TO: ALL HOLDERS OF TRAILING EDGE FLAP DRIVE 9.5 DIAMETER ROTARY ACTUATOR ASSEMBLY COMPONENT MAINTENANCE MANUAL 27-51-10

REVISION NO. 15 DATED MAR 01/05

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
REPAIR 10-1 601-602 REPAIR 12-1 601-602 1006,1022-1023	Added optional planet gears
REPAIR 10-1 602 REPAIR 12-1 602	Updated the finish on the planet gears
1003,1005,1013-1015	Added optional seals

TRAILING EDGE FLAP DRIVE
9.5 DIAMETER ROTARY ACTUATOR ASSEMBLY

PART NUMBERS 256T3250-2,-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
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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 Revisions & 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:

Testing/Trouble Shooting
Disassembly
Assembly

TRAILING EDGE FLAP DRIVE 9.5 DIAMETER ROTARY ACTUATOR ASSEMBLY

DESCRIPTION AND OPERATION

1. Description

   A. The trailing edge flap drive rotary actuator assembly consists of an input shaft, torque limiter assembly, no-back assembly, and gearbox assembly, all mounted in a common housing.

   B. The 767 has two sets of flaps on each side of the aircraft, with two actuators operating each flap. The 10.5-inch diameter actuator is mounted at the outboard ends of the inboard flaps, with the 9.5-inch diameter actuator at all other positions.

2. Operation

   A. Power is delivered to the input side of the actuator by the flap drive torque tube system.

   B. The torque limiter grounds the flap drive to airplane structure when input torque exceeds a predetermined value. The no-back, or brake, assembly prevents back-driving in either direction. The gearbox assembly uses epicyclic gearing to amplify torque to the levels required for flap actuation under all loading conditions.

3. Leading Particulars (Approximate)

   Length -- 13 inches
   Diameter -- 10 inches
   Weight -- 60 pounds

TESTING AND TROUBLE SHOOTING

1. Test Equipment and Materials

NOTE: Equivalent substitutes may be used.

A. Test Fixture Assembly -- A27071-85 (Replaces A27071-49) *[1]

B. Test Fixture Assembly -- A27071-49 (Supersedes A27071-44, -2) *[2]

C. Ring Bracket Assembly -- A27071-4 *[1] *[2]

D. Spline Assembly -- A27071-55 *[1] *[2]

E. Test Set -- A27081-1

F. Strip Chart Recorder (optional)

G. Dial Indicator (0.001-inch graduations)

*[1] Part of T.E. Rotary Actuator Test Equipment A27071-84 and -123 (A27071-84 replaces A27071-48; A27071-123 replaces A27071-84, -48 for future procurement)

*[2] Part of T.E. Rotary Actuator Test Equipment A27071-48 (A27071-48 supersedes A27071-43, -1)

2. Preparation for Test

A. Install rotary actuator assembly on test fixture A27071-85 or -49, using ring bracket A27071-4 and spline A27071-55.

B. Connect test set A27081-1 to test fixture torque meter and calibrate.

NOTE: Test set A27081-1 must be calibrated each time the direction of rotation is reversed.

C. Connect strip chart recorder to record input torque.

3. Check No-Load Torque and Binding/Roughness

A. Drive input shaft at 240-260 rpm for 45-75 sec in each direction while recording input torque.

B. Check that input torque does not exceed 40 lb-in. Check that variation in torque does not exceed 10 lb-in. and that peak-to-peak variation does not exceed 2.5 lb-in.

4. Check Torque Limiter Operation

NOTE: Check of torque limiter operation is optional if torque limiter has been rebuilt and tested during assembly.

A. Drive input shaft at 600-700 rpm.

B. Gradually increase load on output shaft. Ensure that torque limiter does not begin to lock out below an input torque of 290 pound-inches for 256T3252-2, 370 pound-inches for 256T3252-3, or 245 pound-inches for units affected by, but not modified per, Service Bulletin 27-36. Check that complete lockout has occurred by 342 pound-inches for 256T3252-2, 410 pound-inches for 256T3252-3, or 315 pound-inches for units affected by, but not modified per, the service bulletin.

NOTE: The following serial numbers identify units affected by Service Bulletin 27-36: 0110, 0121, 0122, 0129, 0131, 0133-0137, 0139-0147, 0149, 0150, 0152, 0160-0173, 0175-0192, 0194-0207, 0209-0211, 0213-0220, 0222-0224, 0228-0230, 0232-0238, 0240-0247.

C. Reduce input torque to zero and apply torque in opposite direction until motion occurs (torque limiter releases). Reset trip indicator.

D. Repeat steps A. thru C. three more times to verify repeatability.

E. Reverse direction of applied input torque and repeat steps A. thru D.

5. Check No-Back Brake Operation

A. With input shaft free to rotate, apply load of 177,280 lb-in. to output shaft, and verify that input shaft does not rotate.

B. Reduce load on output to zero. Check that no-back brake has released and input shaft can be rotated in both directions.

C. Repeat steps A. and B. in opposite direction.

6. Check Backlash

A. Apply a 5000 lb-in. load to the output shaft.

NOTE: Load will be reacted by the no-back brake.

B. Reverse direction of applied load and measure backlash between torqued positions. Check that backlash does not exceed 0.60 deg, or 0.0315 in. FIM measured at 3.0 in. radius.

DISASSEMBLY

NOTE: See TESTING/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. Equipment

NOTE: Equivalent substitutes may be used.

A. Planet gear installation assembly -- A27061-3 *[1]

B. Star planet timing assembly -- A27061-6 *[1]

C. Wrench adapter assembly -- A27061-8 *[1]

*[1] Part of TE Rotary Actuator Tool Set A27061-44

2. Parts Replacement (IPL Fig. 1)

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

A. Packings (15, 75, 100, 160, 177)

B. Retaining rings (12, 50, 110, 210, 235)

C. Seals (10, 80, 185)

3. Disassembly

NOTE: Tag all shims removed during disassembly and note location to facilitate assembly.

A. Disassemble rotary actuator assembly (IPL Fig. 1).

(1) Remove screws (166) and dowel pins (167) and remove cover assembly (165) from gearbox assembly (300). Remove seal (185), packing (177), and shim (190) from cover assembly.

(2) Remove parts (150, 155) to remove trip indicator assembly (115) from cover assembly. Remove packing (160).

NOTE: Do not remove inserts (170, 175) from cover assembly unless necessary for repair or replacement.

(3) Remove input shaft (295) with installed parts from gearbox assembly. Remove packing (100), bearing (180), retaining ring (110) and shim (105) from input shaft. Remove disc cam drive assembly, comprising driven camplate (205) and attached parts, and shim (220).

(4) Remove retaining ring (235) and driver camplate (240) from output camshaft of no back assembly (245).

(5) Remove retaining ring (210) and spring (215). Remove lockwire from screws (195), then disassemble disc cam drive assembly by removing screws (195, 200) and separating parts (197, 205, 222, 225, 230).

(6) Remove screws (45), retaining ring (50), and shim (55), then remove bearing retainer assembly (60) from output shaft of gearbox assembly. Remove parts (70 thru 80) from bearing retainer.

NOTE: Do not remove inserts (65) from bearing retainer unless necessary for repair or replacement.

(7) Remove torque limiter assembly (85A), shim (90), and no-back assembly (245) from gearbox assembly.

(8) Remove parts (25, 30) and drain port inner cover (20) from gearbox assembly. Remove seal housing (5) and seal (10), then remove packing (15) and backup ring (12) from gearbox assembly.

NOTE: Do not remove nameplate from gearbox assembly unless necessary for repair or replacement.

B. Disassemble torque limiter assembly (IPL Fig. 3).

(1) Remove bearings (5, 10).

(2) Stand unit on end with input cam plate (85) facing down and restrain the input cam plate (85).

(3) Bend flanges of lockwasher (30) back and remove nut assembly (15) with wrench adapter assembly A27061-8.

(4) Remove output ring (45) then remove lockwasher (30), bearing race (35) and roller bearing (40) from output ring (45).

(5) Remove brake plates (65, 70) from output cam plate (75).

(6) Lift output cam plate (75) out of input cam plate (85). Remove springs (50), washer (55) and shim (60) from output cam plate (75).

NOTE: Note thickness of shim to facilitate assembly.

(7) Remove balls (80) from input cam plate (85).

C. Disassemble no-back assembly (IPL Fig. 4).

(1) Remove bearing (5).

(2) Stand unit on end with lockring retainer (10) facing upward.

(3) Slide out lockring retainer (10) and remove lockrings (15).

(4) Remove spring (20), backup plate (25) and brake plates (30, 35).

(5) Lift no-back follower (80) out of output cam shaft (40) and remove balls (45).

(6) Remove retaining ring (50) from no-back follower (80) and remove brake plates (55, 60), backup plate (65), shim (70) and wave spring (75).

NOTE: Note thickness of shim to facilitate assembly.

D. Disassemble gearbox assembly (IPL Fig. 2).

(1) Remove screws (5), washers (10), nuts (15A) and drain port cover (20) from inner drain port (140).

(2) Remove retaining ring (25) and shim (30).

NOTE: Note thickness of shim to facilitate assembly.

CAUTION: SPLINED SHAFT (100) AND SHAFT (105) CONSTITUTE A MATCHED SET. KEEP PARTS TOGETHER AS A MATCHED SET.

(3) Mate star planet timing assembly A27061-6 to star planet gears (80). Tap shaft (105) lightly to disengage splined shaft (100) from shaft (105). Remove splined shaft (100) and outer side ring gear (35).

(4) Remove shaft (105) with attached star planet gears (80). Remove inner side ring gear (85) and sun ring gear (90).

(5) Remove star planet timing assembly A27061-6. Remove bolts (40), washers (45), nuts (55A), dowels (50) and separate bearing housing (60) from shaft (105). Remove shims (75) and star planet gears (90). Keep and tag shaft (105) and splined shaft (100) as a matched set.

NOTE: Note thickess of shims (75) to facilitate assembly.

(6) Remove bearings (65, 70) from star planet gears (80).

(7) Attach planet gear installation assembly A27061-3 to planet gears (110 thru 120) on the same side of drain port (135) on fixed ring gear (140).

(8) Stand fixed ring gear (140) on end with planet gear installation assembly A27061-3 facing down.

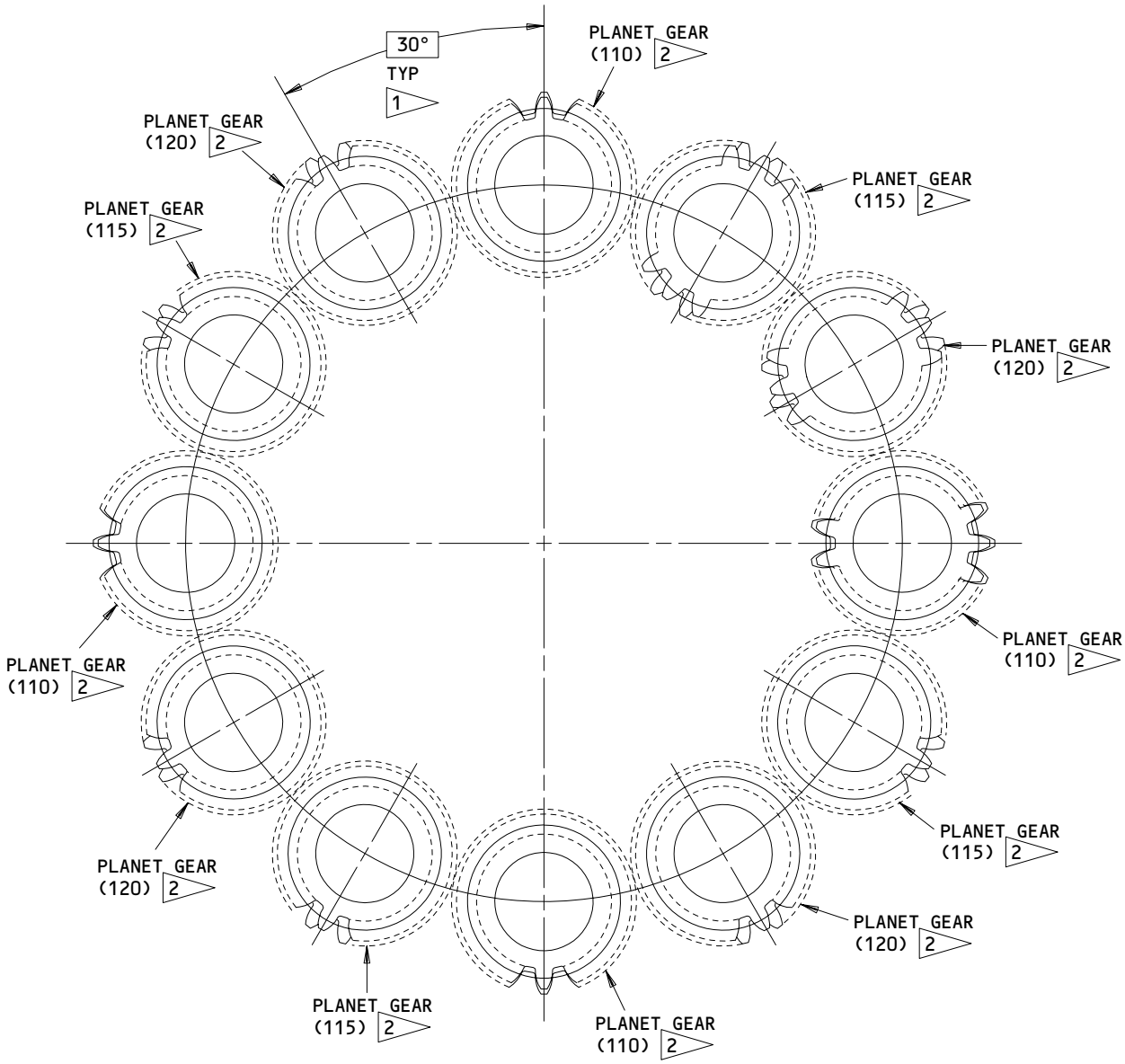
(9) Lift fixed ring gear (140) to disengage middle gear of planet gears (110, 115, 120) from fixed ring gear. Hold fixed ring gear in this position.

(10) Rotate planet gears (110, 115, 120) to position indicated in Fig. 301 and lift fixed ring gear (140) out of planet gear set.

(11) Remove inner drain port (135), if required, by removing rivets (130).

(12) Lift planet gear set (110, 115, 120) out of planet gear installation assembly A27061-3 and separate planet gears (110, 115, 120) from journal rings (125).

E. Disassemble trip indicator assembly (IPL Fig. 5) using standard industry practices.



VIEW LOOKING DOWN
(SEE TEXT)

1 ANGULAR POSITION OF PLANET GEARS (110,115,120) END GEAR TOOTH

2 LOCATE PLANET GEARS (110,115,120) AS SHOWN BEFORE REMOVING FIXED RING GEAR (140) THRU END MESH OF PLANET GEARS

ITEM NUMBERS REFER TO IPL FIG. 2

Planet Gears Setting Diagram
Figure 301

178582

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 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. Magnetic particle check the following parts per 20-20-01.

   A. IPL Fig. 1

      (1) Dowel pin (167)

      (2) Retaining ring (197)

      (3) Trip indicator retainer (222) and ring (230)

      (4) Spring (215)

      (5) Input shaft (295)

   B. IPL Fig. 2

      (1) Outer side ring gear (35)

      (2) Dowel (50)

      (3) Star planet gear (80)

      (4) Inner side ring gear (85)

      (5) Sun ring gear (90)

      (6) Shafts (100, 105)

      (7) Planet gears (110, 115, 120)

      (8) Journal rings (125)

      (9) Fixed ring gear (140)

   C. IPL Fig. 3

      (1) Nut (25)

      (2) Race (35)

(3) Output ring (45)

(4) Brake plates (70)

(5) Camplates (75, 85)

D. IPL Fig. 4

(1) Retainer (10)

(2) Lockring (15)

(3) Backup plate (25, 65)

(4) Brake plates (35, 55)

(5) No-back follower (80)

(6) Camshaft (40)

4. Penetrant check the following parts per 20-20-02.

A. IPL Fig. 1

(1) Bearing retainer (67)

(2) Cover (165 ref)

(3) Camplate (240)

(4) Housing seal (5)

(5) Camplate (205)

B. IPL Fig. 2

(1) Bearing housing (60)

(2) Inner drain port (135)

C. Brake plates (65, IPL Fig. 3)

D. IPL Fig. 5

(1) Arm (20)

(2) Plate (30)

(3) Actuator (45)

(4) Guard (55)

5. Check gear teeth and splines for uneven wear.

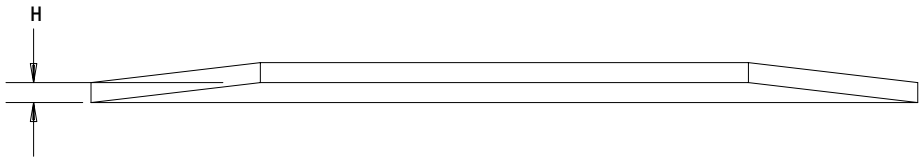
6. Check brake plates (30, 60, IPL Fig. 4) for wear.

7. Check spring (215, IPL Fig. 1).

   A. Compress spring to 0.600 in. and check that load is 6.25-7.75 lbs.

   B. Compress spring to 0.700 in. and check that load is 5.0-6.0 lbs.

8. Check springs (50, IPL Fig. 3; 20, IPL Fig. 4) per Fig. 501.



ITEM NO. IPL FIG.	H (INCH)	LOAD (LBS)
50, IPL FIG. 3	0.023 0.010	230 MAX 265-295
20, IPL FIG. 4	0.030 0.010 0.000	510 630 680

Spring Check
Figure 501

178590

REPAIR - GENERAL

1. Content

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

P/N	NAME	REPAIR
256T3265	COVER	1-1
256T3269	HOUSING, SEAL	2-1
256T3270	RETAINER, BEARING	3-1
256T3271	SHAFT, INPUT	4-1
256T3297	NAMEPLATE	5-1
- - -	MISC PARTS REFINISH	6-1
256T3254	GEAR, SIDE RING	7-1
256T3255	GEAR, FIXED RING	8-1
256T3258	GEAR, SUN RING	9-1
256T3259	GEAR, PLANET	10-1
256T3263	RING, JOURNAL	11-1
256T3264	GEAR, STAR PLANET	12-1
256T3266	HOUSING, BEARING	13-1
256T3268	GEAR, SIDE RING	14-1
256T3275	GUARD	15-1
256T3278	ARM	16-1
256T3299	SHAFT, OUTPUT	17-1
256T3801	PLATE, INPUT CAM	18-1

256T3806	RING, OUTPUT	19-1
256T3836	CAMSHAFT, OUTPUT	20-1

2. Standard Practices

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

20-30-02 Stripping of Protective Finishes
20-30-03 General Cleaning Procedures
20-41-01 Decoding Table for Boeing Finish Codes
20-41-02 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
20-43-01 Chromic Acid Anodizing
20-50-05 Application of Aluminum Foil and Other Markers
20-50-08 Application of Dry Lubricant
20-50-10 Application of Stencils, Insignia, Silk Screen, Part Numbering and Identification Markings

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 70 (BMS 5-92) (Ref 20-60-04)

D. Lubricant -- BMS 3-8 (Ref 20-60-02)

E. Enamel -- BMS 10-60, type 1, color gloss red (BAC101) (Ref 20-60-02)

F. Corrosion Preventive Compound -- MIL-C-11796, Class 3 (Ref 20-60-03)

4. Dimensioning Symbols

A. Standard True Position Dimensioning Symbols used in the 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
↗↗	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]

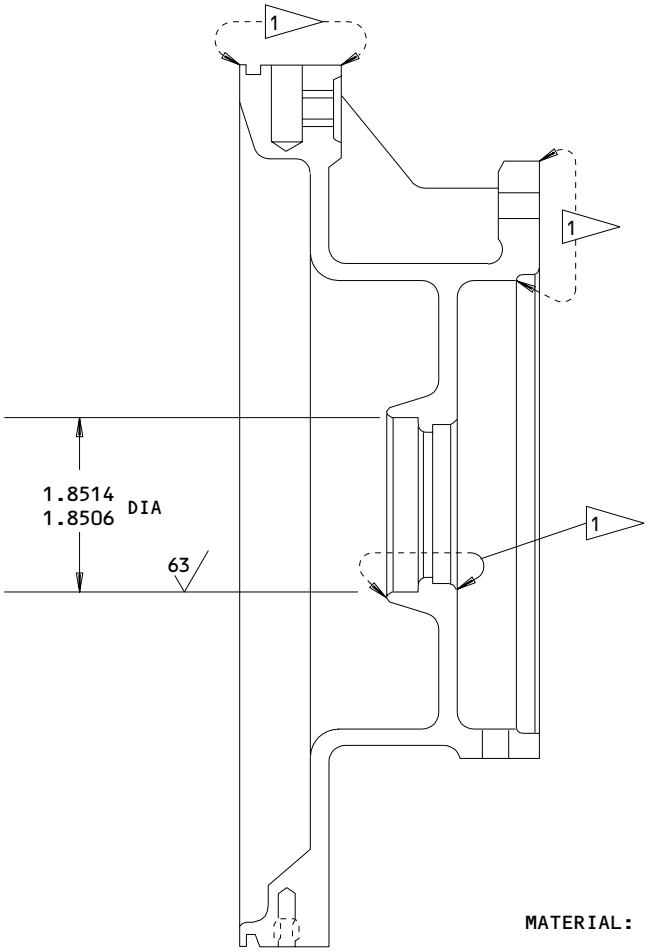
True Position Dimensioning Symbols
Figure 601

COVER ASSEMBLY - REPAIR 1-1

256T3265-1

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

COVER (165 REF) -- CHROMIC ACID OR SULFURIC ACID ANODIZE (F-17.05) ALL OVER AND APPLY ONE COAT PRIMER, BMS 10-11, TYPE 1 (F-20.02) EXCEPT IN HOLES, ON TRIP INDICATOR MOUNTING SURFACE, AND AS NOTED

1 OMIT PRIMER THESE SURFACES

MATERIAL: AL ALLOY

ALL DIMENSIONS ARE IN INCHES

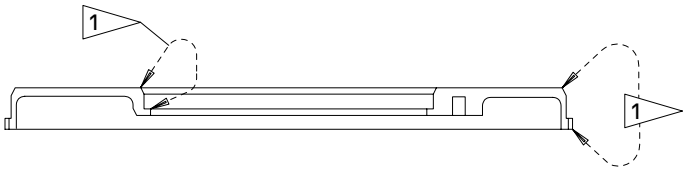
Cover Refinish
Figure 601

SEAL HOUSING - REPAIR 2-1

256T3269-1

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 ANODIZE (F-17.04) ALL OVER AND APPLY ONE COAT PRIMER, BMS 10-11, TYPE 1 (F-20.02) EXCEPT OMIT FINISH ON SPLINES AND AS NOTED

1 OMIT PRIMER THESE SURFACES

MATERIAL: AL ALLOY

ALL DIMENSIONS ARE IN INCHES

Seal Housing Refinish
Figure 601

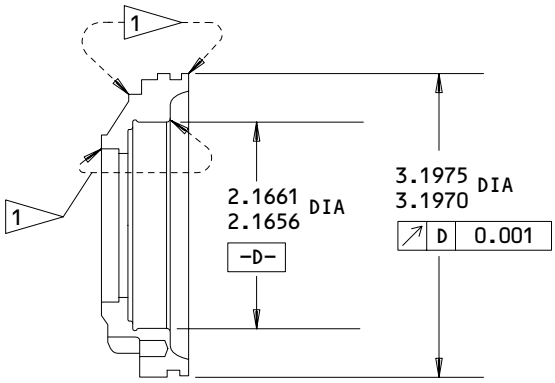
72286

BEARING RETAINER - REPAIR 3-1

256T3270-1

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

RETAINER (67)--CHROMIC ACID OR SULFURIC ACID ANODIZE (F-17.05) ALL OVER AND APPLY ONE COAT PRIMER, BMS 10-11, TYPE 1 (F-20.02) ON EXTERNAL SURFACES EXCEPT AS NOTED

