TO: ALL HOLDERS OF TRAILING EDGE FLAP DRIVE TEE GEARBOX ASSEMBLY COMPONENT MAINTENANCE MANUAL 27-51-25

REVISION NO. 9 DATED MAR 01/00

HIGHLIGHTS

Pages which have been added or revised are outlined below together with the highlights of the revision. Remove and insert the affected pages as listed and enter Revision No. and date on the Record of Revision Sheet.

CHAPTER/SECTION AND PAGE NO.	DESCRIPTION OF CHANGE
TR & SB RECORD 1 102 301 401 501 REPAIR 3-1 601-602 701-704 801-803 1002,1004-1011	Incorporated latest engineering changes and added substitute kit assemblies 256T3310-5 and -6.
CONTENTS 1 101-103 401 501 REPAIR-GEN 603 REPAIR 7-1 601 REPAIR 8-1 601 704	Clarified text without technical change.

TRAILING EDGE FLAP DRIVE TEE GEARBOX ASSEMBLY

PART NUMBER 256T3310-2

COMPONENT MAINTENANCE MANUAL
WITH
ILLUSTRATED PARTS LIST

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

TEMPORARY REVISION AND SERVICE BULLETIN RECORD

BOEING SERVICE BULLETIN	BOEING TEMPORARY REVISION	OTHER DIRECTIVE	DATE OF INCORPORATION INTO MANUAL
		PRR B10112 PRR B13106-7	OCT 10/81 MAR 01/00

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*1	MAR 01/00	01
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*703	MAR 01/00	01.1
*704	MAR 01/00	01.1
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*802	MAR 01/00	01.1
*803	MAR 01/00	01.1
*804	MAR 01/00	01.101
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*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	MAR 01/00	01.1
*1011	MAR 01/00	01.1
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TABLE OF CONTENTS

INTRODUCTION

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

This manual is divided into separate sections:

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

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

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

TRAILING EDGE FLAP DRIVE TEE GEARBOX ASSEMBLY

DESCRIPTION AND OPERATION

1. The trailing edge flap drive tee 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 tee gearbox assembly provides a 90-degree take-off from the main drive path.

3. Leading Particulars (approximate)

   A. Length -- 10 inches (25 centimeters)

   B. Width -- 10 inches (25 centimeters)

   C. Height -- 4 inches (10 centimeters)

   D. Weight -- 10 pounds (4.5 kilograms)

TESTING AND FAULT ISOLATION

1. Equipment and Material

   NOTE: Equivalent substitutes may be used.

   A. Dial indicator.

   B. Test Fixture -- A27046-3 (Consists of -20 fixture assembly plus -133 usage placard)

   C. Test Equipment -- A27046-8 (Includes -53 tower assembly, -54 crank assembly, -55 brackets, -56 and -58 clamp assemblies, and -126 weight assembly)

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 and binding exists, or if no-load torque of 2.5 pound-inches (0.28 Nm) is exceeded, replace bearings (111, 112, 125, 130, IPL Fig. 1) as follows:

      (1) Completely disassemble unit as shown in DISASSEMBLY and remove gears and bearings.

      (2) Examine gears for pitting and other signs of uneven wear. Bearing pattern is to be centered in area of pitch diameter.

      (3) Replace bearings and gears, if necessary, and assemble as shown in ASSEMBLY steps 3.A. thru 4.F.

6. Backlash Check (Ref IPL Fig. 1)

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 A27046-20 as shown in placard A27046-133.

B. Attach clamp assemblies A27046-56, -58, crank assembly A27046-54, and brackets A27046-55 on shafts of bevel gears (70, 72, 87, 90). 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 output shaft (90) and clamp in position. Apply an equal outward axial load to the input shaft (70) to seat gear firmly against shim(s) and bearing cap.

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 three 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. If no corrective procedures are required, complete assembly as shown in assembly steps 4.H. and on.

F. If backlash exceeds required limits, adjust shim thickness as follows.

(1) Disassemble unit per DISASSEMBLY steps 2.A. thru 2.D.

(2) Adjust thickness of shims (65) as required to increase or decrease backlash, and assemble parts as shown in ASSEMBLY steps 4.C. and 4.F.

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

(3) Repeat backlash check.

G. Remove gearbox from test fixture.

H. If backlash still exceeds required limits, replace bearing then gears as required and repeat backlash check.

I. After correct backlash has been obtained, rotate bevel gear (70) by hand with no load on bevel gear (100). Check that gears mesh smoothly with no significant binding or roughness through at least two revolutions in each direction.

J. Complete assembly as shown in ASSEMBLY steps 4.H. and on.

DISASSEMBLY

NOTE: See Testing and Trouble shooting 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 (Ref 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)

2. Disassembly (Ref IPL Fig. 1)

   A. Remove lockwire and sealant.

   B. Remove nuts (25) and washers (30), then slide parts (20, 35, 40) off shafts of bevel gears (70, 90).

   C. Remove bolts (50) and washers (55) and remove bearing cap (45) from housing assembly (140). Remove shim(s) (65) from bearing cap. Measure and record shim thickness to facilitate assembly.

   D. Remove bevel gear (70, 72) from housing and remove bearings (111, 112) and shields (60, 113) from gear.

   E. Remove bevel gear assembly (87, 90) from housing and remove bearings (125, 130) and shield (115) from gear.

      NOTE: Plug (95) is deleted from later bevel gear assemblies. If plug (95) is used on bevel gear assembly (90), do not remove the plug unless repair or replacement is necessary.

   F. Remove shim(s) (120) from housing assembly. Measure and record shim thickness.

   G. Remove parts (5 thru 15) from housing assembly.

      NOTE: Do not remove inserts (145, 150) or nameplate (135) from housing assembly unless repair or replacement is necessary.

CLEANING

1. Clean all parts using standard industry practices and information contained in 20-30-03, except as noted in par. 2.

2. Clean sealed bearings (111, 112, 125, 130, IPL Fig. 1) as shown in manufacturer's instructions.

CHECK

1. Check all parts for obvious defects in accordance with standard industry practices.

2. Visually check all splines in couplings for wear or pitting. Check rubber sleeves in couplings for wear tear, or fraying of dacron cover.

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

4. 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 gears (70, 72, 87, 90)

   C. Plug (95)

      NOTE: Plug (95) deleted from later assemblies.

