TO: ALL HOLDERS OF MAIN LANDING GEAR SPRING CARTRIDGE ASSEMBLY COMPONENT MAINTENANCE MANUAL 32-32-30

REVISION NO. 7 DATED MAR 01/03

HIGHLIGHTS

All data formerly in 767 CMM 32-32-31 is now included in this manual 32-32-30.

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
DESCRIPTION & OPERATION	Added clarifications and updated callouts.
1	
101	
301	
401	
501	
REPAIR-GEN	
601-602	
REPAIR 1-1	
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REPAIR 2-1	
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REPAIR 3-1	
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REPAIR 4-1	
601	
701-702	
801-802	
901	
1005	
REPAIR 3-1	Added Datum D.
602-603	

MAIN LANDING GEAR SPRING CARTRIDGE ASSEMBLY

PART NUMBER 161T2033-1,-2

COMPONENT MAINTENANCE MANUAL
WITH
ILLUSTRATED PARTS LIST

T21920

BOEING

COMPONENT
MAINTENANCE MANUAL

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

T21915

TEMPORARY REVISION AND SERVICE BULLETIN RECORD

BOEING SERVICE BULLETIN	BOEING TEMPORARY REVISION	OTHER DIRECTIVE	DATE OF INCORPORATION INTO MANUAL
32-0139		PRR C12338	JAN 01/89 SEP 01/95

PAGE	DATE	CODE
32-32-30		
TITLE PAGE		
1	JAN 01/89	01.1
2	BLANK	
REVISION RECORD		
1	OCT 01/87	01
2	BLANK	
TR & SB RECORD		
1	SEP 01/95	01.1
2	BLANK	
LIST OF EFFECTIVE PAGES		
*1	MAR 01/03	01
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1	OCT 01/87	01
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*1	MAR 01/03	01.1
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TESTING & TROUBLE SHOOTING		
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*602	MAR 01/03	01.1
*603	MAR 01/03	01.1
*604	BLANK	
REPAIR 4-1		
*601	MAR 01/03	01.1
602	BLANK	
ASSEMBLY		
*701	MAR 01/03	01.1
*702	MAR 01/03	01.1
FITS AND CLEARANCES		
*801	MAR 01/03	01.1
*802	MAR 01/03	01.1
SPECIAL TOOLS		
*901	MAR 01/03	01.1
902	BLANK	
ILLUSTRATED PARTS LIST		
1001	OCT 01/87	01
*1002	MAR 01/03	01.101
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*1005	MAR 01/03	01.1
*1006	BLANK	

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* = REVISED, ADDED OR DELETED

TABLE OF CONTENTS

INTRODUCTION

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

This manual is divided into separate sections:

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

Refer to the Table of Contents for the page location of applicable sections. An asterisked flagnote *[ ] in place of the page number indicates that no special instructions are provided since the function can be performed using standard industry practices.

Throughout the manual IPL item number references include alpha-variants, unless otherwise stated.

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.

Verification:

Testing/TS -- Jul 21/82
Disassembly -- Jul 21/82
Assembly -- Jul 21/82

MAIN LANDING GEAR SPRING CARTRIDGE ASSEMBLY

DESCRIPTION AND OPERATION

1. The spring cartridge assembly includes a spring, an outer slide and an inner slide, with a fitting at one end of each slide. The spring cartridge attaches to the upper spindle assembly and the lower lock link. The spring cartridge pushes the lock links into the overcenter position to lock the side strut assembly when the main gear is lowered by the alternate extension system.

2. Leading Particulars (Approximate)

   A. Length -- 26.8 inches (between center of bearings)

   B. Diameter -- 3.5 inches

   C. Weight -- 22 lbs

TESTING/TROUBLE SHOOTING

1. Equipment

   A. Test Fixture -- A32042-1

2. Test

   A. Install the cartridge assembly on test fixture Tool A32042-1.

   B. Functional Test:

      (1) Extend the cartridge to 27.30 inches (measured between bearing centers). The force gage must read 270-322 lbs.

      (2) Extend the cartridge to 32.76 inches (measured between bearing centers). The force gage must read 404-494 lbs.

TROUBLE	PROBABLE CAUSE	CORRECTION
Load not within limits	Defective spring (80, IPL Fig. 1)	Disassemble and replace spring per par. 3.A.

Trouble Shooting Chart
Figure 101

3. Corrective Procedures

   A. Replacement of spring (80).

      (1) Completely disassemble the unit per DISASSEMBLY. Replace spring (80).

      (2) Assemble the unit per ASSEMBLY.

      (3) Do the test again (par. 2).

DISASSEMBLY

NOTE: Refer to TESTING/TROUBLE SHOOTING to find the condition or possible cause of malfunction and to find out how much disassembly and repair is necessary.