1 OMIT PRIMER THESE SURFACES

MATERIAL: AL ALLOY

ALL DIMENSIONS ARE IN INCHES

Bearing Retainer Refinish
Figure 601

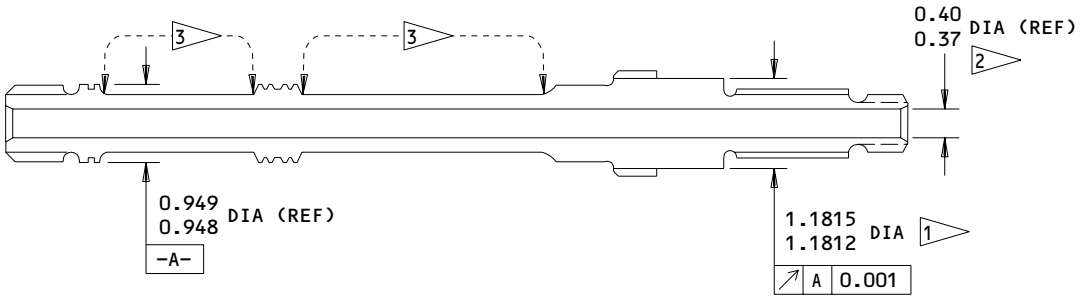
72288

INPUT SHAFT - REPAIR 4-1

256T3271-1

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-TITANIUM ALLOY PLATE (F-16.05) AND APPLY PHOSPHATE TREATMENT ALL OVER EXCEPT AS NOTED BY 1. THROW-IN PLATING OF UNCONTROLLED THICKNESS ALLOWED AT MOUTHS OF BORE. APPLY TWO COATS PRIMER BMS 10-11, TYPE I (F-20.03) PLUS CORROSION PREVENTITIVE COMPOUND MIL-C-11796, CLASS I (F-19.03) TO SURFACE OF BORE. APPLY ONE COAT PRIMER TO SURFACES NOTED BY 3

MATERIAL: 4340M STEEL
275-300 KSI

ALL DIMENSIONS ARE IN INCHES

1 NO FINISH (F-25.01) THIS SURFACE

2 PLATING OPTIONAL THIS SURFACE. APPLY PRIMER AND CORROSION PREVENTITIVE COMPOUND

3 APPLY PRIMER THESE SURFACES

Input Shaft Refinish
Figure 601

NAMEPLATE - REPAIR 5-1

256T3297-1

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

1. Nameplate Replacement (IPL Fig. 1)

   A. Remove nameplate (350).

   B. Steel stamp assembly number, serial number, and date of manufacture on replacement nameplate.

   C. Bend nameplate to conform to gearbox assembly contour.

   D. Bond in place with adhesive, Type 70, in approximate location shown in IPL Fig. 1.

MISCELLANEOUS PARTS REFINISH - REPAIR 6-1

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

IPL FIG. & ITEM	MATERIAL	FINISH
Fig. 1		
Anti-rotation pin (70)	1018 Steel	Cadmium plate (F-15.02).
Dowel pin (167)	4340 Steel 180-200 ksi	Cadmium plate (F-15.02).
Drain port inner cover (20)	Al alloy	Chromic acid or sulfuric acid anodize (F-17.05) and apply one coat primer, BMS 10-11, type 1 (F-20.02) all over.
Ring (197), retainer (222), ring (230)	4340 Steel 125-150 ksi	Cadmium plate (F-15.02).
Diaphragm (225)	301 CRES, full hard	Passivate (F-17.09).
Camplate (240)	Al alloy	Hard anodize.
Spring (215)	Music wire	Cadmium plate per 20-42-05, Class 2, and apply Type II post-plate treatment.
Fig. 2		
Drain port cover (20), inner drain port (135)	Al alloy	Chromic acid or sulfuric acid anodize (F-17.05) and apply 1 coat of primer (F-20.02) all over.
Dowel (50)	4340 Steel, 180-200 ksi	Cadmium plate (F-15.02) all over.
Fig. 3		
Nut (25), washer (55),	4340 Steel, 150-170 ksi	Cadmium plate (F-15.02) all over.

Refinish Details
Figure 601 (Sheet 1)

IPL FIG. & ITEM	MATERIAL	FINISH
Fig. 3 (Cont)		
Spring (50)	17-7PH CRES	Passivate (F-17.09) and apply dry film lubricant (F-19.10) all over.
Brake plate (70)	17-7PH CRES, 150-170 ksi	Passivate (F-17.09) all over.
Output cam plate (75)	9310 Steel, 150-190 ksi core strength	Cadmium plate (F-15.23) all over except no finish (F-25.01) in ball grooves, ball ramps and ball relief grooves.
Fig. 4		
Retainer (10)	15-5PH CRES, 180-200 ksi	Passivate (F-17.09) all over.
Ring (15)	4340 (opt 4140) Steel, 150-170 ksi	Cadmium plate (F-15.02) all over.
Spring (20)	17-7PH CRES	Passivate (F-17.09) and apply dry film lubricant (F-19.10) all over.
Brake plates (35, 55)	17-7PH CRES, 180-200 ksi	Passivate (F-17.09) all over.
Backup plate (25A, 65)	15-5PH CRES, 150-170 ksi	Passivate (F-17.25) all over.
No-back follower (80)	9310 Steel, core strength 150-190 ksi	Cadmium plate (F-15.23) except no finish (F-25.01) in ball grooves, ball ramps and ball relief grooves.

Refinish Details
Figure 601 (Sheet 2)

IPL FIG. & ITEM	MATERIAL	FINISH
Fig. 5		
Retainer plate (30), Actuator (45)	Al alloy	Chromic acid or sulfuric acid anodize (F-17.05) all over.
Spring (35)	302 or 306 CRES	Passivate (F-17.09) all over.

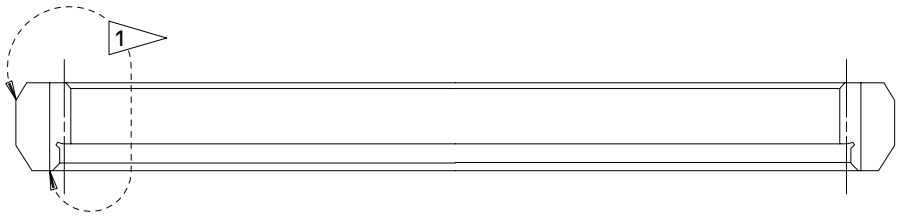
Refinish Details
Figure 601 (Sheet 3)

SIDE RING GEAR - REPAIR 7-1

256T3254-2, -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 TITANIUM PLATE (F-15.32) ALL OVER.
APPLY 1 COAT OF PRIMER (F-20.02) ALL OVER
EXCEPT AS NOTED

1 OMIT PRIMER THIS SURFACE

MATERIAL: 433OM STEEL, 220-240 KSI

Ring Gear Refinish
Figure 601

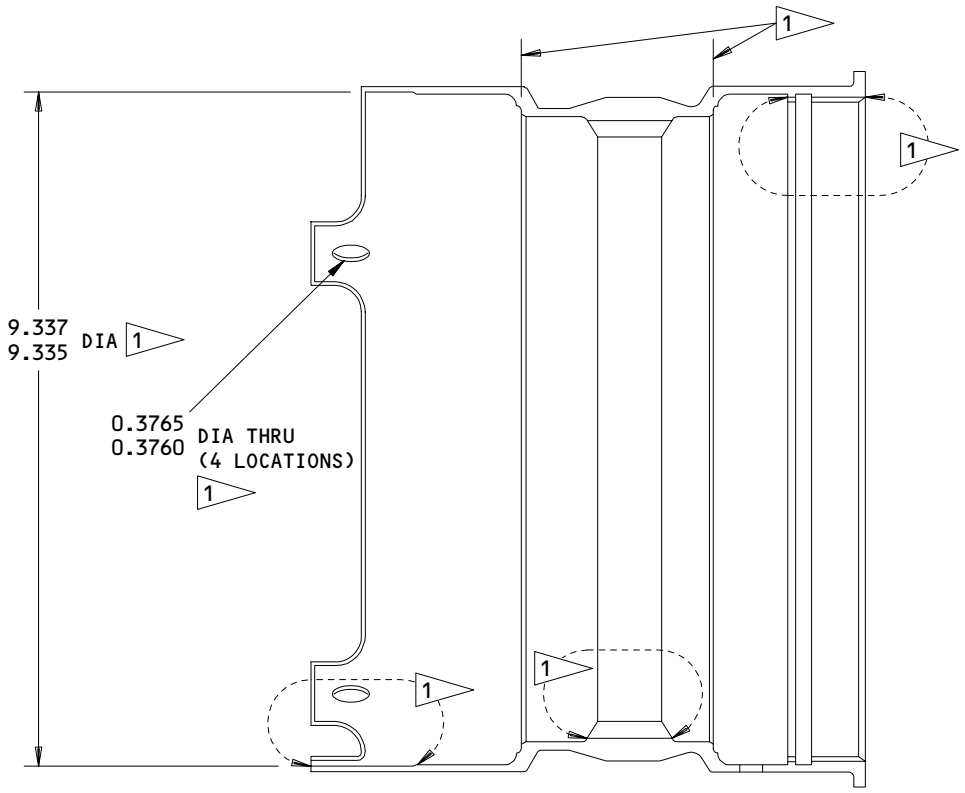
178953

FIXED RING GEAR - REPAIR 8-1

256T3255-3, -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.



REFINISH

CADMIUM TITANIUM PLATE 0.0005-0.0007 THICK AS SHOWN IN SOPM 20-42-02 AND APPLY PHOSPHATE COAT (F-14.14) ALL OVER. APPLY 1 COAT OF PRIMER (F-20.02) ALL OVER UNLESS SHOWN DIFFERENTLY.

ALTERNATE FINISH

CADMIUM PLATE AS SHOWN IN QQ-P-416, CLASS 2, TYPE 2 (SOPM 20-42-05) ALL OVER AND APPLY 1 COAT OF PRIMER (F-20.02) UNLESS SHOWN DIFFERENTLY.

MATERIAL: 4340M STEEL, 200-220 KSI

ALL DIMENSIONS ARE IN INCHES

1 OMIT PRIMER THIS SURFACE

Fixed Ring Gear Refinish
Figure 601

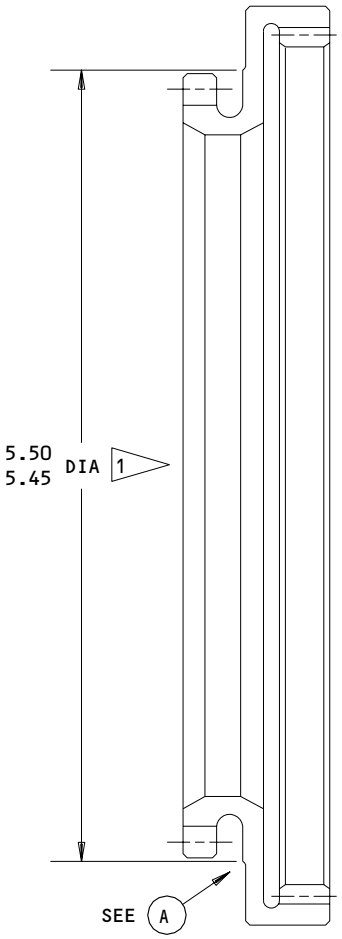
178596

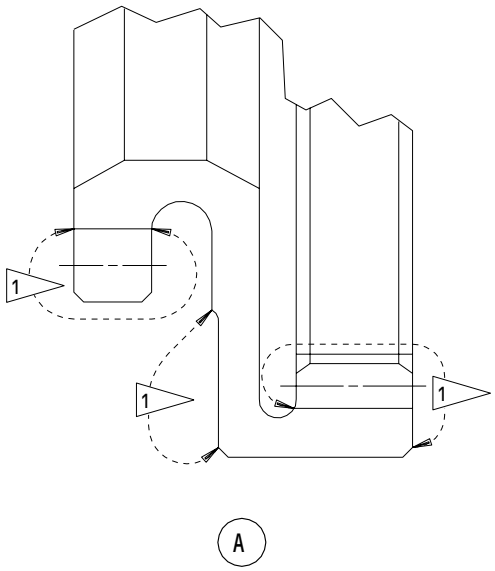
SUN RING GEAR - REPAIR 9-1

256T3258-2

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

CADMIUM PLATE PER QQ-P-416, CLASS 2, TYPE 2 (REF 20-42-05) ALL OVER AND APPLY 1 COAT OF PRIMER (F-20.02) EXCEPT AS NOTED

MATERIAL: 4340M STEEL, HEAT TREATED AND NITRIDED

ALL DIMENSIONS ARE IN INCHES

1 OMIT PRIMER THIS SURFACE

Sun Ring Gear Refinish
Figure 601

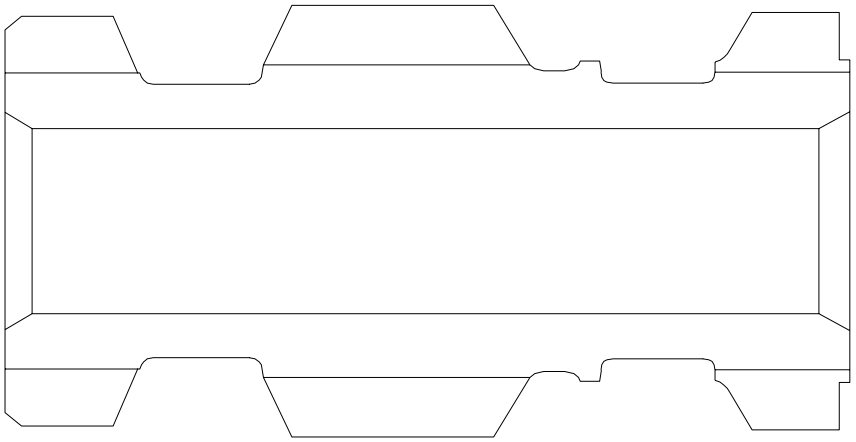
178617

PLANET GEAR - REPAIR 10-1

256T3259-1 THRU -6

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.



MATERIAL: 4340M STEEL, 275-300 KSI

REFINISH

256T3259-1,-2,-3:

EXTERNAL SURFACES -- CADMIUM TITANIUM PLATE (F-15.32). PLATING OPTIONAL IN ENDS OF BORE.

INTERNAL BORE -- PHOSPHATE TREAT (F-18.02) BUT DO NOT APPLY LUBRICANT. APPLY BMS 10-11, TYPE 1 PRIMER (F-20.03) AND MIL-C-11796, CLASS 1 CORROSION PREVENTIVE COMPOUND (F-19.03).

OPTIONAL:

EXTERNAL SURFACES -- CADMIUM TITANIUM PLATE (F-16.05)(0.0005-0.0007 THICK). PLATING OPTIONAL IN ENDS OF BORE.

INTERNAL BORE -- APPLY PHOSPHATE COATING (F-16.12, WHICH REPLACES F-14.14). APPLY BMS 10-11, TYPE 1 PRIMER (F-20.03) AND MIL-C-11796, CLASS 1 CORROSION PREVENTIVE COMPOUND (F-19.03).

256T3259-4,-5,-6:

CADMIUM-TITANIUM PLATE (F-15.32) ALL OVER. APPLY BMS 10-11, TYPE 1 PRIMER (F-20.02) ON INTERNAL BORE.

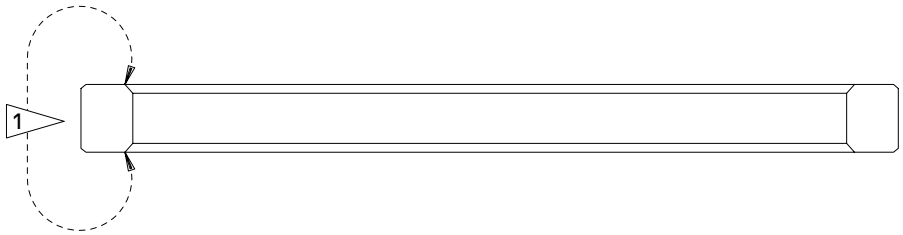
256T3259-1 thru -6
Planet Gear Refinish
Figure 601

JOURNAL RING - REPAIR 11-1

256T3263-1

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-TITANIUM PLATE (F-15.32) ALL OVER AND
APPLY 1 COAT OF PRIMER (F-20.02) ALL OVER
EXCEPT AS NOTED BY 1

1 OMIT PRIMER THIS SURFACE

MATERIAL: 4340M STEEL, 275-300 KSI

Journal Ring Refinish
Figure 601

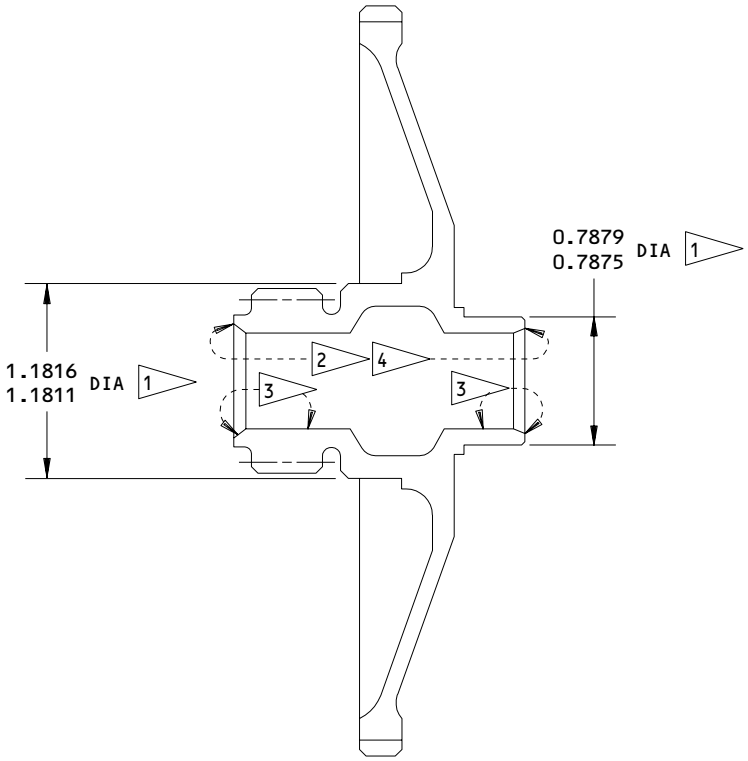
178625

STAR PLANET GEAR - REPAIR 12-1

256T3264-2, -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

256T3264-2:

CADMIUM PLATE (F-15.06) ALL OVER EXCEPT AS NOTED BY 1. PLATING OPTIONAL ON INTERNAL BORE AND CHAMFERS AS INDICATED BY 2. PLATING THROW-IN OF UNCONTROLLED THICKNESS ALLOWED AT MOUTHS OF BORE ON INDICATED SURFACES. APPLY BMS 10-11, TYPE 1 PRIMER (F-20.03) AND MIL-C-11796, CLASS 1 CORROSION PREVENTIVE COMPOUND (F-19.03) TO AREA INDICATED BY 2.

256T3264-3:

CADMIUM PLATE (F-15.06) ALL OVER EXCEPT AS NOTED BY 1. APPLY BMS 10-11, TYPE 1 PRIMER (F-20.03) ON AREA INDICATED BY 4.

1 NO FINISH (F-25.01) THIS SURFACE

2 CADMIUM PLATE OPTIONAL THERE SURFACES. APPLY PRIMER AND CORROSION PREVENTIVE COMPOUND

3 UNCONTROLLED PLATING THROW-IN ALLOWED

4 APPLY PRIMER TO THESE SURFACES

MATERIAL: 434OM STEEL
CORE STRENGTH 168-186 KSI
NITRIDED GEAR TEETH (OPTIONAL ALL OVER) CASE HARDNESS HR15N 87.5 MIN

ALL DIMENSIONS ARE IN INCHES

256T3264-2,-3
Star Planet Gear Refinish
Figure 601

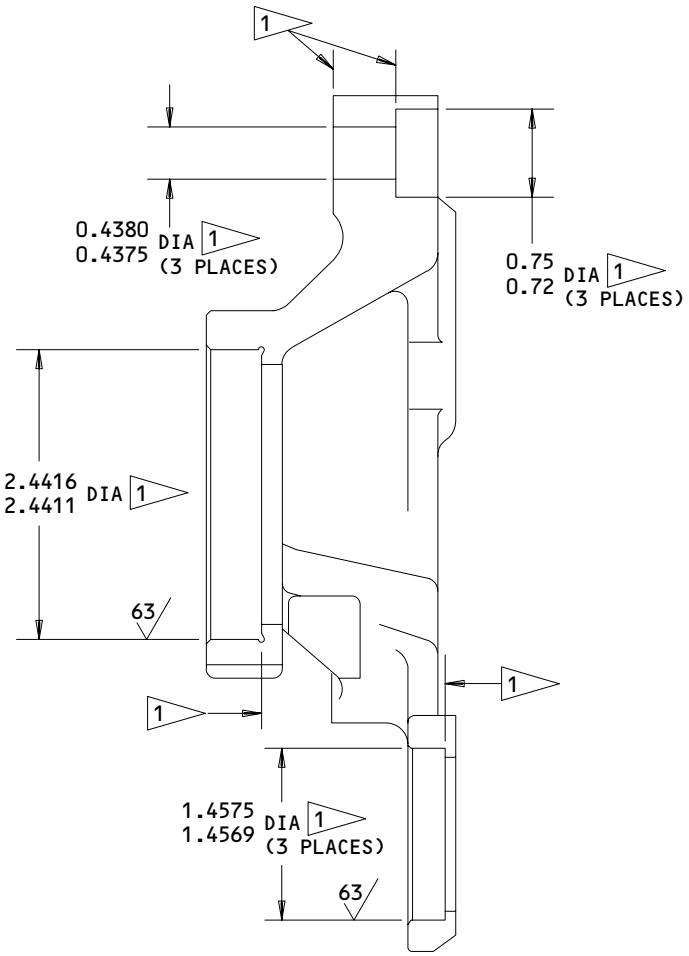
178639

BEARING HOUSING - REPAIR 13-1

256T3266-1

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

ANODIZE (F-17.05) ALL OVER AND APPLY 1 COAT OF PRIMER (F-20.02) EXCEPT AS NOTED

1 OMIT PRIMER THIS SURFACE

MATERIAL: AL ALLOY

ALL DIMENSIONS ARE IN INCHES

Bearing Housing Refinish
Figure 601

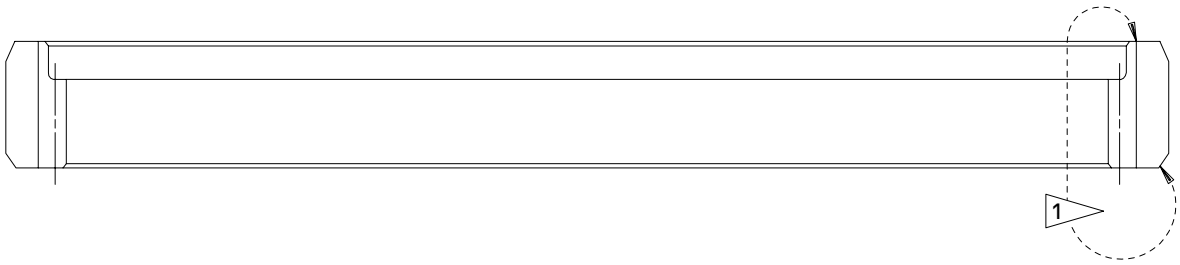
178657

SIDE RING GEAR - REPAIR 14-1

256T3268-2, -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 TITANIUM PLATE, 0.0005-0.0007 INCH THICK PER 20-42-02 AND APPLY PHOSPHATE TREATMENT (F-14.14) ALL OVER. THEN APPLY 1 COAT OF PRIMER (F-20.02) EXCEPT AS NOTED

