COMPONENT MAINTENANCE MANUAL WITH ILLUSTRATED PARTS LIST

AUTOTHROTTLE BRAKE ASSEMBLY

PART NUMBER 254A1141–3, –4, –5, –6

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

BOEING®

COMPONENT MAINTENANCE MANUAL

Revision No. 14
Jul 01/2009

To: All holders of AUTOTHROTTLE BRAKE ASSEMBLY 22-35-03.

Attached is the current revision to this COMPONENT MAINTENANCE MANUAL

The COMPONENT MAINTENANCE MANUAL is furnished either as a printed manual, on microfilm, or digital products, or any combination of the three. This revision replaces all previous microfilm cartridges or digital products. All microfilm and digital products are reissued with all obsolete data deleted and all updated pages added.

For printed manuals, changes are indicated on the List of Effective Pages (LEP). The pages which are revised will be identified on the LEP by an R (Revised), A (Added), O (Overflow, i.e. changes to the document structure and/or page layout), or D (Deleted). Each page in the LEP is identified by Chapter-Section-Subject number, page number and page date.

Pages replaced or made obsolete by this revision should be removed and destroyed.

ATTENTION

IF YOU RECEIVE PRINTED REVISIONS, PLEASE VERIFY THAT YOU HAVE RECEIVED AND FILED THE PREVIOUS REVISION. BOEING MUST BE NOTIFIED WITHIN 30 DAYS IF YOU HAVE NOT RECEIVED THE PREVIOUS REVISION. REQUESTS FOR REVISIONS OTHER THAN THE PREVIOUS REVISION WILL REQUIRE A COMPLETE MANUAL REPRINT SUBJECT TO REPRINT CHARGES SHOWN IN THE DATA AND SERVICES CATALOG.

Location of Change	Description of Change
	NO HIGHLIGHTS

BOEING®

COMPONENT MAINTENANCE MANUAL

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

TABLE OF CONTENTS

BOEING®

COMPONENT MAINTENANCE MANUAL

TEMPORARY REVISION AND SERVICE BULLETIN RECORD

BOEING SERVICE BULLETIN	BOEING TEMPORARY REVISION	OTHER DIRECTIVE	DATE OF INCORPORATION INTO MANUAL
		PRR 38169	SEP 01/96
		PRR 38170	DEC 01/97

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

Revision		Filed	
Number	Date	Date	Initials

Revision		Filed	
Number	Date	Date	Initials

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

BOEING®

COMPONENT MAINTENANCE MANUAL

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

Temporary Revision		Inserted		Removed	
Number	Date	Date	Initials	Date	Initials

Temporary Revision		Inserted		Removed	
Date	Initials	Number	Date	Date	Initials

Temporary Revision		Inserted		Removed	
Number	Date	Date	Initials	Date	Initials

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.

AUTOTHROTTLE BRAKE ASSEMBLY - DESCRIPTION AND OPERATION

1. Description

A. The autothrottle brake assembly consists of two roller assemblies, a rotor, a stator, springs, bearings, and shims in a housing assembly.

2. Operation

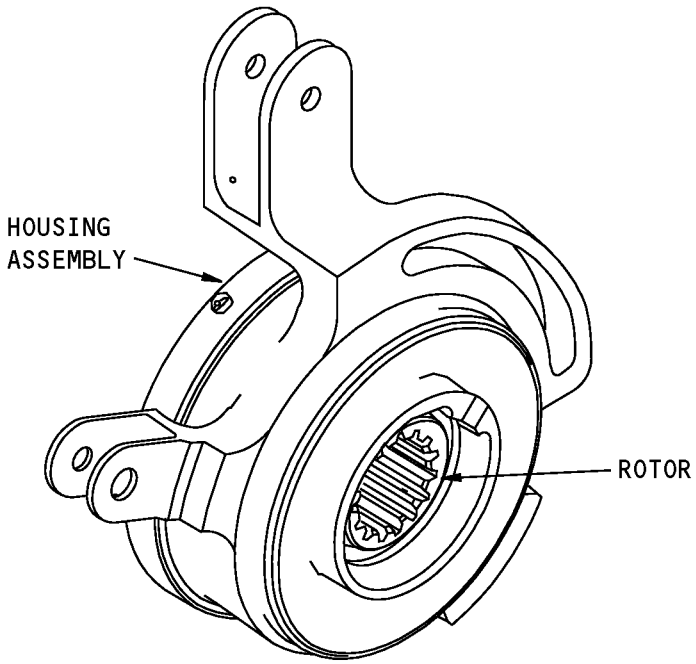
A. The autothrottle brake is a component of the autothrottle installation. It provides feel friction for the thrust levers and permits the pilots to manually override the Thrust Management System.

3. Leading Particulars (Approximate)

A. Diameter – 7.0 inches

B. Weight – 4 inches

C. Width – 4 pounds



Autothrottle Brake Assembly
Figure 1

TESTING AND FAULT ISOLATION

1. General

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

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

C. Refer to IPL Figure 1 for item numbers.

2. Testing and Fault Isolation

A. Tools/Equipment

NOTE: Equivalent substitutes may be used.

Reference	Description
SPL-4426	Test Equipment, Autothrottle, Gearbox, Brake (50Hz) (Part #: J22004-67, Supplier: 81205)
SPL-4427	Test Equipment, Autothrottle, Gearbox, Brake (60Hz) (Part #: J22004-68, Supplier: 81205)
SPL-5350	Rigging Equipment - Autothrottle Brake (Part #: A22008-25, Supplier: 81205)
STD-3726	Torquemeter - 0 to 100 in-lbs (0 to 11.3 N·m)

B. References

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

C. Procedure

(1) Shim Instructions

(a) Use the A22008 rigging equipment, SPL-5350 and remove the nut (5).Shim Instructions

(b) Replace the shims (25) as required per TESTING AND FAULT ISOLATION, Table 101. An increase/decrease of 0.005-inch shim thickness will cause an increase/decrease of approximately 3 pound-inches of torque.

Table 101: Shim Thickness Chart

IPL (Fig. 1) Item	SHIM THICKNESS
25	0.015
25A	0.020
25B	0.025
25C	0.050

(2) Brake Assembly Run-In

(a) Place the brake assembly (1) in a fixture that keeps the assembly in a stationary position. Rotate the rotor and verify that the torque is 30-50 pound-inches in both directions using a torquemeter with a 0 to 100 in-lbs (0 to 11.3 N·m), STD-3726.

1) Do the shim procedure to get the required torque, if necessary.

(b) Place the brake assembly (1) in the Brake Test Equipment, SPL-4426 or Brake Test Equipment, SPL-4427 so that the assembly is kept in a stationary position.

(c) Rotate the rotor at 50 to 100 rpm with the assembly held stationary. Make sure that the rotor does not chatter. Adjust the rpm of the rotor to prevent chatter. One run-in cyle is 15 minutes of continuous rotation in one direction and 15 minutes of continuous rotation in the opposite direction. The total run-in time shall be 90 minutes (three cycles).

NOTE: The temperature of the assembly (1) must not exceed 200°F during run-in. A fan may be used to blow air over the assembly during the run-in.

(d) Disassemble, clean and degrease the brake assembly (DISASSEMBLY).

CAUTION: ALL THE PARTS MUST POINT IN THE SAME DIRECTION THAT THEY DID BEFORE.

(e) Reassemble the brake assembly in the same sequence (ASSEMBLY).

(3) Acceptance Test

NOTE: Do this acceptance test after the run-in has been completed.

(a) Place the brake assembly (1) in the Brake Test Equipment, SPL-4426 or Brake Test Equipment, SPL-4427 to keep the assembly in a stationary position.

(b) Make sure that the rotor rotates continuously, smoothly and does not bind, chatter or stick.

(c) Rotate the rotor at 2.0 to 3.0 rpm in one direction until the running torque is stable.

NOTE: Do not run the assembly for more than 5 minutes.

(d) Make sure that the torque is 38 - 44 pound-inches for 30 seconds of operation.

(e) Do steps TESTING AND FAULT ISOLATION, Paragraph 2.C.(3)(b), TESTING AND FAULT ISOLATION, Paragraph 2.C.(3)(c) and TESTING AND FAULT ISOLATION, Paragraph 2.C.(3)(d) in the opposite direction.

(f) Do the shim procedure, and steps TESTING AND FAULT ISOLATION, Paragraph 2.C.(3)(b), TESTING AND FAULT ISOLATION, Paragraph 2.C.(3)(c) and TESTING AND FAULT ISOLATION, Paragraph 2.C.(3)(d), if the torque is not satisfactory.

(g) When the test is completed, make sure the torque on the nut (5) is 100-200 pound-inches.

(h) Use the double-twist method (SOPM 20-50-02) to lockwire the nut (5) to the housing assembly (55B).

DISASSEMBLY

1. General

A. This procedure has the data necessary to disassemble the autothrottle brake assembly.

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

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

D. Refer to IPL Figure 1 for item numbers.

2. Disassembly

NOTE: This assembly is of instrument quality. It must be handled with the utmost care and assembled in a clean area.

