TO: ALL HOLDERS OF TRAILING EDGE FLAP DRIVE OFFSET GEARBOX ASSEMBLY COMPONENT MAINTENANCE MANUAL 27-51-44

REVISION NO. 8 DATED JAN 01/94

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
102	Revised the backlash requirement to 0.006-0.013 inch per gear mesh for the backlash measured with the clamp A27046-58.

TRAILING EDGE FLAP DRIVE OFFSET GEARBOX ASSY

PART NUMBER 256T3570-3,-5

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
	27-14	PRRB10112	JUL 10/81 JAN 01/90

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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 May 21/84
Assembly May 21/84

TRAILING EDGE FLAP DRIVE OFFSET GEARBOX ASSEMBLY

DESCRIPTION AND OPERATION

1. The offset gearbox transmits torque through torque drive shafts from the power drive unit to the flap actuators on each wing. Power is delivered through the gearbox in an angular path by means of sliding couplings and a bevel gear train with an overall gear ratio of 1:1.

2. Leading Particulars (approximate)

   Length -- 10 inches
   Width -- 10 inches
   Height -- 5 inches
   Operating RPM -- 600-700 RPM

TESTING AND TROUBLE SHOOTING

1. Test Equipment and Materials

   NOTE: Equivalent substitutes may be used.

   A. Test Fixture -- A27046-176, -177

   B. Test Equipment -- A27046-8 (includes -53 tower assembly, -54 crank assembly, -55 bracket, -58 clamp assembly, and -126 weight assemblies)

   C. Grease -- MIL-G-21164 (Optional: MIL-G-23827)

   D. Sealant -- BMS 5-26 (Ref 20-60-04)

   E. Lockwire -- MS20995C32

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

3. Binding and Roughness Check

   A. Apply an 8-12 pound tension load axially to the output shaft.

   B. With no torque 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.

   C. If no corrective action is required, proceed with no-load torque check (par. 4); otherwise, replace parts per step D.

   D. If roughness or binding exists, replace bearings (45, 100, 105, IPL Fig. 1) as follows:

      (1) Completely disassemble unit per DISASSEMBLY and remove gears and bearings.

      (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 bearings and gears, if necessary, and assemble per ASSEMBLY steps 2.A. thru 2.T.

4. No-Load Torque Check

A. Apply an 8-12 pound tension load axially to the output shaft.

B. With no torque on the output shaft, the torque required at the input shaft to breakout and rotate the input shaft, through a minimum of 720 degrees in both directions, shall not exceed 2.5 pound-inches.

5. Backlash Check (Ref IPL Fig. 1)

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

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

A. Install gearbox assembly on the test fixture assembly.

NOTE: Refer to usage placard for applicability.

B. Attach clamps A27046-58, crank A27046-54, and brackets A27046-55 to shafts of bevel gears (115, 120 or 50, 55). Secure parts with washers (75) and nuts (70).

C. Using weight A27046-126, or equivalent, apply 25-35 pounds outward axial load to the gear shaft.

D. Using crank, apply 5-10 lb-in. torque to the shaft in each direction. Check that the backlash measured at the scribe line on the clamp A27046-58 is 0.006-0.013 inch per gear mesh or 0.003-0.007 inch per gear mesh at the pitchline for units in service, or 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 opposite direction.

NOTE: Backlash specified is equivalent to 0.003-0.007 inch per gear mesh for units in service, or for overhauled units, measured at the gear pitch line. Do not include internal splines backlash when measuring individual gear set backlash.

E. Repeat steps B thru D for the opposite end of the gearbox.

F. Repeat no-load torque check in step 4.

G. If no corrective procedures are required, check lubrication per par. 6. To correct backlash, adjust shim thickness as follows:

(1) Disassemble unit per DISASSEMBLY steps 2.A. and 2.B.

(2) Adjust thickness of shims (40) as required to increase or decrease backlash. Remove (or add) shims (60 thru 63) in equal amount as added (or removed) to shims (40).

NOTE: To decrease backlash, increase shim (40) thickness. To increase backlash, decrease shim thickness.

(3) Attach cover (35) and bracket (23) with bolts (21, 25) and washers (22, 30). Tighten bolts to 50-70 lb-in.

(4) Repeat backlash check.

6. Unless already performed, check that gear teeth and splines are filled with grease and assemble unit per ASSEMBLY steps 2.U. thru 2.AB. Lubricate as necessary.

CAUTION: DO NOT FILL HOUSING WITH GREASE OR OPERATION OF GEARBOX MAY BE ADVERSELY AFFECTED.

A. Remove gears (50) without separating halves of housing assembly (140) per DISASSEMBLY steps 2.A., 2.B., and 2.D.

B. Fill gear teeth and coat splines of shaft (65) with grease.

C. Secure covers (35) and bracket (23) with bolts (21, 25) and washers (22, 30). Tighten bolts to 50-70 lb-in.

D. Seal and lockwire per ASSEMBLY steps 2.W. thru 2.AB.

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

NOTE: The following parts are recommended for replacement. Unless otherwise noted, actual replacement of parts may be based on inservice experience.

A. Lockwire

B. Molded sleeve (85)

C. Nut (70, 135)

2. Disassemble Gearbox Assembly (IPL, Fig. 1)

CAUTION: RECORD THE LOCATION OF EACH GEAR FOR REFERENCE DURING ASSEMBLY. GEARS (50, 55, 115, 120) ARE SIMILAR IN APPEARANCE AND ARE PHYSICALLY INTERCHANGEABLE. DAMAGE TO THE GEARBOX COULD RESULT IF GEARS ARE NOT INSTALLED IN THE CORRECT LOCATIONS DURING ASSEMBLY.

A. Remove bolts (10), washers (15) and drain cover (20).

B. Remove bracket (23) by removing bolts (21) and washers (22). Remove covers (35) and shims (40) by removing bolts (25) and washers (30). Record thickness of shims removed to facilitate reassembly.

CAUTION: DO NOT ALLOW BEVEL GEARS (115, 120) TO SLIP FROM HOUSINGS DURING SEPARATION OF HOUSING ASSEMBLY (140 or 145).

C. Separate housing assembly (140 or 145) by moving bolts (125), washers (130), and nuts (135).

D. Remove bevel gears (50, 55) and shims (60, 61, 62, 63) from shaft (65). Record thickness of shims to facilitate reassembly.

E. Remove bearings (45) from bevel gears (50, 55).

F. Remove nut (70) and washer (75) from bevel gears (115, 120) remaining in housing halves.

G. Slide out coupling (80) and remove sleeve (85) from coupling. Remove sleeve (90) and bearing shield (95) from bevel gears.

H. Remove bevel gears (115, 120) and shims (110) from housings (175, 195). Record thickness of shims to facilitate reassembly.

I. Remove bearings (100, 105) from bevel gears (115, 120).

J. Do not remove pins (138, 190) or inserts (155, 170A) from housings (175, 195) unless necessary for repair or replacement.

CLEANING

1. Clean all parts except bearings (45, 100, 105, IPL Fig. 1) using standard industry practices and information contained in 20-30-03.

2. Clean bearings (45, 100, 105, IPL Fig. 1) per manufacturer's instructions.

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. Penetrant check per 20-20-02 (IPL Fig. 1)

   A. Drain cover (20).

   B. Housing assy (140, 145, 185)

4. Magnetic particle check per 20-20-01 (IPL Fig. 1)

   A. Gear (55, 115, 120)

   B. Shaft (65)

   C. Coupling (80)

   D. Bearing shield (95)

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 (85) and replace if dacron cover is torn, worn, or frayed.

REPAIR - GENERAL

1. Content

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

P/N	NAME	REPAIR
256T3414	BEARING SHIELD	1-1
256T3571	HOUSING	2-1
256T3574	COVER	3-1
256T3575 256T3578	BEVEL GEAR	4-1
256T3576 256T3577	BEVEL GEAR	5-1
256T3579	SHAFT	6-1
65B81978	COVER	7-1
256T3749	COUPLING HALF	8-1
256T3582	NAMEPLATE	9-1
	MISC PARTS REFINISH	10-1

2. Standard Practices

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

20-10-01 Repair and Refinish of High Strength Steel Parts
20-10-04 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
20-41-02 Application of Chemical and Solvent Resistant Finishes
20-41-03 Application of Corrosion Preventives to Closed End Tubes
20-42-02 Low Hydrogen Embrittlement Cadmium-Titanium Alloy Plating
20-42-05 Bright Cadmium Plating
20-50-03 Bearing Installation and Retention
20-50-10 Application of Stencils, Insignia, Silk Screen, Part Numbering and Identification Markings
20-50-12 Application of Adhesives

3. Materials

NOTE: Equivalent substitutes may be used.