ALTERNATE FINISH

CADMIUM PLATE PER QQ-P-416, TYPE 2, CLASS 2 OR 3 (REF 20-42-05) ALL OVER. APPLY 1 COAT OF PRIMER (F-20.02) EXCEPT AS NOTED

1 OMIT PRIMER THIS SURFACE

MATERIAL: 4340M STEEL, 275-300 KSI

Ring Gear Refinish
Figure 601

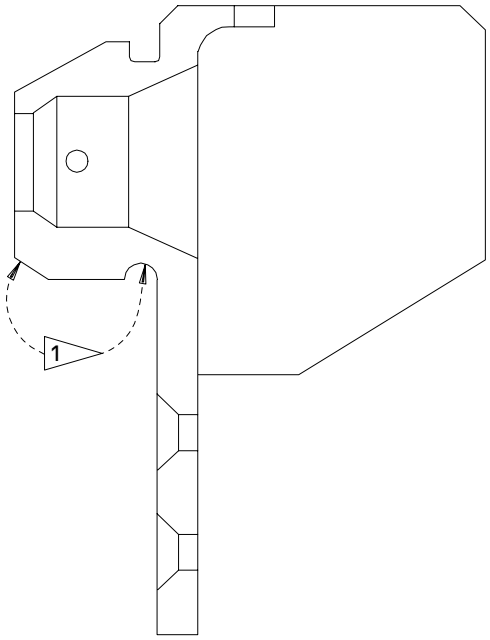
178957

GUARD - REPAIR 15-1

256T3275-1

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 AND APPLY 1 COAT OF PRIMER (F-20.02)
EXCEPT AS NOTED

1 OMIT PRIMER THIS SURFACE

MATERIAL: AL ALLOY

Guard Refinish
Figure 601

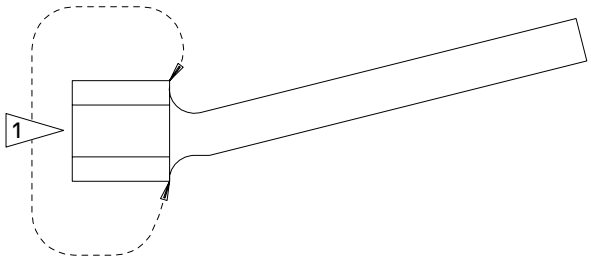
178659

ARM - REPAIR 16-1

256T3278-1

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) AND APPLY 1 COAT OF PRIMER (F-20.02) ALL OVER APPLY ENAMEL PER 1

1 APPLY 1 COAT OF ENAMEL, BMS 10-60, TYPE I COLOR BAC101 RED GLOSS ON SURFACES INDICATED

MATERIAL: 4330M STEEL, 220-240 KSI

Arm Refinish
Figure 601

178843

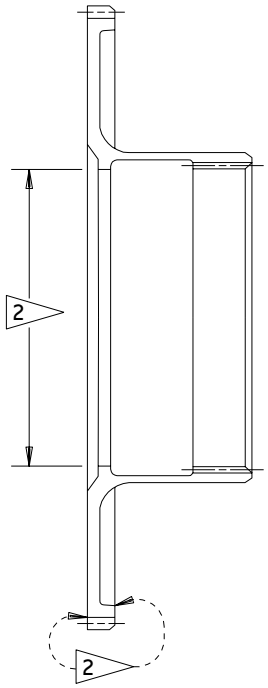
OUTPUT SHAFT ASSEMBLY - REPAIR 17-1

256T3299-2

CAUTION: SPLINED SHAFT (100 OR 100A, IPL FIG. 2) AND SHAFT (105) CONSTITUTE A MATCHED SET. KEEP PARTS TOGETHER TO ENSURE PROPER OPERATION AFTER ASSEMBLY.

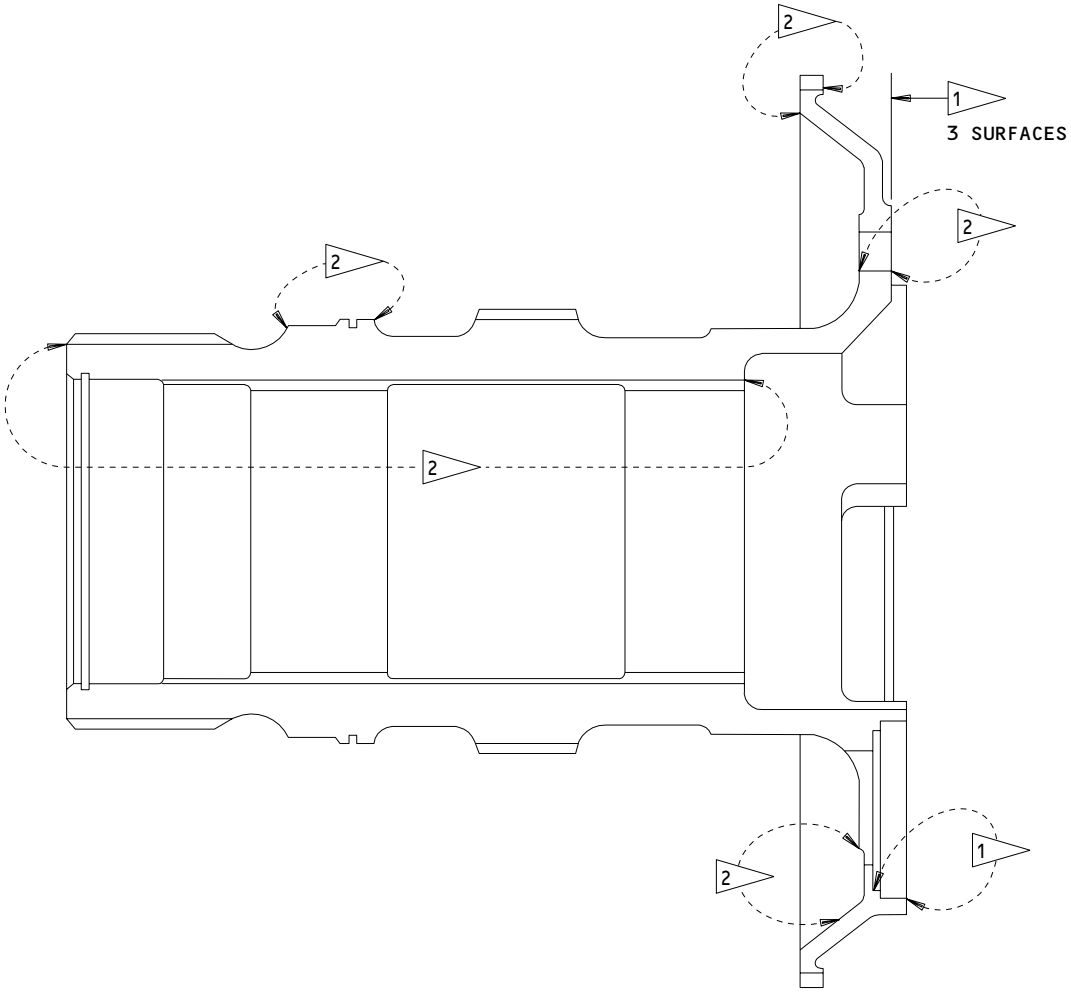
1. Plating Repair

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.



256T3299-5,-6
Output Shaft Assembly Refinish
Figure 601 (Sheet 1)

178858



256T3299-4

NOTE: REFINISH PART INDIVIDUALLY

REFINISH

CADMIUM-TITANIUM PLATE 0.0005-0.0007 INCH THICK PER 20-42-02 AND APPLY PHOSHATE TREATMENT (F-14.14) ALL OVER EXCEPT AS NOTED IN 1. APPLY 1 COAT OF PRIMER (F-20.02) EXCEPT ON GEAR TEETH, SPLINES AND AS NOTED IN 1 2

ALTERNATE FINISH: (256T3299-4,-6 ONLY)

CADMIUM PLATE PER QQ-P-416, CLASS 2 OR 3, TYPE 2 (REF 20-42-05) ALL OVER EXCEPT AS NOTED IN 1. APPLY 1 COAT OF PRIMER (F-20.02) EXCEPT ON GEAR TEETH, SPLINES AND AS NOTED IN 1 2

MATERIAL: 4340M STEEL, 275-300 KSI

1 NO FINISH (F-25.01) THIS SURFACE

2 OMIT PRIMER THIS SURFACE

Output Shaft Assembly Refinish
Figure 601 (Sheet 2)

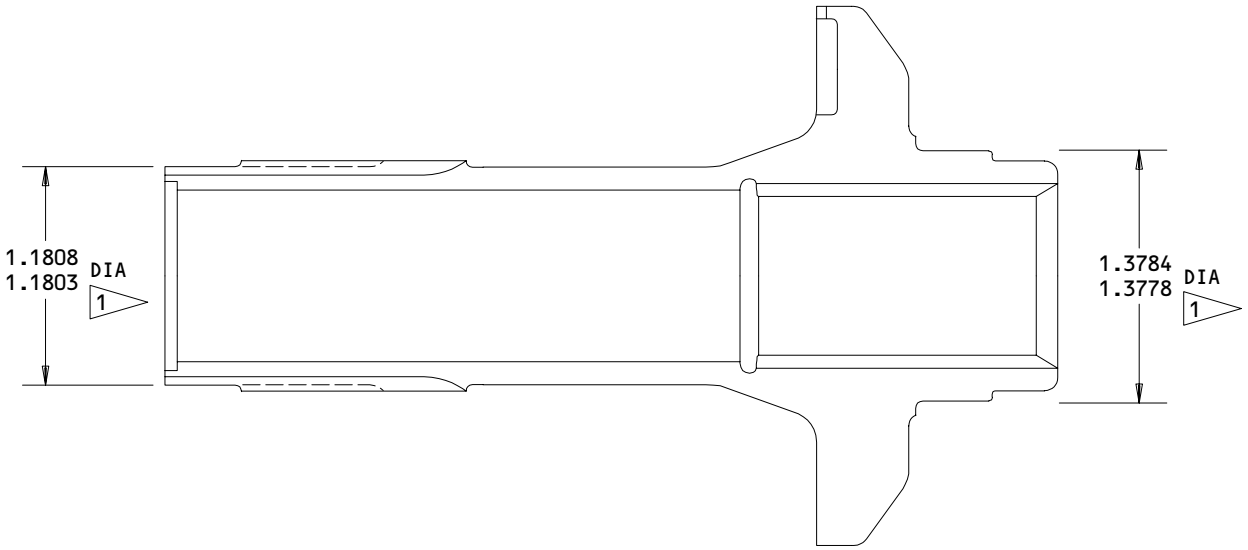
178874

INPUT CAM PLATE - REPAIR 18-1

256T3801-1

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-15.23) ALL OVER EXCEPT NO FINISH (F-25.01) IN BALL GROOVES, BALL RAMPS, BALL RELIEF GROOVES AND AS NOTED BY 1

1 NO FINISH (F-25.01) THIS SURFACE

MATERIAL: 9310 STEEL, 150-170 KSI

ALL DIMENSIONS ARE IN INCHES

Input Cam Plate Refinish
Figure 601

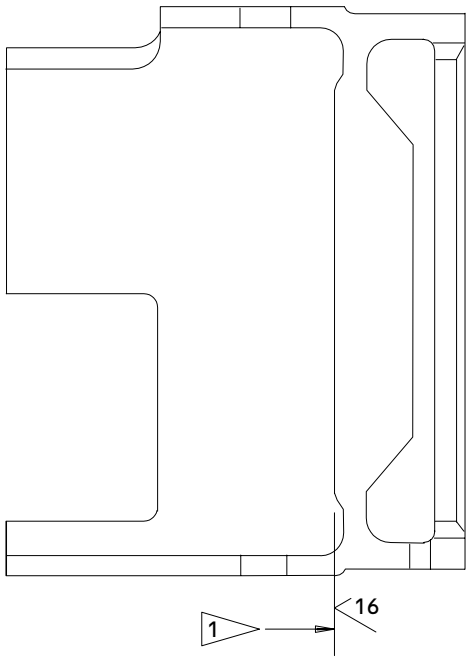
178925

OUTPUT RING - REPAIR 19-1

256T3806-1

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 EXCEPT AS NOTED

1 NO FINISH (F-25.01) THIS SURFACE

MATERIAL: 4340 STEEL, 180-200 KSI

Output Ring Refinish
Figure 601

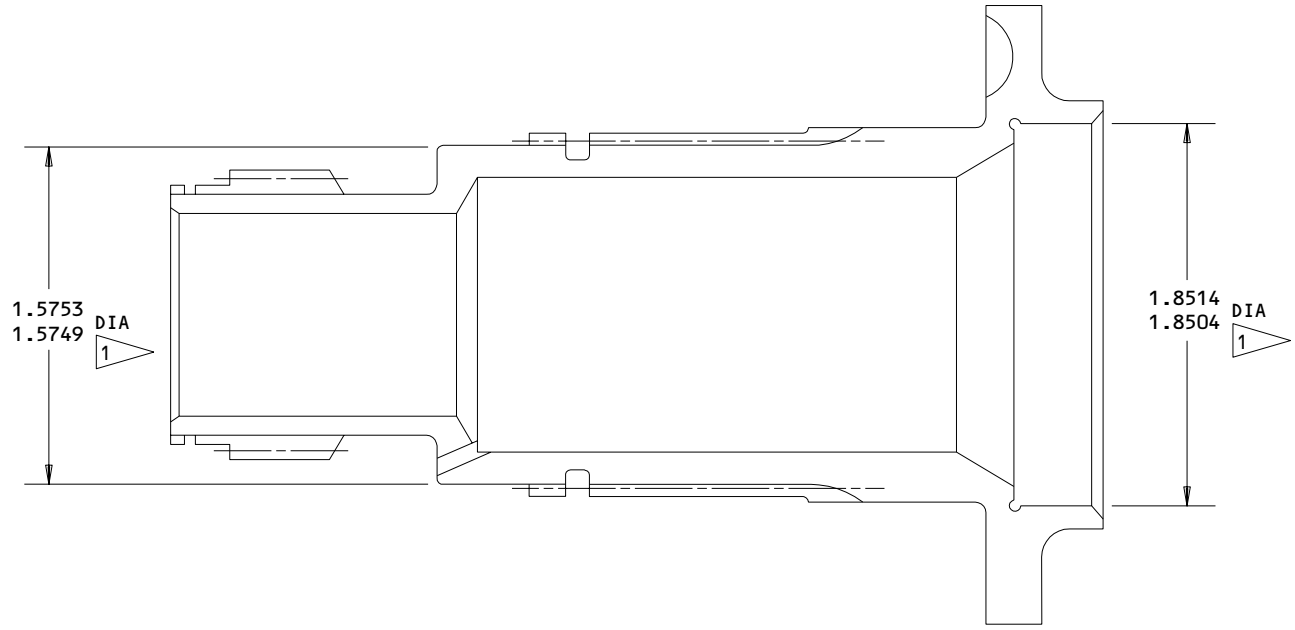
178923

OUTPUT CAMSHAFT - REPAIR 20-1

256T3836-1

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-15.23) ALL OVER EXCEPT NO FINISH (F-25.01) IN BALL GROOVES, BALL RAMPS, BALL RELIEF GROOVES AND AREA INDICATED BY 1

1 NO FINISH (F-25.01) THIS SURFACE

MATERIAL: 9310 STEEL, CORE STRENGTH 150-190 KSI

ALL DIMENSIONS ARE IN INCHES

Output Camshaft Refinish
Figure 601

178933

ASSEMBLY

1. Materials

NOTE: Equivalent substitutes may be used.

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

B. Corrosion Preventive Compound -- MIL-C-11796, Class 3 (Ref 20-60-02)

C. Corrosion Preventive Compound -- MIL-C-16173, Grade 2 (Ref 20-60-03)

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

E. Sealant -- MIL-S-8802 (Ref 20-60-04)

F. Lockwire -- MS20995C20

G. Primer -- BMS 10-11, type 1 (Ref 20-60-02)

2. Equipment

A. Grinding Fixture Assembly -- A27061-11 *[1]

B. Star Planet Timing Assembly -- A27061-6 *[1]

C. Brake Gap Gage Assembly -- A27061-7 *[1]

D. Wrench Adapter Assembly -- A27061-8 *[1]

E. Wrench Adapter Assembly -- A27061-9 *[1]

F. Run-In Block Assembly -- A27061-10 *[1]

G. Planet Gear Installation Assembly -- A27061-3 *[1]

H. Spring Holder -- A27061-12 *[1]

I. Spline Adapter -- A27061-47 *[2]

J. Support Plate -- A27061-48 *[2]

*[1] Part of T.E. Rotary Actuator Tool Set A27061-44

*[2] Part of T.E. Rotary Actuator Tool Sets A27061-46 and A27061-54.
A27061-54 replaces A27061-46 for future procurement.

3. Lubrication

A. Apply light coat of grease to packings, seals, splines, faying surfaces, and bearings at assembly.

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

B. Apply light coat of grease to gear teeth.

4. Assembly

A. Assemble trip indicator assembly (IPL Fig. 5).

(1) Coat all surfaces of seal (50) with grease and install seal on actuator (45).

(2) Coat all surfaces of pin (40) with grease. Position actuator (45) in guard (55) and secure with pin (40). Install pin to depth shown (Fig. 701).

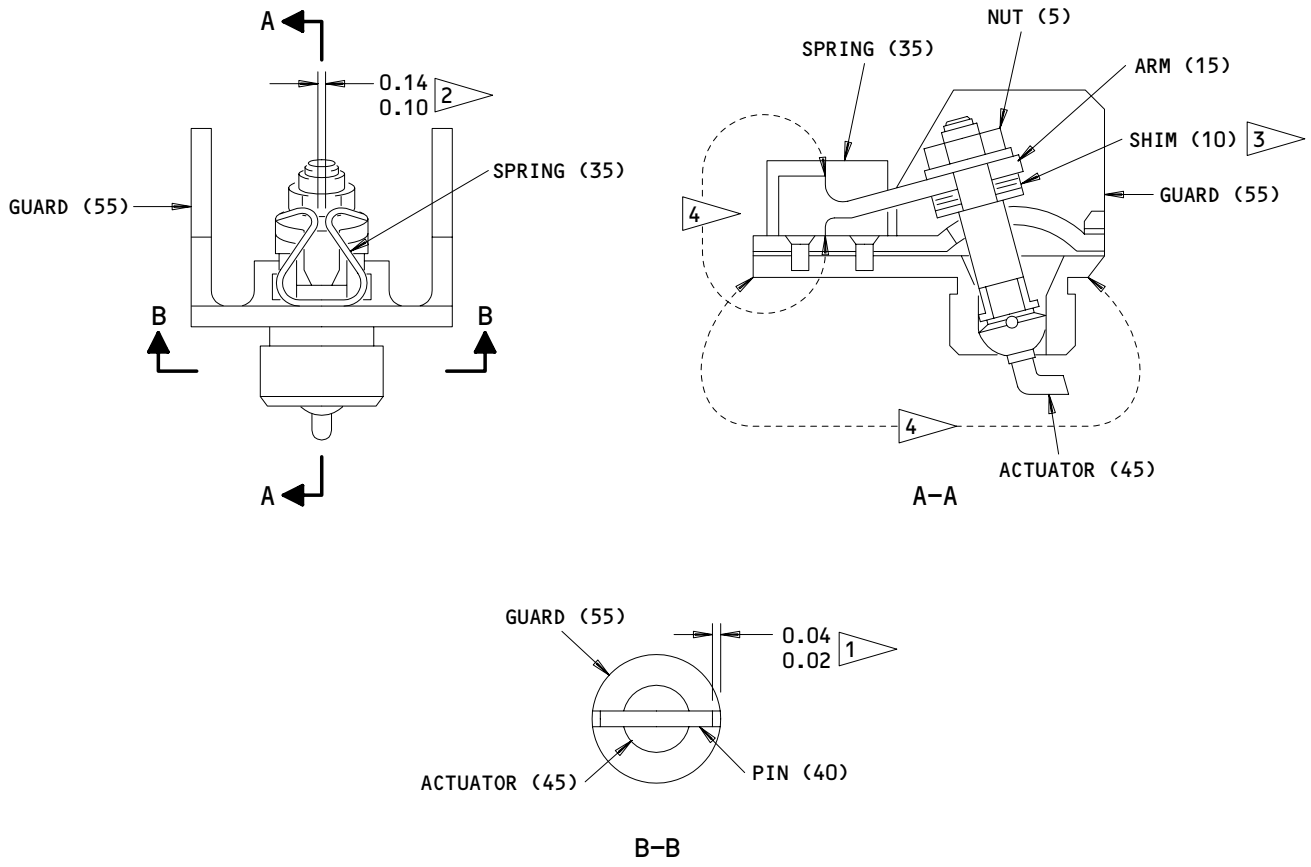
(3) Install spring (35) and retaining plate (30) and secure with rivets (25). Drive rivets to fill countersink. Adjust spring to dimension shown after rivet installation.

(4) Install shim (10), arm (20) and secure with washer (15) and nut (5). Tighten nut to 9-12 lb-in.

(5) Check and adjust shim (10) thickness to preload arm (20) against spring (35).

(6) Remove nut (5) and coat mating threads of nut (5) and actuator (45) with corrosion preventive compound, MIL-C-16173. Reinstall nut and tighten to 9-12 lb-in.

(7) Apply 1 coat of primer per F-20.02 (Ref 20-41-01) except as noted.



1 INSTALL PIN (40) TO DEPTH SHOWN

2 ADJUST SPRING (35) TO DIMENSION SHOWN AFTER RIVETS (25) INSTALLATION

3 ADJUST SHIM (10) THICKNESS SO THERE IS PRELOAD BETWEEN ARM (20) AND SPRING (35)

4 OMIT PRIMER THIS SURFACE

ALL DIMENSIONS ARE IN INCHES

ITEM NUMBERS REFER TO IPL FIG. 5

Trip Indicator Assembly – Assembly Details
Figure 701

178944

B. Assemble no-back assembly (IPL Fig. 4).

(1) Before assembly, apply a thin film of grease to the brake surfaces of the brake plate assemblies (30, 60).

(2) Install brake plate assemblies (60) and brake plates (55) on follower (80) and secure with retaining ring (50).

(3) Position follower (80) on end with splines facing down. Apply 15-25 pound load to the uppermost brake plate assembly (60) and measure gap between lower surface of follower and friction surface of uppermost brake plate assembly (Fig. 702). Remove load and remove retaining ring (50), brake plates (55) and brake plate assemblies (60).

(4) Measure thickness of backup plate (65) and compare with the value obtained in step (3). Remove material from backup plate (65) on surface noted as required to obtain a gap of 0.007-0.010 inch when backup plate (65) is installed on follower (80). Finish surface as noted in Fig. 702.

(5) Lubricate follower (80) by applying a thin film of grease to spline teeth and inserting brake plate (55) to full length of teeth. Remove brake plate and wipe excess grease from spline area and runout groove.

(6) Position follower (80) on end with spline facing up and install spring (75), shim (70), backup plate (65), brake plate assemblies (60) and brake plates (55) on follower. Secure parts with retaining ring (50). Check that gap between backup plate (65) and follower (80) is between 0.007-0.010 inch.