1. Equipment

   A. Spring Compressor -- A32003-1

2. Parts Replacement

   NOTE: These parts are recommended for replacement. Replacement of other parts can be by in-service experience.

   A. Cotter pins.

3. Disassembly (IPL Fig. 1)

   WARNING: THE SPRING INSIDE THIS UNIT HAS A HEAVY PRELOAD. BE VERY CAREFUL WHEN YOU REMOVE THE SPRING, OR INJURY TO PERSONNEL AND DAMAGE TO PARTS CAN OCCUR.

   A. Install the cartridge in spring compressor A32003-1. Compress spring (80) to remove the load between sleeve (35) and outer slide (85).

   B. Remove cotter pins (5), bolts (10), washers (15, 20), nuts (25), bushings (30). Remove sleeve (35, 40) and fittings (45, 60).

      NOTE: Do not remove bearings (50, 65) from fittings (55, 70) unless necessary for repair or replacement.

   C. Slide out the outer slide (85) and inner slide (90) from spring (80).

   D. Remove stop washer (75) from inner slide (90).

CLEANING

1. Clean all parts but bearings (50, 65) by standard industry practices and the instructions in SOPM 20-30-03.

2. Clean teflon-lined bearings (50, 65) by the special procedure in SOPM 20-30-01.

CHECK

1. Examine all parts for defects with standard industry practices. Refer to FITS AND CLEARANCES for design dimensions and wear limits.

2. Examine fittings (45, 60) for loose bearings and bushings per SB 32-0139.

3. Magnetic particle examine 161T2036-1 spring (80) per SOPM 20-20-01.

4. Penetrant examine per SOPM 20-20-02 -- 161T2051-2 spring (80B), slides (85, 90), fittings (55, 70), sleeves (35, 40).

5. Examine spring (80) per Fig. 501.

ITEM NO. (IPL FIG. 1)	APPROXIMATE FREE LENGTH (INCHES)	TEST LENGTH (INCHES)	ALLOWABLE LOAD LIMITS (POUNDS)
80 (161T2036-1)	31.00	14.94 20.40	404 - 494 270 - 322
80B (161T2051-2)	30.96	14.94 20.40	404 - 494 266 - 326

Spring Check Data
Figure 501

REPAIR - GENERAL

1. Content

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

P/N	NAME	REPAIR
161T2034	SLIDE, OUTER	1-1
161T2035	SLIDE, INNER	2-1
161T2037	FITTING, LOWER	3-1
161T2041	FITTING, UPPER	3-1
- - -	MISCELLANEOUS PARTS REFINISH	4-1

2. Standard Practices

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

20-00-00 Introduction
20-10-01 Repair and Refinish of High Strength Steel Parts
20-10-02 Machining of Alloy Steel
20-10-04 Grinding of Chromic Plated Parts
20-10-04 Grinding of Chrome Plate
20-10-05 Application and Finishng of Thermal Spray Coating
20-41-01 Decoding Table for Boeing Finish Codes
20-42-03 Hard Chrome Plating
20-43-01 Chromic Acid Anodizing
20-50-03 Bearing and Bushing Replacement
20-60-02 Finishing Materials
20-60-04 Miscellaneous Materials

3. Materials

NOTE: Equivalent substitutes can be used.

