TO: ALL HOLDERS OF CONTROL STAND SPEEDBRAKE MECHANISM ASSEMBLY COMPONENT MAINTENANCE MANUAL 27-62-24

REVISION NO. 2 DATED MAR 01/02

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
104	Converted foldout graphics to standard size. Graphic content unrevised.

BOEING

COMPONENT
MAINTENANCE MANUAL

CONTROL STAND SPEEDBRAKE MECHANISM ASSEMBLY

PART NUMBER 254T5100-1

COMPONENT MAINTENANCE MANUAL
WITH
ILLUSTRATED PARTS LIST

K89581

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

K89582

TEMPORARY REVISION AND SERVICE BULLETIN RECORD

BOEING SERVICE BULLETIN	BOEING TEMPORARY REVISION	OTHER DIRECTIVE	DATE OF INCORPORATION INTO MANUAL

PAGE	DATE	CODE
27-62-24		
TITLE PAGE		
1	MAR 01/00	01
2	BLANK	
REVISION RECORD		
1	NOV 01/00	01.1
2	BLANK	
TR & SB RECORD		
1	NOV 01/00	01.1
2	BLANK	
LIST OF EFFECTIVE PAGES		
*1	MAR 01/02	01
THRU LAST PAGE		
CONTENTS		
1	NOV 01/00	01.1
2	BLANK	
INTRODUCTION		
1	NOV 01/00	01.1
2	BLANK	
DESCRIPTION & OPERATION		
1	NOV 01/00	01.1
2	NOV 01/00	01.1
TESTING & FAULT ISOLATION		
101	NOV 01/00	01.1
102	NOV 01/00	01.1
103	NOV 01/00	01.1
*104	MAR 01/02	01.1
DISASSEMBLY		
301	NOV 01/00	01.1
302	BLANK	
CLEANING		
401	NOV 01/00	01.1
402	BLANK	
CHECK		
501	NOV 01/00	01.1
502	BLANK	
REPAIR-GENERAL		
601	NOV 01/00	01.1
602	NOV 01/00	01.1
REPAIR 1-1		
601	NOV 01/00	01.1
602	NOV 01/00	01.1
603	NOV 01/00	01.1
604	BLANK	
REPAIR 2-1		
601	NOV 01/00	01.1
602	NOV 01/00	01.1
603	NOV 01/00	01.1
604	BLANK	
REPAIR 3-1		
601	NOV 01/00	01.1
602	NOV 01/00	01.1
603	NOV 01/00	01.1
604	NOV 01/00	01.1
REPAIR 4-1		
601	NOV 01/00	01.1
602	NOV 01/00	01.1
603	NOV 01/00	01.1
604	NOV 01/00	01.1
ASSEMBLY		
701	NOV 01/00	01.1
702	NOV 01/00	01.1
703	NOV 01/00	01.1
704	NOV 01/00	01.1
705	NOV 01/00	01.1
706	NOV 01/00	01.1

* = REVISED, ADDED OR DELETED

PAGE	DATE	CODE
ASSEMBLY		CONT.
707	NOV 01/00	01.1
708	NOV 01/00	01.1
FITS AND CLEARANCES		
801	NOV 01/00	01.1
802	NOV 01/00	01.1
803	NOV 01/00	01.1
804	NOV 01/00	01.1
SPECIAL TOOLS		
901	NOV 01/00	01.1
902	BLANK	
ILLUSTRATED PARTS LIST		
1001	NOV 01/00	01.1
1002	NOV 01/00	01.1
1003	NOV 01/00	01.1
1004	NOV 01/00	01.1
1005	NOV 01/00	01.1
1006	NOV 01/00	01.1
1007	NOV 01/00	01.1
1008	BLANK	
1009	NOV 01/00	01.1
1010	NOV 01/00	01.1
1011	NOV 01/00	01.1
1012	NOV 01/00	01.1
1013	NOV 01/00	01.1
1014	NOV 01/00	01.1
1015	NOV 01/00	01.1
1016	NOV 01/00	01.1
1017	NOV 01/00	01.1
1018	NOV 01/00	01.1

PAGE	DATE	CODE

* = REVISED, ADDED OR DELETED

TABLE OF CONTENTS

*[1] Not Applicable.

INTRODUCTION

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

This manual is divided into separate sections:

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

Refer to the Table of Contents for the page location of applicable sections.

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:

CONTROL STAND SPEEDBRAKE MECHANISM ASSEMBLY

DESCRIPTION AND OPERATION

1. Description

   A. The speed brake mechanism assembly consists of a shaft and crank assembly, housing assembly, and three linear transducer assemblies.

2. Operation

   A. The speed brake mechanism assembly provides command signals for the speed brake electronic control system. Movement of the speed brake control lever by the pilot provides a mechanical input to the transducer assemblies via the shaft and crank assembly. Output signals from the transducers are fed to the spoiler electronics control modules for speed brake operation.

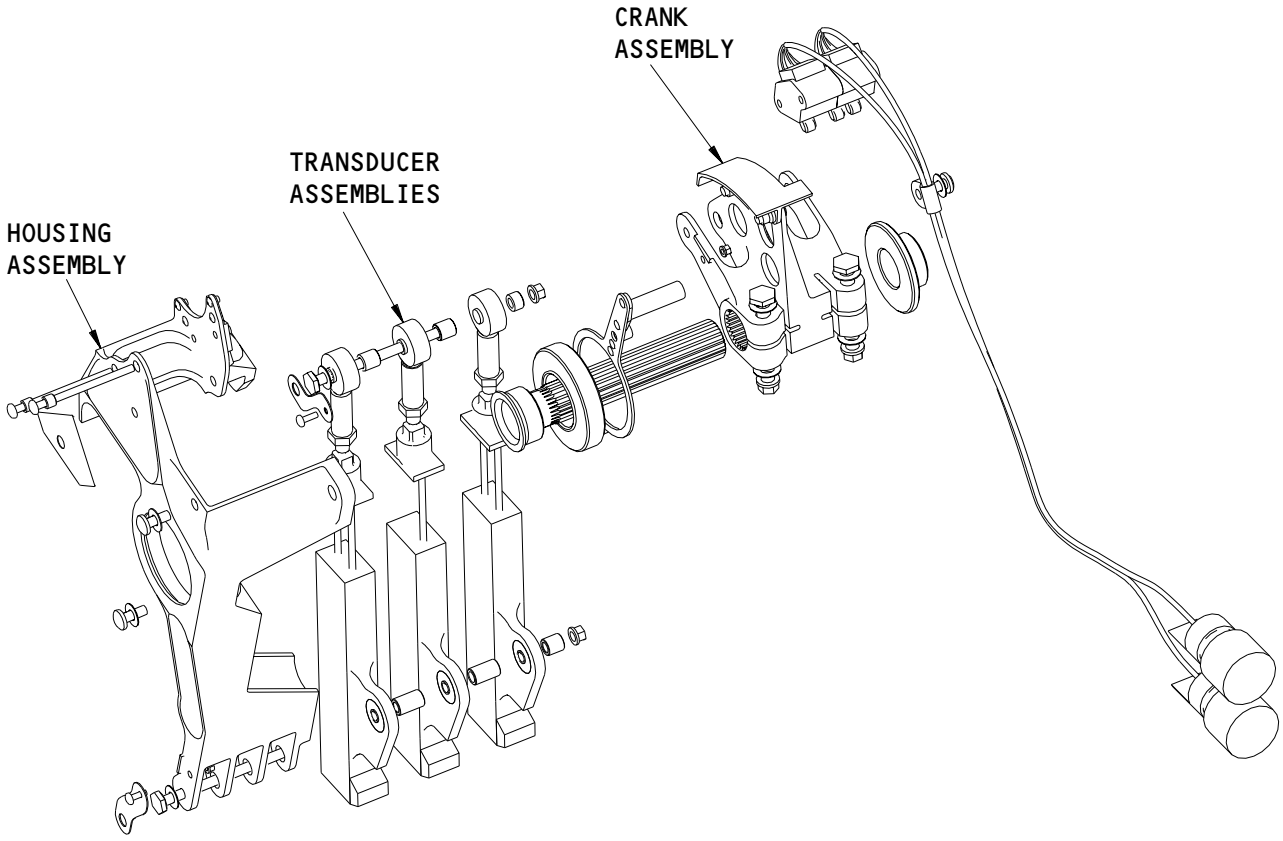
3. Leading Particulars (Approximate)

   A. Length -- 15 inches

   B. Width -- 6 inches

   C. Height -- 8 inches

   D. Weight -- 9 pounds



Control Stand Speedbrake Mechanism Assembly
Figure 1

K84835

TESTING AND FAULT ISOLATION

1. General

   A. This procedure has the data necessary to do a test of the mechanism after an overhaul or for fault isolation.

   B. Refer to the Standard Overhaul Practices Manual (SOPM) for details of the SOPM chapters identified in this procedure.

   C. Refer to IPL Fig. 1 for item numbers.

2. Testing and Fault Isolation

   A. Special Tools and Equipment

      NOTE: Equivalent tool/equipment can be used.

      (1) 254T5001, Adapter Plate

      (2) Phase Angle Voltmeter (North Atlantic Instruments Model 2250)

      (3) 26 VAC (400) Hz Power Supply (5-10 Watt output) Adjustable and stabilized

      (4) Continuity Tester or ohm meter (0 ohm to 1 megohm)

      (5) MS20392-2P105 Rig Pin (0.1860-0.1840 dia x 1.7 inch min, alloy steel, aluminum, cres or titanium)

   B. References

      (1) 27-62-24/301, Disassembly

      (2) 27-62-24/701, Assembly

      (3) Installation of Safetying Devices SOPM 20-50-02

   C. Procedure

      (1) Install the mechanism assembly on the adapter plate 254T5001-1.

(2) Rotate the input shaft slowly through the range of travel in both directions.

NOTE: Take care not to damage the finishes. The only noticeable force should be the force of the switches on the cam.

(3) Rotate the input shaft to allow installation of the rig pin.

(4) If there is no rig pin installed, rotate the input shaft as necessary and install the rig pin.

(5) Loosen the locknut on the transducer (110).

NOTE: Nut may have a lock wire.

(6) Rotate the wrench flats on the transducer (110) until the phase angle volt meter reads +0.05V to -0.05V with a loose pin rig.

(7) Tighten the locknut and verify that the Phase Angle Voltmeter reads +0.05V to -0.05V with a loose rig pin.

(8) Repeat par. C.(1) thru C.(7) for each transducer (110).

(9) Install lockwire on the locknut of each transducer (110) as shown in SOPM 20-50-02.

NOTE: The switches (190, 210) are not adjustable and do not need to be rigged.

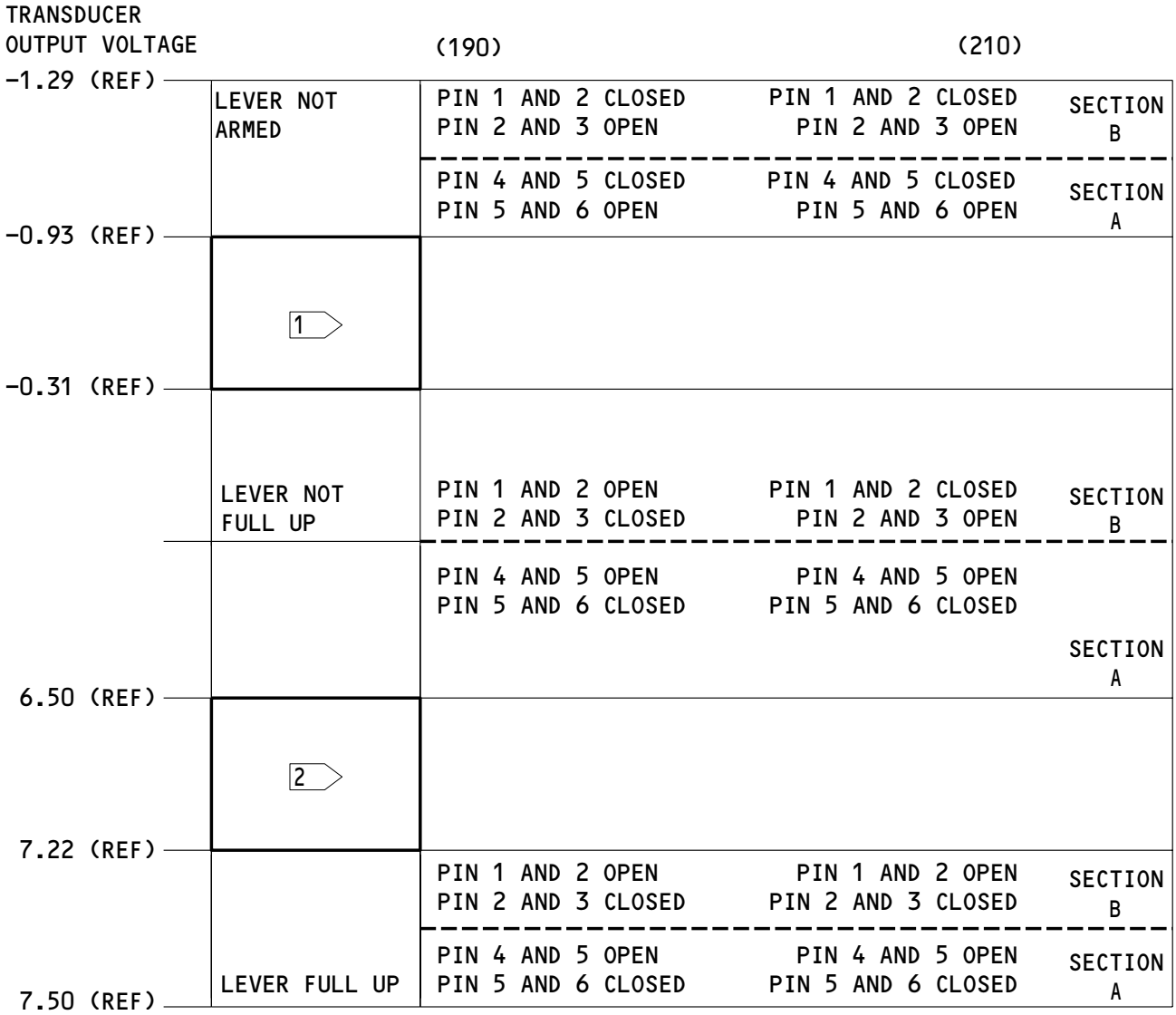
(10) Connect one transducer (110) to the 26VAC (400 Hz) power supply and the phase angle volt meter as shown in Fig. 102.

(11) Remove the rig pin if it is installed.

(12) Verify the following circuit conditions exist between the noted pins at the phase angle volt meter readings shown using a continuity test or an ohm meter. Rotate the input shaft in one direction as required to obtain the listed range readings (Fig. 101).

(13) Turn the shaft in the opposite direction and repeat par. C.(12).

(14) Repeat par. C.(10) thru C.(13) for each transducer (110).



