

 **BOEING**
COMPONENT
MAINTENANCE MANUAL

TO: ALL HOLDERS OF TRAILING EDGE FLAP DRIVE ANGLE GEARBOX ASSEMBLY
COMPONENT MAINTENANCE MANUAL 27-51-34

REVISION NO. 1 DATED MAR 01/00

HIGHLIGHTS

All data formerly in manual 27-51-31 is included in this manual. Pages that have been added or revised are outlined below together with the highlights of the revision. Remove and insert the affected pages as listed and enter Revision No. and date on the Record of Revision Sheet.

CHAPTER/SECTION

AND PAGE NO.

DESCRIPTION OF CHANGE

CONTENTS

Clarified text without technical change.

1

101-103

301

401

501

REPAIR-GEN

602

REPAIR 6-1

601

702-703

REPAIR 2-1

601

REPAIR 3-1

601-602

1002,1004-1005,

1007-1009

Incorporated latest engineering that added an optional cover and an optional bevel gear.

REPAIR 5-1

601

Revised adhesive from type 38 to type 70 or 71.

27-51-34

HIGHLIGHTS

01.1

Page 1

Mar 01/00



TRAILING EDGE FLAP DRIVE
ANGLE GEARBOX ASSEMBLY

PART NUMBER 256T3340-2

COMPONENT MAINTENANCE MANUAL
WITH
ILLUSTRATED PARTS LIST

27-51-34

TITLE PAGE

Page 1

Oct 01/87

01



REVISION RECORD

- Retain this record in front of manual. On receipt of revision, insert revised pages in the manual, and enter revision number, date inserted and initial.

REVISION NUMBER	REVISION DATE	DATE FILED	BY	REVISION NUMBER	REVISION DATE	DATE FILED	BY

27-51-34

REVISION RECORD

01

Page 1

Oct 01/87



TEMPORARY REVISION AND SERVICE BULLETIN RECORD

BOEING SERVICE BULLETIN	BOEING TEMPORARY REVISION	OTHER DIRECTIVE	DATE OF INCORPORATION INTO MANUAL
		PRRB10112	OCT 10/81

27-51-34

TR & SB RECORD

01

Page 1

Oct 01/87


BOEING
 COMPONENT
 MAINTENANCE MANUAL

PAGE	DATE	CODE	PAGE	DATE	CODE
27-51-34			CLEANING		
			*401	MAR 01/00	01.1
			402	BLANK	
TITLE PAGE			CHECK		
1	OCT 01/87	01	*501	MAR 01/00	01.1
2	BLANK		502	BLANK	
REVISION RECORD			REPAIR-GENERAL		
1	OCT 01/87	01	601	OCT 01/87	01
2	BLANK		*602	MAR 01/00	01.1
TR & SB RECORD			REPAIR 1-1		
1	OCT 01/87	01	601	OCT 01/87	01
2	BLANK		602	OCT 01/87	01
LIST OF EFFECTIVE PAGES			REPAIR 2-1		
*1	MAR 01/00	01	*601	MAR 01/00	01.1
THRU LAST PAGE			602	BLANK	
CONTENTS			REPAIR 3-1		
*1	MAR 01/00	01.1	*601	MAR 01/00	01.1
2	BLANK		*602	MAR 01/00	01.1
INTRODUCTION			REPAIR 4-1		
1	OCT 01/87	01	601	OCT 01/87	01
2	BLANK		602	BLANK	
DESCRIPTION & OPERATION			REPAIR 5-1		
1	OCT 01/87	01	*601	MAR 01/00	01.1
2	BLANK		602	BLANK	
TESTING & TROUBLE SHOOTING			REPAIR 6-1		
*101	MAR 01/00	01.1	*601	MAR 01/00	01.1
*102	MAR 01/00	01.1	602	BLANK	
*103	MAR 01/00	01.1	ASSEMBLY		
104	BLANK		701	OCT 01/87	01
DISASSEMBLY			*702	MAR 01/00	01.1
*301	MAR 01/00	01.1	*703	MAR 01/00	01.1
302	BLANK		704	OCT 01/87	01

* = REVISED, ADDED OR DELETED

27-51-34

EFFECTIVE PAGES
CONTINUED Page 1
01 Mar 01/00

PAGE	DATE	CODE	PAGE	DATE	CODE
FITS AND CLEARANCES					
801	OCT 01/87	01			
802	OCT 01/87	01			
803	OCT 01/87	01			
804	BLANK				
SPECIAL TOOLS					
901	OCT 01/87	01			
902	BLANK				
ILLUSTRATED PARTS LIST					
1001	OCT 01/87	01			
*1002	MAR 01/00	01.1			
*1003	MAR 01/00	01.1			
*1004	MAR 01/00	01.1			
*1005	MAR 01/00	01.1			
*1006	MAR 01/00	01.1			
*1007	MAR 01/00	01.1			
*1008	MAR 01/00	01.1			
*1009	MAR 01/00	01.1			
*1010	BLANK				

* = REVISED, ADDED OR DELETED

27-51-34

EFFECTIVE PAGES
 LAST PAGE Page 2
 01 Mar 01/00

TABLE OF CONTENTS

<u>Paragraph Title</u>	<u>Page</u>
Description and Operation.	1
Testing and Fault Isolation.	101
Disassembly.	301
Cleaning	401
Check.	501
Repair	601
Assembly	701
Fits and Clearances.	801
Special Tools.	901
Illustrated Parts List	1001

27-51-34

CONTENTS

Page 1

Mar 01/00

01.1



INTRODUCTION

The instructions in this manual provide the information necessary to perform maintenance functions ranging from simple checks and replacement to complete shop-type repair.

This manual is divided into separate sections:

- | | |
|--|------------------------------|
| 1. Title Page | 4. List of Effective Pages |
| 2. Record of Revisions | 5. Table of Contents |
| 3. Temporary Revision &
Service Bulletin Record | 6. Introduction |
| | 7. Procedures & IPL Sections |

Refer to the Table of Contents for the page location of applicable sections. An asterisked flagnote *[] in place of the page number indicates that no special instructions are provided since the function can be performed using standard industry practices.

The beginning of the REPAIR section includes a list of the separate repairs, a list of applicable standard Boeing practices, and an explanation of the True Position Dimensioning symbols used.

An explanation of the use of the Illustrated Parts List is provided in the Introduction to that section.

All weights and measurements used in the manual are in English units, unless otherwise stated. When metric equivalents are given they will be in parentheses following the English units.

Design changes, optional parts, configuration differences and Service Bulletin modifications create alternate part numbers. These are identified in the Illustrated Parts List (IPL) by adding an alphabetical character to the basic item number. The resulting item number is called an alpha-variant. Throughout the manual, IPL basic item number references also apply to alpha-variants unless otherwise indicated.

Verification:

Disassembly	Jan 29/82
Assembly	Jan 29/82

27-51-34

INTRODUCTION

01

Page 1

Oct 01/87



TRAILING EDGE FLAP DRIVE ANGLE GEARBOX ASSEMBLY

DESCRIPTION AND OPERATION

1. The trailing edge flap drive angle gearbox assembly consists of two bearing-mounted bevel gears enclosed in an aluminum alloy housing. Internally-splined coupling sleeves are attached to the ends of the gear shafts.
2. Power from the trailing edge flap drive power drive unit (PDU) is delivered to rotary actuators operating each flap via flap drive torque tubes. The angle gearbox assembly transmits drive system torque through an angular path.
3. Leading Particulars (approximate)
 - A. Length -- 9 inches (23 centimeters)
 - B. Width -- 9 inches (23 centimeters)
 - C. Height -- 7 inches (18 centimeters)
 - D. Weight -- 9 pounds (4 kilograms)
 - E. Drive Angle -- 95.44 degrees

27-51-34

DESCRIPTION & OPERATION

01

Page 1

Oct 01/87

TESTING AND FAULT ISOLATION1. Test Equipment and Materials

NOTE: Equivalent substitutes may be used.