5. Penetrant check the following parts (IPL Fig. 1) as shown in 20-20-02.

   A. Drain (5)

   B. Bearing cap (45)

   C. Housing (155)

6. Check gear teeth and splines for uneven wear.

REPAIR - GENERAL

1. Contents

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

P/N	NAME	REPAIR
256T3311	HOUSING	1-1
256T3312	BEARING CAP	2-1
256T3314	BEVEL GEAR	3-1
256T3315	BEVEL GEAR	4-1
256T3316	SHIELD	5-1
256T3749	COUPLING HALF	6-1
256T3320	NAMEPLATE	7-1
- - -	MISC PARTS REFINISH	8-1

2. Standard Practices

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

20-10-02 Machining of Alloy Steel
20-10-03 Shot peening
20-10-04 Grinding of Chrome Plated Parts
20-30-02 Stripping of Protective Finishes
20-30-03 General Cleaning Procedures
20-41-01 Decoding Table for Boeing Finish Codes
20-42-03 Hard Chrome Plating
20-42-05 Bright Cadmium Plating
20-43-01 Chromic Acid Anodizing
20-50-10 Application of Stencils, Insignia, Silk Screen, Part Numbering and Indentification Markings
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)

—	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 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

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
[◎ | ∅ 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
[⌖ | ∅ 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, 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]

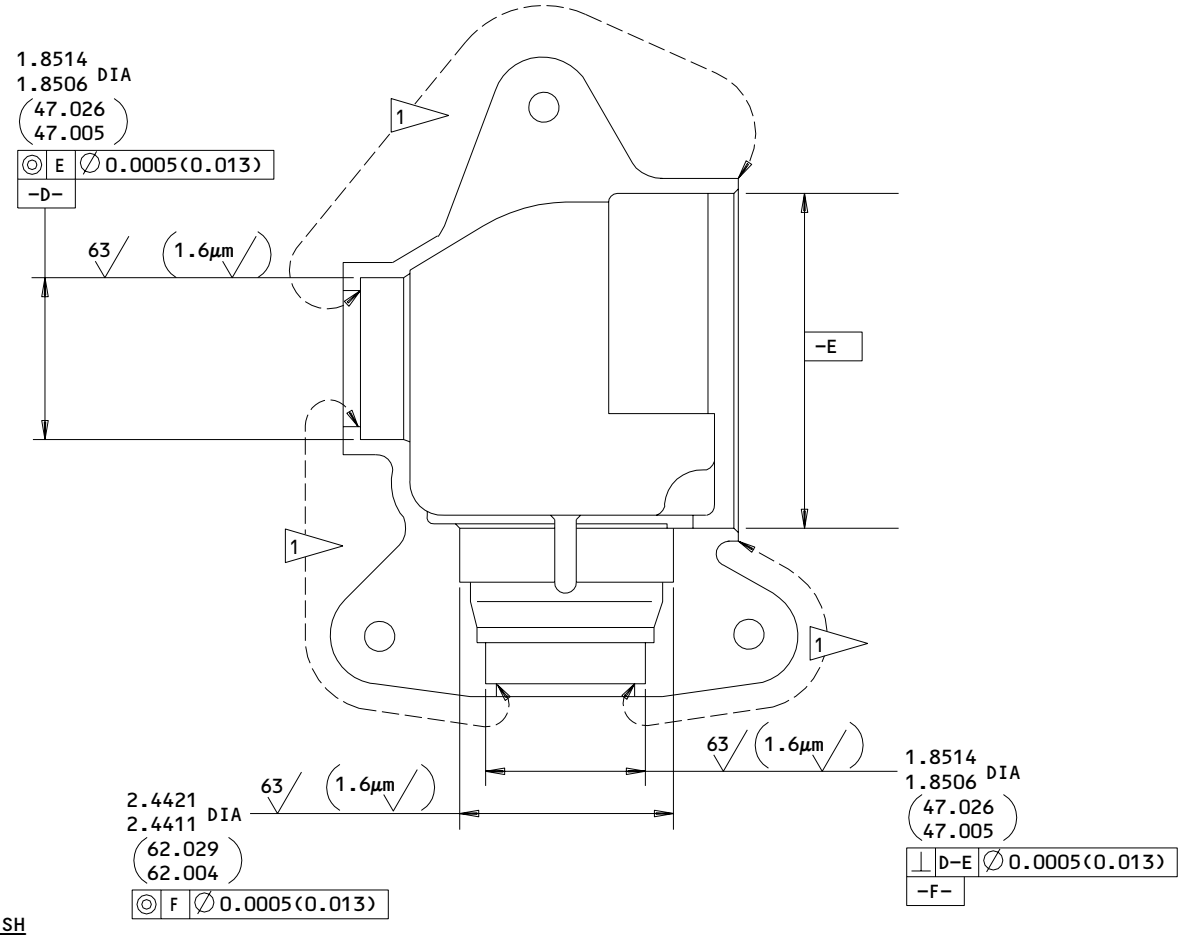
True Position Dimensioning Symbols
Figure 601

HOUSING ASSEMBLY - REPAIR 1-1

256T3311-1

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

HOUSING (155): CHROMIC ACID OR SULFURIC ACID ANODIZE (F-17.05) ALL OVER. APPLY ONE COAT PRIMER, BMS 10-11,TYPE 1 (F-20.02) AS NOTED.

1 APPLY PRIMER THESE SURFACES EXCEPT IN BOLT HOLES

MATERIAL: AL ALLOY

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

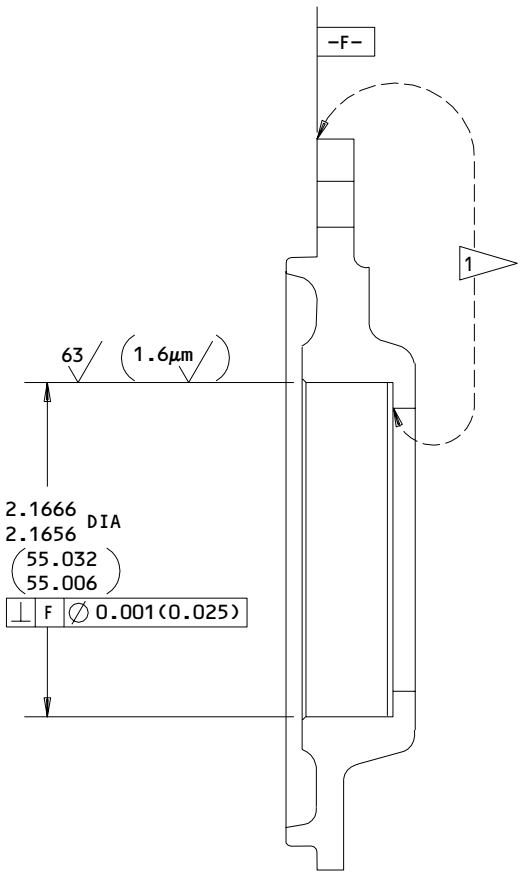
Housing Assembly Repair
Figure 601

BEARING CAP - REPAIR 2-1

256T3312-1

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

CHROMIC ACID OR SULFURIC ACID ANODIZE (F-17.05). APPLY ONE COAT PRIMER, BMS 10-11,TYPE 1 (F-20.02) AS NOTED.