NOTE: See the TESTING AND FAULT ISOLATION to establish the condition of the component or the most probable cause of it's malfunction. This is to determine the extent of the disassembly required.

A. Tools/Equipment

NOTE: Equivalent substitutes may be used.

Reference	Description
SPL-5350	Rigging Equipment - Autothrottle Brake (Part #: A22008-25, Supplier: 81205)

B. Procedure

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

(2) Use A22008-25 rigging equipment, SPL-5350.

(3) Clamp the cap assembly (10) and the housing assembly (55B) together before you turn the nut (5) off the housing assembly (55B), do not gall the threads.

CLEANING

1. General

A. This procedure has the data necessary to clean the autothrottle brake assembly.

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

C. Refer to IPL Figure 1 for item numbers.

2. Cleaning

A. References

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

B. Procedure

(1) Clean the bearings (15, 60) as specified in SOPM 20-30-01.

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

CHECK

1. **General**
   A. This procedure has the data necessary to find defects in the material of the specified parts.
   B. Refer to FITS AND CLEARANCES for the design dimension and wear limits.
   C. Refer to the Standard Overhaul Practices Manual (SOPM) for the SOPM subjects identified in this procedure.
   D. Refer to IPL Figure 1 for item numbers.
2. **Check**
   A. References

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

   B. Procedure
      (1) Use standard industry procedures to do a visual check of all the parts for defects. Do the penetrant of magnetice particle check if the visual check shows possible damage or if you suspect possible damage on the parts listed below:
      (2) Do a magnetic particle check (SOPM 20-20-01) of these parts:
         (a) Nut (5), shim (25), stator (35), disc (45), rotor (50)
      (3) Do a penetrant check (SOPM 20-20-02) of these parts:
         (a) Cap (20), spring (30), housing (65B)
      (4) Check the springs (30).
         (a) Check that the spring heights are within the CHECK, Table 501 values:

Table 501: Spring Details

SPRING HEIGHT (INCHES)	LOAD (LBS)
0.108	56.4
0.103	106.5
0.098	151.2
0.093	190.9
0.088	226.5
0.083	258.7
0.078	288.1
0.073	315.3
0.068	341.3
0.063	366.5

REPAIR

1. General

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

Table 601:

PART NUMBER	NAME	REPAIR
—	REFINISH OF OTHER PARTS	1-1
253T7539	CAP ASSEMBLY	2-1, 2-2
253T7530	SHIM	3-1
253T7536	STATOR	4-1
254N1166	DISC	5-1
253T7535	ROTOR	6-1
254A1149	HOUSING ASSEMBLY	7-1, 7-2

2. Dimensioning Symbols

A. Standard True Position Dimensioning Symbols used in the applicable repair procedures are shown in REPAIR-GENERAL, Figure 601.

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

EXAMPLES

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

True Position Dimensioning Symbols
Figure 601

REFINISH OF OTHER PARTS - REPAIR 1-1

1. General

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

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

C. Refer to IPL Figure 1 for item numbers.

2. Refinish of other parts

A. References

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

B. General

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

C. Procedure

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

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

Table 601: Refinish Details

IPL FIG. & ITEM	MATERIAL	FINISH
IPL Fig. 1		
Nut (5)	15-5PH CRES 180-200 ksi	Cadmium plate, type 2, class 2 (F-16.06).
Spring (30)	301 or 302 CRES or 17-7PH CRES	Prepare the surface and passivate (F-17.09).

CAP ASSEMBLY - REPAIR 2-1

253T7593–3

1. General

A. This procedure has the data necessary to replace the bearing (15) in the cap assembly (10).

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

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

D. Refer to IPL Figure 1 for item numbers.

2. Bearing Replacement

A. Consumable Materials

NOTE: Equivalent substitutes may be used.

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

B. References

Reference	Title
SOPM 20-50-03	BEARING AND BUSHING REPLACEMENT
SOPM 20-60-04	MISCELLANEOUS MATERIALS

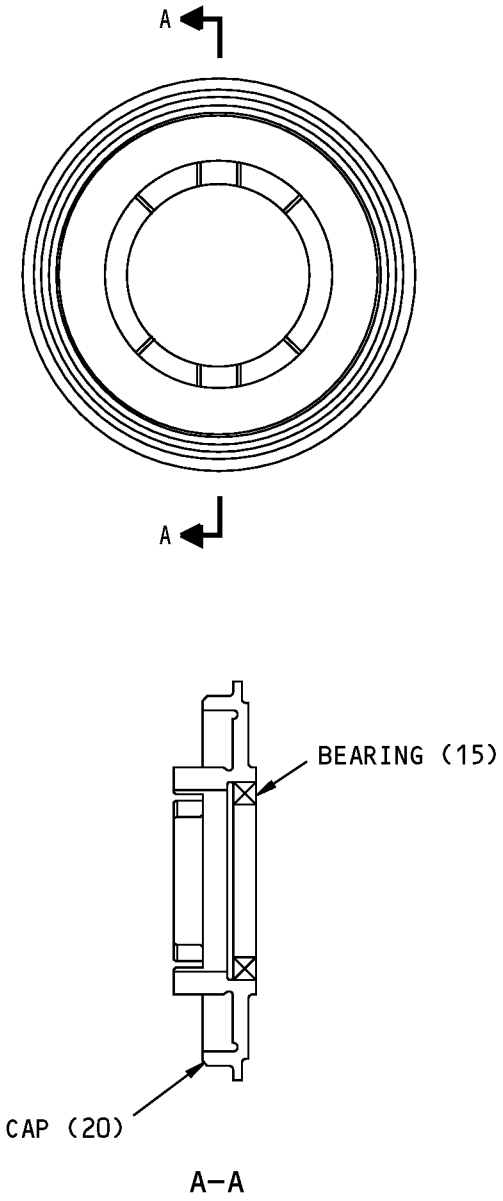
C. Procedure

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

(1) Remove the bearing (15) from the cap (20).

(2) Install the replacement bearing (15) with sealant, A00247 on to the inside diameter of cap (20) and the outside diameter of bearing (15).

(3) Roller swage the cap (20) onto the bearing (15) as shown in SOPM 20-50-03.



125 ALL MACHINED SURFACES UNLESS SHOWN DIFFERENTLY

BREAK ALL SHARP EDGES

ITEM NUMBERS REFER TO IPL FIG. 1

ALL DIMENSIONS ARE IN INCHES

253T7539-3 Cap Assembly Bearing Replacement
Figure 601

CAP - REPAIR 2-2

253T7539–4

1. General

A. This procedure has the data necessary to repair and refinish the cap (20).

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

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

D. Refer to IPL Figure 1 for item numbers.

E. General repair details:

(1) Material: Aluminum alloy

2. Cap Refinish

A. Consumable Materials

NOTE: Equivalent substitutes may be used.

Reference	Description	Specification
C00259	Primer - Chemical And Solvent Resistant Finish, Epoxy Resin	BMS10-11, Type I

B. References

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

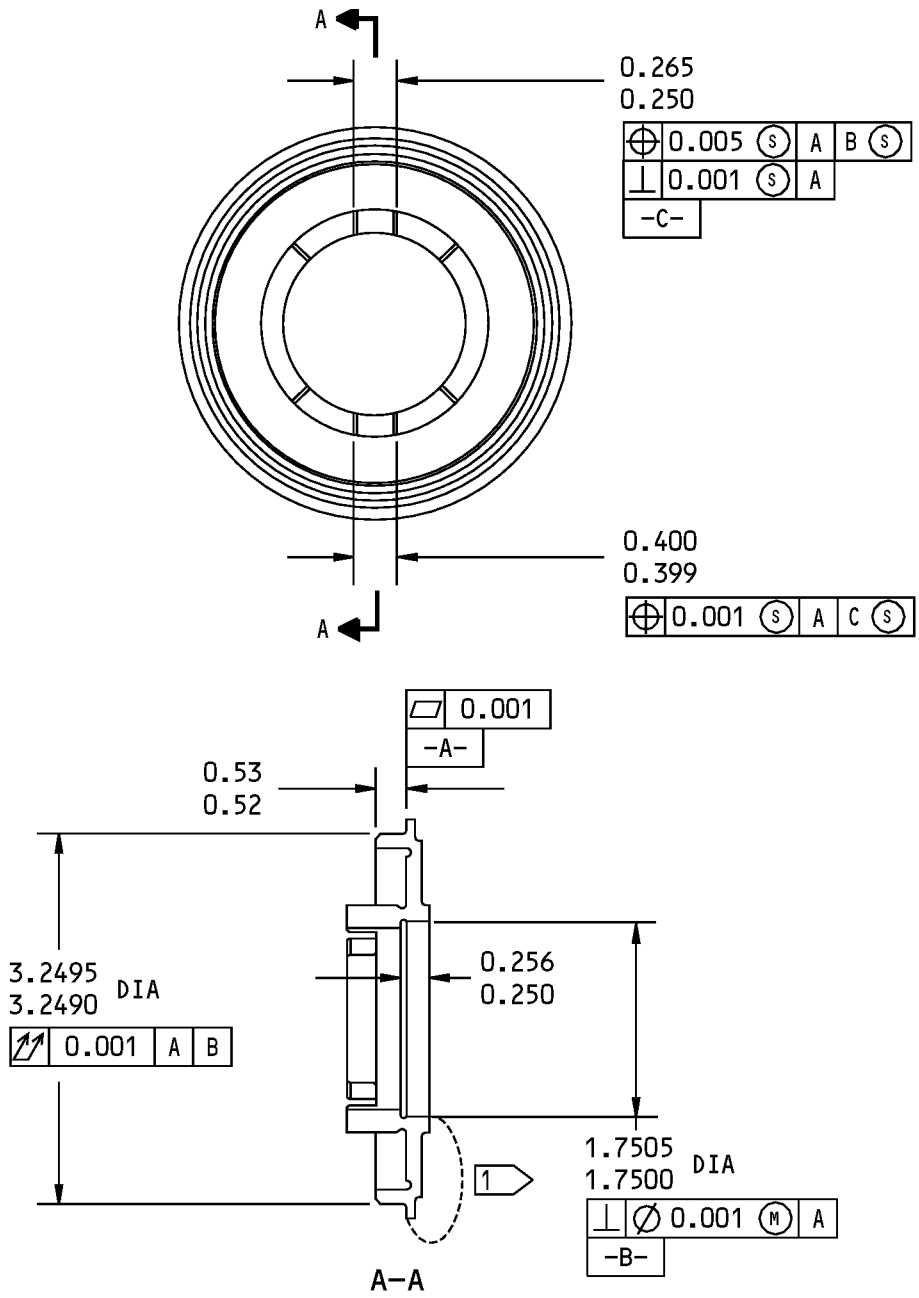
C. Procedure (REPAIR 2-2, Figure 601)