- A. Test Fixture -- A27046-160 (Consists of -169 fixture assembly plus usage placard)
- B. Test Equipment -- A27046-8 (Includes -54 crank assembly, -55 brackets, -56 and -58 clamp assemblies, and -126 weight assemblies)
- C. Grease -- MIL-G-23827 (Ref 20-60-03)
- D. Primer -- BMS 10-11, Type 1 (Ref 20-60-02)
- E. Sealant -- BMS 5-26 or MIL-S-8802 (Ref 20-60-04)
- F. Lockwire -- MS20995C32

2. Visually check unit in accordance with standard industry practices.

3. Binding and Roughness Check

- A. With no load on the output shaft, operate the input shaft by hand through a minimum of 720 degrees in both directions. There shall be no significant binding or roughness.

4. No-Load Torque Check

- A. With no load on the output shaft, measure the amount of torque applied at the input shaft when rotated through a minimum of 720 degrees in both directions. The no-load torque shall not exceed 2.5 pound-inches (0.28 Nm).

5. Corrective Procedures

- A. If no corrective action is required, proceed with backlash check (par. 6).
- B. If roughness or binding exists, or if no-load torque of 2.5 pound-inches (0.28 Nm) is exceeded, replace bearings (75, 80, IPL Fig. 1) as follows:
 - (1) Completely disassemble unit as shown in DISASSEMBLY and remove gears and bearings.

27-51-34TESTING & TROUBLE SHOOTING
01.1 Page 101
Mar 01/00

- (2) Examine gears for pitting and other signs of uneven wear. Bearing pattern is to be centered in the area of pitch diameter.
- (3) Replace gears, if necessary, and bearings, and assemble as shown in ASSEMBLY steps 3.A. thru 4.D.

6. Backlash Check

NOTE: Units "in service" referred to in the following test are units removed from service for known or suspected malfunctioning characteristics and for which testing is desired to determine further disposition. Units that meet the "in service" limits may be returned to service without overhaul.

Test limits for units in service are the same as for overhauled unless otherwise noted.

- A. Install gearbox assembly on test fixture assembly A27046-169.
- B. Attach clamp assemblies A27046-56, -58, crank assembly A27046-54, and brackets A27046-55 on shafts of bevel gears (65). Secure parts with washers (30) and nuts (25).
- C. Using weight assembly A27046-126, or equivalent, apply a 25-35 pounds (111-156 N) outward axial load to one shaft and clamp in position. Apply an equal outward axial load to the opposite shaft.
- D. Using crank assembly, apply a 5-10 pound-inches (0.56-1.13 Nm) torque to the shaft in each direction. Check that backlash measured at the scribe line on clamp assembly A27046-58 is 0.007-0.016 inches (0.18-0.41 mm) for units in service, or 0.007-0.013 inches (0.18-0.32 mm) for overhauled units, measured at 3 places approximately 120 degrees apart. Backlash is the total clearance measured from the torqued position in one direction to the torqued position in the other direction.

NOTE: Backlash specified is equivalent to 0.004-0.009 inches (0.102-0.23 mm) for units in service, or 0.004-0.007 inches (0.102-0.178 mm) for overhauled units, measured at the pitchline of the gears.

- E. Check lubrication as shown in par. 7 if no corrective procedures are required. To correct backlash, adjust shim thickness as follows:
 - (1) Disassemble unit as shown in DISASSEMBLY steps 2.A. thru 2.D.

27-51-34

- (2) Adjust thickness of shims (70) as required to increase or decrease backlash, and assemble parts as shown in ASSEMBLY steps 4.C. and 4.D.

NOTE: To decrease backlash, increase shim thickness. To increase backlash, reduce shim thickness.

- (3) Repeat backlash check.

7. Check that splines and gear teeth are filled with grease. Lubricate as necessary.

CAUTION: APPLY GREASE TO GEAR TEETH ONLY. DO NOT FILL HOUSING WITH GREASE OR DRAINAGE OF GEARBOX MAY BE ADVERSELY AFFECTED.

- A. Fill gear teeth with grease.
- B. Install covers (50) on housing assembly with bolts (55) and washers (60).
- C. Rotate either shaft by hand through at least two revolutions.
- D. Remove bolts (55) and washers (60) and remove both bevel gears (65) with covers (50). Remove excess grease sticking to inside of housing, especially in drain grooves and holes.
- E. Reinstall bevel gears and covers with bolts (55) and washers (60). Install with wet primer applied to bolt holes.
- F. Fill pocket area of umbrella shield (45) with grease and slide into position on gear shaft. Wipe off excess grease. Install parts (20 thru 40) and tighten nut (25) to 400-450 pound-inches (45-51 Nm).

8. Seal and lockwire as shown in ASSEMBLY steps 4.L. and 4.M.

27-51-34TESTING & TROUBLE SHOOTING
01.1 Page 103
Mar 01/00

DISASSEMBLY

NOTE: See TESTING AND FAULT ISOLATION to establish the condition of the component or most probable cause of its malfunction. This is to determine the extent of disassembly required without completely tearing down and rebuilding the component.

1. Parts Replacement (IPL Fig. 1)

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

- A. Lockwire
- B. Molded sleeve (40)
- C. Nut (25)

2. Disassembly (Ref IPL Fig. 1)

- A. Remove lockwire and sealant.
- B. Remove nuts (25) and washers (30), then slide parts (20, 35 thru 45) off shafts of bevel gears (65).
- C. Remove bolts (55) and washers (60), then remove covers (50) and enclosed parts from housing assembly (90).
- D. Remove gears with bearings (75, 80) and shims (70) from covers. Remove bearings from gear shafts. Measure and record shim thicknesses to facilitate assembly.
- E. Remove parts (5 thru 15) from housing assembly.

NOTE: Do not remove inserts (95, 100) or nameplate (85) from housing assembly unless repair or replacement is necessary.

27-51-34

DISASSEMBLY

01.1

Page 301

Mar 01/00



CLEANING

1. Clean all parts by standard industry practices and information contained in 20-30-03, but not as noted in par. 2.
2. Clean sealed bearings (75, 80, IPL Fig. 1) as shown in manufacturer's instructions.

27-51-34

CLEANING
Page 401
Mar 01/00

01.1

CHECK

1. Check all parts for obvious defects in accordance with standard industry practices.
2. Refer to FITS AND CLEARANCES for design dimensions and wear limits.
3. Magnetic particle check the following parts (IPL Fig. 1) as shown in 20-20-01.
 - A. Coupling half (20) and coupling sleeve (35)
 - B. Bevel gear (65)
4. Penetrant check the following parts (IPL Fig. 1) as shown in 20-20-02.
 - A. Drain (5)
 - B. Cover (50)
 - C. Housing (105)
5. Check gear teeth and splines for uneven wear. If spline bearing surfaces show visible signs of wear or pitting, replace both mating parts.
6. Check molded sleeve (40) and replace if dacron cover is torn, worn, or frayed.

27-51-34

CHECK

01.1

Page 501

Mar 01/00

REPAIR – GENERAL1. Contents

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

<u>P/N</u>	<u>NAME</u>	<u>REPAIR</u>
256T3341	HOUSING	1-1
256T3342	COVER	2-1
256T3344	BEVEL GEAR	3-1
256T3749	COUPLING HALF	4-1
256T3320	NAMEPLATE	5-1
- - -	MISC PARTS REFINISH	6-1

2. Standard Practices

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

20-30-02 Stripping of Protective Finishes
 20-30-03 General Cleaning Procedures
 20-41-01 Decoding Table for Boeing Finish Codes
 20-42-05 Bright Cadmium Plating
 20-43-01 Chromic Acid Anodizing
 20-50-05 Application of Aluminum Foil and Other Markers
 20-50-12 Application of Adhesives

3. Materials

NOTE: Equivalent substitutes may be used.