1 APPLY PRIMER THIS AREA EXCEPT IN BOLT HOLES

MATERIAL: AL ALLOY

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

Bearing Cap Refinish
Figure 601

19939

BEVEL GEAR - REPAIR 3-1

256T3314-1, -3

1. Plating Repair

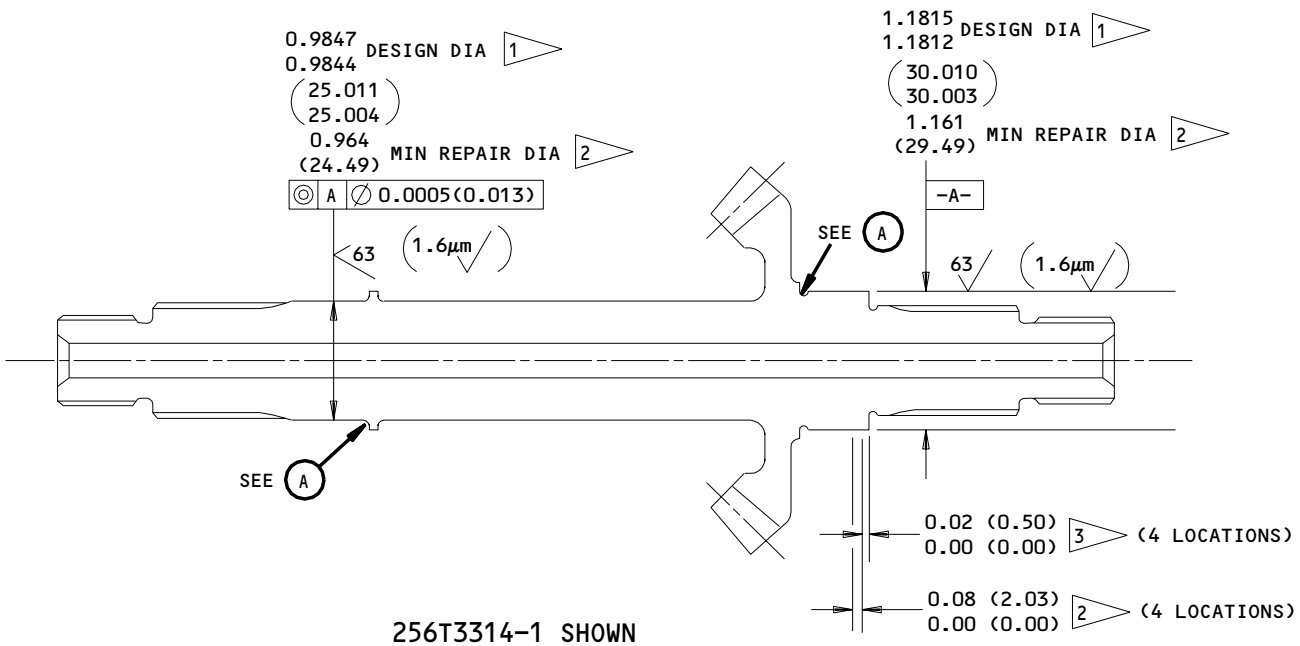
   NOTE: Repair consists of stripping and restoration of original finish. Refer to Refinish instruction in Fig. 601 and to REPAIR-GEN for list of applicable standard practices.

2. Bearing Seat Repair (Fig. 601)

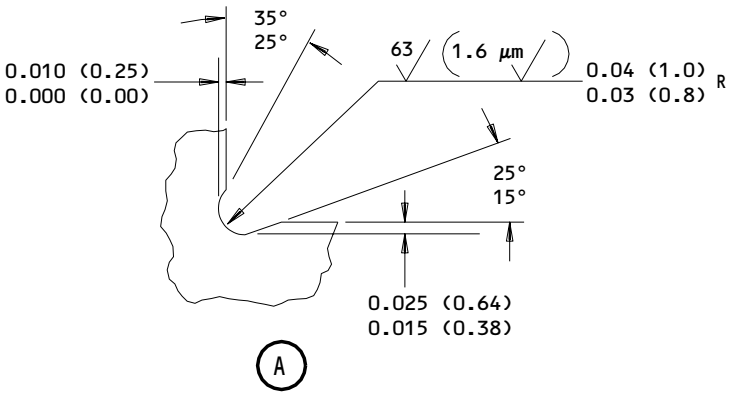
   A. Machine bearing seat as required, within repair limit shown, to remove defects.

   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 0.010 inch (0.25 mm) after grinding.



256T3314-1 SHOWN
256T3314-3 SIMILAR



REFINISH

EXTERNAL SURFACES: CADMIUM PLATE (F-15.23) EXCEPT AS NOTED. PLATING THROW-IN ALLOWED AT MOUTHS OF BORES.

INTERNAL BORES: PHOSPHATE COAT (F-18.02) DELETING FOLLOW-UP OIL TREATMENT. APPLY TWO COATS PRIMER, BMS 10-11, TYPE 1 (F-20.03) THEN APPLY CORROSION PREVENTIVE COMPOUND, MIL-C-11796, CLASS 1 (F-19.03)

1 NO CADMIUM PLATING THIS SURFACE

2 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

3 PLATING RUNOUT

4 END OF PLATING

REPAIR

REF 2 3 4

125 (3.2 µm) ALL MACHINED SURFACES EXCEPT AS NOTED

BREAK SHARP EDGES 0.01-0.02 (0.25-0.51) R

SHOT PEEN: SHOT NO. 170-460
INTENSITY 0.006A
COVERAGE 2.0

MATERIAL: 9310 STEEL, CARBURIZED
(150-190 KSI CORE STRENGTH)

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

256T3314-1,-3
Bevel Gear Repair
Figure 601

19943

BEVEL GEAR ASSEMBLY - REPAIR 4-1

256T3315-1

NOTE: Refer to REPAIR-GEN for list of applicable standard practices. For repair of surfaces which may only require stripping and restoration of original finish, refer to Refinish instruction, Fig. 601.

Plug (95), deleted from later bevel gear assemblies.