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

(1) Put a finish on the cap (20).

(a) Chromate acid anodize and apply primer, C00259 (F-18.13) to surfaces identified by flagnote 1 in REPAIR 2-2, Figure 601.

1) Obey the flagnote 1 in REPAIR 2-2, Figure 601.



1 APPLY THE PRIMER TO THIS AREA ONLY

125 ALL MACHINED SURFACES UNLESS SHOWN DIFFERENTLY

BREAK ALL SHARP EDGES

ITEM NUMBERS REFER TO IPL FIG. 1

ALL DIMENSIONS ARE IN INCHES

253T7539-4 Cap Repair
Figure 601

SHIM - REPAIR 3-1

253T7530–1, –2, –3, –4

1. General

A. This procedure has the data necessary to repair and refinish the shim (25).

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

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

D. Refer to IPL Figure 1 for item numbers.

E. General repair details:

(1) Material: 17-7PH CRES 180-200 ksi

2. Flatness Check

A. Procedure

(1) Check the flatness and parallelism of the shim as identified by flagnote 1 in REPAIR 3-1, Figure 601.

3. Shim Refinish

A. References

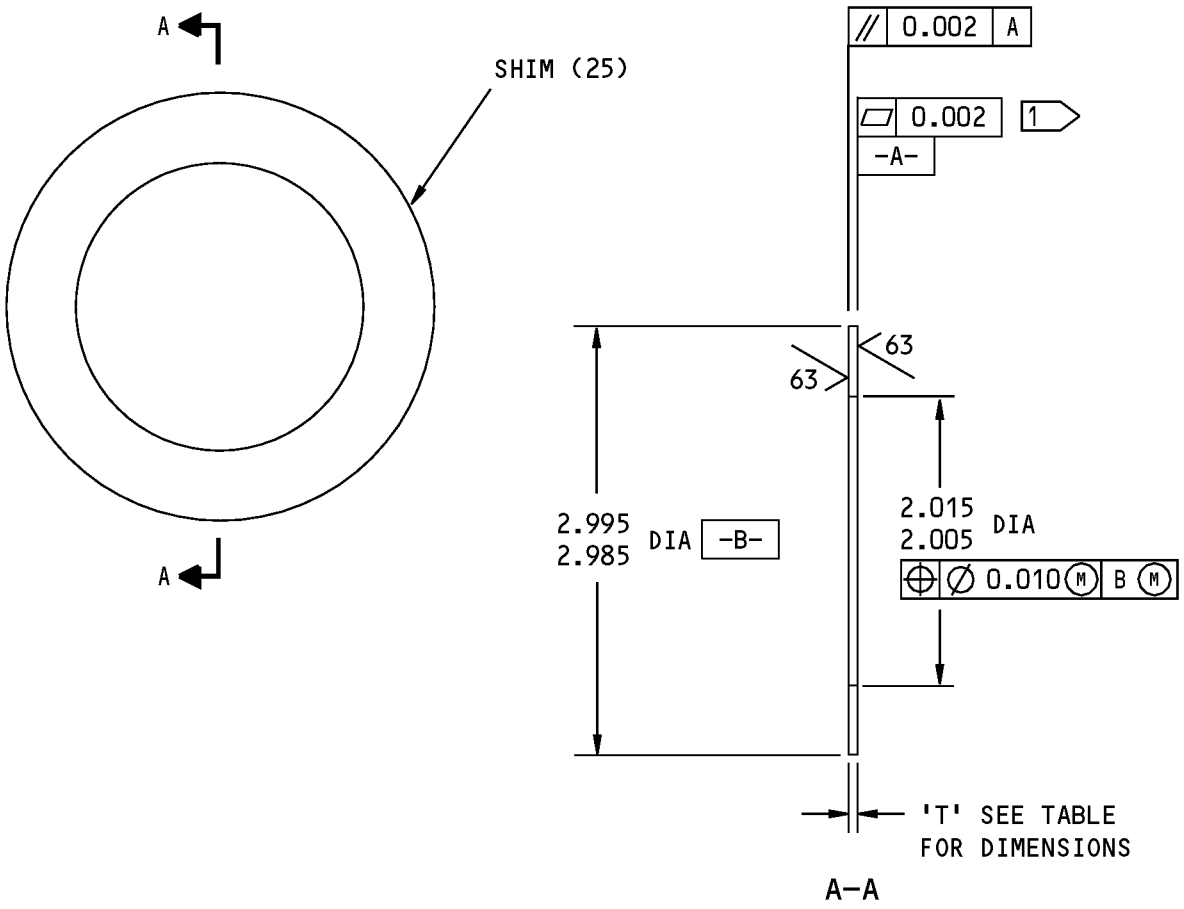
Reference	Title
SOPM 20-41-01	DECODING TABLE FOR BOEING FINISH CODES

B. Procedure

NOTE: For decoding table for Boeing finish codes, refer to SOPM 20-41-01

(1) Put a finish on the shim (25).

(a) Prepare the surface and passivate (F-17.09).



ITEM NUMBER	DIMENSION 'T'
(25)	0.013 - 0.017
(25A)	0.017 - 0.023
(25B)	0.022 - 0.028
(25C)	0.044 - 0.054

1 THE PART MAY BE RESTRAINED BY AN EVENLY DISTRIBUTED, 2.5 POUND MAXIMUM LOAD, WHEN CHECKING THE FLATNESS AND PARALLELISM

125 ALL MACHINED SURFACES UNLESS SHOWN DIFFERENTLY

BREAK ALL SHARP EDGES

ITEM NUMBERS REFER TO IPL FIG. 1

ALL DIMENSIONS ARE IN INCHES

Assembly Detail
Figure 601

STATOR - REPAIR 4-1

253T7536–2, –3

1. General

A. This procedure has the data necessary to repair and refinish the stator (35).

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

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

D. Refer to IPL Figure 1 for item numbers.

E. General repair details:

(1) Material: Steel Alloy, induction hardened to A80 minimum

2. Flatness Check

A. Procedure

(1) Check the flatness and parallelism of the stator (35) as idenified by flagnote 1 in REPAIR 4-1, Figure 601.

