



COMPONENT MAINTENANCE MANUAL WITH ILLUSTRATED PARTS LIST

RUDDER PEDAL ASSEMBLY

PART NUMBER
251A3132-3, -4, -5, -6, -7, -8

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27-27-07

**COMPONENT MAINTENANCE MANUAL**

Revision No. 11
Jul 01/2009

To: All holders of RUDDER PEDAL ASSEMBLY 27-27-07.

Attached is the current revision to this COMPONENT MAINTENANCE MANUAL

The COMPONENT MAINTENANCE MANUAL is furnished either as a printed manual, on microfilm, or digital products, or any combination of the three. This revision replaces all previous microfilm cartridges or digital products. All microfilm and digital products are reissued with all obsolete data deleted and all updated pages added.

For printed manuals, changes are indicated on the List of Effective Pages (LEP). The pages which are revised will be identified on the LEP by an R (Revised), A (Added), O (Overflow, i.e. changes to the document structure and/or page layout), or D (Deleted). Each page in the LEP is identified by Chapter-Section-Subject number, page number and page date.

Pages replaced or made obsolete by this revision should be removed and destroyed.

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TRANSMITTAL LETTER

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Location of Change

Description of Change

NO HIGHLIGHTS

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HIGHLIGHTS

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**COMPONENT MAINTENANCE MANUAL****TEMPORARY REVISION AND SERVICE BULLETIN RECORD**

BOEING SERVICE BULLETIN	BOEING TEMPORARY REVISION	OTHER DIRECTIVE	DATE OF INCORPORATION INTO MANUAL
		PRR 38169	MAR 01/98
		PRR 38230	JUL 01/02

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TR AND SB RECORD

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All revisions to this manual will be accompanied by transmittal sheet bearing the revision number. Enter the revision number in numerical order, together with the revision date, the date filed and the initials of the person filing.

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COMPONENT MAINTENANCE MANUAL

INTRODUCTION

1. General

- A. The instructions in this manual supply the data necessary to do the maintenance functions together with the test, fault isolation, repair, and replacement of the defective parts.
- B. This manual is divided into different parts:
 - (1) Title Page
 - (2) Transmittal Letter
 - (3) Highlights
 - (4) List of Effective Pages
 - (5) Table of Contents
 - (6) Temporary Revision & Service Bulletin Record
 - (7) Record of Revisions
 - (8) Record of Temporary Revisions
 - (9) Introduction
 - (10) Procedures & IPL Sections
- C. Components that can be repaired have a different repair number for each specified repair. To find the repair number location of a component, look in the Repair-General procedure at the beginning of the REPAIR section. The Repair-General procedure also has an explanation of the True Position Dimension symbols used.
- D. All dimensions, measures, quantities and weights included are in English units. When metric equivalents are given they will be in the parentheses that follow the English units.
- E. The introduction to the Illustrated Parts List (IPL) shows how the IPL data is used.
- F. Design changes, optional parts, configuration differences and Service Bulletin modifications may cause different part numbers. These part numbers are identified in the IPL with an alphabetical letter which is added to the end of the basic item number. This new item number is referred to as an alpha-variant. Throughout the manual, IPL basic item number references also apply to alpha-variants unless shown differently.
- G. The tool reference numbers found in the individual procedures and in the Special Tools, Fixtures, and Equipment section are used to identify if a tool is a standard tool (STD-XXXX), a commercial tool (COM-XXXX), or a Special Tool (SPL-XXXX). This reference number is also used to distinguish between tools with similar names in the same procedure. These reference numbers are for use in the documentation only. They are not to be used for ordering tools.

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INTRODUCTION

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RUDDER PEDAL ASSEMBLY - DESCRIPTION AND OPERATION

1. Description

- A. The rudder pedal assembly is a component of the nose wheel steering, main rudder braking and rudder steering systems. The assembly has a pedal, a control rod assembly, an arm assembly, a shaft, and a bellcrank assembly. Late units have a retainer bracket to hold the pushrod attachment bolt in position if its nut comes off.

2. Operation

- A. The rudder pedal assembly moves the rudder to control the airplane yaw during flight. During ground operation, the pedal is used to apply the main landing gear brakes and to steer the nose wheel.

3. Leading Particulars (Approximate)

- A. Length – 7 inches
- B. Width – 10 inches
- C. Height – 26 inches
- D. Weight – 7 pounds

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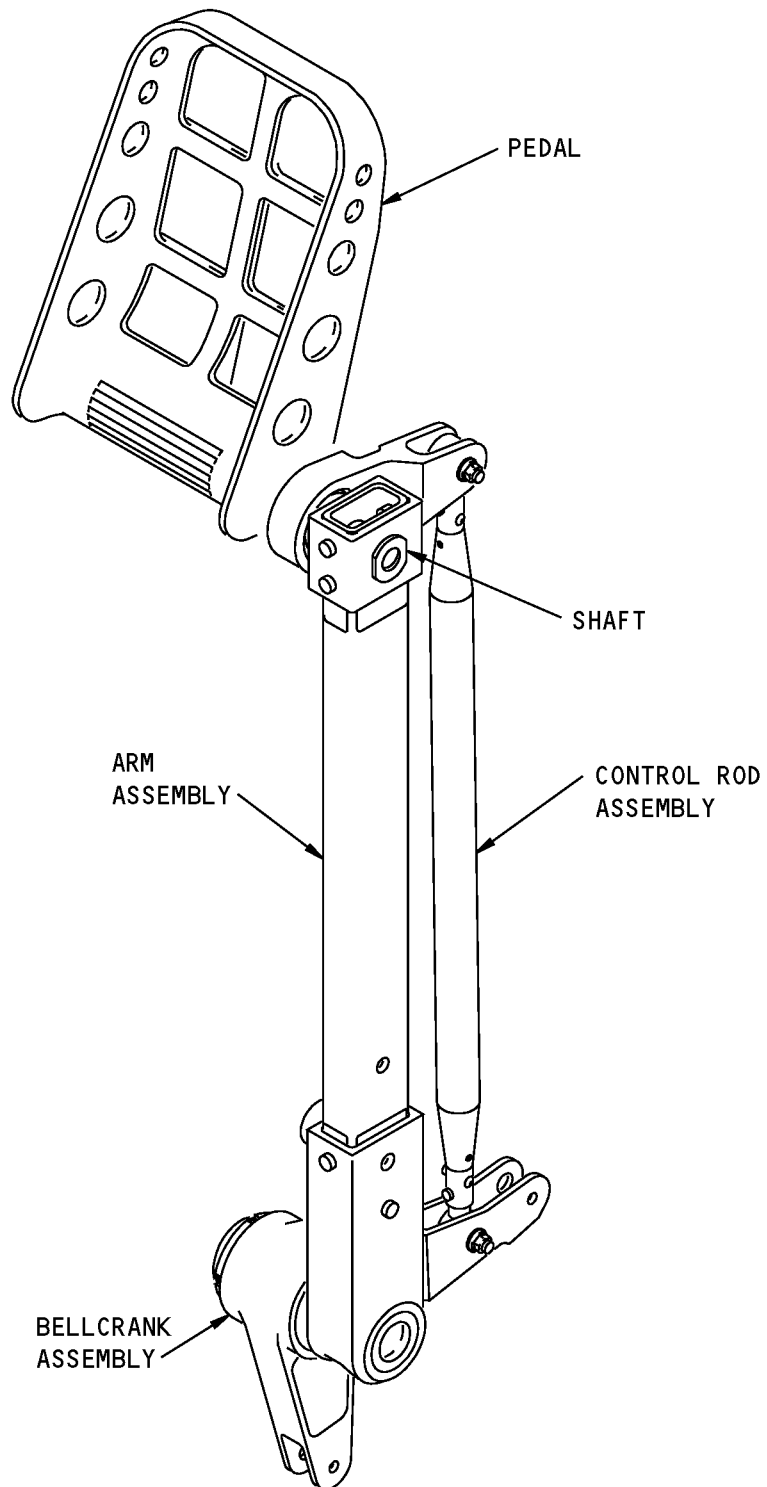
DESCRIPTION AND OPERATION

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Rudder Pedal Assembly
Figure 1

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DESCRIPTION AND OPERATION

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TESTING AND FAULT ISOLATION

(NOT APPLICABLE)

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TESTING AND FAULT ISOLATION

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DISASSEMBLY

1. General

- A. This procedure has the data necessary to disassemble the rudder pedal assembly.
- B. Disassemble this component sufficiently to isolate the defects, do the necessary repairs, and put the component back to a serviceable condition.
- C. Refer to IPL Figure 1 for item numbers.

2. Disassembly

A. References

Reference	Title
SOPM 20-50-01	BOLT AND NUT INSTALLATION
SOPM 20-50-03	BEARING AND BUSHING REPLACEMENT

B. Procedure

NOTE: For bolt and nut installation, refer to SOPM 20-50-01.

- (1) Remove the bolts (15), the washers (25), the nuts (30), and the bushing (20) from the control rod assembly (10A) (SOPM 20-50-03).
- (2) Remove the nut (35), the washers (40), the bearings (45, 65), the spacer (60), the ring (70), and the shaft (75) from the pedal (50 or 55) (SOPM 20-50-03).
- (3) Remove the nut (80), the bearings (85, 105), the spacer (90), and the bellcrank (110 or 115) from the arm assembly (120) (SOPM 20-50-03).

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DISASSEMBLY

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CLEANING

1. General

- A. This procedure has the data necessary to clean the parts of the rudder pedal assembly.
- B. Refer to the Standard Overhaul Practices Manual (SOPM) for the SOPM subjects identified in this procedure.
- C. Refer to IPL Figure 1 for item numbers.

2. Cleaning

A. References

Reference	Title
SOPM 20-30-01	CLEANING AND RELUBRICATING BEARINGS
SOPM 20-30-03	GENERAL CLEANING PROCEDURES

B. Procedure

- (1) Clean the bearings (45, 65, 85, 105, 140) as specified in SOPM 20-30-01.
- (2) Use standard industry procedures and the instructions in SOPM 20-30-03 to clean all other parts.

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CLEANING
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CHECK

1. General

- A. This procedure has the data to find defects in the specified parts.
- B. Refer to FITS AND CLEARANCES for the design dimension and wear limits.
- C. Refer to the Standard Overhaul Practices Manual (SOPM) for the SOPM subjects identified in this procedure.
- D. Refer to IPL Figure 1 for item numbers.

2. Check

A. References

Reference	Title
SOPM 20-20-02	PENETRANT METHODS OF INSPECTION

B. Procedure

- (1) Use standard industry procedures to do a visual check of all the parts for defects. Do the penetrant particle check if the visual check shows possible defects.
- (2) Do a penetrant check (SOPM 20-20-02) of these parts:
 - (a) Bellcrank (110, 115)
 - (b) Shaft (75)
 - (c) Pedal (50, 55)
 - (d) Terminal (135)

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CHECK

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**COMPONENT MAINTENANCE MANUAL****REPAIR****1. General**

- A. Instructions for repair, refinish, and replacement of the specified subassembly parts are included in each REPAIR when applicable:

Table 601:

PART NUMBER	NAME	REPAIR
—	REFINISH OF OTHER PARTS	1-1
251A3135	ARM ASSEMBLY	2-1
251A3136	TERMINAL	3-1
251A3137	TUBE	4-1
251A3139	BELLCRANK ASSEMBLY	5-1,5-2
65B80361	PEDAL	6-1
251A3143	SHAFT	7-1

2. Dimensioning Symbols

- A. Standard True Position Dimensioning Symbols used in the applicable repair procedures are shown in SOPM 20-00-00.

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REPAIR - GENERAL

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COMPONENT MAINTENANCE MANUAL

REFINISH OF OTHER PARTS - REPAIR 1-1

1. General

- A. This procedure has the data to refinish the parts which are not given in the specified repairs.
- B. Refer to the Standard Overhaul Practices Manual (SOPM) for the SOPM subjects identified in this procedure.
- C. Refer to IPL Figure 1 for item numbers.

2. Refinish of Other Parts

- A. Consumable Materials

NOTE: Equivalent substitutes may be used.

Reference	Description	Specification
C00259	Primer - Chemical And Solvent Resistant Finish, Epoxy Resin	BMS10-11, Type I

- B. References

Reference	Title
SOPM 20-30-02	STRIPPING OF PROTECTIVE FINISHES
SOPM 20-41-01	DECODING TABLE FOR BOEING FINISH CODES
SOPM 20-60-02	FINISHING MATERIALS

- C. Procedure

NOTE: For stripping of protective finishes, refer to SOPM 20-30-02. For decoding table for Boeing finish Codes, refer to SOPM 20-41-01. For finishing materials, refer to SOPM 20-60-02.

- (1) Instructions for the repair of the parts listed in REPAIR 1-1, Table 601 is for repair of the initial finish.

Table 601: Refinish Details

IPL FIG. & ITEM	MATERIAL	FINISH
IPL Fig. 1		
Spacer (90), Fitting (130)	Al alloy	Boric acid-sulfuric acid anodize or chromic acid anodize (F-17.31). Apply primer, C00259 (F-20.03) to all external surfaces.
Retainer (155)	Al alloy	Boric acid-sulfuric acid anodize or chromic acid anodize (F-17.31). Apply primer, C00259 (F-20.03).

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REPAIR 1-1

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ARM ASSEMBLY - REPAIR 2-1

251A3135-1, -2, -3

1. General

- A. This procedure has the data to repair and refinish the arm assembly (120).
- B. Refer to the Standard Overhaul Practices Manual (SOPM) for the SOPM subjects identified in this procedure.
- C. Refer to IPL Figure 1 for item numbers.

2. Bearing Replacement

- A. Consumable Materials

NOTE: Equivalent substitutes may be used.

Reference	Description	Specification
D00013	Grease - Aircraft And Instrument Grease	MIL-PRF-23827 (NATO G-354) (Supersedes MIL-G-23827)
D00633	Grease - Aircraft General Purpose	BMS3-33

- B. References

Reference	Title
SOPM 20-50-03	BEARING AND BUSHING REPLACEMENT
SOPM 20-60-03	LUBRICANTS

- C. Procedure

NOTE: For lubricants, refer to SOPM 20-60-03.

- (1) Remove the bearing (140) from the terminal (135).
(SOPM 20-50-03).
- (2) If you find defects on the arm assembly, refer to REPAIR 2-1, Paragraph 3. for repair instructions.
- (3) Install a replacement bearing (140) with grease, D00013 or grease, D00633 and roller swage it to a swage depth of 0.005-0.009 inch (SOPM 20-50-03).

3. Arm Assembly Parts Replacement

- A. Consumable Materials

NOTE: Equivalent substitutes may be used.

Reference	Description	Specification
A00247	Sealant - Pressure And Environmental - Chromate Type	BMS 5-95
A01076	Adhesive - Synthetic Rubber	BAC5010, Type 93 (BMS5-95, Class B)

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B. References

Reference	Title
SOPM 20-60-04	MISCELLANEOUS MATERIALS

C. Procedure (REPAIR 2-1, Figure 601, REPAIR 2-1, Figure 602

NOTE: For miscellaneous materials, refer to SOPM 20-60-04.