NOTE: Use shim thickness as noted during disassembly.

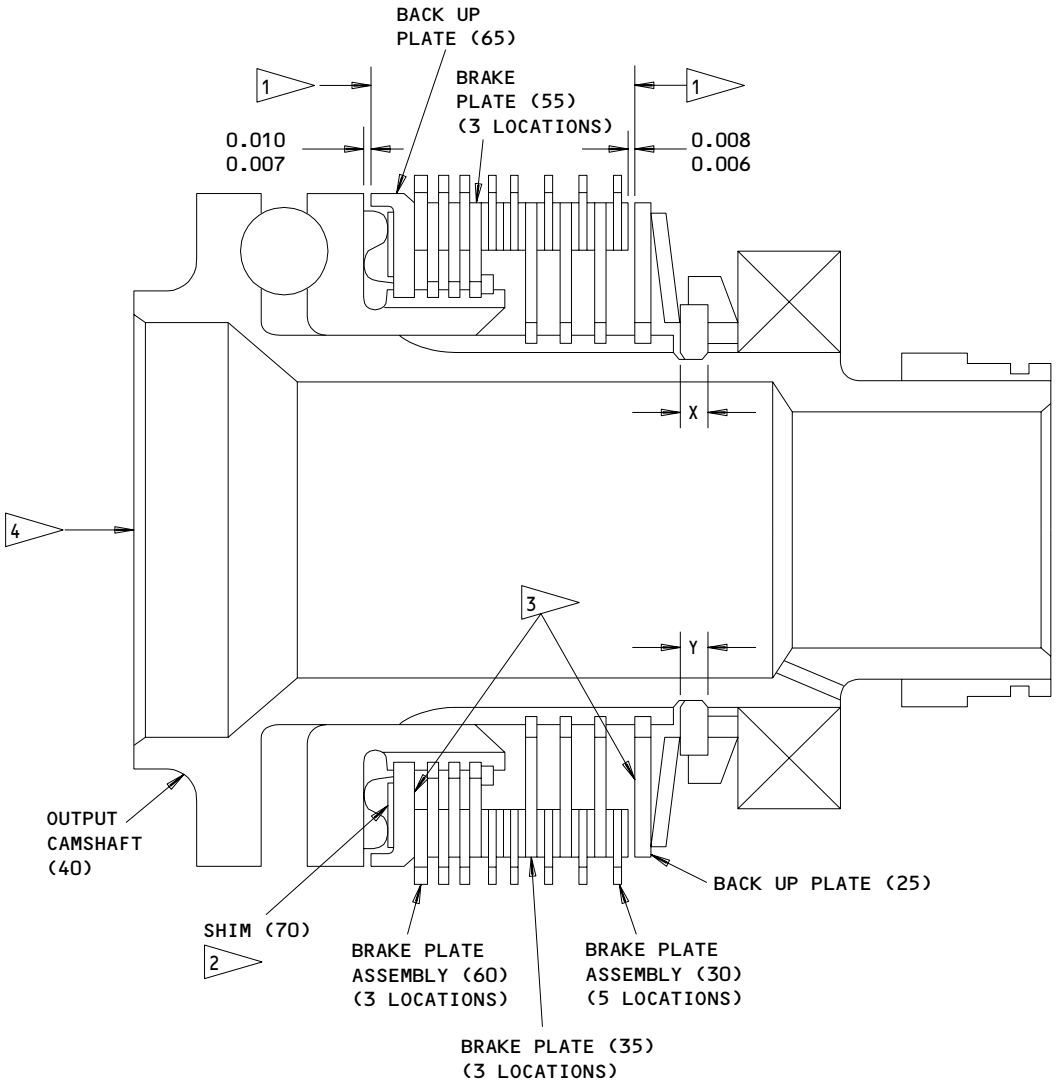
(7) Lubricate spline teeth of camshaft (40) by applying a thin film of grease to spline teeth and inserting backup plate (25) to full depth of spline. Remove backup plate and remove excess grease deposited on spline.

(8) Position camshaft (40) on end with gear teeth facing up and install balls (45) in ball grooves.

(9) Insert follower (80) with attached parts on camshaft (40) with balls (45) seated in ball grooves.

(10) Assemble brake plates (35), brake plate assemblies (30), backup plate (25) and disc spring (20) on camshaft (40).

(11) Support camshaft on surface indicated and apply 20-25 pounds axial load on backup plate (25). Measure dimension Y between upper surface of spring (20) and upper surface of retaining ring groove of camshaft (40).



1. REMOVE MATERIAL FROM THIS SURFACE TO OBTAIN GAP SHOWN. SURFACE FINISHES 16 MICROINCHES OR BETTER FOR BACK UP PLATE (25,25A) AND 125 MICROINCHES OR BETTER FOR BACK UP PLATE (65). PASSIVATE (F-17.25) SURFACE OF BACK UP PLATE (25A, 65) AND PHOSPHATE COAT (F-18.02) SURFACE OF BACK UP PLATE (25) (REF SOPM 20-41-01)
2. ADJUST SHIM THICKNESS TO OBTAIN 18-24 LB-IN FRICTION TORQUE
3. BRAKE PLATES (35,60), BRAKE PLATE ASSEMBLIES (30,55) AND AREA INDICATED MUST BE FREE OF EXCESSIVE GREASE
4. SUPPORT CAMSHAFT (40) ON THIS SURFACE WHILE MEASURING DIM X

ALL DIMENSIONS ARE IN INCHES

ITEM NUMBERS REFER TO IPL FIG. 4

No Back Assembly - Assembly Details
Figure 702

(12) Measure actual thickness, dimension X, of lockrings (15) and calculate amount of material to be removed from backup plate (25), S.

$$S = X - Y + 0.0155$$

Remove material from backup plate (25) and finish surface as noted.

(13) Reinstall backup plate (25), spring (20), lockrings (15) and retainer (10). Check that gap between backup plate (25) and brake plate assembly (30) is 0.006-0.008 inch.

(14) Install bearing (5) on camshaft (40).

(15) Align spline teeth of brake plate assemblies (30, 60) to facilitate installation.

(16) Install unit in run-in block A27061-10 and attach wrench adapter A27061-9 to camshaft (40). Break in no-back assembly by running the unit at 200 rpm for 5 minutes in both directions. Check no load friction torque of no-back assembly.

(17) Completely disassemble no-back assembly per DISASSEMBLY par. 3.C. and clean parts with dry pressurized air to remove excess friction material powder. Adjust thickness of shim (70) as required to obtain no load friction torque of 18-24 lb-in.

(18) Reassemble parts in the same sequence.

(19) Check that there is no excess grease in areas indicated and drain passages are not blocked by excess grease.

C. Assemble torque limiter assembly (IPL Fig. 3).

(1) All parts must be clean and lubricated with a thin film of grease prior to assembly.

(2) Install bearing (5) on input cam plate (85).

(3) Stand input cam plate (85) on end with threaded end upward and install balls (80) in ball grooves of input cam plate.

(4) Lubricate external spline on output cam plate (75) by applying a light film of grease to full length of teeth and inserting brake plate (70) to full depth of spline. Remove brake plate and wipe excess grease off brake plate and spline teeth of output cam plate.

(5) Install output cam plate (75) on input cam plate (85) with ball grooves aligned with balls (80).

(6) Stack brake plates (65, 70) on output cam plate (75) in order shown (Fig. 703). Wipe excess grease as required.

(7) Calculate shim (60) thickness, S (Fig. 703):

(a) Install brake gap gage assembly A27061-7 on brake plate (65) and measure dimension X.

(b) Measure dimension Y on output ring (45).

(c) Stack springs (50) and washer (55) on spring holder A27061-12 and measure dimension Z. Do not compress spring during measurement.

(d) Calculate shim (60) thickness S:

S = X + Y + 0.455 - Z (for 256T3252-2)
S = X + Y + 0.385 - Z (for 256T3252-3)

(e) Adjust shim (60) thickness to obtain calculated value.

(f) Remove brake gap gage assembly A27061-7 from input cam plate (85). Remove springs (50) and washer (55) from spring holder A27061-12.

(8) Install shim (60) and washer (55, 55A) in output cam plate (75). If the calculated shim thickness is greater than or equal to .210, use two (55) washers for 256T3252-2. If the calculated shim thickness is greater than or equal to 0.128, use two (55A) washers for 256T3252-3.

(9) Wipe springs (50) with a clean dry cloth to remove excess grease and install springs in series as shown in the output cam plate (75).

(10) Install output ring (45) on output cam plate (75) with missing spline features aligned.

(11) Apply a light coating of grease to thrust bearing (40) and bearing race (35) and install parts on output ring (45).

(12) Install lockwasher (30) with tab in keyway of input cam plate (85). Install nut assembly (15) and tighten using wrench adapter assembly A27061-8 to obtain gap shown. If witness notch of lockwasher does not align with keyway of input cam plate after tightening nut assembly, remove nut assembly and replace lockwasher.

(13) 256T3252-2, -3 torque limiter should be adjusted and tested as follows:

(a) Place torque limiter in support plate P/N A27061-48 with output ring restrained.

(b) Insert A27061-47 spline adapter into the input cam plate (align with the missing spline).

(c) Apply 290 pound-inches of torque for -2, 370 pound-inches for -3 or 245 pound-inches for units affected by, but not modified per Service Bulletin 27-36, in cw direction and check the gap between output ring and brake plate. Gap dimension shall be at least 0.001" (0.070" maximum).

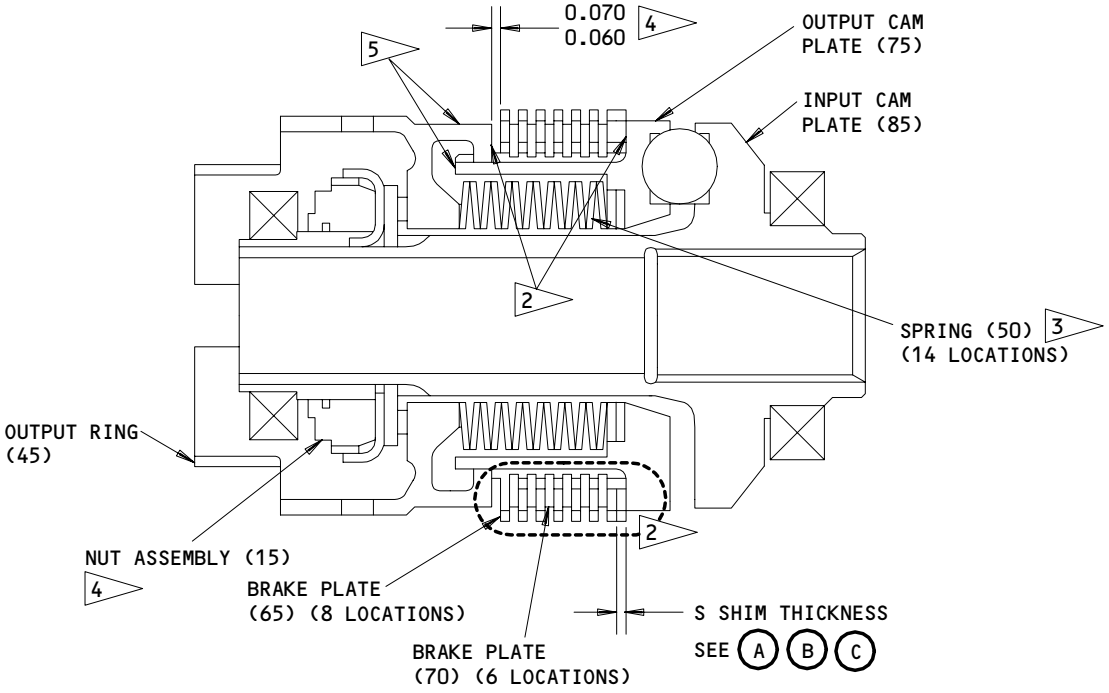
(d) If gap dimension is between 0.001" to .070" continue to rotate torque wrench to 342 pound-inches for -2, 410 pound-inches for -3 , or 315 pound-inches for units affected by, but not modified per Service Bulletin 27-36. The unit shall lock up at a value not to exceed 342 pound-inches for -2, 410 pound-inches for -3 , or 315 pound-inches for units affected by, but not modified per Service Bulletin 27-36 . No gap shall exist between output ring and brake plate.

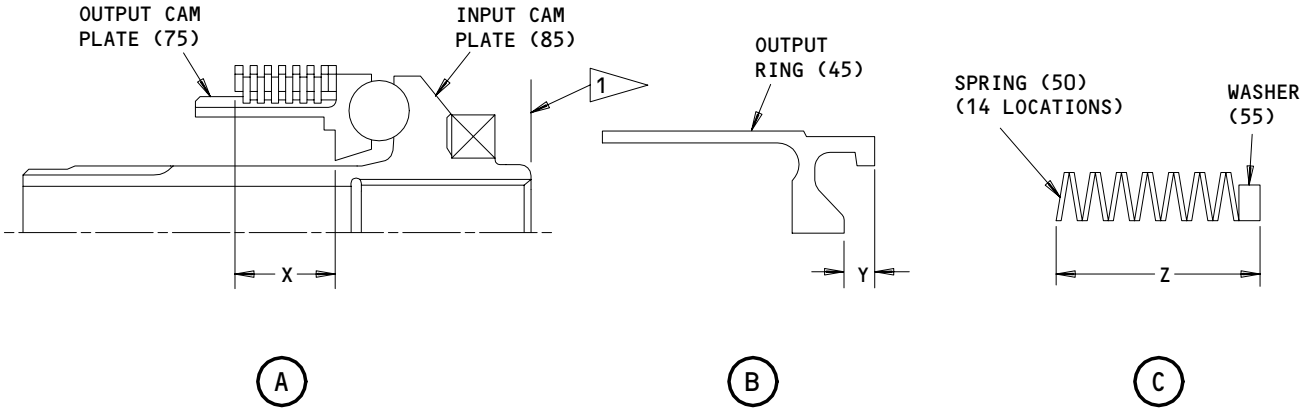
(e) If there is no gap between output ring and brake plate before 290 pound-inches torque for -2, 370 pound-inches for -3 or 245 pound-inches for units affected by, but not modified per Service Bulletin 27-36, is reached, disassemble unit and shim to increase torque lockout value (for each shim added, thickness = 0.010" will increase lockout torque approximately 12 pound-inches). If the output ring does not touch the brake plate when the input torque is 342 pound-inches for -2, 410 pound-inches for -3 or 315 pound-inches for units affected by, but not modified per Service Bulletin 27-36, find the input torque that brings the output ring in contact with the brake plate and reduce the shim so that the gap between the output ring and brake plate is between 0.001" and 0.070" (each 0.010" less shim thickness will decrease the lockout torque by approximately 12 pound-inches). Repeat testing per steps (c) and (d).

(f) Perform same testing in ccw direction per steps (c), (d) and (e).

(14) Locally break the flange of lockwasher (30) into two slots, 180 degrees apart, of the nut assembly (15). Use a 0.17-inch maximum square punch through the holes in the output ring (45) to break the flange. If the lockwasher is being reused, break the flange at 30 degrees minimum from the previous marks.

(15) Install bearing (10) on input camplate (85).





1 SUPPORT INPUT CAM PLATE (85) ON THIS SURFACE TO MEASURE DIMENSION X

2 BRAKE PLATES (65,70) AND SURFACES INDICATED MUST BE FREE OF EXCESS GREASE

3 REMOVE EXCESS GREASE BEFORE ASSEMBLY

4 TIGHTEN NUT ASSEMBLY (15) TO OBTAIN DIMENSION SHOWN

5 MISSING SPLINE FEATURES TO ALIGN

ITEM NUMBERS REFER TO IPL FIG. 3

ALL DIMENSIONS ARE IN INCHES

Torque Limiter Assembly - Assembly Details
Figure 703

D. Assemble gearbox assembly (IPL Fig. 2).

(1) Install inner drain port (135) on fixed ring gear (140), if removed, and secure with rivets (130). Fillet seal around inner drain port with sealant.

(2) Apply a thin film of grease to all surfaces of planet gears (110, 115, 120) and journal rings (125). Assemble planet gears (110, 115, 120) and journal rings (125) as a unit with planet gears in sequence shown. With planet gear installation assembly A27061-3 on the bench, install planet gear set on the tool so that the planet gears sequence is identical to the illustration in Fig. 704.

(3) Install fixed ring gear (140) on planet gears (110, 115, 120) set (Fig. 704).

(a) Position planet gear installation assembly A27061-3 on end with planet gears (110, 115, 120) facing up. Rotate each planet gear (110, 115, 120) to position shown for meshing end gear teeth of planet gears with fixed ring gear (140).

(b) Position fixed ring gear (140) so that the splined end faces down. Install fixed ring gear over planet gears (110, 115, 120) set so that spline teeth in the middle of fixed ring gear clear end gear teeth of planet gears. Hold fixed ring gear in this position.

(c) Rotate each planet gear (110, 115, 120) to position shown for meshing middle gear teeth of planet gears with fixed ring gear (140). Insert fixed ring gear until the middle gear teeth of planet gear fully mesh with spline teeth of fixed ring gear. Fix planet gear set in this position.

(d) Leave planet gear installation assembly A27061-3 on the planet gear to facilitate further assembly.

(4) Install bearings (65, 70) on star planet gears (80).

CAUTION: SPLINED SHAFT (100) AND SHAFT (105) CONSTITUTE A MATCHED SET AND MUST BE USED TOGETHER TO ENSURE PROPER OPERATION AFTER ASSEMBLY.

(5) Separate splined shaft (100) from shaft (105). Install star planet gears (80) on bearing housing (60) then install bearing housing with star planet gears and shims (75) on shaft (105). Install dowels (50), bolts (40), washers (45) and nuts (55A). Tighten nuts to 60-85 lb-in.

(6) Check axial play of each star planet gear (80). Remove parts and adjust shim thickness as required to obtain a 0.002-0.004 inch axial play of each star planet gear.

(7) Reinstall star planet gears (80), bearing housing (60) and shims (75) on shaft (105). Apply corrosion preventive compound, MIL-C-11796 to all surface of dowels (50) and install dowels thru bearing housing. Apply corrosion preventive compound, MIL-C-16173 to threads of bolts (40) and nuts (55A) and install bolts (40), washers (45) and nuts (55A). Tighten bolts to 100-140 lb-in. or tighten nuts to 60-85 lb-in.

(8) Rotate star planet gears (80) to position indicated per Fig. 704 and fix in place using star planet timing assembly A27061-6.

(9) Apply a light coating of grease to all surfaces of inner side ring gear (85) and sun ring gear (90). Install both gears on planet gears (110, 115, 120) set inside fixed ring gear (140).

(10) With star planet gear timing fixed in place by star planet gear timing assembly A27061-6, install shaft (105) and associated parts in fixed ring gear (140).

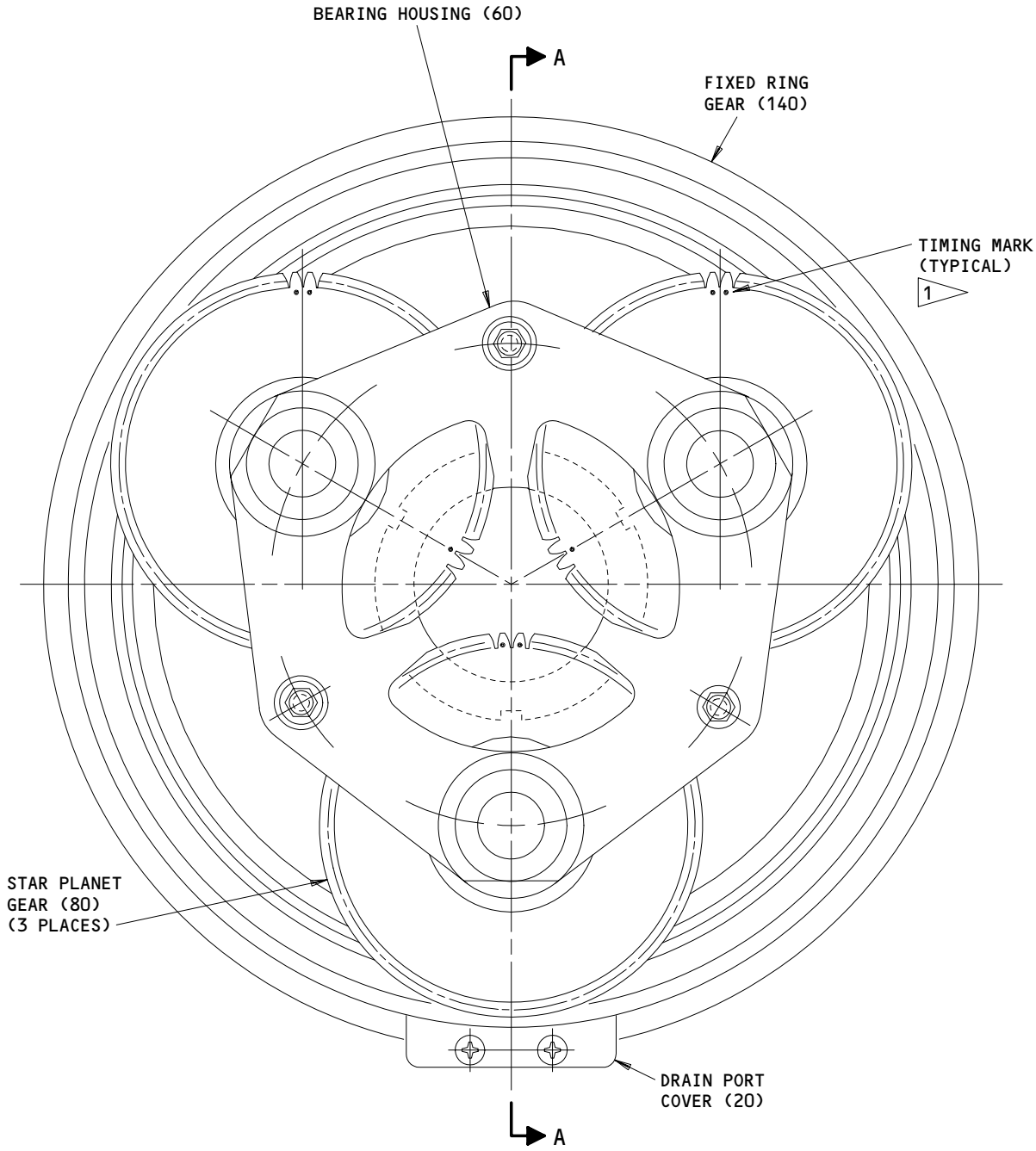
(11) Remove planet gear installation assembly A27061-3 from the planet gear set. Apply a light coating of grease to all surfaces of outer side ring gear (35) and install outer side ring gear on planet gear set.

(12) Heat splined shaft (100) to 340-360°F for 30 minutes to ease assembly and install splined shaft on shaft (105) with missing spline features aligned. Install shim (30) and retaining ring (25). Remove star planet gear timing assembly A27061-6.

(13) Check end play of output shaft assembly (95). Remove retaining ring (25) and adjust thickness of shim (30) to obtain end play of 0.005-0.010 inch.

(14) Check that there is no excess grease blocking drain passage in fixed ring gear (140).