3. Stator Refinish

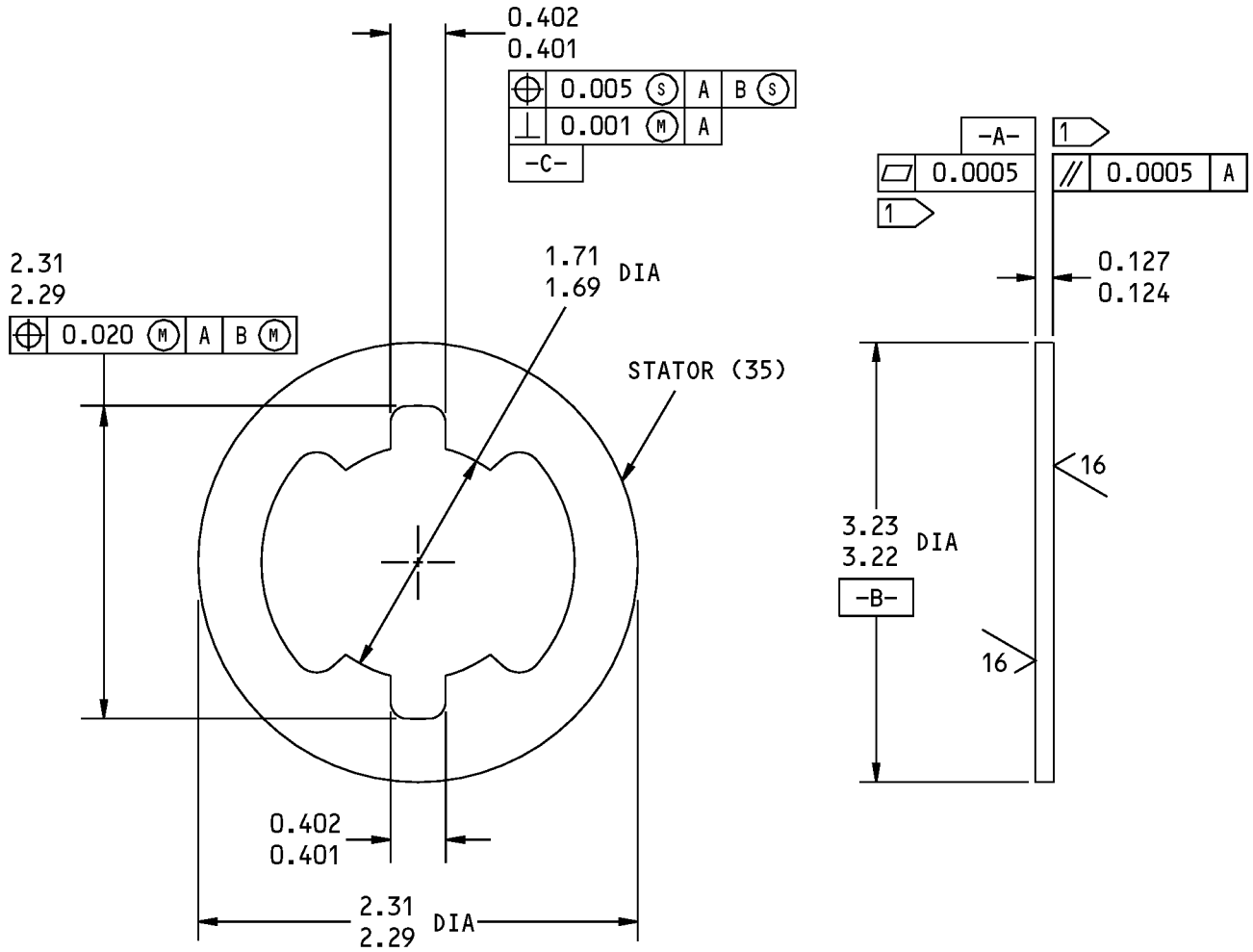
A. References

Reference	Title
SOPM 20-41-01	DECODING TABLE FOR BOEING FINISH CODES
SOPM 20-44-02	TEMPORARY PROTECTIVE COATINGS

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

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

(1) No finish is required except that temporary coating (SOPM 20-44-02) may be applied as protection during handling (F-25.01).



1 THIS PART MAY BE RESTRAINED BY AN EVENLY DISTRIBUTED 5 POUNDS MAXIMUM LOAD, WHEN CHECKING THE FLATNESS AND PARALLELISM

125 ALL MACHINED SURFACES UNLESS SHOWN DIFFERENTLY

BREAK ALL SHARP EDGES

ITEM NUMBERS REFER TO IPL FIG. 1

ALL DIMENSIONS ARE IN INCHES

253T7536-2,-3 Stator Repair
Figure 601

DISC - REPAIR 5-1

254N1166–1, –2

1. General

A. This procedure has the data necessary to repair and refinish the disc (45).

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

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

D. Refer to IPL Figure 1 for item numbers.

E. General repair details:

(1) Material: Steel Alloy, induction hardened to A80 to A83

2. Flatness Check

A. Procedure

(1) Check the flatness and parallelism of the disc (45) as identified by flagnote 1 in REPAIR 5-1, Figure 601.

3. Disc Refinish

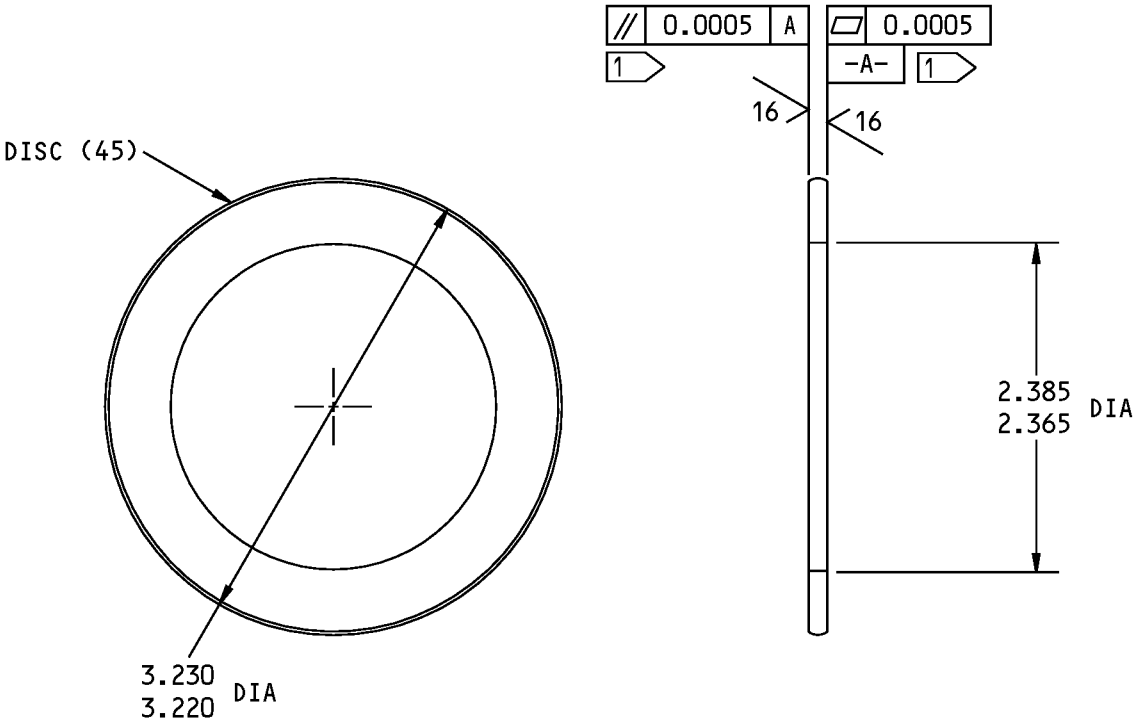
A. References

Reference	Title
SOPM 20-41-01	DECODING TABLE FOR BOEING FINISH CODES
SOPM 20-44-02	TEMPORARY PROTECTIVE COATINGS

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

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

(1) No finish (F-25.01) is required except that temporary coating may be applied as protection during handling (SOPM 20-44-02).



