TO: ALL HOLDERS OF TRAILING EDGE FLAP DRIVE ACTUATOR INPUT ANGLE GEARBOX ASSEMBLY COMPONENT MAINTENANCE MANUAL 27-51-40

REVISION NO. 1 DATED MAR 01/00

HIGHLIGHTS

All data formerly in manual 27-51-41 is included in this manual 27-51-40.

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 Revisio No. and date on the Record of Revision Sheet.

CHAPTER/SECTION AND PAGE NO.	DESCRIPTION OF CHANGE
TR & SB RECORD	Incorporated latest engineering changes that added substitute kit assemblies 256T3510-5 and -6.
1	
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101-103	
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REPAIR-GEN	
603	
REPAIR 5-1	
601-602	
REPAIR 6-1	
601-602	
701-704	
801-802	
1002,1004-1010	
102-103	Clarified text without technical change.
301	
401	
501	
REPAIR 5-1	
601	

CHAPTER/SECTION AND PAGE NO.	DESCRIPTION OF CHANGE
REPAIR 6-1 601 REPAIR 9-1 601 704	HIGHLIGHT CONTINUED FROM PREVIOUS PAGE
REPAIR 8-1 601	Changed adhesive type from type 38 to type 70, 71.

TRAILING EDGE FLAP DRIVE
ACTUATOR INPUT ANGLE GEARBOX ASSEMBLY

PART NUMBER 256T3510-3, -4

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

PAGE	DATE	CODE
27-51-40		
TITLE PAGE		
1	OCT 01/87	01
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REVISION RECORD		
1	OCT 01/87	01
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*1	MAR 01/00	01.1
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*1	MAR 01/00	01
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1	OCT 01/87	01
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*101	MAR 01/00	01.1
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604	BLANK	
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REPAIR 8-1		
*601	MAR 01/00	01.1
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REPAIR 9-1		
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ASSEMBLY		
*701	MAR 01/00	01.1
*702	MAR 01/00	01.1
*703	MAR 01/00	01.1
*704	MAR 01/00	01.1
FITS AND CLEARANCES		
*801	MAR 01/00	01.1
*802	MAR 01/00	01.1
803	OCT 01/87	01
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SPECIAL TOOLS		
901	OCT 01/87	01
902	BLANK	
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1001	OCT 01/87	01
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*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	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 ACTUATOR INPUT ANGLE GEARBOX ASSEMBLY

DESCRIPTION AND OPERATION

1. The trailing edge flap drive actuator input 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 to the inboard actuator of the inboard flap.

3. Leading Particulars (approximate)

   A. Length -- 10 inches (25 centimeters)

   B. Width -- 6 inches (15 centimeters)

   C. Height -- 6 inches (15 centimeters)

   D. Weight -- 9 pounds (4 kilograms)

   E. Drive Angle -- 106.38 degrees

TESTING AND FAULT ISOLATION

1. Test Equipment and Materials

   NOTE: Equivalent substitutes may be used.

   A. Test Fixture -- A27046-4 (Consists of -24 fixture assembly plus -134 usage placard)

   B. Test Equipment -- A27046-8 (Includes -53 tower assembly, -55 and -57 brackets, -56 and -58 clamp assemblies, -59 collet assembly, and -126 weight assemblies)

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 (80, 85, 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.

6. Backlash Check (IPL Fig. 1)

NOTE: Units "in service" referred to in the following test are units removed from service for known or suspected malfucntioning 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. Check backlash between gears (165, 175).

(1) Remove coupling sleeve (40) from gearbox assembly by removing nut (30) and washer (35) and sliding parts (40, 25, 45) off shaft of bevel gear (165).

(2) Reinstall coupling half (25) and molded shield (45), then secure with nut (30) and washer (35). Tighten nut (30) to 400-450 inch-pounds (45-51 Nm).

(3) Install gearbox assembly on test fixture assembly A27046-24 as shown in placard A27046-134.

(4) Attach clamp assembly A27046-56 and bracket A27046-55 on shaft of bevel gear (165). Secure parts with washer (35) and nut (30).

(5) Install clamp assembly A27046-58, bracket A27046-57, and collet assembly A27046-59 on coupling (110).

(6) Using weight assembly A27046-126, or equivalent, apply a 25-35 lb (111-156 N) outward axial load to input shaft (165) and clamp in position. Apply an equal outward axial load to the output gear (175).

(7) Using torque wrench with 1/2-inch socket, apply a 5-10 pound-inch (0.56-1.13 Nm) torque to the collet in each direction. Check that backlash measured at the scribe line on clamp assembly A27046-58 is 0.007-0.016 (0.179-0.406 mm) for units in service, or 0.007-0.013 inches (0.179-0.330 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 (0.102-0.229 mm) for units in service, or 0.004-0.007 inches (0.102-0.178 mm) for overhauled units, measured at the pitch line of the gears.

B. If no corrective procedures are required, complete assembly as shown in ASSEMBLY steps 4.J. and on.

C. If backlash exceeds required limits, adjust shim thickness on bevel gear (70) as follows:

(1) Disassemble unit as shown in DISASSEMBLY steps 2.A. thru 2.D.

(2) Adjust thickness of shims (75) as required to increase or decrease backlash. Then assemble parts as shown in ASSEMBLY steps 4.B. thru 4.D.

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

(3) Repeat backlash check.

D. Remove gearbox from test fixture.

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

F. Reinstall coupling sleeve (40) onto gearbox assembly by removing nut (30) and washer (35) and sliding parts (25, 45) off shaft of bevel gear (165), then by reinstalling coupling half (25), molded sleeve (45), and coupling sleeve (40). Secure with nut (30) and washer (35). Tighten nut (30) to 400-450 inch-pounds (45-51 Nm).

G. After correct backlash has been obtained, rotate bevel gear (165) by hand with no load on bevel gear (175). Check that gears mesh smoothly with no significant binding or roughness through at least two revolutions in each direction.

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

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 (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 (45)

2. Disassembly (Ref IPL Fig. 1)

   A. Remove lockwire and sealant.

   B. Remove nut (30) and washer (35), then slide parts (25, 40, 45) off shafts of bevel gear (165).

   C. Remove bolts (60) and washers (65) then remove cover (55) and enclosed parts from housing assembly (130).

   D. Remove parts (50, 75 thru 85, 165) from cover. Remove shield (50) and bearings (80, 85) from bevel gear (165). Measure and record shim (75) thickness to facilitate assembly.

   E. Remove bolts (95) then remove bearing cap (90) and parts (100 thru 120) from housing.

   F. Remove bevel gear (175) with attached parts and shim(s) (100) from bearing cap. Remove bearings (120) from gear. Measure and record shim thickness.