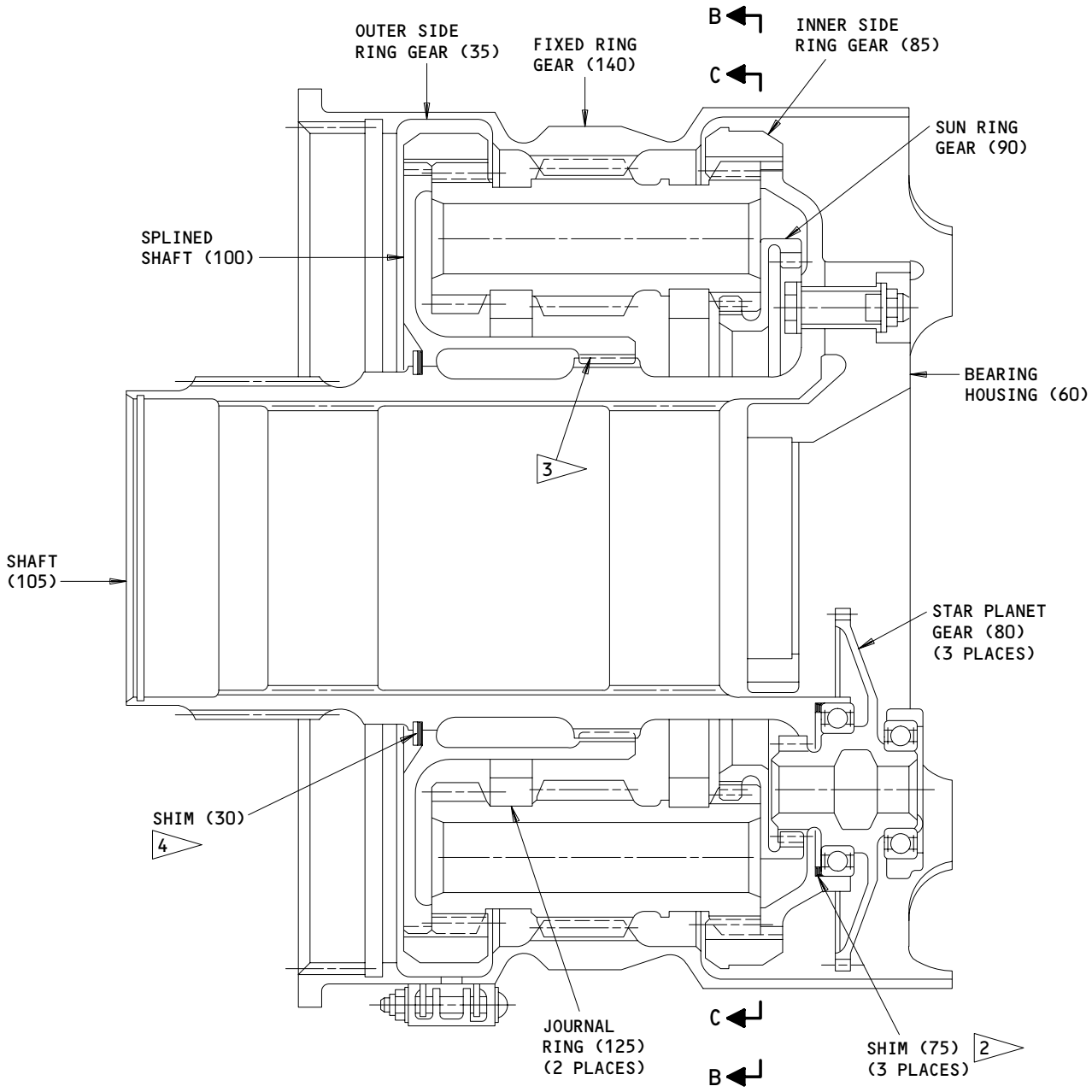
(15) Apply corrosion preventive compound, MIL-C-16173 to threads of screws (5) and nuts (15A). Install drain port cover (20) and secure with screws (5), washers (10) and nuts (15A). Tighten screws to 20-25 lb-in. or tighten nuts to 12-15 lb-in.



1 TIMING MARKS ON STAR PLANET GEARS MUST BE IN POSITIONS SHOWN BEFORE INSTALLING ON SUN RING GEAR (90)

ITEM NUMBERS REFER TO IPL FIG. 2

Gearbox Assembly - Assembly Details
Figure 704 (Sheet 1)



A-A

2 ADJUST SHIM THICKNESS TO OBTAIN 0.002-0.004 END PLAY OF STAR PLANET GEAR (80) (3 PLACES)

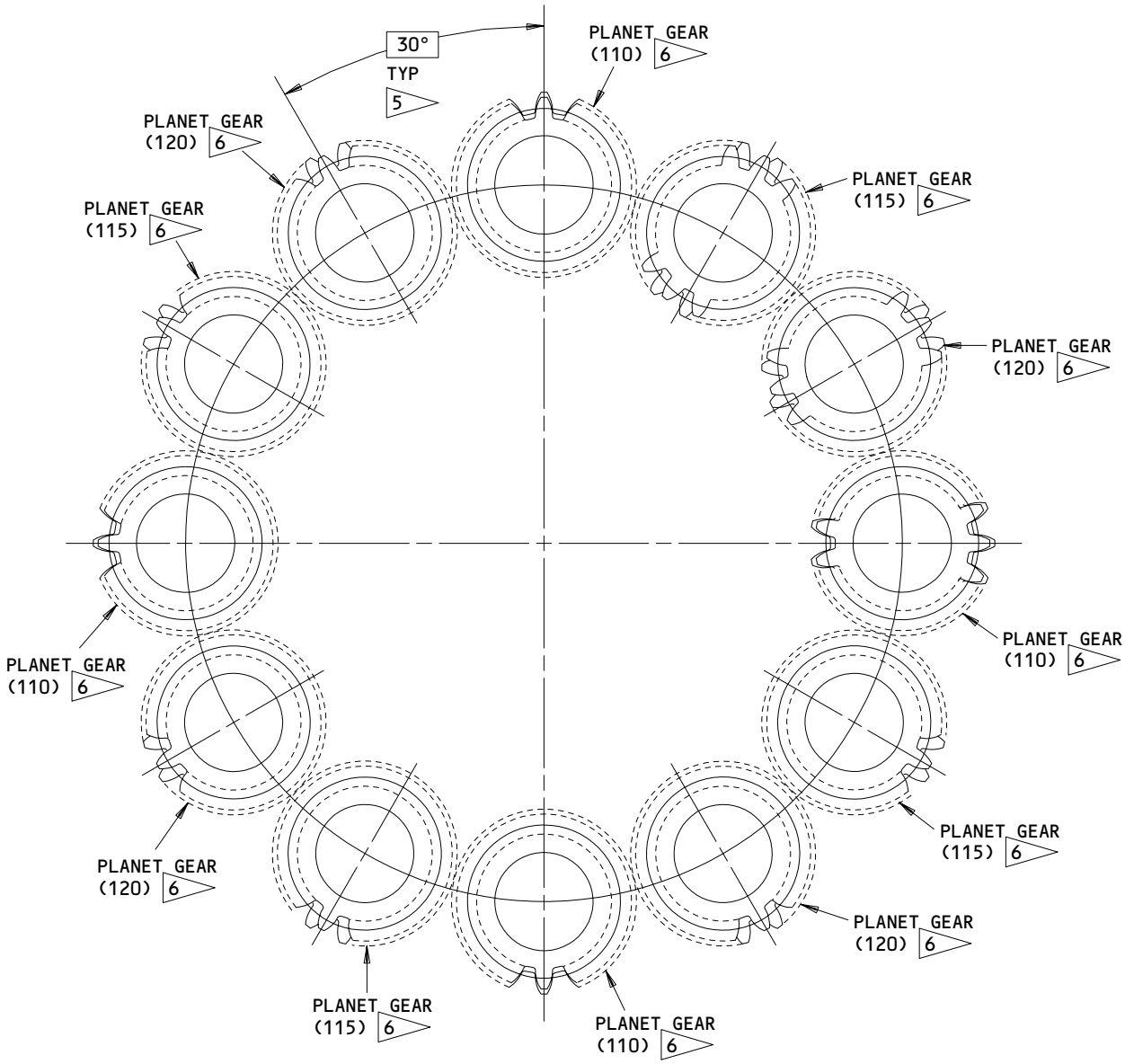
3 INSTALL WITH MISSING SPLINE FEATURES ALIGNED

4 ADJUST SHIM THICKNESS TO OBTAIN 0.005-0.010 END PLAY OF OUTPUT SHAFT ASSEMBLY (95)

ITEM NUMBERS REFER TO IPL FIG. 2

ALL DIMENSIONS ARE IN INCHES

Gearbox Assembly - Assembly Details
Figure 704 (Sheet 2)



FIXED RING GEAR (140) OMITTED FOR CLARITY
B–B

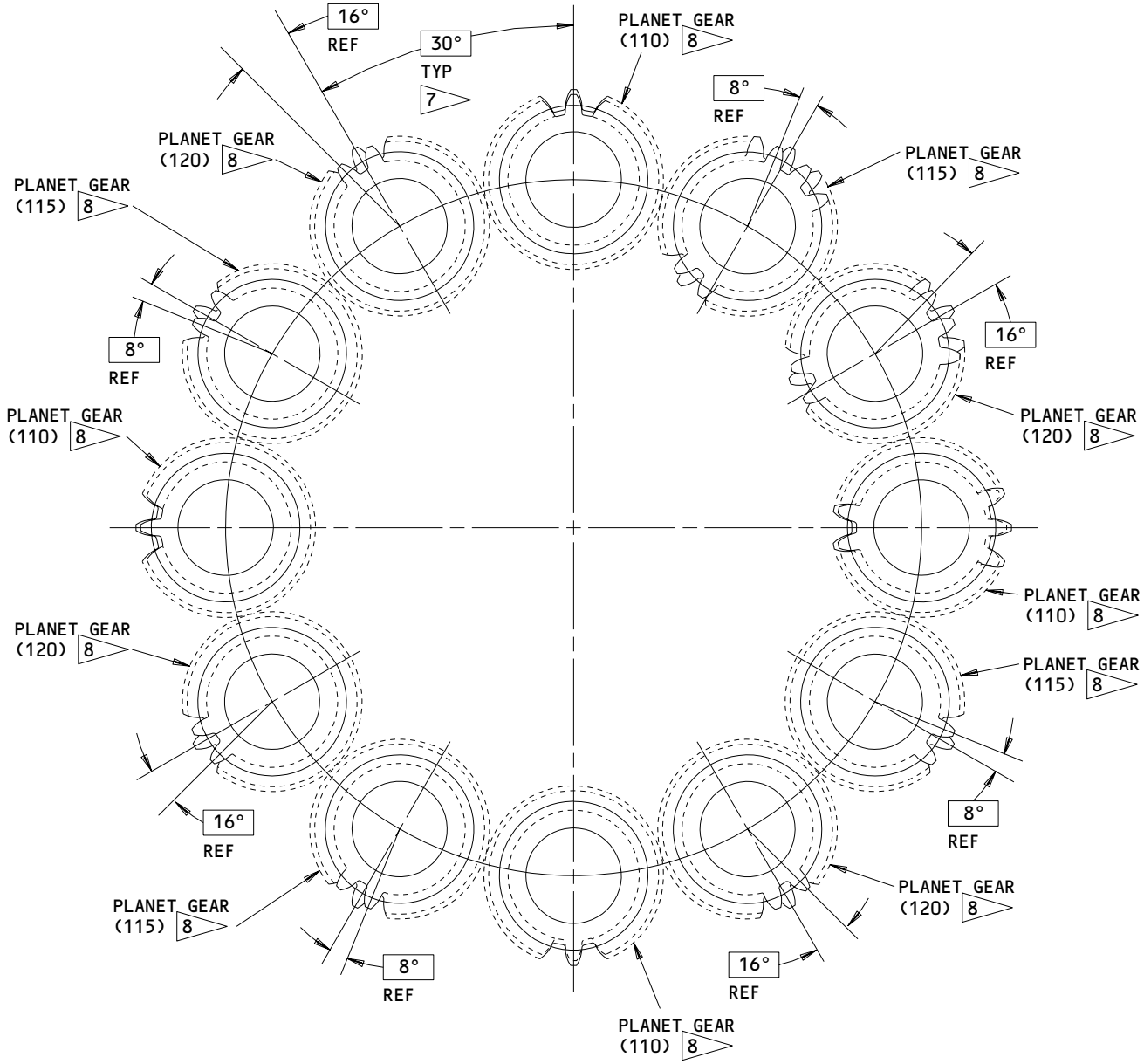
5 ANGULAR POSITION OF PLANET GEARS (110,115,120) END GEAR TOOTH

6 LOCATE PLANET GEARS (110,115,120) AS SHOWN BEFORE INSTALLING FIXED RING GEAR (140) THRU END MESH OF PLANET GEARS

ITEM NUMBERS REFER TO IPL FIG. 2

PLANET GEARS SETTING DIAGRAM FOR
INSTALLATION OF FIXED RING GEAR THRU END MESH

Gearbox Assembly – Assembly Details
Figure 704 (Sheet 3)



FIXED RING GEAR (140) OMITTED FOR CLARITY
C–C

7 ANGULAR POSITION OF PLANET GEARS (110,115,120) CENTER GEAR TOOTH

8 LOCATE PLANET GEARS (110,115,120) AS SHOWN BEFORE INSTALLING FIXED RING GEAR (140) THRU CENTER MESH OF PLANET GEARS AND BEFORE INSTALLING SIDE RING GEARS (35,85) ON END MESH OF PLANET GEARS

ITEM NUMBERS REFER TO IPL FIG. 2

PLANET GEARS SETTING DIAGRAM FOR INSTALLATION OF FIXED RING GEAR THRU CENTER MESH AND INSTALLATION OF SIDE RING GEARS

Gearbox Assembly – Assembly Details
Figure 704 (Sheet 4)

179158

E. Assemble rotary actuator assembly (IPL Fig. 1).

(1) Remove excess grease from internal splines of gearbox assembly output shaft by inserting a spare brake plate to full depth of splines (2 places). Remove brake plate and excess grease deposited beyond ends of splines.

(2) Determine appropriate shim (55, 90) thicknesses.

NOTE: If parts removed during disassembly have not been replaced, original shims may be re-installed.

(a) Install no-back assembly (245) and torque limiter assembly (85A) in gearbox assembly.

(b) Install bearing retainer (60) and retaining ring (50) in output shaft and measure clearance between retainer and ring.

(c) Use one-half of measurement as thickness of shim (55) and other half as thickness of shim (99).

(d) Remove retaining ring and bearing retainer from output shaft.

(e) Remove torque limiter assembly and no-back assembly from gearbox assembly.

(3) Install shim (99) in no-back assembly and re-install no-back and torque limiter assemblies in gearbox assembly. Align timing mark "X" on output camshaft of no-back assembly (245) opposite internal missing spline tooth of torque limiter (180 degrees apart).

(4) Install packing (75) and seal (80) on bearing retainer (60), then install parts in output shaft with notches in retainer and output shaft approximately aligned. Rotate retainer as required, then install anti-rotation pin (70).

(5) Install shim (55) selected in step (2) and secure assembly with retaining ring (50).

(6) Re-check torque limiter and no-back endplay to confirm 0.005-0.007 in. value.

(7) Secure retaining ring (50) with screws (45) installed with corrosion preventive compound, MIL-C-16173, applied to mating threads. Tighten screws to 9-12 lb-in.

(8) Install driver camplate (240) on output camshaft of no-back assembly (245) and secure with retaining ring (235). Ensure that timing marks (two dots on driver camplate, "X" on output camshaft) are aligned. If unable to locate "X" on output camshaft, align driver camplate (240) timing mark opposite internal missing spline tooth of torque limiter (180 degrees apart).

(9) Assemble disc cam drive assembly.

(a) Attach diaphragm (225) and ring (197) to retainer (222) with screws (195) installed with corrosion preventive compound, MIL-C-16173, applied to mating threads. Tighten screws to 9-12 lb-in.

(b) Attach diaphragm and ring (230) to driven camplate (205) and secure with screws (200) installed with corrosion preventive compound, MIL-C-16173, applied to mating threads. Ensure that centerline of missing spline of retainer (222) is aligned with centerline of cam on driven camplate. Tighten screws to 9-12 lb-in.

(c) Check that movement of retainer (222) relative to ring (230) is at least 0.135 in., and that runout on ring is no more than 0.010 in. FIM. Adjust screws (195, 200) as necessary to satisfy these requirements.

(d) Install lockwire on screws (195) per 20-50-02, double-twist method.

(e) Install compression spring (215) in assembly and retain with ring (210).

(10) Install bearing (180) on input shaft (295) per 20-50-03.

(11) Determine location for ring (110) installation.

NOTE: If parts removed during disassembly have not been replaced, original ring location may be used.

(a) Install ring (110) in center groove on input shaft (295) and install input shaft with bearing (180) into gearbox assembly.

NOTE: Missing spline features of torque limiter input camplate (85A ref) and input shaft (295) must be aligned.

(b) Install cover assembly (165) on gearbox assembly (300). Secure temporarily with 3 dowel pins (167). If dowel pin holes in gearbox and cover cannot be aligned, remove cover, input shaft, shim (55), bearing retainer (50), torque limiter assembly (85A), and no-back assembly (245). Measure thickness of shim (55), then discard. Add equivalent thickness to shim (90). Re-install removed parts, including cover assembly and dowel pins.

(c) Measure endplay of input shaft, then remove dowel pins, cover assembly, and input shaft. If endplay is greater than 0.080 in., move ring (110) from center groove to groove nearest O-ring packing (100) groove.

(12) Install disc cam drive (Ref step (9)) and packing (100) on input shaft.

NOTE: Missing spline features on trip indicator retainer (222) and input shaft must be aligned.

(13) Install input shaft with associated parts in gearbox assembly. Ensure that shaft is seated on ring (110). Measure amount of cam engagement between driver camplate (240) and driven camplate (205). Grind driven camplate on surface indicated in Fig. 705 as required to obtain 0.100-0.110 in. cam engagement. Check that input shaft does not exert any pre-load on disc cam drive assembly. If necessary, remove shim (90) and add an equivalent thickness to shim (55) to remove pre-load.

(14) Install shim (220) as required to obtain 0.005 in. maximum endplay of disc cam drive assembly.

(15) Install seal (185) and packing (177) on cover assembly (165), then install cover assembly on gearbox assembly with corrosion preventive compound MIL-C-11796. Secure with dowel pins (167) and retain pins with screws (166) installed with corrosion preventive compound, MIL-C-16173, on mating threads. Tighten screws to 20-25 lb-in. Check that input shaft endplay is still 0.005-0.007 in. If necessary to reduce endplay, shim (190) up to 0.030 in. thick may be installed in cover assembly. If additional shim thickness is required to obtain 0.005-0.007 in. endplay, add to shim (55) and remove equivalent amount from shim (90). Shim (105) may be installed if required to obtain 0.73-0.81 in. and 1.40-1.50 in. dimensions between cover and input shaft (Fig. 705).

(16) Install backup ring (12) and packing (15) in ring gear of gearbox assembly (300). Install seal (10) in seal housing (5), then install seal housing in gearbox assembly.

NOTE: Missing spline features of mating parts must be aligned.

(17) Check clearance for trip indicator assembly (115) (Fig. 706).

(a) Measure dimension "X" between trip indicator ring (230) and centerline of trip indicator mounting hole.

(b) Mount trip indicator assembly in fixture A27061-11 and measure dimension "Y".

(c) Grind tip of trip indicator actuator as required to obtain 0.005-0.015 in. clearance ("X" minus "Y"). Break sharp edges at tip 0.02-0.04 in. radius and chemical treat machined surface (F-17.07, Ref 20-41-01).

NOTE: If clearance exceeds 0.015 in. before grinding, disassemble trip indicator assembly and adjust shim (10, IPL Fig. 5) thickness.

(18) Install packing (160) on trip indicator assembly and install on cover assembly. Apply corrosion preventive compound, MIL-C-11796, to all areas of fastener holes and install screws (150) and washers (155). Tighten screws to 12-15 lb-in.

(19) Apply corrosion preventive compound, MIL-C-16173, to threads of screws (25) and mating threads in gearbox assembly. Install drain port inner cover (20) and secure with screws (25) and washers (30). Tighten screws to 20-25 lb-in.

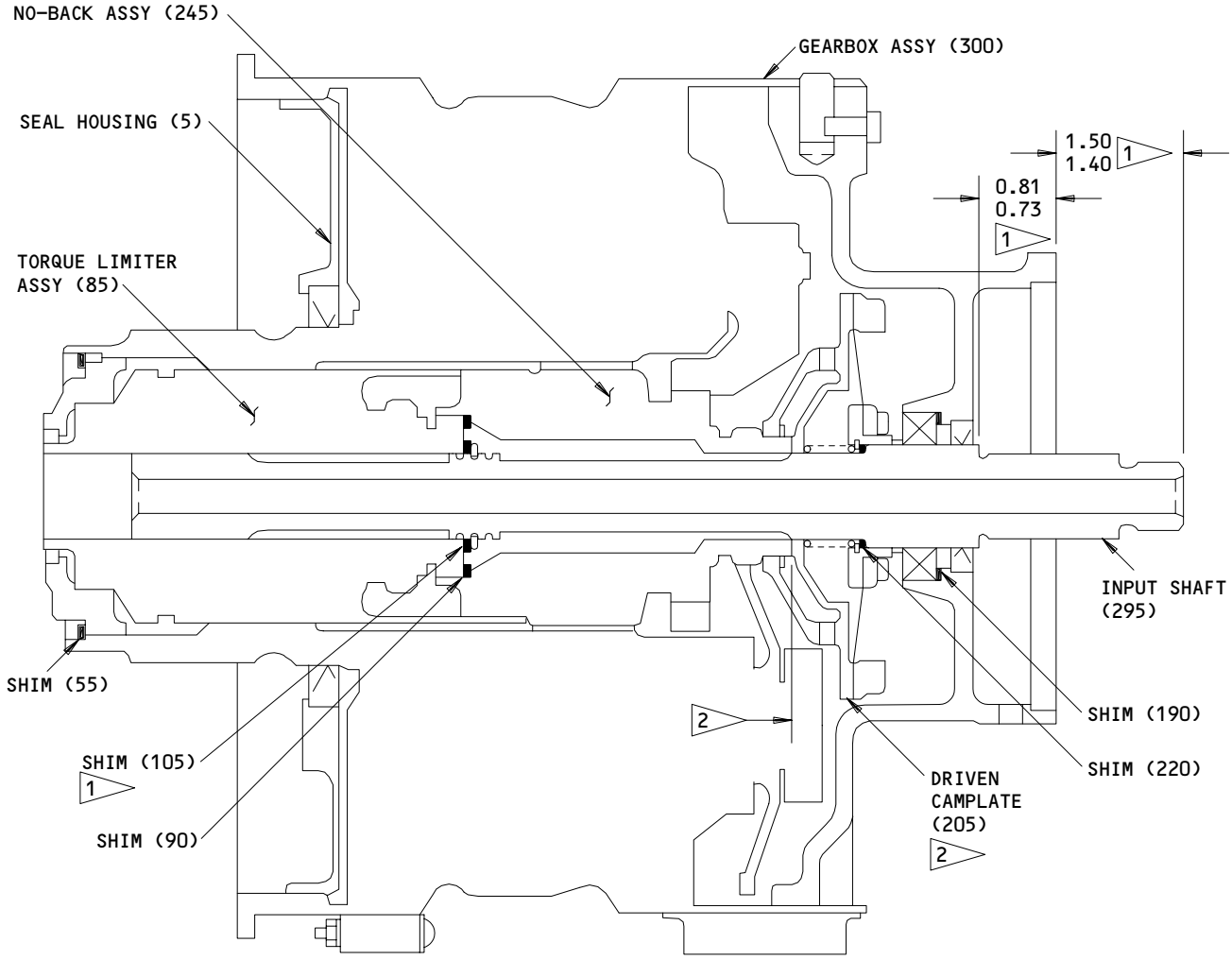
(20) Fillet seal gearbox-cover seam with sealant, BMS 5-26 or MIL-S-8802.