1 THIS PART MAY BE RESTRAINED BY AN EVENLY DISTRIBUTED 5 POUNDS MAXIMUM LOAD, WHEN CHECKING THE FLATNESS AND PARALLELISM

125 ALL MACHINED SURFACES UNLESS SHOWN DIFFERENTLY

BREAK ALL SHARP EDGES

ITEM NUMBERS REFER TO IPL FIG. 1

ALL DIMENSIONS ARE IN INCHES

254N1166-1,-2 Disc Repair
Figure 601

ROTOR - REPAIR 6-1

253T7535–1, –2

1. General

A. This procedure has the data necessary to repair and refinish the rotor (50).

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

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

D. Refer to IPL Figure 1 for item numbers.

E. General repair details:

(1) Material: Steel Alloy, induction hardened to A80 minimum

2. Rotor Refinish

A. References

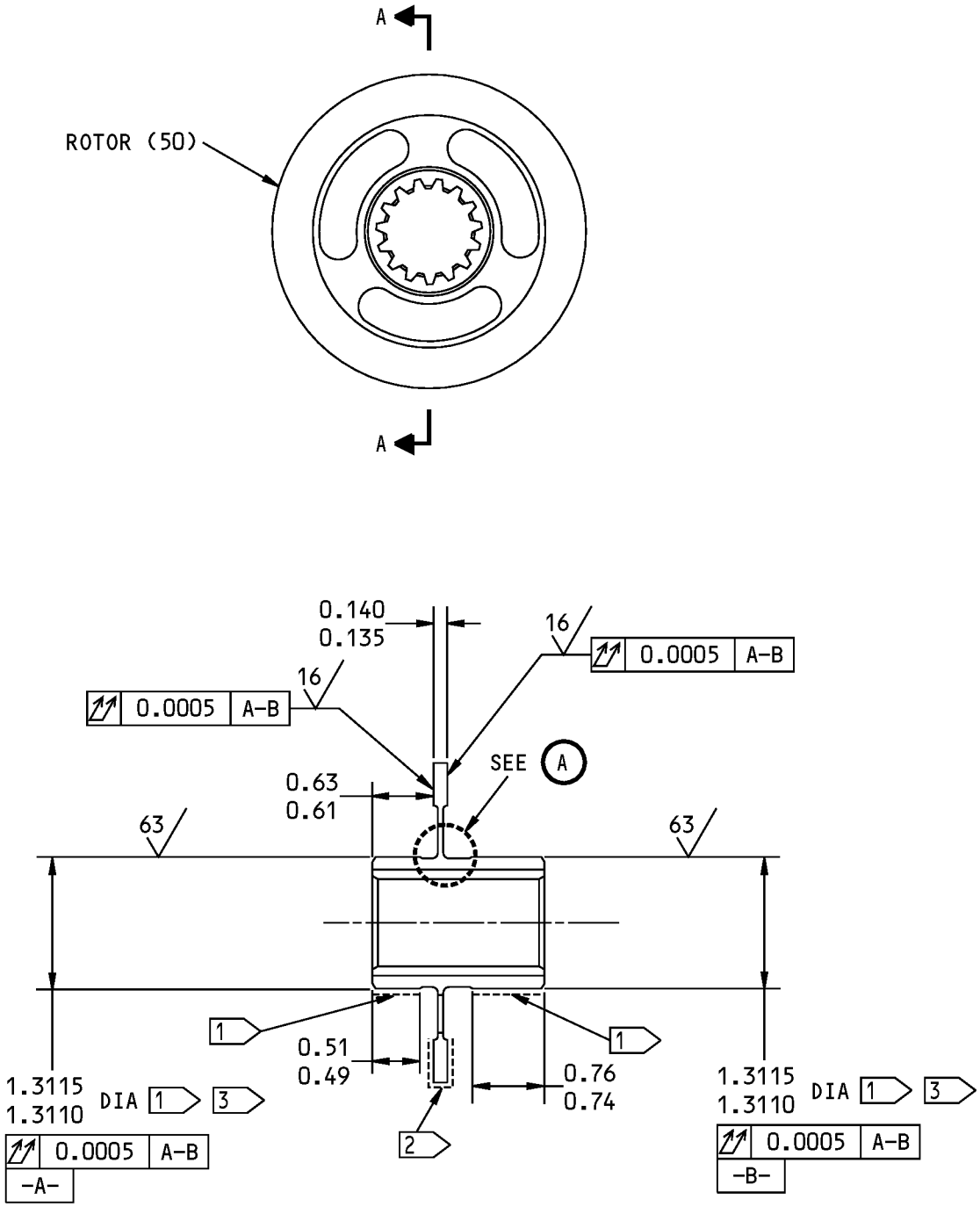
Reference	Title
SOPM 20-30-02	STRIPPING OF PROTECTIVE FINISHES
SOPM 20-41-01	DECODING TABLE FOR BOEING FINISH CODES

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

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

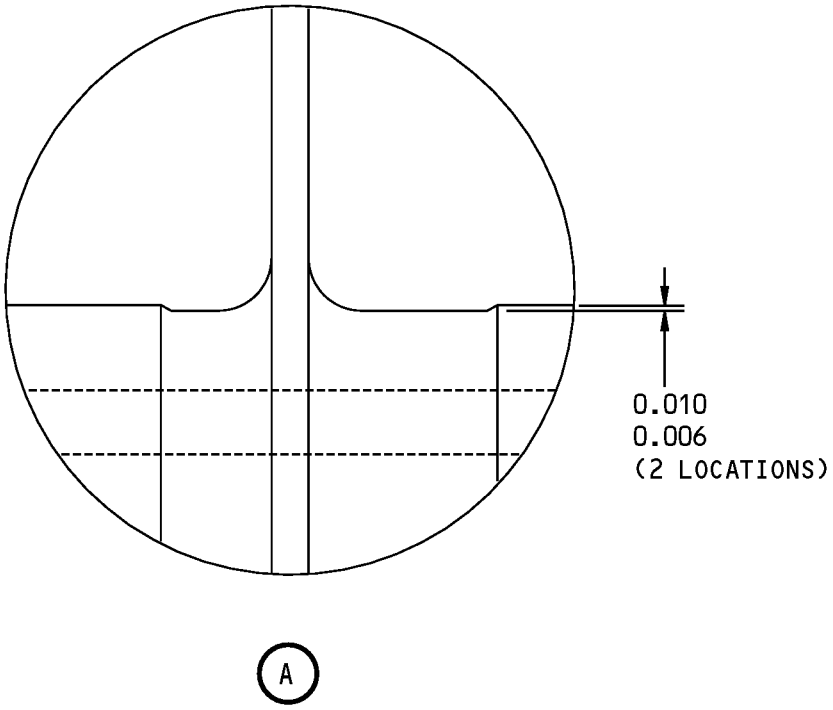
(1) Put a finish on the rotor (50).

(a) Apply cadmium plate (F-15.06) as shown in REPAIR 6-1, Figure 601. Obey flagnotes 1, 2, and 3 in REPAIR 6-1, Figure 601.



A-A

253T7535-1,-2 Rotor Repair
Figure 601 (Sheet 1 of 2)



1. THE DIMENSIONS APPLY TO THE AREA SHOWN ONLY
2. NO PLATE FINISH IN THIS AREA
3. THE DIMENSIONS APPLY AFTER PLATING

125 ALL MACHINED SURFACES UNLESS SHOWN DIFFERENTLY

BREAK ALL SHARP EDGES

ITEM NUMBERS REFER TO IPL FIG. 1

ALL DIMENSIONS ARE IN INCHES

253T7535-1,-2 Rotor Repair
Figure 601 (Sheet 2 of 2)

HOUSING ASSEMBLY - REPAIR 7-1

254A1149–5, –6

1. General

A. This procedure has the data necessary to replace the bearing (60) in the housing assembly (55B, 57).

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

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

D. Refer to IPL Figure 1 for item numbers.

2. Bearing Replacement

A. Consumable Materials

NOTE: Equivalent substitutes may be used.

Reference	Description	Specification
D00013	Grease - Aircraft And Instrument Grease	MIL-PRF-23827 (NATO G-354) (Supersedes MIL-G-23827)

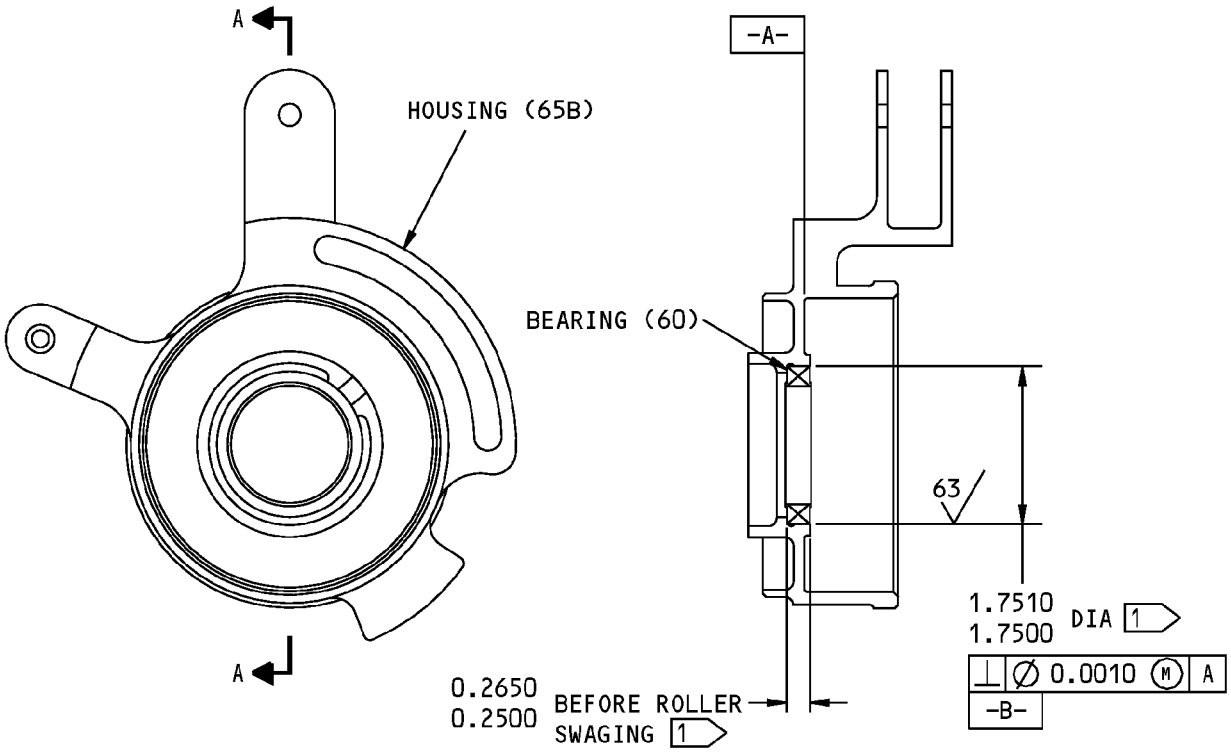
B. References

Reference	Title
SOPM 20-50-03	BEARING AND BUSHING REPLACEMENT

C. Procedure

(1) Remove the bearing (60) from the housing (65B or 70).