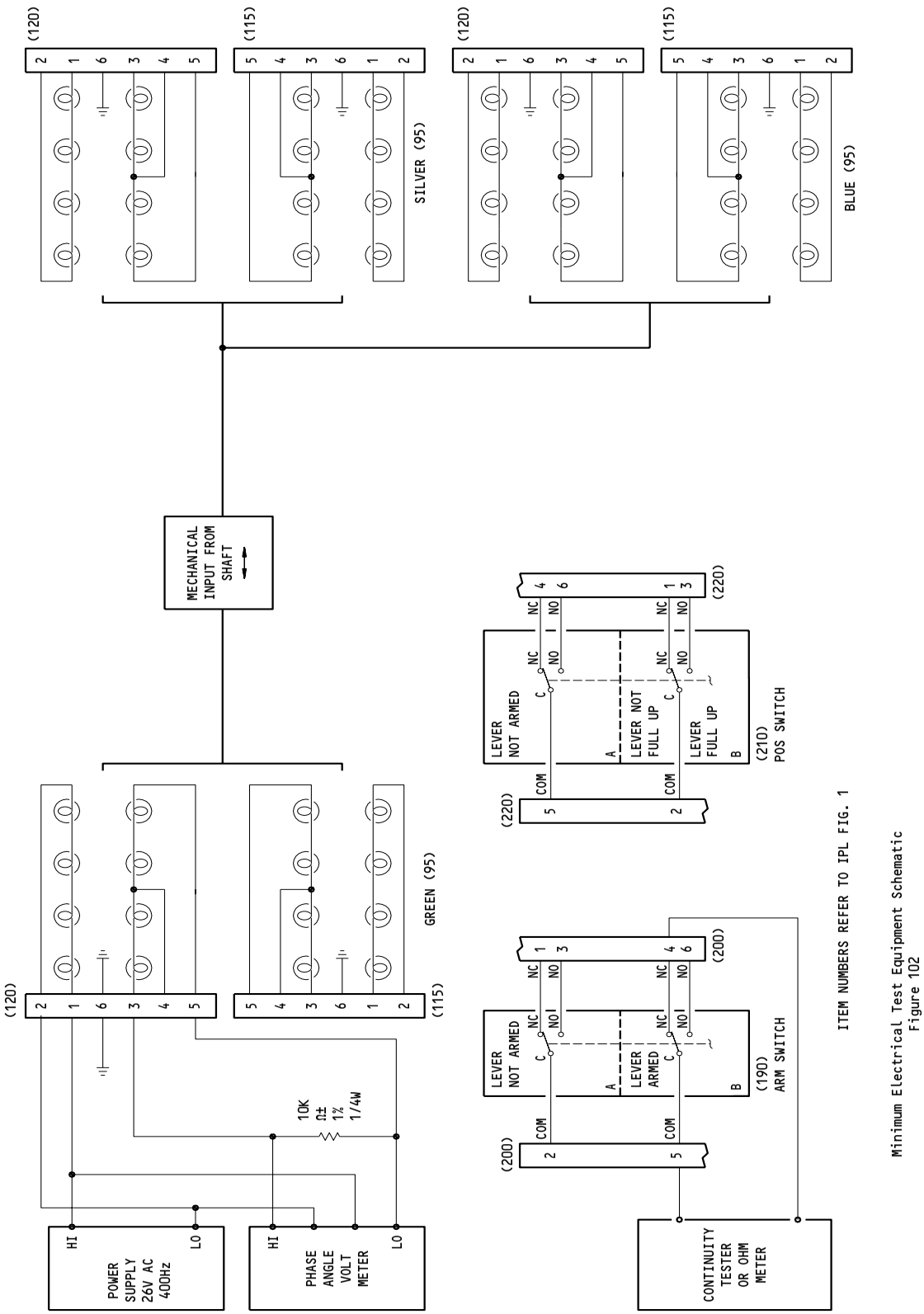
1 SECTIONS "A" AND "B" OF SWITCH (190), AND SECTION "A" OF SWITCH (210) MUST CHANGE CONDITION IN THIS RANGE

2 SECTION "B" OF SWITCH (210) MUST CHANGE CONDITION IN THIS RANGE

ITEM NUMBERS REFER TO IPL FIG. 1

Switch Actuation Schedule
Figure 101

K86565



Minimum Electrical Test Equipment Schematic
Figure 102

K88084

DISASSEMBLY

1. General

   A. This procedure has the data necessary to disassemble the Control Stand Speedbrake Mechanism 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 the Standard Overhaul Practices Manual (SOPM) for details of the SOPM chapters identified in this procedure.

   D. Refer to IPL Fig. 1 for item numbers.

2. Disassembly

   A. Procedure

      (1) Use standard industry procedures to disassemble this component.

CLEANING

1. General

   A. This procedure has the data necessary to clean the Control Stand Speedbrake Mechanism assembly.

   B. Refer to the Standard Overhaul Practices Manual (SOPM) for details of the SOPM chapters identified in this procedure.

   C. Refer to IPL Fig. 1 for item numbers.

2. Cleaning

   A. References

      (1) SOPM 20-30-01, Cleaning and Relubricating Antifriction Bearings

      (2) SOPM 20-30-03, General Cleaning Procedures

   B. Procedure

      (1) Clean the bearings (165) as specified in SOPM 20-30-01.

      (2) Clean the rod end (100) as specified in the instructions of the manufacturer.

      (3) Use standard industry procedures and refer to SOPM 20-30-03 to clean all the other parts.

CHECK

1. General

   A. This procedure has the data necessary to find defects in the material of 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 details of the SOPM chapters identified in this procedure.

   D. Refer to IPL Fig. 1 for item numbers.

2. Check

   A. References

      (1) SOPM 20-20-01, Magnetic Particle Inspection

      (2) 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 or magnetic particle check if the visual check shows possible damage or if you suspect possible damage on the parts listed below:

      (2) Do a magnetic particle check (SOPM 20-20-01) of these parts:

         (a) Shaft (170)

      (3) Do a penetrant check (SOPM 20-20-02) of these parts:

         (a) Cam (70), Crank (75), Housing (255)

REPAIR - GENERAL

1. General

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

PART NUMBER	NAME	REPAIR
---	REFINISH OF OTHER PARTS	1-1
254T5101	SHAFT	2-1
254T5111	CRANK	3-1
254T5210	HOUSING ASSEMBLY	4-1, 4-2

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

EXAMPLES

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

True Position Dimensioning Symbols
Figure 601

K84732

REFINISH OF OTHER PARTS - REPAIR 1-1

1. General

   A. This procedure has the data necessary to refinish the parts which are not given in the specified repairs.

   B. Refer to the Standard Overhaul Practices Manual (SOPM) for details of the SOPM chapters identified in this procedure.

   C. Refer to IPL Fig. 1 for item numbers.

2. Refinish of Other Parts

   A. General

      (1) Instructions for the repair of the parts listed in Table 601 are for repair of the initial finish.

   B. Consumable Materials

      NOTE: Equivalent material can be used.

      (1) C00259 Primer -- BMS 10-11, Type 1 (SOPM 20-60-02)

      (2) C00542 Cadmium plate -- QQ-P-416 (SOPM 20-42-05)

   C. References

      (1) SOPM 20-30-02, Stripping of Protective Finishes

      (2) SOPM 20-30-03, General Cleaning Procedures

      (3) SOPM 20-41-01, Decoding Table for Boeing Finish Codes

(4) SOPM 20-41-02, Application of Chemical and Solvent Resistant Finishes

(5) SOPM 20-42-05, Bright Cadmium Plating

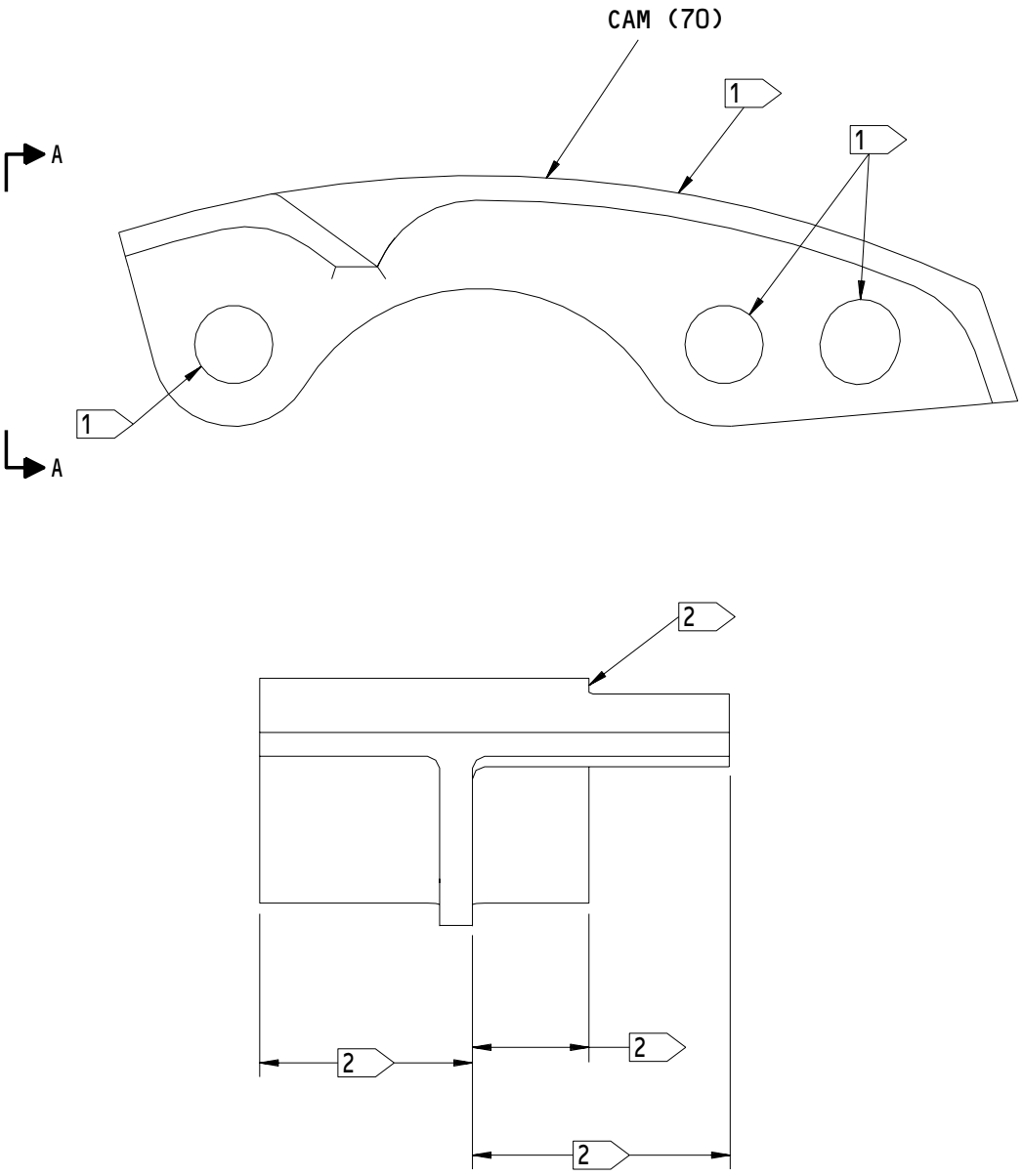
(6) SOPM 20-43-01, Chromic Acid Anodizing

(7) SOPM 20-60-02, Finishing Materials

D. Procedure

IPL FIG. & ITEM	MATERIAL	FINISH
IPL Fig. 1		
Cam (70)	15-5PH CRES	Cadmium plate (F-16.06) and apply one layer of BMS 10-11, type 1 primer (F-20.02), except as shown in Fig. 601.
Clip (90, 235)	304 CRES	Passivate (F-17.09).
Retainer (160)	Aluminum alloy	Boric acid-sulfuric acid anodize or chromic acid anodize (F-17.31) and apply one layer of BMS 10-11, type 1 primer (F-20.02).
Bushing (180)	Aluminum alloy	Boric acid-sulfuric acid anodize or chromic acid anodize (F-17.35).

Refinish Details
Table 601



A–A

1 NO PRIMER ON THESE SURFACES

2 PRIMER IS OPTIONAL ON THESE SURFACES

ITEM NUMBERS REFER TO IPL FIG. 1

254T5112-1
Cam
Figure 601

K86264

SHAFT - REPAIR 2-1

254T5101-1

1. General

A. This procedure has the data necessary to repair and refinish the shaft (170).

B. Refer to the Standard Overhaul Practices Manual (SOPM) for details of the SOPM chapters identified in this procedure.

C. Refer to the REPAIR - GENERAL (27-62-24/601, REPAIR - GENERAL) for the Standard True Position Dimensioning Symbols shown in the repair.

D. Refer to IPL Fig. 1 for item numbers.

E. General repair details:

(1) Material: 15-5 PH Cres

2. Shaft (170) Repair:

A. References

(1) SOPM 20-10-01, Repair and Refinish of High Strength Steel Parts

(2) SOPM 20-10-02, Machining of Alloy Steel

(3) SOPM 20-10-03, Shot Peening

(4) SOPM 20-10-04, Grinding of Chrome Plated Parts

(5) SOPM 20-20-01, Magnetic Particle Inspection

(6) SOPM 20-41-01, Decoding Table for Boeing Finish Codes

(7) SOPM 20-42-03, Hard Chrome Plating

B. Procedure

(1) Grind the shaft (170) outside diameter as specified in SOPM 20-10-04 and Fig. 601 until the damage or corrosion is removed.

(a) Make sure you do not grind the shaft (170) to a diameter that is less than the specified repair limit.

(b) Make sure the surface roughness is 63RA or better.

(2) Break all the sharp edges.

(3) Do a class "B" magnetic particle examination of the shaft (170) as specified in SOPM 20-20-01.

(4) Shot peen the shaft (170) as specified in SOPM 20-10-03.

(5) Apply chrome plate (F-15.34) to buildup the diameter as shown in Fig. 601.

(a) The final chrome plate thickness must be in the range 0.003 inch to 0.015 inch.

(6) Grind the shaft (170) to the design dimension and surface roughness as shown in Fig. 601.

3. Shaft Refinish

A. Consumable Materials

NOTE: Equivalent material can be used.

(1) C00542 Cadmium plate -- QQ-P-416 (SOPM 20-42-05)

B. References

(1) SOPM 20-41-01, Decoding Table for Boeing Finish Codes

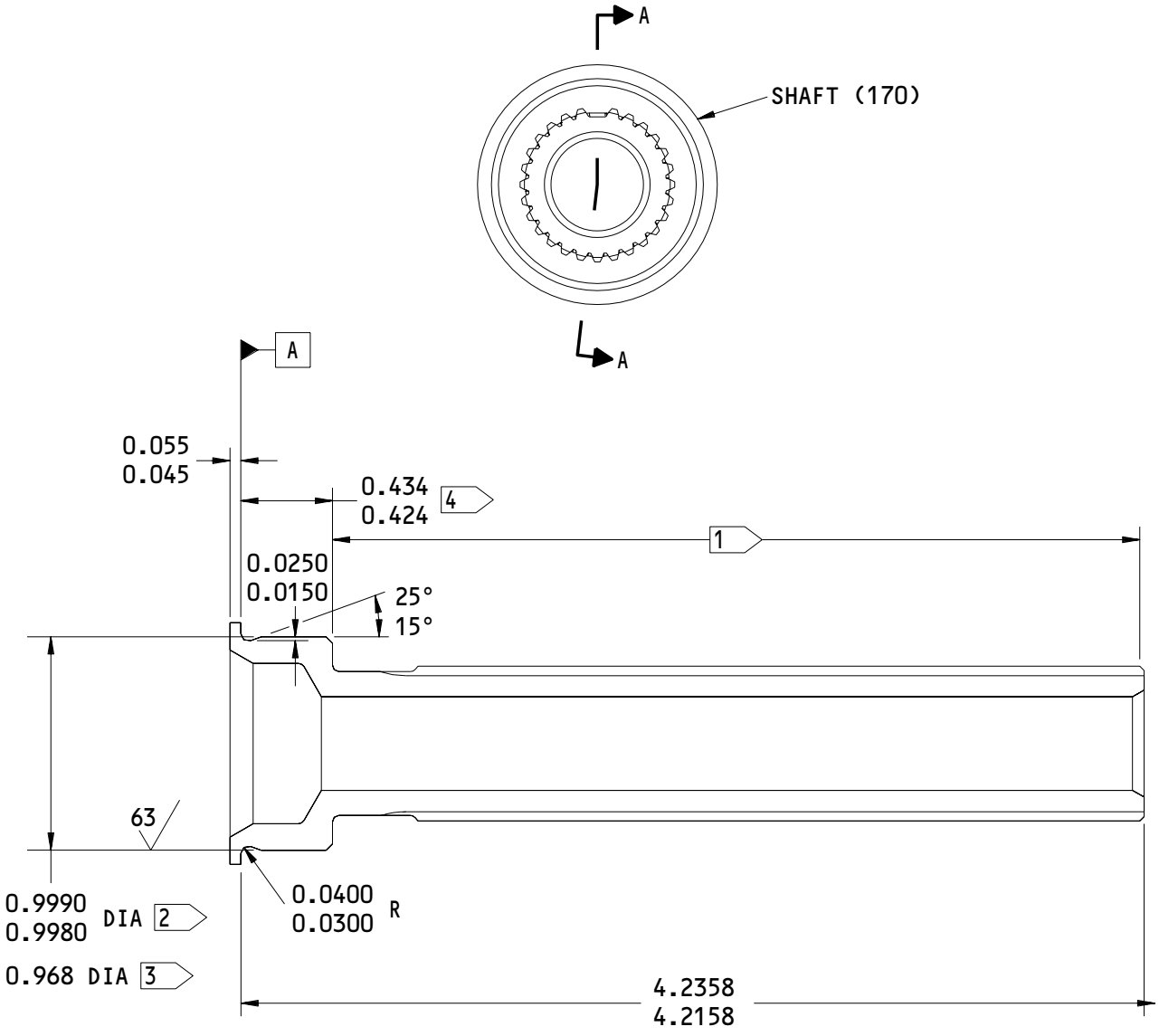
(2) SOPM 20-42-05, Bright Cadmium Plating

C. Procedure (Fig. 601)

(1) Passivate (F-17.25)

(2) Apply cadmium plate (F-16.06) as shown in Fig. 601.