   G. Separate splined coupling (110) and bevel gear by pushing coupling toward end with internal spline. Remove C-ring (105).

   H. Remove parts (10 thru 20) from housing assembly.

      NOTE: Do not remove inserts (140, 145) or nameplate (125) 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 (80, 85, 120, IPL Fig. 1) as shown in manufacturer's instructions.

CHECK

1. Check 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 (25) and coupling sleeve (40)

   B. Splined coupling (110)

   C. Bevel gears (165, 170, 175, 180)

   D. C-ring (105)

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

   A. Drain (10)

   B. Cover (55)

   C. Bearing cap (90)

   D. Housing (150)

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

REPAIR - GENERAL

1. Contents

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

P/N	NAME	REPAIR
256T3316	SHIELD	1-1
256T3342	COVER	2-1
256T3511	HOUSING	3-1
256T3512	BEARING CAP	4-1
256T3513	BEVEL GEAR	5-1
256T3514	BEVEL GEAR	6-1
256T3749	COUPLING HALF	7-1
256T3320	NAMEPLATE	8-1
- - -	MISC PARTS REFINISH	9-1

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
20-10-02 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 Identification 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 THIS FEATURE PERMISSIBLE VARIATIONS ARE ESTABLISHED BY TOLERANCES ON OTHER DIMENSIONS OR NOTES.
[-A-]	DATUM
Ⓜ	MAXIMUM MATERIAL CONDITION (MMC)
Ⓛ	LEAST MATERIAL CONDITION (LMC)
Ⓢ	REGARDLESS OF FEATURE SIZE (RFS)
Ⓟ	PROJECTED TOLERANCE ZONE
FIM	FULL INDICATOR MOVEMENT

EXAMPLES

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

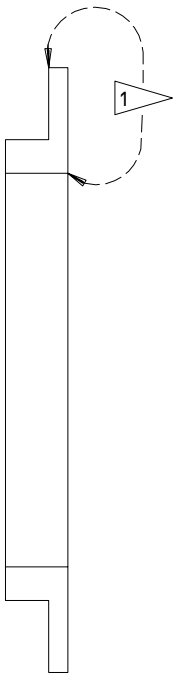
True Position Dimensioning Symbols
Figure 601

SHIELD - REPAIR 1-1

256T3316-1, -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.



REFINISH

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

1 APPLY PRIMER THESE SURFACES ONLY

MATERIAL: 4340 STEEL (125-145 KSI)

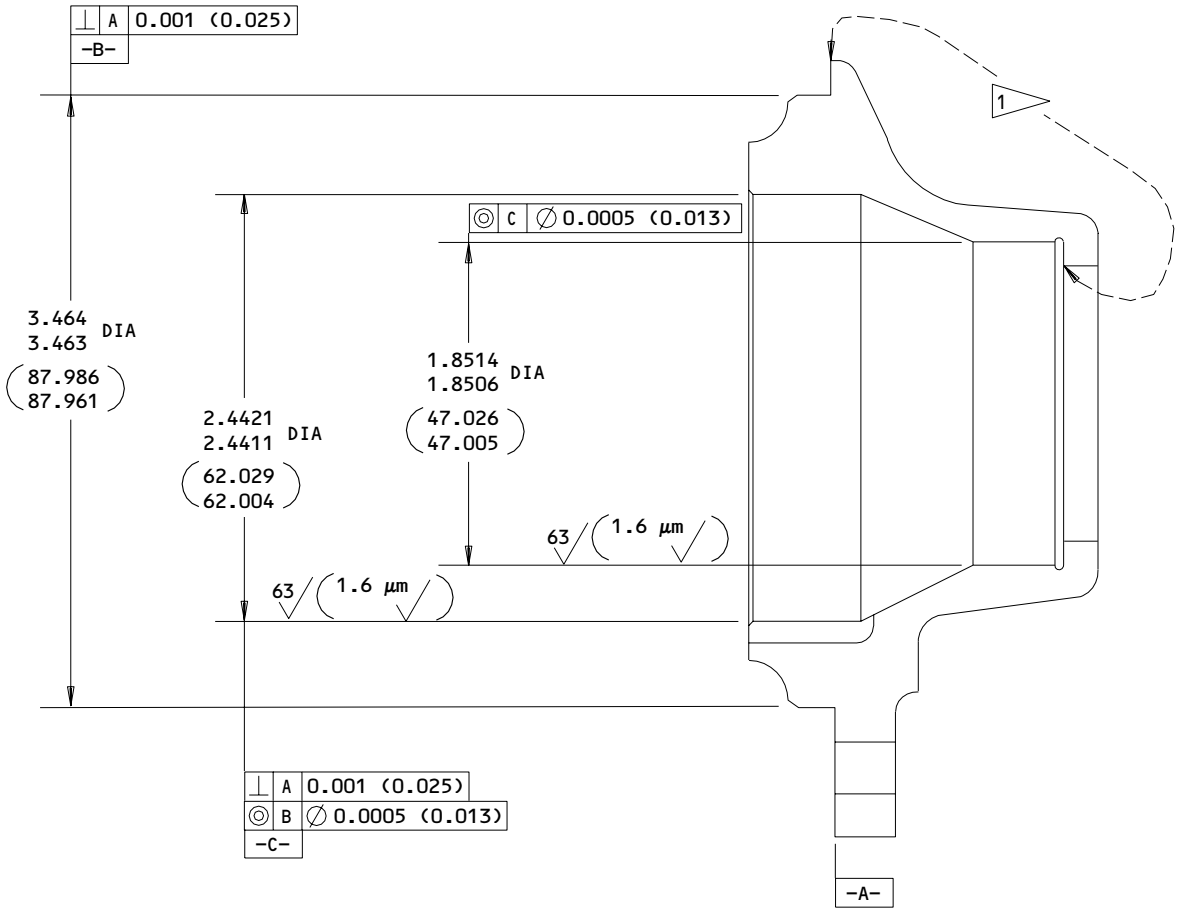
Shield Refinish
Figure 601

COVER - REPAIR 2-1

256T3342-1

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) ALL OVER. APPLY ONE COAT PRIMER, BMS 10-11, TYPE I (F-20.02) AS NOTED