F. Functional test assembly per TESTING AND TROUBLE SHOOTING.

G. Remove drain covers on gearbox assembly. Check drain passages to ensure there is no obstruction or plugging with excess grease. Re-install parts per step E.(19).

5. Storage

A. Use standard industry practices and information contained in 20-44-02 for storage of this component.



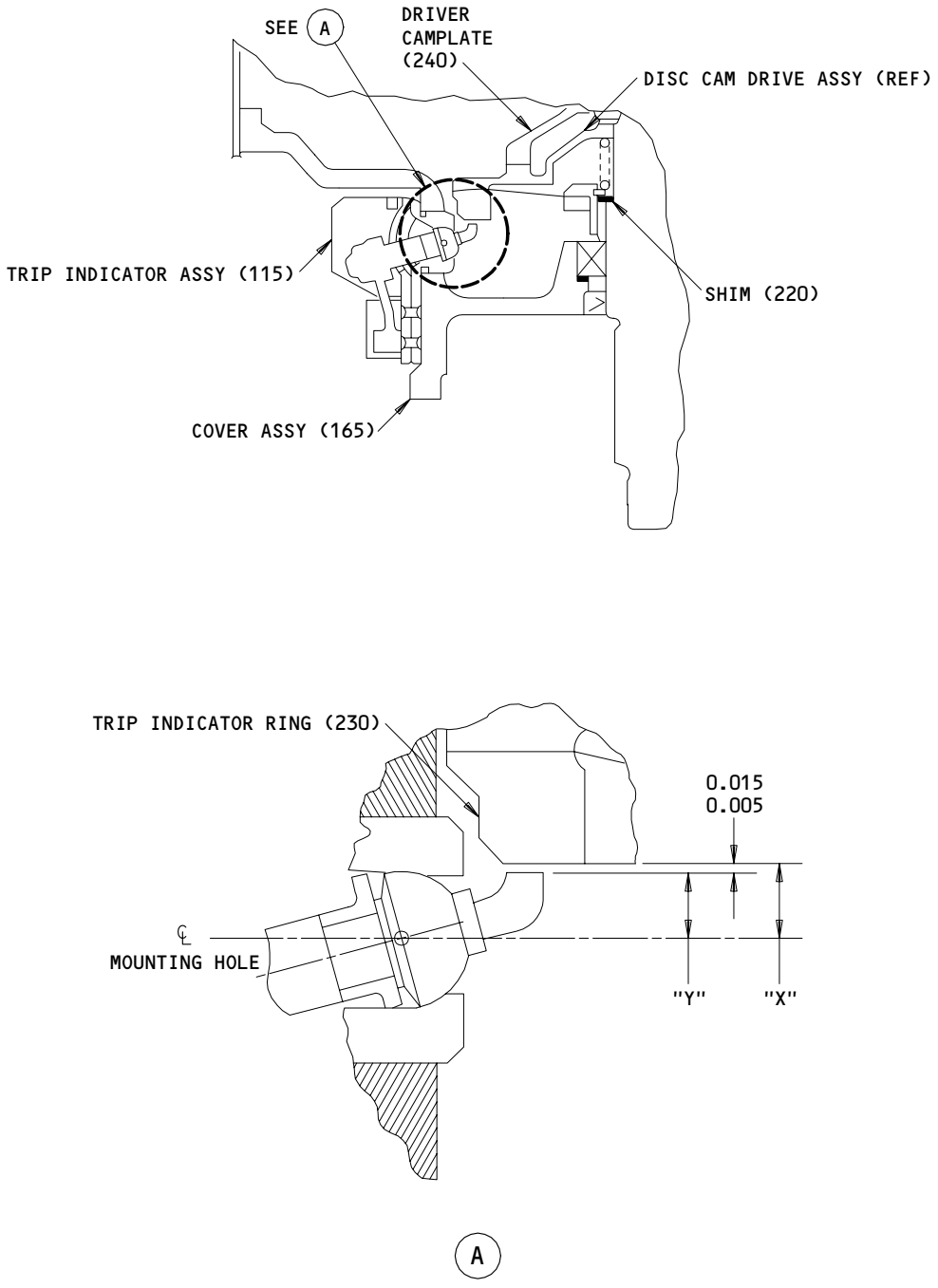
1 INSTALL SHIM (105) IF NECESSARY TO OBTAIN INDICATED DIMENSIONS

2 GRIND DRIVEN CAMPLATE (205) ON INDICATED SURFACE AS REQUIRED TO OBTAIN 0.100-0.110 CAM ENGAGEMENT

ALL DIMENSIONS ARE IN INCHES

ITEM NUMBERS REFER TO IPL FIG. 1

Acutator Assembly - Assembly Details
Figure 705

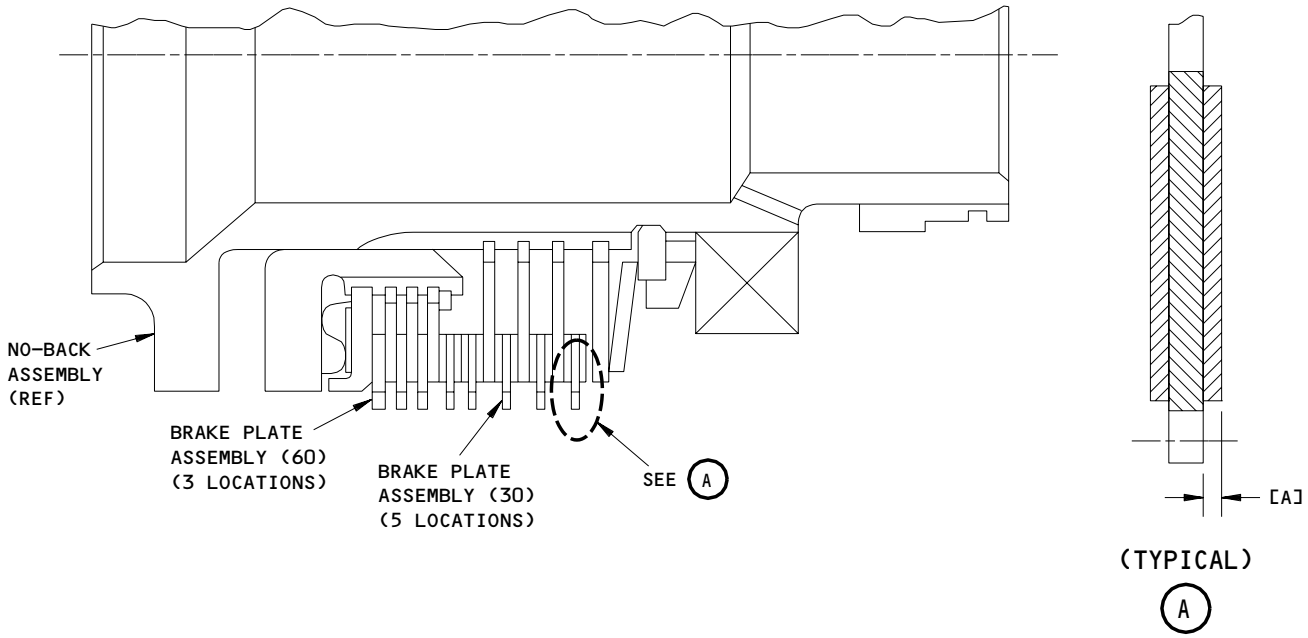


ALL DIMENSIONS ARE IN INCHES

ITEM NUMBERS REFER TO IPL FIG. 1

Trip Indicator Assembly Installation
Figure 706

FITS AND CLEARANCES



REF LETTER	REF IPL	DESIGN DIMENSION*				SERVICE WEAR LIMIT*		
	FIG. 4, MATING ITEM NO.	DIMENSION		ASSEMBLY CLEARANCE		DIMENSION		MAXIMUM CLEARANCE
		MIN	MAX	MIN	MAX	MIN	MAX	
[A]	1	0.010	0.020			0.006		

* ALL DIMENSIONS ARE IN INCHES

1 THICKNESS OF RULON FACING MATERIAL ON BRAKE PLATE ASSEMBLY (30,60)

Fits and Clearances
Figure 801

L80640

FOR TORQUE VALUES OF STANDARD FASTENERS, REFER TO 20-50-01			
ITEM NO. IPL FIG.	NAME	TORQUE	
		POUND-INCHES	POUND-FEET
FIG. 1			
45	SCREW	20-25	
195,200	SCREW	9-12	
166	SCREW	20-25	
150	SCREW	12-15	
25	SCREW	20-25	
FIG. 2			
40	BOLT	100-140	
55	NUT	60-85	
5	SCREW	20-25	
15	NUT	12-15	
FIG. 5			
5	NUT	9-12	

Torque Table
Figure 802

SPECIAL TOOLS, FIXTURES, AND EQUIPMENT

NOTE: Equivalent substitutes may be used.

1. A27061-11 -- Grinding Fixture Assembly *[1]

2. A27071-85 -- Test Fixture Assembly (Replaces A27071-49) *[2]

3. A27071-49 -- Test Fixture Assembly (Supersedes A27071-44, -2) *[3]

4. A27071-4 -- Ring Bracket Assembly *[2] *[3]

5. A27071-55 -- Spline Assembly *[2] *[3]

6. A27081-1 -- Test Set

7. Strip Chart Recorder (optional)

8. Dial Indicator (0.001-inch graduations)

9. A27061-10 -- Run-In Block Assembly *[1]

10. A27061-9 -- Wrench Adapter Assembly *[1]

11. A27061-7 -- Brake Gap Gage Assembly *[1]

12. A27061-8 -- Wrench Adapter Assembly *[1]

13. A27061-3 -- Planet Gear Installation Assembly *[1]

14. A27061-6 -- Star Planet Timing Assembly *[1]

15. A27061-12 -- Spring Holder *[1]

16. A27061-47 -- Spline Adapter *[4]

17. A27061-48 -- Support Plate *[4]

*[1] Part of A27061-44 T.E. Rotary Actuator Tool Set (replaces A27061-1)

*[2] Part of A27071-84 and -123 T.E. Rotary Actuator Test Equipment
(A27071-84 replaces A27071-48; A27071-123 replaces A27071-84, -48 for future procurement)

*[3] Part of A27071-48 T.E. Rotary Actuator Test Equipment
(A27071-48 supersedes A27071-43, -1)

*[4] Part of A27061-46 and A27061-54 T.E. Rotary Actuator Tool Sets. A27061-54 replaces A27061-46 for future procurement. A27061-54 adds a spline adapter for use on 10.5 inch rotary actuators found in CMM 27-51-08.

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 are 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 MICRODOT INC AEROSPACE FASTENING SYS KAYNAR MFG 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

27737 INA BEARING COMPANY INC
1 INA DRIVE
CHERAW, SOUTH CAROLINA 29520

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

52828 REPUBLIC FASTENER MFG CORP
1300 RANCHO CONEJO BLVD
NEWBURY PARK, CALIFORNIA 91320-1405

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

72962 ELASTIC STOP NUT A DIV OF HARTFORD INDUSTRIES INC
2330 VAUXHALL ROAD
UNION, NEW JERSEY 07083-5038

VENDORS

73680 GARLOCK INC MECHANICAL PACKING DIV SUB OF COLT IND
1666 DIVISION STREET
PALMYRA, NEW YORK 14522-9343

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

80539 SPS TECHNOLOGIES INC AEROSPACE PRODUCTS DIV
2701 SOUTH HARBOR BOULEVARD PO BOX 1259
SANTA ANA, CALIFORNIA 92702-1259

80756 SPIROLUX DIV OF KAYDON CORP
29 CASSENS STREET
ST. LOUIS, MISSOURI 63026-2542

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

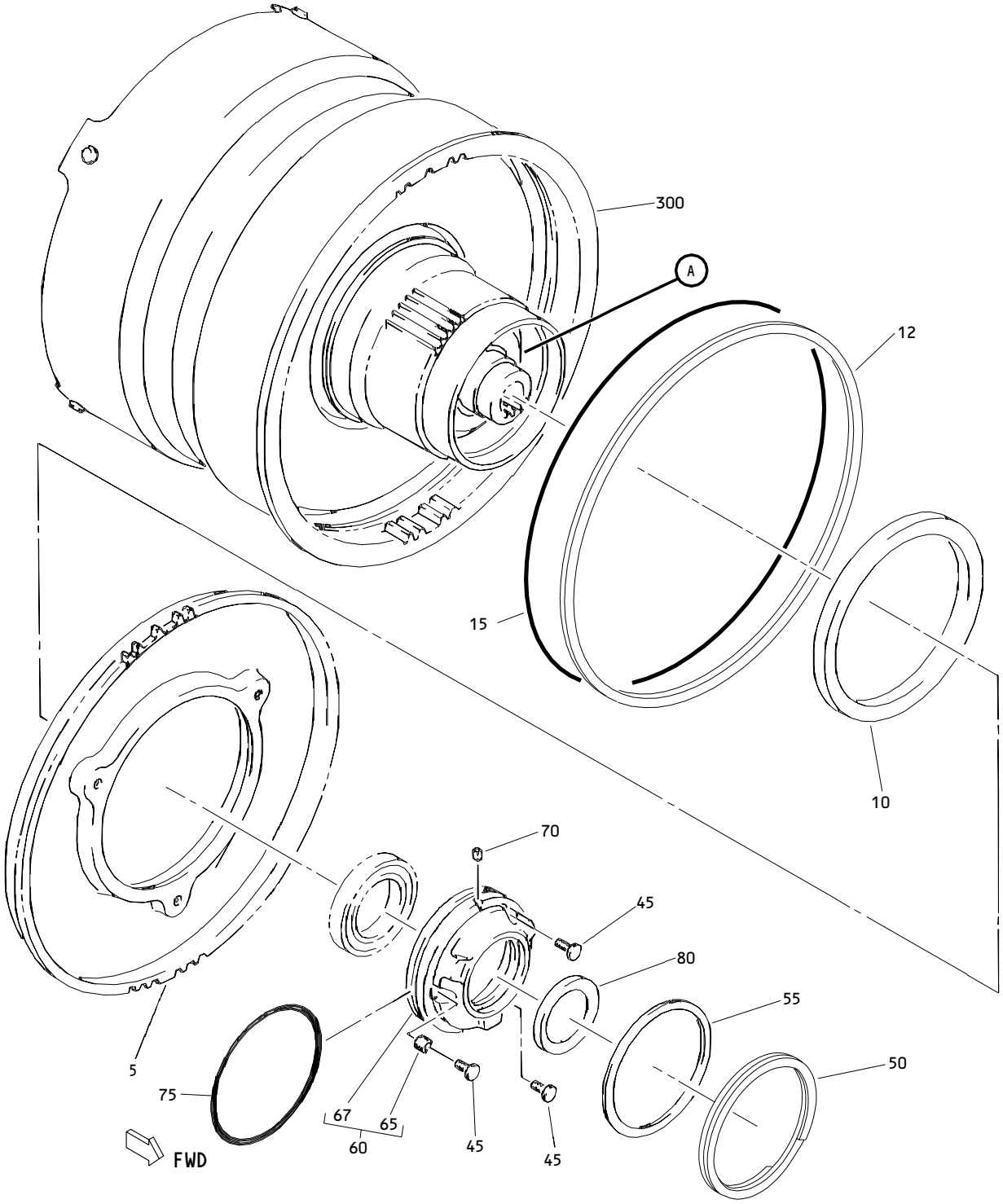
PART NUMBER	AIRLINE PART NO.	FIG.	ITEM	TTL REQ
BACB10BB20PP		2	65	3
BACB10BB30PP		1	180	1
		2	70	3
		3	10	1
BACB10BB35PP		3	5	1
BACB10BB40PP		4	5	1
BACB10T1-28A		4	45	3
BACB10T1-36A		3	80	3
BACN10JC3		5	15	1
BRH10A3		5	15	1
C004RRP0ZZ		2	65	3
C006RRPP1P28LY1		1	180	1
		2	70	3
		3	10	1
C006RRP0ZZ		1	180	1
		2	70	3
		3	10	1
C007RPP1P28LY19		3	5	1
C008RRPP1P28LY1		4	5	1
C008RRP0ZZ		4	5	1
H10-3BAC		5	15	1
KS400CD		2	25	1
MS16555-607		5	40	1
MS20426DD3-5		5	25	2
MS20470DD4-5		2	130	2
MS21042L3		2	15A	2
MS21042L5		2	55A	3
MS21209C06-15		1	65	3
MS21209C0815		1	170	2
MS21209F1-15		1	175	6
MS28775-015		1	160	1
MS28775-116		1	100	1

PART NUMBER	AIRLINE PART NO.	FIG.	ITEM	TTL REQ
MS28775-233		1	75	1
MS29561-270		1	15	1
		1	177	1
NAS1189-06T6B		1	200	12
NAS1216-3-8		1	166	4
NAS1352-06-4		1	45	3
NAS1352-06H6		1	195	6
NAS1632-2		1	150	2
NAS1633-8		1	25	2
NAS620-10L		2	10	4
NAS620-8		1	155	2
NAS623-3-16		2	5	2
NAS6605-12		2	40	3
NS202101-02		5	15	1
PKTLL004P1		2	65	3
PKTLL006P1		1	180	1
		2	70	3
		3	10	1
PKTLL007P1		3	5	1
PKTLL008P1		4	5	1
RMLH9075-3W		5	15	1
RRN125		1	210A	1
RR318CD		1	50	1
RSN143		1	235	1
RS215CD		4	50	1
RS93CD		1	110	1
TC2031		3	40	1
T6S1032J		5	15	1
VN303A02		5	15	1
1904LLT1C1-01		2	65	3
1904SZZ		2	65B	3
1906SZZ		2	70B	3
1907RRT1C1-01		3	5	1
1908LLT1C1-01		4	5	1
21000-0240		1	80A	1
21000-0241		1	10B	1
21000-0243		1	185B	1
256T3231-1		2	50	3
256T3236-1		1	70	1
256T3247-1		1	115	1
		5	1	RF
256T3250-2		1	1	RF
256T3251-2		1	300	1
		2	1	RF

PART NUMBER	AIRLINE PART NO.	FIG.	ITEM	TTL REQ
256T3252-2		1	85A	1
		3	1A	RF
256T3252-3		1	85B	1
		3	1B	RF
256T3253-2		1	245	1
		4	1	RF
256T3254-2		2	85	1
256T3255-3		2	140	1
256T3255-4		2	140A	1
256T3258-2		2	90	1
256T3259-1		2	110	4
256T3259-2		2	115	4
256T3259-3		2	120	4
256T3259-4		2	110A	4
256T3259-5		2	115A	4
256T3259-6		2	120A	4
256T3263-1		2	125	2
256T3264-2		2	80	3
256T3264-3		2	80A	3
256T3265-1		1	165	1
256T3266-1		2	60	1
256T3268-2		2	35	1
256T3268-3		2	35A	1
256T3269-1		1	5	1
256T3270-1		1	60	1
256T3270-3		1	67	1
256T3271-1		1	295	1
256T3272-1		1	215	1
256T3273-1		1	20	1
256T3274-1		1	167	4
256T3275-1		5	55	1
256T3276-1		5	45	1
256T3277-1		5	30	1
256T3278-1		5	20	1
256T3279-1		5	10	1
256T3281-1		5	35	1
256T3282-1		5	50	1
256T3292-2		2	135	1
256T3293-1		1	10	1
256T3293-3		1	185	1
256T3293-4		1	80	1
256T3293-5		1	10A	1
256T3293-7		1	185A	1
256T3295-1		1	12	1
256T3296-1		2	20	1

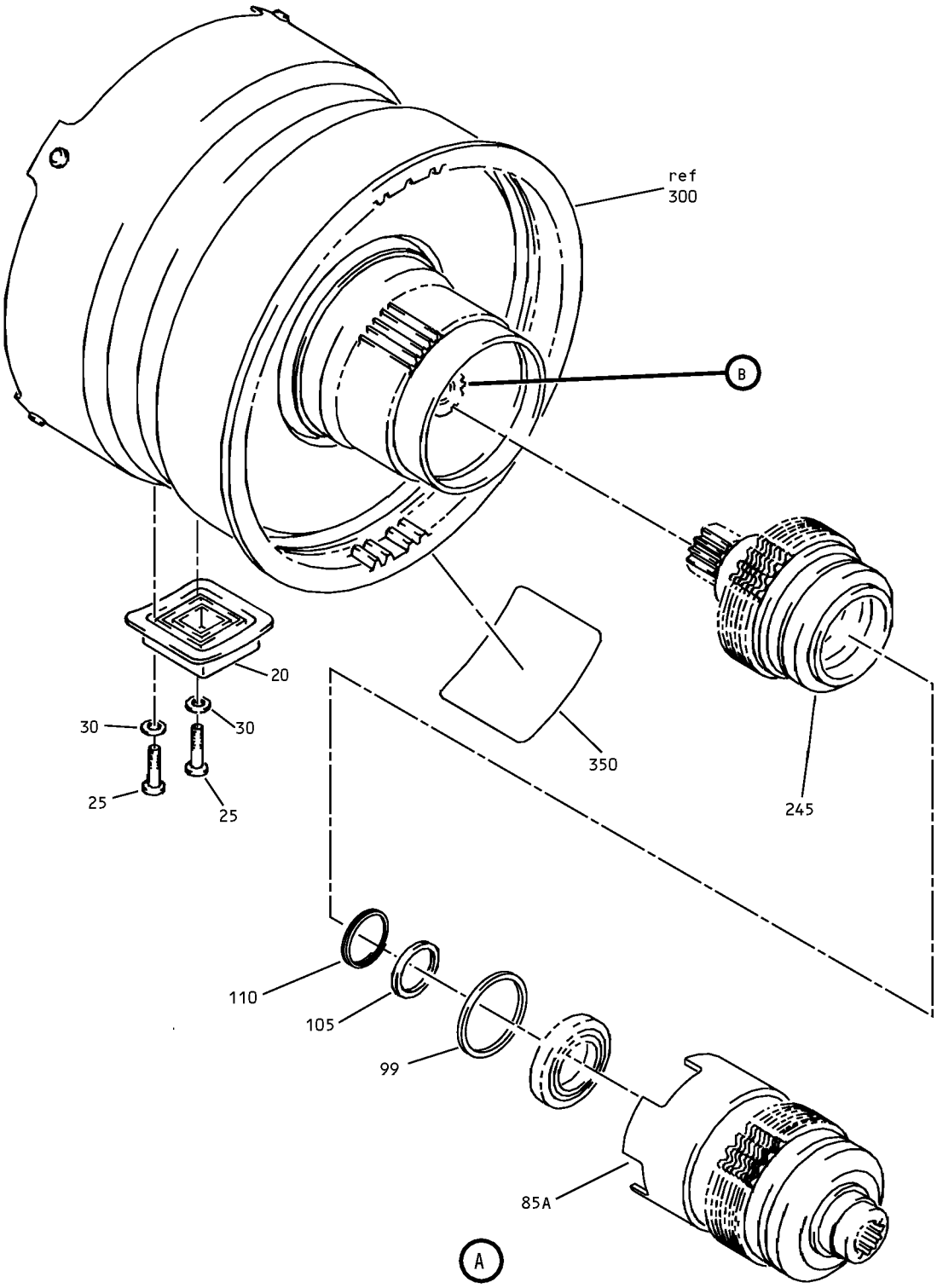
PART NUMBER	AIRLINE PART NO.	FIG.	ITEM	TTL REQ
256T3297-1		1	350	1
256T3299-2		2	95	1
256T3299-4		2	105	1
256T3299-5		2	100A	1
256T3299-6		2	100	1
256T3801-1		3	85	1
256T3802-1		3	75	1
256T3803-1		3	50	14
256T3804-1		3	65	8
256T3805-1		3	60	1
256T3806-1		3	45	1
256T3807-1		1	230	1
256T3809-1		3	55	2
256T3810-1		3	70	6
256T3811-1		1	222	1
256T3812-1		1	225	1
256T3813-1		1	197	1
256T3825-1		4	80	1
256T3826-1		4	65	1
256T3827-1		4	30	5
256T3827-2		4	60	3
256T3827-4		4	30A	5
256T3827-5		4	60A	3
256T3828-1		4	35	3
256T3829-1		4	10	1
256T3830-1		4	15	2
256T3831-1		4	25	1
256T3832-2		4	55	3
256T3833-1		4	20	1
256T3834-3		4	75	1
256T3835-1		2	30	1
256T3835-3		1	55	1
256T3835-4		1	99	1
		1	190	1
		2	75	3
256T3835-7		4	70	1
256T3835-8		1	220	1
256T3835-9		1	105	1
256T3836-1		4	40	1
256T3840-2		1	240	1
256T3848-1		3	50B	14
256T3850-1		1	205	1
256T3850-10		1	205B	1
256T3855-1		2	25A	1
69B83376-3		3	30	1