A. Corrosion Preventive Compound -- MIL-C-11796, Class 1 (Ref 20-60-02)

B. Primer -- BMS 10-11, Type 1 (Ref 20-60-02)

C. Adhesive -- BMS 5-92, Type 3 (Ref 20-60-04)

D. Grease -- MIL-G-21164 (Optional: MIL-G-23827) (Ref 20-60-03)

4. Dimensioning Symbols

A. Standard True Position Dimensioning Symbols used in applicable repair procedures are shown in Fig. 601.

—	STRAIGHTNESS
▱	FLATNESS
⊥	PERPENDICULARITY (OR SQUARENESS)
//	PARALLELISM
○	ROUNDNESS
⌭	CYLINDRICITY
⌒	PROFILE OF A LINE
⌓	PROFILE OF A SURFACE
◎	CONCENTRICITY
⌯	SYMMETRY
∠	ANGULARITY
↗	RUNOUT
⌖	THEORETICAL EXACT POSITION OF A FEATURE (TRUE POSITION)
∅	DIAMETER
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)
Ⓢ	REGARDLESS OF FEATURE SIZE (RFS)
Ⓟ	PROJECTED TOLERANCE ZONE

EXAMPLES

[— | 0.002]	STRAIGHT WITHIN 0.002
[⊥ | B | 0.002]	PERPENDICULAR TO B WITHIN 0.002
[// | A | 0.002]	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
[⌒ | A | 0.006]	EACH LINE ELEMENT OF THE SURFACE AT ANY CROSS SECTION MUST LIE BETWEEN TWO PROFILE BOUNDARIES 0.006 INCH APART IN RELATION TO DATUM PLANE A
[⌓ | A | 0.020]	SURFACES MUST LIE WITHIN PARALLEL BOUNDARIES 0.02 INCH APART AND EQUALLY DISPOSED ABOUT TRUE PROFILE
[◎ | C | ∅ 0.0005]	CONCENTRIC TO C WITHIN 0.0005 DIAMETER (FULL INDICATOR MOVEMENT)
[⌯ | A | 0.010]	SYMMETRICAL WITH A WITHIN 0.010
[∠ | A | 0.005]	ANGULAR TOLERANCE 0.005 WITH A
[⌖ | B | ∅ 0.002 Ⓢ]	LOCATED AT TRUE POSITION WITHIN 0.002 DIA IN RELATION TO DATUM B, REGARDLESS OF FEATURE SIZE
[⊥ | A | ∅ 0.010 Ⓜ] [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	EXACT DIMENSION IS 2.000

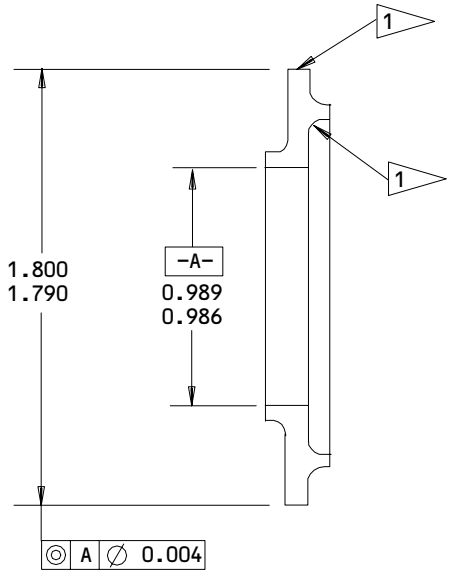
True Position Dimensioning Symbols
Figure 601

BEARING SHIELD - REPAIR 1-1

256T3414-1

1. Plating Repair

NOTE: Repair consists of restoration of original finish. Refer to Refinish instructions, Fig. 601, and to REPAIR_GEN for list of applicable standard practices.



REFINISH

CADMIUM PLATE (F-15.02) ALL OVER. APPLY ONE COAT BMS 10-11, TYPE 1, PRIMER TO SURFACES INDICATED BY 1

MATERIAL: 4340 STEEL, 125-145 KSI

125 ALL MACHINED SURFACES

BREAK EDGES APPROXIMATELY 0.008R

ALL DIMENSIONS APPLY AFTER PLATING

ALL DIMENSIONS ARE IN INCHES

Bearing Shield Repair
Figure 601

13758

HOUSING ASSEMBLY - REPAIR 2-1

256T3571-1, -2

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

1. Pin Replacement (IPL Fig. 1)

   A. Remove pins (138, 190).

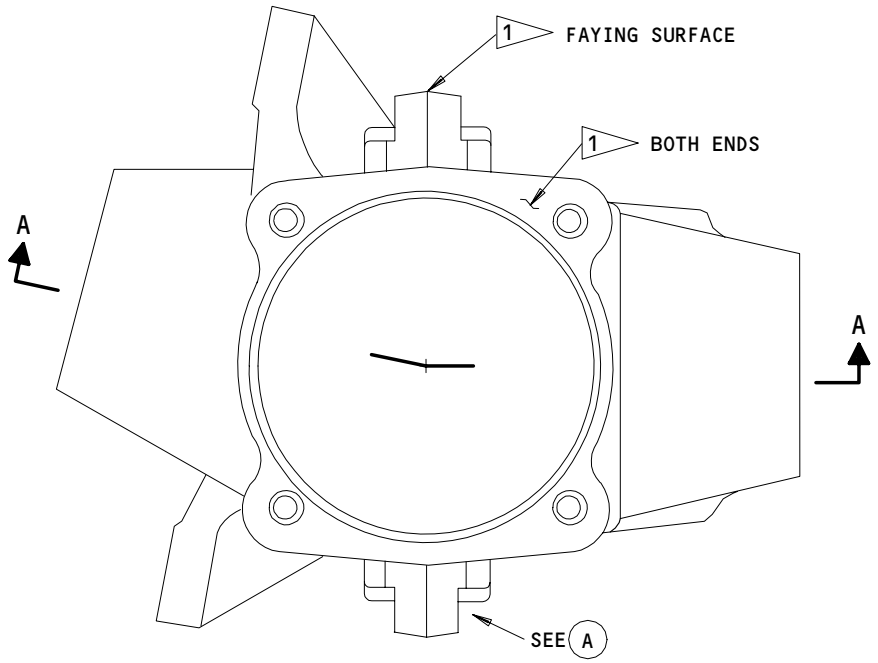
      NOTE: Pin (138) is not part of assembly but is included to simplify repair instructions.

   B. Coat pins and mating holes with wet BMS 10-11, type 1 primer and insert to dimension shown in Fig. 601.

   C. Swage over end of hole, if required, for positive pin retention.

2. Plating Repair

   A. Repair consists of restoration of original finish. Refer to Refinish instructions, Fig. 601.



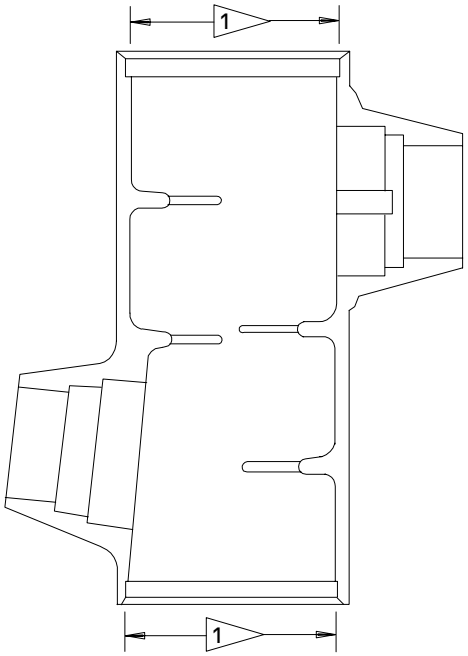
REFINISH

APPLY ONE COAT BMS 10-11, TYPE 1, PRIMER ON ALL EXTERNAL SURFACES EXCEPT THOSE NOTED.

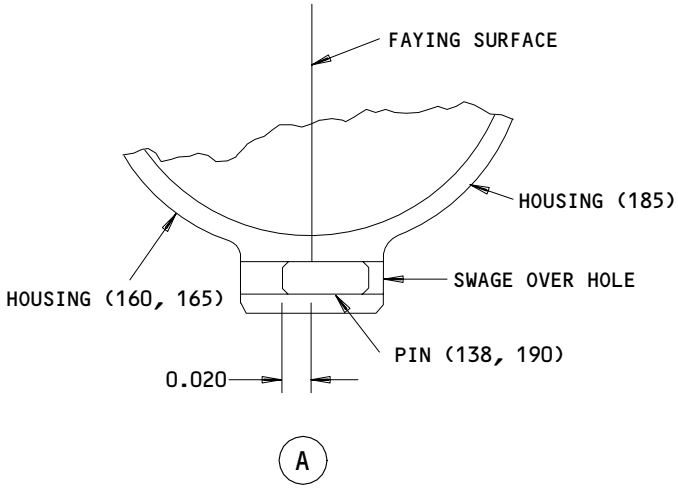
1 NO PRIMER THIS SURFACE

MATERIAL: AL ALLOY

ALL DIMENSIONS ARE IN INCHES



A-A



256T3571-1,-2

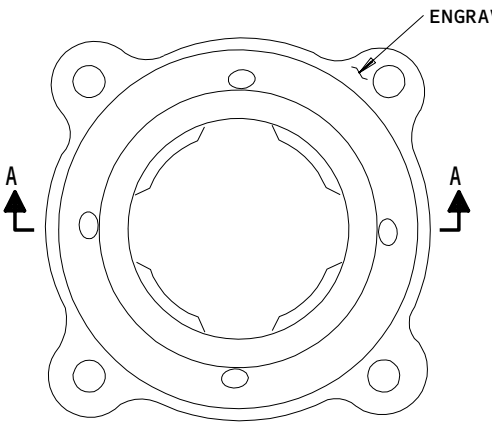
Housing Assy Repair
Figure 601

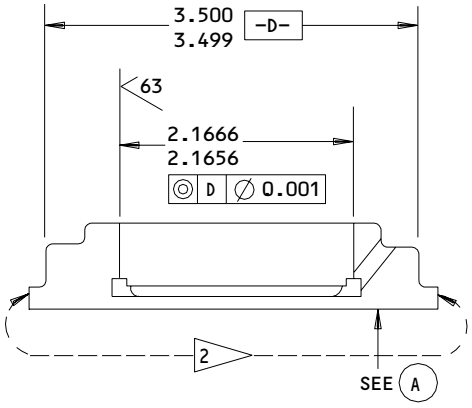
COVER - REPAIR 3-1

256T3574-1

1. Plating Repair

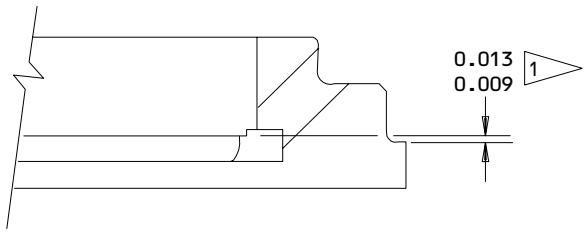
NOTE: Repair consists of restoration of original finish. Refer to Refinish instructions, Fig. 601, and to REPAIR-GEN for list of applicable standard practices.