A. Enamel -- BMS 10-60, Gloss, Color Gray (707) (Ref 20-60-02)

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

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

D. Sealant -- BMS 5-95 (SOPM 20-60-04)

4. Dimensioning Symbols

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

SLIDE, OUTER - REPAIR 1-1

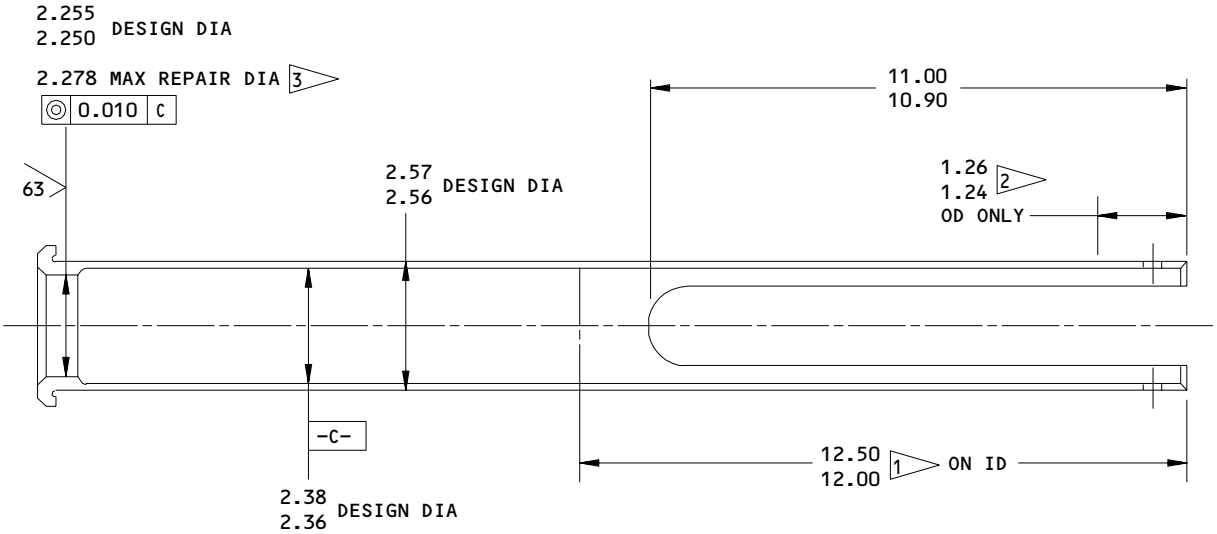
161T2034-1

NOTE: Refer to REPAIR - GENERAL for a list of applicable standard practices. For repair of surfaces which is only replacement of the original finish, refer to Refinish instructions, Fig. 601.

1. ID Repair (Fig. 601)

   A. Machine as required, within repair limits, to remove defects.

   B. Refinish as indicated.



REFINISH

PASSIVATE (F-17.25, WHICH REPLACES F-17.09) ALL OVER AND PLATE AS SHOWN IN 1 2

1 CHROME PLATE (F-15.03), 0.0005-0.0010 THICK

2 CADMIUM PLATE AND APPLY BMS 10-11, TYPE 1 PRIMER (F-16.01)

3 RESTORATION TO DESIGN DIMENSIONS NOT REQUIRED

REPAIR

REF 3

125 ALL MACHINED SURFACES UNLESS SHOWN DIFFERENTLY

MATERIAL: 304 CRES, ANNEALED (QQ-S-763)

ALL DIMENSIONS ARE IN INCHES

161T2034-1
Outer Slide Repair and Refinish
Figure 601

T21916

SLIDE, INNER - REPAIR 2-1

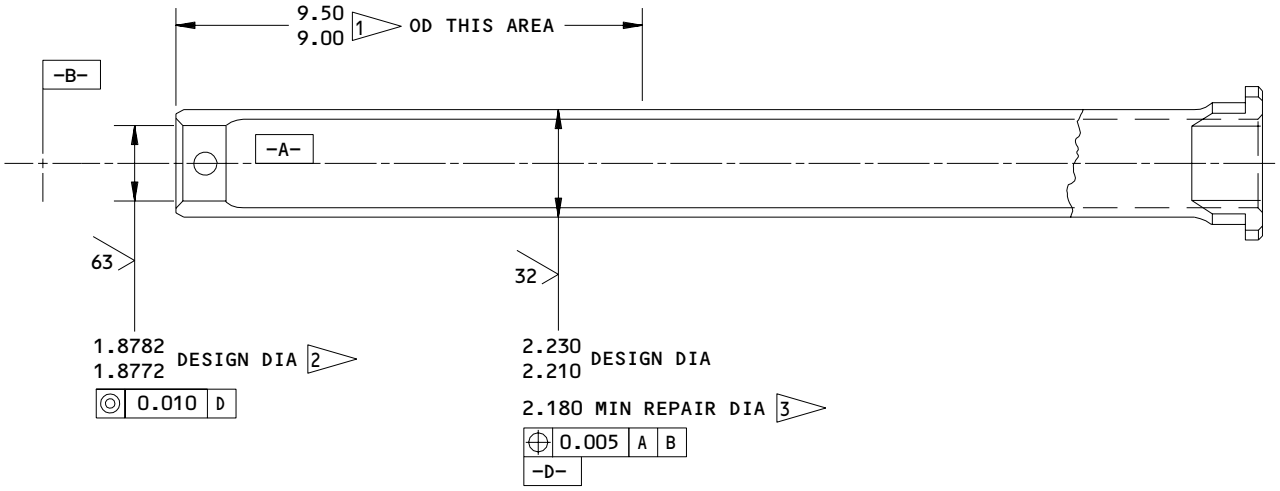
161T2035-1

NOTE: Refer to REPAIR - GENERAL for a list of applicable standard practices. For repair of surfaces which is only replacement of the original finish, refer to Refinish instructions, Fig. 601.