1 APPLY PRIMER THIS AREA ONLY. OMIT PRIMER IN BOLT HOLES

MATERIAL: AL ALLOY

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

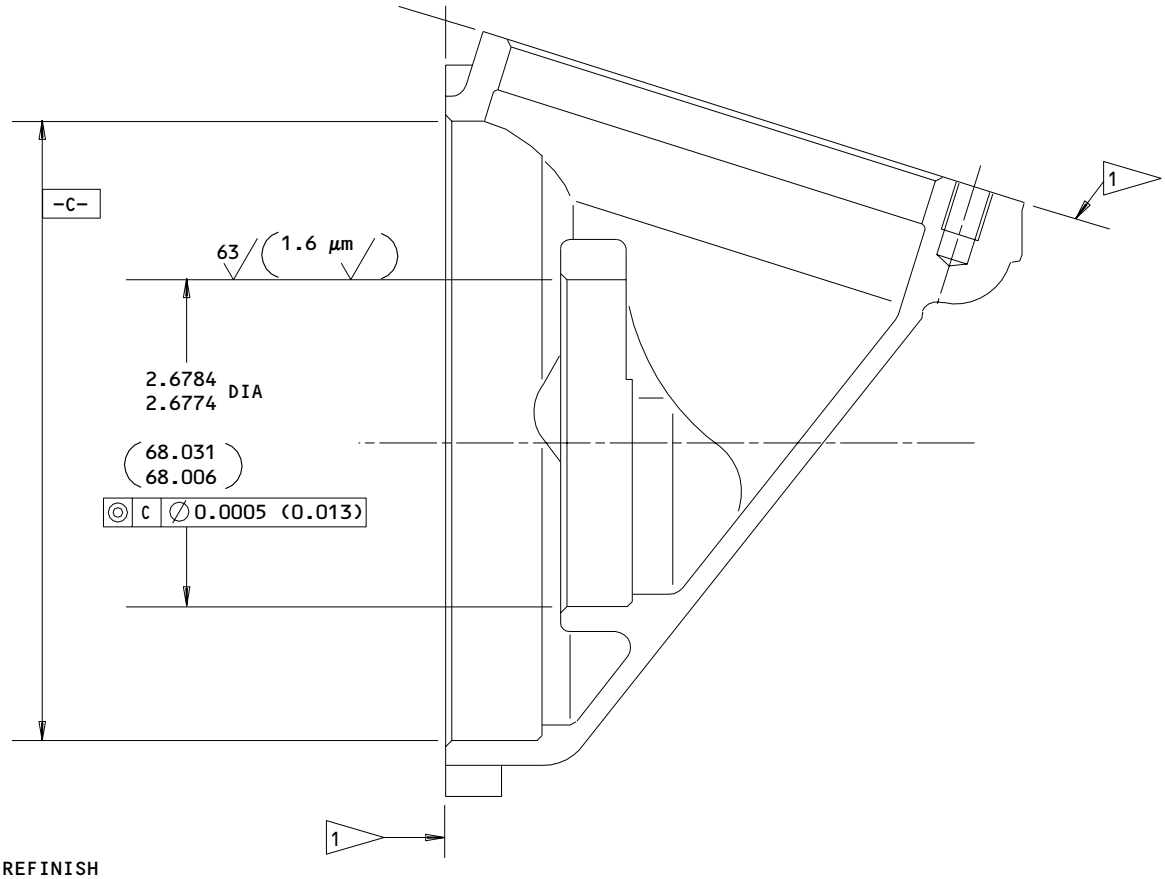
Cover Refinish
Figure 601

HOUSING ASSEMBLY - REPAIR 3-1

256T3511-1, -2

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 (150): CHROMIC ACID OR SULFURIC ACID ANODIZE (F-17.05) ALL OVER. APPLY ONE COAT PRIMER, BMS 10-11, TYPE I (F-20.02) TO EXTERNAL SURFACES EXCEPT IN HOLES AND AS NOTED.

1 NO PRIMER THESE SURFACES

MATERIAL: AL ALLOY

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

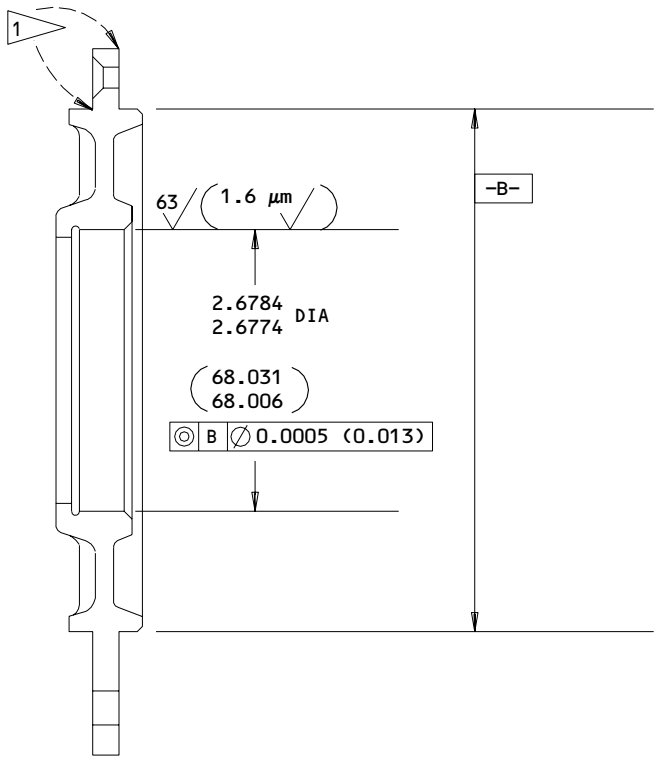
Housing Assembly Repair
Figure 601

BEARING CAP - REPAIR 4-1

256T3512-1

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) ALL OVER. APPLY ONE COAT PRIMER, BMS 10-11, TYPE I (F-20.02) TO EXTERNAL SURFACES AS NOTED.