(3) Cadmium plate is optional unless specified differently in Fig. 601.



A–A

1 APPLY CADMIUM PLATE TO THE INDICATED SURFACE

2 NO CADMIUM PLATE ON THE INDICATED SURFACE

3 REPAIR LIMIT

4 APPLY CHROME PLATE TO THE INDICATED SURFACE

ITEM NUMBERS REFER TO IPL FIG. 1

ALL DIMENSIONS ARE IN INCHES

254T5101-1
Shaft Repair
Figure 601

K86198

CRANK - REPAIR 3-1

254T5111-2

1. General

A. This procedure has the data necessary to repair and refinish the crank (75).

B. Refer to the Standard Overhaul Practices Manual (SOPM) for details of the SOPM chapters identified in this procedure.

C. Refer to the REPAIR - GENERAL (27-62-24/601, REPAIR - GENERAL) for the Standard True Position Dimensioning Symbols shown in the repair.

D. Refer to IPL Fig. 1 for item numbers.

E. General repair details:

(1) Material: Aluminum alloy

2. Crank (75) Repair

A. Consumable Materials

NOTE: Equivalent material can be used.

(1) C00851 Anodize -- Class 1 (SOPM 20-43-03)

B. References

(1) SOPM 20-20-02, Penetrant Methods of Inspection

(2) SOPM 20-41-01, Decoding Table for Boeing Finish Codes

(3) SOPM 20-43-01, Chromic Acid Anodizing

(4) SOPM 20-60-02, Finishing Materials

C. Procedure

(1) Machine the inner diameters of the holes in crank (75) as shown in Fig. 601 until the damage or corrosion is removed.

(a) Make sure you do not machine the holes to a diameter that is greater than the specified repair limit.

(2) Do a penetrant examination as specified in SOPM 20-20-02.

(3) Hard anodize (F-17.17) to buildup the inner diameter as shown in Fig. 601.

(a) The maximum finished hard anodized plate thickness is 0.004 inch.

(4) Machine the inner diameter to the dimension and surface roughness as shown in Fig. 601.

3. Crank (75) Refinish

A. Consumable Materials

NOTE: Equivalent material can be used.

(1) C00259 Primer -- BMS 10-11, Type 1 (SOPM 20-60-02)

B. References

(1) SOPM 20-30-02, Stripping of Protective Finishes

(2) SOPM 20-41-01, Decoding Table For Boeing Finish Codes

(3) SOPM 20-41-02, Application of Chemical and Solvent Resistant Finishes

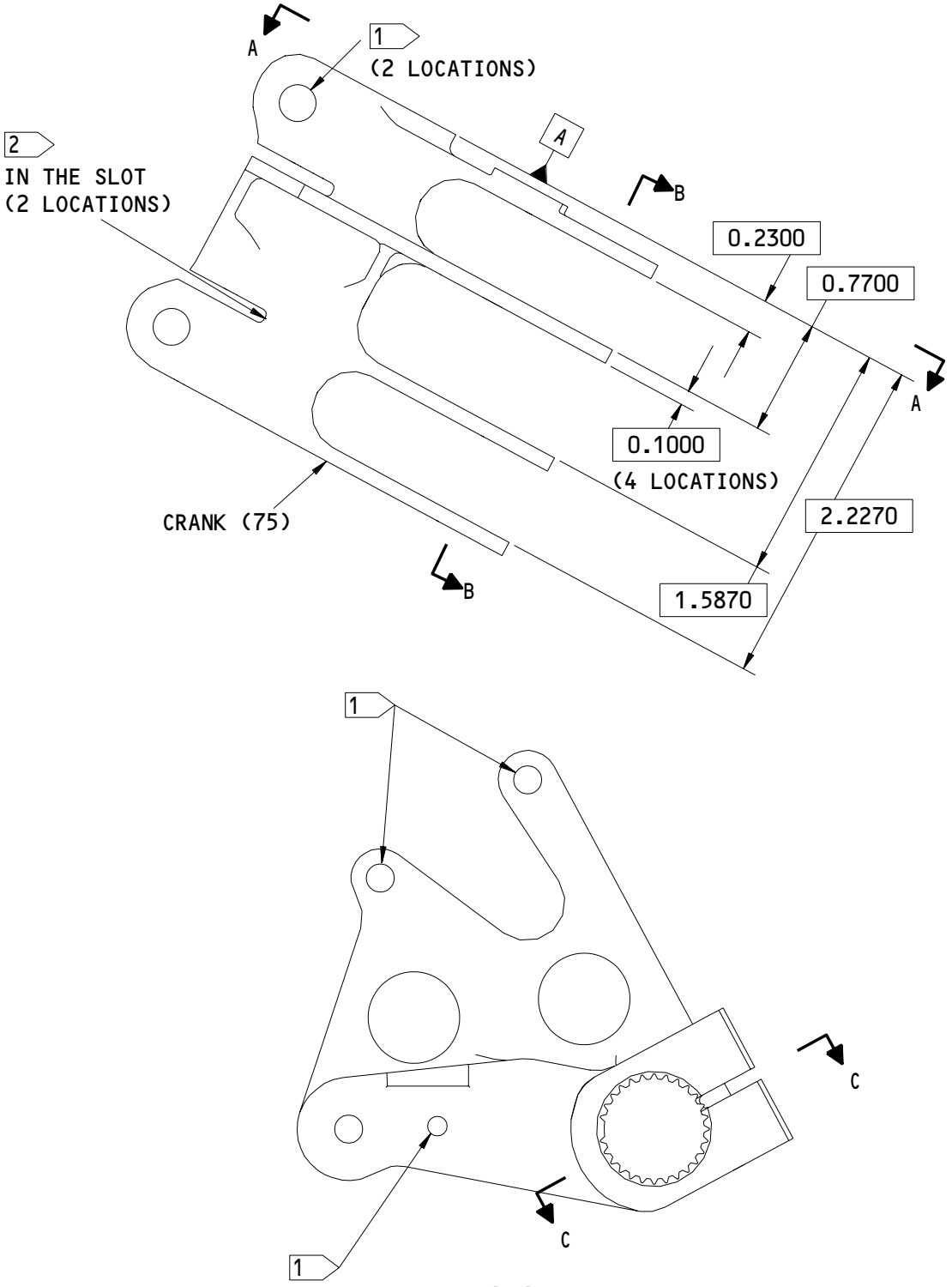
(4) SOPM 20-43-01, Chromic Acid Anodizing

(5) SOPM 20-60-02, Finishing Materials

C. Procedure (Fig. 601)

(1) Boric acid - sulfuric acid anodize or chromic acid anodize (F-17.35).

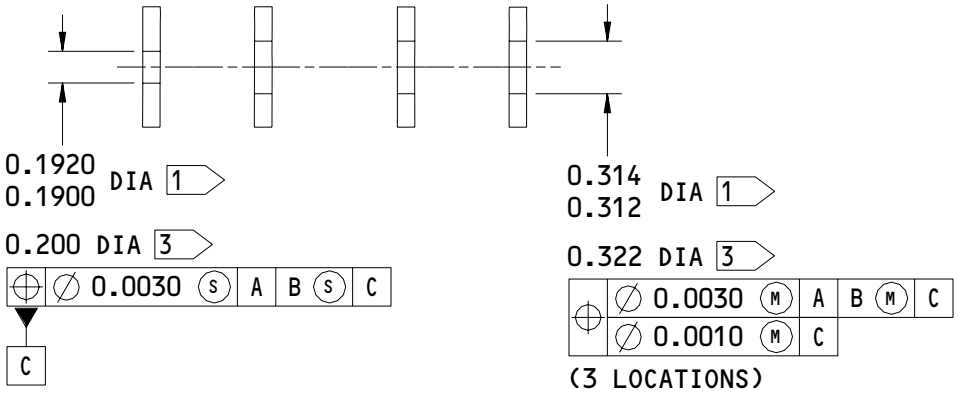
(2) Apply BMS 10-11, type 1 primer (F-20.02) as shown in Fig. 601.



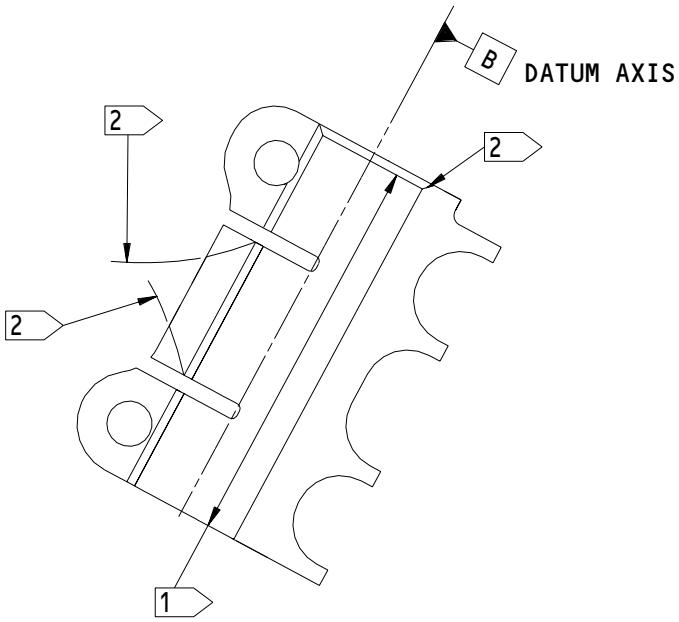
A–A

254T5111-2
Crank Repair
Figure 601 (Sheet 1)

K92480



B–B



C–C

1 NO PRIMER ON THE INDICATED SURFACE

2 PRIMER IS OPTIONAL ON THIS SURFACE

3 REPAIR LIMIT

125 ALL MACHINED SURFACES UNLESS SHOWN DIFFERENTLY

BREAK ALL SHARP EDGES

ITEM NUMBERS REFER TO IPL FIG. 1

ALL DIMENSIONS ARE IN INCHES

254T5111-2
Crank Repair
Figure 601 (Sheet 2)

K92493

HOUSING ASSEMBLY - REPAIR 4-1

254T5210-1

1. General

A. This procedure has the data necessary to repair and refinish the housing assembly (240).

B. Refer to the Standard Overhaul Practices Manual (SOPM) for details of the SOPM chapters identified in this procedure.

C. Refer to the REPAIR - GENERAL (27-62-24/601, REPAIR - GENERAL) for the Standard True Position Dimensioning Symbols shown in the repair.

D. Refer to IPL Fig. 1 for item numbers.

E. General repair details:

(1) Material: Aluminum alloy

2. Housing Assembly (240) Repair

A. Consumable Materials

NOTE: Equivalent material can be used.

(1) C00851 Anodize -- Class 1 (SOPM 20-43-03)

B. References

(1) SOPM 20-20-02, Penetrant Methods of Inspection

(2) SOPM 20-41-01, Decoding Table for Boeing Finish Codes

(3) SOPM 20-43-01, Chromic Acid Anodizing

(4) SOPM 20-60-02, Finishing Materials

C. Procedure (Fig. 601)

(1) Machine the inner diameter of the holes in housing (255) as shown in Fig. 601 until the damage or corrosion is removed.

(a) Make sure you do not machine the holes to a diameter that is greater than the repair limit shown in Fig. 601.

(2) Hard anodize (F-17.17) to buildup the inner-diamter as shown in Fig. 601.

(a) The maximum finished hard anodized plate thickness is 0.004 inch.

(3) Machine the inner diameter to the dimension and surface roughness as shown in Fig. 601.

3. Housing Assembly (240)

A. Consumable Materials

NOTE: Equivalent material can be used.

(1) C00259 Primer -- BMS 10-11, Type 1 (SOPM 20-60-02)

B. References

(1) SOPM 20-30-02, Stripping of Protective Finishes

(2) SOPM 20-41-01, Decoding Table for Boeing Finish Codes

(3) SOPM 20-41-02, Application of Chemical and Solvent Resistant Finishes

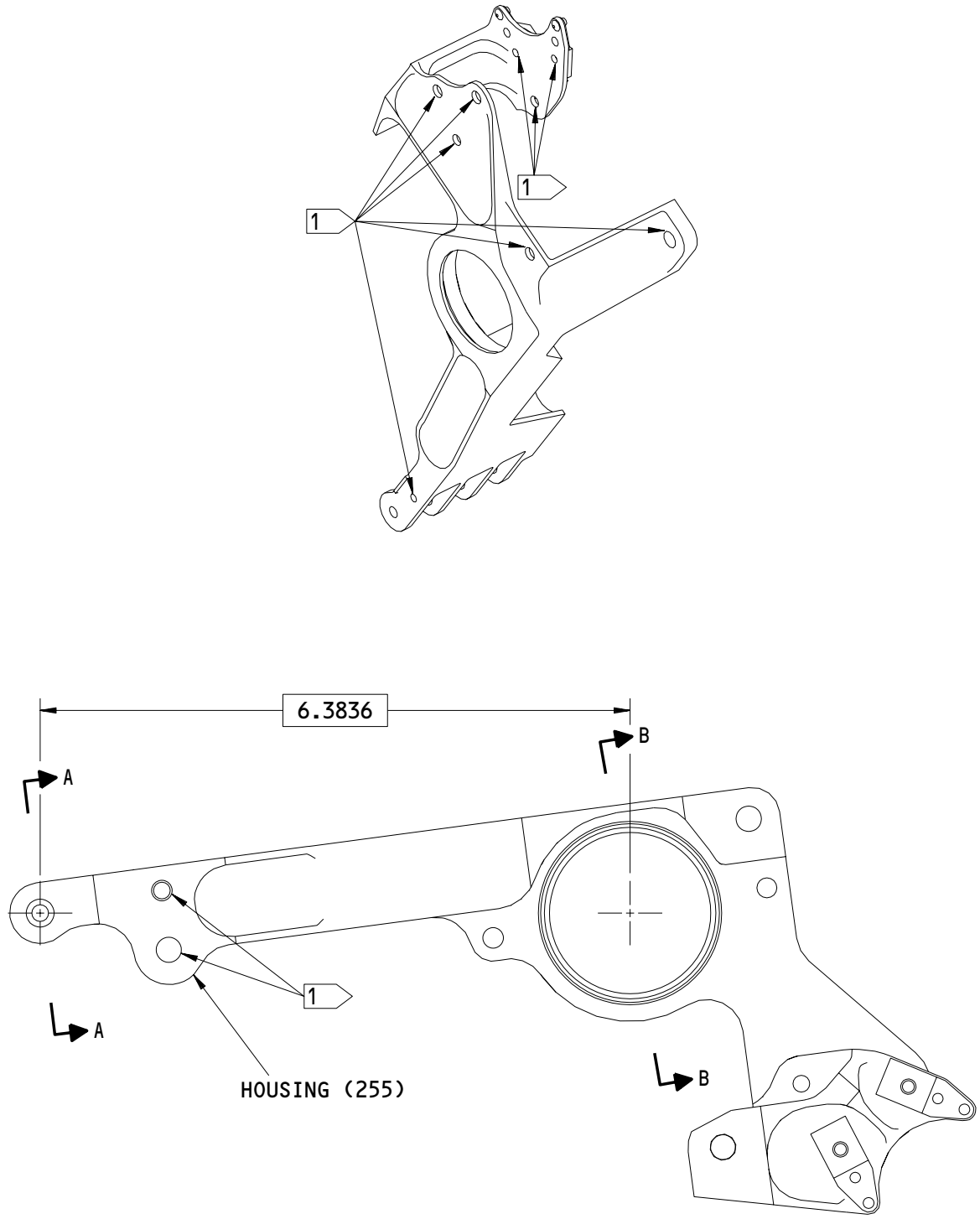
(4) SOPM 20-43-01, Chromic Acid Anodizing