1. OD Repair (Fig. 601)

   A. Machine as required, within repair limits, to remove defects.

   B. Build up the surface with chrome plate. Grind to design dimensions and finish.



REFINISH

PASSIVATE (F-17.25, WHICH REPLACES F-17.09) ALL OVER AND PLATE AS SHOWN BY 1 2 3

1 CHROME PLATE (F-15.03), 0.0005-0.0010 THICK

2 CADMIUM PLATE AND APPLY BMS 10-11, TYPE 1 PRIMER (F-16.01)

3 LIMIT FOR BUILDUP WITH CHROME PLATE (SOPM 20-42-03) AND GRIND (SOPM 20-10-04) TO DESIGN DIMENSIONS AND FINISH

REPAIR

REF 3

125 ALL MACHINED SURFACES UNLESS SHOWN DIFFERENTLY

MATERIAL: 304 CRES, ANNEALED (QQ-S-763)

ALL DIMENSIONS ARE IN INCHES

161T2035-1
Inner Slide Repair and Refinish
Figure 601

T21918

FITTING ASSEMBLY - REPAIR 3-1

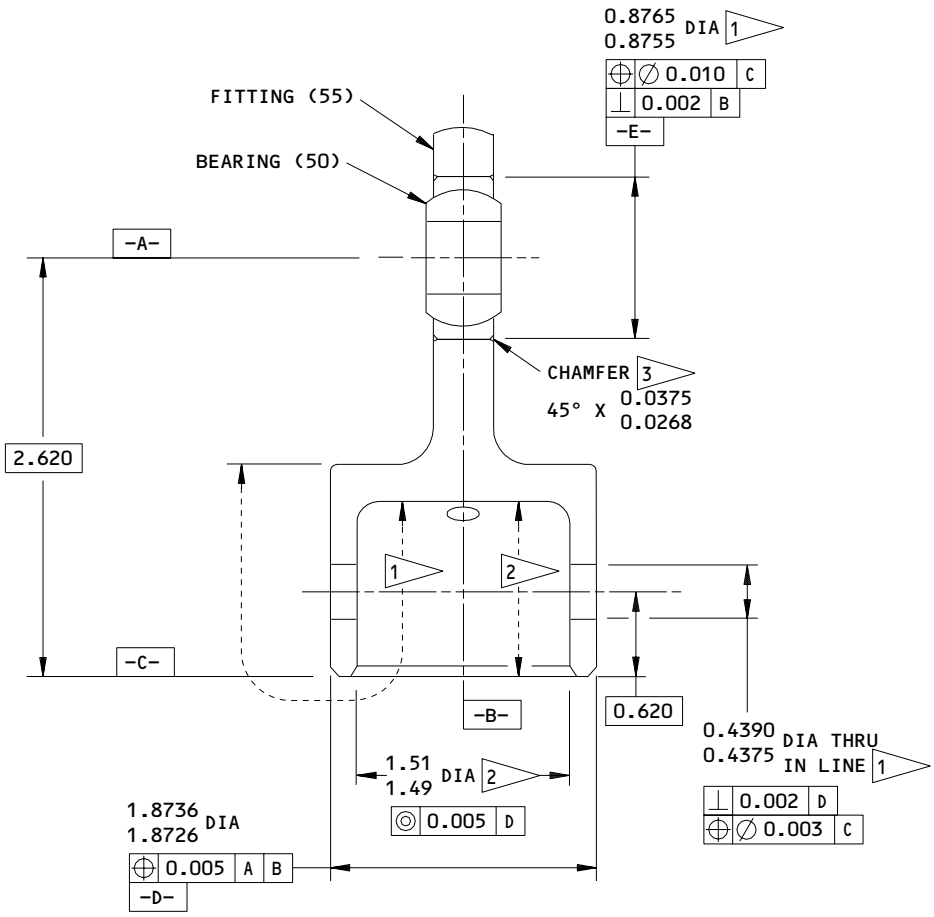
161T2037-1
161T2041-1

NOTE: Refer to REPAIR - GENERAL for a list of applicable standard practices. For repair of surfaces which is only replacement of the original finish, refer to Refinish instructions, Fig. 601.

1. Bearing Replacement (Fig. 601, 602)

A. Install a replacement bearing and roller swage it (SOPM 20-50-03).

B. Fillet seal the bearing as shown.



REFINISH

CHROMIC ACID ANODIZE AND APPLY BMS 10-11, TYPE 1 PRIMER (F-18.13). AFTER BEARING IS INSTALLED, APPLY BMS 10-60 ENAMEL (F-14.9813, WHICH REPLACES SRF-14.9813) UNLESS SHOWN BY 1. APPLY CORROSION PREVENTIVE COMPOUND AS SHOWN BY 2.