1 APPLY PRIMER THESE SURFACES ONLY. OMIT PRIMER IN BOLT HOLES

MATERIAL: AL ALLOY

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

Bearing Cap Refinish
Figure 601

BEVEL GEAR - REPAIR 5-1

256T3513-1, -2

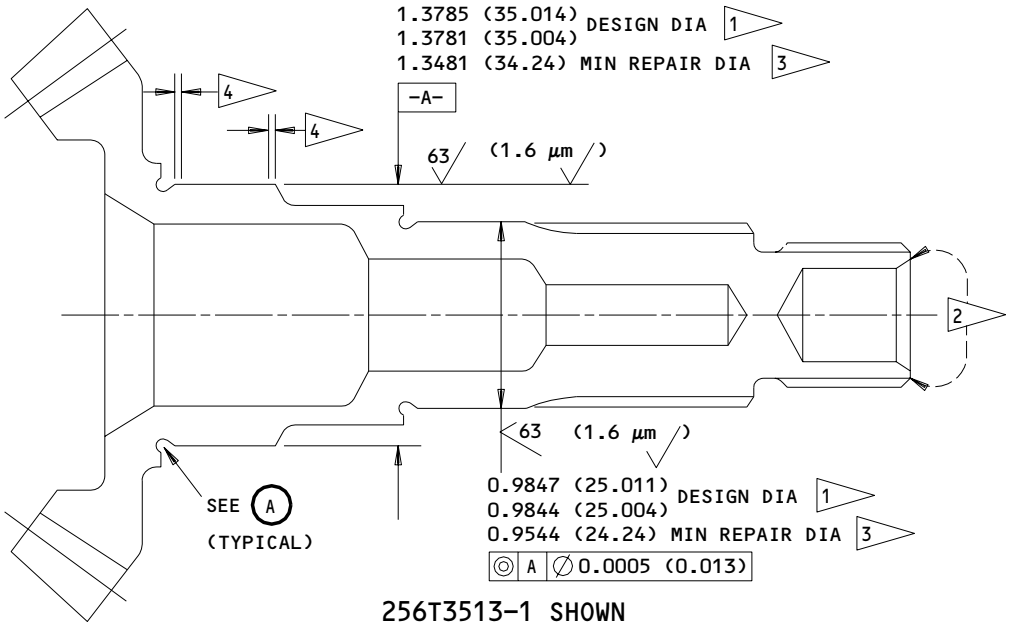
NOTE: Refer to REPAIR-GEN for list of applicable standard practices. For repair of surfaces which may only require stripping and restoration of original finish, refer to REFINISH instruction, Fig. 601.

1. Bearing Seat Repair (Fig. 601)

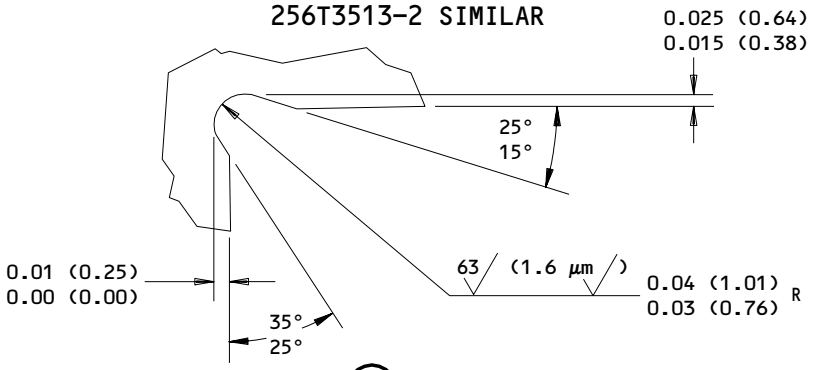
   A. Machine bearing seat as required, within repair limit shown, to remove defects.

   B. Shot peen as indicated.

   C. Build up repaired area with chrome plate as shown in 20-42-03, and grind to design dimensions and finish shown. Chrome plate must not exceed 0.015 inch thickness after grinding.



256T3513-1 SHOWN
256T3513-2 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) EXCEPT AS NOTED. DELETE FOLLOW-UP OIL TREATMENT. APPLY TWO COATS PRIMER, BMS 10-11, TYPE I (F-20.03) THEN APPLY CORROSION PREVENTIVE COMPOUND, MIL-C-11796, CLASS I (F-19.03)

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

REPAIR

REF 3 4

125 ALL MACHINED SURFACES UNLESS SHOWN DIFFERENTLY

BREAK SHARP EDGES 0.008 (0.20)R

SHOT PEEN: SHOT NO. 170-460
INTENSITY 0.014A
COVERAGE 2.0

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

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

256T3513-1,-2
Bevel Gear Refinish
Figure 601

BEVEL GEAR - REPAIR 6-1

256T3514-1, -3

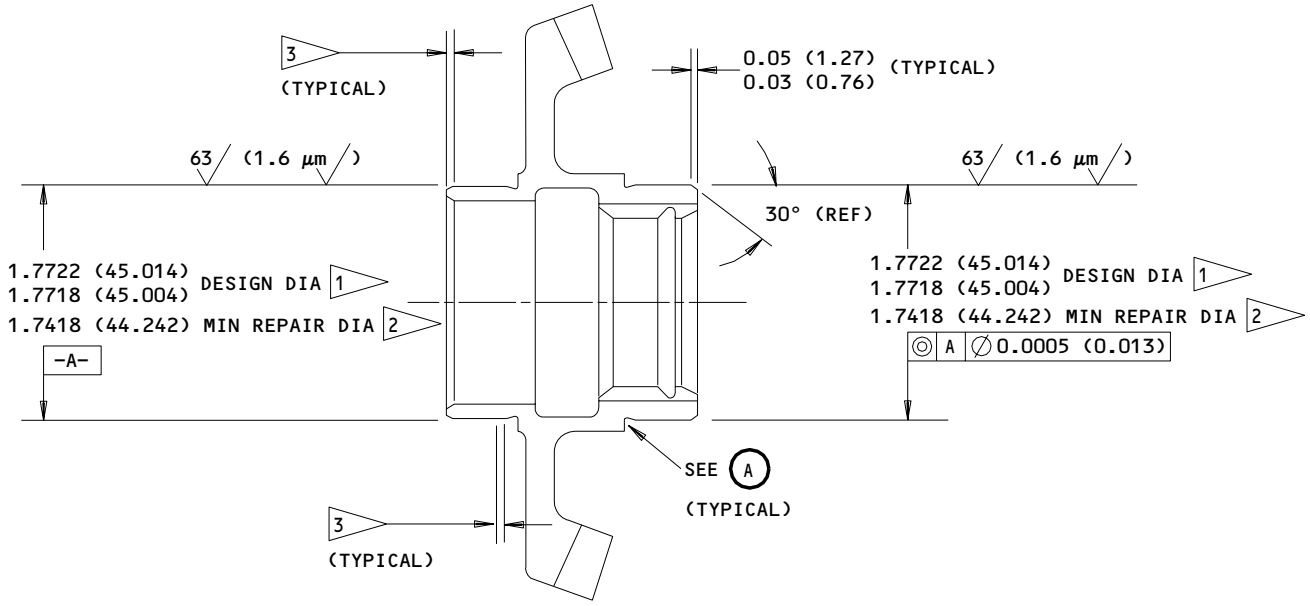
NOTE: Refer to REPAIR-GEN for list of applicable standard practices. For repair of surfaces which may only require stripping and restoration of original finish, refer to REFINISH instruction, Fig. 601.