(5) SOPM 20-60-02, Finishing Materials

C. Procedure (Fig. 601)

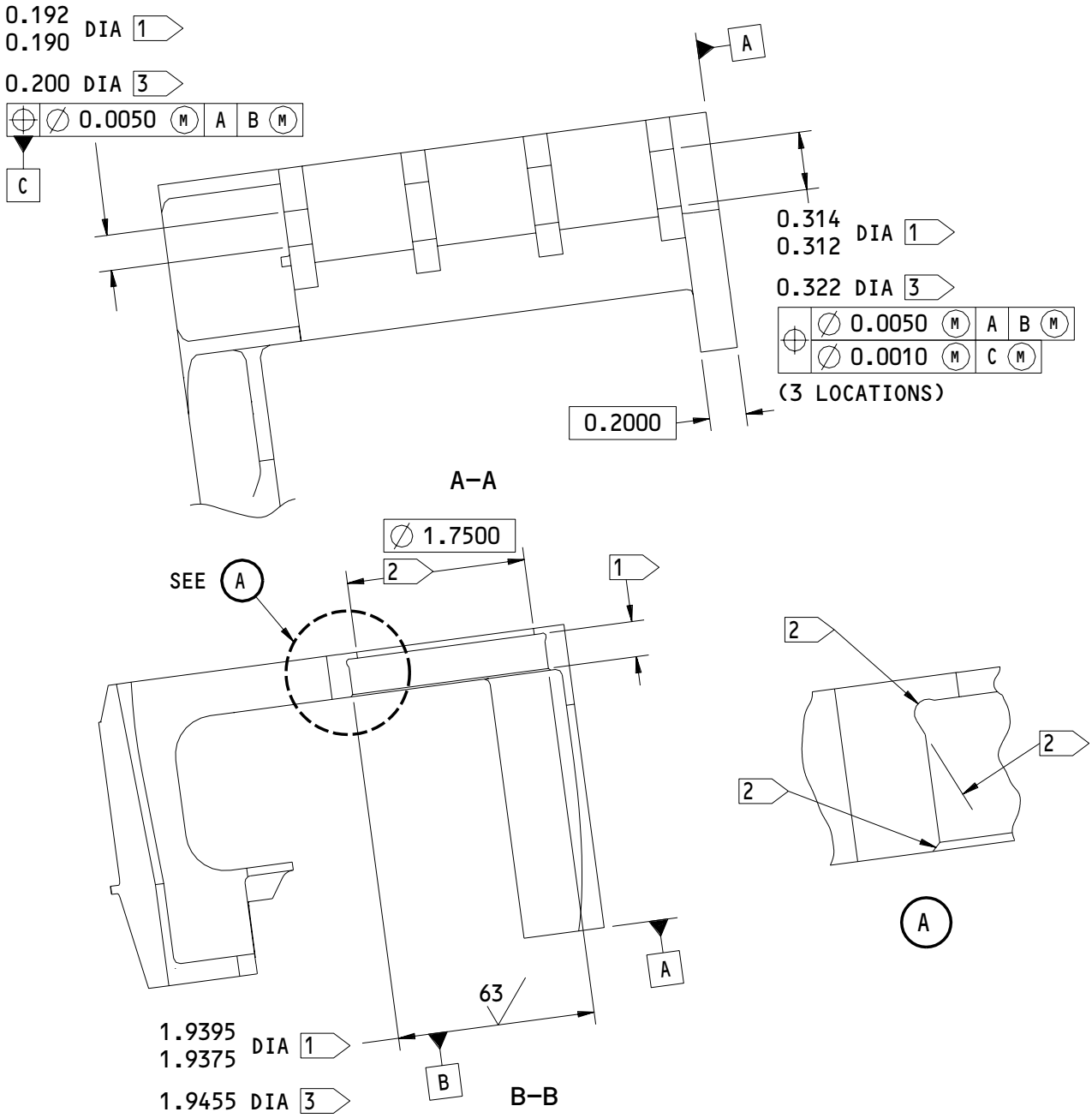
(1) Boric acid - sulfuric acid anodize or chromic acid anodize (F-17.31).

(2) Apply BMS 10-11, Type 1 primer (F-20.02) as shown in Fig. 601.



254T5210-1
Housing Assembly
Figure 601 (Sheet 1)

K93169



1 NO PRIMER ON THIS SURFACE

2 PRIMER OPTIONAL ON THIS SURFACE

3 REPAIR LIMIT

125 ALL MACHINED SURFACES UNLESS SHOWN DIFFERENTLY

BREAK ALL SHARP EDGES

ITEM NUMBERS REFER TO IPL FIG. 1

ALL DIMENSIONS ARE IN INCHES

254T5210-1
Housing Assembly
Figure 601 (Sheet 2)

K94124

ASSEMBLY

1. General

   A. This procedure has the data necessary to assemble the Control Stand Speedbrake Mechanism assembly.

   B. Refer to the Standard Overhaul Practices Manual (SOPM) for details of the SOPM chapters identified in this procedure.

   C. Refer to IPL Fig. 1 for item numbers.

2. Assembly

   A. Consumable Materials

      NOTE: Equivalent material can be used.

      (1) A00359 Sealant -- BMS 5-95 (SOPM 20-60-04)

   B. References

      (1) SWPM 20-00-11, Materials

      (2) SWPM 20-10-11, Installation of Electrical Wires and Wire Harnesses

      (3) SWPM 20-10-14, Installation of Shrinkable Sleeves

      (4) SWPM 20-60-06, Installation of Electrical Connectors

      (5) SOPM 20-30-03, General Cleaning Procedures

      (6) SOPM 20-50-01, Bolt and Nut Installation

      (7) SOPM 20-50-05, Application of Aluminum Foil and Other Markers

      (8) SOPM 20-60-04, Miscellaneous Materials

   C. Procedure

      (1) Use standard industry procedures and the steps shown below to assemble this component.

      (2) Make sure that each core rod and coil assembly in each transducer assembly (95) is a matched set.

(3) Make sure the length for the rod end (100) is as shown in Fig. 701 for each transducer assembly (95).

(4) If a connector (115, 120) must be replaced on a transducer assembly (95), use the schematic in Fig. 701 (SWPM 20-60-06).

(5) If a connector (200, 220) or a switch (190, 210) must be replaced on a wire bundle assembly (185, 205), use the schematic in Fig. 702 or Fig. 703 (SWPM 20-60-06).

(6) Make sure the wires in wire bundle assembly (185, 205) are covered as shown in Fig. 702 and 703 (SWPM 20-10-14).

(7) Install the bearing (165) in the housing assembly (240).

(8) Install the retainer assembly (140) on the housing assembly (240) with the bolts (125) and the washers (130).

(9) Install the transducer assemblies (95) in the housing assembly with the bolt (25), the washer (30), the bushings (35, 40) and the nut (50).

(10) Install the clip (235) on the housing assembly (240) with the bolt (225) and the nut (230).

(11) Align the crank assembly (55) in the housing assembly (240).

(12) Install the crank assembly (55) on the transducer assemblies (95) with the bolt (25), the washer (30), the bushings (40, 45) and the nut (50).

(13) Install the clip (90) on the housing assembly (240) with the bolt (80) and the nut (85).

(14) Insert the shaft (170) through the bearing (165) and the crank assembly (55).

(15) Install the bolts (10), the washers (15), and the nuts (20) in the crank assembly (55).

(16) Slide the spacer (5) onto the shaft (170).

(17) Install the wire bundle assemblies (185, 205) in the housing assembly (240) with the screws (175) and the bushings (180).

(18) Make a curve with the wire bundle assemblies (185, 205) and install the clamp (135) on the retainer assembly (140) with the bolt (125) and the washer (130).

(19) Install a new marker (260) if the old marker (260) is damaged or not there.

(a) Remove the damaged marker (260).

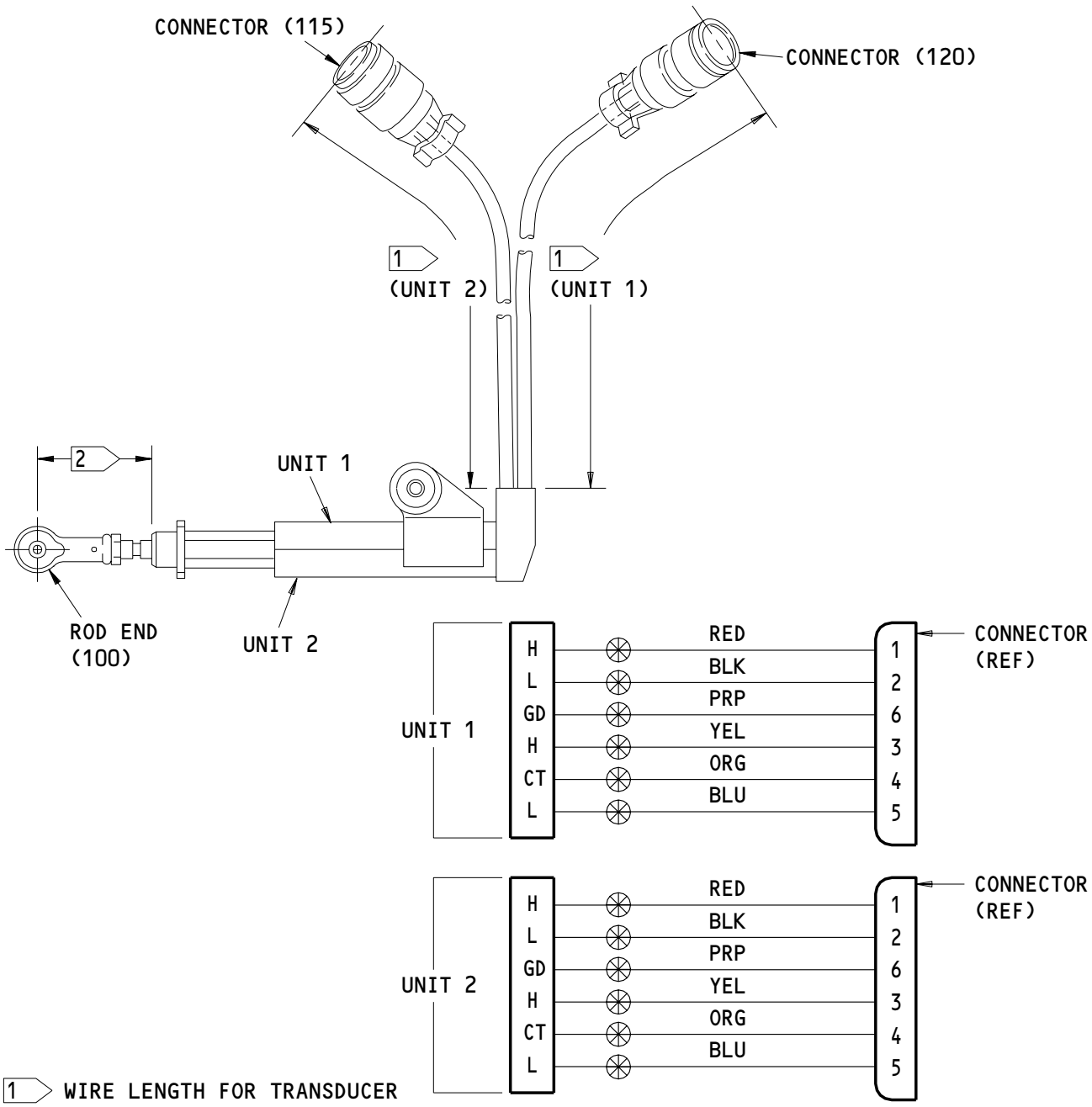
(b) Clean the surface of the housing assembly (240) (SOPM 20-30-03).

(c) Install the marker (260) approximately in the location shown in Fig. 704.

(20) Apply P29 vinyl tape to the two ends of the wire bundles of the transducer assemblies (95) as shown in Fig. 704. Apply green tape on TS35, silver tape on TS36 and blue tape on TS37 (SWPM 20-00-11).

(21) Apply BMS 13-47 identification tape with the information from the table in Fig. 704 to the wires of the transducer assemblies (95) (SWPM 20-10-11).

(22) Test the assembly as shown in the Testing and Fault Isolation section.



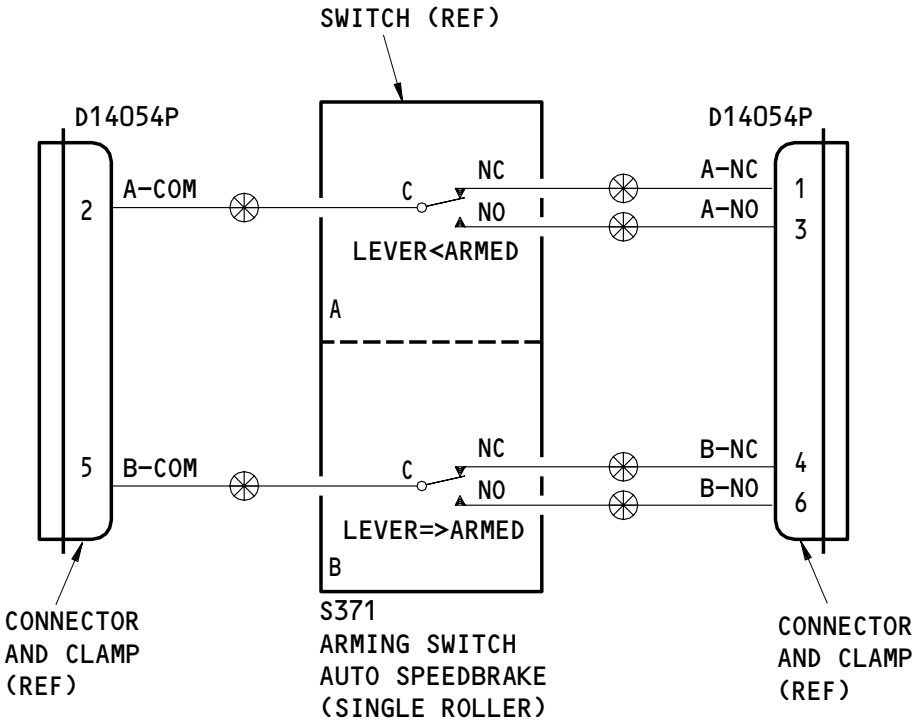
ELECTRICAL SCHEMATIC WIRING
TYPICAL FOR ALL TRANSDUCER ASSEMBLIES

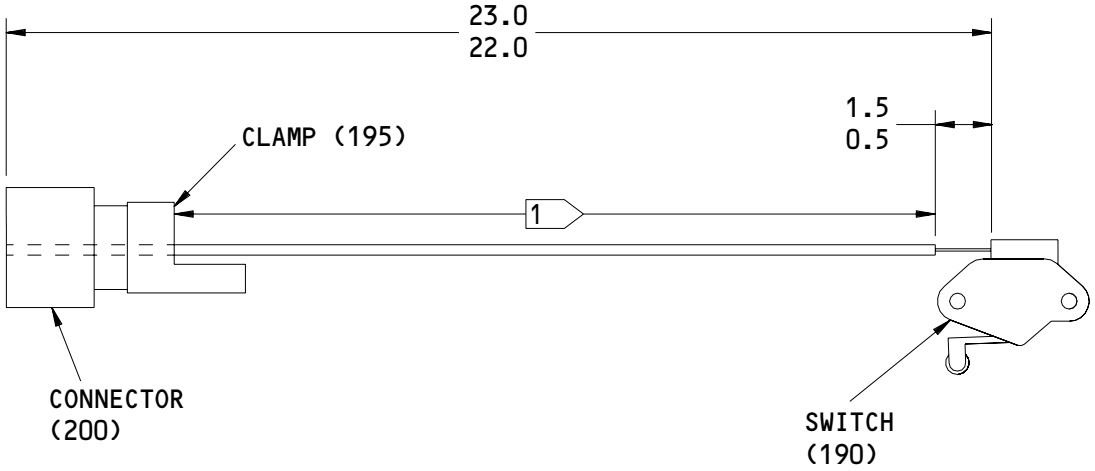
1 WIRE LENGTH FOR TRANSDUCER ASSEMBLY (95) 60.0 INCHES
WIRE LENGTH FOR TRANSDUCER ASSEMBLY (95A) 50.0 INCHES