PART NUMBER	AIRLINE PART NO.	FIG.	ITEM	TTL REQ
69B83554-1		3	35	1
69B83555-1		3	15	1
69B83555-2		3	25	1
69B83555-3		3	20	1
9304PPPRBFS428		2	65	3
9306NPPFS428		1	180A	1
		2	70A	3
		3	10A	1
9306PPPRBFS428		1	180	1
		2	70	3
		3	10	1
9307PPPRBFS428		3	5	1
9308PPPRBFS428		4	5	1
96-02		5	15	1



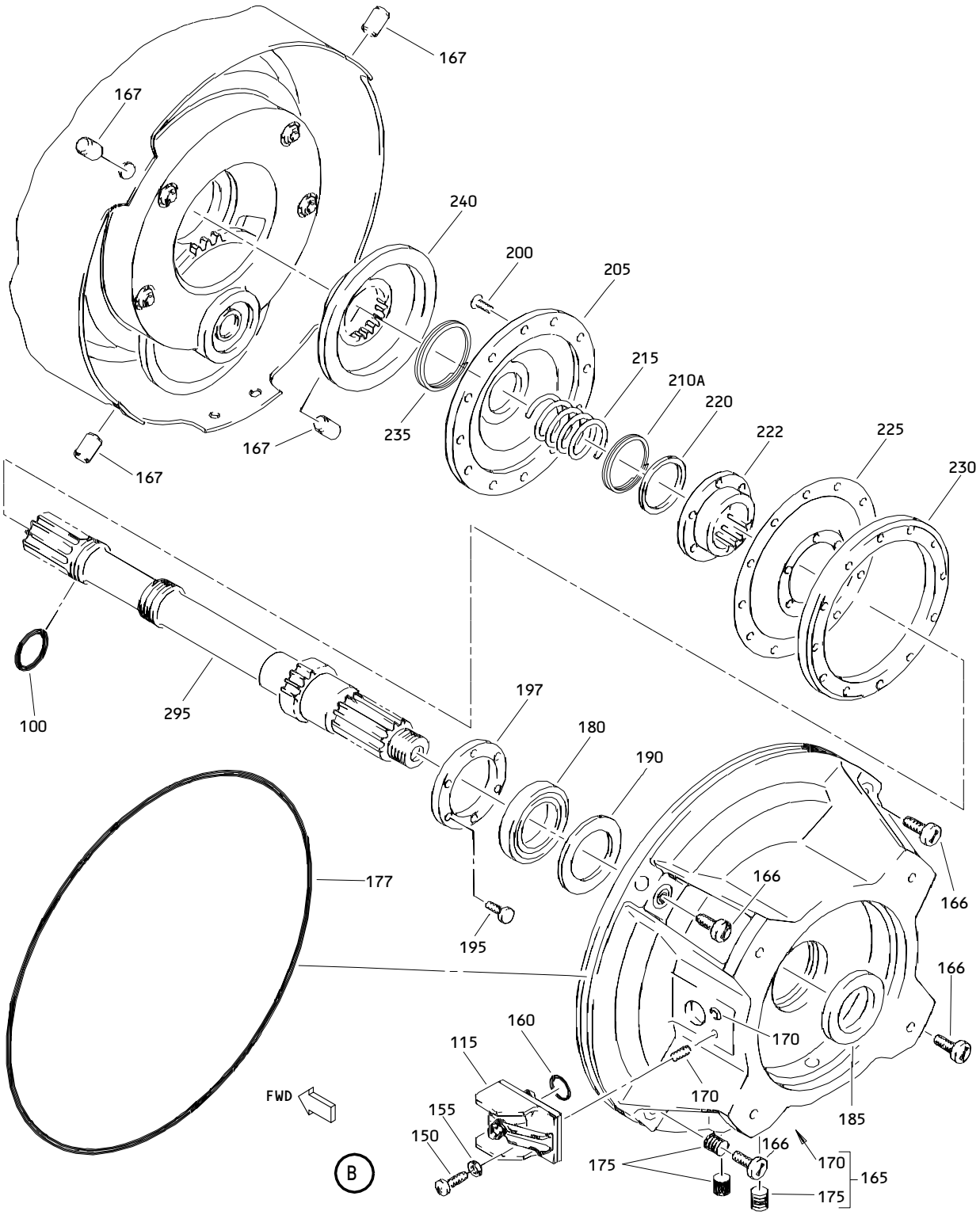
Trailing Edge Flap Drive 9.5 Diameter Rotary Actuator Assembly
Figure 1 (Sheet 1)

T68068



Trailing Edge Flap Drive 9.5 Diameter Rotory Actuator Assembly
Figure 1 (Sheet 2)

T68069



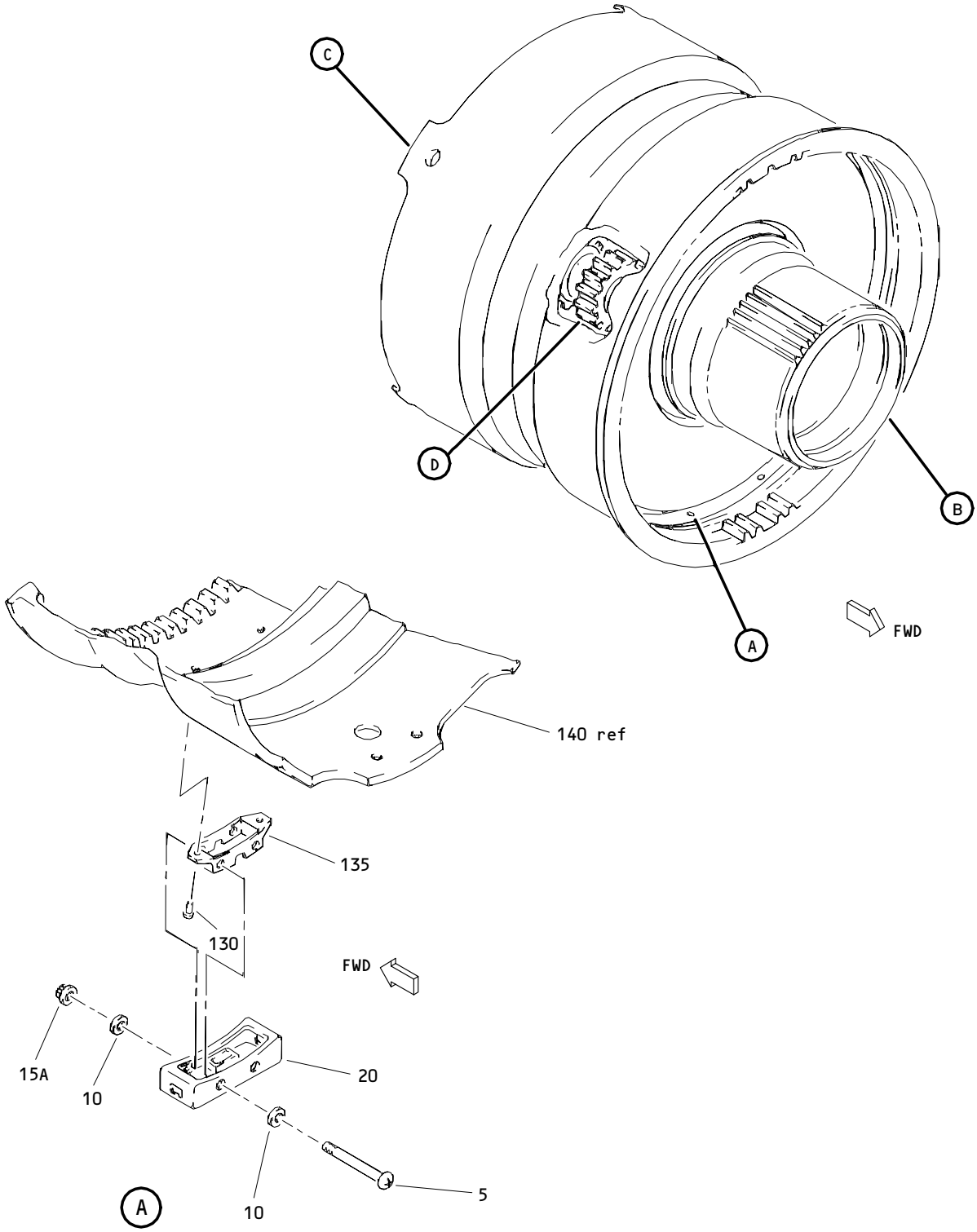
Trailing Edge Flap Drive 9.5 Diameter Rotary Actuator Assembly
Figure 1 (Sheet 3)

T68525

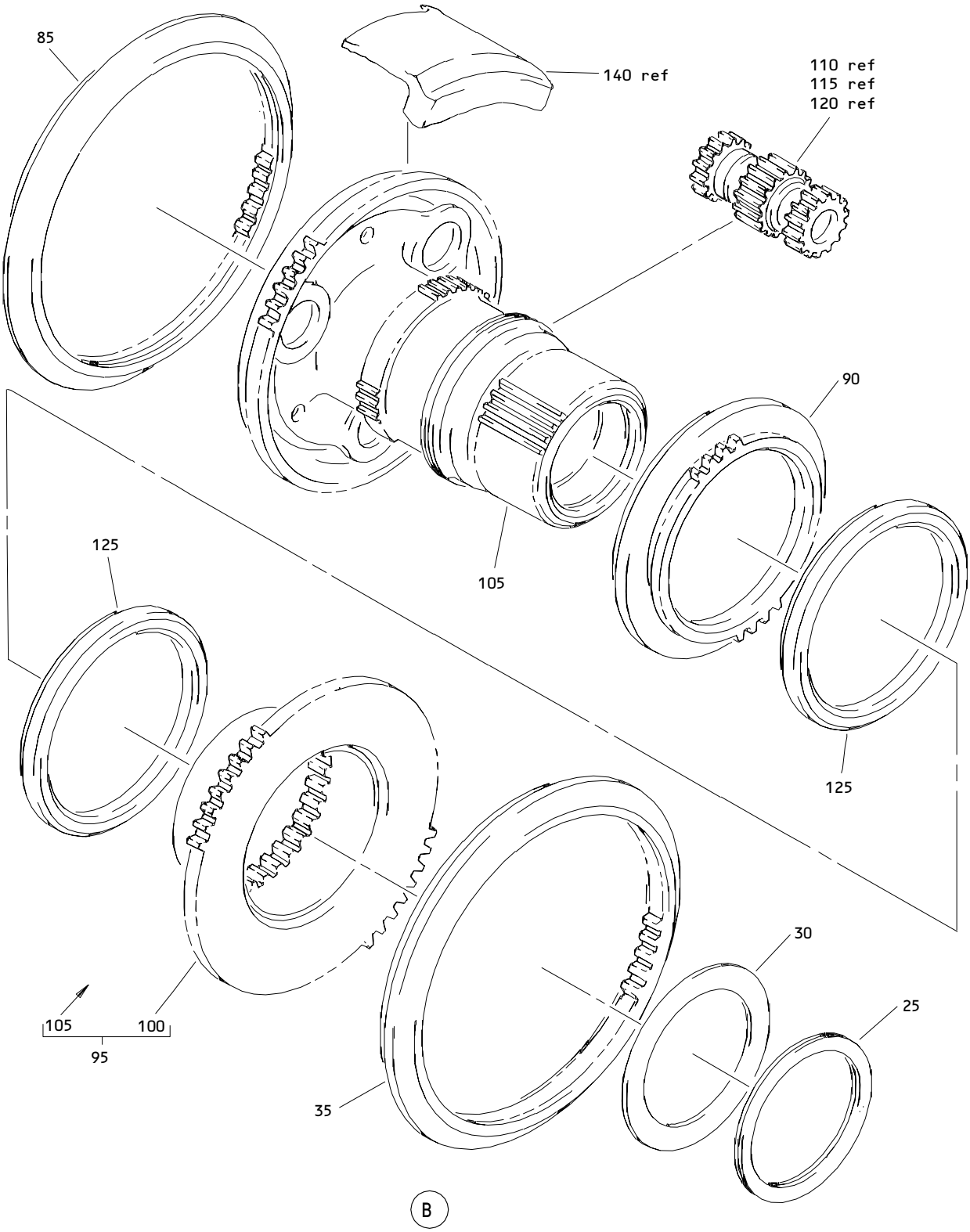
FIG. & ITEM	PART NO.	AIRLINE PART NUMBER	NOMENCLATURE 1234567	EFF CODE	QTY PER ASSY
01-					
-1	256T3250-2		ACTUATOR ASSY-TE FLAP DRIVE 9.5 DIA ROTARY (PRE SB 767-27-0115)	A	RF
-1A	256T3250-4		ACTUATOR ASSY-TE FLAP DRIVE 9.5 DIA ROTARY (POST SB 767-27-0115)	B	RF
5	256T3269-1		.HOUSING-SEAL		1
10	256T3293-1		.SEAL- (OPT ITEMS 10A, 10B)		1
-10A	256T3293-5		.SEAL- (OPT ITEMS 10, 10B)		1
-10B	21000-0241		.SEAL- (V73680) (OPT ITEMS 10, 10A)		1
12	256T3295-1		.RING-BACKUP		1
15	MS29561-270		.PACKING		1
20	256T3273-1		.COVER-DRAIN PORT, INNER PORT		1
			ATTACHING PARTS		
25	NAS1633-8		.SCREW		2
30	AN960-10L		.WASHER		2
			-------*-------		
45	NAS1352-06-4		.SCREW		3
50	RR318CD		.RING-RETAINING (V80756)		1
55	256T3835-3		.SHIM		AR
60	256T3270-1		.RETAINER ASSY-BRG		1
65	MS21209C06-15		..INSERT		3
67	256T3270-3		..RETAINER		1
70	256T3236-1		.PIN-ANTIROTATION		1
75	MS28775-233		.PACKING		1
80	256T3293-4		.SEAL (OPT ITEM 80A)		1
-80A	21000-0240		.SEAL- (V73680) (OPT ITEM 80)		1
85	256T3252-1		DELETED		
85A	256T3252-2		.LIMITER ASSY- (FOR DETAILS SEE FIG. 3)	A	1

FIG. & ITEM	PART NO.	AIRLINE PART NUMBER	NOMENCLATURE 1234567	EFF CODE	QTY PER ASSY
01-					
-85B	256T3252-3		.LIMITER ASSY- (FOR DETAILS SEE FIG. 3)	B	1
99	256T3835-4		.SHIM		AR
100	MS28775-116		.PACKING		1
105	256T3835-9		.SHIM		1
110	RS93CD		.RING-RETAINING (V80756)		1
115	256T3247-1		.INDICATOR ASSY-TRIP. (FOR DETAILS SEE FIG. 5)		1
150	NAS1632-2		.SCREW		2
155	NAS620-8		.WASHER		2
160	MS28775-015		.PACKING		1
165	256T3265-1		.COVER ASSY-INPUT END ATTACHING PARTS		1
166	NAS1216-3-8		.SCREW		4
167	256T3274-1		.PIN-DOWEL -------*-------		4
170	MS21209C0815		..INSERT		2
175	MS21209F1-15		..INSERT		6
177	MS29561-270		.PACKING		1
180	9306PPPRBFS428		.BEARING- (V21335) (SPEC BACB10BB30PP) (OPT PKTLL006P1 (V78118)) (OPT C006RRP0ZZ (V40920)) (OPT C006RRPP1P28LY196 (V40920)) (OPT ITEM 180A)		1
-180A	9306NPPFS428		.BEARING- (V21335) (OPT ITEM 180)		1
185	256T3293-3		.SEAL- (OPT ITEMS 185A, 185B)		1

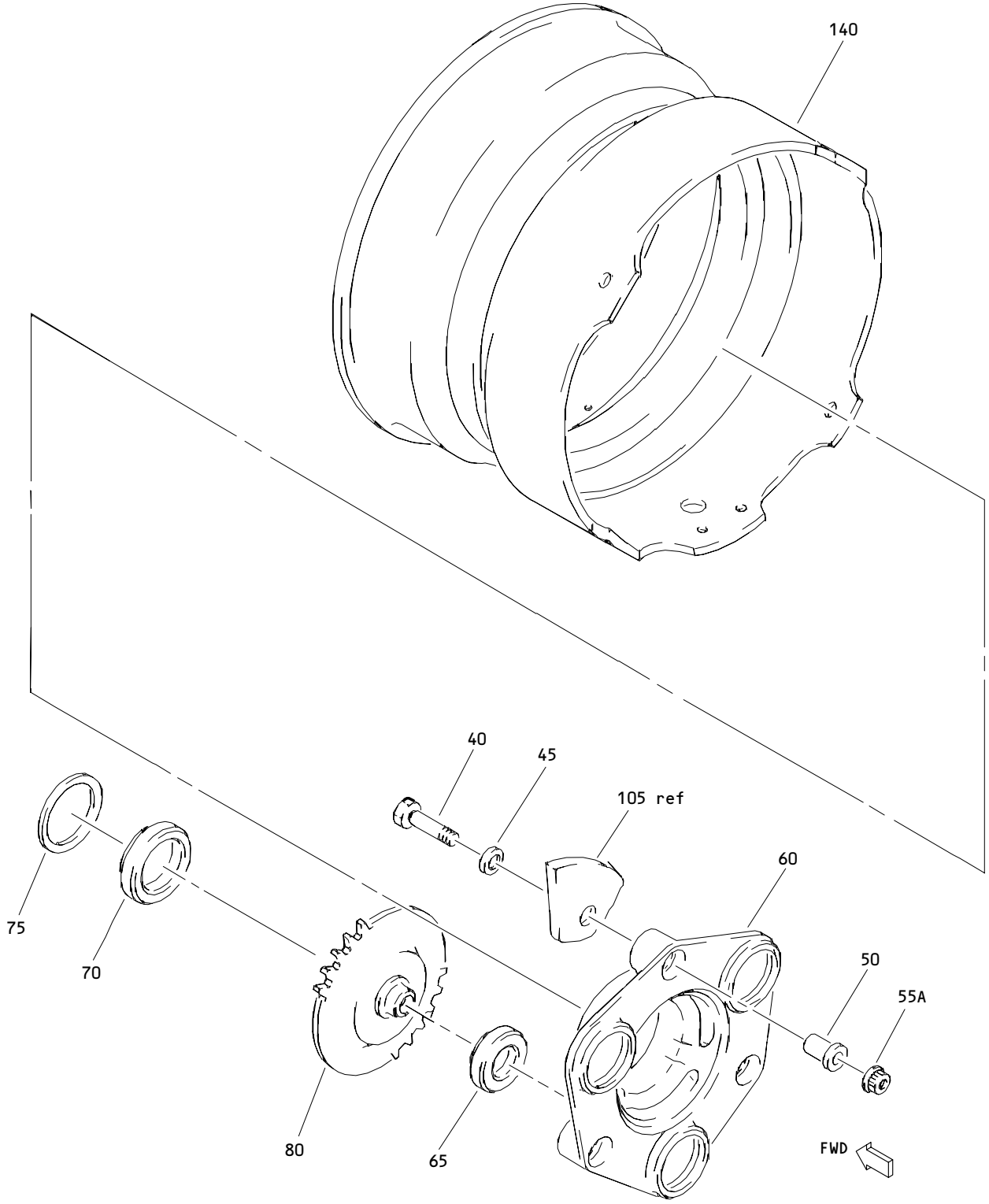
FIG. & ITEM	PART NO.	AIRLINE PART NUMBER	NOMENCLATURE 1234567	EFF CODE	QTY PER ASSY
01-					
-185A	256T3293-7		.SEAL-		1
			(OPT ITEMS 185, 185B)		
-185B	21000-0243		.SEAL-		1
			(V73680)		
			(OPT ITEMS 185, 185A)		
190	256T3835-4		.SHIM		AR
195	NAS1352-06H6		.SCREW		6
197	256T3813-1		.RING-RETAINING		1
200	NAS1189-06T6B		.SCREW	A	12
-200A	NAS1189-06T5B		.SCREW	B	12
205	256T3850-1		.CAMPLATE-		1
			(OPT ITEM 205B)		
-205A	256T3850-4		DELETED		
-205B	256T3850-10		.CAMPLATE-		1
			(OPT ITEM 205)		
210	RR125		DELETED		
210A	RRN125		.RING-RETAINING		1
			(V80756)		
215	256T3272-1		.SPRING-CPRSN		1
220	256T3835-8		.SHIM		1
222	256T3811-1		.RETAINER-TRIP IND		1
225	256T3812-1		.DIAPHRAGM-TRIP IND		1
230	256T3807-1		.RING-TRIP IND		1
235	RSN143		.RING-RTNR		1
			(V80756)		
240	256T3840-2		.CAMPLATE-DRIVER		1
-240A	256T3840-5		DELETED		
245	256T3253-2		.NO BACK ASSY-	A	1
			(FOR DETAILS SEE FIG. 4)		
-245A	256T3253-2		.NO BACK ASSY-	B	1
			(OPT ITEM 245B)		
			(FOR DETAILS SEE FIG. 4)		
-245B	256T3253-3		.NO BACK ASSY-	B	1
			(OPT ITEM 245A)		
			(FOR DETAILS SEE FIG. 4)		
295	256T3271-1		.SHAFT-INPUT		1
300	256T3251-2		.GEARBOX ASSY-		1
			(FOR DETAILS SEE FIG. 2)		
350	256T3297-1		.NAMEPLATE		1