(2) Roller swage the bearing (60) into the housing (65B or 70) with grease, D00013 (SOPM 20-50-03).



1 ROLLER SWAGE THE BEARING IN THE HOUSING USING GREASE MIL-G-23827

125 ALL MACHINED SURFACES UNLESS SHOWN DIFFERENTLY

BREAK ALL SHARP EDGES

ITEM NUMBERS REFER TO IPL FIG. 1

ALL DIMENSIONS ARE IN INCHES

254A1149-5,-6 Housing Assembly Bearing Replacement
Figure 601

HOUSING - REPAIR 7-2

254A1149–7, –8

1. General

A. This procedure has the data necessary to repair and refinish the housing (65B, 70).

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

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

D. Refer to IPL Figure 1 for item numbers.

E. General repair details:

(1) Material: Aluminum alloy

2. Housing Refinish

A. Consumable Materials

NOTE: Equivalent substitutes may be used.

Reference	Description	Specification
C00259	Primer - Chemical And Solvent Resistant Finish, Epoxy Resin	BMS10-11, Type I

B. References

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

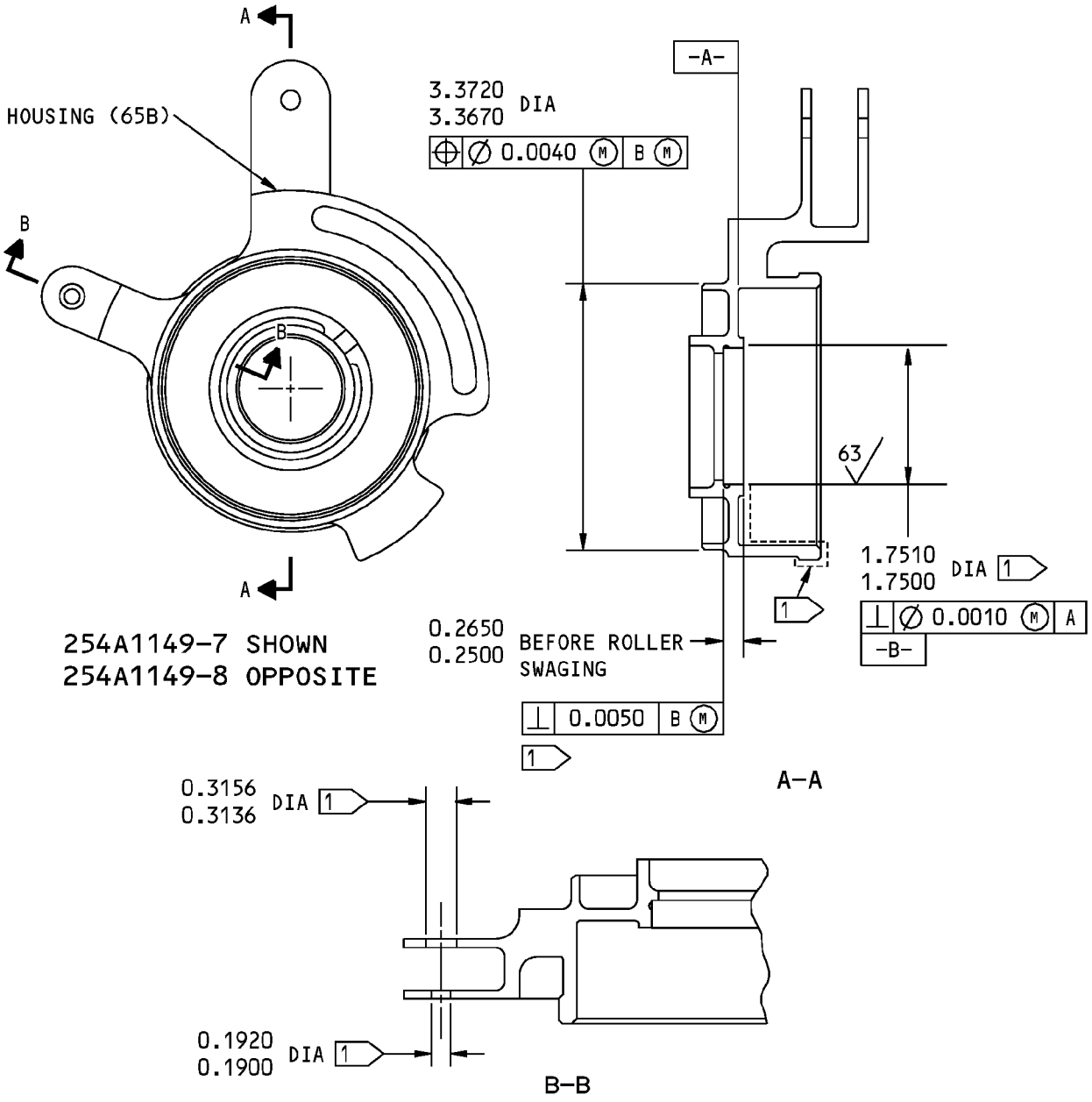
C. Procedure (REPAIR 7-2, Figure 601)

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

(1) Put a finish on the housing (65B, 70).

(a) Boric acid/sulfuric acid anodize or chromic acid anodize (F-17.31).

(b) Apply primer, C00259 (F-20.02), to all surfaces except as identified by flagnote 1 in REPAIR 7-2, Figure 601.



1 NO PRIMER IN THIS AREA

125 ALL MACHINED SURFACES UNLESS SHOWN DIFFERENTLY

BREAK ALL SHARP EDGES

ITEM NUMBERS REFER TO IPL FIG. 1

ALL DIMENSIONS ARE IN INCHES

254A1149-7,-8 Housing Repair
Figure 601

ASSEMBLY

1. General

A. This procedure has the data necessary to assemble the autothrottle brake assembly.

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

C. Refer to IPL Figure 1 for item numbers.

2. Assembly

A. Tools/Equipment

NOTE: Equivalent substitutes may be used.

Reference	Description
SPL-5350	Rigging Equipment - Autothrottle Brake (Part #: A22008-25, Supplier: 81205)

B. Consumable Materials

NOTE: Equivalent substitutes may be used.

Reference	Description	Specification
D00013	Grease - Aircraft And Instrument Grease	MIL-PRF-23827 (NATO G-354) (Supersedes MIL-G-23827)

C. References

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

D. Procedure (ASSEMBLY, Figure 701)

NOTE: For bolt and nut installation, refer to SOPM 20-50-01

For lubricants, refer to SOPM 20-60-03

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

NOTE: This assembly is of instrument quality. It must be handled with the utmost care and assembled in a clean area.

(2) Install the shims (25) in the cap assembly (10).

NOTE: The concave sides of the springs (30) must point away from each other.

(3) Install the springs (30) on the cap assembly (10).

(4) Apply a layer of grease, D00013 to both sides of the stator (35) and install it in the housing (65B or 70).

CAUTION: THE ROLLERS IN THE SECOND ROLLER ASSEMBLY MUST POINT IN THE OPPOSITE DIRECTION FROM THE ROLLERS IN THE FIRST ROLLER ASSEMBLY.

(5) Apply a layer of grease, D00013 to both sides of the second roller assembly (40) and install it in the housing (65B or 70).

(6) Apply a layer of grease, D00013 to both sides of the rotor (50) and install it in the housing (65B or 70).

(7) Apply a layer of grease, D00013 to both sides of a roller assembly (40) and install it in the housing (65B or 70).

(8) Apply a layer of grease, D00013 to both sides of the disc (45) and install it in the housing (65B or 70).

(9) Apply a layer of grease, D00013 to the inside of the housing (65B or 70).