2 ROD END LENGTH USED WITH TRANSDUCER (110) 2.13-2.19 INCHES
ROD END LENGTH USED WITH TRANSDUCER (110A) 2.27-2.33 INCHES

Transducer Assembly and Wiring Details
Figure 701

K85530



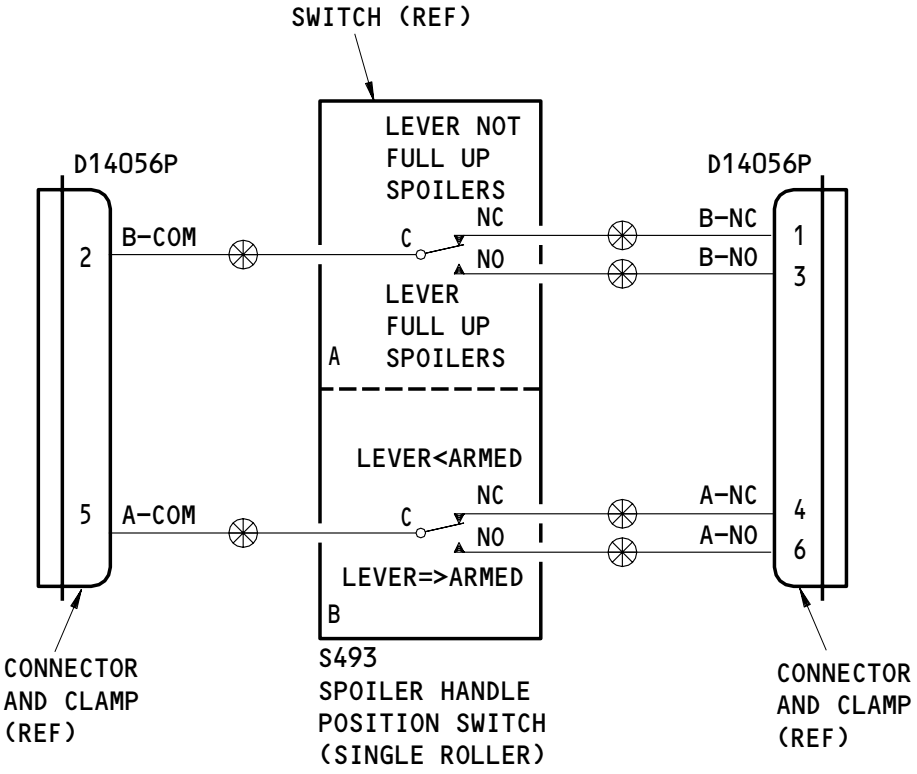


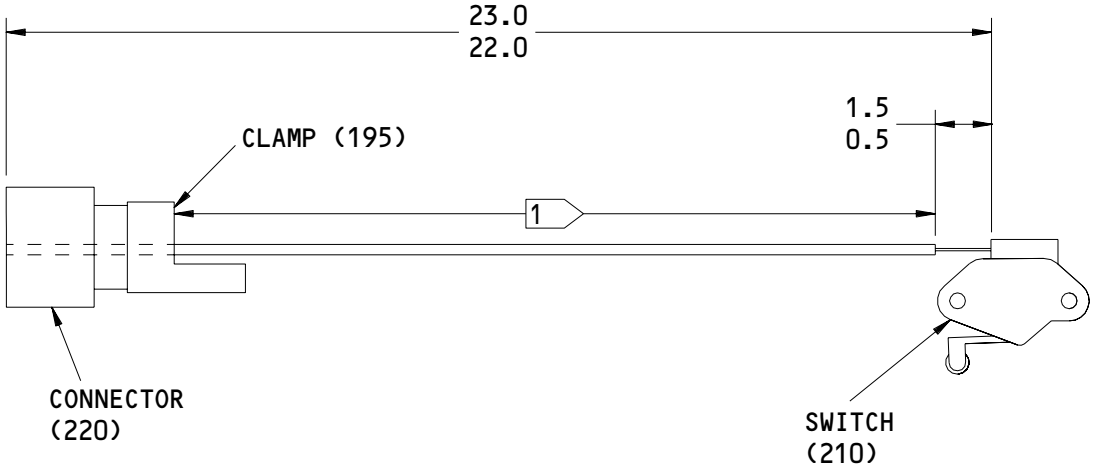
1 INSTALL RT876 (YELLOW) HEAT SHRINK TUBING AS SHOWN IN SOPM 20-10-14

ITEM NUMBERS REFER TO IPL FIG. 1

254T5114-1
Wire Bundle Assembly
Figure 702

K84998



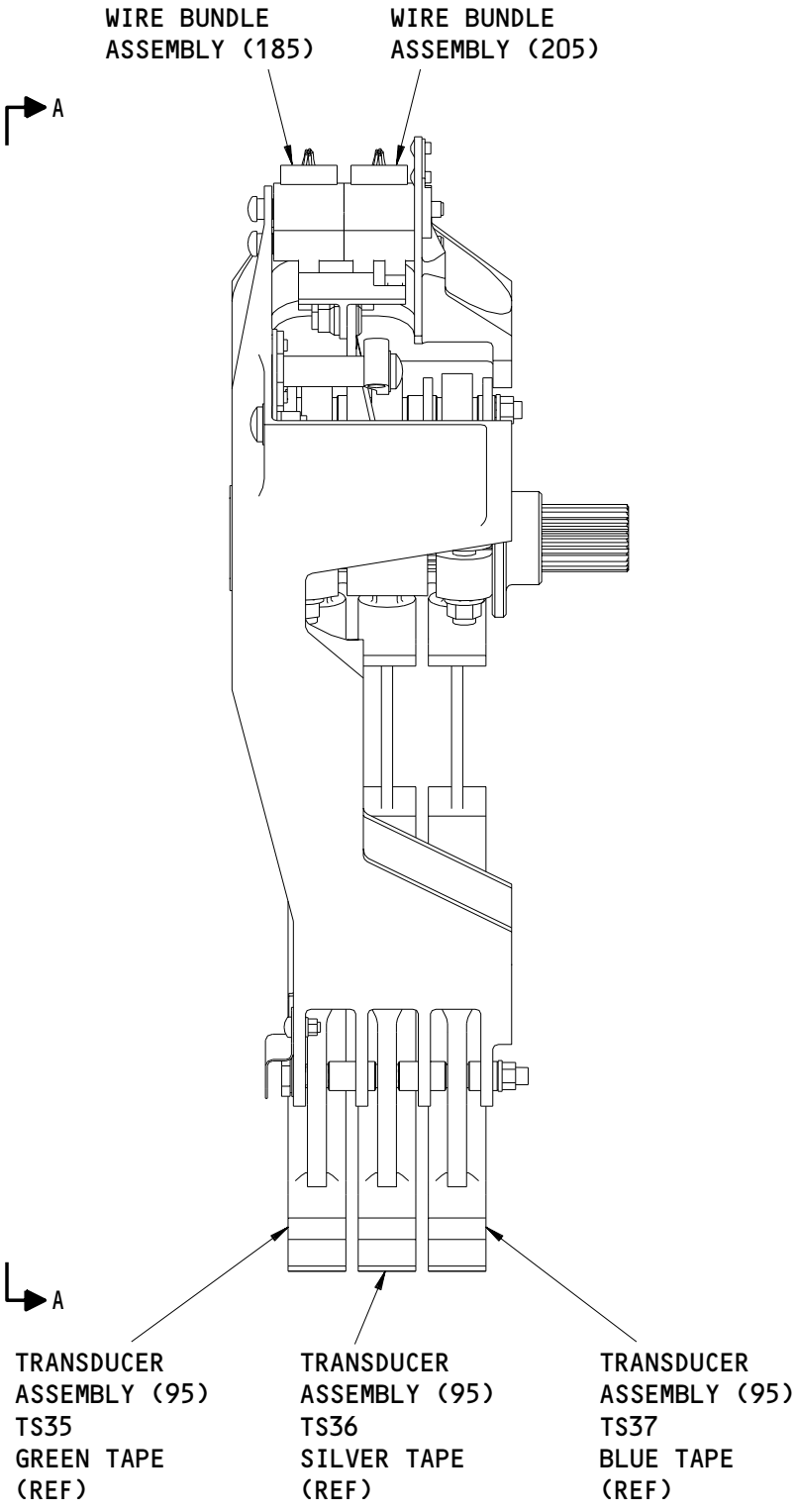


1 INSTALL RT876 (YELLOW) HEAT SHRINK TUBING AS SHOWN IN SOPM 20-10-14

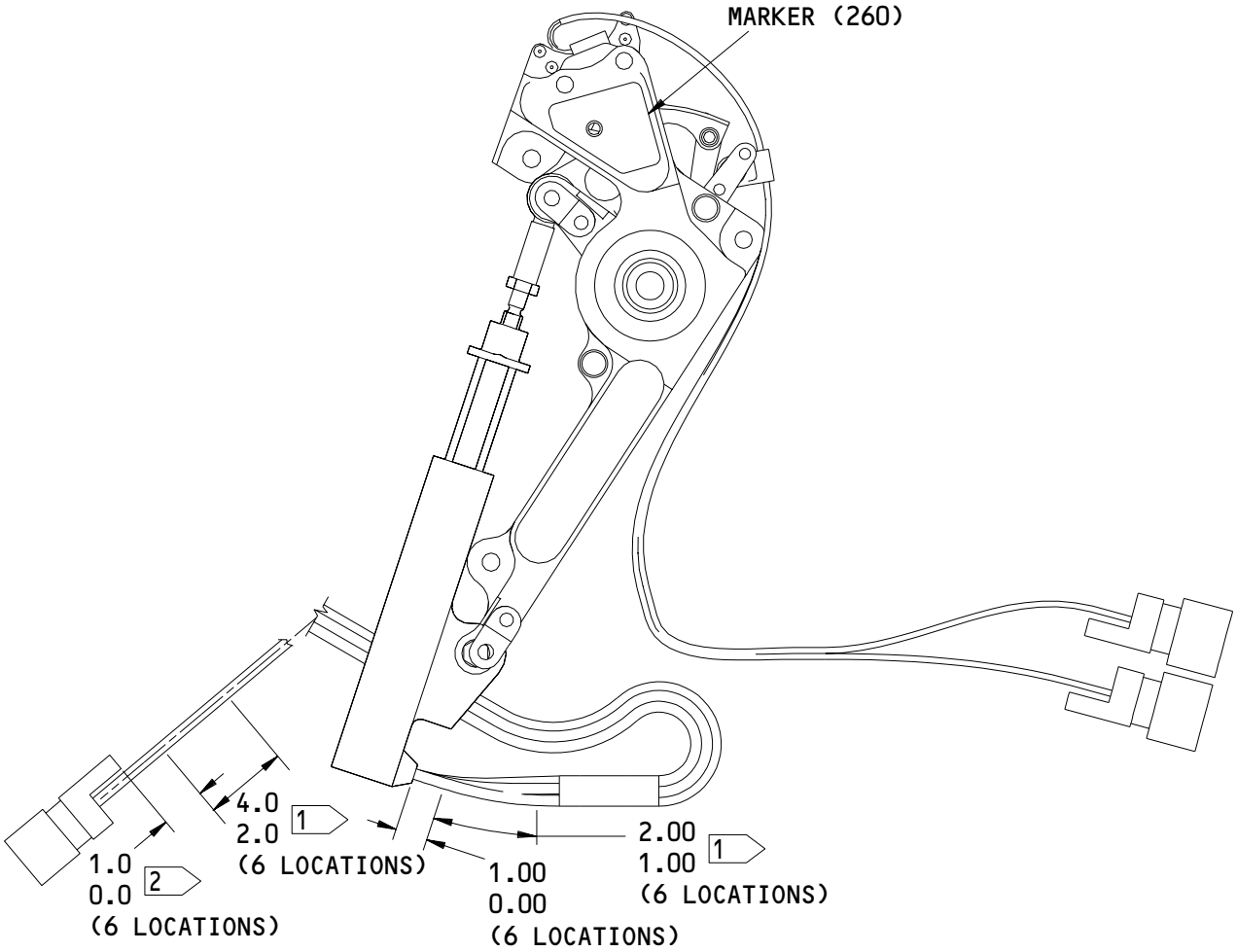
ITEM NUMBERS REFER TO IPL FIG. 1

254T5114-2
Wire Bundle Assembly
Figure 703

K85432



Transducer Assembly Identification
Figure 704 (Sheet 1)



A–A

EQUIPMENT NUMBER	UNIT	TYPE	CONNECTOR	MATES WITH	PANEL NO.	POSITION
TS 35	1	BACC63BN12C12P	D4131P	D4131J	AE0113	6
TS 35	2	BACC45FT14C15P	D4137P	D4137J	AE0113	1
TS 36	1	BACC63BN12C12P	D4133P	D4133J	AE0113	5
TS 36	2	BACC45FT14C15P	D4139P	D4139J	AE0113	4
TS 37	1	BACC63BN12C12P	D4135P	D4135J	AE0113	7
TS 37	2	BACC45FT14C15P	D4141P	D4141J	AE0113	3