A-A

ENGRAVED	ACTUAL DIM
9	0.0090 - 0.0099
0	0.0100 - 0.0109
1	0.0110 - 0.0119
2	0.0120 - 0.0130



MATERIAL: AL ALLOY

125 ALL MACHINED SURFACES UNLESS NOTED

BREAK SHARP EDGES APPROXIMATELY 0.008 R

ALL DIMENSIONS ARE IN INCHES

REFINISH

ANODIZE (F-17.05) ALL OVER AND APPLY ONE COAT OF BMS 10-11, TYPE 1, PRIMER TO EXTERNAL SURFACE INDICATED BY 2

1 MEASURE DIMENSION INDICATED AND COMPARE TO RANGE OF DIMENSIONS IN TABLE. VIBRO-ENGRAVE CORRESPONDING CODE IN LOCATION SHOWN.

Cover Repair
Figure 601

13896

BEVEL GEAR - REPAIR 4-1

256T3575-1
256T3578-1

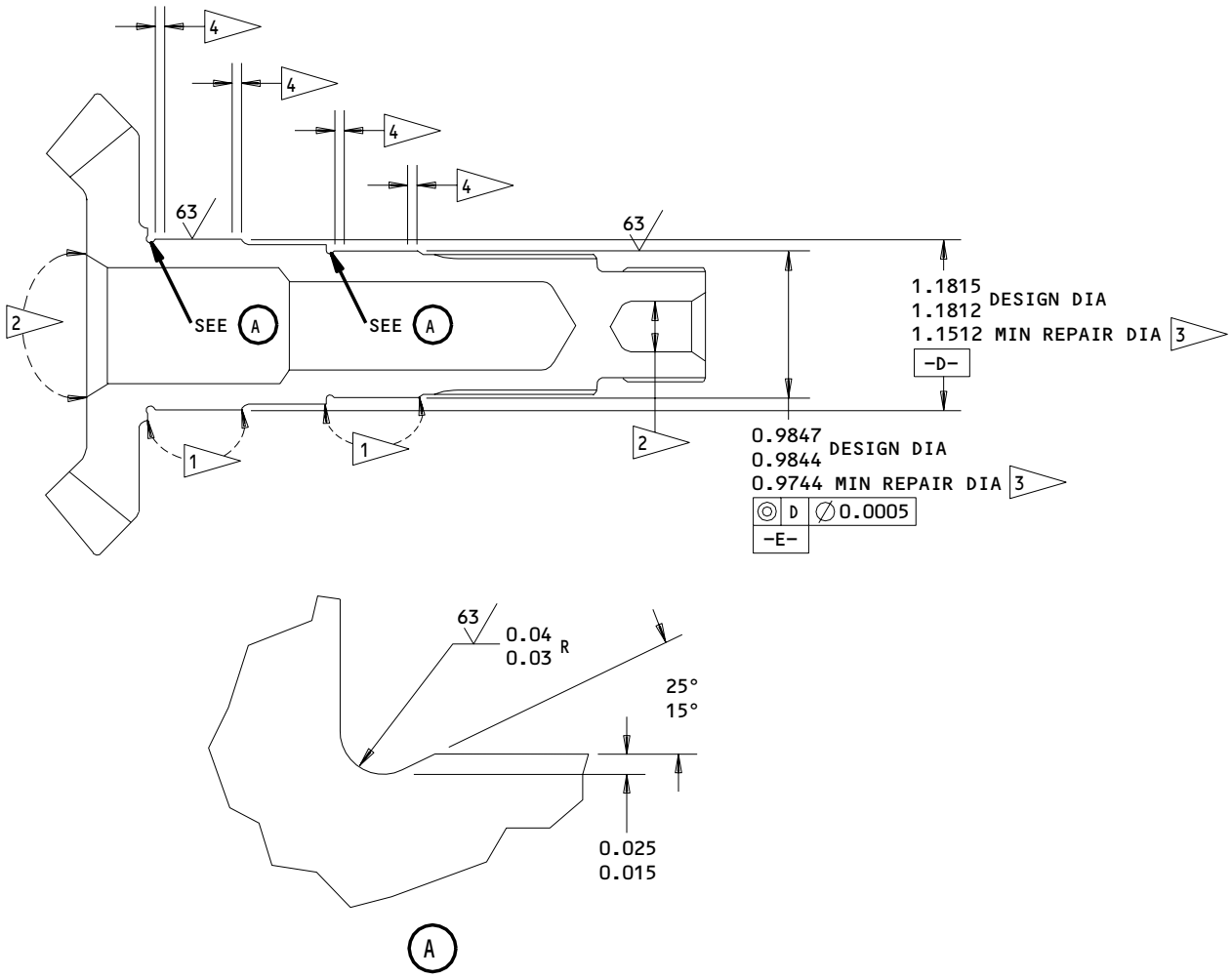
NOTE: Refer to REPAIR-GEN for list of applicable standard practices. For repair of surfaces which may only require restoration of original finish, refer to Refinish instructions, Fig. 601.

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 inch for the 1.1812-1.1815 diameter bearing seat or 0.005 inch for the 0.9844-0.9847 diameter bearing seat after grinding.



REFINISH

CADMIUM PLATE (F-15.23) ALL OVER EXCEPT UNCONTROLLED THICKNESS ALLOWABLE IN BORE.

1 NO FINISH THIS SURFACE

2 APPLY LIGHT ZINC PHOSPHATE COAT (F-14.14). APPLY TWO COATS OF BMS 10-11, TYPE 1, PRIMER (F-20.03) FOLLOWED BY CORROSION PREVENTIVE COMPOUND (F-19.03)

3 BUILD UP WITH CHROME PLATE (F-15.03) AND GRIND TO DESIGN DIMENSIONS AND FINISH SHOWN. OBSERVE RUNOUT AT EDGES AND RELIEF GROOVES AS INDICATED