1. Plug Replacement (Ref IPL Fig. 1)

   A. Remove plug (95).

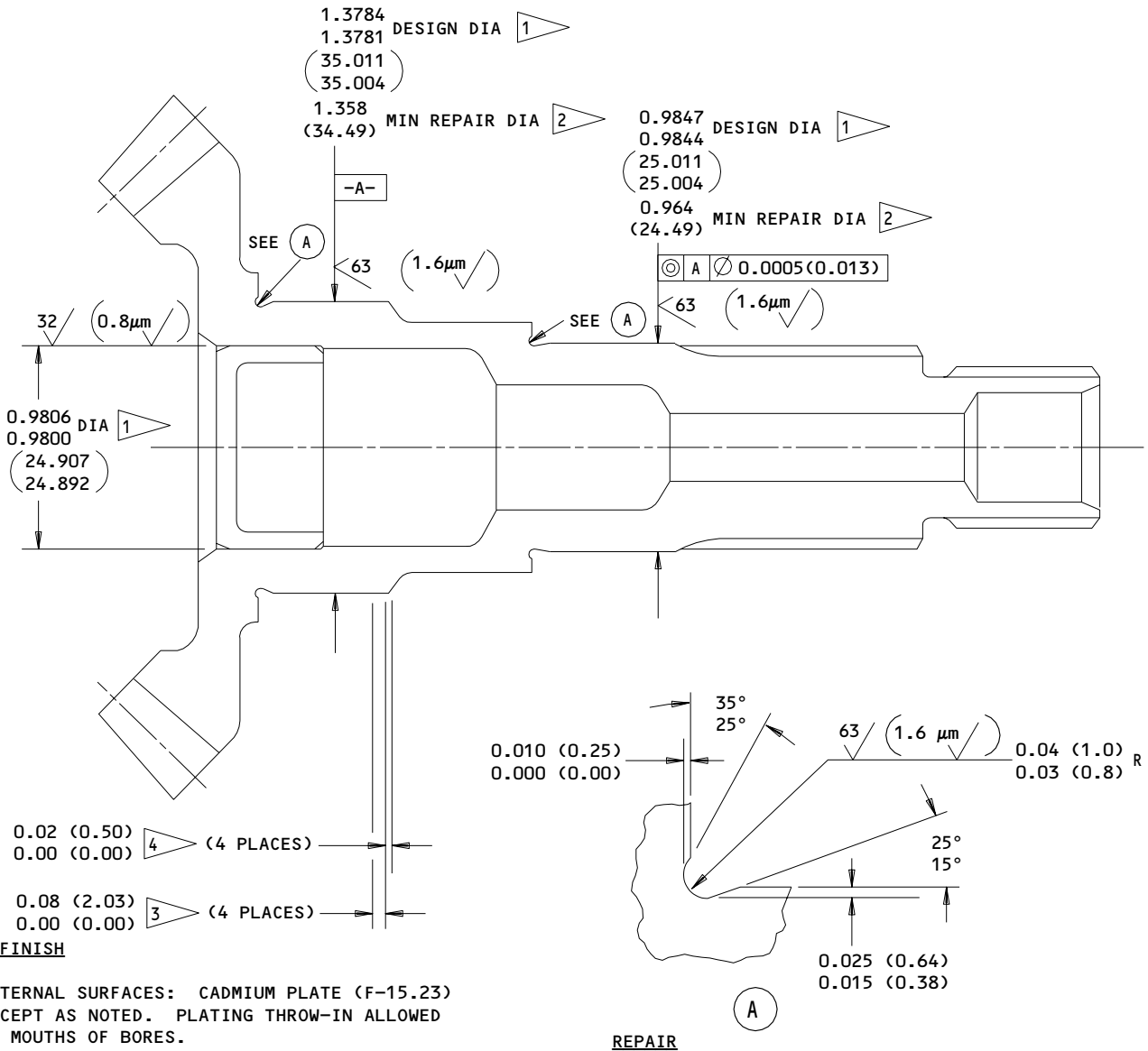
   B. Install replacement plug with wet primer.

2. Bearing Seat Repair (Ref 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 0.010 inches (0.25 mm) after grinding.



REFINISH

EXTERNAL SURFACES: CADMIUM PLATE (F-15.23) EXCEPT AS NOTED. PLATING THROW-IN ALLOWED AT MOUTHS OF BORES.

INTERNAL BORES: PHOSPHATE COAT (F-18.02) DELETING FOLLOW-UP OIL TREATMENT. APPLY TWO COATS PRIMER, BMS 10-11, TYPE 1 (F-20.03) THEN APPLY CORROSION PREVENTIVE COMPOUND, MIL-C-11796, CLASS 1 (F-19.03)

1 NO CADMIUM PLATING THIS SURFACE

2 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

3 PLATING RUNOUT

4 END OF PLATING

REPAIR

REF 2 3 4

125 (3.2 µm) ALL MACHINED SURFACES EXCEPT AS NOTED

BREAK SHARP EDGES 0.01-0.02 (0.25-0.51)R

SHOT PEEN: SHOT NO. 170-460
INTENSITY 0.006A
COVERAGE 2.0

MATERIAL: 9310 STEEL, CARBURIZED
(150-190 KSI CORE STRENGTH)

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

256T3315-1
Bevel Gear Assembly Repair
Figure 601

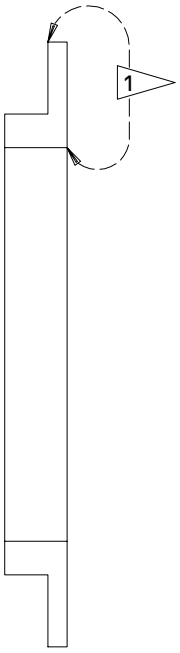
19949

SHIELD - REPAIR 5-1

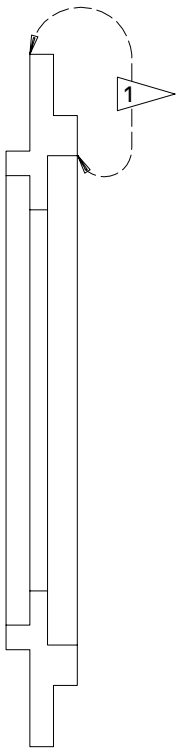
256T3316-1, -2, -3, -4

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.



-1, -3



-2, -4

REFINISH

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

1 APPLY PRIMER THESE SURFACES ONLY

MATERIAL: 4340 STEEL
(125-145 KSI)

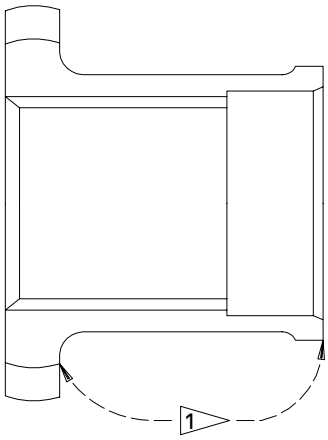
Shield Refinish
Figure 601

COUPLING HALF - REPAIR 6-1

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

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

MATERIAL: 4340 STEEL, 150-170 KSI

Coupling Half Refinish
Figure 601

19950

NAMEPLATE - REPAIR 7-1

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 38.