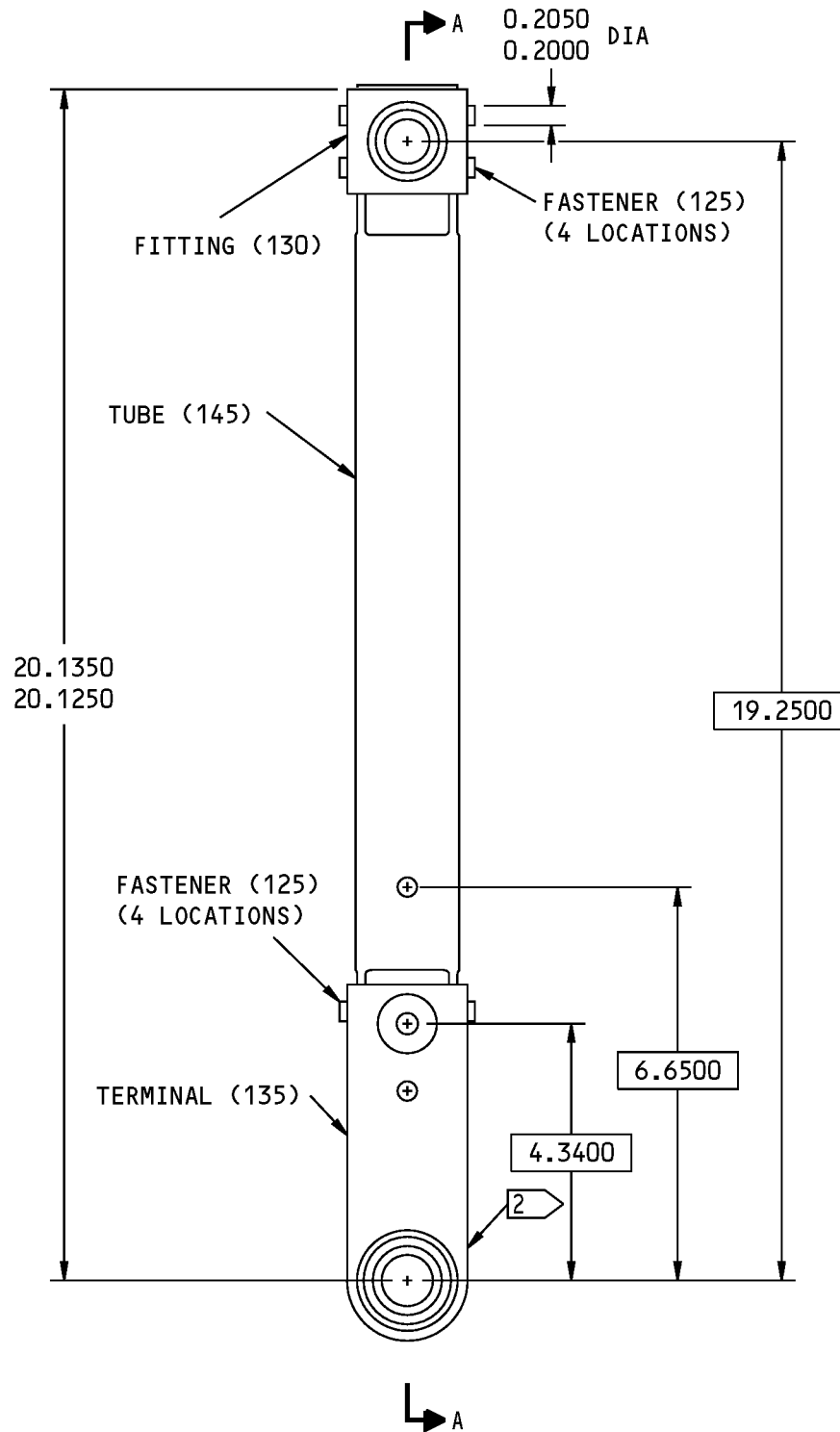
- (1) Remove the fasteners that hold the defective parts.
- (2) Disassemble the arm unit as necessary to remove the defective parts.
- (3) Get replacements, or repair the defective parts by the instructions in REPAIR 3-1, REPAIR 4-1, REPAIR 5-1.
- (4) If necessary, drill holes for fasteners, with the old or mating parts as a guide. Chemical treat (F-17.10) the chamfers indicated.
- (5) Assemble the arm parts and the fasteners with adhesive, A01076 and sealant, A00247, as shown.

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REPAIR 2-1
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251A3135-1,-2 Arm Assembly Repair
Figure 601 (Sheet 1 of 2)

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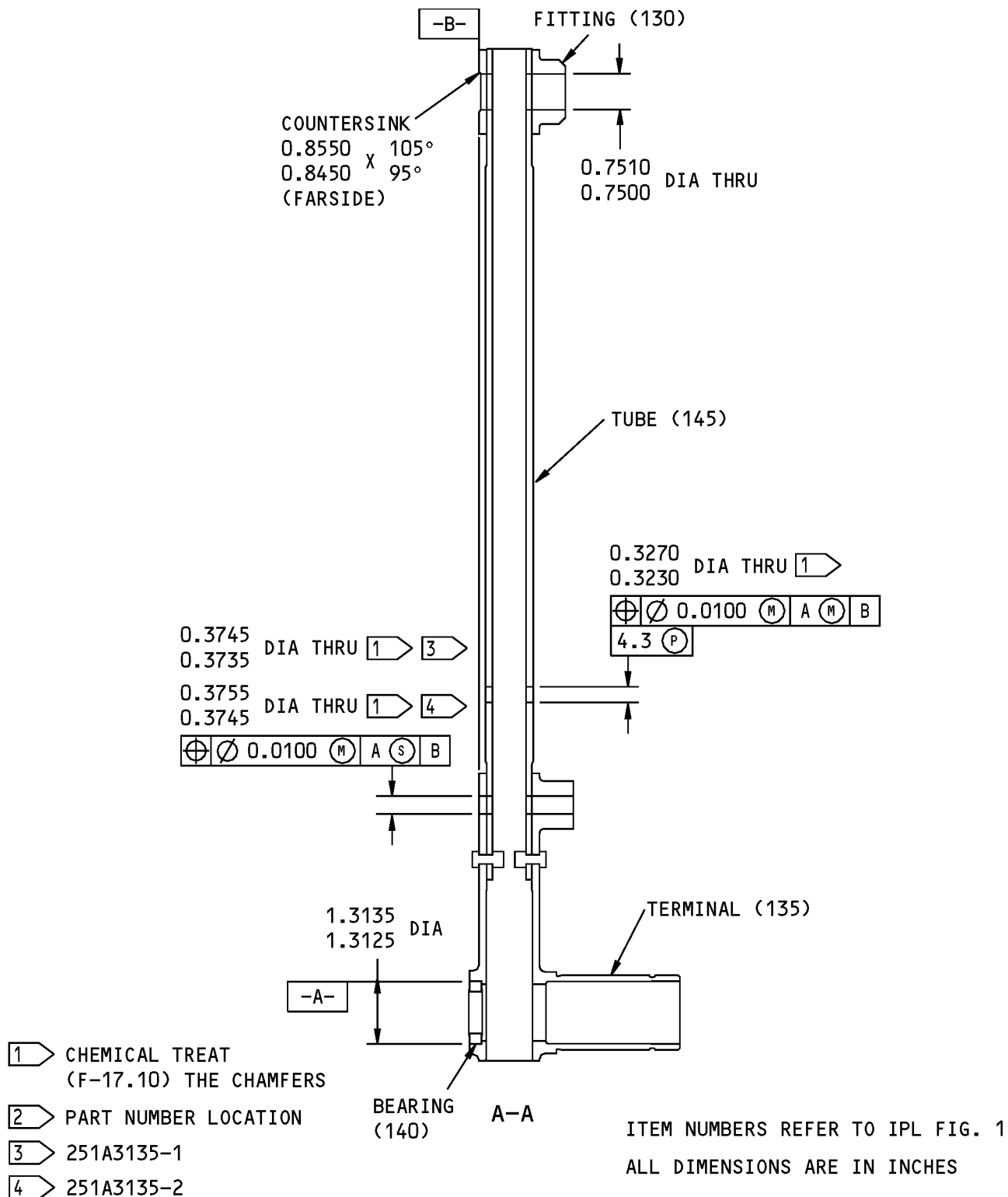
REPAIR 2-1

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251A3135-1,-2 Arm Assembly Repair
Figure 601 (Sheet 2 of 2)

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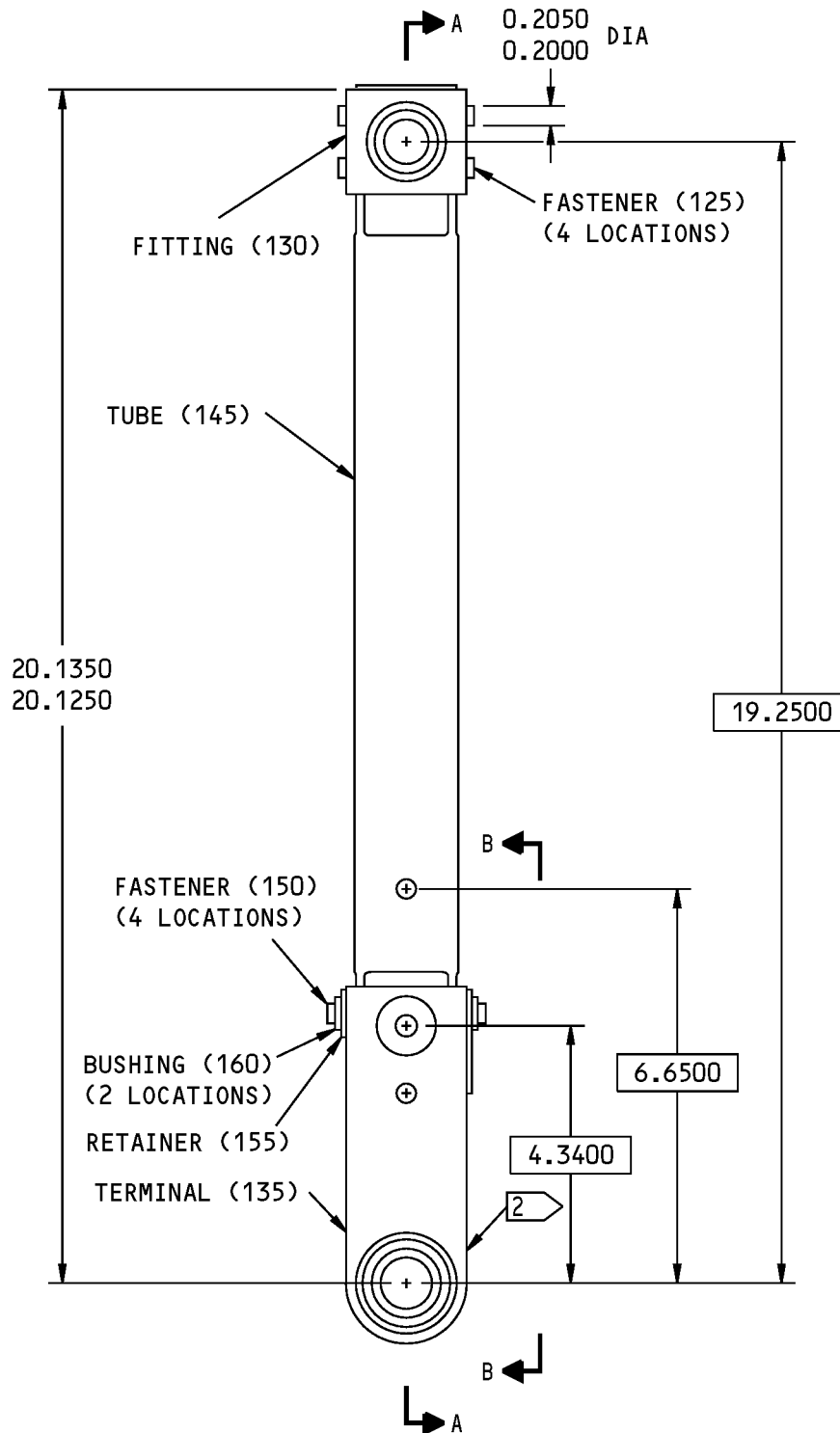
REPAIR 2-1

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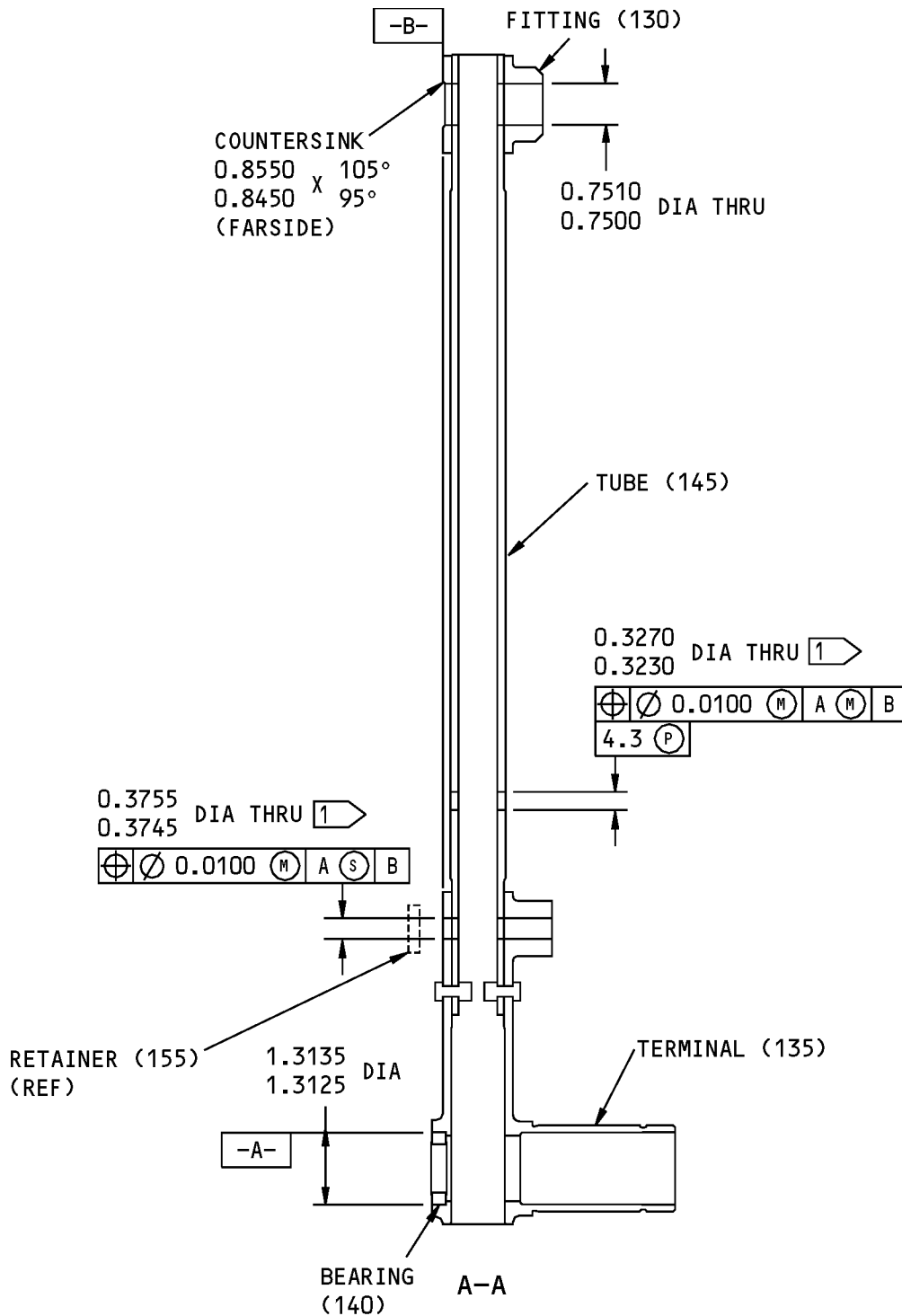
251A3135-3 Arm Assembly Repair
Figure 602 (Sheet 1 of 3)

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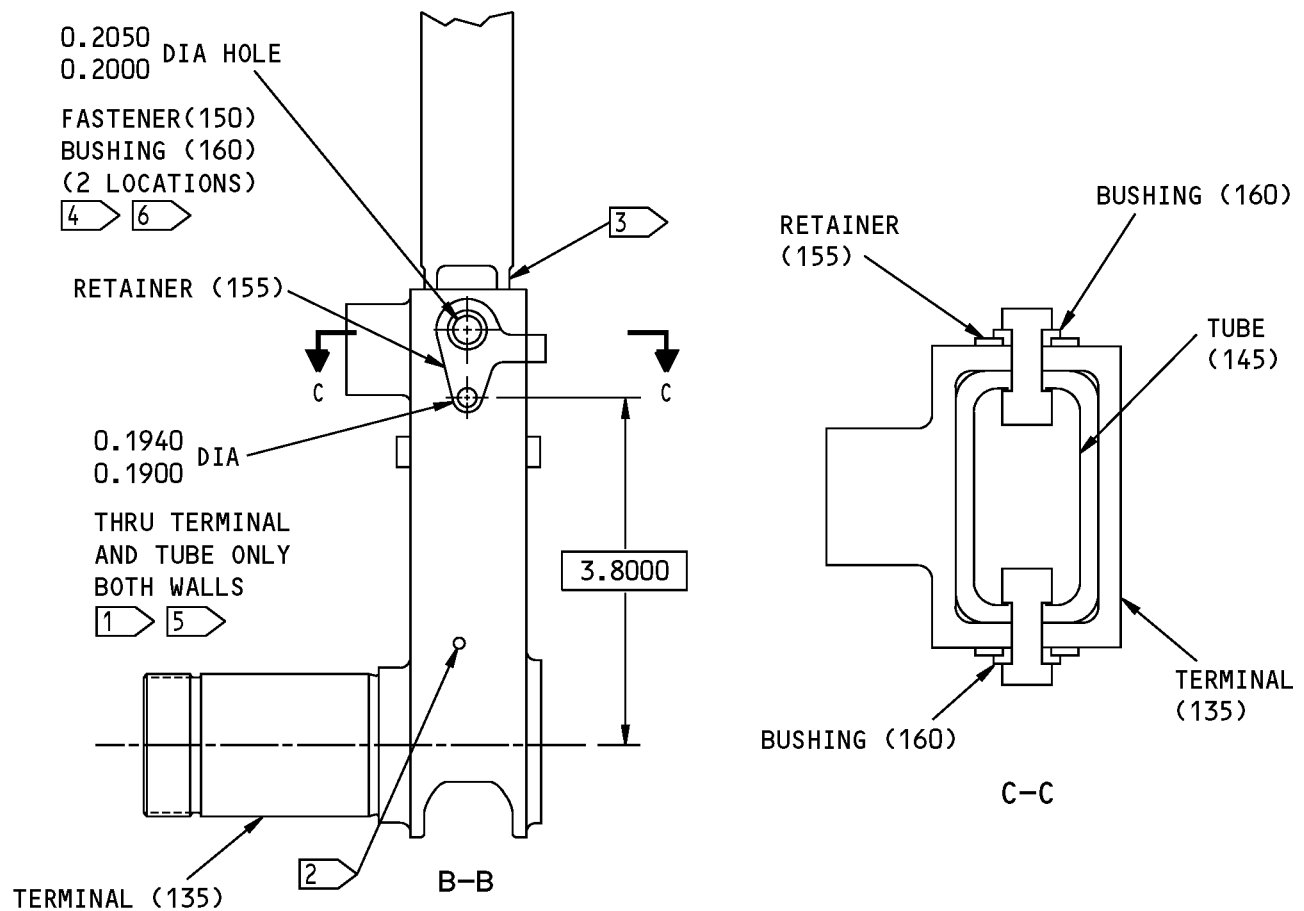
251A3135-3 Arm Assembly Repair
Figure 602 (Sheet 2 of 3)

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REPAIR 2-1

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- 1 CHEMICAL TREAT (F-17.10) THE CHAMFERS
- 2 PART NUMBER LOCATION
- 3 BOND WITH TYPE 93 ADHESIVE
- 4 INSTALL WITH BMS 5-95 SEALANT (SOPM 20-50-19, METHOD 2)
- 5 REMOVE UNWANTED ADHESIVE FROM HOLE TO PERMIT FASTENER INSTALLATION
- 6 AFTER FASTENER INSTALLATION, MAKE SURE RETAINER CAN TURN AROUND THIS POINT FOR ACCESS TO HOLE AND THEN BACK TO HOLD INSTALLATION BOLT IN POSITION IN THIS HOLE.