- A. Primer -- BMS 10-11, Type 1 (Ref 20-60-02)
 B. Corrosion Preventive Compound -- MIL-C-11796, Class 1 (Ref 20-60-02)
 C. Adhesive -- Type 38 (Ref 20-50-12)

27-51-34

REPAIR-GENERAL

01

Page 601

Oct 01/87

—	STRAIGHTNESS	⊕	THEORETICAL EXACT POSITION OF A FEATURE (TRUE POSITION)
▭	FLATNESS	∅	DIAMETER
⊥	PERPENDICULARITY (OR SQUARENESS)	S ∅	SPHERICAL DIAMETER
//	PARALLELISM	R	RADIUS
○	ROUNDNESS	SR	SPHERICAL RADIUS
⊙	CYLINDRICITY	()	REFERENCE
⌒	PROFILE OF A LINE	BASIC (BSC) OR	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.
△	PROFILE OF A SURFACE	DIM	
◎	CONCENTRICITY	-A-	DATUM
≡	SYMMETRY	Ⓜ	MAXIMUM MATERIAL CONDITION (MMC)
∠	ANGULARITY	Ⓛ	LEAST MATERIAL CONDITION (LMC)
↗	RUNOUT	Ⓢ	REGARDLESS OF FEATURE SIZE (RFS)
↗↗	TOTAL RUNOUT	Ⓟ	PROJECTED TOLERANCE ZONE
⊏	COUNTERBORE OR SPOTFACE	FIM	FULL INDICATOR MOVEMENT
∇	COUNTERSINK		

EXAMPLES

— 0.002

STRAIGHT WITHIN 0.002

◎ ∅ 0.0005 C

CONCENTRIC TO C WITHIN 0.0005 DIAMETER

⊥ 0.002 B

PERPENDICULAR TO B WITHIN 0.002

≡ 0.010 A

SYMMETRICAL WITH A WITHIN 0.010

// 0.002 A

PARALLEL TO A WITHIN 0.002

∠ 0.005 A

ANGULAR TOLERANCE 0.005 WITH A

○ 0.002

ROUND WITHIN 0.002

⊕ ∅ 0.002 Ⓢ B

LOCATED AT TRUE POSITION WITHIN 0.002 DIA RELATIVE TO DATUM B, REGARDLESS OF FEATURE SIZE

⊙ 0.010

CYLINDRICAL SURFACE MUST LIE BETWEEN TWO CONCENTRIC CYLINDERS, ONE OF WHICH HAS A RADIUS 0.010 INCH GREATER THAN THE OTHER

**⊥ ∅ 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

⌒ 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

2.000

THEORETICALLY EXACT DIMENSION IS 2.000

▭ 0.020 A

SURFACES MUST LIE WITHIN PARALLEL BOUNDARIES 0.02 INCH APART AND EQUALLY DISPOSED ABOUT TRUE PROFILE

OR
2.000
BSC

NOTE: DATUM MAY APPEAR AT EITHER SIDE OF TOLERANCE FRAME

0.020 A

A 0.020

True Position Dimensioning Symbols
 Figure 601

27-51-34

REPAIR-GENERAL

01.1

Page 602

Mar 01/00



HOUSING ASSEMBLY - REPAIR 1-1

256T3341-1

1. Plating Repair

NOTE: Repair consists of stripping and restoration of original finish. Refer to Refinish instruction in Fig. 601 and to REPAIR-GEN for list of applicable standard practices.

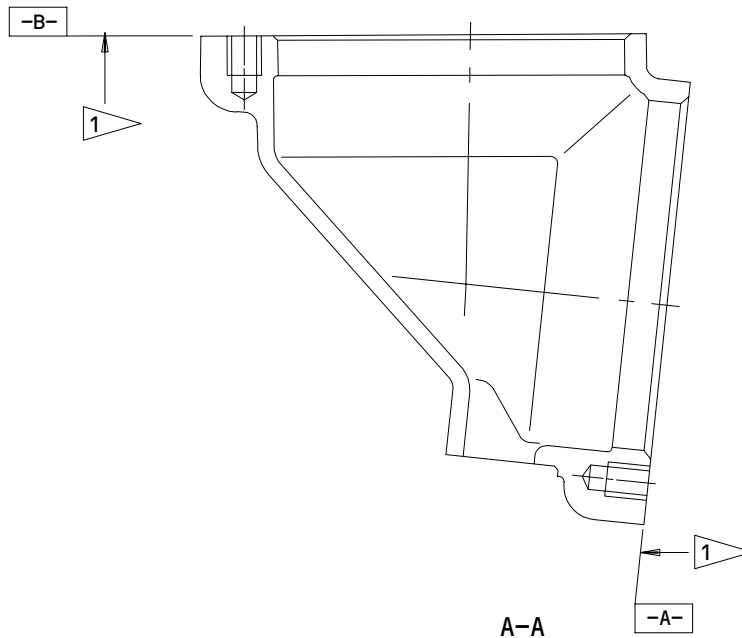
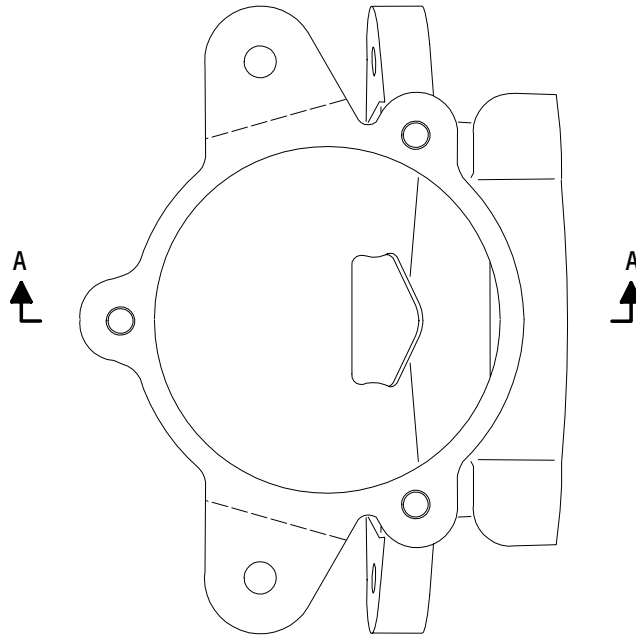
27-51-34

REPAIR 1-1

01

Page 601

Oct 01/87



REFINISH

HOUSING (105): CHROMIC ACID OR SULFURIC ACID ANODIZE (F-17.05) ALL OVER. APPLY ONE COAT PRIMER, BMS 10-11, TYPE 1 (F-20.02) ON EXTERNAL SURFACES EXCEPT HOLES AND SURFACES NOTED.