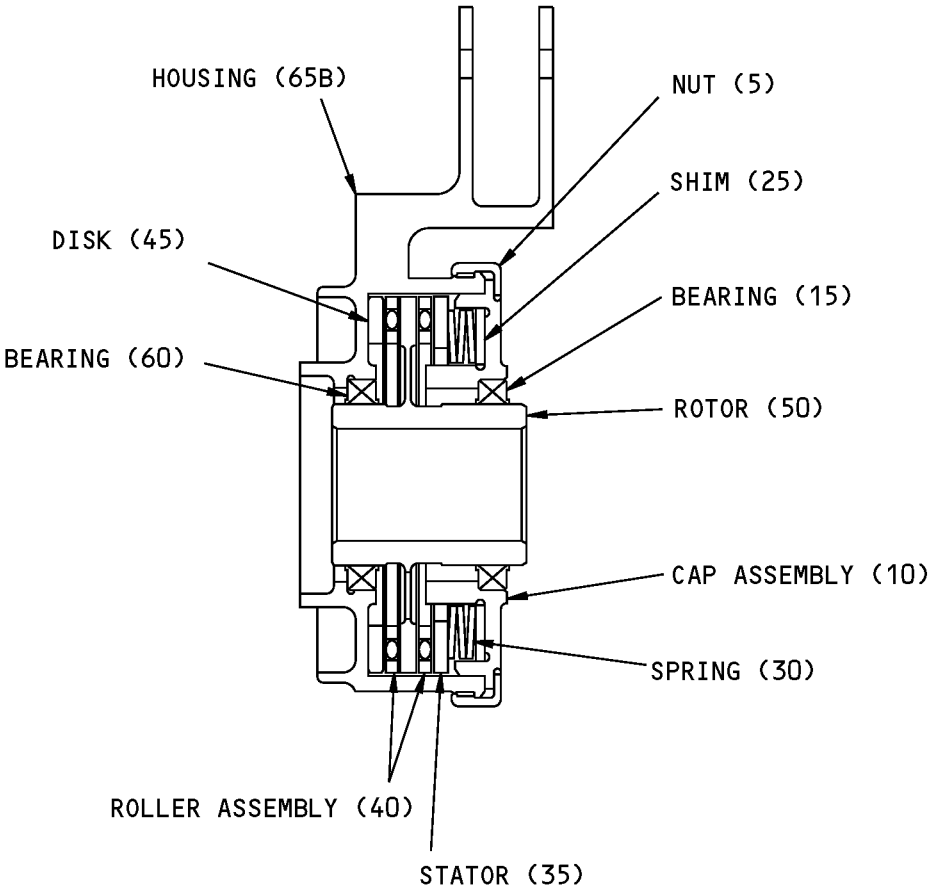
(10) Use the rigging equipment, SPL-5350 and assemble the cap assembly (10) with the housing assembly (55B or 57).

(a) Clamp the cap assembly (10) and the housing assembly (55B or 70) together.

(b) Tighten the nut (5).

(11) Torque the nut (5) to 100-200 pound-inches.

(12) Do the run-in procedure and check the running torque as shown in TESTING AND FAULT ISOLATION.

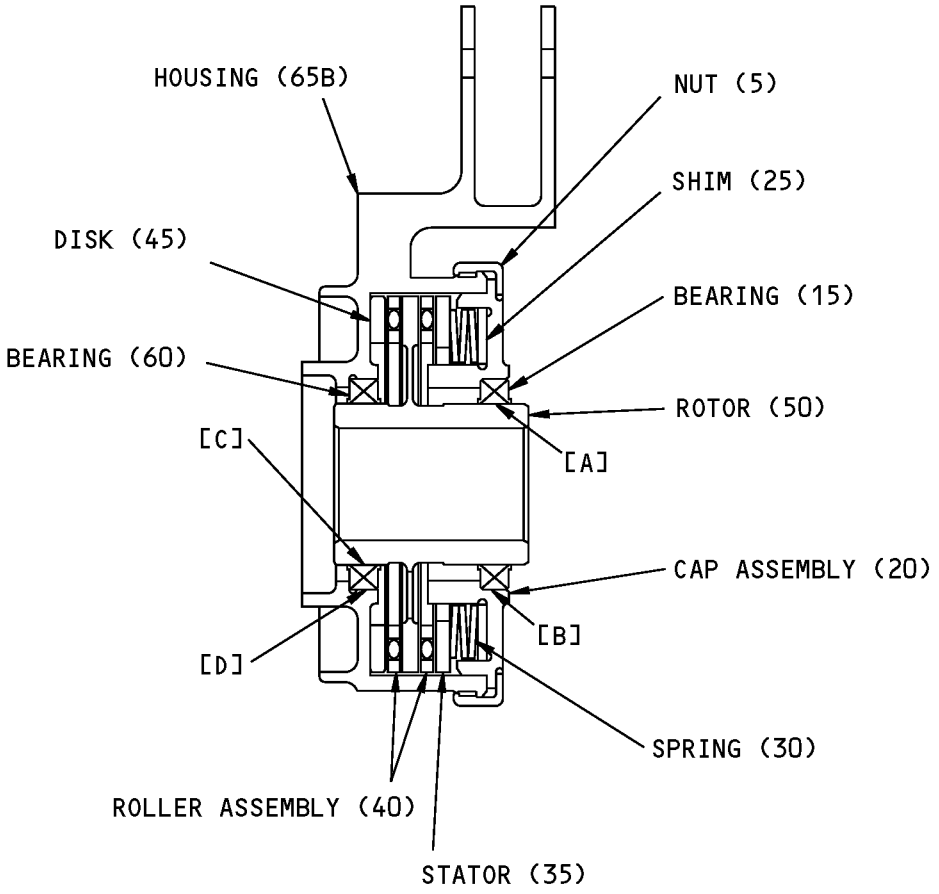


251A1141-3,-5 SHOWN
251A1141-4,-6 OPPOSITE

ITEM NUMBERS REFER TO IPL FIG. 1

Assembly Detail
Figure 701

FITS AND CLEARANCES



251A1141-3,-5 SHOWN
251A1141-4,-6 OPPOSITE

Fits and Clearances
Figure 801 (Sheet 1 of 2)

REF LETTER	REF IPL FIG. 1, MATING ITEM NO.		DESIGN DIMENSION* DIMENSION MIN	DESIGN DIMENSION* DIMENSION MAX	DESIGN DIMENSION* ASSEMBLY CLEARANCE [1] MIN	DESIGN DIMENSION* ASSEMBLY CLEARANCE [1] MAX	SERVICE WEAR LIMIT* DIMENSION MIN	SERVICE WEAR LIMIT* DIMENSION MAX	SERVICE WEAR LIMIT* MAXIMUM CLEARANCE
[A]	4	ID 15	1.3120	1.3125	0.0005	0.0015			
	1	OD 50	1.3110	1.3115					
[B]		ID 20	1.7500	1.7505	0.0000	0.0010			
	1	OD 15	1.7495	1.7500					
[C]	1	ID 60	1.3120	1.3125	-0.0005	-0.0015			
	4	OD 50	1.3110	1.3115					
[D]	3	ID 65B,70	1.7500	1.7510	0.0000	0.0015			
	1	OD 60	1.7495	1.7500					

* ALL DIMENSIONS ARE IN INCHES

ITEM NUMBERS REFER TO IPL FIG. 1

Fits and Clearances
Figure 801 (Sheet 2 of 2)

SPECIAL TOOLS, FIXTURES, AND EQUIPMENT

1. General

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

NOTE: Equivalent substitutes may be used.

Special Tools

Reference	Description	Part Number	Supplier
SPL-4426	Test Equipment, Autothrottle, Gearbox, Brake (50Hz)	J22004-67	81205
SPL-4427	Test Equipment, Autothrottle, Gearbox, Brake (60Hz)	J22004-68	81205
SPL-5350	Rigging Equipment - Autothrottle Brake	A22008-25	81205