ITEM NUMBERS REFER TO IPL FIG. 1
ALL DIMENSIONS ARE IN INCHES

251A3135-3 Arm Assembly Repair
Figure 602 (Sheet 3 of 3)

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REPAIR 2-1
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TERMINAL - REPAIR 3-1

251A3136-1

1. General

- A. This procedure has the data to repair and refinish the terminal (135).
- B. Refer to the Standard Overhaul Practices Manual (SOPM) for the SOPM subjects identified in this procedure.
- C. Refer to IPL Figure 1 for item numbers.
- D. General repair details:
 - (1) Material: Aluminum alloy

2. Terminal Refinish

- A. Consumable Materials

NOTE: Equivalent substitutes may be used.

Reference	Description	Specification
C00259	Primer - Chemical And Solvent Resistant Finish, Epoxy Resin	BMS10-11, Type I

- B. References

Reference	Title
SOPM 20-30-02	STRIPPING OF PROTECTIVE FINISHES
SOPM 20-41-01	DECODING TABLE FOR BOEING FINISH CODES
SOPM 20-60-02	FINISHING MATERIALS

- C. Procedure (REPAIR 3-1, Figure 601)

NOTE: For stripping of protective finishes, refer to SOPM 20-30-02. For decoding table for Boeing finish Codes, refer to SOPM 20-41-01. For finishing materials, refer to SOPM 20-60-02.

- (1) Chromic acid anodize or boric acid - sulfuric acid anodize (F-17.31).
- (2) Apply primer, C00259 (F-20.03), unless shown.

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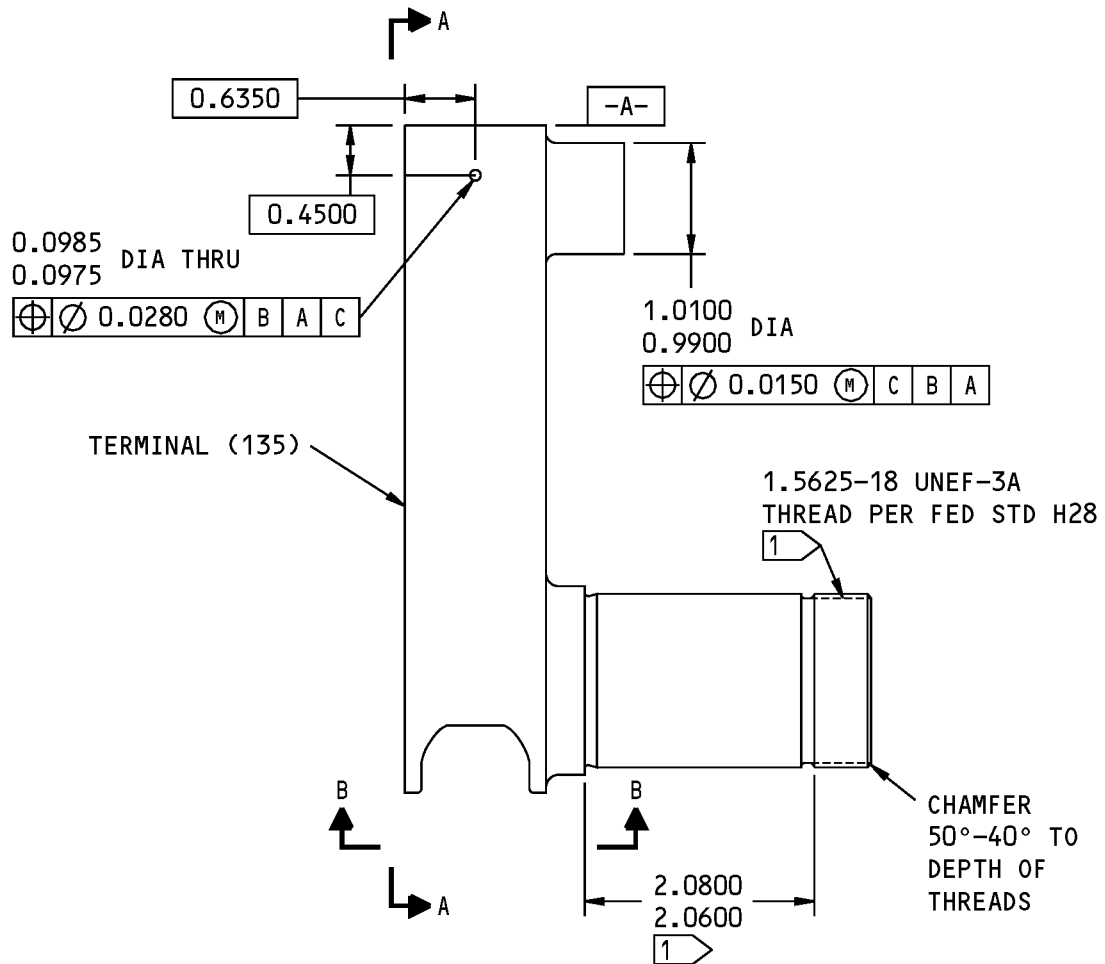
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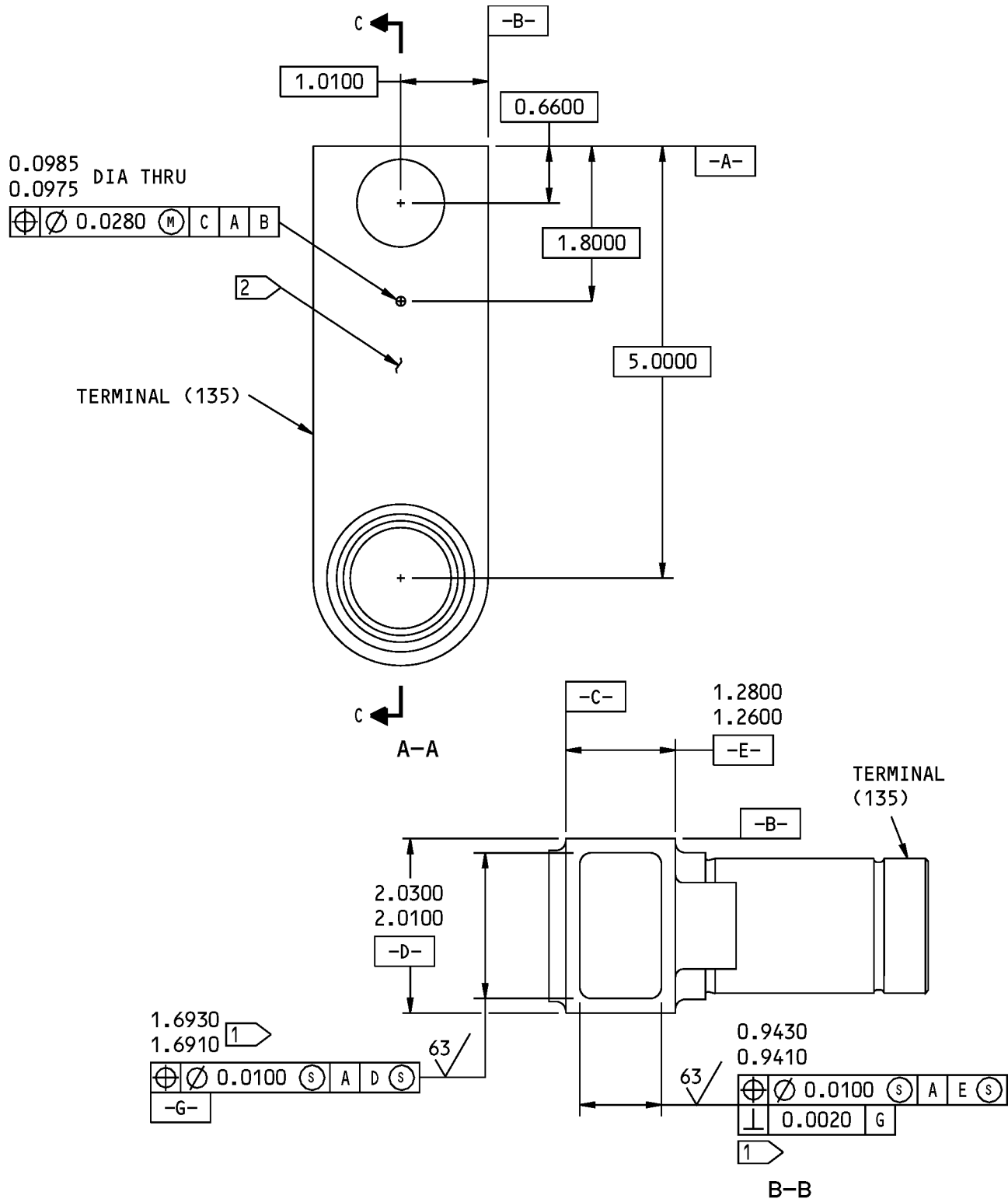
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251A3136-1 Terminal Repair
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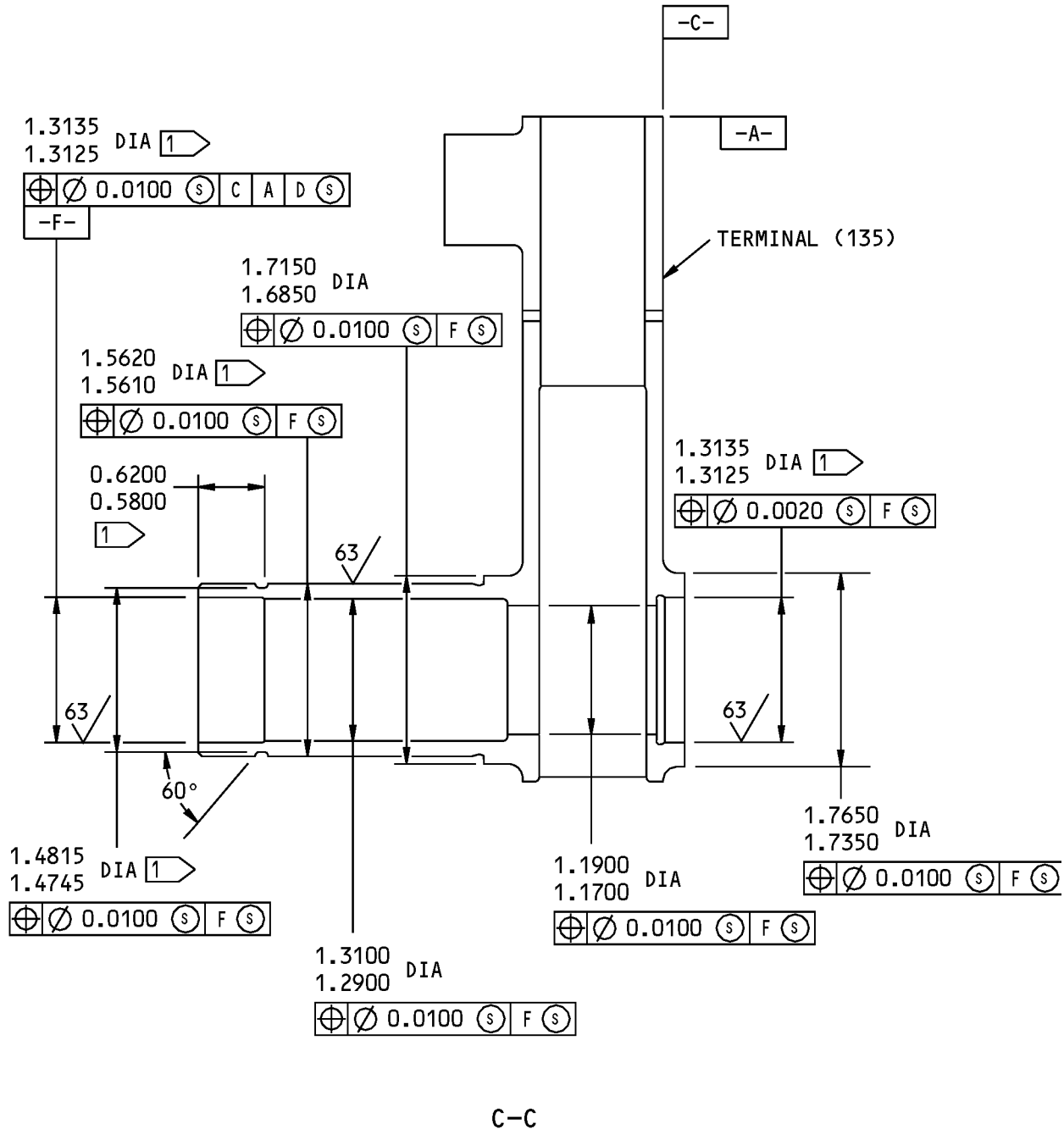
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251A3136-1 Terminal Repair
Figure 601 (Sheet 2 of 3)

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REPAIR 3-1
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1 NO PRIMER ON THIS SURFACE

2 PART NUMBER LOCATION

ITEM NUMBERS REFER TO IPL FIG. 1

ALL DIMENSIONS ARE IN INCHES

251A3136-1 Terminal Repair
Figure 601 (Sheet 3 of 3)

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REPAIR 3-1

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**COMPONENT MAINTENANCE MANUAL****TUBE - REPAIR 4-1****251A3137-1****1. General**

- A. This repair gives the data to repair and refinish the tube (145).
- B. Refer to the Standard Overhaul Practices Manual (SOPM) for the SOPM subjects identified in this procedure.
- C. Refer to IPL Figure 1 for item numbers.
- D. General repair details:
 - (1) Material: Al Alloy

2. Tube Refinish

- A. Consumable Materials

NOTE: Equivalent substitutes may be used.

Reference	Description	Specification
C00259	Primer - Chemical And Solvent Resistant Finish, Epoxy Resin	BMS10-11, Type I

- B. References

Reference	Title
SOPM 20-30-02	STRIPPING OF PROTECTIVE FINISHES
SOPM 20-41-01	DECODING TABLE FOR BOEING FINISH CODES
SOPM 20-60-02	FINISHING MATERIALS

- C. Procedure (REPAIR 4-1, Figure 601)

NOTE: For stripping of protective finishes, refer to SOPM 20-30-02. For decoding table for Boeing finish Codes, refer to SOPM 20-41-01. For finishing materials, refer to SOPM 20-60-02.