1. NO ENAMEL ON THIS SURFACE
2. APPLY MIL-C-11796 CLASS 1 CORROSION PREVENTIVE COMPOUND (F-19.03)
3. FILLET SEAL WITH BMS 5-95 SEALANT

REPAIR

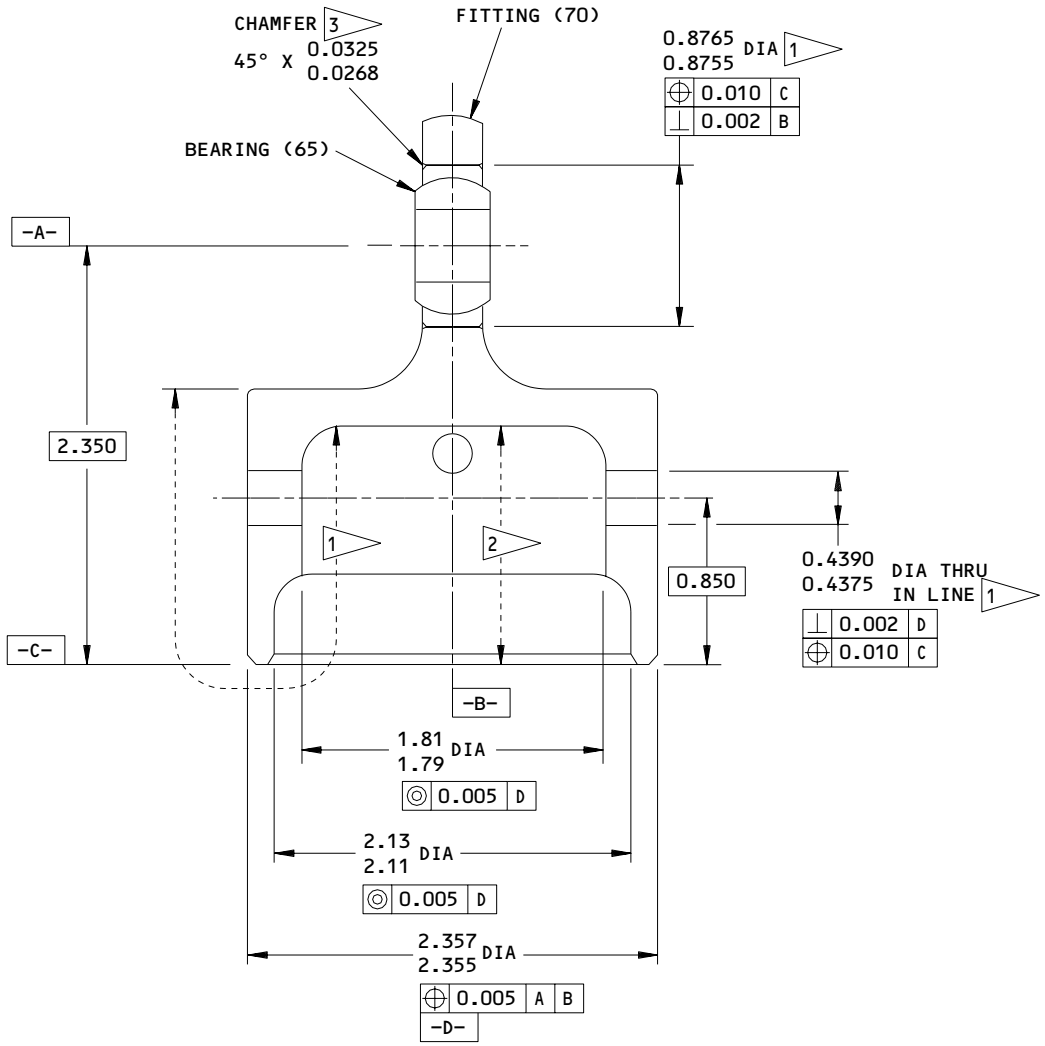
125 ALL MACHINED SURFACES UNLESS SHOWN DIFFERENTLY

MATERIAL: AL ALLOY

ALL DIMENSIONS ARE IN INCHES

161T2037-1
Lower Fitting Assembly Repair and Refinish
Figure 601

T21919



REFINISH

CHROMIC ACID ANODIZE AND APPLY BMS 10-11, TYPE 1 PRIMER (F-18.13). AFTER BEARING IS INSTALLED APPLY BMS 10-60 ENAMEL (F-14.9813, WHICH REPLACES SRF-14.9813) UNLESS SHOWN BY 1. APPLY CORROSION PREVENTIVE COMPOUND AS SHOWN BY 2.