MISCELLANEOUS PARTS REFINISH - REPAIR 8-1

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

IPL FIG. & ITEM	MATERIAL	FINISH
Fig. 1		
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 except holes.
Coupling sleeve (35)	4140 steel 150-170 ksi	Cadmium plate (F-15.02).
Plug (95)	4340 steel 125-145 ksi	Cadmium plate (F-15.02).

Refinish Details
Figure 601

ASSEMBLY

1. Materials

NOTE: Equivalent substitutes may be used.

A. Grease -- MIL-G-23827 (Ref 20-60-03)

B. Sealant -- BMS 5-26 or MIL-S-8802 (Ref 20-60-04)

C. Lockwire -- MS20995C32

2. Equipment

NOTE: Equivalent substitutes may be used.

A. Bearing Width Checking Equipment -- A27040-1

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 (120) thickness (Fig. 701).

NOTE: If housing assembly (140), bearing (125), or bevel gear (87, 90) have not been replaced, shim(s) removed during disassembly may be reinstalled.

(1) Install bearing (125) 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.

(2) Add 3.150 inches (80.010 mm) to "A", then subtract this sum from the corresponding engraved dimension on housing assembly (140).

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

B. Install bearings (130, 125) on bevel gear assembly (87, 90) (Ref 20-50-03). Make sure direction of bearing (125) on gear is same as direction on checking fixture (Fig. 701).

C. Place shim(s) (120) in bearing recess of the housing and install the bevel gear and bearings.

D. Determine proper shim (65) thickness (Fig. 701).

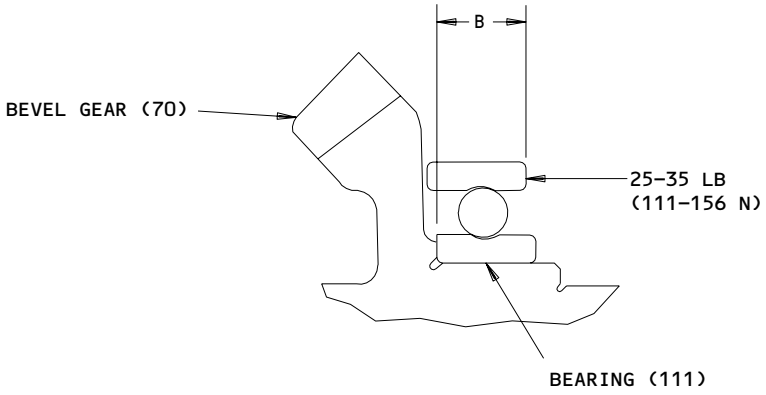
NOTE: If housing assembly (140), bearing cap (45), bevel gear (70, 72), or bearing (111) has not been replaced, shim(s) removed during disassembly may be reinstalled.

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

(2) Add 1.860 inches (47.244 mm) to "B", then subtract this sum from the sum of the corresponding engraved dimensions on housing assembly (140) and bearing cap (45).

(3) Select appropriate shim or shim set from table (Fig. 701).

E. Install bearings (111, 112) on bevel gear (70, 72) (Ref 20-50-03). Make sure direction of bearing (111) on gear is same as direction on checking fixture.



BEARING WIDTH MEASUREMENT

DIMENSION B SHOWN
DIMENSION A SIMILAR

SHIM OR SHIM SET		NOMINAL THICKNESS
USE WITH A	USE WITH B	
256T3321-1	256T3322-1	0.010 (0.254)
256T3321-2	256T3322-2	0.012 (0.305)
256T3321-3	256T3322-3	0.015 (0.381)
256T3321-4	256T3322-4	0.018 (0.457)
256T3321-5	256T3322-5	0.020 (0.508)
256T3321-1 AND -2	256T3322-1 AND -2	0.022 (0.559)
256T3321-1 AND -3	256T3322-1 AND -3	0.025 (0.635)
256T3321-2 AND -3	256T3322-2 AND -3	0.027 (0.686)
256T3321-1 AND -5	256T3322-1 AND -5	0.030 (0.762)
256T3321-2 AND -5	256T3322-2 AND -5	0.032 (0.813)
256T3321-3 AND -5	256T3322-3 AND -5	0.035 (0.889)
256T3321-4 AND -5	256T3322-4 AND -5	0.038 (0.965)
256T3321-5 AND -5	256T3322-5 AND -5	0.040 (1.016)

SHIM THICKNESS TABLE

Shim Selection
Figure 701

F. Place shim(s) (65) in bearing recess in bearing cap (45). Install bevel gear with bearings in housing, then install bearing cap with bolts (50) and washers (55).

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

H. Check that spline 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.

(1) Remove bolts (50) and washers (55) and remove bevel gear (70, 72) with bearing cap (45) from housing assembly (140).

(2) Fill gear teeth with grease.

(3) Install bearing cap (45) on housing assembly with bolts (50) and washers (55).

(4) Rotate either shaft by hand through at least two revolutions.

(5) Remove bolts (50) and washers (55) and remove bevel gear (70, 72) with bearing cap (45). Remove excess grease sticking to inside of housing, especially in drain grooves and holes.

(6) Install bevel (70, 72) and bearing cap (45) with bolts (50) and washers (55) using wet primer applied to bolt holes.

(7) Fill pocket areas of shields (60, 113, 115) with grease and slide shields onto shafts of bevel gears and seated against bearings (111, 112, 125), respectively. Wipe off excess grease.

(8) Install parts (20 thru 40) onto each bevel gear, then tighten nuts (25) to 400-450 pound-inches (45-51 Nm).