1. Bearing Seat Repair (Fig. 601)

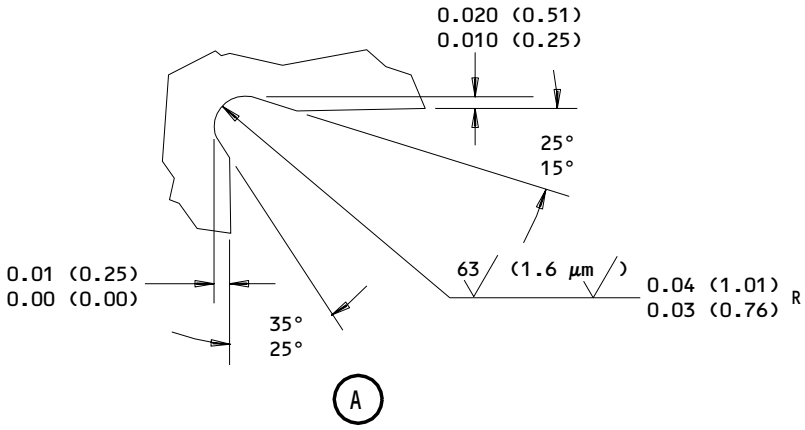
   A. Machine bearing seat as required, within repair limit shown, to remove defects.

   B. Shot peen as indicated.

   C. Build up repaired area with chrome plate as shown in 20-42-03, and grind to design dimensions and finish shown. Chrome plate must not exceed 0.015 inch thickness after grinding.



251T3514-1 SHOWN
251T3514-3 SIMILAR



REFINISH

CADMIUM PLATE (F-15.23) ALL OVER EXCEPT AS NOTED.

1 NO CADMIUM PLATING THIS SURFACE

2 BUILD UP WITH CHROME PLATE AND GRIND TO DESIGN DIMENSIONS AND FINISH SHOWN. OBSERVE RUNOUT AT EDGES AND RELIEF GROOVE AS INDICATED

3 PLATING RUNOUT 0.00-0.08 (0.00-2.03)

REPAIR

REF 2 3

125 ALL MACHINED SURFACES UNLESS SHOWN DIFFERENTLY

BREAK SHARP EDGES 0.008 (0.20)R

SHOT PEEN SHOT NO. 170-460
INTENSITY 0.014A
COVERAGE 2.0

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

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

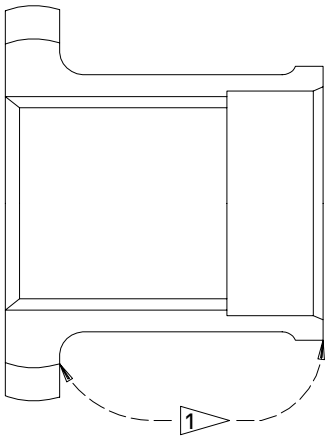
256T3514-1,-3
Bevel Gear Refinish
Figure 601

COUPLING HALF - REPAIR 7-1

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

19211

NAMEPLATE - REPAIR 8-1

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 70 or 71.

MISCELLANEOUS PARTS REFINISH - REPAIR 9-1

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

IPL FIG. & ITEM	MATERIAL	FINISH
Fig. 1		
Drain (10)	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 (40)	4140 steel 150-170 ksi	Cadmium plate (F-15.02).
Splined coupling (110)	4340 steel 150-170 ksi	Cadmium plate (F-15.02).
C-ring (105)	Music wire	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. 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

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 (75) thickness (Fig. 701).

NOTE: If housing assembly (130), bearing (80), bevel gear (165), or cover (55) have not been replaced, shim(s) removed during disassembly may be reinstalled.

(1) Install bearing (80) 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 3.488 inches (88.595 mm) to "A", then subtract this sum from the sum of the corresponding engraved dimensions on housing assembly (130) and cover (55).

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

B. Install bearings (85, 80) on bevel gear (165) (Ref 20-50-03). Make sure direction of bearing (80) on gear is same as direction on checking fixture (Ref Fig. 701).

C. Place shim(s) (75) in bearing recess in cover (55), then install bevel gear with bearings.

D. Install cover (55) on housing assembly with bolts (60) and washers (65).

E. Determine proper shim (100) thickness (Fig. 701).

NOTE: If housing assembly (130), bearing cap (90), or bearing (120) have not been replaced shim(s) removed during disassembly may be reinstalled.

(1) Install outer bearing (120) (facing bearing cap) 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.

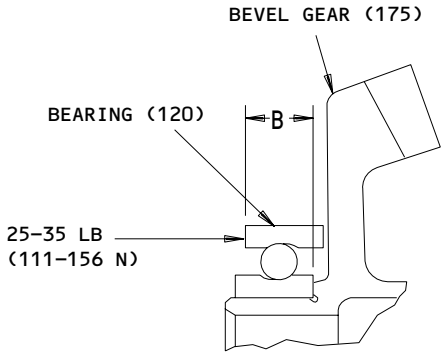
(2) Add 1.339 inch (34.011 mm) to "B", then subtract this sum from the sum of the corresponding engraved dimensions on housing assembly (130) and bearing cap (90).

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

F. Install bearings (120) on bevel gear (175) (Ref 20-50-03). Make sure measured bearing is installed on side facing bearing cap, and direction of this bearing on gear is same as direction on checking fixture.

G. Install C-ring (105) onto splined coupling (110). Then install splined coupling into bevel gear (175) with C-ring engaged in grooved internal splined end of bevel gear.

H. Place shim(s) (100) in bearing recess in bearing cap. Install bevel gear with bearings in housing, then install bearing cap with bolts (95).



BEARING WIDTH MEASUREMENT
DIMENSION B SHOWN
DIMENSION A SIMILAR

SHIM OR SHIM SET		NOMINAL THICKNESS
USE WITH A	USE WITH B	
256T3321–1	256T3517–1	0.010 (0.254)
256T3321–2	256T3517–2	0.012 (0.305)
256T3321–3	256T3517–3	0.015 (0.381)
256T3321–4	256T3517–4	0.018 (0.457)
256T3321–5	256T3517–5	0.020 (0.508)
256T3321–1 AND –2	256T3517–1 AND –2	0.022 (0.559)
256T3321–1 AND –3	256T3517–1 AND –3	0.025 (0.635)
256T3321–2 AND –3	256T3517–2 AND –3	0.027 (0.686)
256T3321–1 AND –5	256T3517–1 AND –5	0.030 (0.762)
256T3321–2 AND –5	256T3517–2 AND –5	0.032 (0.813)
256T3321–3 AND –5	256T3517–3 AND –5	0.035 (0.889)
256T3321–4 AND –5	256T3517–4 AND –5	0.038 (0.965)
256T3321–5 AND –5	256T3517–5 AND –5	0.040 (1.016)

SHIM THICKNESS TABLE

Shim Selection
Figure 701

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

J. 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.

(1) Remove bolts (95), then remove bevel gear (175) with bearing cap (90) from housing assembly (130).