MATERIAL: AL ALLOY

1 NO PRIMER THIS SURFACE

256T3341-1

Housing Assembly Refinish
 Figure 601

27-51-34

REPAIR 1-1
 Page 602
 Oct 01/87

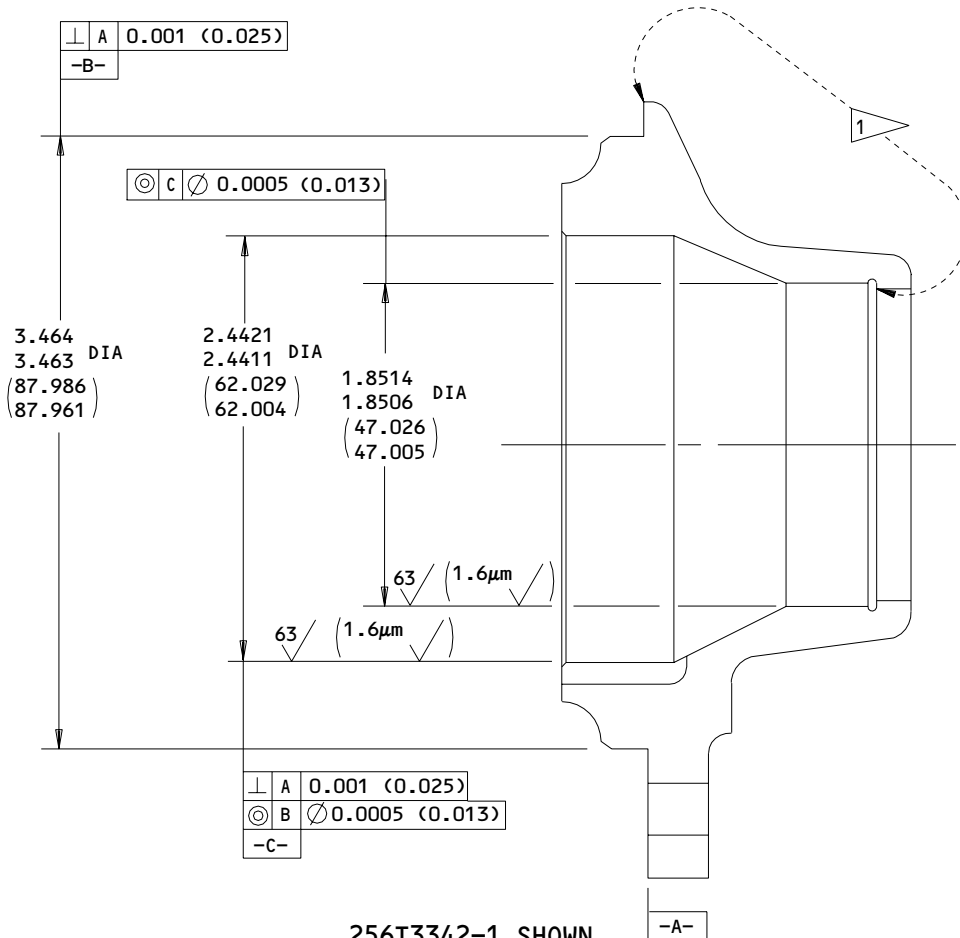
01

COVER - REPAIR 2-1

256T3342-1, -3

1. Plating Repair

NOTE: Repair consists of stripping and restoration of original finish. Refer to Refinish instruction in Fig. 601 and to REPAIR - GENERAL for a list of applicable standard practices.



REFINISH

CHROMIC ACID OR SULFURIC ACID
 ANODIZE (F-17.05) ALL OVER.
 APPLY A LAYER OF PRIMER, BMS 10-11,
 TYPE 1 (F-20.02) AS NOTED

1 APPLY PRIMER THIS AREA ONLY. NO
 PRIMER IN BOLT HOLES

256T3342-1 SHOWN
 256T3342-3 SIMILAR

MATERIAL: AL ALLOY

DIMENSIONS ARE IN INCHES EXCEPT
 DIMENSIONS IN () ARE IN MILLIMETERS

256T3342-1,-3
 Cover Refinish
 Figure 601

27-51-34

REPAIR 2-1

Page 601

Mar 01/00

01.1

BEVEL GEAR – REPAIR 3-1

256T3344-1, -2

NOTE: Refer to REPAIR – GENERAL for a list of applicable standard practices. For repair of surfaces which may only require restoration of original finish, refer to Refinish instructions, Fig. 601.

1. Bearing Seat Repair (Fig. 601)

- A. Machine bearing seat as required, within repair limit shown, to remove defects.
- B. Shot peen as indicated.
- C. Build up repaired area with chrome plate, and grind to design dimensions and finish shown. Chrome plate must not exceed 0.015 inches (0.38 mm) after grinding.

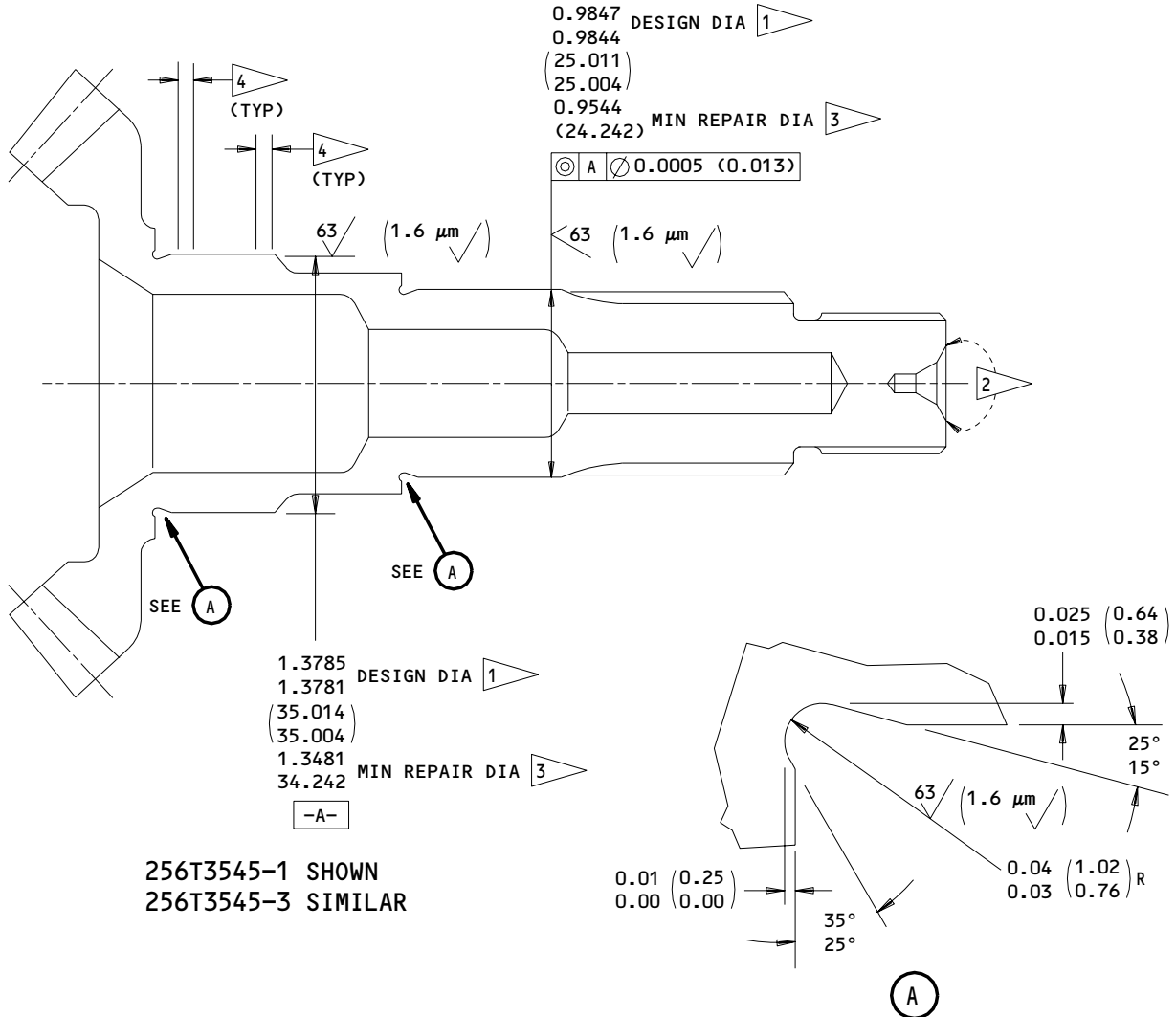
27-51-34

REPAIR 3-1

01.1

Page 601

Mar 01/00



256T3545-1 SHOWN
 256T3545-3 SIMILAR

REFINISH

EXTERNAL SURFACES: CADMIUM PLATE (F-15.23) BUT NOT WHEN NOTED. PLATING THROW-IN ALLOWED AT MOUTH OF BORES.