1 APPLY P29 VINYL TAPE

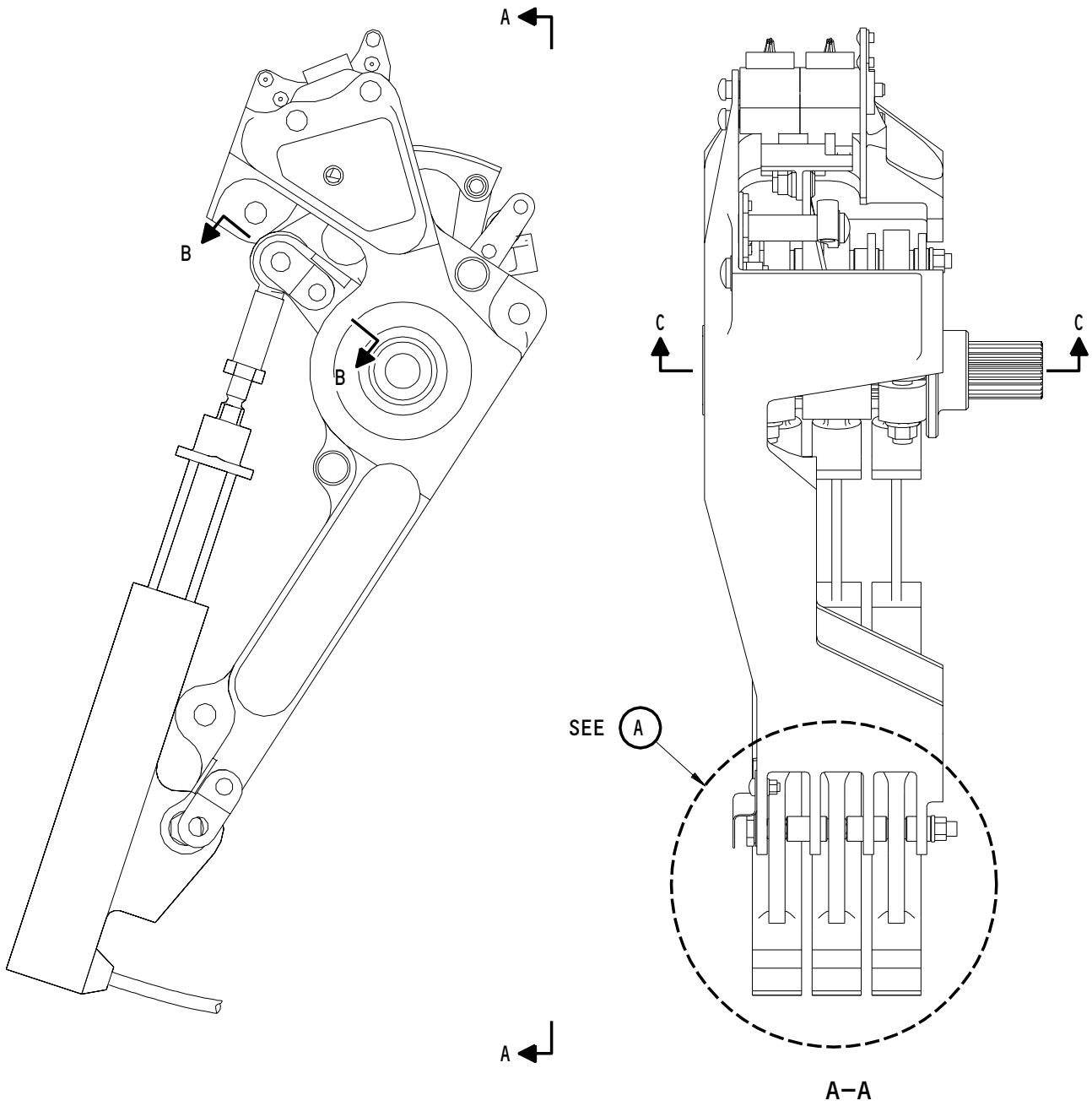
2 START IN THIS AREA TO APPLY NEW IDENTIFICATION LABELS

ITEM NUMBERS REFER TO IPL FIG. 1

ALL DIMENSIONS ARE IN INCHES

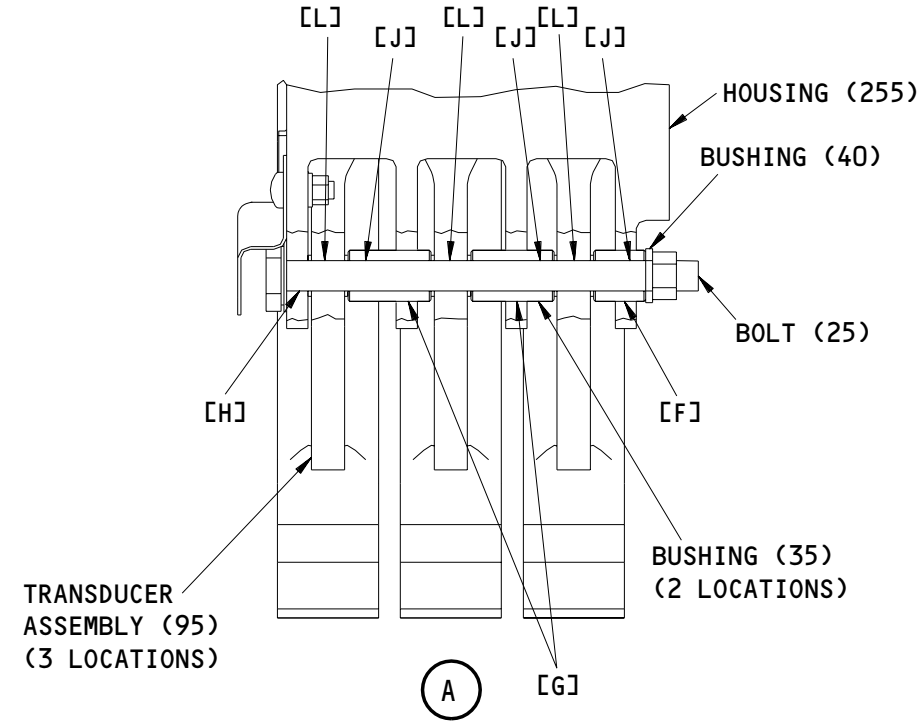
Transducer Assembly Identification
Figure 704 (Sheet 2)

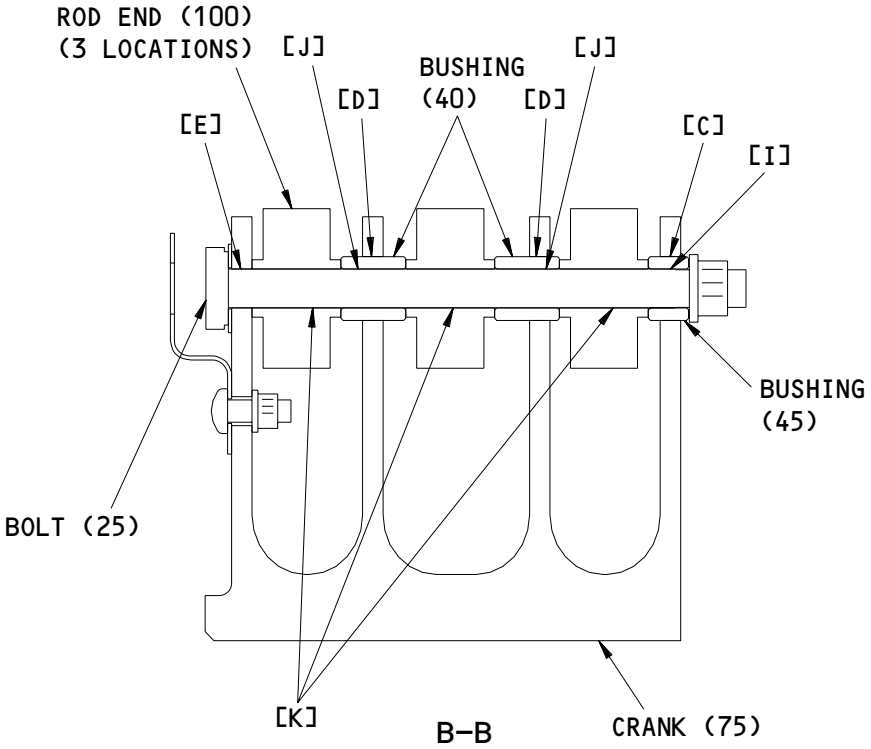
K88387



Fits and Clearances
Figure 801 (Sheet 1)

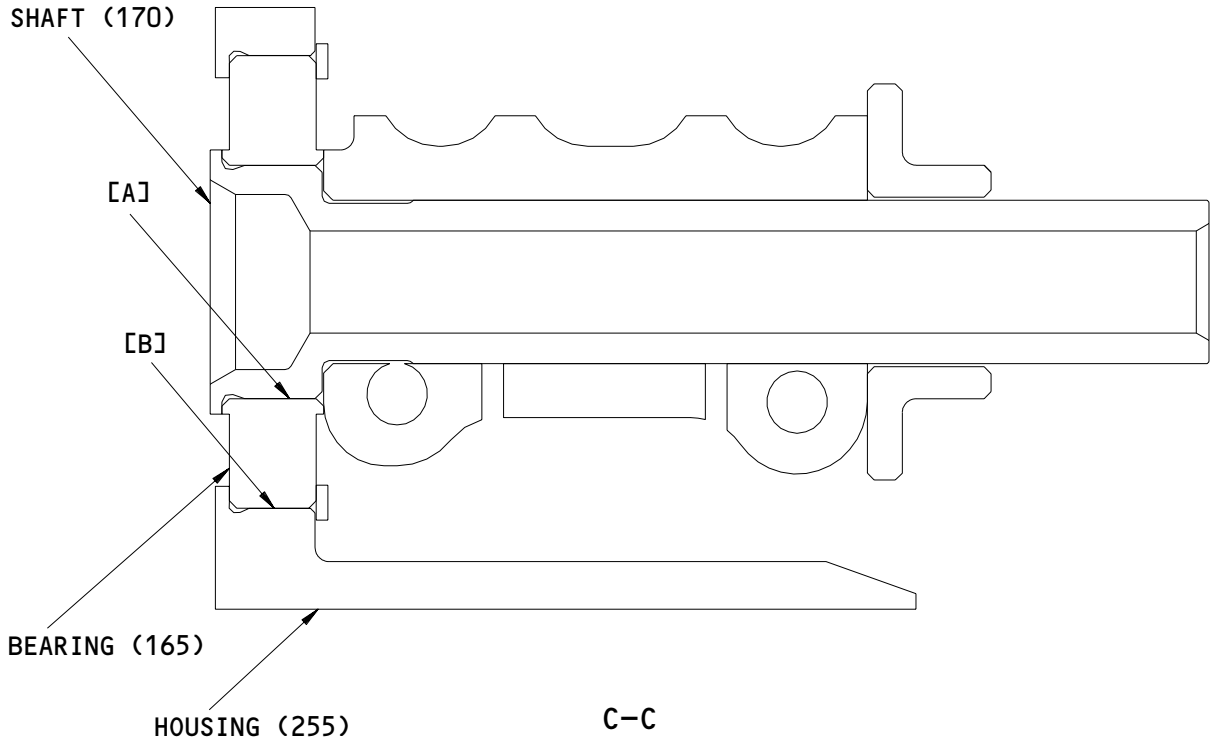
K88564





Fits and Clearances
Figure 801 (Sheet 2)

K88623



Fits and Clearances
Figure 801 (Sheet 3)

K88763

REF LETTER	REF IPL FIG. 1, MATING ITEM NO.	DESIGN DIMENSION*				SERVICE WEAR LIMIT*		
		DIMENSION		ASSEMBLY CLEARANCE		DIMENSION		MAXIMUM CLEARANCE
		MIN	MAX	MIN	MAX	MIN	MAX	
[A]	ID 165	0.9995	1.0000	0.0005	0.0020		1.0010	0.0040
	OD 170	0.9980	0.9990			0.9970		
[B]	ID 240	1.9375	1.9395	0.0000	0.0030		1.9415	0.0060
	OD 165	1.9365	1.9375			1.9355		
[C]	ID 75	0.3120	0.3140	0.0000	0.0025		0.3160	0.0065
	OD 45	0.3115	0.3120			0.3095		
[D]	ID 75	0.3120	0.3140	0.0000	0.0025		0.3160	0.0065
	OD 40	0.3115	0.3120			0.3095		
[E]	ID 75	0.1900	0.1920	0.0005	0.0035		0.1940	0.0075
	OD 25	0.1885	0.1895			0.1865		
[F]	ID 255	0.3120	0.3140	0.0000	0.0025		0.3160	0.0065
	OD 40	0.3115	0.3120			0.3095		
[G]	ID 255	0.3120	0.3140	0.0000	0.0025		0.3160	0.0065
	OD 35	0.3115	0.3120			0.3095		
[H]	ID 255	0.1900	0.1920	0.0005	0.0035		0.1940	0.0075
	OD 25	0.1885	0.1895			0.1865		
[I]	ID 45	0.1900	0.1905	0.0005	0.0020		0.1925	0.0060
	OD 25	0.1885	0.1895			0.1865		
[J]	ID 35,40	0.1900	0.1905	0.0005	0.0020		0.1925	0.0060
	OD 25	0.1885	0.1895			0.1865		
[K]	ID 100	0.1897	0.1900	0.0002	0.0015		0.1910	0.0045
	OD 25	0.1885	0.1895			0.1865		
[L]	ID 95	0.1897	0.1900	0.0002	0.0015		0.1910	0.0045
	OD 25	0.1885	0.1895			0.1865		

* ALL DIMENSIONS ARE IN INCHES

Fits and Clearances
Figure 801 (Sheet 4)

K88879

SPECIAL TOOLS, FIXTURES, AND EQUIPMENT

1. General

   A. This is a list of the special tools, fixtures, and equipment used in this manual.

   B. Equivalent alternatives can be used.

      (1) 254T5001 -- Adapter plate - Testing and Fault Isolation

      (2) Phase Angle Voltmeter (North Atlantic Instruments Model 2250)

      (3) 26 VAC (400) Hz Power Supply (5-10 Watt output) Adjustable and stabilized

      (4) Continuity Tester or ohm meter (0 ohm to 1 megohm)

      (5) MS20392-2P105 Rig Pin (0.1860-0.1840 dia x 1.7 inch min, alloy steel, aluminum, cres or titanium)

ILLUSTRATED PARTS LIST

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

2. Indentures show parts relationships as follows:

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

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

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

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

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

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

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

6. Parts Interchangeability

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

VENDORS

S0352 NIPPON MINIATURE BEARING CO LTD
TOKYO, JAPAN

0PTK6 SPS TECHNOLOGIES INC AEROSPACE PRODUCTS DIV
5195 W 4700 SPO BOX 18459
KEARNS, UTAH 84118

02660 AMPHENOL CORP INDUSTRIAL TECHNOLOGY DIV
358 HALL AVENUE PO BOX 384
WALLINGFORD, CONNECTICUT 06492

04169 WESTERN SKY INDUSTRIES A DIVISION OF ATLAS CORPORATION
1280 SAN LUIS OBISPO STREET
HAYWARD, CALIFORNIA 94544-7916

06725 AIR INDUSTRIES CORPORATION
12570 KNOTT STREET
GARDEN GROVE, CALIFORNIA 92641-3932

11815 CHERRY AEROSPACE FASTENERS DIV OF TEXTRON
1224 EAST WARNER AVENUE PO BOX 2157
SANTA ANA, CALIFORNIA 92707-0157

13556 LABINAL COMPONENTS AND SYS CINCH MILITARY AEROSPACE DIV
8821 SCIENCE CENTER DRIVE
MINNEAPOLIS, MINNESOTA 55428-3619