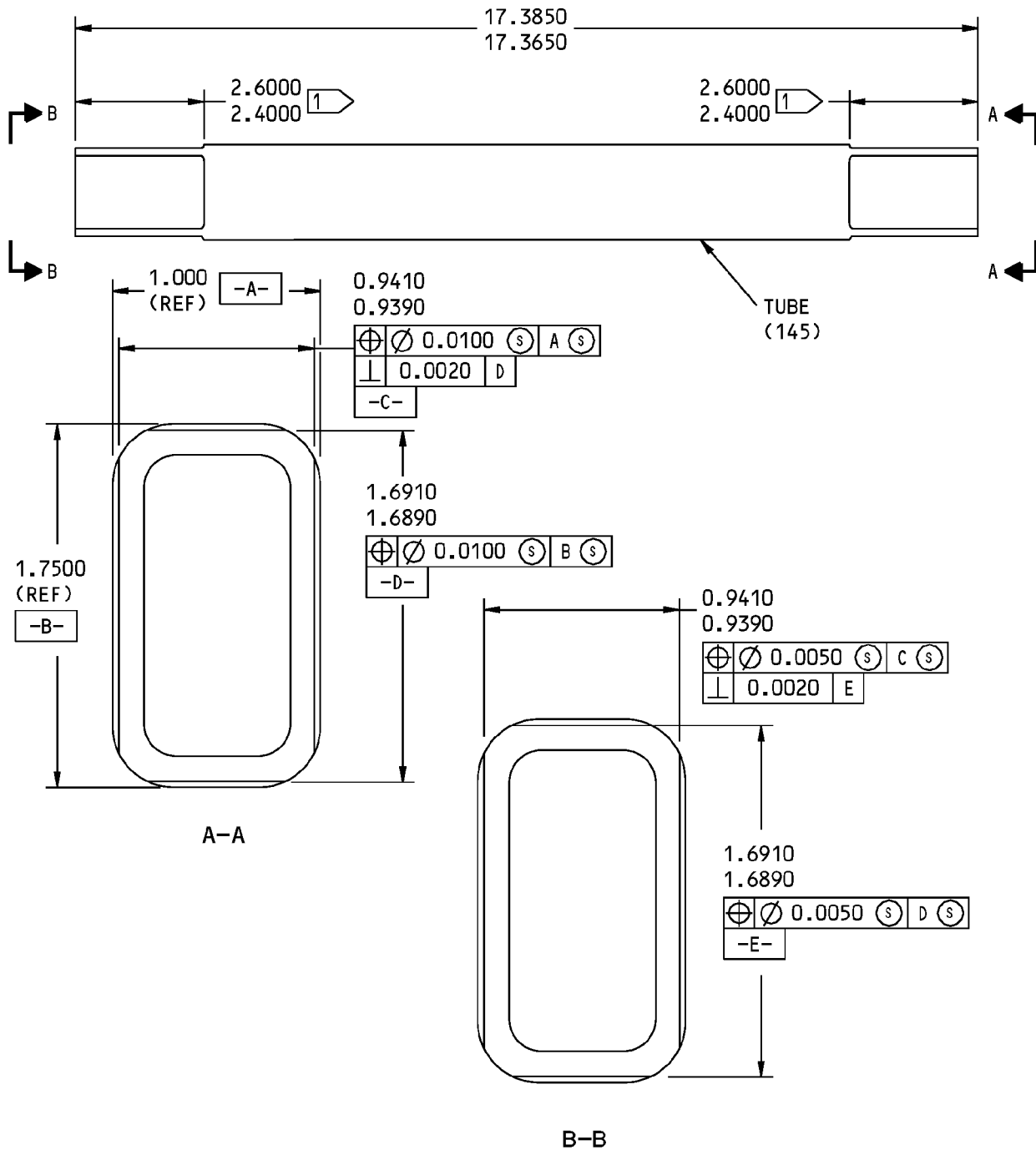
- (1) Chromic acid anodize or boric acid - sulfuric acid anodize (F-17.31).
- (2) Apply primer, C00259 (F-20.02), unless shown.

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REPAIR 4-1
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1 NO PRIMER ON THIS SURFACE

ITEM NUMBERS REFER TO IPL FIG. 1
ALL DIMENSIONS ARE IN INCHES

251A3137-1 Tube Repair
Figure 601

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REPAIR 4-1
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BELLCRANK ASSEMBLY - REPAIR 5-1

251A3139-1, -2

1. General

- A. This repair gives the data to repair and refinish the bellcrank assembly (95, 100).
- B. Refer to the Standard Overhaul Practices Manual (SOPM) for the SOPM subjects identified in this procedure.
- C. Refer to IPL Figure 1 for item numbers.

2. Bearing Replacement

- A. Consumable Materials

NOTE: Equivalent substitutes may be used.

Reference	Description	Specification
D00013	Grease - Aircraft And Instrument Grease	MIL-PRF-23827 (NATO G-354) (Supersedes MIL-G-23827)
D00633	Grease - Aircraft General Purpose	BMS3-33

- B. References

Reference	Title
SOPM 20-50-03	BEARING AND BUSHING REPLACEMENT
SOPM 20-60-03	LUBRICANTS

- C. Procedure (REPAIR 5-1, Figure 601)

NOTE: For lubricants, refer to SOPM 20-60-03.

- (1) Remove the old bearing (105) from the bellcrank (110, 115) (SOPM 20-50-03).
- (2) If you find defects on the bellcrank surfaces, refer to REPAIR 5-2 for repair instructions.
- (3) Install a replacement bearing (105) with grease, D00013 or grease, D00633 and roller swage it to a swage depth of 0.005-0.009 inch (SOPM 20-50-03).

27-27-07

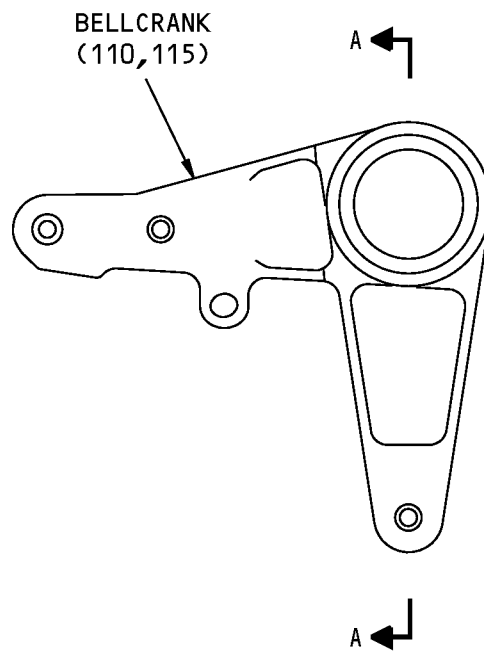
REPAIR 5-1

Page 601

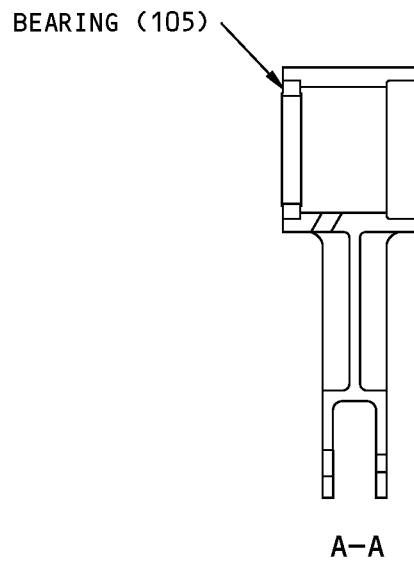
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COMPONENT MAINTENANCE MANUAL



251A3139-1 SHOWN
251A3139-2 OPPOSITE



ITEM NUMBERS REFER TO IPL FIG. 1

251A3139-1,-2 Bellcrank Assembly Repair
Figure 601

27-27-07

REPAIR 5-1
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COMPONENT MAINTENANCE MANUAL

BELLCRANK - REPAIR 5-2

251A3139-3, -4

1. General

- A. This repair gives the data to repair and refinish the bellcrank (110, 115).
- B. Refer to the Standard Overhaul Practices Manual (SOPM) for the SOPM subjects identified in this procedure.
- C. Refer to IPL Figure 1 for item numbers.
- D. General repair details:
 - (1) Material: Al Alloy

2. Bellcrank Refinish

- A. Consumable Materials

NOTE: Equivalent substitutes may be used.

Reference	Description	Specification
C00259	Primer - Chemical And Solvent Resistant Finish, Epoxy Resin	BMS10-11, Type I

- B. References

Reference	Title
SOPM 20-30-02	STRIPPING OF PROTECTIVE FINISHES
SOPM 20-41-01	DECODING TABLE FOR BOEING FINISH CODES
SOPM 20-60-02	FINISHING MATERIALS

- C. Procedure (REPAIR 5-2, Figure 601)

NOTE: For stripping of protective finishes, refer to SOPM 20-30-02. For decoding table for Boeing finish Codes, refer to SOPM 20-41-01. For finishing materials, refer to SOPM 20-60-02.

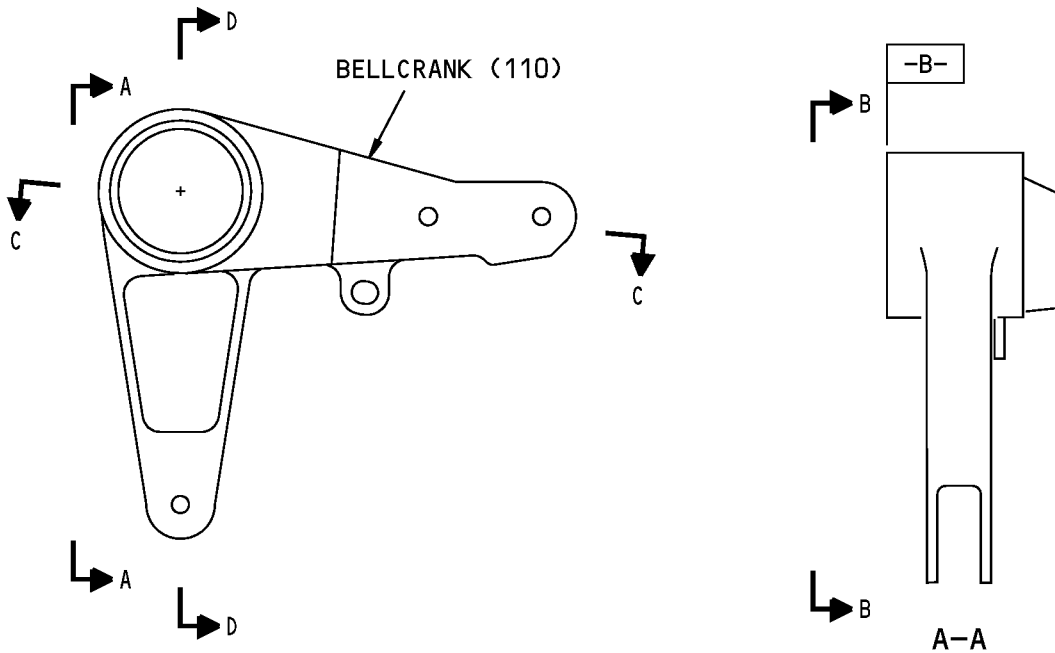
- (1) Chromic acid anodize or boric acid-sulfuric acid anodize (F-17.31).
- (2) Apply primer, C00259 (F-20.03), unless shown.

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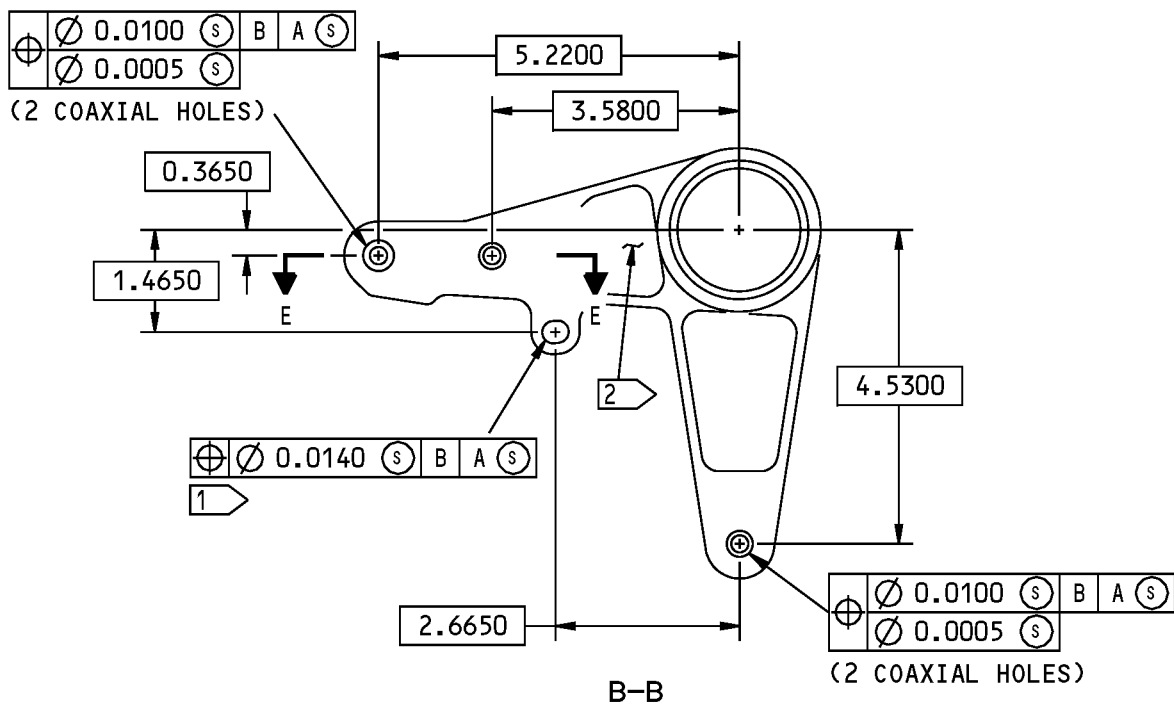
REPAIR 5-2

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COMPONENT MAINTENANCE MANUAL

251A3139-3 SHOWN
251A3139-4 OPPOSITE



251A3139-3,4 Bellcrank Repair
Figure 601 (Sheet 1 of 2)

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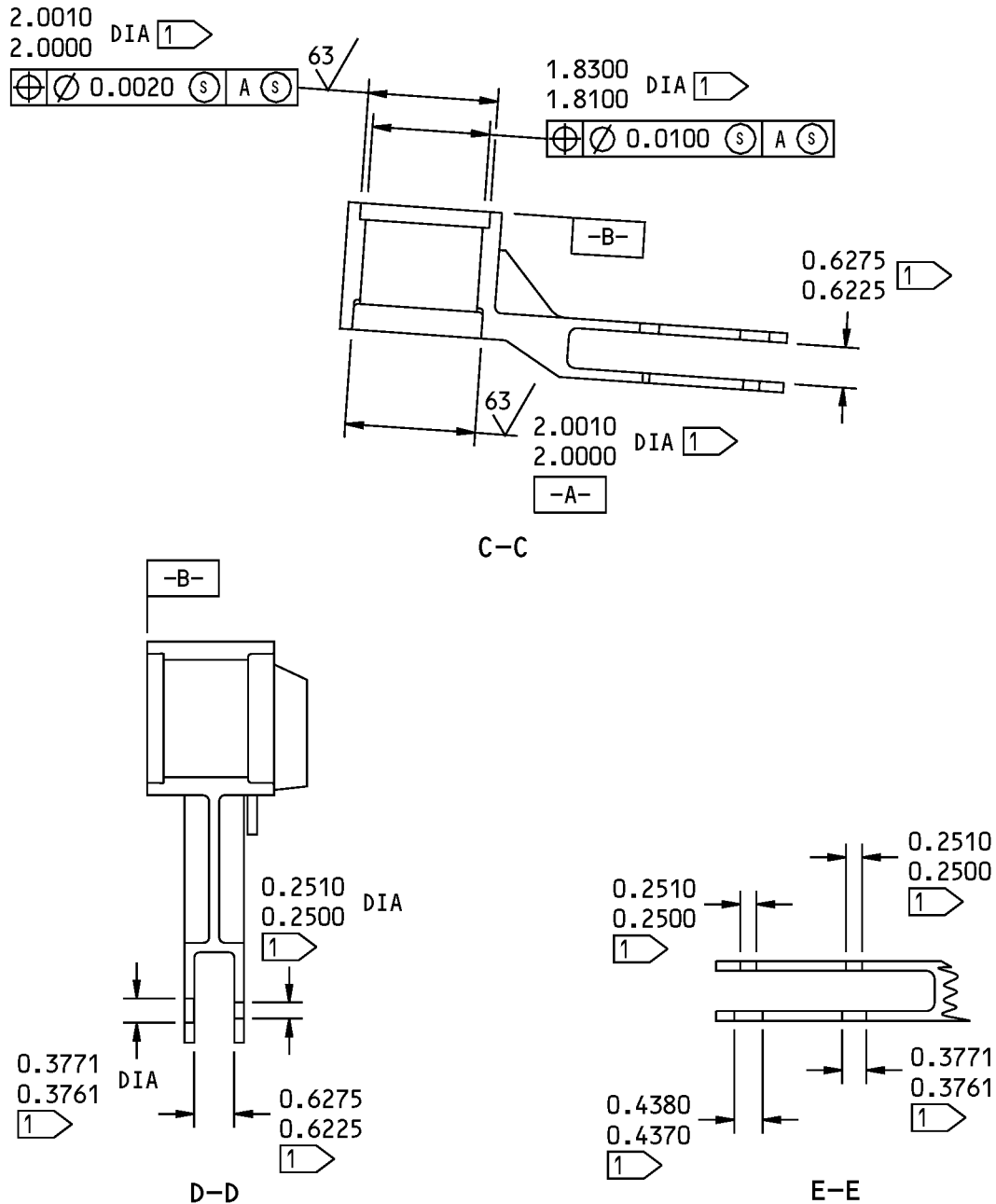
REPAIR 5-2

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COMPONENT MAINTENANCE MANUAL



1 NO PRIMER

2 PART NUMBER LOCATION

ITEM NUMBERS REFER TO IPL FIG. 1

ALL DIMENSIONS ARE IN INCHES

251A3139-3,-4 Bellcrank Repair
Figure 601 (Sheet 2 of 2)**27-27-07**

REPAIR 5-2

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COMPONENT MAINTENANCE MANUAL

PEDAL - REPAIR 6-1

65B80361-1, -2

1. General

- A. This repair gives the data to repair and refinish the pedal (50, 55).
- B. Refer to the Standard Overhaul Practices Manual (SOPM) for the SOPM subjects identified in this procedure.
- C. Refer to IPL Figure 1 for item numbers.
- D. General repair details:
 - (1) Material: Al Alloy

2. Pedal Refinish

- A. Consumable Materials

NOTE: Equivalent substitutes may be used.