INTERNAL BORES: PHOSPHATE COAT (F-18.02) BUT NOT WHEN NOTED. DELETE FOLLOW-UP OIL TREATMENT. APPLY TWO LAYERS OF PRIMER, BMS 10-11, TYPE 1 (F-20.03) THEN APPLY CORROSION PREVENTIVE COMPOUND, MIL-C-11796, CLASS 1 (F-19.03)

- 1 NO PLATING THIS SURFACE
- 2 CADMIUM PLATE (F-15.23) EXCEPT UNCONTROLLED THICKNESS PERMITTED. NO PHOSPHATE COATING BEFORE APPLYING PRIMER AND COMPOUND.

REPAIR

REF 3 4
 BREAK SHARP EDGES 0.008 (0.20) R
 SHOT PEEN: SHOT NUMBER 170-460
 0.014 A INTENSITY
 2.0 COVERAGE
 MATERIAL: 9310 STEEL, CARBURIZED
 (150-190 KSI CORE STRENGTH)

DIMENSIONS ARE IN INCHES EXCEPT
 DIMENSIONS IN () ARE IN MILLIMETERS

- 3 BUILD UP WITH CHROME PLATE (F-15.03) AND GRIND TO DESIGN DIMENSIONS AND FINISH SHOWN. OBSERVE RUNOUT AT EDGES AND RELIEF GROOVE AS INDICATED
- 4 PLATING RUNOUT 0.00-0.08 (0.00-2.03)

256T3344-1,-2
 Bevel Gear Repair
 Figure 601

27-51-34

REPAIR 3-1

01.1

Page 602

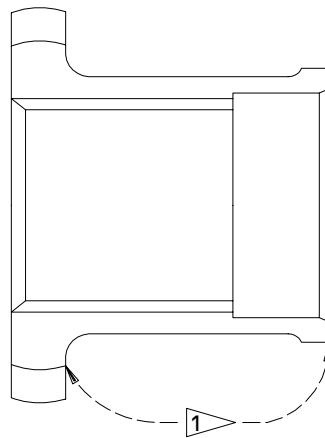
Mar 01/00

COUPLING HALF - REPAIR 4-1


256T3749-1

1. Plating Repair

NOTE: Repair consists of stripping and restoration of original finish. Refer to Refinish instruction in Fig. 601 and to REPAIR-GEN for list of applicable standard practices.

REFINISH

MATERIAL: 4340 STEEL, 150-170 KSI

CADMIUM PLATE (F-15.02)
 ALL OVER AND APPLY ONE COAT
 PRIMER, BMS 10-11, TYPE 1
 (F-20.02) AS INDICATED BY 

Coupling Half Refinish
 Figure 601

27-51-34

REPAIR 4-1

01

Page 601

Oct 01/87

NAMEPLATE – REPAIR 5-1

256T3320-1

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

1. Nameplate Replacement

- A. Steel stamp assembly part number and serial number on nameplate.
- B. Bend to conform to housing contour at location shown in IPL Fig. 1. Bond nameplate in place as shown in 20-50-12, Type 709 or 71.

27-51-34

REPAIR 5-1

01.1

Page 601

Mar 01/00

MISCELLANEOUS PARTS REFINISH – REPAIR 6-1

1. Repair of parts listed in Fig. 601 consists of restoration of the original finish.

IPL FIG. & ITEM	MATERIAL	FINISH
<u>Fig. 1</u>		
Drain (5)	Al alloy	Chromic acid or sulfuric acid anodize (F-17.05) all over. Apply a layer of primer, BMS 10-11, type 1 (F-20.02) to external surfaces but not in holes.
Coupling sleeve (35)	4140 steel 150-170 ksi	Cadmium plate (F-15.02).
Umbrella shield (45)	4340 steel 125-145 ksi	Cadmium plate (F-15.02) plus a layer of coat primer, BMS 10-11, type 1 (F-20.02) but no primer on 0.986-0.988 inch (25.044-25.095 mm) bore.

Refinish Details
 Figure 601

27-51-34

REPAIR 6-1

01.1

Page 601

Mar 01/00

ASSEMBLY1. Materials

NOTE: Equivalent substitutes may be used.

- A. Grease -- MIL-G-23827 (Ref 20-60-03)
- B. Primer -- BMS 10-11, Type 1 (Ref 20-60-02)
- C. Sealant -- BMS 5-26 or MIL-S-8802 (Ref 20-60-04)
- D. Lockwire -- MS20995C32

2. Equipment

NOTE: Equivalent substitutes may be used.

- A. Bearing Width Checking Equipment -- A27040-1
- B. Deleted.
- C. Deleted.

3. Lubrication

- A. Apply light coating of grease to splines, faying surfaces, and bearings at assembly.

CAUTION: APPLY GREASE TO GEAR TEETH ONLY. DO NOT FILL HOUSING WITH GREASE OR DRAINAGE OF GEARBOX MAY BE ADVERSELY AFFECTED.

- B. Fill gear teeth with grease.

4. Assembly (Ref IPL Fig. 1)

- A. Determine proper shim thickness (Ref Fig. 701).

NOTE: If housing assembly (90), covers (50), bevel gears (65), and bearings (75) have not been replaced, shim(s) removed during disassembly may be reinstalled.

- (1) Install bearing (75) on checking equipment A27040-1 and apply axial load of 25-35 pounds (111-156 N). Measure bearing width A across inner race at bearing seat to outer race at shim seat. Note direction of bearing with respect to applied load.

27-51-3401 ASSEMBLY
Page 701
Oct 01/87

(2) Record dimension H engraved on housing assembly (90) and dimension C engraved on cover (50), each corresponding to portion of gearbox where bearing will be installed.

(3) For each bevel gear and its corresponding bearing width A, calculate thickness of shim S as follows:

$$S = H + C - A - 3.020 \text{ inch (76.708 mm)}$$

(4) Select appropriate shim or shim set from table.

NOTE: Corresponding parts (shim, bevel gear, bearings, cover) must be kept together as a set to facilitate assembly and backlash adjustment.

B. Install bearings (75, 80) on bevel gears (65) (Ref 20-50-03). Make sure direction of bearings (75) on gears is same as direction on checking fixture (Fig. 701).

C. Place shims (70) in bearing recess in covers, then install bevel gears with bearings.

D. Install covers on housing assembly with bolts (55) and washers (60).

E. Check backlash as shown in TESTING AND FAULT ISOLATION.

F. Adjust shims on either gear as required to obtain backlash within design limits. Refer to FITS AND CLEARANCES for design backlash limits.

NOTE: If backlash is below minimum, use next thinner shim or shim set per table in Fig. 701. If backlash exceeds maximum, use next thicker shim or shim set.

G. With no load on gear train, rotate either gear shaft by hand. Check that gears mesh smoothly with no significant binding or roughness through at least two revolutions in each direction.

H. Remove bolts (55) and washers (60) and remove both bevel gears (65) with covers (50). Remove squeezed grease sticking to inside of housing, especially in drain grooves and holes.