4 PLATING RUNOUT 0.00-0.08

REPAIR

REF 3 4

MATERIAL: 9310 STEEL (GEAR TEETH CARBURIZED 0.030-0.050 DEEP) 150-190 KSI

63 GEAR AND SPLINE TOOTH PROFILES

125 ALL MACHINED SURFACES AND BORES EXCEPT AS NOTED

ALL DIMENSIONS ARE IN INCHES

256T3575-1
256T3578-1
Bevel Gear Repair
Figure 601

13900

BEVEL GEAR - REPAIR 5-1

256T3576-1
256T3577-1

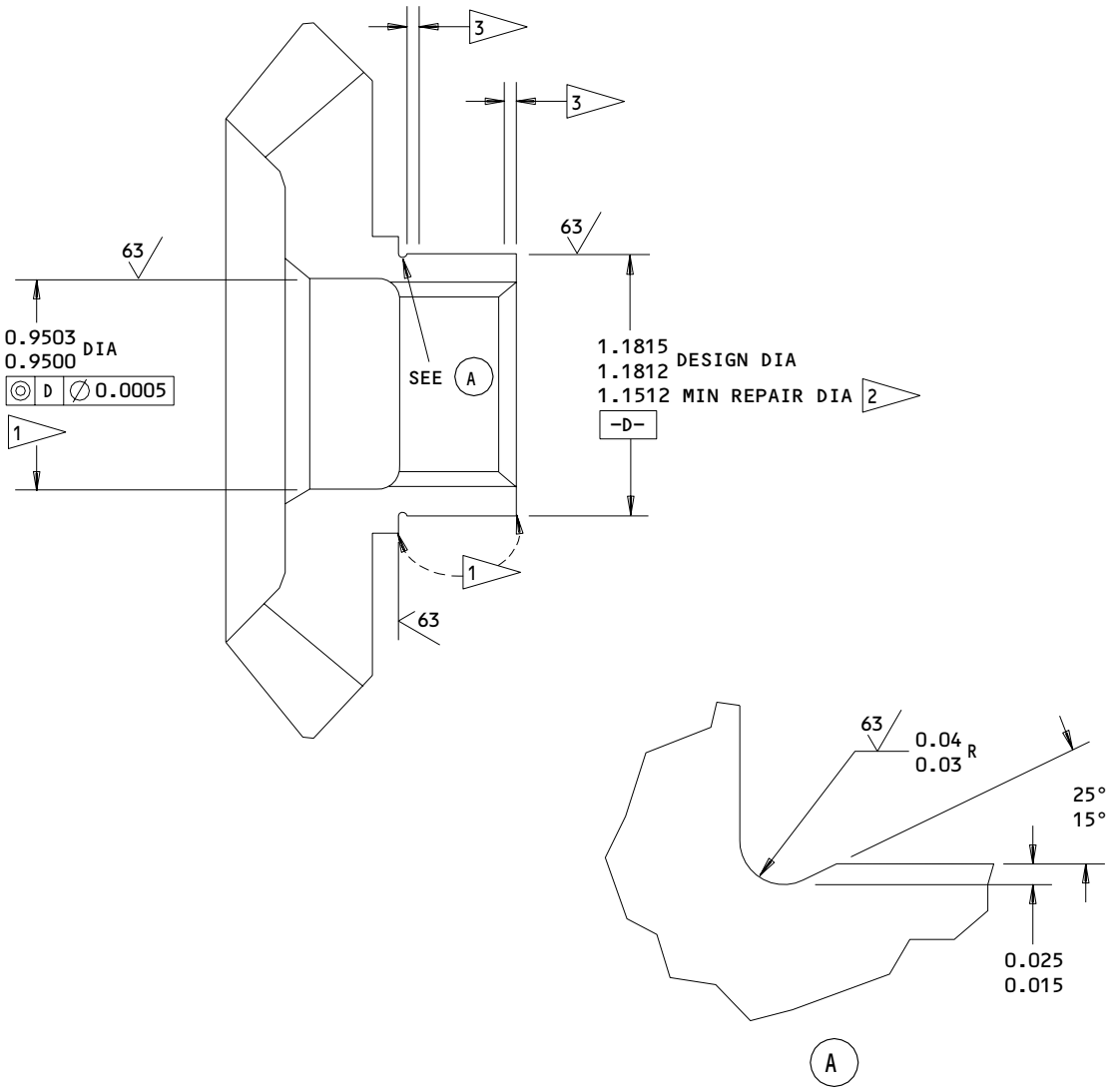
NOTE: Refer to REPAIR-GEN for list of applicable standard practices. For repair of surfaces which may only require restoration of original finish, refer to Refinish instructions, Fig. 601.

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 inch after grinding.



REFINISH

CADMIUM PLATE ALL OVER (F-15.23) EXCEPT NO PLATING ON SURFACES INDICATED BY 1

2 BUILD UP WITH CHROME PLATE (F-15.03) AND GRIND TO DESIGN DIMENSIONS AND FINISH SHOWN. OBSERVE RUNOUT AT EDGES AND RELIEF GROOVES AS INDICATED

3 PLATING RUNOUT 0.00-0.08

REPAIR

REF 2 3

MATERIAL: 9310 STEEL (GEAR TEETH CARBURIZED 0.030-0.050 DEEP) 150-190 KSI

63 ON GEAR TEETH AND SPLINE TEETH

BREAK SHARP EDGES APPROXMATELY 0.008 R

ALL DIMENSIONS ARE IN INCHES

256T3576-1
256T3577-1
Bevel Gear Repair
Figure 601

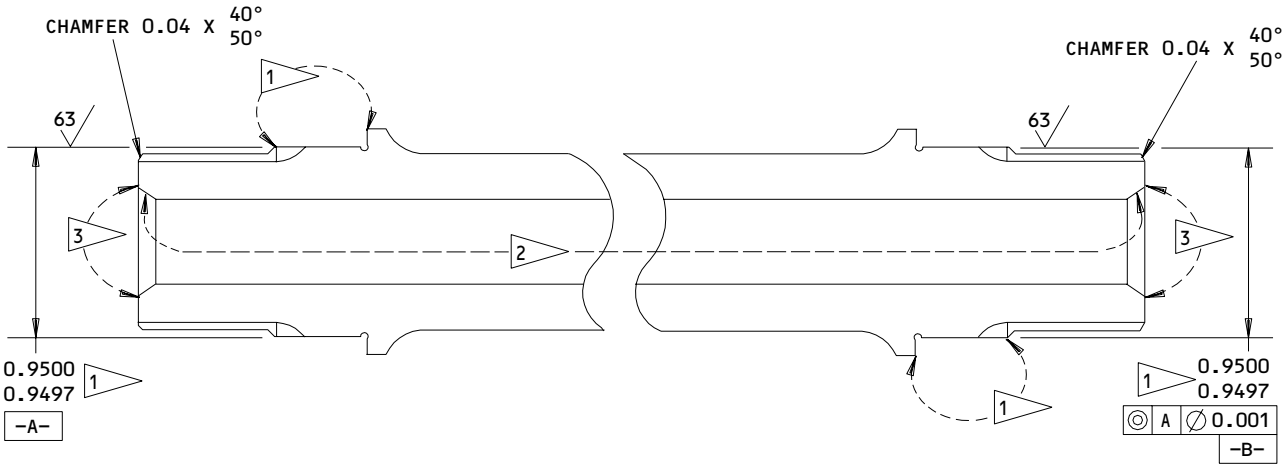
13902

DRIVESHAFT - REPAIR 6-1

256T3579-1

1. Plating Repair

NOTE: Repair consists of restoration of original finish. Refer to Refinish instructions, Fig. 601 and to REPAIR-GEN for list of applicable standards.



REFINISH

CADMIUM-TITANIUM PLATE (F-15.01)
ALL OVER EXCEPT AS NOTED.

1 NO PLATING THIS SURFACE

2 APPLY LIGHT ZINC PHOSPHATE COAT (14.14). APPLY TWO COATS OF BMS 10-11, TYPE 1, PRIMER (F-20.03) FOLLOWED BY CORROSION PREVENTIVE COMPOUND (F-19.03) OR GREASE MIL-G-21164 (OPTIONAL: MIL-G-23827)

MATERIAL: 4330M STEEL, 220-240 KSI

GLASS BEAD SHOT PEEN ALL EXTERNAL SURFACES -

BEAD SIZE 165
INTENSITY 0.006A
COVERAGE 2.0

125 ALL MACHINED SURFACES EXCEPT AS NOTED

63 SPLINE TOOTH PROFILES

BREAK SHARP EDGES APPROXIMATELY 0.008 R

3 FADE OUT GLASS PEENING

ALL DIMENSIONS ARE IN INCHES

Drive Shaft Repair
Figure 601

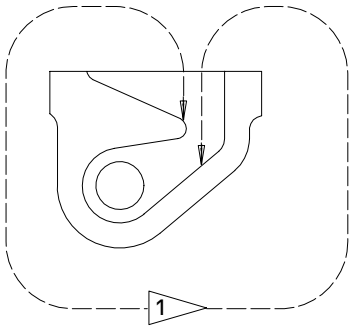
13914

COVER - REPAIR 7-1

65B81978-3

1. Plating Repair

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



REFINISH

CHROMIC ACID ANODIZE (F-17.02) ALL OVER
AND APPLY 1 COAT OF BMS 10-11, TYPE 1 PRIMER
(F-20.02) TO SURFACES INDICATED BY 1

MATERIAL: AL ALLOY

Cover Refinish
Figure 601

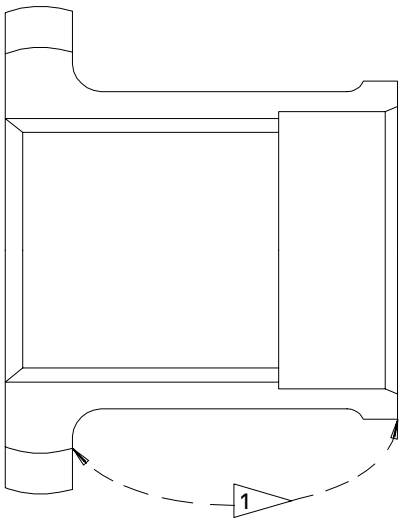
13915

COUPLING HALF - REPAIR 8-1

256T3749-1

1. Plating Repair

NOTE: Repair consists of restoration of original finish. Refer to Refinish instructions, Fig. 601 and to REPAIR-GEN for list of applicable standards.



REFINISH

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

MATERIAL: 4340 STEEL, 150-170 KSI

Coupling Half Repair
Figure 601

14030

NAMEPLATE - REPAIR 9-1

256T3582-1

1. Nameplate Replacement

   A. Remove nameplate if damaged.

   B. Steel stamp date of manufacture, serial number and assembly number on nameplate per 20-50-10. Bend to conform to housing contour.

   C. Using adhesive, apply nameplate to same area from which damaged nameplate was removed.

MISCELLANEOUS PARTS REFINISH - REPAIR 10-1

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

IPL FIG. & ITEM	MATERIAL	FINISH
Fig. 1		
Bracket (23,23A)	Al alloy	Chemically treat and apply one coat of BMS 10-11 type 1 primer (F-18.06).
Sleeve coupling (90)	4140 steel, 140-170 ksi	Cadmium plate (0.0002 to 0.0004 inch) (F-15.02).
Housing (175, 180,195)	Al alloy	Chromic acid anodize (F-17.04).