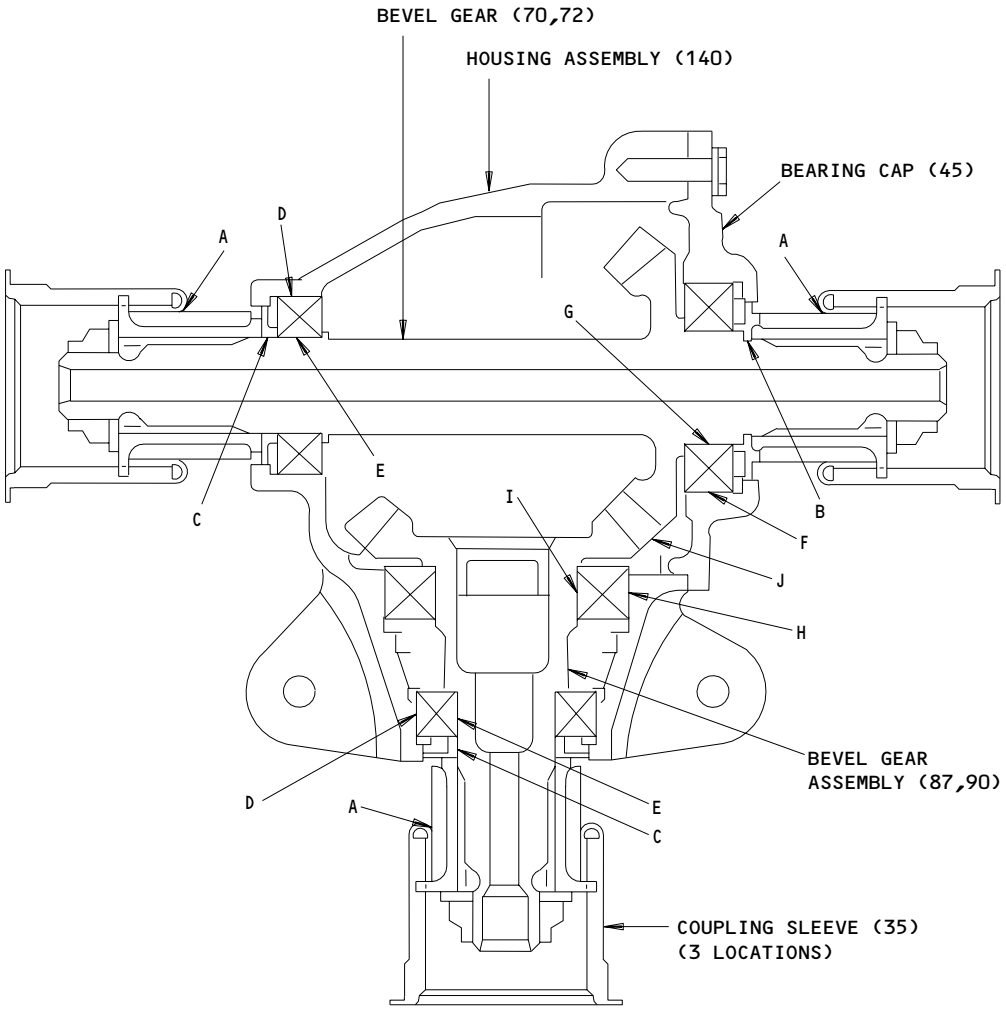
I. Install parts (5 thru 15) with wet primer applied to all areas of bolt holes.

J. Install lockwire on bolts (50) by double-twist procedure (Ref 20-50-02).

K. Fillet seal all cap-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.



Fits and Clearances
Figure 801 (Sheet 1)

19954

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	1.50 (38.10)	1.52 (38.61)	0.00 (0.00)	0.04 (1.02)			
	OD 40	1.48 (37.59)	1.50 (38.10)					
B	ID 60	1.1830 (30.048)	1.1850 (30.099)	0.0015 (0.038)	0.0038 (0.096)	1.1760 (29.870)	1.1885 (30.188)	0.0070 (0.178)
	OD 70, 72	1.1812 (30.003)	1.1815 (30.010)					
C	ID 113, 115	0.9860 (25.044)	0.9880 (25.095)	0.0013 (0.033)	0.0036 (0.091)	0.9810 (24.917)	0.9917 (25.189)	0.0070 (0.178)
	OD 70, 90, 72, 87	0.9844 (25.004)	0.9847 (25.011)					
D	ID 140	1.8506 (47.005)	1.8514 (47.026)	0.0002 (0.005)	0.0015 (0.039)	1.8476 (46.929)	1.8534 (47.076)	0.0030 (0.076)
	OD 112, 125	1.8499 (46.987)	1.8504 (47.000)					
E	ID 112, 125	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 70, 90, 72, 87	0.9844 (25.004)	0.9847 (25.011)					
F	ID 45	2.1656 (55.006)	2.1666 (55.032)	0.0002 (0.005)	0.0017 (0.043)	2.1626 (54.930)	2.1684 (55.077)	0.0030 (0.076)
	OD 111	2.1649 (54.988)	2.1654 (55.001)					
G	ID 111	1.1807 (29.990)	1.1811 (30.000)	−0.0008 (−0.020)	−0.0001 (−0.003)	1.1811 (30.000)	1.1812 (30.003)	0.0000 (0.000)
	OD 70, 72	1.1812 (30.003)	1.1815 (30.010)					

Fits and Clearances
Figure 801 (Sheet 2)

8864

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	
H	ID 140 OD 130	2.4411 (62.004) 2.4404 (61.986)	2.4421 (62.029) 2.4409 (61.999)	0.0002 (0.005)	0.0017 (0.043)	2.4381 (61.927)	2.4439 (62.075)	0.0030 (0.076)
I	ID 130 OD 87, 90	1.3775 (34.989) 1.3781 (35.004)	1.3780 (35.001) 1.3784 (35.011)	−0.0009 (−0.022)	−0.0001 (−0.003)	1.3780 (35.001)	1.3781 (35.004)	0.0000 (0.000)
J	70, 90, 72, 87 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 MILLIMETERS

Fits and Clearances
Figure 801 (Sheet 3)

L08179

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

8947

SPECIAL TOOLS, FIXTURES, AND EQUIPMENT

NOTE: Equivalent substitutes may be used.

1. A27040-1 -- Bearing Width Checking Equipment

2. A27046-3 -- Test Fixture

3. A27046-8 -- Test Equipment

ILLUSTRATED PARTS LIST

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

2. Indentures show parts relationships as follows:

    Assembly
      Detail Parts for Assembly
      Subassembly
      Attaching Parts for Subassembly
        Detail Parts for Subassembly

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

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

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

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

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

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

6. Parts Interchangeability

Optional (OPT)	The parts are optional to and interchangeable with other parts having the same item number.
Supersedes, Superseded By (SUPSDS, SUPSD BY)	The part supersedes and is not interchangeable with the original part.
Replaces, Replaced By (REPLS, REPLD BY)	The part replaces and is interchangeable with, or is an alternate to, the original part.