15653 KAYNAR TECHNOLOGY KAYNAR DIV
800 SOUTH STATE COLLEGE BLVD PO BOX 3001
FULLERTON, CALIFORNIA 92634-3001

21335 TORRINGTON CO FAFNIR BEARING DIV
59 FIELD STREET
TORRINGTON, CONNECTICUT 06790-4942

27238 BRISTOL INDUSTRIES
630 EAST LAMBERT ROAD PO BOX 630
BREA, CALIFORNIA 92621-4119

33463 NOVATRONICS OF CANADA LTD
677 ERIE STREET
STRATFORD, ONTARIO, CANADA N5A 6VA

VENDORS

38443 MRC BEARINGS
402 CHANDLER STREET
JAMESTOWN, NEW YORK 14701-3802

5M902 FAIRCHILD IND INC FAIRCHILD AEROSPACE FASTENER DIV
3016 W LOMITA BLVD
TORRANCE, CALIFORNIA 90505-5103

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

56878 SPS TECHNOLOGIES INC AEROSPACE AND INDUSTRIAL PRODUCTS DIV
HIGHLAND AVENUE
JENKINTOWN, PENNSYLVANIA 19046

62554 SIMMONDS MECAERO FASTENERS INC
1734 SEQUOIA AVENUE
ORANGE, CALIFORNIA 92668

72962 HARVARD INDUSTRIES INC
3 WERNER WAY SUITE 210
LEBANON, NEW JERSEY 08833

73197 HI-SHEAR TECHNOLOGY CORP
2600 SKYPARK DRIVE
TORRANCE, CALIFORNIA 90509

82647 TEXAS INSTRUMENT INC CONTROL PRODUCTS DIV
34 FOREST STREET MAIL 12-33
ATTLEBORO, MASSACHUSETTS 02703-2454

92215 FAIRCHILD IND INC FAIRCHILD AEROSPACE FASTENER DIV
3010 W LOMITA BLVD
TORRANCE, CALIFORNIA 90505-5102

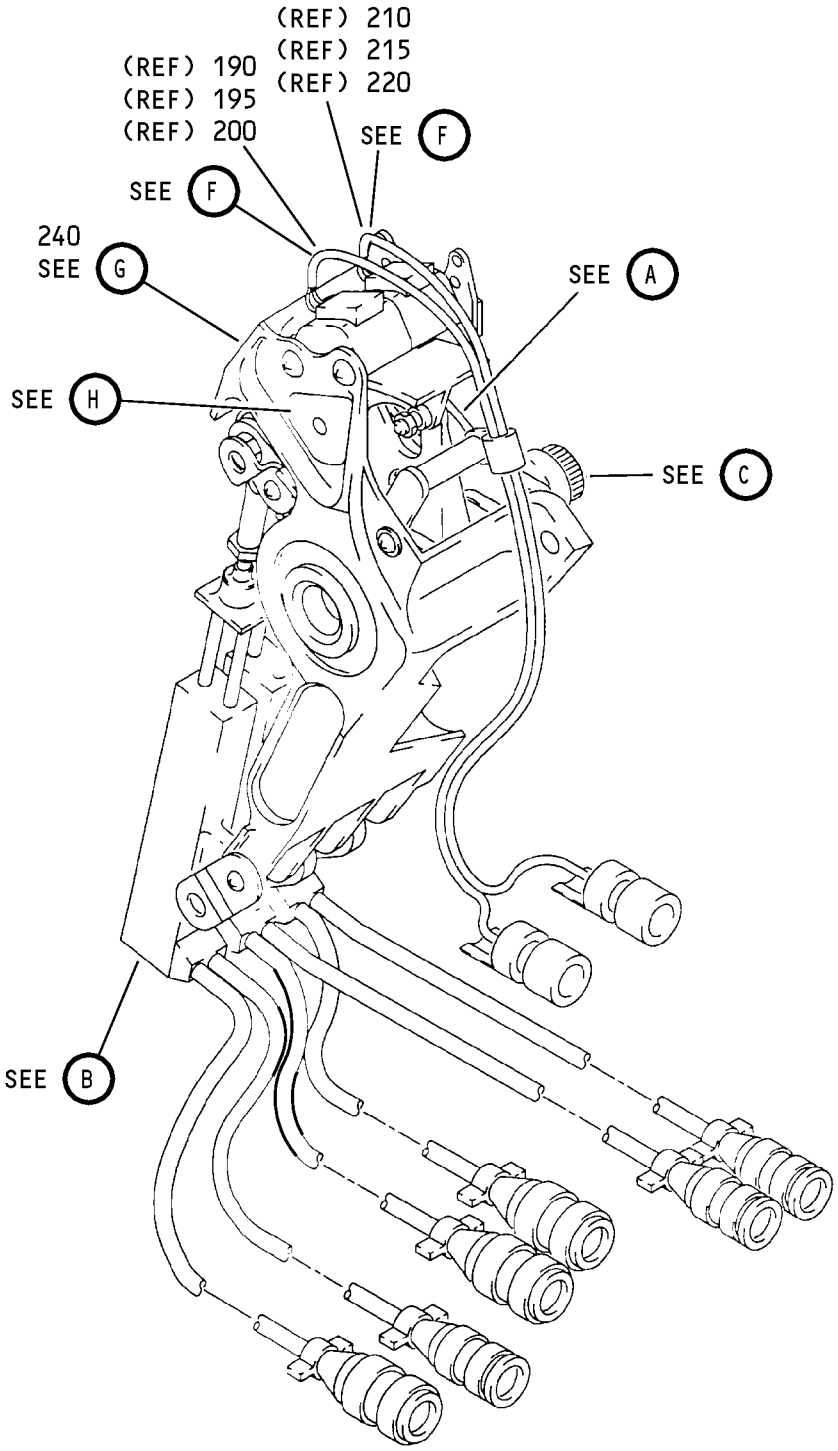
93190 SCHAEVITZ ENGINEERING
US ROUTE 130 & UNION AVENUE PO BOX 505
PENNSAUKEN, NEW JERSEY 08110-1347

REFERENCE DESIGNATOR INDEX (SEE SCHEMATIC DIAGRAM)		
REFERENCE DESIGNATOR	PART NUMBER	FIG-ITEM
S371	10AT97-3	1-190
S493	10AT304-1	210

PART NUMBER	AIRLINE PART NO.	FIG.	ITEM	TTL REQ
ABR3F1G		1	100	3
BACB10FV16J		1	165	1
BACB28BA0305020		1	45	1
BACB28BA0305032		1	40	3
BACB28BA0305051		1	35	2
BACB30NM3K35		1	25	2
BACB30NR4K15		1	10	2
BACB30NT3K2		1	125	3
BACB30VT6K3		1	60	2
BACC10DK3		1	135	1
BACC10GH12		1	195	1
		1	215	1
BACC30BL6		1	65A	2
BACC45FT12-12P7		1	200	1
BACC45FT12-12P8		1	220	1
BACC45FT14C15P		1	115	3
BACC63BN12C12P		1	120	3
BACN10JP3BCD		1	150	2
BACN10KB06CFD		1	250	2
BACN10TL3-12		1	155	1
BACN10YR04CD		1	85	1
		1	230	1
BACN10YR3CD		1	50	2
BACN10YR4CD		1	20	2
BACR15BA3AD		1	145	6
BACR15BB3AD		1	245	4
BACS12CK04-5		1	80	1
		1	225	1
BACS12CK06-32		1	175	2
BAC27TCT492		1	260	1
BH00312-04		1	85	1
		1	230	1
BRH30C04		1	85	1
		1	230	1
C0909A12C12PN		1	120	3
HHREB3N1		1	100	3
HST10AG6-3		1	60	2
HST79-6		1	65A	2
HST79CY6		1	65A	2
H52732-04CD		1	85	1
		1	230	1

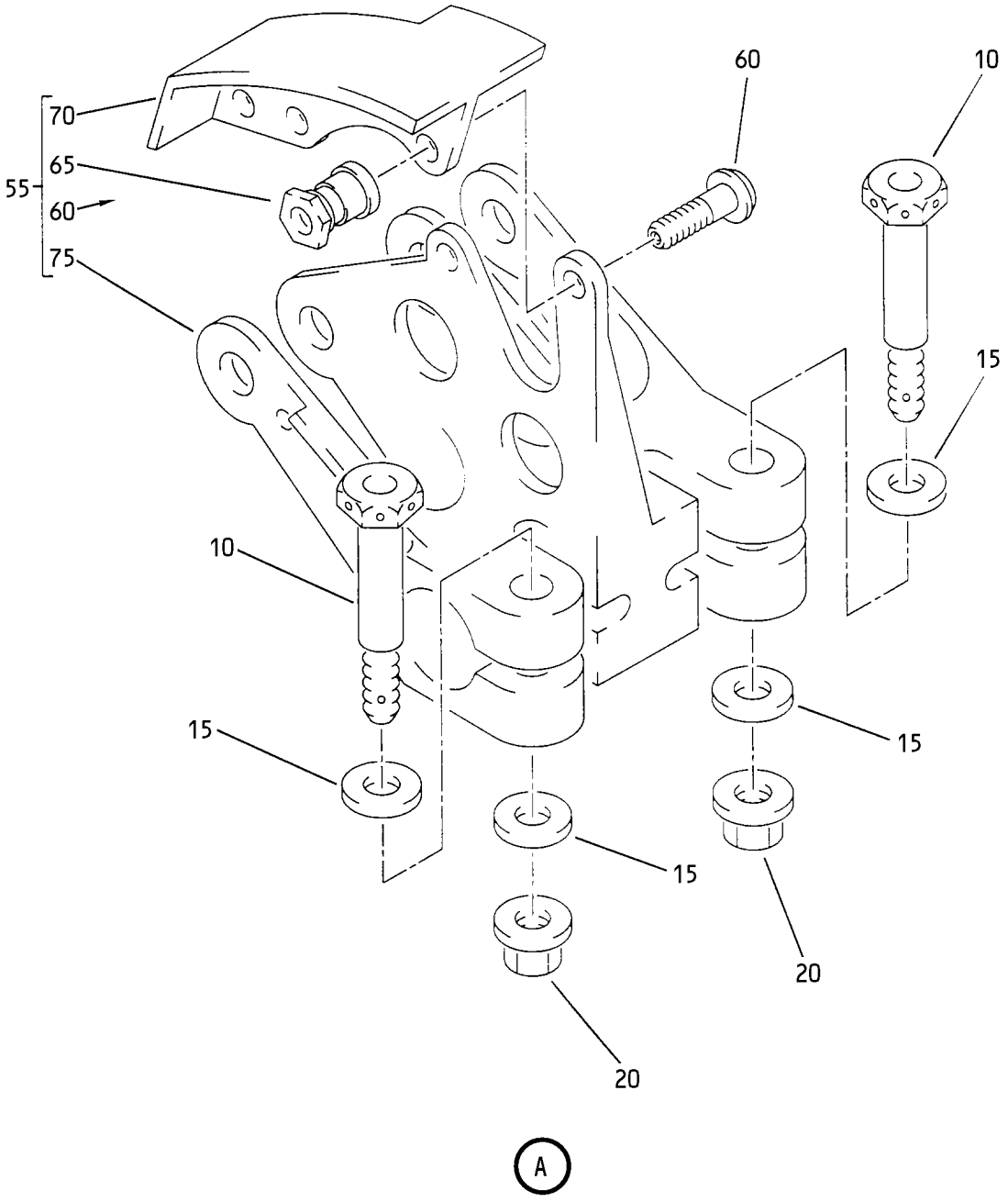
PART NUMBER	AIRLINE PART NO.	FIG.	ITEM	TTL REQ
H52732-3CD		1	50	2
H52732-4CD		1	20	2
H913A		1	110A	3
LH3858-40		1	85	1
		1	230	1
MS35695-1		1	105	3
NAS1149D0316J		1	30	2
		1	130	3
NAS1149D0416J		1	15	4
NAS509-4		1	105A	3
PLH504CD		1	85	1
		1	230	1
PLH53CD		1	50	2
PLH54CD		1	20	2
REPB3NE9171		1	100	3
REPB3NE9171B		1	100	3
REPB3NFS428		1	100	3
REPB3N4		1	100	3
S253T404-4		1	110	3
S253T404-5		1	110A	3
T6113C440		1	85	1
		1	230	1
WSI4-12		1	155	1
03560411-001		1	110	3
10AT304-1		1	210	1
10AT97-3		1	190	1
253T1215-2		1	90	1
		1	235	1
253T1217-10		1	95	3
254T5100-1		1	1A	RF
254T5101-1		1	170	1
254T5111-1		1	55	1
254T5111-2		1	75	1
254T5112-1		1	70	1
254T5113-2		1	5	1
254T5114-1		1	185	1
254T5114-2		1	205	1
254T5201-1		1	180	2
254T5202-1		1	140	1
254T5202-2		1	160	1

PART NUMBER	AIRLINE PART NO.	FIG.	ITEM	TTL REQ
254T5210-1		1	240	1
254T5210-2		1	255	1
48-63N12C12P		1	120	3
80724-440		1	85	1
		1	230	1



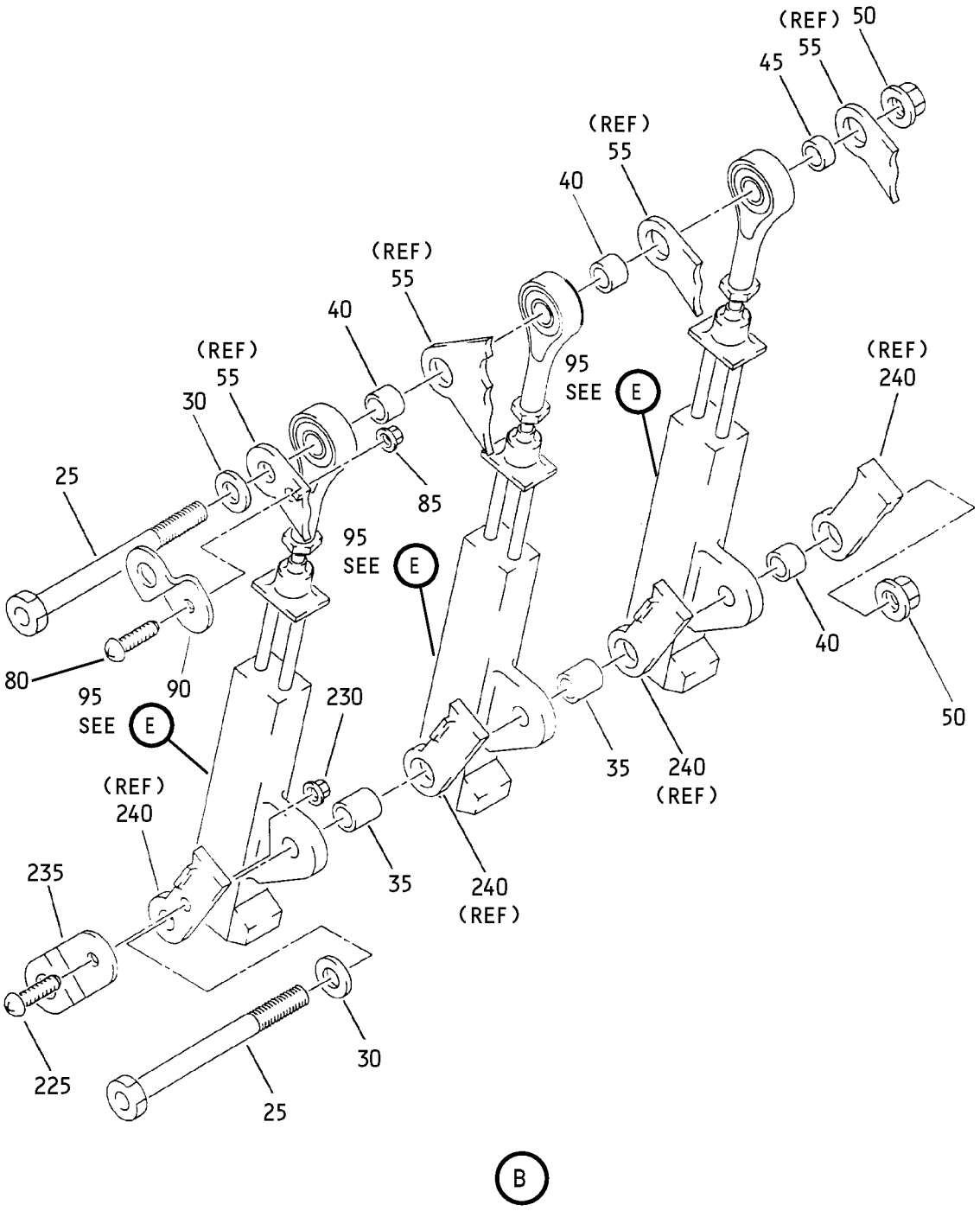
Control Stand Speedbrake Mechanism Assembly
Figure 1 (Sheet 1)