Refinish Details
Figure 601

ASSEMBLY

1. Materials and Equipment

NOTE: Equivalent substitutes may be used.

A. Grease -- MIL-G-21164 (Optional: MIL-G-23827) (Ref 20-60-03)

B. Lockwire -- MS20995C32

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

D. Primer -- BMS 10-11, Type 1 (Ref 20-60-02)

E. Check Equipment -- A27040-1

2. Assemble Gearbox Assembly (IPL Fig. 1)

CAUTION: GEARS (50, 55, 115, 120) ARE SIMILAR IN APPEARANCE AND ARE PHYSICALLY INTERCHANGEABLE. DAMAGE TO THE GEARBOX COULD RESULT IF GEARS ARE NOT INSTALLED IN THE CORRECT LOCATIONS DURING ASSEMBLY.

NOTE: Approximately one pound of grease will be used during assembly. One-half pound of grease will be applied to gears (50, 55, 115, 120). One-half pound of grease will be applied to the interior surfaces of housing assemblies (165, 185).

A. For bevel gear (120) only (Fig. 701):

(1) Identify gear (120) by engraved X on threaded end.

(2) Apply a 25-35 lb axial load to bearing (105) and measure dimension B using check equipment A27040-1.

(3) Add dimension B to dimension F engraved on gear.

(4) Locate single digit code engraved on parting surface of housing assembly (185). Determine dimension A using table 4.

(5) Subtract value determined in step (3) above from dimension A. The result is the thickness of shim (110) to be installed under bearing (105). See Fig. 701, Table 1.

B. Press bearing (105) on bevel gear (120).

C. Fill gear teeth of bevel gear (120) with approximately 0.125 pound of grease. Install the gear in housing (195) with shim (110) of thickness calculated per step A.(4).

D. For bevel gear (115) only (Fig. 701):

(1) Identify gear (115) by engraved Y on threaded end.

(2) Apply a 25-35 lb load to bearing (105) and measure dimension B using check equipment A27040-1.

(3) Add dimension B to dimension H engraved on gear.

(4) Locate single digit code engraved on parting surface of housing assembly (160). Determine dimension D using table 5.

(5) Subtract value determined in step (3) above from dimension D. The result is the thickness of shim (110) to be installed under bearing (105). See Fig. 701, Table 1.

E. Press bearing (105) on bevel gear (115).

F. Fill gear teeth of bevel gear (115) with approximately 0.125 pound of grease. Install the gear in housing (175) with shim (110) of thickness calculated per step D.(4).

G. For bevel gear (50) only (Fig. 701):

(1) Identify bevel gear (50) by engraved Y.

(2) Apply a 25-35 lb axial load to bearing (45) and measure dimension B using check equipment A27040-1.

(3) Add dimension B, dimension J engraved on gear, and dimension engraved on cover (35). See Fig. 701, Table 3.

(4) From dimension E engraved on outside of housing assembly (185), subtract value determined in step (2) above. The result is the thickness of shim (40) to be installed in cover (35). See Fig. 701, Table 2.

H. Install bearing (45) on bevel gear (50).

I. Install same number of shims (62, 63) as recorded during disassembly onto shaft (65).

J. Coat splines of shaft (65) with grease and install bevel gear (50) with bearing (45) onto shaft (65).

K. Using shim (40) determined in step G, install shaft (65) with attached parts into cover (35).

L. Fill gear teeth of bevel gear (50) with approximately 0.125 pound of grease. Install cover (35) on housing (185). Attach cover (35) at two places with bolts (25) and washers (30) installed hand tight.

M. Install same number of shims (60, 61) as recorded during disassembly onto shaft (65).

N. For bevel gear (55) only (Fig. 701):

(1) Identify bevel gear (55) by engraved X.

(2) Apply a 25-35 lb axial load to bearing (45) and measure dimension B using check equipment A27040-1.

(3) Add dimension B, dimension G engraved on gear, and dimension engraved on cover (35). See Fig. 701, Table 3.

(4) From dimension C engraved on outside of housing assembly (185), subtract value determined in step (2) above. The result is the thickness of shim (40) to be installed in cover (35). See Fig. 701, Table 2.

O. Install bearing (45) on bevel gear (55).

P. Apply 0.125 pound of grease to all areas of bevel gear (55). Make sure gear teeth are filled with grease. Coat spline of shaft (65) with grease and install bevel gear (55), meshing with bevel gear (120).

Q. Install shims (40) as determined in step N in cover (35). Attach cover (35) and bracket (23 or 23A) at two locations with bolts (21) and washers (22) installed hand tight.

R. Measure end play of shaft (65) and adjust shims (60, 61, 62, 63) until end play is 0.002 inch minimum.

S. Apply grease to interior surfaces of housing assemblies (160, 185). Make sure drain hole is clear of grease.

T. Lightly grease pins (138, 190) with BMS 3-24 and attach housing assembly (160) to housing assembly (185) using bolts (125), washers (130) and nuts (135). Install one washer (130) under bolt head and one under nut. Tighten bolts and nuts hand tight.

U. Check backlash per TESTING AND TROUBLE SHOOTING.

V. Tighten all bolts to 50-70 lb-in.

W. Make sure drain hole is clear of grease. Attach drain cover (20) using bolt (10) and washer (15). Tighten bolt to 20-25 lb-in.

X. Seal seam of housing halves and covers (35) with bead of sealant.

Y. Lockwire bolts (25) using double-twist method.

Z. Fill cavity between bearing (100) and bearing shield (95) with grease and install bearing shield.

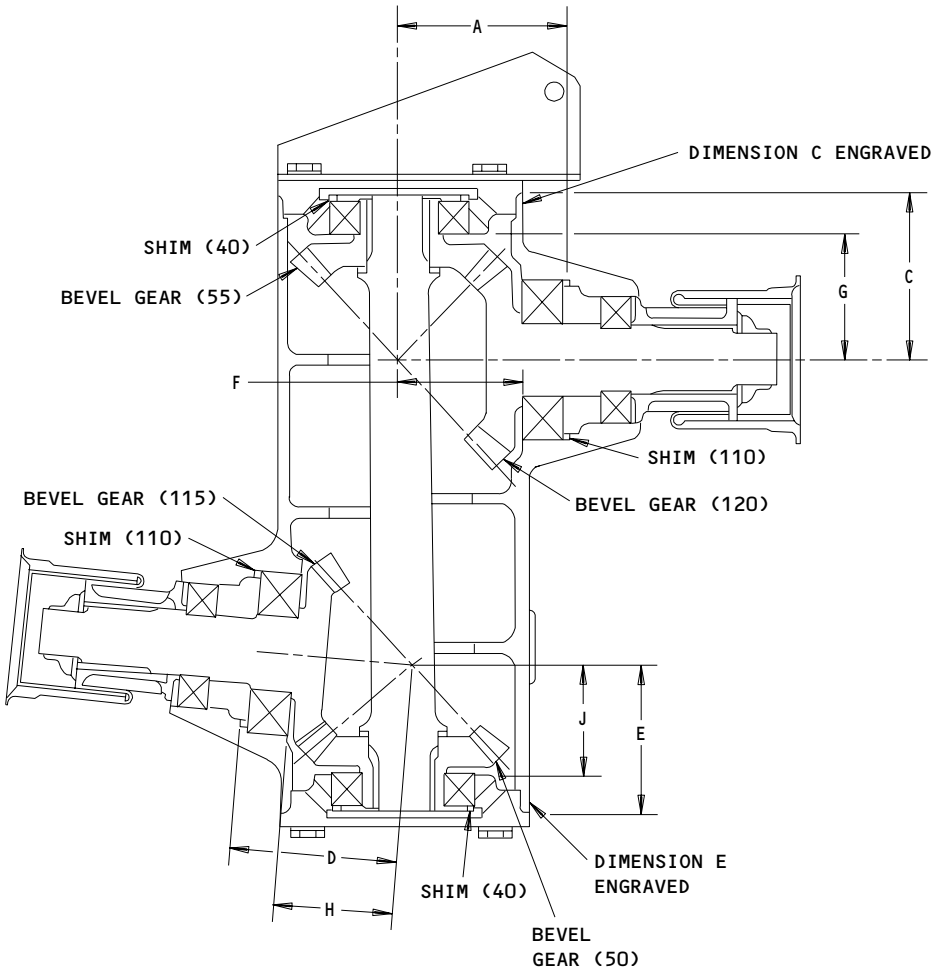
AA. Install molded sleeve (85) over coupling half (80).

AB. Coat spline with grease and slide combination of sleeve (85) and coupling half (80) into coupling sleeve (90) and over splines of bevel gears (115, 120).

AC. Install washer (75) and nut (70). Tighten nut to 600-800 lb-in.