Reference	Description	Specification
C00259	Primer - Chemical And Solvent Resistant Finish, Epoxy Resin	BMS10-11, Type I
C00923	Coating - Interior Decorative Urethane Enamel, Low Gloss	BMS10-83, Type III
C50078	Hi-Speed Dark Gray Flat Lacquer (1-1-1-703)	
G00167	Coating - Flame Spray Tungsten Carbide Powder	BMS10-67, Type I

- B. References

Reference	Title
SOPM 20-30-02	STRIPPING OF PROTECTIVE FINISHES
SOPM 20-41-01	DECODING TABLE FOR BOEING FINISH CODES
SOPM 20-60-02	FINISHING MATERIALS

- C. Procedure (REPAIR 6-1, Figure 601)

NOTE: For stripping of protective finishes, refer to SOPM 20-30-02. For decoding table for Boeing finish Codes, refer to SOPM 20-41-01. For finishing materials, refer to SOPM 20-60-02.

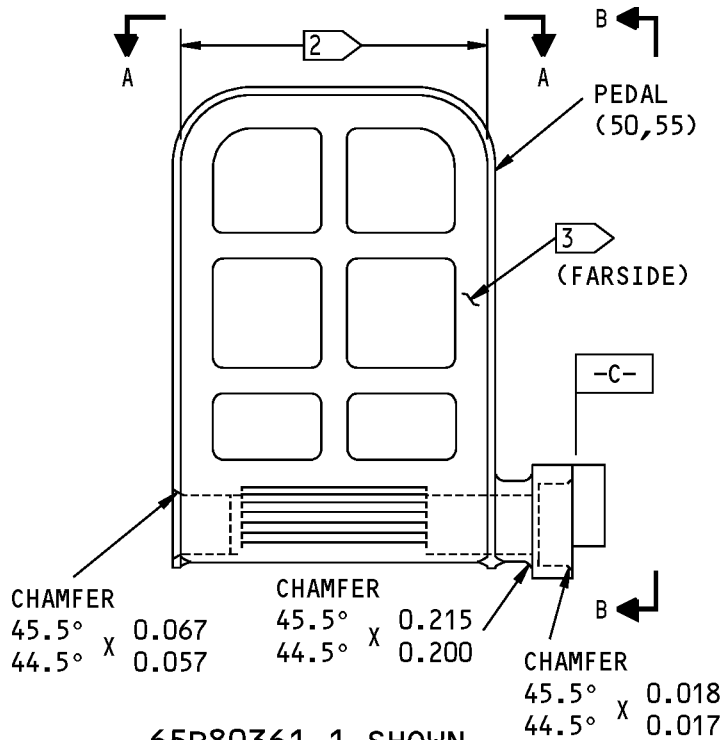
- (1) Apply flame spray coating, G00167 (F-15.370, which replaces F-15.11) as shown. Overspray is permitted.
- (2) On other surfaces, anodize and apply primer, C00259 (F-18.04) unless shown.
- (3) Apply enamel coating, C00923 (F-22.32-703) or dark gray lacquer enamel, C50078(F-14.907) to the primed surfaces.

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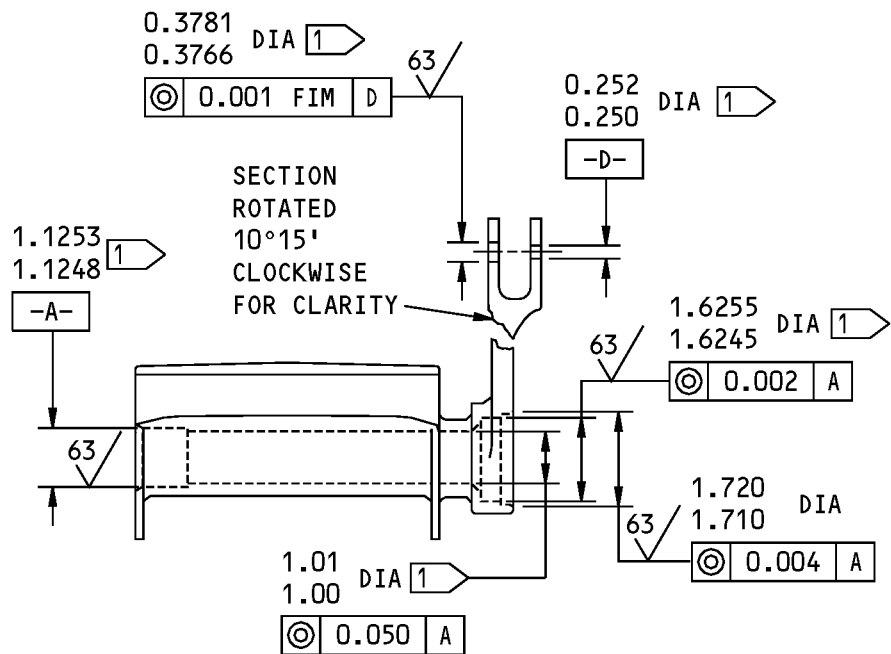
REPAIR 6-1

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COMPONENT MAINTENANCE MANUAL

65B80361-1 SHOWN
65B80361-2 OPPOSITE



A-A

65B80361-1,-2 Pedal Repair
Figure 601 (Sheet 1 of 2)

27-27-07

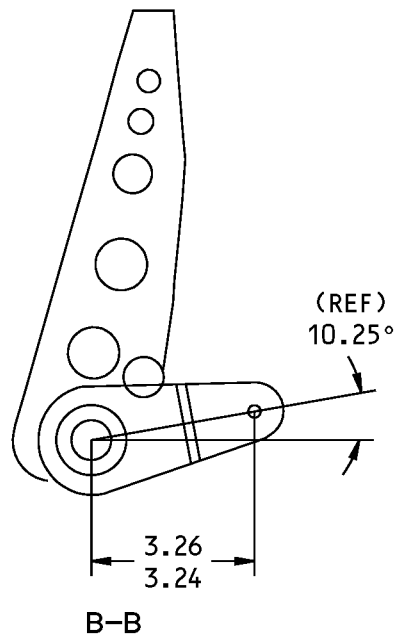
REPAIR 6-1

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1 NO PRIMER OR ENAMEL OR LACQUER ON THIS SURFACE

2 APPLY BMS 10-67, TYPE 1 THERMAL SPRAY COATING TO THIS SURFACE

3 PART NUMBER LOCATION

125 ✓ ALL MACHINED SURFACES UNLESS SHOWN DIFFERENTLY

ITEM NUMBERS REFER TO IPL FIG. 1

ALL DIMENSIONS ARE IN INCHES

65B80361-1,-2 Pedal Repair
Figure 601 (Sheet 2 of 2)

27-27-07

REPAIR 6-1

Page 603

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COMPONENT MAINTENANCE MANUAL

SHAFT - REPAIR 7-1

251A3143-1

1. General

- A. This repair gives the data to repair and refinish the shaft (75).
- B. Refer to the Standard Overhaul Practices Manual (SOPM) for the SOPM subjects identified in this procedure.
- C. Refer to IPL Figure 1 for item numbers.
- D. General repair details:
 - (1) Material: Al Alloy

2. Shaft Refinish

- A. Consumable Materials

NOTE: Equivalent substitutes may be used.

Reference	Description	Specification
C00259	Primer - Chemical And Solvent Resistant Finish, Epoxy Resin	BMS10-11, Type I

- B. References

Reference	Title
SOPM 20-30-02	STRIPPING OF PROTECTIVE FINISHES
SOPM 20-41-01	DECODING TABLE FOR BOEING FINISH CODES
SOPM 20-60-02	FINISHING MATERIALS

- C. Procedure (REPAIR 7-1, Figure 601)

NOTE: For stripping of protective finishes, refer to SOPM 20-30-02. For decoding table for Boeing finish Codes, refer to SOPM 20-41-01. For finishing materials, refer to SOPM 20-60-02.

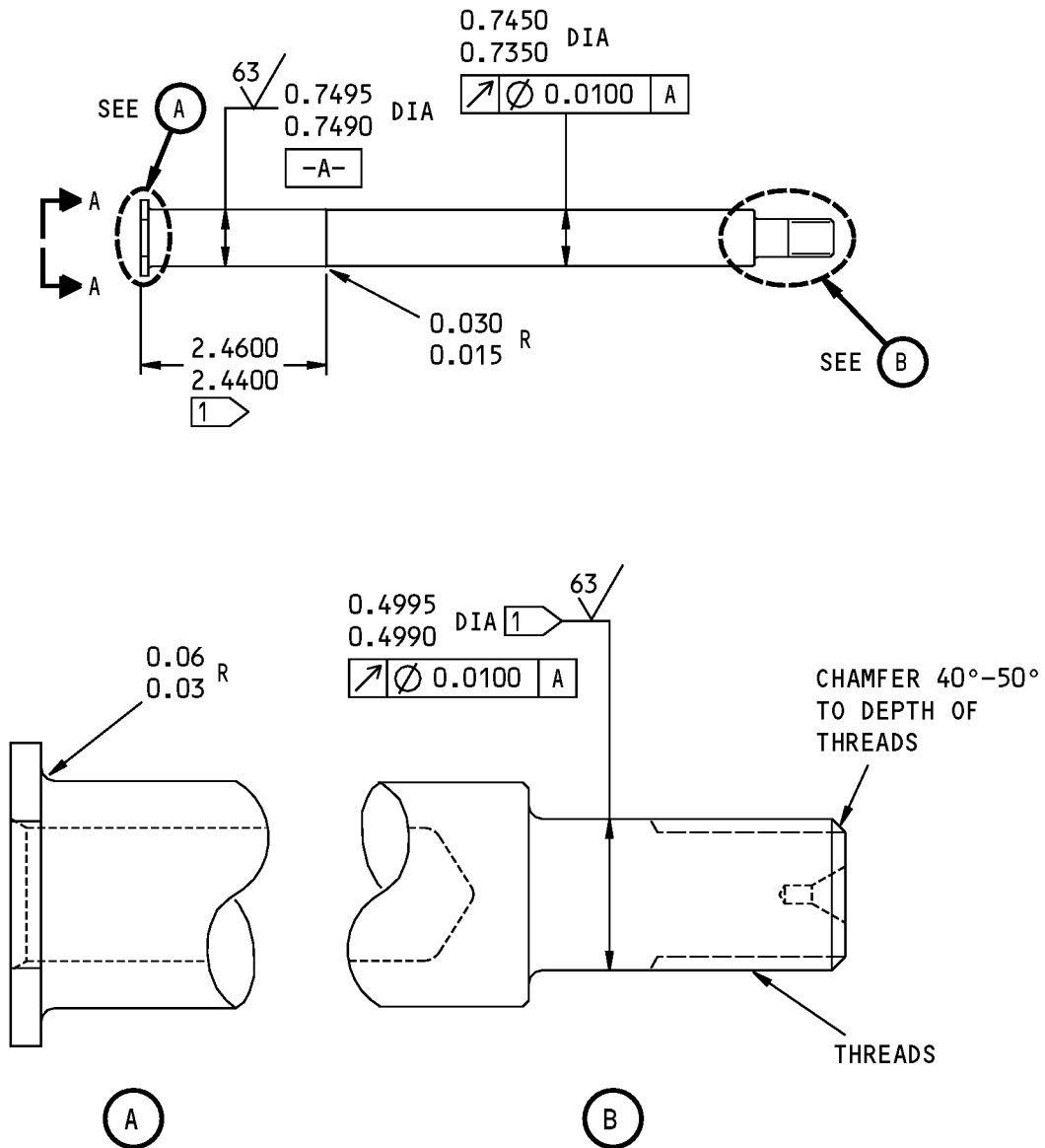
- (1) Boric acid-sulfuric acid anodize or chromic acid anodize (F-17.31) all surfaces.
- (2) Apply primer, C00259 (F-20.02), unless shown.

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REPAIR 7-1
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COMPONENT MAINTENANCE MANUAL



1 NO PRIMER ON THIS SURFACE

ITEM NUMBERS REFER TO IPL FIG. 1
ALL DIMENSIONS ARE IN INCHES

251A3143-1 Shaft Repair
Figure 601

27-27-07

REPAIR 7-1
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COMPONENT MAINTENANCE MANUAL

ASSEMBLY

1. General

- A. This procedure has the data to assemble the rudder pedal assembly.
- B. Refer to the Standard Overhaul Practices Manual (SOPM) for the SOPM subjects identified in this procedure.
- C. Refer to IPL Figure 1 for item numbers.

2. Assembly

- A. Consumable Materials

NOTE: Equivalent substitutes may be used.

Reference	Description	Specification
A00225	Compound - Two Part Hole Filling, Polysulfide	BMS5-16
D00013	Grease - Aircraft And Instrument Grease	MIL-PRF-23827 (NATO G-354) (Supersedes MIL-G-23827)
D00633	Grease - Aircraft General Purpose	BMS3-33

- B. References

Reference	Title
SOPM 20-30-02	STRIPPING OF PROTECTIVE FINISHES
SOPM 20-41-01	DECODING TABLE FOR BOEING FINISH CODES
SOPM 20-50-01	BOLT AND NUT INSTALLATION
SOPM 20-50-03	BEARING AND BUSHING REPLACEMENT
SOPM 20-60-02	FINISHING MATERIALS
SOPM 20-60-03	LUBRICANTS
SOPM 20-60-04	MISCELLANEOUS MATERIALS

- C. Procedure (ASSEMBLY, Figure 701)

NOTE: For stripping of protective finishes, refer to SOPM 20-30-02. For decoding table for Boeing finish Codes, refer to SOPM 20-41-01. For bolt and nut installation, refer to SOPM 20-50-01. For finishing materials, refer to SOPM 20-60-02. For lubricants, refer to SOPM 20-60-03. For miscellaneous materials, refer to SOPM 20-60-04.

- (1) Use standard industry procedures and these steps.
- (2) Install the shaft (75) in the arm assembly (120).
- (3) Install the pedal (50, 55) in the shaft (75).
 - (a) Install the bearing (65) in the pedal (50, 55) with grease, D00013 or grease, D00633 (SOPM 20-50-03).
 - (b) Install the ring (70) in the pedal (50, 55) to hold the bearing (65).
 - (c) Install the shaft (75) through the arm assembly (120).
 - (d) Install the spacer (60) and the pedal (50, 55) onto the shaft (75).