K88932



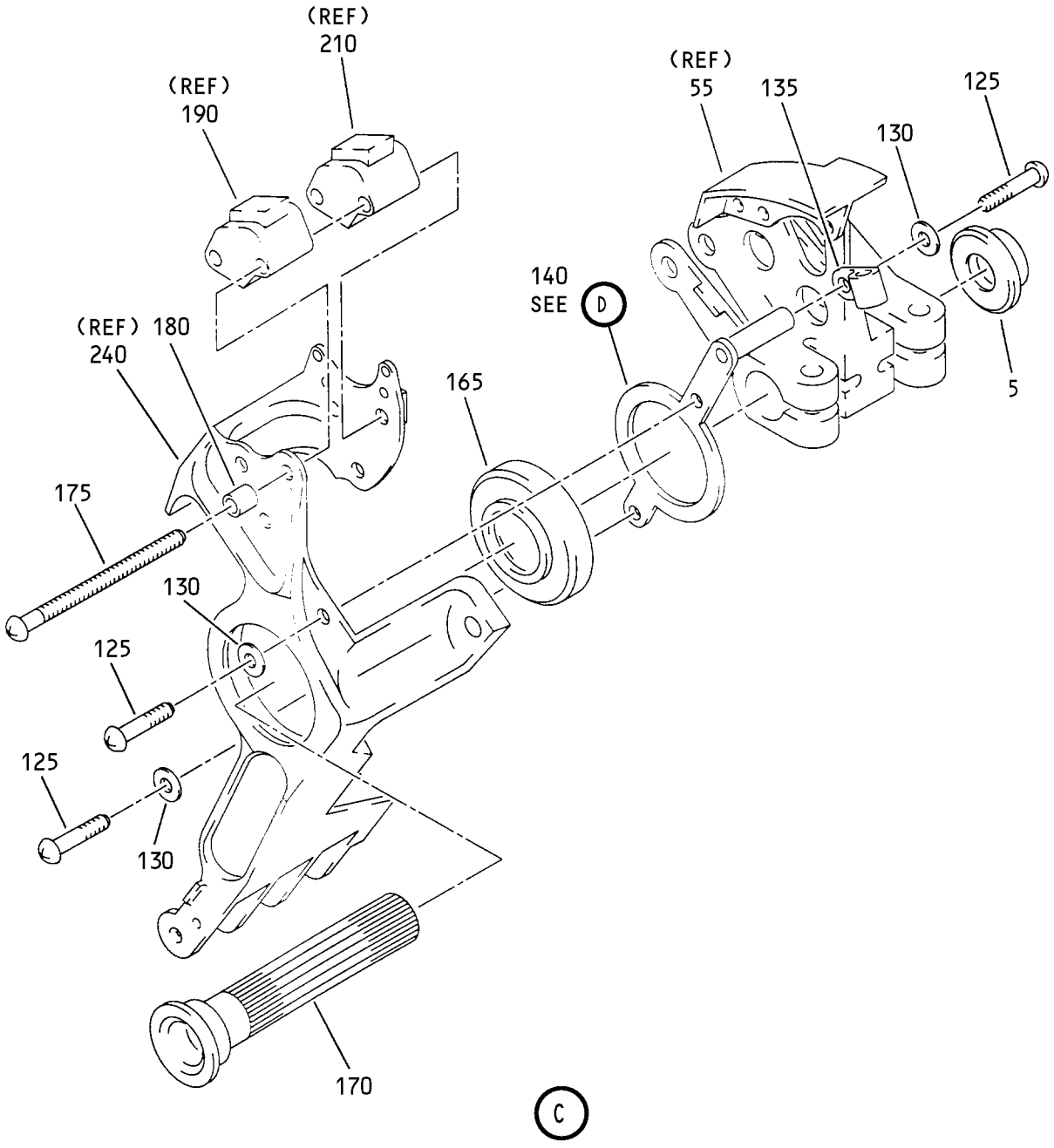
Control Stand Speedbrake Mechanism Assembly
Figure 1 (Sheet 2)

K88988



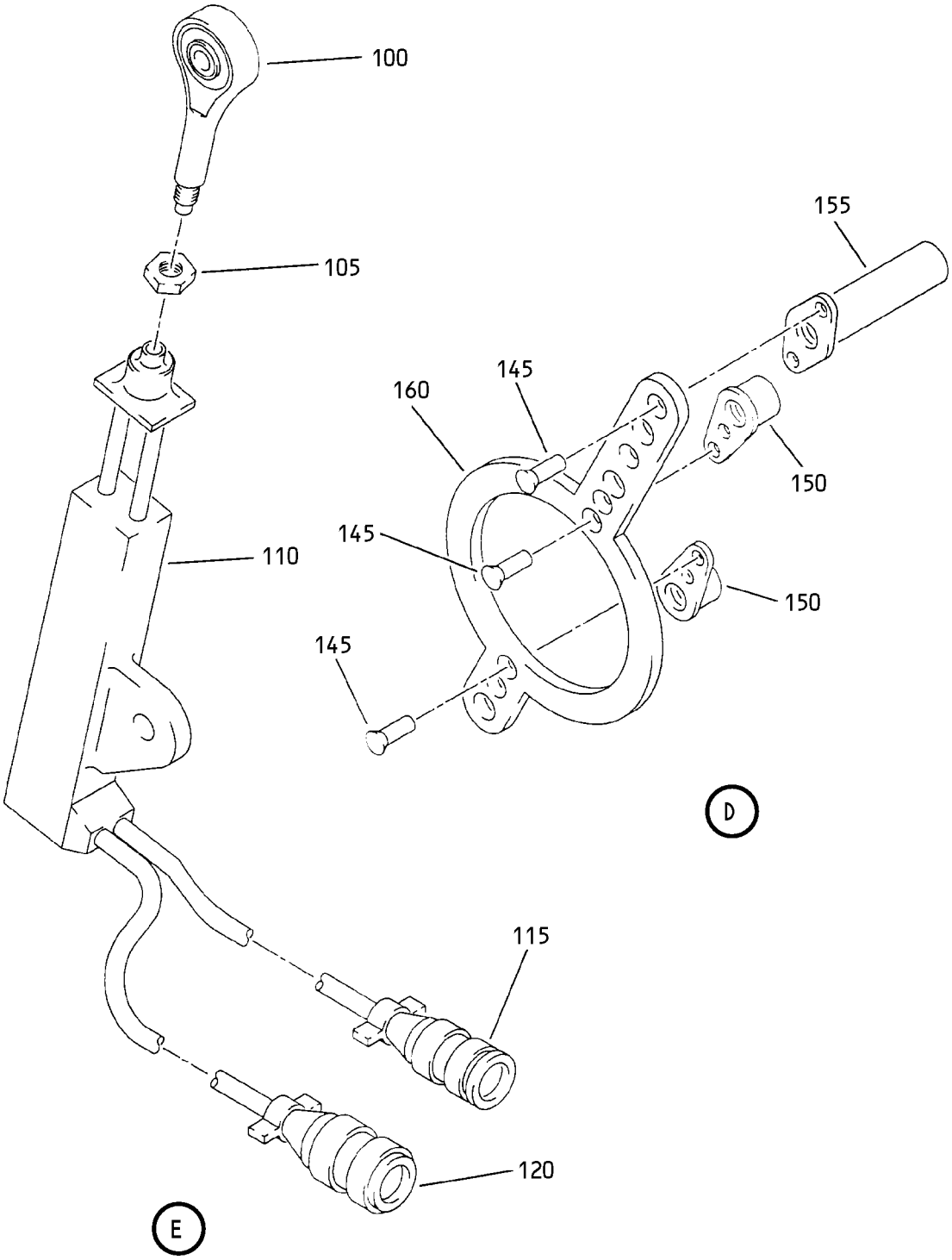
Control Stand Speedbrake Mechanism Assembly
Figure 1 (Sheet 3)

K88991



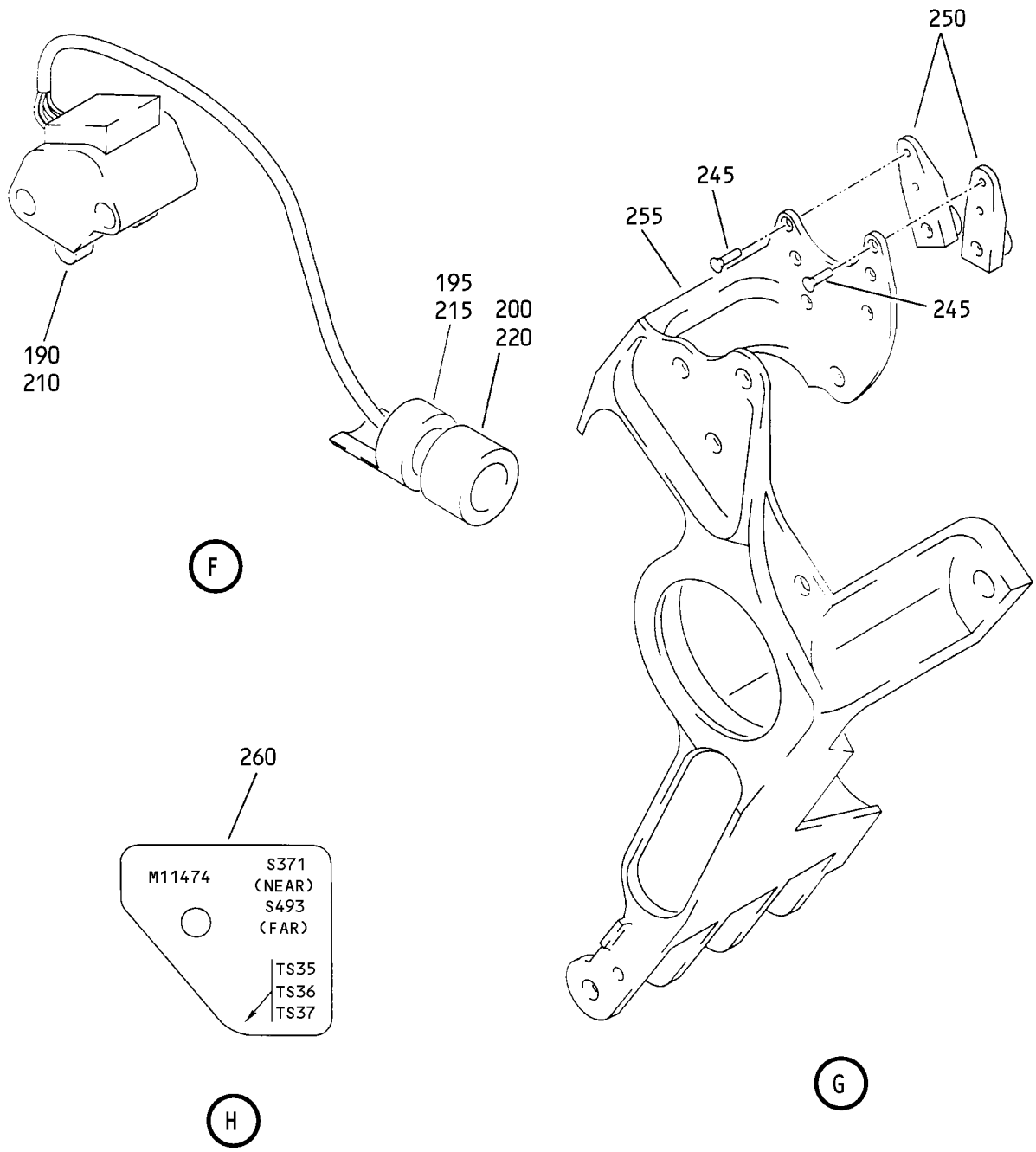
Control Stand Speedbrake Mechanism Assembly
Figure 1 (Sheet 4)

K89550



Control Stand Speedbrake Mechanism Assembly
Figure 1 (Sheet 5)

K89562



Control Stand Speedbrake Mechanism Assembly
Figure 1 (Sheet 6)

K89577

FIG. & ITEM	PART NO.	AIRLINE PART NUMBER	NOMENCLATURE 1234567	EFF CODE	QTY PER ASSY
01-					
-1A	254T5100-1		MECHANISM ASSY-SPEEDBRAKE CONT STAND		RF
5	254T5113-2		.SPACER		1
10	BACB30NR4K15		.BOLT		2
15	NAS1149D0416J		.WASHER		4
20	H52732-4CD		.NUT- (V15653) (SPEC BACN10YR4CD) (OPT PLH54CD (V62554))		2
25	BACB30NM3K35		.BOLT		2
30	NAS1149D0316J		.WASHER		2
35	BACB28BA0305051		.BUSHING		2
40	BACB28BA0305032		.BUSHING		3
45	BACB28BA0305020		.BUSHING		1
50	H52732-3CD		.NUT- (V15653) (SPEC BACN10YR3CD) (OPT PLH53CD (V62554))		2
55	254T5111-1		.CRANK ASSY		1
60	HST10AG6-3		..BOLT- (VOPTK6) (SPEC BACB30VT6K3) (OPT HST10AG6-3 (V06725)) (OPT HST10AG6-3 (V56878)) (OPT HST10AG6-3 (V73197))		2
65	BACC3BL6		DELETED		
65A	HST79CY6		..COLLAR- (V73197) (SPEC BACC30BL6) (OPT HST79-6 (V92215)) (OPT HST79CY6 (V56878)) (OPT HST79CY6 (V5M902))		2

FIG. & ITEM	PART NO.	AIRLINE PART NUMBER	NOMENCLATURE 1234567	EFF CODE	QTY PER ASSY
01-					
70	254T5112-1		..CAM		1
75	254T5111-2		..CRANK		1
80	BACS12CK04-5		.SCREW		1
85	H52732-04CD		.NUT-		1
			(V15653)		
			(SPEC BACN10YR04CD)		
			(OPT BH00312-04		
			(V27238))		
			(OPT BRH30C04		
			(V52828))		
			(OPT LH3858-40		
			(V72962))		
			(OPT T6113C440		
			(V11815))		
			(OPT 80724-440		
			(V56878))		
			(OPT PLH504CD		
			(V62554))		
90	253T1215-2		.CLIP		1
95	253T1217-10		.TRANSDUCER ASSY-		3
			(OPT ITEM 95A)		
-95A	253T1217-7		.TRANSDUCER ASSY-		3
			(OPT ITEM 95)		
100	REPB3NFS428		..ROD END-		1
			(V21335)		
			(SPEC BACB10AE1)		
			(OPT REPB3NE9171		
			(V21335))		
			(OPT REPB3NE9171B		
			(V21335))		
			(OPT REPB3N4		
			(V38443))		
			(OPT HHREB3N1		
			(V38443))		
			(OPT ABR3F1G		
			(VS0352))		

FIG. & ITEM	PART NO.	AIRLINE PART NUMBER	NOMENCLATURE 1234567	EFF CODE	QTY PER ASSY
01-					
105	MS35695-1		..NUT-		1
			(OPT ITEM 105A)		
-105A	NAS509-4		..NUT-		1
			(OPT ITEM 105)		
110	03560411-001		..TRANSDUCER-		1
			(V93190)		
			(SPEC S253T404-4)		
			(OPT ITEM 110A)		
-110A	H913A		..TRANSDUCER-		1
			(V33463)		
			(SPEC S253T404-5)		
			(OPT ITEM 110)		
115	BACC45FT14C15P		..CONNECTOR		1
120	CO909A12C12PN		..CONNECTOR-		1
			(V13556)		
			(SPEC BACC63BN12C12P)		
			(OPT 48-63N12C12P		
			(V02660))		
125	BACB30NT3K2		.BOLT		3
130	NAS1149D0316J		.WASHER		3
135	BACC10DK3		.CLAMP		1
140	254T5202-1		.RETAINER ASSY		1
145	BACR15BA3AD		..RIVET-		6
			(SIZE DETERMINE ON INST)		
150	BACN10JP3BCD		..NUTPLATE		2
155	WSI4-12		..NUTPLATE-		1
			(V04169)		
			(SPEC BACN10TL3-12)		
160	254T5202-2		..RETAINER		1
165	BACB10FV16J		.BEARING		1
170	254T5101-1		.SHAFT		1
175	BACS12CK06-32		.SCREW		2
180	254T5201-1		.BUSHING		2
-185	254T5114-1		.WIRE BUNDLE ASSY		1
190	10AT97-3		..SWITCH-		1
			(V82647)		
			(S371)		
195	BACC10GH12		..CLAMP		1
200	BACC45FT12-12P7		..CONNECTOR		1

FIG. & ITEM	PART NO.	AIRLINE PART NUMBER	NOMENCLATURE 1234567	EFF CODE	QTY PER ASSY
01-					
-205	254T5114-2		.WIRE BUNDLE ASSY		1
210	10AT304-1		..SWITCH-		1
			(V82647)		
			(S493)		
215	BACC10GH12		..CLAMP		1
220	BACC45FT12-12P8		..CONNECTOR		1
225	BACS12CK04-5		.SCREW		1
230	H52732-04CD		.NUT-		1
			(V15653)		
			(SPEC BACN10YR04CD)		
			(OPT BH00312-04		
			(V27238))		
			(OPT BRH30C04		
			(V52828))		
			(OPT LH3858-40		
			(V72962))		
			(OPT T6113C440		
			(V11815))		
			(OPT 80724-440		
			(V56878))		
			(OPT PLH504CD		
			(V62554))		
235	253T1215-2		.CLIP		1
240	254T5210-1		.HOUSING ASSY		1
245	BACR15BB3AD		..RIVET-		4
			(SIZE DETERMINE ON INST)		
250	BACN10KB06CFD		..NUTPLATE		2
255	254T5210-2		..HOUSING		1
260	BAC27TCT492		.MARKER		1

- Item Not Illustrated