I. Reinstall bevel gears and covers with bolts (55) and washers (60). Install with wet primer applied to boltholes.

27-51-34

ASSEMBLY

01.1

Page 702

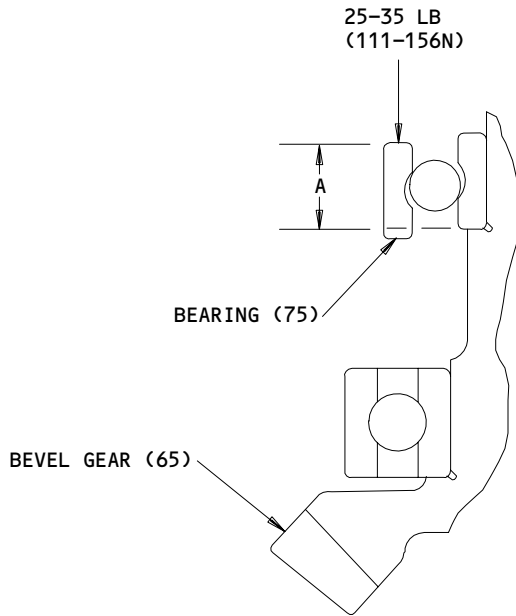
Mar 01/00



- J. Fill pocket area of umbrella shield (45) with grease and slide into position on gear shaft. Wipe off excess grease. Install parts (20 thru 40) and tighten nut (25) to 400-450 pound-inches (45.2-50.8 Nm).
 - K. Install parts (5 thru 15) with wet primer applied to all areas of boltholes.
 - L. Install lockwire on bolts (55), by double-twist procedure (Ref 20-50-02).
 - M. Fillet seal all cover-to-housing and drain-to-housing joint edges with sealant.
5. Storage
- A. Use standard industry practices and information contained in 20-44-02 to store this component.

27-51-34ASSEMBLY
Page 703
Mar 01/00

01.1



BEARING WIDTH MEASUREMENT

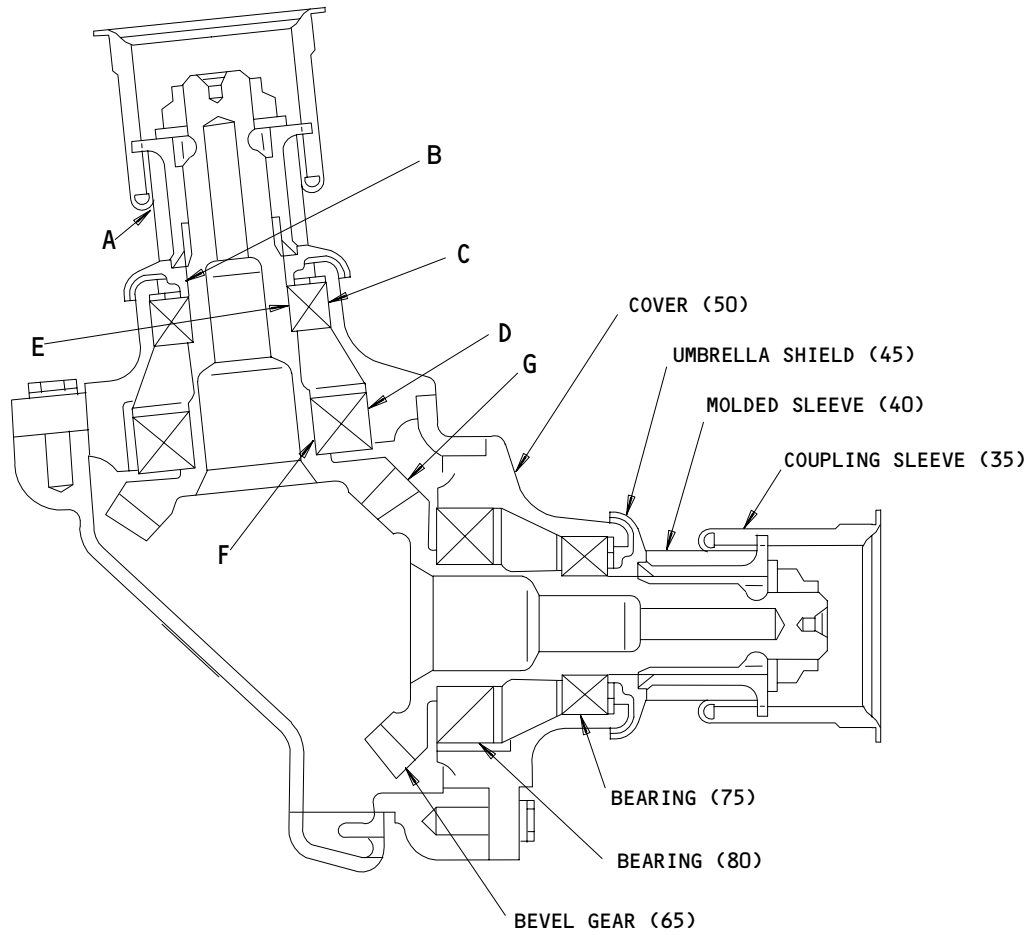
SHIM OR SHIM SET	NOMINAL THICKNESS
256T3321-1	0.010 (0.254)
256T3321-2	0.012 (0.305)
256T3321-3	0.015 (0.381)
256T3321-4	0.018 (0.457)
256T3321-5	0.020 (0.508)
256T3321-1 & -2	0.022 (0.559)
256T3321-1 & -3	0.025 (0.635)
256T3321-2 & -3	0.027 (0.686)
256T3321-1 & -5	0.030 (0.762)
256T3321-2 & -5	0.032 (0.813)
256T3321-3 & -5	0.035 (0.889)
256T3321-4 & -5	0.038 (0.965)
256T3321-5 & -5	0.040 (1.016)

SHIM THICKNESS TABLE

Shim Selection
 Figure 701

27-51-34
 ASSEMBLY
 Page 704
 Oct 01/87

FITS AND CLEARANCES



Fit and Clearances
Figure 801 (Sheet 1)

27-51-34

FITS AND CLEARANCES
01 Page 801
Oct 01/87

Ref Letter Fig.801	Mating Item No. IPL Fig. 1	Design Dimension				Service Wear Limit		
		Dimension		Assembly Clearance *[1]		Dimension		Maximum Clearance
		Min	Max	Min	Max	Min	Max	
A	ID 35	1.500 (38.10)	1.520 (38.61)	0.000 (0.00)	0.040 (1.02)	1.460 (37.08)	1.520 (38.61)	0.040 (1.02)
	OD 40	1.480 (37.59)	1.500 (38.10)					
B	ID 45	0.986 (25.044)	0.988 (25.095)	0.0013 (0.033)	0.0036 (0.091)	0.9784 (24.851)	0.994 (25.25)	0.006 (0.15)
	OD 65	0.9844 (25.004)	0.9847 (25.011)					
C	ID 50	1.8506 (47.005)	1.8514 (47.026)	0.0002 (0.005)	0.0015 (0.039)	1.8474 (46.924)	1.8544 (47.102)	0.003 (0.076)
	OD 75	1.8499 (46.987)	1.8504 (47.000)					
D	ID 50	2.4411 (62.004)	2.4421 (62.029)	0.0002 (0.005)	0.0017 (0.043)	2.4379 (61.923)	2.4451 (62.106)	0.003 (0.076)
	OD 80	2.4404 (61.986)	2.4409 (61.999)					
E	ID 75	0.9839 (24.991)	0.9843 (25.001)	-0.0008 (-0.020)	-0.0001 (-0.003)	0.9843 (25.001)	0.9844 (25.004)	0.0000 (0.000)
	OD 65	0.9844 (25.004)	0.9847 (25.011)					
F	ID 80	1.3775 (34.989)	1.3780 (35.001)	-0.0010 (-0.025)	-0.0001 (-0.003)	1.3780 (35.001)	1.3781 (35.004)	0.0000 (0.000)
	OD 65	1.3781 (35.004)	1.3785 (35.014)					
G	65 *[2]			0.004 (0.10)	0.007 (0.18)			0.009 (0.23)