MATERIAL: AL ALLOY

ALL DIMENSIONS ARE IN INCHES

1 NO ENAMEL ON THIS SURFACE

2 APPLY MIL-C-11796 CLASS 1 CORROSION PREVENTIVE COMPOUND (F-19.03)

3 FILLET SEAL WITH BMS 5-95 SEALANT

161T2041-1
Upper Fitting Assembly Repair and Refinish
Figure 602

N87377

MISCELLANEOUS PARTS REFINISH - REPAIR 4-1

1. Repair of these parts is only replacement of the original finish.

IPL FIG. & ITEM	MATERIAL	FINISH
Fig. 1		
Sleeve (35, 40)	Al alloy	Chromic acid anodize and apply BMS 10-11, Type 1 primer (F-18.13) all over. Apply BMS 10-60 enamel (F-14.9813, which replaces SRF-14.9813), but no enamel in ID or in the 0.4375-inch hole.
Stop washer (75)	304 CRES per QQ-S-763	Passivate (F-17.25, which replaces F-17.09) all over.
Spring (80)	17-7 PH CRES per AMS 5673	Passivate (F-17.25, which replaces F-17.09) all over.
Spring (80B)	Titanium Alloy	No finish.

Refinish Details
Figure 601

ASSEMBLY

1. Materials

   NOTE: Equivalent substitutes can be used.

   A. Sealant -- BMS 5-95 (Replaces BMS 5-79) (SOPM 20-60-04)

   B. Enamel -- BMS 10-60 (SOPM 20-60-02)

   C. Solvent -- Aliphatic naphtha TT-N-95, Type 1 (Replaces BMS 3-2 Type 1) (SOPM 20-60-01)

2. Equipment

   NOTE: Equivalent substitutes can be used.

   A. Spring Compressor -- A32003-1

3. Assembly (IPL Fig. 1)

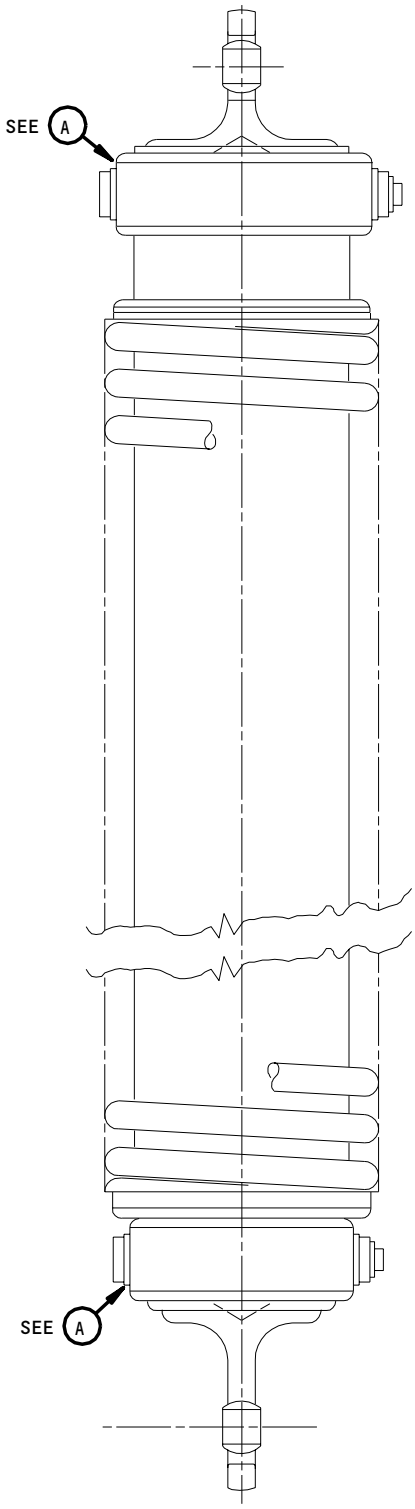
   A. Install stop washer (75) on inner slide (90). Install outer slide (85) on spring (80) and slide inner slide (90) on outer slide.

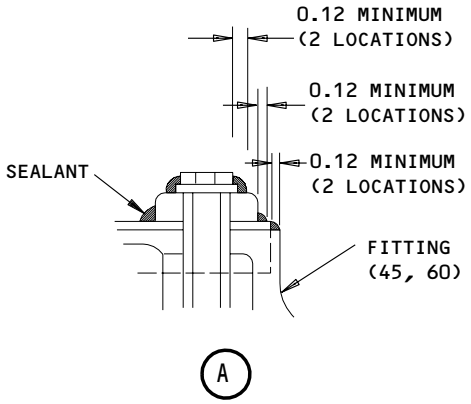
   B. With spring compressor A32003-1, compress spring (80) to 20.9 inches.

   C. Install parts (5 thru 40) on outer slide (85) and inner slide (90).

   D. Seal the contact areas of parts (10 thru 40) per Fig. 701.

4. Give protection to the spring cartridge and put it away by standard industry practices and the instructions in SOPM 20-44-02 and 20-70-01.