(2) Fill gear teeth with grease.

(3) Reinstall bearing cap (90) on housing assembly (130) with bolts (95).

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

(5) Remove bolts (95), then remove bevel gear (175) with bearing cap (90) from housing assembly (130). Remove excess grease sticking to inside of housing, especially in drain grooves and holes.

(6) Reinstall bearing cap (90) with bevel gear (175) on housing assembly (130) using bolts (95) with wet primer applied to bolt holes.

(7) Remove nut (30) and washer (35) from bevel gear (165), then slide parts (40, 25, 45, 50) off shaft of bevel gear (165). Reinstall shield (50) onto shaft of bevel gear with cavity formed by shield and bearing (80) filled with grease. Slide remaining parts (45, 25, 40) onto shaft of bevel gear and secure with nut (30) and washer (35). Tighten nut (30) to 400-450 inch-pounds (45-51 Nm).

K. Install drain (10) onto housing assembly (130) using bolts (15) and washers (20) with wet primer applied to bolt holes.

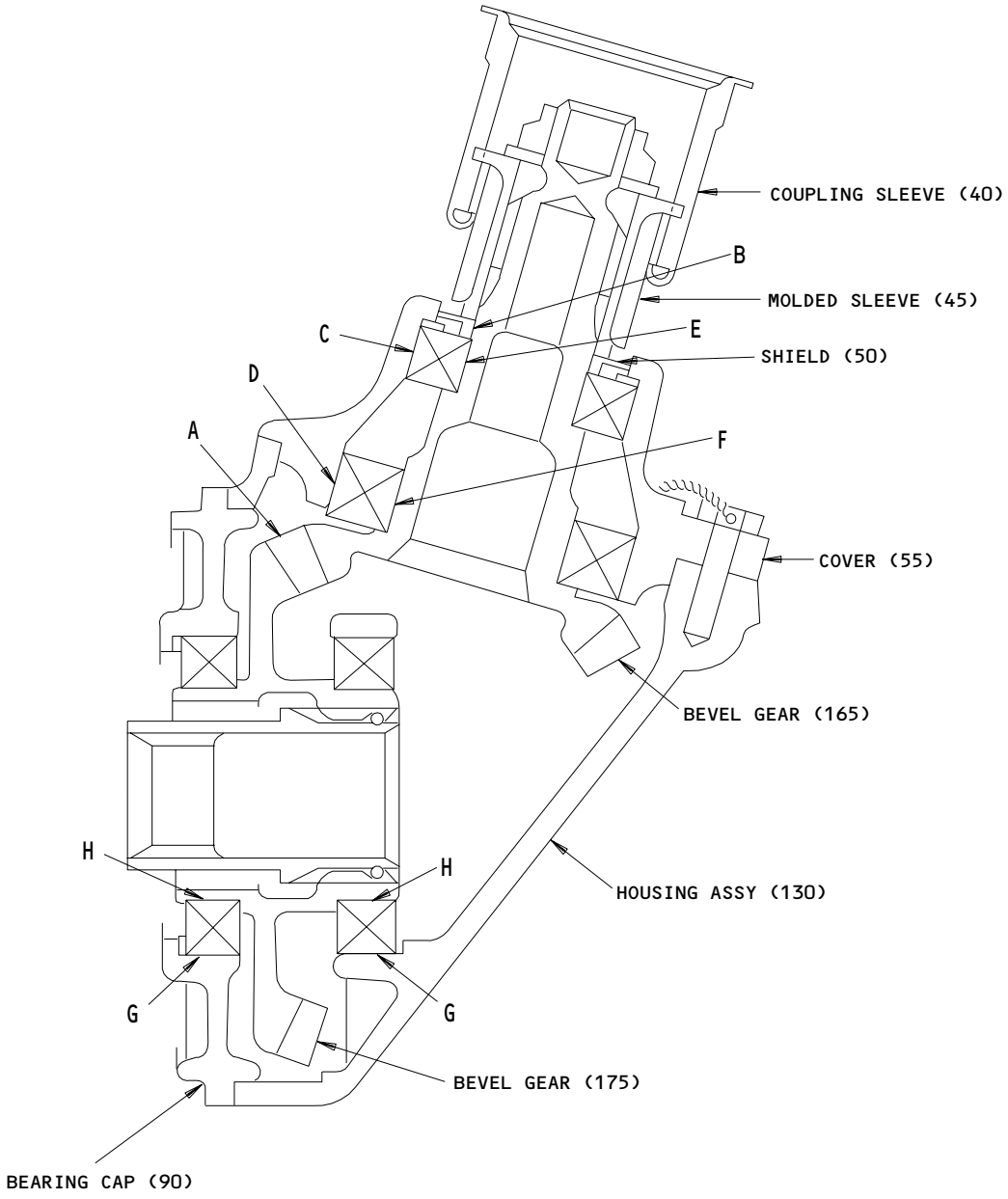
L. Install lockwire on bolts (60) by double-twist procedure (Ref 20-50-02).