VENDORS

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

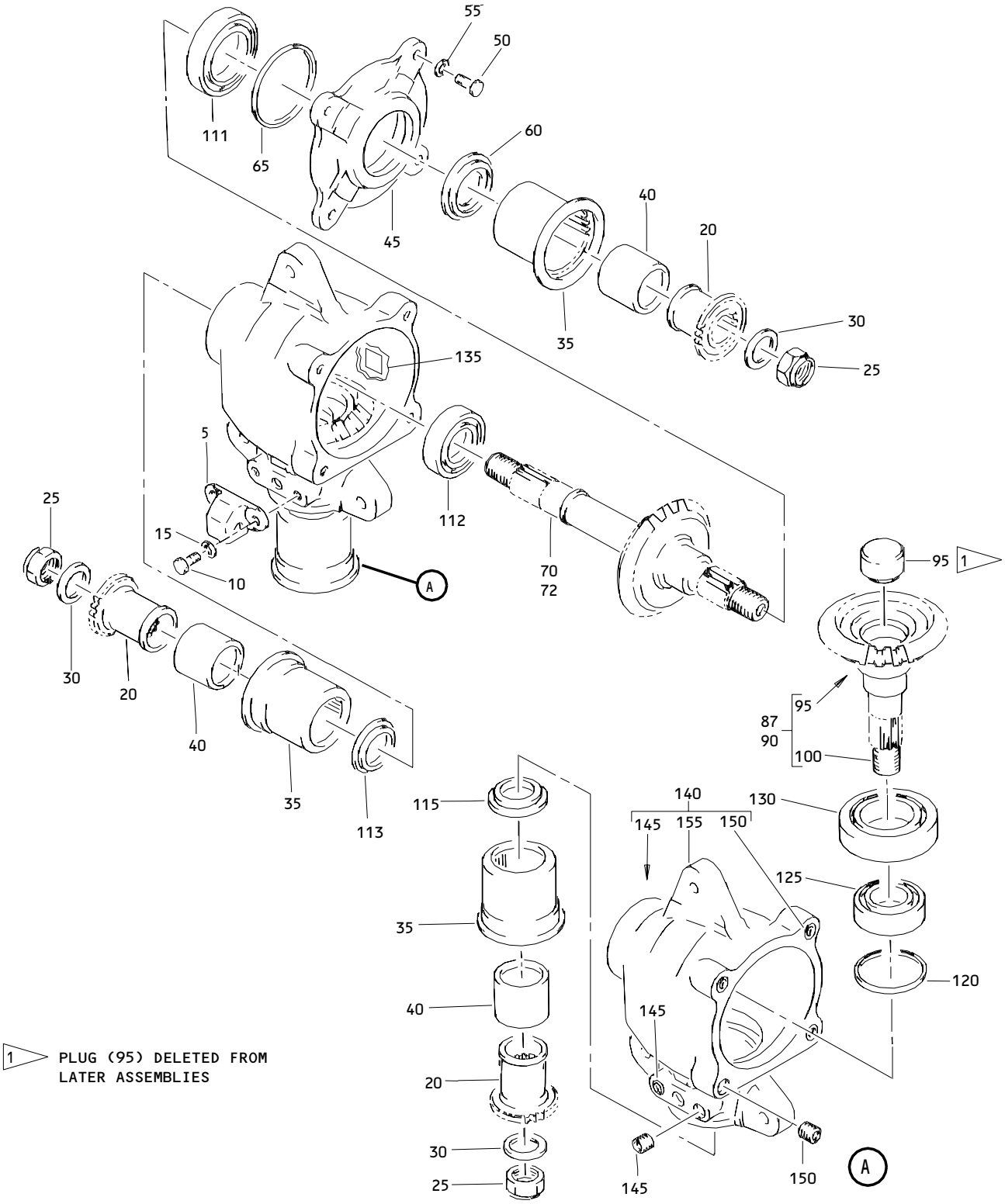
VENDORS

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

PART NUMBER	AIRLINE PART NO.	FIG.	ITEM	TTL REQ
AN960-1216		1	30	3
AN960PD10L		1	15	2
AN960PD416L		1	55	4
BACB10BA25PP		1	112	1
		1	125	1
BACB10BA30PP		1	111	1
BACB10BA35PP		1	130	1
BACN10JC12		1	25	3
BMN4122AD3-12		1	25	3
C105RRPP1P28LY1		1	112	1
C105RRPOZZ		1	112	1
		1	125	1
C105RRP1P28LY19		1	125	1
C106RRPP1P28LY1		1	111	1
C106RRPOZZ		1	111	1
C107RRPP1P28LY1		1	130	1
C107RRPOZZ		1	130	1
H10-12BAC		1	25	3
LL105KS		1	112	1
		1	125	1
LL106KS		1	111	1
LL107KS		1	130	1
LL107KSG20		1	130	1
MS21209F1-15P		1	145	2
MS21209F4-15P		1	150	4
NAS6603-2		1	10	2
NAS6604H4		1	50	4
PKTLL105P1		1	112	1
		1	125	1
PKTLL106P1		1	111	1
PKTLL107P1		1	130	1
RMLH9074-12		1	25	3
256T3310-2		1	1	RF
256T3310-5		1	67	1
256T3310-6		1	67A	1
256T3311-1		1	140	1
256T3311-2		1	155	1
256T3312-1		1	45	1
256T3313-1		1	5	1
256T3314-1		1	70	1

PART NUMBER	AIRLINE PART NO.	FIG.	ITEM	TTL REQ
256T3314-3		1	72	1
256T3315-1		1	90	1
256T3315-2		1	100	1
256T3315-3		1	87	1
256T3316-1		1	113A	1
		1	115A	1
256T3316-2		1	60A	1
256T3316-3		1	113	1
		1	115	1
256T3316-4		1	60	1
256T3320-1		1	135	1
256T3321-1		1	120	1
256T3321-2		1	120A	1
256T3321-3		1	120B	1
256T3321-4		1	120C	1
256T3321-5		1	120D	1
256T3322-1		1	65	1
256T3322-2		1	65A	1
256T3322-3		1	65B	1
256T3322-4		1	65C	1
256T3322-5		1	65D	1
256T3749-1		1	20	3
48FT1216		1	25	3
6005TT		1	112	1
		1	125	1
6006TT		1	111	1
6007TT		1	130	1
65B84033-18		1	40	3
65B84034-3		1	35	3
9105LLT1C1-01		1	112	1
		1	125	1
9105NPPFS428		1	112	1
		1	125	1
9106LLT1C1-01		1	111	1
9107LLT1C1-01		1	130	1
9107NPPFS4281		1	130	1
993L05		1	112	1
		1	125	1
993L06		1	111	1
993L07		1	130	1