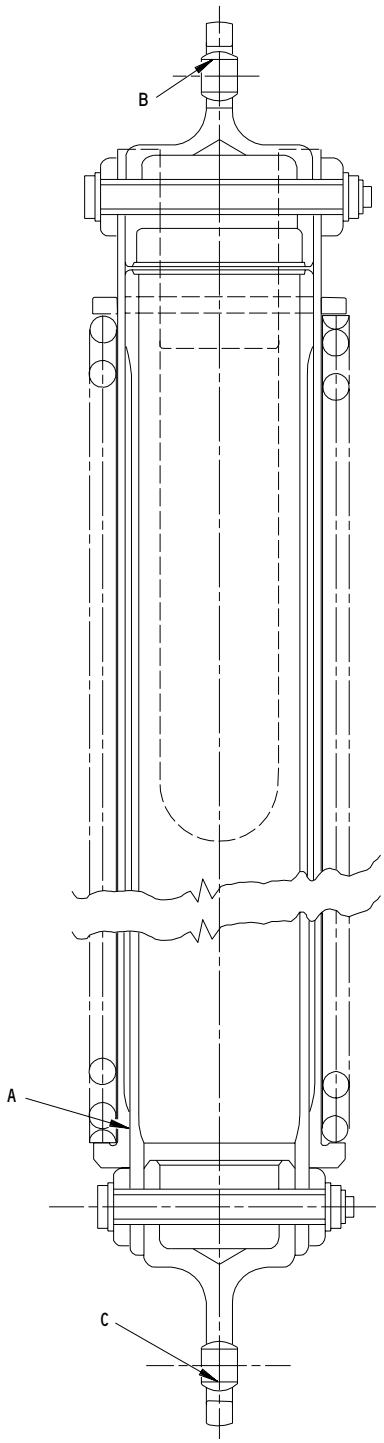


1. CLEAN AREAS OF SEALANT APPLICATION WITH SOLVENT
2. APPLY FILLET OF SEALANT TO EDGES OF PARTS AS SHOWN OR PER SOPM 20-50-19
3. APPLY BMS 10-60 GRAY GLOSS ENAMEL (F-14.9813, WHICH REPLACES SRF-14.9813) OVER SEALANT AND AREAS AROUND SEALANT

ALL DIMENSIONS ARE IN INCHES

Sealant Application
Figure 701

T21923



Fits and Clearances
Figure 801 (Sheet 1)

Ref Letter Fig.801	Mating Item No. IPL Fig.1	Design Dimension				Service Wear Limit		
		Dimension		Assembly Clearance		Dimension		Maximum Clearance
		Min	Max	Min	Max	Min	Max	
A	ID 85 OD 90	2.250 2.210	2.255 2.230	0.020	0.045	2.207	2.278	0.048
B	ID 65 OD 1	0.3750 0.3735	0.3754 0.3745	0.0005	0.0019	0.3723	0.3776	0.0031
C	ID 50 OD 2	0.3750 0.3735	0.3754 0.3745	0.0005	0.0019	0.3723	0.3776	0.0031

ALL DIMENSIONS ARE IN INCHES

1 BOLT NAS6606D20 OR BACB30LE6K73 (INSTALLATION PART)

2 BOLT NAS6606D20 (INSTALLATION PART)

Fits and Clearances
Figure 801 (Sheet 2)

13780

SPECIAL TOOLS, FIXTURES, AND EQUIPMENT

NOTE: Equivalent substitutes can be used.

1. A32042-1 -- Test Fixture

2. A32003-1 -- Spring Compressor

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.