3. Storage

A. Prepare and store components in accordance with standard industry practices.



SHIM ADJUSTMENT

Shim Adjustment
Figure 701 (Sheet 1)

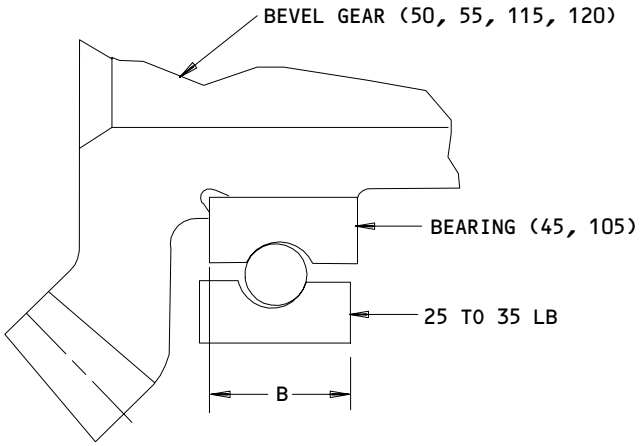
SHIM OR SHIMSET	NOMINAL THICKNESS (IN.)
256T3415-1	0.010
256T3415-2	0.012
256T3415-3	0.015
256T3415-4	0.020
256T3415-5	0.025
256T3415-1 & -2	0.022
256T3415-2 & -2	0.024
256T3415-2 & -3	0.027

TABLE 1

SHIM OR SHIMSET	NOMINAL THICKNESS (IN.)
256T3533-1	0.010
256T3583-2	0.012
256T3583-3	0.015
256T3583-4	0.020
256T3583-5	0.025
256T3583-1 & -2	0.022
256T3583-2 & -2	0.024
256T3583-2 & -3	0.027
256T3583-1 & -4	0.030
256T3583-2 & -4	0.032
256T3583-3 & -4	0.035
256T3583-2 & -5	0.037
256T3583-3 & -5	0.040

TABLE 2

Shim Adjustment
Figure 701 (Sheet 2)



ENGRAVED	ACTUAL DIMENSION (INCHES)
9	0.0090–0.0099
0	0.0100–0.0109
1	0.0110–0.0119
2	0.0120–0.0130

DECODING TABLE FOR ENGRAVED
DIMENSION ON COVER (35)
TABLE 3

Shim Adjustment
Figure 701 (Sheet 3)

ENGRAVED	ACTUAL DIMENSIONS (INCHES)
9	2.4190–2.4199
0	2.4200–2.4209
1	2.4210–2.4219
2	2.4220–2.4229
3	2.4230–2.4239
4	2.4240–2.4249
5	2.4250–2.4259
6	2.4260–2.4269
7	2.4270–2.4279
8	2.4280–2.4290

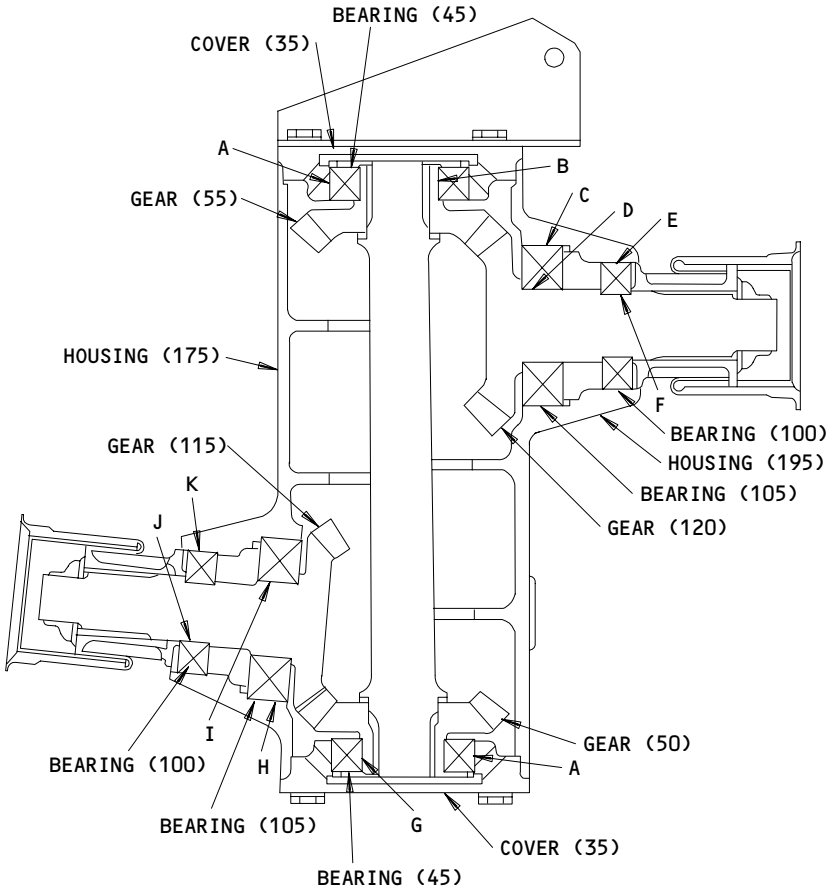
DECODING TABLE FOR ENGRAVED DIMENSION
ON HOUSING ASSEMBLY (185)
TABLE 4

ENGRAVED	ACTUAL DIMENSIONS (INCHES)
9	2.2590–2.2599
0	2.2600–2.2609
1	2.2610–2.2619
2	2.2620–2.2629
3	2.2630–2.2639
4	2.2640–2.2649
5	2.2650–2.2659
6	2.2660–2.2669
7	2.2670–2.2679
8	2.2680–2.2690

DECODING TABLE FOR ENGRAVED DIMENSION
ON HOUSING ASSEMBLY (160)
TABLE 5

Shim Adjustment
Figure 701 (Sheet 4)

FITS AND CLEARANCES



ITEM NUMBERS IPL FIG. 1

Fits and Clearances
Figure 801 (Sheet 1)

Ref Letter Fig.801	Mating Item No. IPL Fig.1	Design Dimension				Service Wear Limit		
		Dimension		Assembly Clearance *[1]		Dimension		Maximum Clearance
		Min	Max	Min	Max	Min	Max	
A	ID 35	2.1656	2.1666	0.0002	0.0017		2.1696	0.0030
	OD 45	2.1649	2.1654			2.1624		
B	ID 45	1.1807	1.1811	-0.0008	-0.0001		1.1812	0.0000
	OD 55	1.1812	1.1815			1.1811		
C	ID 195	2.4411	2.4421	0.0002	0.0017		2.4439	0.0030
	OD 105	2.4404	2.4409			2.4391		
D	ID 105	1.1807	1.1811	-0.0008	-0.0001		1.1812	0.0000
	OD 120	1.1812	1.1815			1.1811		
E	ID 195	1.8506	1.8514	0.0002	0.0015		1.8529	0.0030
	OD 100	1.8499	1.8504			1.8474		
F	ID 100	0.9839	0.9843	-0.0008	-0.0001		0.9844	0.0000
	OD 120	0.9844	0.9847			0.9843		
G	ID 45	1.1807	1.1811	-0.0008	-0.0001		1.1812	0.0000
	OD 50	1.1812	1.1815			1.1811		
H	ID 175	2.4411	2.4421	0.0002	0.0017		2.4439	0.0030
	OD 105	2.4404	2.4409			2.4391		
I	ID 105	1.1807	1.1811	-0.0008	-0.0001		1.1812	0.0000
	OD 115	1.1812	1.1815			1.1811		
J	ID 100	0.9839	0.9843	-0.0008	-0.0001		0.9844	0.0000
	OD 115	0.9844	0.9847			0.9843		
K	ID 175	1.8506	1.8514	0.0002	0.0015		1.8529	0.0030
	OD 100	1.8499	1.8504			1.8474		

*[1] NEGATIVE NUMBERS DENOTE INTERFERENCE FIT
ALL DIMENSIONS ARE IN INCHES

Fits and Clearances
Figure 801 (Sheet 2)

13756

FOR TORQUE VALUES OF STANDARD FASTENERS, REFER TO 20-50-01			
ITEM NO. IPL FIG. 1	NAME	TORQUE	
		POUND-INCHES	POUND-FEET
10	BOLT	20-25	
25	BOLT	50-70	
70	NUT	600-800	
125	BOLT	50-70	

Torque Table
Figure 802

13757

SPECIAL TOOLS, FIXTURES, AND EQUIPMENT

NOTE: Equivalent substitutes may be used for listed item.