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ASSEMBLY
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**COMPONENT MAINTENANCE MANUAL**

- (e) Install the washer (40) and the bearing (45) on the shaft (75) with grease (SOPM 20-50-03).
- (f) Install the washer (40) and the nut (35) on the shaft (75).
- (g) Tighten the nut (35) to 20-50 pound-inches.
- (h) Apply compound, A00225 to the inside diameter of the shaft (75) as shown in ASSEMBLY, Figure 701.
- (4) Install the bearing (85) on the arm assembly (120) with grease, D00013 or grease, D00633 (SOPM 20-50-03).
- (5) Install the bellcrank assembly (95, 100) on the arm assembly (120).
- (6) Install the spacer (90) on the arm assembly (120).
- (7) Install the nut (80) on the arm assembly (120).
- (8) Tighten the nut (80) to 100-125 pound-inches.
- (9) Install the rod assembly (10A) on the pedal (50, 55) and the bellcrank assembly (95, 100).
 - (a) Install the bushings (20) on the pedal (50, 55) and the bellcrank assembly (95, 100) with grease, D00013 or grease, D00633 (SOPM 20-50-03).
 - (b) Apply grease, D00013 or grease, D00633 to the bores of the rod assembly (10A) end bearings and the bushing (20).
 - (c) Install the rod assembly (10A) on the pedal (50, 55) with the bolt (15), the washer (25) and the nut (30).
 - (d) Install the rod assembly (10A) on the bellcrank assembly (95, 100) with the bolt (15), the washer (25) and the nut (30).

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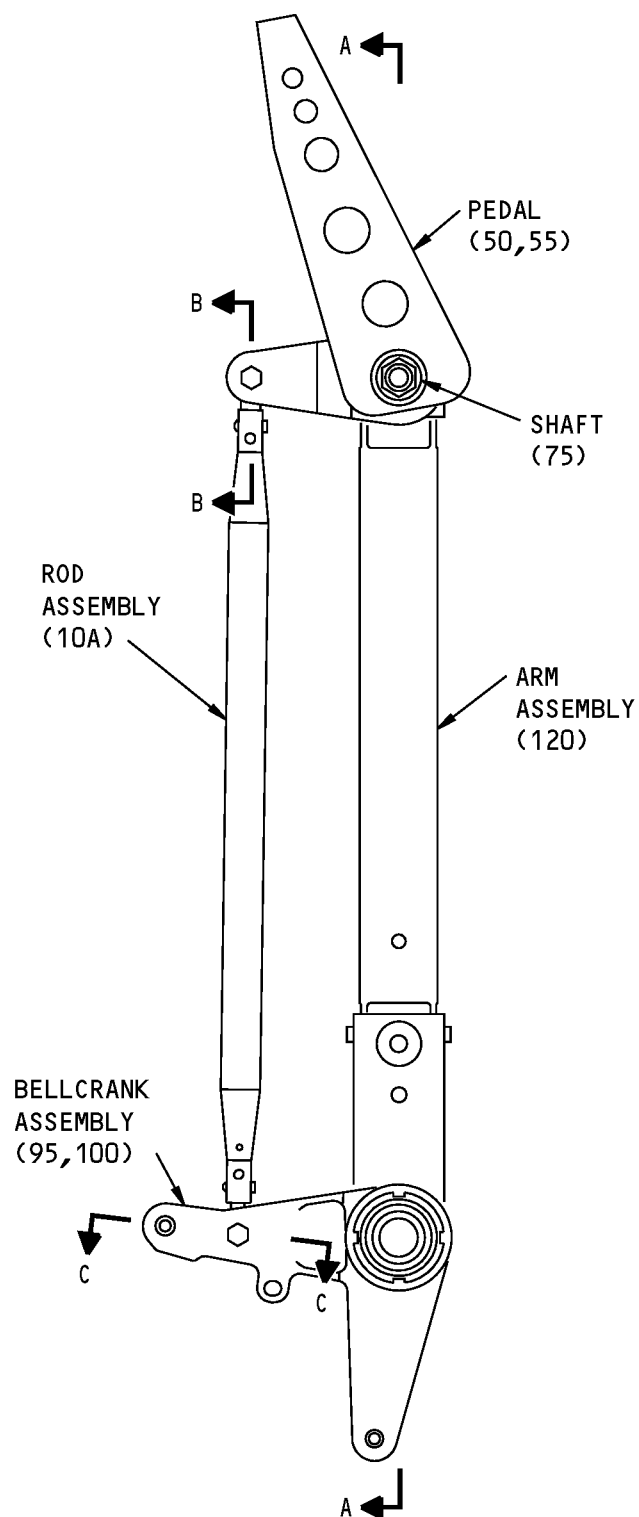
ASSEMBLY

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Rudder Pedal Assembly
Figure 701 (Sheet 1 of 3)

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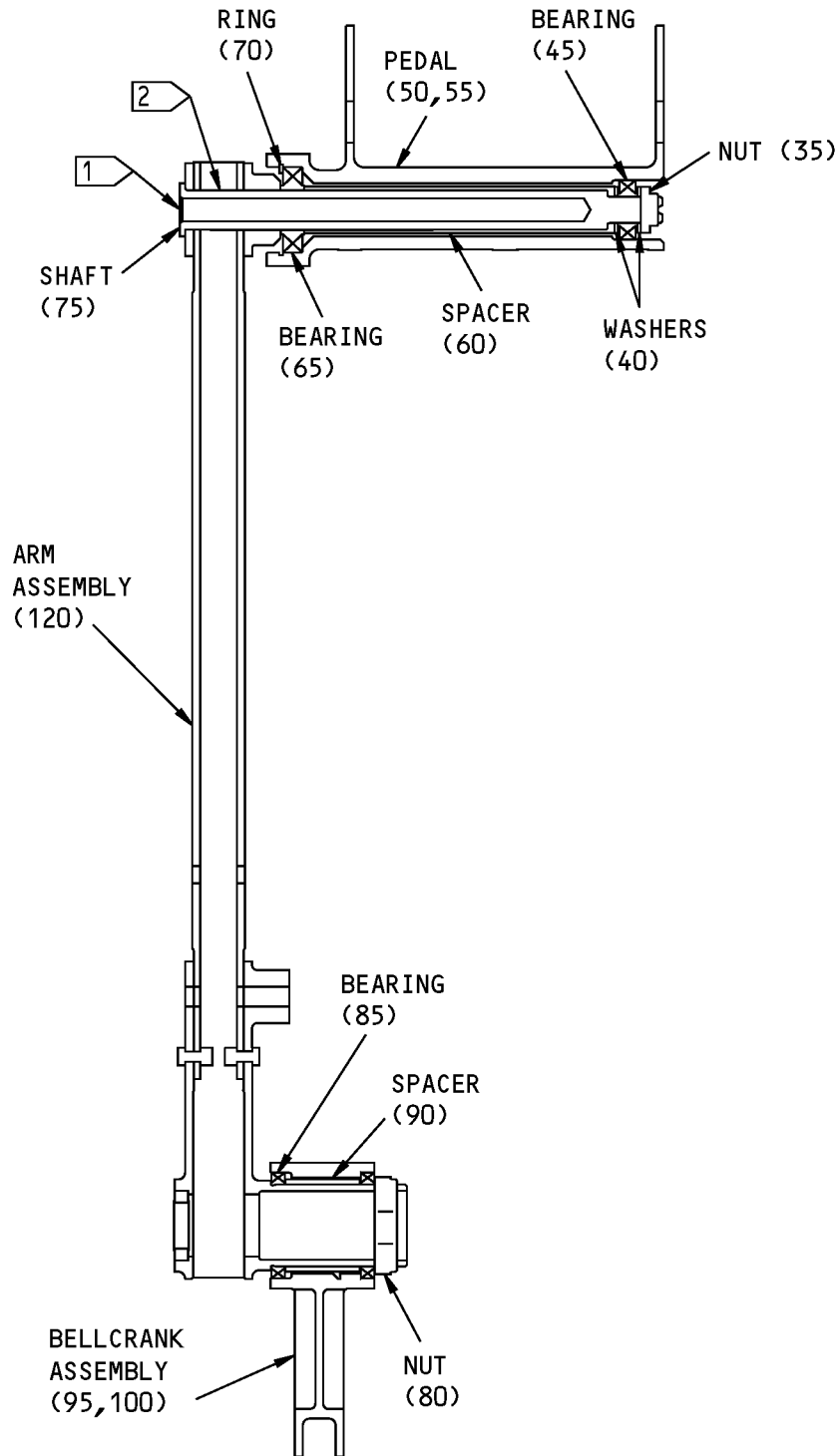
ASSEMBLY

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A-A

Rudder Pedal Assembly
Figure 701 (Sheet 2 of 3)

27-27-07

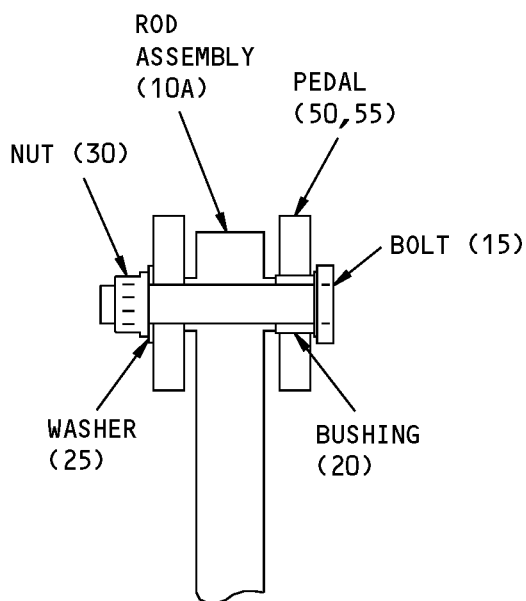
ASSEMBLY

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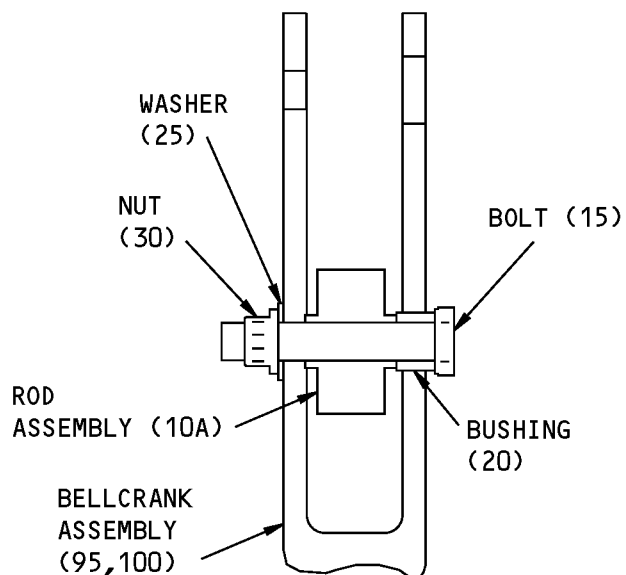
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B-B



C-C

- 1 FILL THIS HOLE WITH BMS 5-16 SEALANT IN HOLE
- 2 CHEMICAL TREAT AND APPLY BMS 10-11 TYPE 1 PRIMER (F-18.01) TO BARE SURFACES

ITEM NUMBERS REFER TO IPL FIG. 1

Rudder Pedal Assembly
Figure 701 (Sheet 3 of 3)

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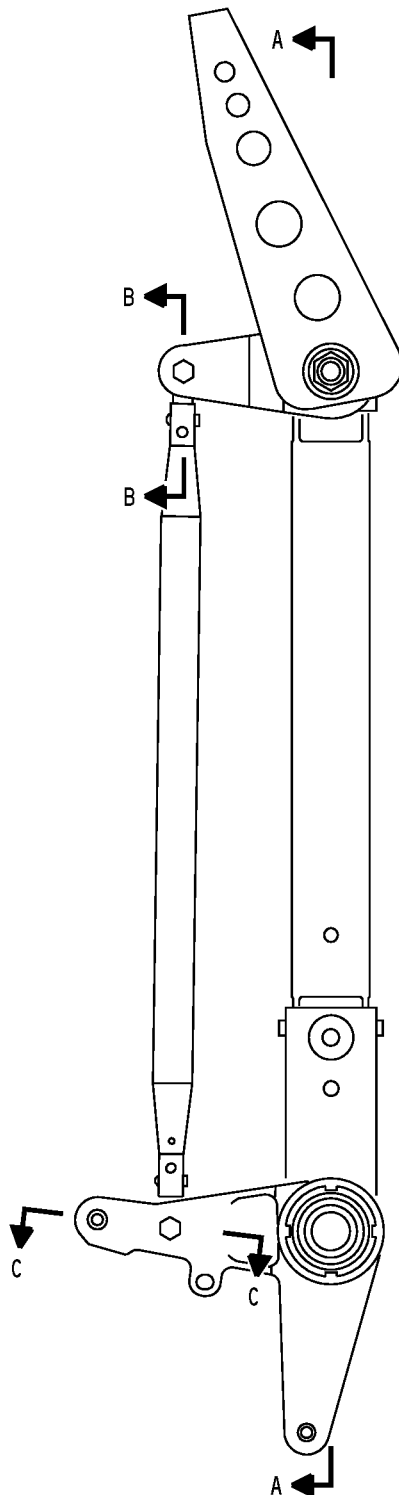
ASSEMBLY

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COMPONENT MAINTENANCE MANUAL

FITS AND CLEARANCES

Fits and Clearances
Figure 801 (Sheet 1 of 5)

27-27-07

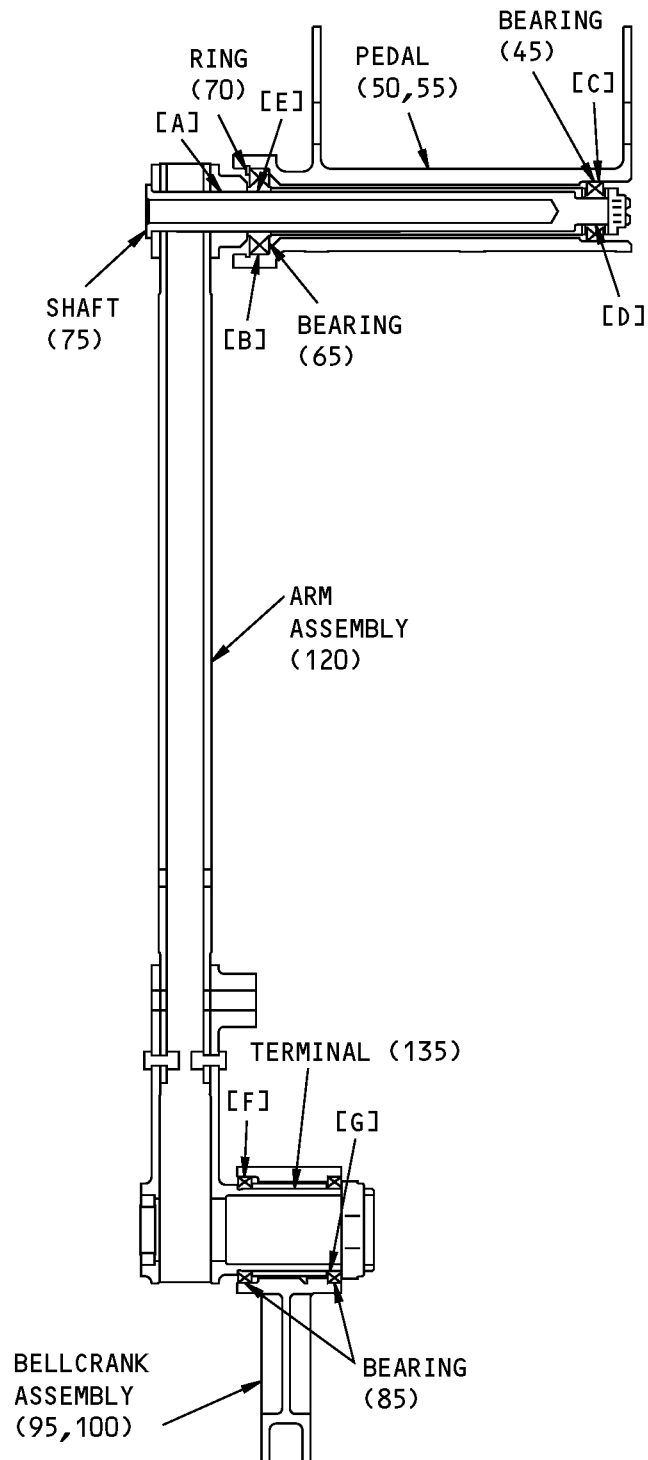
FITS AND CLEARANCES

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A-A

Fits and Clearances
Figure 801 (Sheet 2 of 5)