Trailing Edge Flap Drive Tee Gearbox Assembly
Figure 1

	FIG. & ITEM	PART NO.	AIRLINE PART NUMBER	NOMENCLATURE 1234567	EFF CODE	QTY PER ASSY
	01-					
	-1	256T3310-2		GEARBOX ASSY-TE FLAP DRIVE TEE		RF
	5	256T3313-1		.DRAIN		1
	10	NAS6603-2		.BOLT		2
	15	AN960PD10L		.WASHER		2
	20	256T3749-1		.COUPLING HALF		3
R	25	H10-12BAC		.NUT- (V15653) (SPEC BACN10JC12) (OPT RMLH9074-12 (V72962)) (OPT 48FT1216 (V56878)) (OPT BMN4122AD3-12 (V97928))		3
	30	AN960-1216		.WASHER		3
	35	65B84034-3		.SLEEVE-CPLG		3
	40	65B84033-18		.SLEEVE-MOLDED		3
	45	256T3312-1		.CAP-BRG		1
	50	NAS6604H4		.BOLT		4
	55	AN960PD416L		.WASHER		4
	60	256T3316-4		.SHIELD- (OPT ITEM 60A)		1
	-60A	256T3316-2		.SHIELD- (OPT ITEM 60)		1
	65	256T3322-1		.SHIM-(THICKNESS TO BE DETERMINED UPON INSTALLATION) (MFD FROM CRES SH A1S1 301 MIL-S-5059 F-17.09 .010 IN 1.5 IN X 1.5 IN. CONDITION HARD SURFACE NO 2B)		AR
	-65A	256T3322-2		.SHIM-(THICKNESS TO BE DETERMINED UPON INSTALLATION) (MFD FROM CRES SH A1S1 301 MIL-S-5059 F-17.09 .012 IN 1.5 IN X 1.5 IN. CONDITION HARD SURFACE NO 2B)		AR

	FIG. & ITEM	PART NO.	AIRLINE PART NUMBER	NOMENCLATURE 1234567	EFF CODE	QTY PER ASSY
	01-					
	-65B	256T3322-3		.SHIM-(THICKNESS TO BE DETERMINED UPON INSTALLATION) (MFD FROM CRES SH A1S1 301 MIL-S-5059 F-17.09 .015 IN 1.5 IN X 1.5 IN. CONDITION HARD SURFACE NO 2B)		AR
	-65C	256T3322-4		.SHIM-(THICKNESS TO BE DETERMINED UPON INSTALLATION) (MFD FROM CRES SH A1S1 301 MIL-S-5059 F-17.09 .018 IN 1.5 IN X 1.5 IN. CONDITION HARD SURFACE NO 2B)		AR
	-65D	256T3322-5		.SHIM-(THICKNESS TO BE DETERMINED UPON INSTALLATION) (MFD FROM CRES SH A1S1 301 MIL-S-5059 F-17.09 .020 IN 1.5 IN X 1.5 IN. CONDITION HARD SURFACE NO 2B)		AR
R	67	256T3310-5		.KIT ASSY-SUBSTITUTE (OPT ITEM 67A)		1
R	-67A	256T3310-6		.KIT ASSY-SUBSTITUTE (OPT ITEM 67)		1
R	70	256T3314-1		..GEAR-BEVEL (USED ON ITEM 67)		1
R	72	256T3314-3		..GEAR-BEVEL (USED ON ITEM 67A)		1
	75	LL106KSG20		DELETED		
	80	9105NPPFS428		DELETED		
	85	256T3316-3		DELETED		
	-85A	256T3316-1		DELETED		
R	87	256T3315-3		..GEAR-BEVEL (USED ON ITEM 67A)		1
R	90	256T3315-1		..GEAR ASSY-BEVEL (USED ON ITEM 67)		1
	95	256T3318-1		DELETED		
R	100	256T3315-2		...GEAR-BEVEL		1

	FIG. & ITEM	PART NO.	AIRLINE PART NUMBER	NOMENCLATURE 1234567	EFF CODE	QTY PER ASSY
	01-					
R	111	LL106KSG20		.BEARING- (V38443) (SPEC BACB10BA30PP) (OPT LL106KS (V38443)) (OPT 6006TT (V43991)) (OPT 9106LLT1C1-01 (V21760)) (OPT 9106NPPFS428 (V21335)) (OPT 993L06 (V29337)) (OPT PKTLL106P1 (V78118)) (OPT C106RRP0ZZ (V40920)) (OPT C106RRPP1P28LY1 (V40920))		1
R	112	9105NPPFS428		.BEARING- (V21335) (SPEC BACB10BA25PP) (OPT PKTLL105P1 (V78118)) (OPT C105RRPP1P28LY1 (V40920)) (OPT LL105KS (V38443)) (OPT 6005TT (V43991)) (OPT 9105LLT1C1-01 (V21760)) (OPT 993L05 (V29337)) (OPT C105RRP0ZZ (V40920))		1
R	113	256T3316-3		.SHIELD- (OPT ITEM 113A)		1
R	-113A	256T3316-1		.SHIELD- (OPT ITEM 113)		1
R	115	256T3316-3		.SHIELD- (OPT ITEM 115A)		1
	-115A	256T3316-1		.SHIELD- (OPT ITEM 115)		1

	FIG. & ITEM	PART NO.	AIRLINE PART NUMBER	NOMENCLATURE 1234567	EFF CODE	QTY PER ASSY
	01-120	256T3321-1		.SHIM-(THICKNESS TO BE DETERMINED UPON INSTALLATION)		AR
	-120A	256T3321-2		.SHIM-(THICKNESS TO BE DETERMINED UPON INSTALLATION)		AR
	-120B	256T3321-3		.SHIM-(THICKNESS TO BE DETERMINED UPON INSTALLATION)		AR
	-120C	256T3321-4		.SHIM-(THICKNESS TO BE DETERMINED UPON INSTALLATION)		AR
	-120D	256T3321-5		.SHIM-(THICKNESS TO BE DETERMINED UPON INSTALLATION)		AR
R	125	9105NPPFS428		.BEARING- (V21335) (SPEC BACB10BA25PP) (OPT LL105KS (V38443)) (OPT 6005TT (V43991)) (OPT 9105LLT1C1-01 (V21760)) (OPT 993L05 (V29337)) (OPT PKTLL105P1 (V78118)) (OPT C105RRP0ZZ (V40920)) (OPT C105RRP1P28LY196 (V40920))		1

	FIG. & ITEM	PART NO.	AIRLINE PART NUMBER	NOMENCLATURE 1234567	EFF CODE	QTY PER ASSY
	01-					
R	130	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 C107RRP0ZZ (V40920)) (OPT C107RRPP1P28LY196 (V40920))		1
	135	256T3320-1		.NAMEPLATE		1
	140	256T3311-1		.HOUSING ASSY		1
	145	MS21209F1-15P		..INSERT		2
	150	MS21209F4-15P		..INSERT		4
	155	256T3311-2		..HOUSING		1

- Item Not Illustrated

*[1] Plug 256T3318-1 deleted on later assemblies.