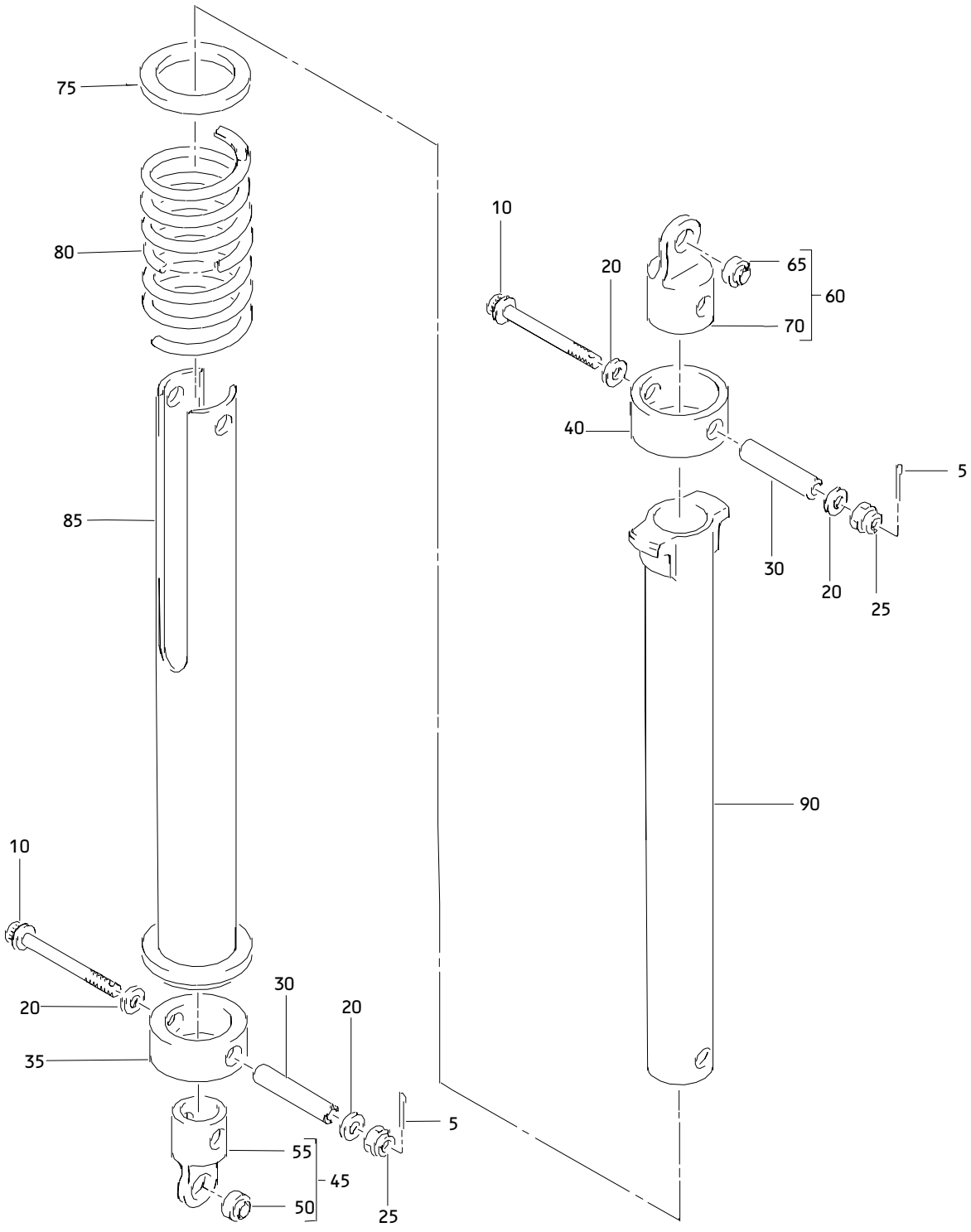
    B. When the top assembly part number is not changed by the Service Bulletin, the notations appear at the detail part level.

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

56878 SPS TECHNOLOGIES INC
HIGHLAND AVENUE
JENKINTOWN, PENNSYLVANIA 19046



Main Landing Gear Side Strut Spring Cartridge Assy
Figure 1

T21921

FIG. & ITEM	PART NO.	AIRLINE PART NUMBER	NOMENCLATURE 1234567	EFF CODE	QTY PER ASSY
01-					
-1	161T2033-1		CARTRIDGE ASSY-MLG SIDE STRUT SPRING	A	RF
-1A	161T2033-2		CARTRIDGE ASSY-MLG SIDE STRUT SPRING	B	RF
5	MS24665-134		.PIN-COTTER		2
10	BACB30NR4DK50		DELETED		2
10A	NAS6404D49		DELETED		2
10B	NAS6604D49		.BOLT		2
10C	NAS6704D49		.BOLT (OPT ITEMS 10B,10D)		2
10D	BACB30NM4DK49		.BOLT (OPT ITEMS 10B,10C)		2
15	AN960-416L		DELETED		2
20	AN960-416		.WASHER		4
25	BRH10-4		DELETED		2
25A	LCN12-428		.LOCKNUT- (V56878) (OPT ITEM 25B)		2
-25B	58703-428-7		.LOCKNUT- (V56878) (OPT ITEM 25A)		2
30	BACB28AK05-297		.BUSHING-		2
35	161T2038-1		.SLEEVE-LWR		1
40	161T2040-1		.SLEEVE-UPR		1
45	161T2037-1		.FITTING ASSY-LWR		1
50	BACB10ES06GC		..BEARING-SPHERICAL		1
55	161T2037-2		..FITTING		1
60	161T2041-1		.FITTING ASSY-UPR		1
65	BACB10ES06GC		..BEARING-SPHERICAL		1
70	161T2041-2		..FITTING		1
75	161T2046-1		.STOPWASHER-SPR		1
80	161T2036-1		.SPRING (OPT TO ITEM 80B)	A	1
80A	161T2051-1		DELETED		
80B	161T2051-2		.SPRING (OPT TO ITEM 80)	B	1
85	161T2034-1		.SLIDE-OUTER		1
90	161T2035-1		.SLIDE-INNER		1