27-27-07

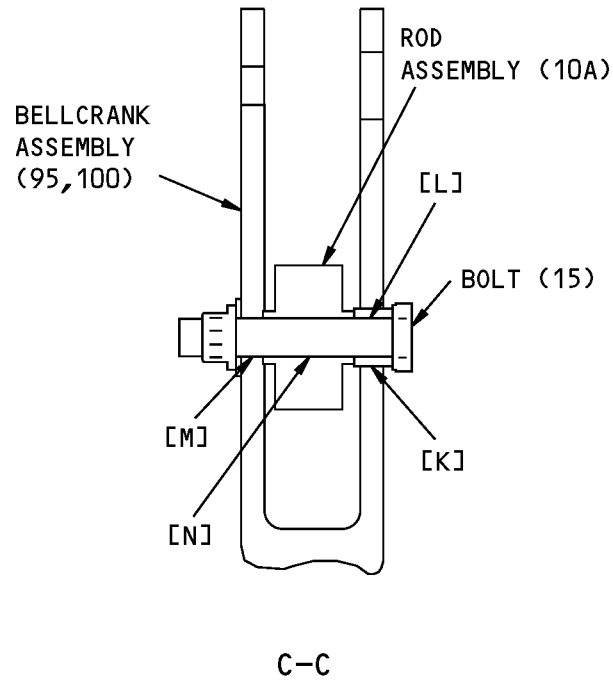
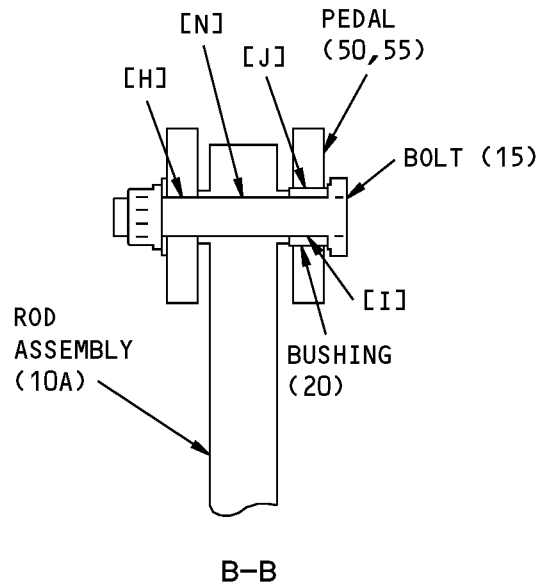
FITS AND CLEARANCES

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COMPONENT MAINTENANCE MANUAL




ITEM NUMBERS REFER TO IPL FIG. 1

Fits and Clearances
Figure 801 (Sheet 3 of 5)

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FITS AND CLEARANCES
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COMPONENT MAINTENANCE MANUAL

REF LETTER	REF IPL	DESIGN DIMENSION*				SERVICE WEAR LIMIT*		
	FIG. 1, MATING ITEM NO.	DIMENSION		ASSEMBLY CLEARANCE 		DIMENSION		MAXIMUM CLEARANCE
		MIN	MAX	MIN	MAX	MIN	MAX	
[A]	ID 130	0.7500	0.7510	0.0005	0.0020	0.7500	0.7510	0.0020
	OD 75	0.7490	0.7495			0.7490	0.7495	
[B]	ID 50,55	1.6245	1.6255	-0.0005	0.0010	1.6245	1.6255	0.0010
	OD 65	1.6245	1.6250			1.6245	1.6250	
[C]	ID 50,55	1.1248	1.1253	-0.0002	0.0008	1.1248	1.1253	0.0008
	OD 45	1.1245	1.1250			1.1245	1.1250	
[D]	ID 45	0.4995	0.5000	0.0000	0.0010	0.4995	0.5000	0.0010
	OD 75	0.4990	0.4995			0.4990	0.4995	
[E]	ID 65	0.7495	0.7500	0.0000	0.0010	0.7495	0.7500	0.0010
	OD 75	0.7490	0.7495			0.7490	0.7495	
[F]	ID 95,100	2.0000	2.0010	0.0000	0.0015	2.0000	2.0010	0.0015
	OD 85	1.9995	2.0000			1.9995	2.0000	
[G]	ID 85	1.5620	1.5625	0.0000	0.0015	1.5620	1.5625	0.0015
	OD 135	1.5610	1.5620			1.5610	1.5620	
[H]	ID 50,55	0.2500	0.2520	0.0005	0.0035	0.2500	0.2520	0.0035
	OD 15	0.2485	0.2495			0.2485	0.2495	
[I]	ID 20	0.2500	0.2515	0.0005	0.0030	0.2500	0.2515	0.0030
	OD 15	0.2485	0.2495			0.2485	0.2495	
[J]	ID 50,55	0.3766	0.3781	0.0005	0.0005	0.3766	0.3781	0.0025
	OD 20	0.3761	0.3766			0.3756	0.3761	
[K]	ID 95,100	0.3761	0.3771	0.0000	0.0005	0.3761	0.3771	0.0015
	OD 20	0.3756	0.3761			0.3756	0.3761	

Fits and Clearances
Figure 801 (Sheet 4 of 5)

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
FITS AND CLEARANCES

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COMPONENT MAINTENANCE MANUAL

REF LETTER	REF IPL		DESIGN DIMENSION*				SERVICE WEAR LIMIT*		
	FIG. 1, MATING ITEM NO.		DIMENSION		ASSEMBLY CLEARANCE 		DIMENSION		MAXIMUM CLEARANCE
			MIN	MAX	MIN	MAX	MIN	MAX	
[L]	ID	20	0.2500	0.2515	0.0005	0.0030	0.2500	0.2515	0.0030
	OD	15	0.2485	0.2495			0.2485	0.2495	
[M]	ID	95,100	0.2500	0.2510	0.0005	0.0025	0.2500	0.2510	0.0025
	OD	15	0.2485	0.2495			0.2485	0.2495	
[N]	ID	10A	0.2497	0.2500	0.0002	0.0015	0.2497	0.2500	0.0015
	OD	15	0.2485	0.2495			0.2485	0.2495	

* ALL DIMENSIONS ARE IN INCHES

 NEGATIVE VALUES ARE IN INTERFERENCE FIT

Fits and Clearances
Figure 801 (Sheet 5 of 5)

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FITS AND CLEARANCES
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COMPONENT MAINTENANCE MANUAL

REF IPL		NAME	TORQUE*	
FIG. NO.	ITEM NO.		POUND-INCHES	POUND-FEET
1	35	Nut	20-50 1	
1	80	Nut	100-125 1	

* REFER TO SOPM 20-50-01 FOR TORQUE VALUES OF STANDARD FASTENERS.

1 ABOVE THE SELF-LOCKING FRICTION TORQUE

Torque Table
Figure 802



COMPONENT MAINTENANCE MANUAL

SPECIAL TOOLS, FIXTURES, AND EQUIPMENT

(NOT APPLICABLE)

27-27-07

SPECIAL TOOLS, FIXTURES, AND EQUIPMENT

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COMPONENT MAINTENANCE MANUAL

ILLUSTRATED PARTS LIST

1. Introduction

- A. The Illustrated Parts List (IPL) contains an illustration and a list of component parts you can repair or replace. The Illustrated Parts Catalog (IPC) shows how to use the Boeing part number system.
- B. This shows how parts are related: The relation of each item to its next higher assembly (NHA) is shown in the NOMENCLATURE column. Use the indenture system that follows:

1	2	3	4	5	6	7
.	Assembly					
.	Attaching parts for assembly					
.	.	Detail parts for assembly				
.	.	Subassembly				
.	.	Attaching parts for subassembly				
.	.	.	Detail parts for subassembly			
.	.	.	Sub-subassembly			
.	.	.	Attaching parts for subassembly			
.	.	.	.	Details parts for sub-subassembly		

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

- C. Each top assembly is given one use code letter (A, B, C, etc.) in the USAGE CODE column. All subsequent component parts in the list can have one or more of the use code letters to show effectivity to top assemblies. A component part without a use code applies to all top assemblies.
- D. An alphabetical letter is added after the item number for optional parts, parts changed by a Service Bulletin, configuration differences (except left-handed and right-handed parts), last engineering releases, and parts added between item numbers in a sequence. The alphabetical letter will not be shown on the illustration for equivalent parts of the same part number.
- E. Color-coded parts are identified with a single digit alpha following the dash number or with "SP" suffix. If the "SP" suffix is used, it represents consolidation of all color codes applicable for a given usage which are not separately listed. Orders for color-coded parts should include the registry number of the airplane for which the parts are ordered.
- F. If a part number is 15 characters long but will not fit in the part number column, the part number will be displayed with a "~" at the end of the line and will be continued on the next line. The "~" denotes that the part number continues on the next line.
- G. Parts changed by a Service Bulletin are shown by PRE SB XXXX and POST SB XXXX added to the NOMENCLATURE column.
- (1) When a new top assembly is added by a Service Bulletin, PRE SB XXXX and POST SB XXXX will be added at the top assembly level only. The configuration differences at the detail part level are shown by use code letters.
- (2) When the top assembly part number is not changed by the Service Bulletin, PRE SB XXXX and POST SB XXXX will be added at the detail level.
- H. Interchangeable Parts

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ILLUSTRATED PARTS LIST

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Optional (OPT)	The part is optional to and interchangeable with other parts that have the same item number.
Replaces, Replaced by and not interchangeable with (REPLACES, REPLACED BY AND NOT INTCHG/W)	The part replaces and is not interchangeable with the initial part.
Replaces, Replaced by (REPLACES, REPLACED BY)	The part replaces and is interchangeable with, or is an alternative to, the initial part.

VENDOR CODES

Code	Name
06144	INDUSTRIAL TECTONICS BEARING CORP 18301 SOUTH SANTA FE AVENUE RANCHO DOMINGUEZ, CALIFORNIA 90221 FORMERLY IN COMPTON, CALIFORNIA
15653	ALCOA GLOBAL FASTENERS INC DIV KAYNAR PRODUCTS 800 S STATE COLLEGE BLVD FULLERTON, CALIFORNIA 92831-3001 FORMERLY VK6405 MICRODOT AEROSP LTD; FORMERLY KAYNAR TECH FORMERLY FAIRCHILD FASTENERS KAYNAR DIV
21335	TIMKEN US CORPORATION DIV FAFNIR 336 MECHANIC STREET LEBANON, NH 03766-0267 FORMERLY FAFNIR BRG AND TEXTRON INC FAFNIR DIV IN NEW BRITAIN, CONNECTICUT ; FORMERLY TORRINGTON CO THE SPECIAL PRODUCTS DIV SUB OF THE INGERSOLL-RAND CO V8D210 FORMERLY TORRINGTON CO FAFNIR BEARING DIV IN TORRINGTON, CT
30163	VALENTEC DAYRON INC 333 MAGUIRE BLVD PO BOX 140394 ORLANDO, FLORIDA 32814-0394
38443	MRC BEARINGS 402 CHANDLER STREET JAMESTOWN, NEW YORK 14701-3802 FORMERLY MARLIN-ROCKWELL CORP DIV TRW AND TRW INC

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Code	Name
40920	MPB MINIATURE PRECISION BEARING DIV PRECISION PARK PO BOX 547 KEENE, NEW HAMPSHIRE 03431 FORMERLY MPB CORP AND MINIATURE BRG DIV MPB CORP
43991	FAG BEARING INCORPORATED 118 HAMILTON AVENUE STAMFORD, CONNECTICUT 06904 FORMERLY NORMA-HOFFMAN BEARING CORPORATION FORMERLY NORMA FAG BEARINGS CORPORATION
62554	SIMMONDS MECAERO FASTENERS INC 1734 SEQUOIA AVENUE ORANGE, CALIFORNIA 92668
72962	HARVARD INDUSTRIES INC 3 WERNER WAY SUITE 210 LEBANON, NEW JERSEY 08833 FORMERLY ESNA V7A079 FORMERLY ELASTIC STOP NUT IN UNION, NJ
83086	NEW HAMPSHIRE BALL BEARING, INC HITECH DIVISION 172 JAFFREY ROAD PETERBOROUGH, NEW HAMPSHIRE 03458
92215	FAIRCHILD IND INC FAIRCHILD AEROSPACE FASTENER DIV 3010 W LOMITA BLVD TORRANCE, CALIFORNIA 90505-5102 FORMERLY VOI-SHAN IN CULVER CITY, CALIF
97393	SHUR-LOK CORPORATION 2541 WHITE ROAD PO BOX 19584 IRVINE, CALIFORNIA 92623-9584 FORMERLY SHUR LOK CORP VB0060 FORMERLY IN SANTA ANA, CALIFORNIA 92714
97928	Replaced: [V97928] SEE V17446 HUCK INTL by Code: Name and Address below 17446: HUCK INTL INC AEROSPACE FASTENER DIV 900 WATSON CENTER ROAD CARSON, CALIFORNIA 90745-4201 FORMERLY V32134 REXNORD INC; FORMERLY V97928 HUCK INTL

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**COMPONENT MAINTENANCE MANUAL**

Code	Name
K8455	RHP BEARINGS PLC RHP AEROSPACE OLDENDS LANE STONEHOUSE GL10 3RM UK

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NUMERICAL INDEX

PART NUMBER	AIRLINE PART NUMBER	FIGURE	ITEM	UNITS PER ASSEMBLY
102LH9074-8		1	35	1
250N2004-117		1	10A	1
251A3131-11		1	155	1
251A3132-3		1	1B	RF
251A3132-4		1	5A	RF
251A3132-5		1	1C	RF
251A3132-6		1	5B	RF
251A3132-7		1	1D	RF
251A3132-8		1	5C	RF
251A3135-1		1	120	1
251A3135-2		1	120A	1
251A3135-3		1	120B	1
251A3135-4		1	160	2
251A3135-5		1	165	2
251A3136-1		1	135	1
251A3137-1		1	145	1
251A3138-1		1	130	1
251A3139-1		1	95	1
251A3139-2		1	100	1
251A3139-3		1	110	1
251A3139-4		1	115	1
251A3143-1		1	75	1
251A3144-2		1	90	1
65B80361-1		1	50	1
65B80361-2		1	55	1
69235-820CD		1	35	1
BACB10AS14		1	140	1
BACB10AS25		1	85	1
		1	105	1
BACB10BX12		1	65	1
BACB10BX8		1	45	1
BACB28Y4C025		1	20	2
BACB30NF4-16		1	15	2
BACN10JC8CD		1	35	1

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PART NUMBER	AIRLINE PART NUMBER	FIGURE	ITEM	UNITS PER ASSEMBLY
BACN10RF25		1	80	1
BACN10YR4CD		1	30	2
BMN4122CPD8-8		1	35	1
CS208E		1	45	1
CS212E		1	65	1
H51650-8BAC		1	35	1
H52732-4CD		1	30	2
KF12ALY196		1	65	1
KP12A		1	65	1
KP12A2TS		1	65	1
KP12AFS428		1	65	1
KP12AG27		1	65	1
KP12ASD610		1	65	1
KP8A		1	45	1
KP8A2TS		1	45	1
KP8AFS428		1	45	1
KP8AG27		1	45	1
KP8BSD610		1	45	1
LLKP12A		1	65	1
LLKP8A		1	45	1
LLMB540		1	140	1
LLMB543		1	85	1
		1	105	1
MB540-2TS		1	140	1
MB540DD		1	140	1
MB540DDFS428		1	140	1
MB540DDG20		1	140	1
MB540DDL196		1	140	1
MB540DDSD610		1	140	1
MB540TT		1	140	1
MB543-2TS		1	85	1
		1	105	1
MB543DD		1	85	1
		1	105	1
MB543DDFS428		1	85	1

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PART NUMBER	AIRLINE PART NUMBER	FIGURE	ITEM	UNITS PER ASSEMBLY
MB543DDG20		1	105	1
		1	85	1
		1	105	1
MB543DDL196		1	85	1
		1	105	1
MB543DDSD610		1	85	1
		1	105	1
MB543TT		1	85	1
		1	105	1
MS16625-1162		1	70	1
MS21141U0604P		1	125	6
		1	150	2
MS21141U0606P		1	150A	2
MT340E		1	140	1
MT343E		1	85	1
		1	105	1
NAS1149D0363J		1	170	1
NAS1149D0432J		1	25	2
NAS1149E0863P		1	40	2
NAS43DD12-376FC		1	60	1
NAS43DD3-4FC		1	175	1
PLH54CD		1	30	2
SL2822-25		1	80	1