1. A27040-1 -- Check Equipment - TE Flap Drive Gearbox Bearing.
2. A27046-176, -177 -- Test Fixture (supersedes A27046-161, -162 respectively)
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

08524 DEUTSCH FASTENER CORPORATION
PO BOX 92925 7001 WEST IMPERIAL HIGHWAY
LOS ANGELES, CALIFORNIA 90045

15653 KAYNAR MFG COMPANY INC KAYLOCK DIV
PO BOX 3001 800 SOUTH STATE COLLEGE BLVD
FULLERTON, CALIFORNIA 92634

21335 TEXTRON INC FAFNIR BEARING DIVISION
37 BOOTH STREET
NEW BRITAIN, CONNECTICUT 06050

21760 SCHATZ FEDERAL BEARINGS CO INC
FAIRVIEW AVENUE
POUGHKEEPSIE, NEW YORK 12602

29337 HOOVER UNIVERSAL INC BALL AND ROLLER DIV
ERWIN, TENNESSEE 37650

38443 TRW INC BEARING DIV
402 CHANDLER STREET
JAMESTOWN, NEW YORK 14701

43991 FAG BEARING INCORPORATED
HAMILTON AVENUE
STAMFORD, CONNECTICUT 06904

52828 REPUBLIC FASTENER MFG CORP
1300 RANCHO CONEJO BLVD
NEWBURY PARK, CALIFORNIA 91320

56878 SPS TECHNOLOGIES INC
HIGHLAND AVENUE
JENKINTOWN, PENNSYLVANIA 19046
STANDARD PRESSED STEEL CO SEE SPS TECHNOLOGIES INC

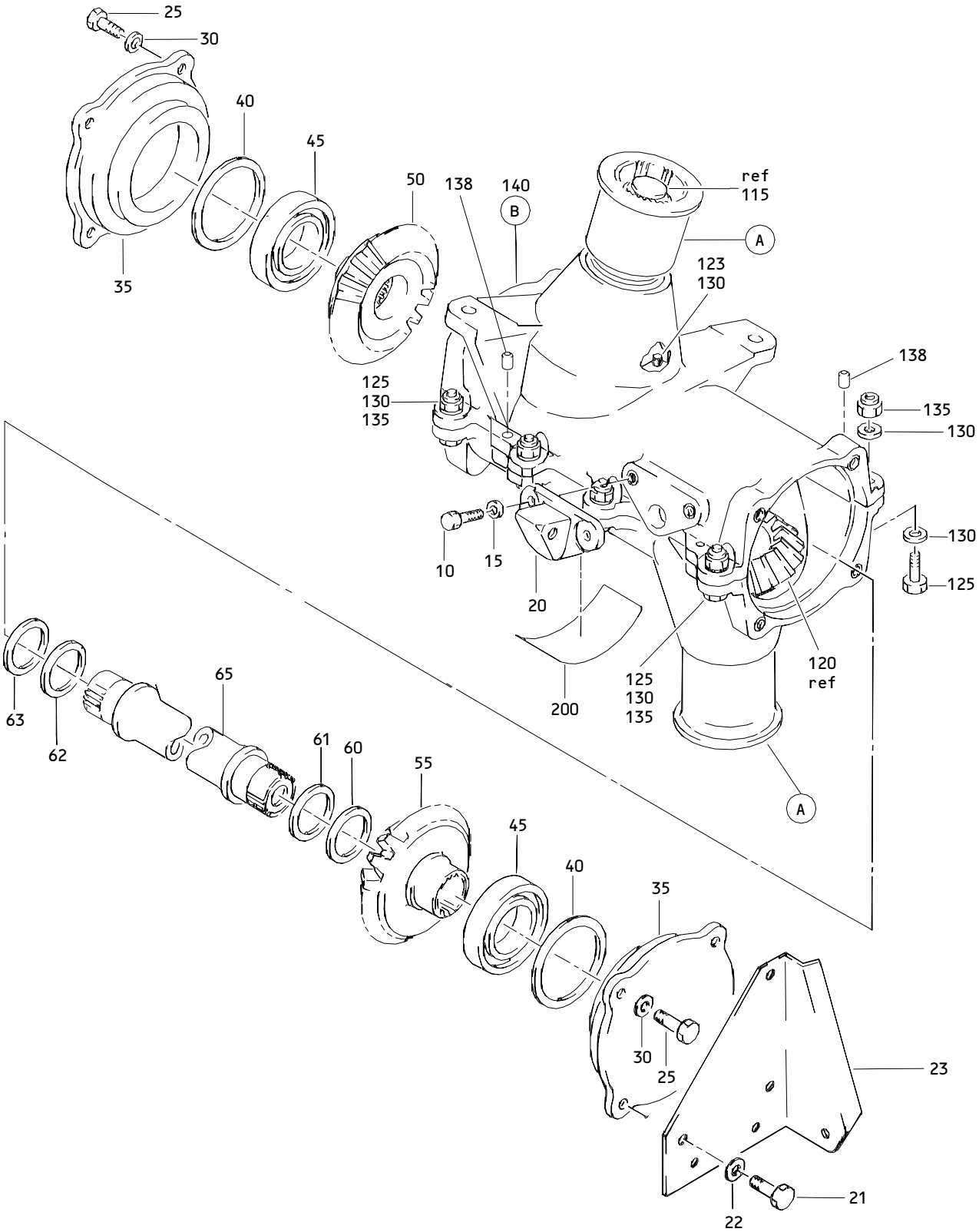
71087 BOOTS ACFT NUT DIV TOWNSEND CO SEE TEXTRON INC CHERRY
FASTENER TOWNSEND DIV V11815

72962 ESNA DIV OF AMERACE CORP
2330 VAUXHALL ROAD
UNION, NEW JERSEY 07083

VENDORS

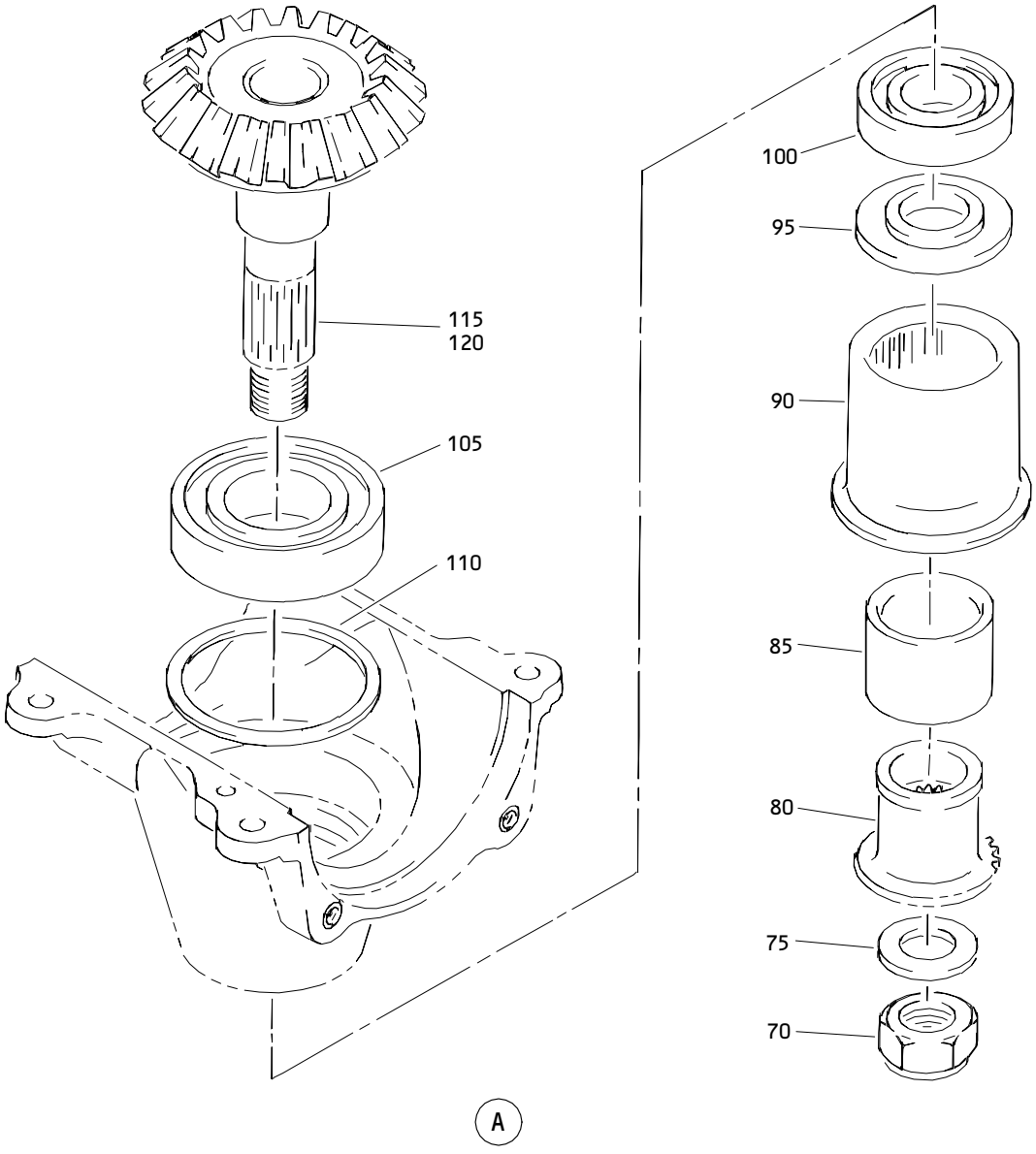
80539 SPS TECHNOLOGIES INC AEROSPACE PRODUCTS DIV
2701 SOUTH HARBOR BOULEVARD
SANTA ANA, CALIFORNIA 92702