*[1] NEGATIVE VALUES DENOTE INTERFERENCE FIT

*[2] BACKLASH BETWEEN INSTALLED GEARS

DIMENSIONS ARE IN INCHES EXCEPT
DIMENSIONS IN () ARE IN MILLIMETERSFits and Clearances
Figure 801 (Sheet 2)

27-51-34

FITS AND CLEARANCES
01 Page 802
Oct 01/87


BOEING
 COMPONENT
 MAINTENANCE MANUAL

FOR TORQUE VALUES OF STANDARD FASTENERS, REFER TO 20-50-01			
ITEM NO. IPL FIG. 1	NAME	TORQUE	
		POUND-INCHES (NEWTON-METERS)	POUND-FEET
25	NUT	400 - 450 (45.2 - 50.8)	

Torque Table
Figure 802

27-51-34

FITS AND CLEARANCES
01 Page 803
Oct 01/87



SPECIAL TOOLS, FIXTURES, AND EQUIPMENT

NOTE: Equivalent substitutes may be used.

1. A27040-1 -- Bearing Width Checking Equipment
2. A27046-160 -- Test Fixture
3. A27046-8 -- Test Equipment

27-51-34

SPECIAL TOOLS

01

Page 901

Oct 01/87

ILLUSTRATED PARTS LIST

1. This section lists and illustrates replaceable or repairable component parts. The Illustrated Parts Catalog contains a complete explanation of the Boeing part numbering system.

2. Indentures show parts relationships as follows:

Assembly

Detail Parts for Assembly

Subassembly

Attaching Parts for Subassembly

Detail Parts for Subassembly

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

3. One use code letter (A, B, C, etc.) is assigned in the EFF CODE column for each variation of top assembly. All listed parts are used on all top assemblies except when limitations are shown by use code letter opposite individual part entries.

4. Letter suffixes (alpha-variants) are added to item numbers for optional parts, Service Bulletin modification parts, configuration differences (except left- and right-hand parts), product improvement parts, and parts added between two sequential item numbers. The alpha-variant is not shown on illustrations when appearance and location of all variants of the part is the same.

5. Service Bulletin modifications are shown by the notations PRE SB XXXX and POST SB XXXX.

A. When a new top assembly part number is assigned by Service Bulletin, the notations appear at the top assembly level only. The configuration differences at detail part level are then shown by use code letter.

B. When the top assembly part number is not changed by the Service Bulletin, the notations appear at the detail part level.

6. Parts Interchangeability

Optional
(OPT)

The parts are optional to and interchangeable with other parts having the same item number.

Supersedes, Superseded By
(SUPSDS, SUPSD BY)

The part supersedes and is not interchangeable with the original part.

Replaces, Replaced By
(REPLS, REPLD BY)

The part replaces and is interchangeable with, or is an alternate to, the original part.

27-51-34

ILLUSTRATED PARTS LIST

01 Page 1001

Oct 01/87

VENDORS

15653 KAYNAR TECHNOLOGY KAYNAR DIV
800 SOUTH STATE COLLEGE BLVD PO BOX 3001
FULLERTON, CALIFORNIA 92634-3001

21335 TORRINGTON CO FAFNIR BEARING DIV
59 FIELD STREET
TORRINGTON, CONNECTICUT 06790-4942

21760 SCHATZ MANUFACTURING CO
FAIRVIEW AVENUE PO BOX 1191
POUGHKEEPSIE, NEW YORK 12601

29337 HOOVER GROUP INC BALL AND ROLLER DIV
2220 PENDLEY ROAD PO BOX 899
CUMMING, GEORGIA 30130-8671

38443 MRC BEARINGS
402 CHANDLER STREET
JAMESTOWN, NEW YORK 14701-3802

40920 MPB MINIATURE PRECISION BEARING DIV
PRECISION PARK PO BOX 547
KEENE, NEW HAMPSHIRE 03431

43991 FAG BEARING INCORPORATED
118 HAMILTON AVENUE
STAMFORD, CONNECTICUT 06904

56878 SPS TECHNOLOGIES INC AEROSPACE AND INDUSTRIAL PRODUCTS DIV
HIGHLAND AVENUE
JENKINTOWN, PENNSYLVANIA 19046

72962 HARVARD INDUSTRIES INC
3 WERNER WAY SUITE 210
LEBANON, NEW JERSEY 08833

27-51-34

ILLUSTRATED PARTS LIST
01.1 Page 1002
Mar 01/00

VENDORS

78118 SPLIT BALL BEARING DIV OF MPB CORP
HIGHWAY 4
LEBANON, NEW HAMPSHIRE 03766-7301

97928 DEUTSCH FASTENER CORP
3969 PARAMONT BOULEVARD
LAKEWOOD, CALIFORNIA 90712-4193

27-51-34

ILLUSTRATED PARTS LIST

01.1 Page 1003

Mar 01/00

PART NUMBER	AIRLINE PART NO.	FIG.	ITEM	TTL REQ
AN960-1216		1	30	2
AN960PD10L		1	15	2
AN960PD416L		1	60	6
BACB10BA25PP		1	75	2
BACB10BA35PP		1	80	2
BACN10JC12		1	25	2
BMN4122AD3-12		1	25	2
C105RRPQZZ		1	75	2
C105RRP1P28LY19		1	75	2
C107RRPP1P28LY1		1	80	2
C107RRPQZZ		1	80	2
H10-12BAC		1	25	2
LL105KS		1	75	2
LL107KS		1	80	2
LL107KSG20		1	80	2
MS21209F1-15P		1	95	2
MS21209F4-15P		1	100	6
NAS6603-2		1	10	2
NAS6604H6		1	55	6
PKTLL105P1		1	75	2
PKTLL107P1		1	80	2
RMLH9074-12		1	25	2
256T3320-1		1	85	1
256T3321-1		1	70	2
256T3321-2		1	70A	2
256T3321-3		1	70B	2
256T3321-4		1	70C	2
256T3321-5		1	70D	2
256T3340-2		1	1	RF
256T3341-1		1	90	1
256T3341-2		1	105	1
256T3342-1		1	50	2
256T3342-3		1	50A	2
256T3343-1		1	5	1
256T3343-3		1	5A	1
256T3344-1		1	65	2
256T3344-2		1	65A	2
256T3345-1		1	45	2
256T3345-2		1	45A	2
256T3749-1		1	20	2