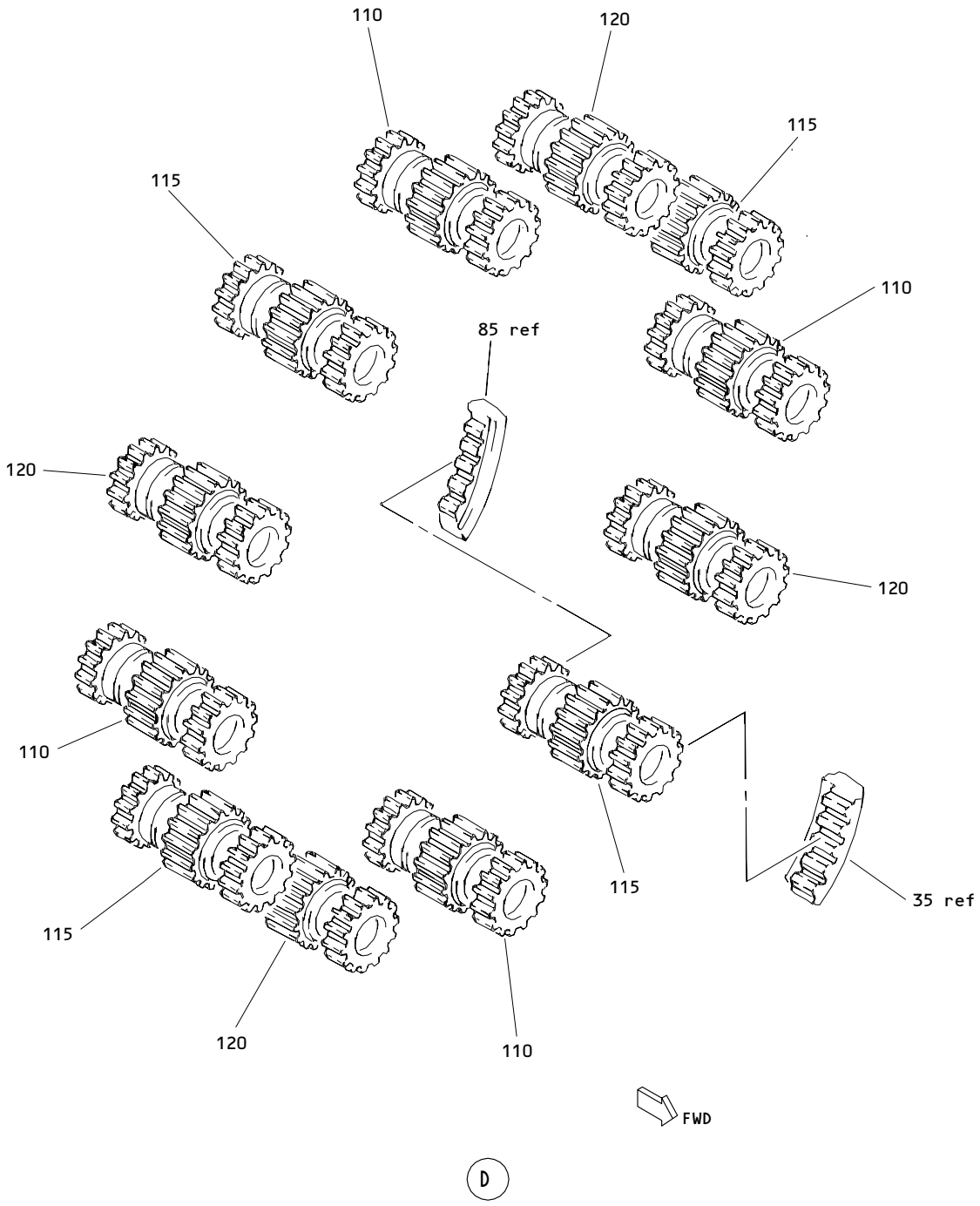
Trailing Edge Flap Actuator Gearbox Assembly
Figure 2 (Sheet 1)



Trailing Edge Flap Actuator Gearbox Assembly
Figure 2 (Sheet 2)



Trailing Edge Flap Actuator Gearbox Assembly
Figure 2 (Sheet 3)

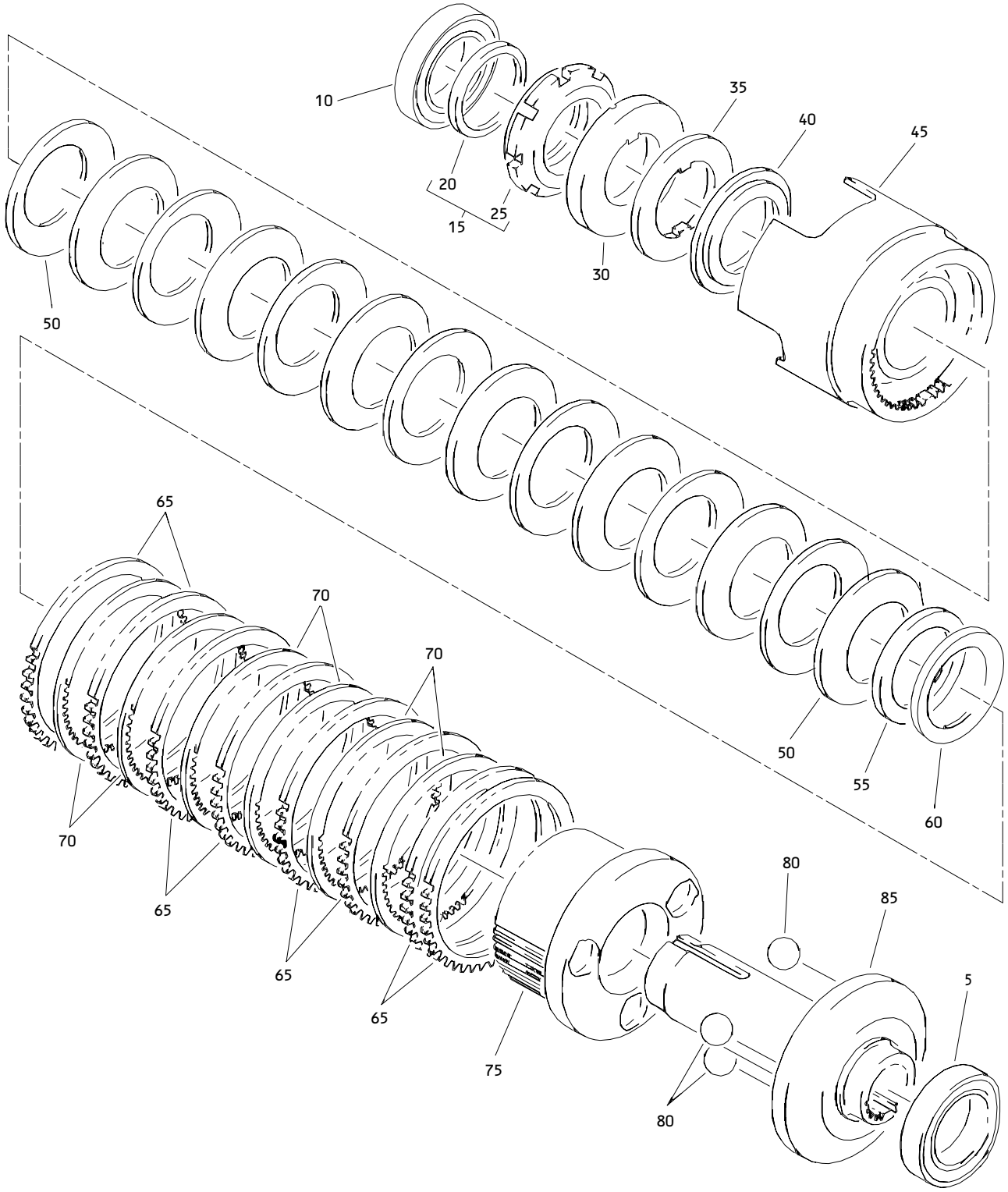


Trailing Edge Flap Actuator Gearbox Assembly
Figure 2 (Sheet 4)

FIG. & ITEM	PART NO.	AIRLINE PART NUMBER	NOMENCLATURE 1234567	EFF CODE	QTY PER ASSY
02-					
-1	256T3251-2		GEARBOX ASSY-TE FLAP ACTR ASSY		RF
5	NAS623-3-16		.SCREW		2
10	NAS620-10L		.WASHER		4
15	H10-3BAC		DELETED		
15A	MS21042L3		.NUT		2
20	256T3296-1		.COVER-OUTER DRAIN		1
25	KS400CD		.RING-RETAINING (V80756) (OPT ITEM 25A)		1
-25A	256T3855-1		.RING-RETAINING (OPT ITEM 25)		1
30	256T3835-1		.SHIM		1
35	256T3268-2		.GEAR-OUTER SIDE RING (OPT ITEM 35A)		1
-35A	256T3268-3		.GEAR-OUTER SIDE RING (OPT ITEM 35)		1
40	NAS6605-12		.BOLT		3
45	AN960-516L		.WASHER		3
50	256T3231-1		.DOWEL-HOLLOW		3
55	H10-5BAC		DELETED		
55A	MS21042L5		.NUT		3
60	256T3266-1		.HOUSING-BRG		1
65	1904LLT1C1-01		.BEARING- (V21760) (SPEC BACB10BB20PP) (OPT 9304PPPRBFS428 (V21335)) (OPT PKTLL004P1 (V78118)) (OPT C004RRP0ZZ (V40920)) (OPT ITEMS 65B, 65C)		3

FIG. & ITEM	PART NO.	AIRLINE PART NUMBER	NOMENCLATURE 1234567	EFF CODE	QTY PER ASSY
02-					
-65A	1906SZZ		DELETED		
-65B	1904SZZ		.BEARING- (V38443) (OPT ITEMS 65, 65C)		3
70	9306PPPRBFS428		.BEARING- (V21335) (SPEC BACB10BB30PP) (OPT PKTLL006P1 (V78118)) (OPT C006RRP0ZZ (V40920)) (OPT C006RRPP1P28LY196 (V40920)) (OPT ITEMS 70A, 70B)		3
-70A	9306NPPFS428		.BEARING-BALL (V21335) (OPT ITEMS 70, 70B)		3
-70B	1906SZZ		.BEARING-BALL (V38443) (OPT ITEMS 70, 70A)		3
75	256T3835-4		.SHIM		AR
80	256T3264-2		.GEAR-STAR PLANET (OPT ITEM 80A)		3
-80A	256T3264-3		.GEAR-STAR PLANET (OPT ITEM 80)		3
85	256T3254-2		.GEAR-INNER SIDE RING (OPT ITEM 85A)		1
-85A	256T3254-3		.GEAR-INNER SIDE RING (OPT ITEM 85)		1
90	256T3258-2		.GEAR-SUN RING		1
95	256T3299-2		.SHAFT ASSY-OUTPUT		1
100	256T3299-6		..SHAFT-SPLINED (MATCHED SET) (OPT ITEM 100A)		1

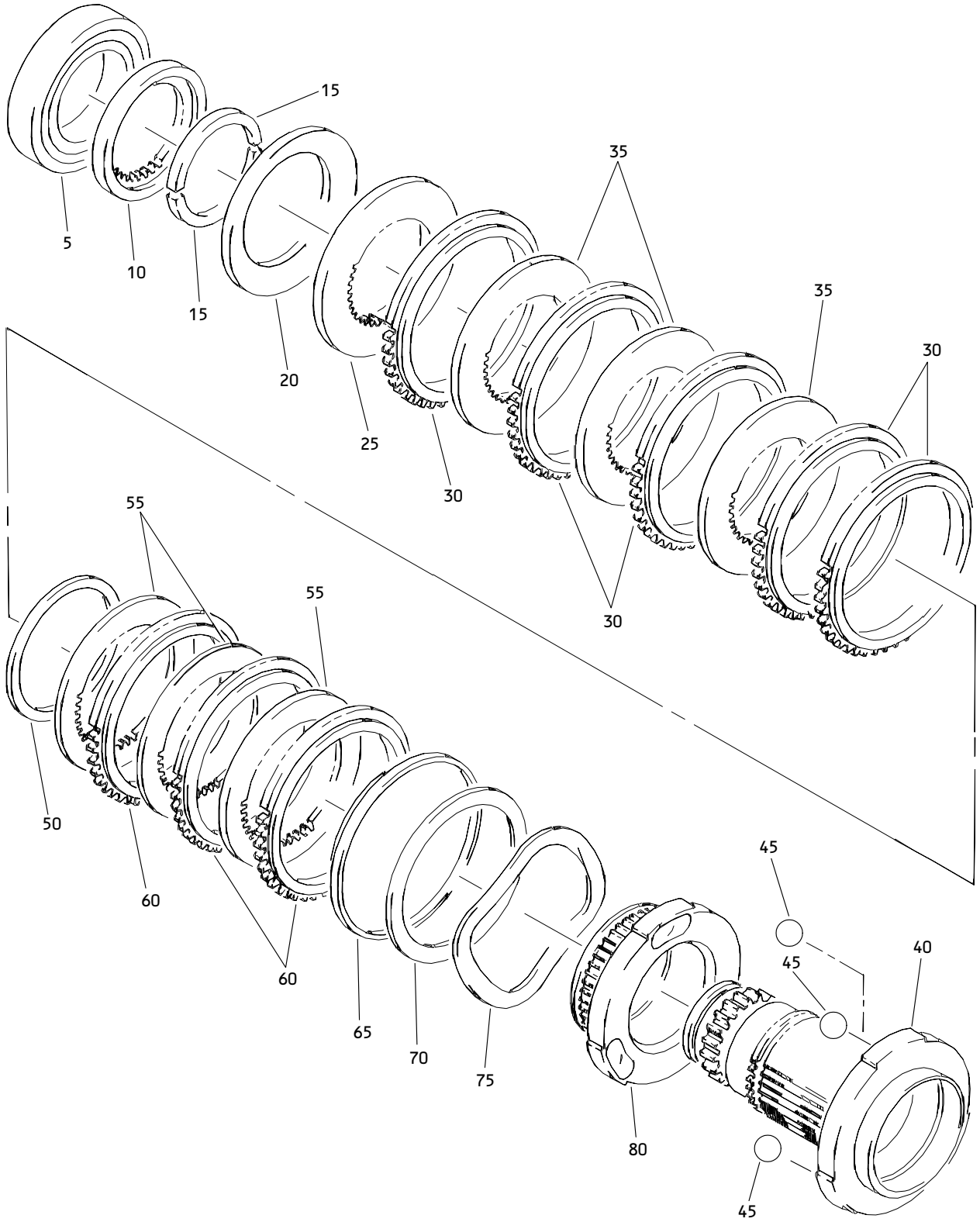
FIG. & ITEM	PART NO.	AIRLINE PART NUMBER	NOMENCLATURE 1234567	EFF CODE	QTY PER ASSY
02-					
-100A	256T3299-5		..SHAFT-SPLINED (MATCHED SET) (OPT ITEM 100)		1
105	256T3299-4		..SHAFT-(MATCHED SET)		1
110	256T3259-1		.GEAR-PLANET (OPT ITEM 110A)		4
-110A	256T3259-4		.GEAR-PLANET (OPT ITEM 110)		4
115	256T3259-2		.GEAR-PLANET (OPT ITEM 115A)		4
-115A	256T3259-5		.GEAR-PLANET (OPT ITEM 115)		4
120	256T3259-3		.GEAR-PLANET (OPT ITEM 120A)		4
-120A	256T3259-6		.GEAR-PLANET (OPT ITEM 120)		4
125	256T3263-1		.RING-JOURNAL		2
130	MS20470DD4-5		.RIVET		2
135	256T3292-2		.DRAIN-INNER PORT		1
140	256T3255-3		.GEAR-FIXED RING (OPT ITEM 140A)		1
-140A	256T3255-4		.GEAR-FIXED RING (OPT ITEM 140)		1



Torque Limiter Assembly
Figure 3

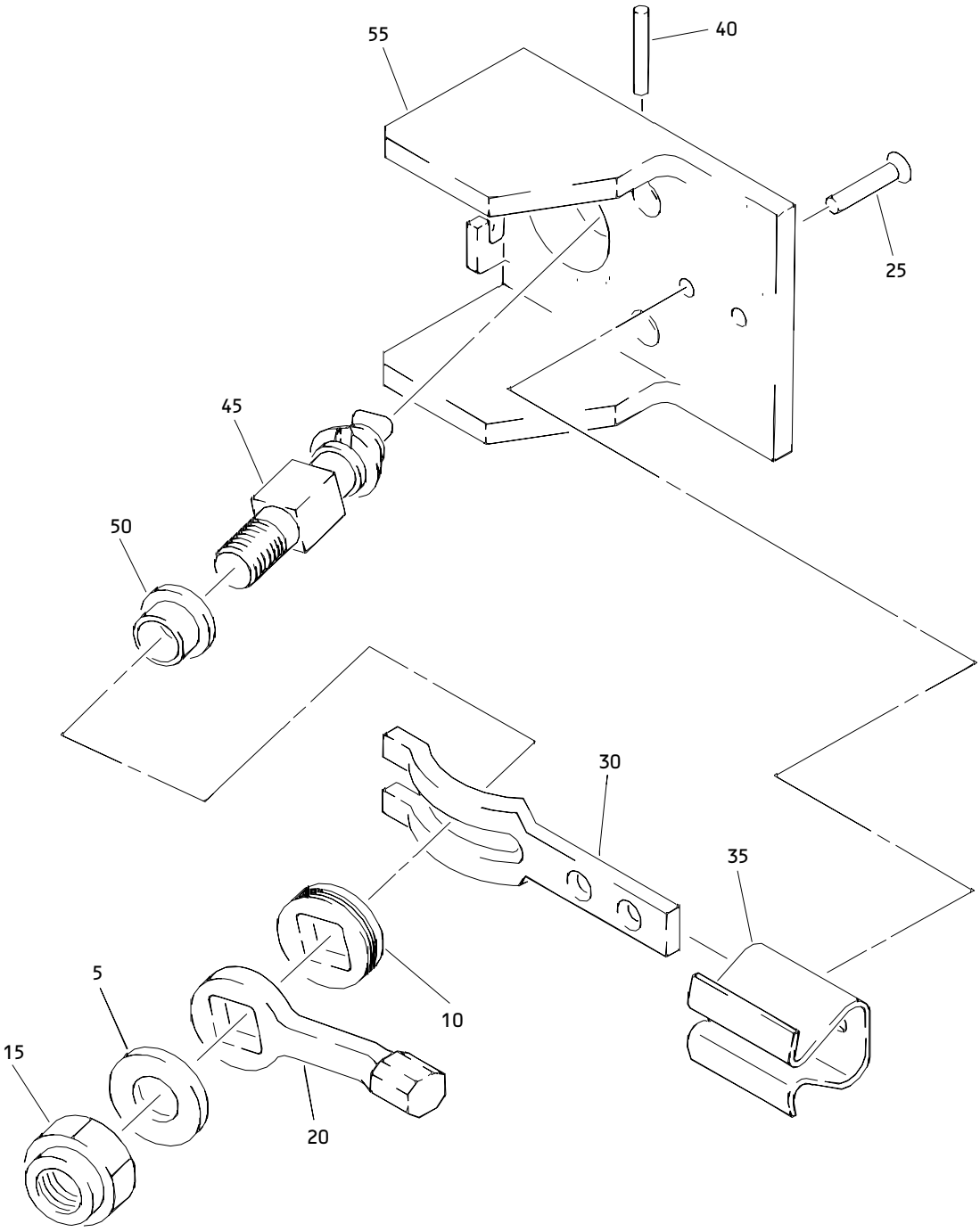
FIG. & ITEM	PART NO.	AIRLINE PART NUMBER	NOMENCLATURE 1234567	EFF CODE	QTY PER ASSY
03-					
-1	256T3252-1		DELETED		
-1A	256T3252-2		LIMITER ASSY-TORQUE	A	RF
-1B	256T3252-3		LIMITER ASSY-TORQUE	B	RF
5	1907RRT1C1-01		.BEARING- (V21760) (SPEC BACB10BB35PP) (OPT 9307PPPRBFS428 (V21335)) (OPT PKTLL007P1 (V78118)) (OPT C007RRP0ZZ (V40920)) (OPT C007RPP1P28LY196 (V40920)) (OPT ITEM 5A)		1
-5A	1907RRT1C1-01		.BEARING-BALL (OPT ITEM 5)		1
10	9306PPPRBFS428		.BEARING- (V21335) (SPEC BACB10BB30PP) (OPT PKTLL006P1 (V78118)) (OPT C006RRP0ZZ (V40920)) (OPT C006RRPP1P28LY196 (V40920)) (OPT ITEM 10A)		1
-10A	9306NPPFS428		.BEARING-BALL (V21335) (OPT ITEM 10)		1
15	69B83555-1		.NUT ASSY		1
20	69B83555-3		..INSERT-LOCKING		1
25	69B83555-2		..NUT		1
30	69B83376-3		.WASHER-CUP LOCK		1
35	69B83554-1		.RACE-THRUST BRG		1
40	TC2031		.BEARING-THRUST ROLLER (V27737)		1

FIG. & ITEM	PART NO.	AIRLINE PART NUMBER	NOMENCLATURE 1234567	EFF CODE	QTY PER ASSY
03-					
45	256T3806-1		.RING-OUTPUT		1
50	256T3803-1		.SPRING-DISC	A	14
-50A	256T3803-2		DELETED		
-50B	256T3848-1		.SPRING-DISC	B	14
55	256T3809-1		.WASHER-CHAFE	A	AR
-55A	256T3809-2		.WASHER-CHAFE	B	AR
60	256T3805-1		.SHIM-LAMINATED		AR
65	256T3804-1		.PLATE-BRAKE		8
70	256T3810-1		.PLATE-STEEL BRAKE		6
75	256T3802-1		.PLATE-OUTPUT CAM		1
80	BACB10T1-36A		.BALL		3
85	256T3801-1		.PLATE-INPUT CAM		1



No Back Assembly
Figure 4

	FIG. & ITEM	PART NO.	AIRLINE PART NUMBER	NOMENCLATURE 1234567	EFF CODE	QTY PER ASSY
	04-					
	-1	256T3253-2		NO BACK ASSY	A,B	RF
	-1A	256T3253-3		NO BACK ASSY	B	RF
	5	1908LLT1C1-01		.BEARING- (V21760) (SPEC BACB10BB40PP) (OPT 9308PPPRBFS428 (V21335)) (OPT PKTLL008P1 (V78118)) (OPT C008RRP0ZZ (V40920)) (OPT C008RRPP1P28LY196 (V40920))		1
	10	256T3829-1		.RETAINER-LOCK RING		1
	15	256T3830-1		.RING-THRUST LOCK		2
	20	256T3833-1		.SPRING-DISC		1
	25	256T3831-1		.PLATE-BACKUP (USED ON ITEM 1)	A,B	1
	-25A	256T3831-2		.PLATE-BACKUP (USED ON ITEM 1A)	B	1
	30	256T3827-1		.PLATE ASSY-BRAKE (OPT ITEM 30A)		5
R	30A	256T3827-4		.PLATE ASSY-BRAKE (OPT ITEM 30)		5
	35	256T3828-1		.PLATE-BRAKE		3
	40	256T3836-1		.CAMSHAFT-OUTPUT		1
	45	BACB10T1-28A		.BALL		3
	50	RS215CD		.RING- (V80756)		1
	55	256T3832-2		.PLATE-BRAKE		3
	60	256T3827-2		.PLATE ASSY-BRAKE (OPT ITEM 60A)		3
R	60A	256T3827-5		.PLATE ASSY-BRAKE (OPT ITEM 60)		3
	65	256T3826-1		.PLATE-BACKUP		1
	70	256T3835-7		.SHIM		1
	75	256T3834-3		.SPRING-WAVE		1
	80	256T3825-1		.FOLLOWER		1



Trip Indicator Assembly
Figure 5

FIG. & ITEM	PART NO.	AIRLINE PART NUMBER	NOMENCLATURE 1234567	EFF CODE	QTY PER ASSY
05-					
-1	256T3247-1		INDICATOR ASSY-TRIP		RF
5	AN960-10L		.WASHER		1
10	256T3279-1		.SHIM-LAMINATED		1
15	H10-3BAC		.NUT- (V15653) (SPEC BACN10JC3) (OPT NS202101-02 (V80539)) (OPT RMLH9075-3W (V72962)) (OPT T6S1032J (V71087)) (OPT VN303A02 (V92215)) (OPT 96-02 (V80539)) (OPT BRH10A3 (V52828))		1
20	256T3278-1		.ARM		1
25	MS20426DD3-5		.RIVET		2
30	256T3277-1		.PLATE-SPR RETAINING		1
35	256T3281-1		.SPRING		1
40	MS16555-607		.PIN-STRAIGHT		1
45	256T3276-1		.ACTUATOR		1
50	256T3282-1		.SEAL		1
55	256T3275-1		.GUARD		1