M. Fillet seal all 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



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	165,170 [2] 175,180			0.004 (0.10)	0.007 (0.18)			0.009 (0.23)
B	ID 50	0.986 (25.044)	0.988 (25.095)				0.9917 (25.189)	
	OD 165,170	0.9844 (25.004)	0.9847 (25.011)	0.0013 (0.033)	0.0036 (0.091)	0.9790 (24.867)		0.0070 (0.178)
C	ID 55	1.8506 (47.005)	1.8514 (47.026)				1.8534 (47.076)	
	OD 80	1.8499 (46.987)	1.8504 (47.000)	0.0002 (0.005)	0.0015 (0.039)	1.8476 (46.929)		0.0030 (0.076)
D	ID 55	2.4411 (62.004)	2.4421 (62.029)				2.4439 (62.075)	
	OD 85	2.4404 (61.986)	2.4409 (61.999)	0.0002 (0.005)	0.0017 (0.043)	2.4381 (61.928)		0.0030 (0.076)
E	ID 80	0.9839 (24.991)	0.9843 (25.001)				0.9844 (25.004)	
	OD 165,170	0.9844 (25.004)	0.9847 (25.011)	−0.0008 (−0.020)	−0.0001 (−0.003)	0.9843 (25.001)		0.0000
F	ID 85	1.3775 (34.989)	1.3780 (35.001)				1.3781 (35.004)	
	OD 165,170	1.3781 (35.004)	1.3785 (35.014)	−0.0010 (−0.025)	−0.0001 (−0.003)	1.3780 (35.001)		0.0000
G	ID 90,130, 135	2.6774 (68.006)	2.6784 (68.031)				2.6802 (68.077)	
	OD 120	2.6767 (67.988)	2.6772 (68.001)	0.0002 (0.005)	0.0017 (0.043)	2.6744 (67.930)		0.0030 (0.076)
H	ID 120	1.7712 (44.988)	1.7717 (45.001)				1.7718 (45.004)	
	OD 175,180	1.7718 (45.004)	1.7722 (45.014)	−0.0010 (−0.025)	−0.0001 (−0.003)	1.7717 (45.001)		0.0000

[1] NEGATIVE VALUES DENOTE INTERFERENCE FIT

[2] BACKLASH BETWEEN INSTALLED GEARS WITH GEAR (115) FIXED AND MEASURED AT 2.9527 (75.00) PITCH DIAMETER ON GEAR (70) OR 4.5768 (116.25) PITCH DIAMETER ON GEAR (115).

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

Fits and Clearances
Figure 801 (Sheet 2)

8884

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

Torque Table
Figure 802

8952

SPECIAL TOOLS, FIXTURES, AND EQUIPMENT

NOTE: Equivalent substitutes may be used.

1. A27040-1 -- Bearing Width Checking Equipment

2. A27046-4 -- 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

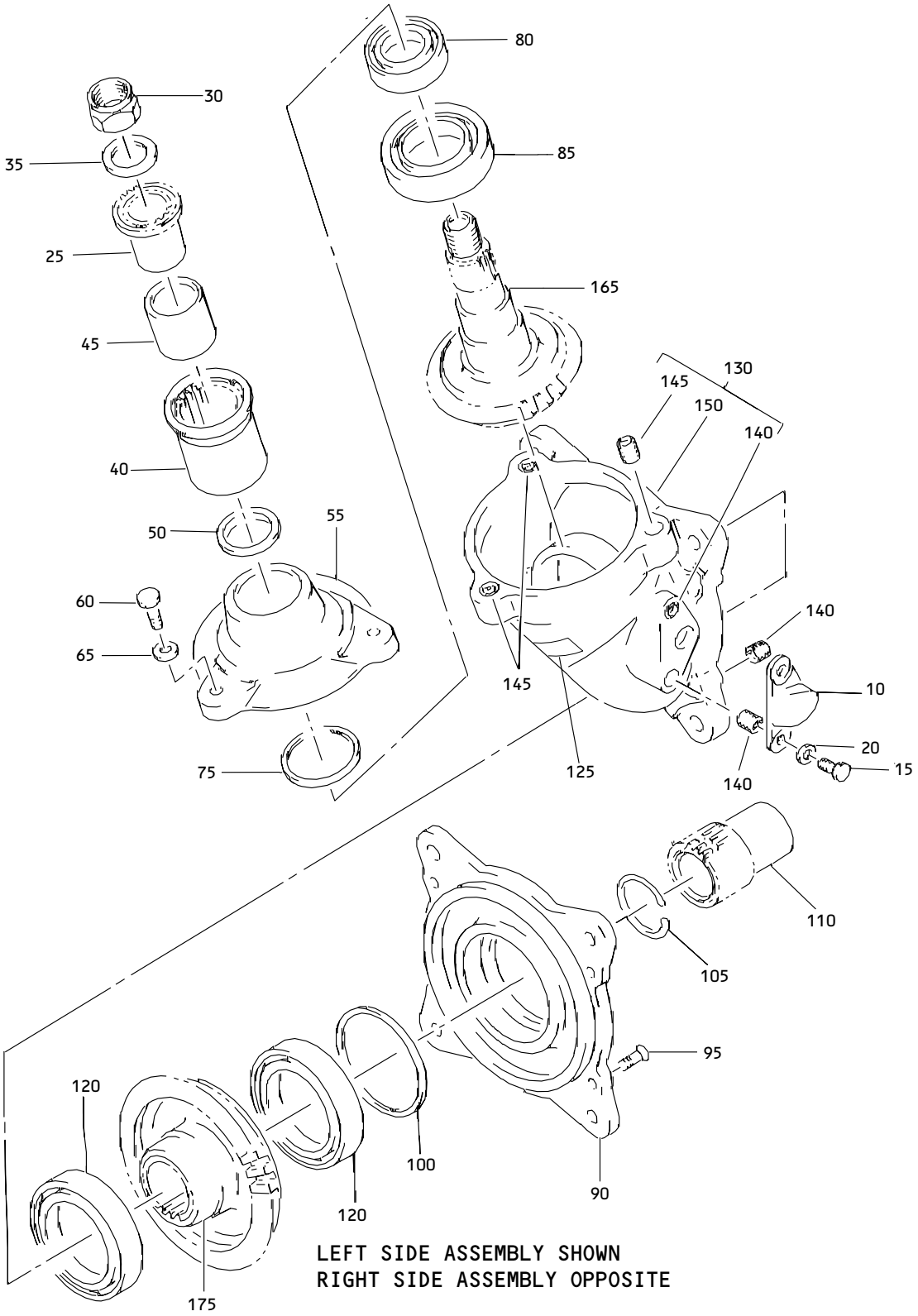
VENDORS

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	35	1
AN960PD10L		1	20	2
AN960PD416L		1	65	3
BACB10BA25PP		1	80	1
BACB10BA35PP		1	85	1
BACB10BB45PP		1	120	2
BACB30LU3-3		1	95	4
BACN10JC12		1	30	1
BMN4122AD3-12		1	30	1
C009RRPP1P29LY1		1	120	2
C009RRPOZZ		1	120	2
C105RRPOZZ		1	80	1
C105RRP1P28LY19		1	80	1
C107RRPP1P28LY1		1	85	1
C107RRPOZZ		1	85	1
H10-12BAC		1	30	1
LL105KS		1	80	1
LL107KS		1	85	1
LL107KSG20		1	85	1
MS21209F1-15P		1	140	6
MS21209F4-15P		1	145	3
NAS6603-2		1	15	2
NAS6604H6		1	60	3
PKTLL009P1		1	120	2
PKTLL105P1		1	80	1
PKTLL107P1		1	85	1
RMLH9074-12		1	30	1
1909RRT1C1-01		1	120	2
256T3316-1		1	50	1
256T3316-3		1	50A	1
256T3320-1		1	125	1
256T3321-1		1	75	1
256T3321-2		1	75A	1
256T3321-3		1	75B	1
256T3321-4		1	75C	1
256T3321-5		1	75D	1
256T3342-1		1	55	1
256T3342-3		1	55A	1
256T3343-1		1	10	1
256T3343-3		1	10A	1
256T3510-3		1	1	RF
256T3510-4		1	5	RF
256T3510-5		1	160	1
256T3510-6		1	160A	1
256T3511-1		1	130	1