92215 VOI-SHAN DIV OF VSI CORP
8463 HIGUERA STREET
CULVER CITY, CALIFORNIA 90230

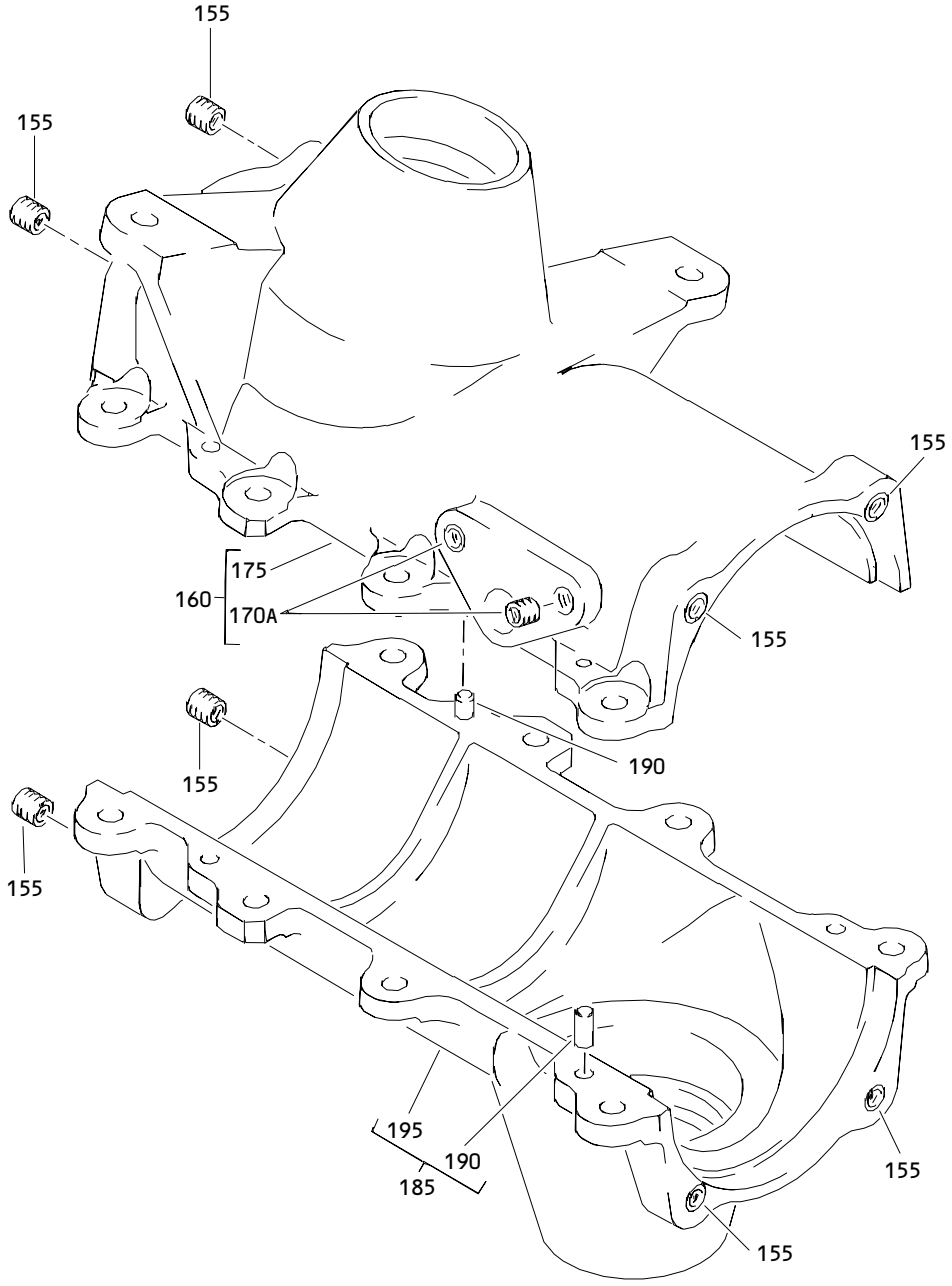


Trailing Edge Flap Drive Offset (LH) Gearbox Assembly
Figure 1 (Sheet 1)

T55251



Trailing Edge Flap Drive Offset (LH) Gearbox Assy
Figure 1 (Sheet 2)



Trailing Edge Flap Drive Offset (LH) Gearbox Assy
Figure 1 (Sheet 3)

FIG. & ITEM	PART NO.	AIRLINE PART NUMBER	NOMENCLATURE 1234567	EFF CODE	QTY PER ASSY
01-					
-1	256T3570-3		GEARBOX ASSY-TE FLAP DRIVE OFFSET (LH)	A	RF
-5	256T3570-4		DELETED		
-5A	256T3570-5		GEARBOX ASSY-TE FLAP DRIVE OFFSET (RH)	C	RF
10	NAS6603-2		.BOLT		2
15	AN960PD10		.WASHER		2
20	65B81978-3		.COVER-DRAIN		1
21	NAS6604H6		.BOLT		3
22	AN960PD416		.WASHER		3
23	256T3022-7		.BRACKET	A	1
-23A	256T3022-17		.BRACKET	C	1
25	NAS6604H5		.BOLT		5
30	AN960PD416		.WASHER		5
35	256T3574-1		.COVER		2
40	256T3583-1		.SHIM-(THICKNESS TO BE DETERMINED UPON INSTALLATION)		AR
-40A	256T3583-2		.SHIM-(THICKNESS TO BE DETERMINED UPON INSTALLATION)		AR
-40B	256T3583-3		.SHIM-(THICKNESS TO BE DETERMINED UPON INSTALLATION)		AR
-40C	256T3583-4		.SHIM-(THICKNESS TO BE DETERMINED UPON INSTALLATION)		AR
-40D	256T3583-5		.SHIM-(THICKNESS TO BE DETERMINED UPON INSTALLATION)		AR
45	LL106KS		.BEARING- (V38443) (SPEC BACB10BA30PP) (OPT 6006TT (V43991)) (OPT 9106LLT1C1-01 (V21760)) (OPT 9106NPPFS428 (V21335)) (OPT 993L06 (V29337)) (OPT LL106KSG20 (V38443))		2

FIG. & ITEM	PART NO.	AIRLINE PART NUMBER	NOMENCLATURE 1234567	EFF CODE	QTY PER ASSY
01-					
50	256T3576-1		.GEAR-BEVEL		1
55	256T3577-1		.GEAR-BEVEL		1
60	256T3584-1		.SHIM		AR
61	256T3584-2		.SHIM		AR
62	256T3584-1		.SHIM		AR
63	256T3584-2		.SHIM		AR
65	256T3579-1		.SHAFT		1
70	BRH10-12		.NUT-		2
			(V52828)		
			(SPEC BACN10JC12)		
			(OPT BMN4122AD3-12		
			(V08524))		
			(OPT BMN4122A12		
			(V08524))		
			(OPT H10-12BAC		
			(V15653))		
			(OPT RMLH9074-12		
			(V72962))		
			(OPT 48FT1216		
			(V56878))		
75	AN960-1216		.WASHER		2
80	256T3749-1		.COUPLING-HALF		2
85	65B84033-18		.SLEEVE-MOLDED		2
90	65B84034-3		.SLEEVE-CPLG		2
95	256T3414-1		.SHIELD-BRG		2
100	LL105KS		.BEARING-		2
			(V38443)		
			(SPEC BACB10BA25PP)		
			(OPT 6005TT		
			(V43991))		
			(OPT 9105LLT1C1-01		
			(V21760))		
			(OPT 9105NPPFS428		
			(V21335))		
			(OPT 993L05		
			(V29337))		

FIG. & ITEM	PART NO.	AIRLINE PART NUMBER	NOMENCLATURE 1234567	EFF CODE	QTY PER ASSY
01-					
105	1206LLT1C1-01		.BEARING- (V21760) (SPEC BACB10AZ30PP) (OPT 206FTT (V43991)) (OPT 99206 (V29337))		2
110	256T3415-1		.SHIM-(THICKNESS TO BE DETERMINED UPON INSTALLATION)		AR
-110A	256T3415-2		.SHIM-(THICKNESS TO BE DETERMINED UPON INSTALLATION)		AR
-110B	256T3415-3		.SHIM-(THICKNESS TO BE DETERMINED UPON INSTALLATION)		AR
-110C	256T3415-4		.SHIM-(THICKNESS TO BE DETERMINED UPON INSTALLATION)		AR
-110D	256T3415-5		.SHIM-(THICKNESS TO BE DETERMINED UPON INSTALLATION)		AR
115	256T3575-1		.GEAR-BEVEL		1
120	256T3578-1		.GEAR-BEVEL		1
123	NAS6604-4		.BOLT		1
125	NAS6604-10		.BOLT		7
130	AN960PD416		.WASHER		16
135	BRH10-4		.NUT- (V52828) (SPEC BACN10JC4) (OPT H10-4BAC (V15653)) (OPT NS202101-048 (V80539)) (OPT RMLH9075-4W (V72962)) (OPT T6S428J (V71087)) (OPT VN303A048 (V92215)) (OPT 96-048 (V80539))		7

FIG. & ITEM	PART NO.	AIRLINE PART NUMBER	NOMENCLATURE 1234567	EFF CODE	QTY PER ASSY
01-					
138	NAS607-4-5P		.PIN-DOWEL		2
140	256T3571-1		.HOUSING ASSY	A	1
-145	256T3571-2		.HOUSING ASSY	C	1
150	NAS607-4-5P		DELETED		
155	MS21209F4-15P		..INSERT		8
160	256T3573-1		..HOUSING ASSY (MATCHED SET)	A	1
-165	256T3573-2		..HOUSING ASSY (MATCHED SET)	C	1
170	MS21209F1-15D		DELETED		
170A	MS21209F1-15P		...INSERT		2
175	256T3573-3		...HOUSING	A	1
-180	256T3573-4		...HOUSING	C	1
185	256T3572-1		..HOUSING ASSY (MATCHED SET)		1
190	NAS607-4-5P		...PIN		2
195	256T3572-2		...HOUSING		1
200	256T3582-1		.NAMEPLATE		1