27-51-34

 ILLUSTRATED PARTS LIST
 01.1 Page 1004
 Mar 01/00


BOEING
 COMPONENT
 MAINTENANCE MANUAL

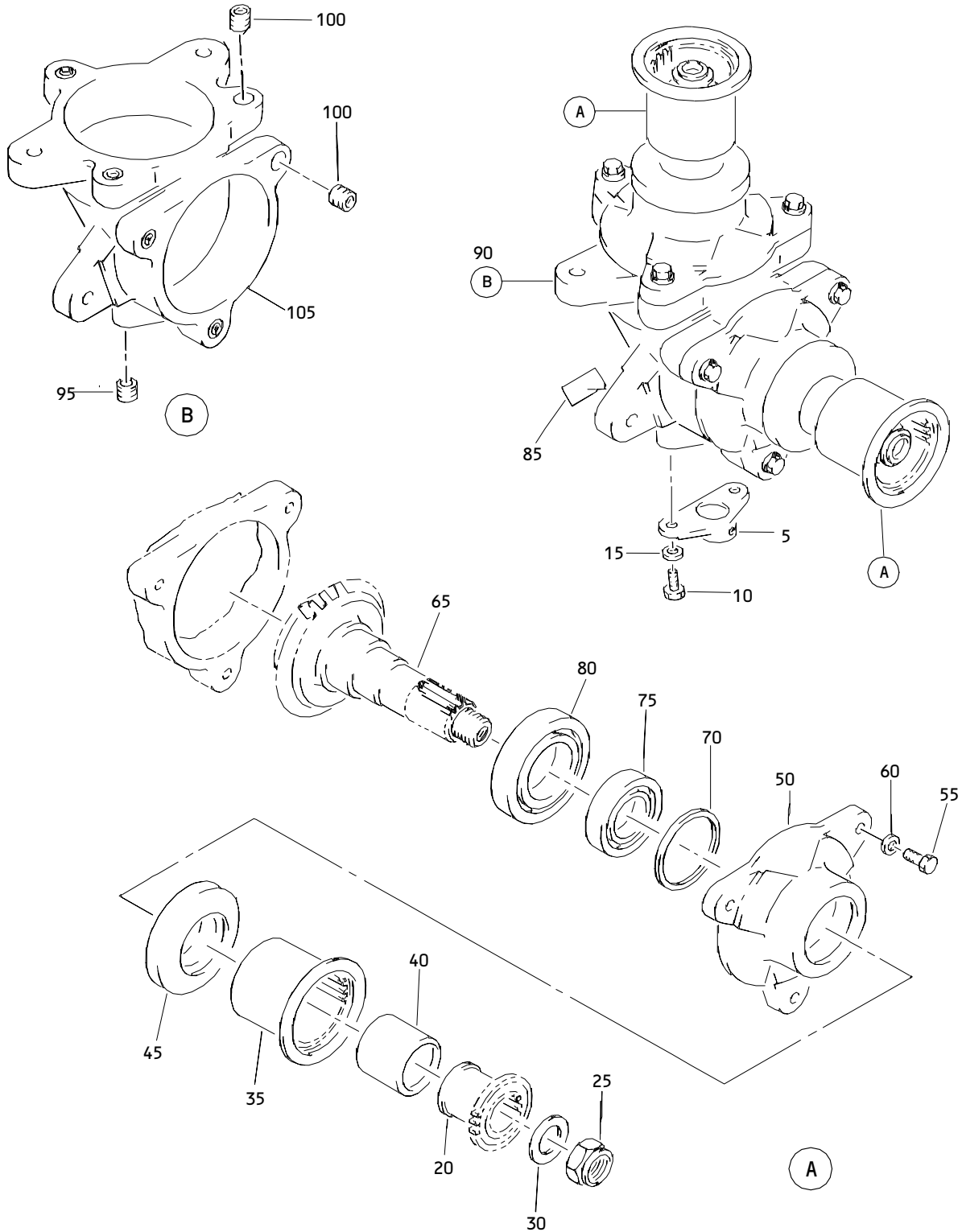
PART NUMBER	AIRLINE PART NO.	FIG.	ITEM	TTL REQ
48FT1216		1	25	2
6005TT		1	75	2
6007TT		1	80	2
65B84033-18		1	40	2
65B84034-3		1	35	2
9105LLT1C1-01		1	75	2
9105NPPFS428		1	75	2
9107LLT1C1-01		1	80	2
9107NPPFS4281		1	80	2
993L05		1	75	2
993L07		1	80	2

27-51-34

ILLUSTRATED PARTS LIST

01.1 Page 1005

Mar 01/00



Trailing Edge Flap Drive Angle Gearbox Assembly
 Figure 1

27-51-34

ILLUSTRATED PARTS LIST
 01.1 Page 1006
 Mar 01/00


BOEING
 COMPONENT
 MAINTENANCE MANUAL

FIG. & ITEM	PART NO.	AIRLINE PART NUMBER	NOMENCLATURE 1234567	EFF CODE	QTY PER ASSY
01- -1	256T3340-2		GEARBOX ASSY-TE FLAP DRIVE ANGLE		RF
5	256T3343-1		.DRAIN- (OPT ITEM 5A)		1
-5A	256T3343-3		.DRAIN- (OPT ITEM 5)		1
10	NAS6603-2		.BOLT		2
15	AN960PD10L		.WASHER		2
20	256T3749-1		.COUPLING HALF		2
25	H10-12BAC		.NUT- (V15653) (SPEC BACN10JC12) (OPT RMLH9074-12 (V72962)) (OPT 48FT1216 (V56878)) (OPT BMN4122AD3-12 (V97928))		2
30	AN960-1216		.WASHER		2
35	65B84034-3		.SLEEVE-CPLG		2
40	65B84033-18		.SLEEVE-MOLDED		2
45	256T3345-1		.SHIELD-UMBRELLA (OPT ITEM 45A)		2
-45A	256T3345-2		.SHIELD-UMBRELLA (OPT ITEM 45)		2
50	256T3342-1		.COVER- (OPT ITEM 50A)		2
-50A	256T3342-3		.COVER- (OPT ITEM 50)		2
55	NAS6604H6		.BOLT		6
60	AN960PD416L		.WASHER		6
65	256T3344-1		.GEAR-BEVEL (OPT ITEM 65A)		2
-65A	256T3344-2		.GEAR-BEVEL (OPT ITEM 65)		2

27-51-34

ILLUSTRATED PARTS LIST

01.1

Page 1007

Mar 01/00

FIG. & ITEM	PART NO.	AIRLINE PART NUMBER	NOMENCLATURE 1234567	EFF CODE	QTY PER ASSY
01-70	256T3321-1		.SHIM-(THICKNESS TO BE DETERMINED UPON INSTALLATION)		AR
-70A	256T3321-2		.SHIM-(THICKNESS TO BE DETERMINED UPON INSTALLATION)		AR
-70B	256T3321-3		.SHIM-(THICKNESS TO BE DETERMINED UPON INSTALLATION)		AR
-70C	256T3321-4		.SHIM-(THICKNESS TO BE DETERMINED UPON INSTALLATION)		AR
-70D	256T3321-5		.SHIM-(THICKNESS TO BE DETERMINED UPON INSTALLATION)		AR
75	9105NPPFS428		.BEARING- (V21335) (SPEC BACB10BA25PP) (OPT LL105KS (V38443)) (OPT 6005TT (V43991)) (OPT 9105LLT1C1-01 (V21760)) (OPT 993L05 (V29337)) (OPT PKTLL105P1 (V78118)) (OPT C105RRPOZZ (V40920)) (OPT C105RRP1P28LY196 (V40920))		2

27-51-34

 ILLUSTRATED PARTS LIST
 01.1 Page 1008
 Mar 01/00


BOEING
 COMPONENT
 MAINTENANCE MANUAL

FIG. & ITEM	PART NO.	AIRLINE PART NUMBER	NOMENCLATURE 1234567	EFF CODE	QTY PER ASSY
01-80	LL107KSG20		.BEARING- (V38443) (SPEC BACB10BA35PP) (OPT LL107KS (V38443)) (OPT 6007TT (V43991)) (OPT 9107LLT1C1-01 (V21760)) (OPT 9107NPPFS4281 (V21335)) (OPT 993L07 (V29337)) (OPT PKTLL107P1 (V78118)) (OPT C107RRPOZZ (V40920)) (OPT C107RRPP1P28LY196 (V40920))		2
85	256T3320-1		.NAMEPLATE		1
90	256T3341-1		.HOUSING ASSY		1
95	MS21209F1-15P		..INSERT		2
100	MS21209F4-15P		..INSERT		6
105	256T3341-2		..HOUSING		1

- Item Not Illustrated

27-51-34

ILLUSTRATED PARTS LIST

01.1

Page 1009

Mar 01/00