PART NUMBER	AIRLINE PART NO.	FIG.	ITEM	TTL REQ
256T3511-2		1	135	1
256T3511-3		1	150	1
256T3511-4		1	155	1
256T3512-1		1	90	1
256T3513-1		1	165	1
256T3513-2		1	170	1
256T3514-1		1	175	1
256T3514-3		1	180	1
256T3515-1		1	110	1
256T3516-2		1	105	1
256T3517-1		1	100	1
256T3517-2		1	100A	1
256T3517-3		1	100B	1
256T3517-4		1	100C	1
256T3517-5		1	100D	1
256T3749-1		1	25	1
48FT1216		1	30	1
6005TT		1	80	1
6007TT		1	85	1
65B84033-18		1	45	1
65B84034-3		1	40	1
9105LLT1C1-01		1	80	1
9105NPPFS428		1	80	1
9107LLT1C1-01		1	85	1
9107NPPFS4281		1	85	1
9309PPPRBFS428		1	120	2
993L05		1	80	1
993L07		1	85	1



Trailing Edge Flap Drive Actuator Input Angle Gearbox Assembly
Figure 1

T57231

FIG. & ITEM	PART NO.	AIRLINE PART NUMBER	NOMENCLATURE 1234567	EFF CODE	QTY PER ASSY
01-					
-1	256T3510-3		GEARBOX ASSY-TE FLAP DRIVE ACTUATOR INPUT ANGLE LH	A	RF
-5	256T3510-4		GEARBOX ASSY-TE FLAP DRIVE ACTUATOR INPUT ANGLE RH	B	RF
10	256T3343-1		.DRAIN- (OPT ITEM 10A)		1
-10A	256T3343-3		.DRAIN- (OPT ITEM 10)		1
15	NAS6603-2		.BOLT		2
20	AN960PD10L		.WASHER		2
25	256T3749-1		.COUPLING HALF		1
30	H10-12BAC		.NUT- (V15653) (SPEC BACN10JC12) (OPT RMLH9074-12 (V72962)) (OPT 48FT1216 (V56878)) (OPT BMN4122AD3-12 (V97928))		1
35	AN960-1216		.WASHER		1
40	65B84034-3		.SLEEVE-COUPLING		1
45	65B84033-18		.SLEEVE-MOLDED		1
50	256T3316-1		.SHIELD- (OPT ITEM 50A)		1
-50A	256T3316-3		.SHIELD- (OPT ITEM 50)		1
55	256T3342-1		.COVER- (OPT ITEM 55A)		1
-55A	256T3342-3		.COVER- (OPT ITEM 55)		1

FIG. & ITEM	PART NO.	AIRLINE PART NUMBER	NOMENCLATURE 1234567	EFF CODE	QTY PER ASSY
01-					
60	NAS6604H6		.BOLT		3
65	AN960PD416L		.WASHER		3
70	256T3513-1		DELETED		
72	256T3513-2		DELETED		
75	256T3321-1		.SHIM-(THICKNESS TO BE DETERMINED UPON INSTALLATION)		AR
-75A	256T3321-2		.SHIM-(THICKNESS TO BE DETERMINED UPON INSTALLATION)		AR
-75B	256T3321-3		.SHIM-(THICKNESS TO BE DETERMINED UPON INSTALLATION)		AR
-75C	256T3321-4		.SHIM-(THICKNESS TO BE DETERMINED UPON INSTALLATION)		AR
-75D	256T3321-5		.SHIM-(THICKNESS TO BE DETERMINED UPON INSTALLATION)		AR
80	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-					
85	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
90	256T3512-1		.CAP-BEARING		1
95	BACB30LU3-3		.BOLT		4
100	256T3517-1		.SHIM-(THICKNESS TO BE DETERMINED UPON INSTALLATION)		AR
-100A	256T3517-2		.SHIM-(THICKNESS TO BE DETERMINED UPON INSTALLATION)		AR
-100B	256T3517-3		.SHIM-(THICKNESS TO BE DETERMINED UPON INSTALLATION)		AR
-100C	256T3517-4		.SHIM-(THICKNESS TO BE DETERMINED UPON INSTALLATION)		AR
-100D	256T3517-5		.SHIM-(THICKNESS TO BE DETERMINED UPON INSTALLATION)		AR

FIG. & ITEM	PART NO.	AIRLINE PART NUMBER	NOMENCLATURE 1234567	EFF CODE	QTY PER ASSY
01-					
105	256T3516-2		.C RING		1
110	256T3515-1		.COUPLING-SPLINED		1
115	256T3514-1		DELETED		
117	256T3514-3		DELETED		
120	1909RRT1C1-01		.BEARING- (V21760) (SPEC BACB10BB45PP) (OPT 9309PPPRBFS428 (V21335)) (OPT PKTLL009P1 (V78118)) (OPT C009RRP0ZZ (V40920)) (OPT C009RRPP1P29LY196 (V40920))		2
125	256T3320-1		.NAMEPLATE		1
130	256T3511-1		.HOUSING ASSY	A	1
-135	256T3511-2		.HOUSING ASSY	B	1
140	MS21209F1-15P		..INSERT		6
145	MS21209F4-15P		..INSERT		3
150	256T3511-3		..HOUSING	A	1
-155	256T3511-4		..HOUSING	B	1
160	256T3510-5		.KIT ASSY-SUBSTITUTE (OPT ITEM 160A)		1
-160A	256T3510-6		.KIT ASSY-SUBSTITUTE (OPT ITEM 160)		1
165	256T3513-1		..GEAR-BEVEL (USED ON ITEM 160)		1
-170	256T3513-2		..GEAR-BEVEL (USED ON ITEM 160A)		1
175	256T3514-1		..GEAR-BEVEL (USED ON ITEM 160)		1
-180	256T3514-3		..GEAR-BEVEL (USED ON ITEM 160A)		1

- Item Not Illustrated