Tool Supplier Information

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

ILLUSTRATED PARTS LIST

1. Introduction

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

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

1 2 3 4 5 6 7

. Assembly

. Attaching parts for assembly

. . Detail parts for assembly

. . Subassembly

. . Attaching parts for subassembly

. . . Detail parts for subassembly

. . . Sub-subassembly

. . . Attaching parts for subassembly

. . . . . Details parts for sub-subassembly

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

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

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

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

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

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

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

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

H. Interchangeable Parts

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

VENDOR CODES

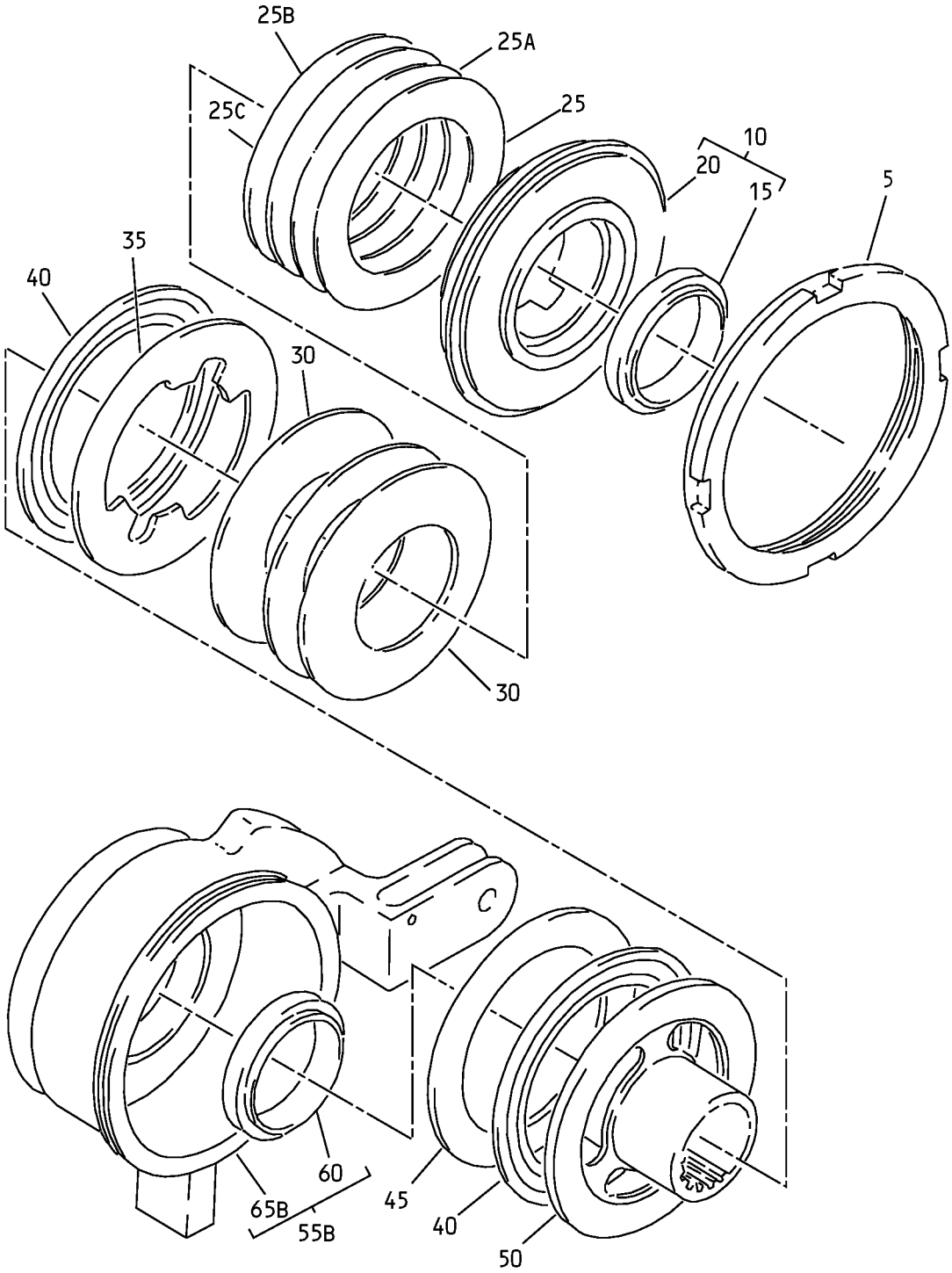
Code	Name
06144	INDUSTRIAL TECTONICS BEARING CORP 18301 SOUTH SANTA FE AVENUE RANCHO DOMINGUEZ, CALIFORNIA 90221 FORMERLY IN COMPTON, CALIFORNIA
21335	TIMKEN US CORPORATION DIV FAFNIR 336 MECHANIC STREET LEBANON, NH 03766-0267 FORMERLY FAFNIR BRG AND TEXTRON INC FAFNIR DIV IN NEW BRITAIN, CONNECTICUT ; FORMERLY TORRINGTON CO THE SPECIAL PRODUCTS DIV SUB OF THE INGERSOLL-RAND CO V8D210 FORMERLY TORRINGTON CO FAFNIR BEARING DIV IN TORRINGTON, CT
38443	MRC BEARINGS 402 CHANDLER STREET JAMESTOWN, NEW YORK 14701-3802 FORMERLY MARLIN-ROCKWELL CORP DIV TRW AND TRW INC
40920	MPB MINIATURE PRECISION BEARING DIV PRECISION PARK PO BOX 547 KEENE, NEW HAMPSHIRE 03431 FORMERLY MPB CORP AND MINIATURE BRG DIV MPB CORP
43991	FAG BEARING INCORPORATED 118 HAMILTON AVENUE STAMFORD, CONNECTICUT 06904 FORMERLY NORMA-HOFFMAN BEARING CORPORATION FORMERLY NORMA FAG BEARINGS CORPORATION

Code	Name
82402	ROLLS-ROYCE GEAR SYSTEMS INC 6125 SILVER CREEK DR PO BOX 680910 PARK CITY, UTAH 84068 FORMERLY LUCAS WESTERN; FORMERLY GEAR SYSTEMS
83086	NEW HAMPSHIRE BALL BEARING, INC HITECH DIVISION 172 JAFFREY ROAD PETERBOROUGH, NEW HAMPSHIRE 03458
K8455	RHP BEARINGS PLC RHP AEROSPACE OLDENDS LANE STONEHOUSE GL10 3RM UK

NUMERICAL INDEX

PART NUMBER	AIRLINE PART NUMBER	FIGURE	ITEM	UNITS PER ASSEMBLY
		1		1
253T7530-1		1	25	AR
253T7530-2		1	25A	AR
253T7530-3		1	25B	AR
253T7530-4		1	25C	AR
253T7535-1		1	50A	1
253T7535-2		1	50	1
253T7536-2		1	35A	1
253T7536-3		1	35	1
253T7539-3		1	10	1
253T7539-4		1	20	1
254A1139-1		1	62	1
254A1139-2		1	63	1
254A1141-3		1	1C	RF
254A1141-4		1	3	RF
254A1141-5		1	1D	RF
254A1141-6		1	3A	RF
254A1143-1		1	5	1
254A1149-5		1	55B	1
254A1149-6		1	57	1
254A1149-7		1	65B	1
254A1149-8		1	70	1
254N1161-1		1	30	3
254N1166-1		1	45A	1
254N1166-2		1	45	1
90650		1	40	2
BACB10AS21		1	15	1
		1	60	1
LLMB542		1	15	1
		1	60	1
MB542-2TS		1	15	1
		1	60	1
MB542DD		1	15	1
		1	60	1

PART NUMBER	AIRLINE PART NUMBER	FIGURE	ITEM	UNITS PER ASSEMBLY
MB542DDFS428		1	15	1
		1	60	1
MB542DDG20		1	15	1
		1	60	1
MB542DDLY196		1	15	1
		1	60	1
MB542DDSD610		1	15	1
		1	60	1
MB542TT		1	15	1
		1	60	1
MT342E		1	15	1
		1	60	1



Autothrottle Brake Assembly
IPL Figure 1

FIG/ ITEM	PART NUMBER	AIRLINE PART NUMBER	NOMENCLATURE 1 2 3 4 5 6 7	USAGE CODE	UNITS PER ASSY
1–			BRAKE ASSY-AUTOTHROTTLE		
–1A	254A1141-1		DELETED		
–1B	254A1141-2		DELETED		
–1C	254A1141-3		BRAKE ASSY-AUTOTHROTTLE	A	RF
–1D	254A1141-5		BRAKE ASSY-AUTOTHROTTLE	C	RF
–3	254A1141-4		BRAKE ASSY-AUTOTHROTTLE	B	RF
–3A	254A1141-6		BRAKE ASSY-AUTOTHROTTLE	D	RF
5	254A1143-1		. NUT		1
10	253T7539-3		. CAP ASSY		1
15	MB542DDSD610		. . BEARING (V83086) (SPEC BACB10AS21) (OPT LLMB542 (V38443)) (OPT MB542-2TS (V43991)) (OPT MB542DDFS428 (V21335)) (OPT MB542TT (V43991)) (OPT MB542DDG20 (V38443)) (OPT MT342E (VK8455)) (OPT MB542DDLY196 (V40920)) (OPT MB542DD (V06144))		1
20	253T7539-4		. . CAP		1
25	253T7530-1		. SHIM		AR
–25A	253T7530-2		. SHIM		AR
–25B	253T7530-3		. SHIM		AR
–25C	253T7530-4		. SHIM		AR
30	254N1161-1		. SPRING		3
35	253T7536-3		. STATOR	C, D	1
–35A	253T7536-2		. STATOR	A, B	1
40	90650		. ROLLER ASSY-SKEWED (V82402)		2
45	254N1166-2		. DISC	C, D	1
–45A	254N1166-1		. DISC	A, B	1
50	253T7535-2		. ROTOR	C, D	1
–50A	253T7535-1		. ROTOR	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–					
55	254A1149-1		DELETED		
–55A	254A1149-2		DELETED		
55B	254A1149-5		. HOUSING ASSY (LH)	A, C	1
–57	254A1149-6		. HOUSING ASSY (RH)	B, D	1
60	MB542DDSD610		. . BEARING (V83086) (SPEC BACB10AS21) (OPT LLMB542 (V38443)) (OPT MB542-2TS (V43991)) (OPT MB542DDFS428 (V21335)) (OPT MB542TT (V43991)) (OPT MB542DDG20 (V38443)) (OPT MT342E (VK8455)) (OPT MB542DDLY196 (V40920)) (OPT MB542DD (V06144))		1
62	254A1139-1		. . INSERT-STOP	A, C	1
–63	254A1139-2		. . INSERT-STOP	B, D	1
65	254A1149-3		DELETED		
–65A	254A1149-4		DELETED		
65B	254A1149-7		. . HOUSING	A, C	1
–70	254A1149-8		. . HOUSING	B, D	1

–Item not Illustrated