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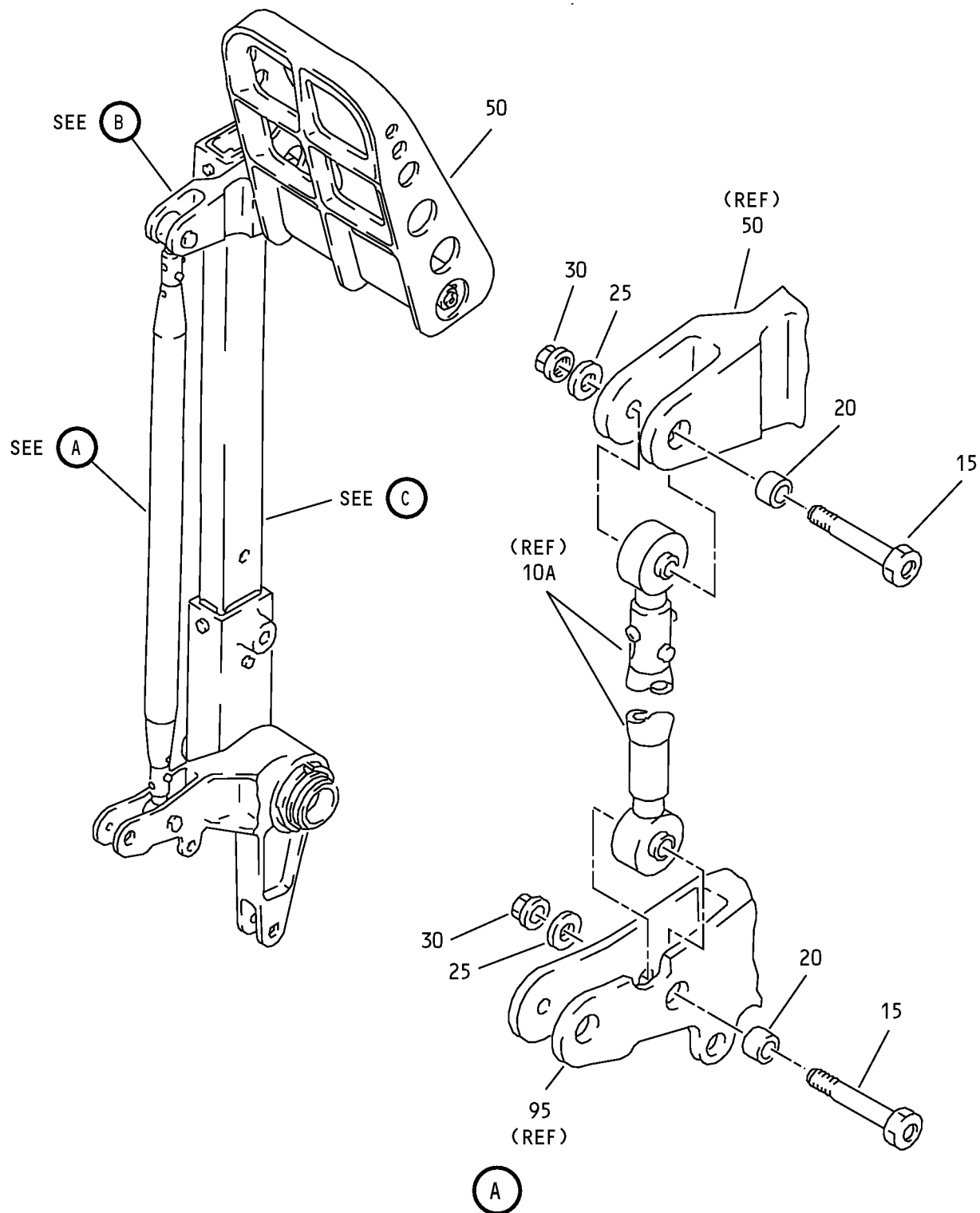
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Rudder Pedal Assembly
IPL Figure 1 (Sheet 1 of 4)

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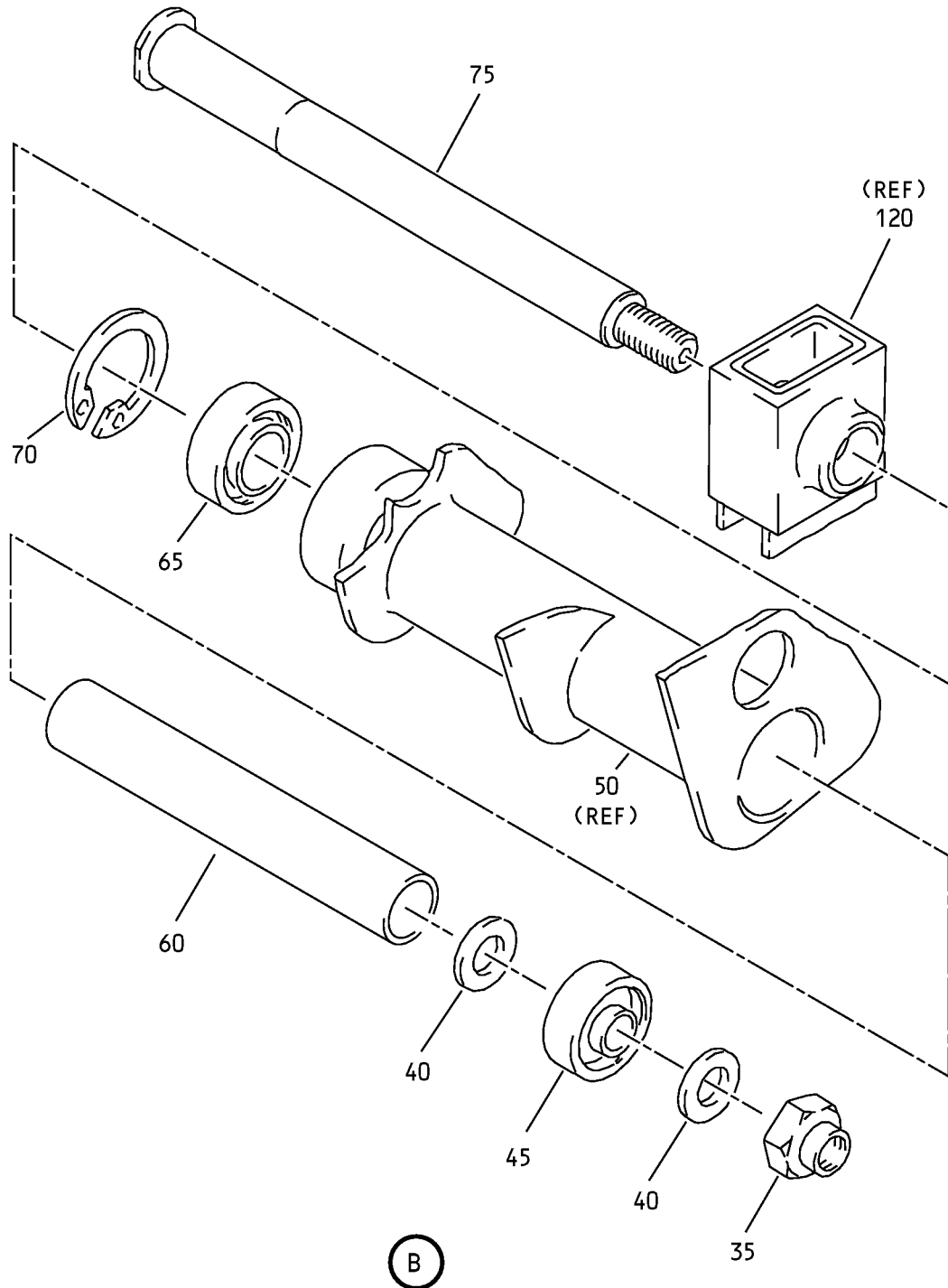
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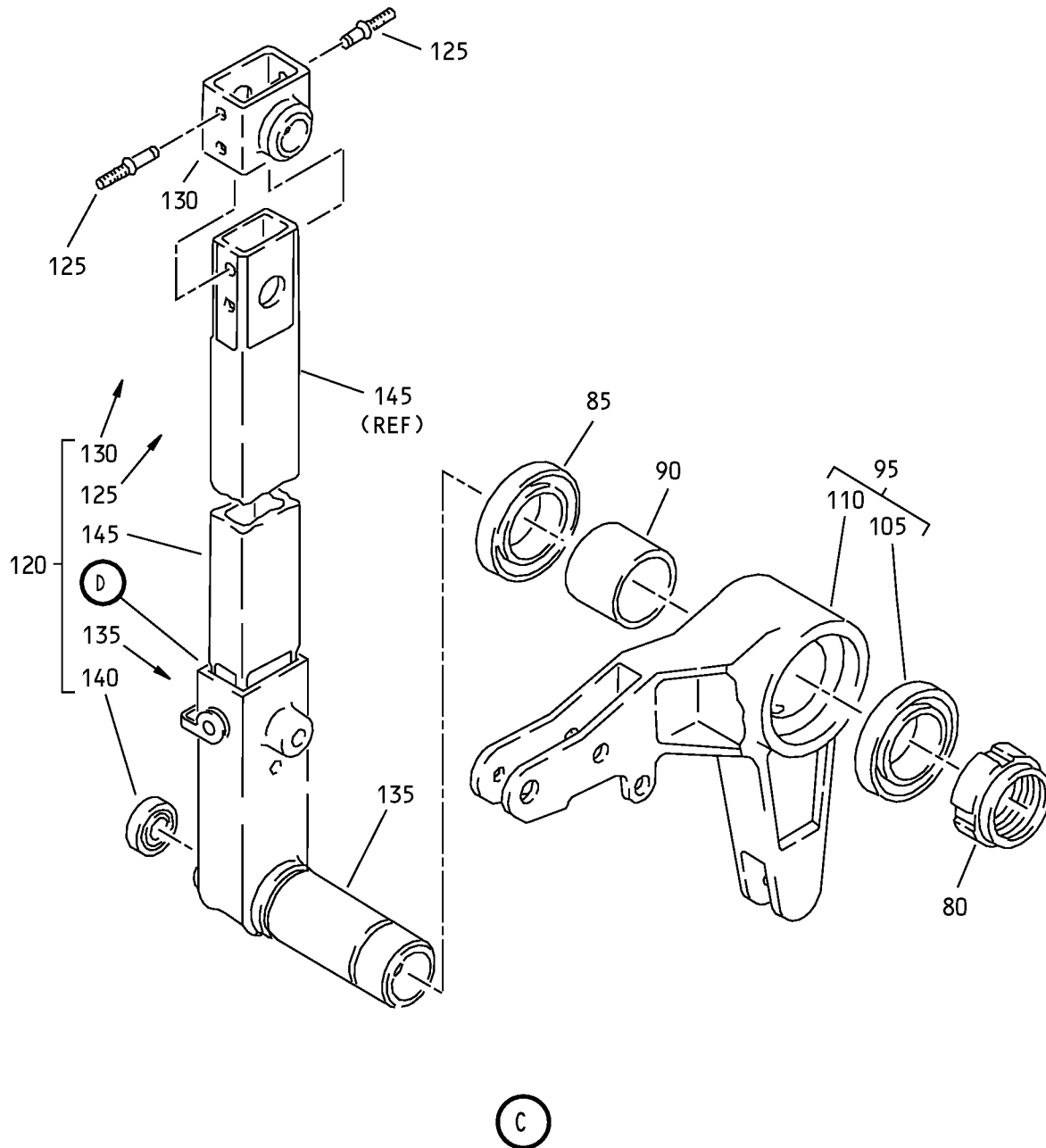
Rudder Pedal Assembly
IPL Figure 1 (Sheet 2 of 4)

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(C)

Rudder Pedal Assembly
IPL Figure 1 (Sheet 3 of 4)

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FIG/ ITEM	PART NUMBER	AIRLINE PART NUMBER	NOMENCLATURE 1 2 3 4 5 6 7	USAGE CODE	UNITS PER ASSY
1-					
-1A	251A3132-1		DELETED		
-1B	251A3132-3		RUDDER PEDAL ASSY	C	RF
-1C	251A3132-5		RUDDER PEDAL ASSY	E	RF
-1D	251A3132-7		RUDDER PEDAL ASSY	G	RF
-5	251A3132-2		DELETED		
-5A	251A3132-4		RUDDER PEDAL ASSY	D	RF
-5B	251A3132-6		RUDDER PEDAL ASSY	F	RF
-5C	251A3132-8		RUDDER PEDAL ASSY	H	RF
10	250N2004-116		DELETED		
10A	250N2004-117		. ROD ASSY-CONT. (REFER TO CMM 27-00-12)		1
			ATTACHING PARTS		
15	BACB30NF4-16		. BOLT		2
20	BACB28Y4C025		. BUSHING		2
25	NAS1149D0432J		. WASHER		2
30	H52732-4CD		. NUT (V15653) (SPEC BACN10YR4CD) (OPT PLH54CD (V62554))		2
			----- * -----		
35	H51650-8BAC		. NUT (V15653) (SPEC BACN10JC8CD) (OPT 102LH9074-8 (V72962)) (OPT 69235-820CD (V92215)) (OPT BMN4122CPD8-8 (V97928))		1
40	NAS1149E0863P		. WASHER		2
45	KP8AFS428		. BEARING (V21335) (SPEC BACB10BX8) (OPT KP8A2TS (V43991)) (OPT LLKP8A (V38443)) (OPT KP8AG27 (V30163)) (OPT KP8A (V38443)) (OPT KP8BSD610 (V83086)) (OPT CS208E (VK8455))		1

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FIG/ ITEM	PART NUMBER	AIRLINE PART NUMBER	NOMENCLATURE 1 2 3 4 5 6 7	USAGE CODE	UNITS PER ASSY
1–					
50	65B80361-1		. PEDAL	C, E, G	1
–55	65B80361-2		. PEDAL	D, F, H	1
60	NAS43DD12-376FC		. SPACER		1
65	KP12AFS428		. BEARING (V21335) (SPEC BACB10BX12) (OPT KP12A2TS (V43991)) (OPT LLKP12A (V38443)) (OPT KP12AG27 (V30163)) (OPT KP12A (V38443)) (OPT KF12ALY196 (V40920)) (OPT KP12ASD610 (V83086)) (OPT CS212E (VK8455))		1
70	MS16625-1162		. RING		1
75	251A3143-1		. SHAFT		1
80	SL2822-25		. NUT (V97393) (SPEC BACN10RF25)		1
85	MB543DDSD610		. BEARING (V83086) (SPEC BACB10AS25) (OPT LLMB543 (V38443)) (OPT MB543-2TS (V43991)) (OPT MB543DDFS428 (V21335)) (OPT MB543TT (V43991)) (OPT MB543DDG20 (V38443)) (OPT MT343E (VK8455)) (OPT MB543DDL196 (V40920)) (OPT MB543DD (V06144))		1
90	251A3144-2		. SPACER		1
95	251A3139-1		. BELLCRANK ASSY	C, E, G	1
–100	251A3139-2		. BELLCRANK ASSY	D, F, H	1

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FIG/ ITEM	PART NUMBER	AIRLINE PART NUMBER	NOMENCLATURE 1 2 3 4 5 6 7	USAGE CODE	UNITS PER ASSY
1– 105	MB543DDSD610		. . BEARING (V83086) (SPEC BACB10AS25) (OPT LLMB543 (V38443)) (OPT MB543-2TS (V43991)) (OPT MB543DDFS428 (V21335)) (OPT MB543TT (V43991)) (OPT MB543DDG20 (V38443)) (OPT MT343E (VK8455)) (OPT MB543DDLY196 (V40920)) (OPT MB543DD (V06144))		1
110	251A3139-3		. . BELLCRANK	C, E, G	1
–115	251A3139-4		. . BELLCRANK	D, F, H	1
120	251A3135-1		. ARM ASSY	C, D	1
–120A	251A3135-2		. ARM ASSY	E, F	1
–120B	251A3135-3		. ARM ASSY	G, H	1
125	MS21141U0604P		. . FASTENER		6
130	251A3138-1		. . FITTING		1
135	251A3136-1		. . TERMINAL		1
140	MB540DDSD610		. . BEARING (V83086) (SPEC BACB10AS14) (OPT LLMB540 (V38443)) (OPT MB540-2TS (V43991)) (OPT MB540DDFS428 (V21335)) (OPT MB540TT (V43991)) (OPT MB540DDG20 (V38443)) (OPT MT340E (VK8455)) (OPT MB540DDLY196 (V40920)) (OPT MB540DD (V06144))		1
145	251A3137-1		. . TUBE		1
150	MS21141U0604P		. . FASTENER	C-F	2
–150A	MS21141U0606P		. . FASTENER	G, H	2
155	251A3131-11		. . FITTING	G, H	1
160	251A3135-4		. . BUSHING (OPT ITEM 165)	G, H	2
165	251A3135-5		. . KIT ASSY-SUBSTITUTE (OPT ITEM 160)	G, H	2
170	NAS1149D0363J		. . . WASHER	G, H	1

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FIG/ ITEM	PART NUMBER	AIRLINE PART NUMBER	NOMENCLATURE 1 2 3 4 5 6 7	USAGE CODE	UNITS PER ASSY
1– 175	NAS43DD3-4FC		. . . SPACER	G, H	1

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