TO: ALL HOLDERS OF CONTROL STAND THRUST LEVER ASSEMBLY COMPONENT MAINTENANCE
$06 MANUAL 76-11-18

REVISION NO. 10 DATED NOV 01/00

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

CHAPTER/SECTION AND PAGE NO.	DESCRIPTION OF CHANGE
INTRODUCTION 1	Added technical clarification to text paragraph.
DESCRIPTION & OPERATION 1 301 702-703	
704	Added technical clarification to figure.
705-706 1008-1010	Added new bench test procedure and Fig. 702, for the fuel control box assembly (Fig. 1, Item 1) in accordance with Service Bulletin SB-767-76-0018.

BOEING

COMPONENT
MAINTENANCE MANUAL

CF6-80 ENGINE THROTTLE FUEL CONTROL BOX ASSEMBLY

PART NUMBERS 315T1040-10,-12,-16,-17,-19
015T0094-8,-9
015T0376-9 THRU -11

COMPONENT MAINTENANCE MANUAL
WITH
ILLUSTRATED PARTS LIST

T22122

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

T22116

TEMPORARY REVISION AND SERVICE BULLETIN RECORD

BOEING SERVICE BULLETIN	BOEING TEMPORARY REVISION	OTHER DIRECTIVE	DATE OF INCORPORATION INTO MANUAL
		PRR B10184	JUL 10/81
		PRR VDC-T0068-1	APR 10/82
		PRR B10900	APR 10/83
		PRR VDC-T0242	APR 10/83
767-78-0004R3		PRR B10793-1	JUN 01/95
767-76-0018R1		PRR B11485	JUN 01/95
747-76-2070		PRR 80452-36	JAN 01/92
767-76-0018R2		PRR B11485	JUN 01/96

PAGE	DATE	CODE
76-11-18		
TITLE PAGE		
1	JUN 01/96	01.1
2	BLANK	
REVISION RECORD		
1	JUN 01/95	01.1
2	BLANK	
TR & SB RECORD		
1	JUN 01/96	01.1
2	BLANK	
LIST OF EFFECTIVE PAGES		
*1	NOV 01/00	01
THRU LAST PAGE		
CONTENTS		
1	JUN 01/95	01.1
2	BLANK	
INTRODUCTION		
*1	NOV 01/00	01.1
2	BLANK	
DESCRIPTION & OPERATION		
*1	NOV 01/00	01.1
2	BLANK	
DISASSEMBLY		
*301	NOV 01/00	01.1
302	BLANK	
CLEANING		
401	JUN 01/95	01.1
402	BLANK	
CHECK		
501	JUN 01/95	01.1
502	BLANK	

PAGE	DATE	CODE
REPAIR-GENERAL		
601	JUN 01/95	01.1
602	JUN 01/95	01.1
603	JUN 01/95	01.1
604	BLANK	
REPAIR 1-1		
601	JUN 01/95	01.1
602	JUN 01/95	01.1
REPAIR 1-2		
601	JUN 01/95	01.1
602	JUN 01/95	01.1
REPAIR 1-3		
601	JUN 01/95	01.1
602	JUN 01/95	01.1
REPAIR 2-1		
601	JUN 01/95	01.1
602	JUN 01/95	01.1
REPAIR 3-1		
601	JUN 01/95	01.1
602	BLANK	
ASSEMBLY		
701	JUN 01/95	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
FITS AND CLEARANCES		
801	JUN 01/95	01.1
802	JUN 01/95	01.1
803	JUN 01/95	01.1
804	BLANK	

* = REVISED, ADDED OR DELETED

PAGE	DATE	CODE
ILLUSTRATED PARTS LIST		
1001	JUN 01/95	01.1
1002	JUN 01/95	01.1
1003	JUN 01/95	01.1
1004	JUN 01/95	01.1
1005	JUN 01/96	01.1
1006	JUN 01/95	01.1
1007	JUN 01/95	01.1
*1008	NOV 01/00	01.1
*1009	NOV 01/00	01.1
*1010	NOV 01/00	01.1
1011	JUN 01/96	01.1
1012	JUN 01/95	01.1
1013	JUN 01/95	01.1
1014	JUN 01/96	01.1
1015	JUN 01/95	01.1
1016	JUN 01/95	01.1
1017	JUN 01/95	01.1
1018	JUN 01/95	01.1

PAGE	DATE	CODE

* = REVISED, ADDED OR DELETED

TABLE OF CONTENTS

INTRODUCTION

The instructions that are specified in this manual give the data necessary to do the maintenance functions that range from simple maintenance checks and part replacement to complete shop-type repair procedures.

This manual is divided into separate sections:

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

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

The beginning of the REPAIR section includes a list of the separate repairs, a list of applicable standard Boeing practices, and an explanation of the True Position Dimensioning symbols used.

An explanation of the use of the Illustrated Parts List is provided in the Introduction to that section.

All weights and measurements used in the manual are in English units, unless otherwise stated. When metric equivalents are given they will be in parentheses following the English units.

Design changes, optional parts, configuration differences and Service Bulletin modifications create alternate part numbers. These are identified in the Illustrated Parts List (IPL) by adding an alphabetical character to the basic item number. The resulting item number is called an alpha-variant. Throughout the manual, IPL basic item number references also apply to alpha-variants unless otherwise indicated.

Verification:

Disassembly	DEC 21 1981
Assembly	DEC 21 1981

CF6-80 ENGINE THROTTLE FUEL CONTROL BOX ASSEMBLY

DESCRIPTION AND OPERATION

1. Description

   A. The fuel control box assembly consists of a housing containing a bearing-mounted gear which meshes with a gear rack and a transducer.

   B. The control box mounts on the engine control unit and supports the engine condition control actuator.

   C. A lever on the control assembly gear engages with the fuel control unit power lever.

   D. The fuel control unit drive extends through the control assembly housing and engages the engine control actuator.

2. Operation

   A. The throttle push/pull cable moves the rack, and rotates the gear. This operation sets the fuel control power lever in the proper position for the specified throttle setting.

   B. The transducer transmits power lever angle to the autothrottle.

   C. An additional switch on some assemblies transmits a signal to a part number indicator in the cockpit.

3. Leading Particulars (Approximate)

   Height -- 7 inches
   Width -- 10 inches
   Thickness -- 2 inches
   Weight -- 4 lbs

DISASSEMBLY

1. Parts Replacement

NOTE: The parts that follow are recommended for replacement. Unless specified differently, actual replacement of parts can be based on in-service experience.

A. Lockwire

2. Disassembly (IPL Fig. 1)

NOTE: Disassemble this component only as necessary to complete fault isolation, determine the serviceability of parts, perform required repairs, and restore the unit to a serviceable condition.

A. If installed, remove housing body (825) and cover (820) by removing parts (805 thru 815)

B. Remove coverplate (5) by removing parts (10 thru 20).

C. Remove parts (25 thru 40) and remove transducer (45A). Separate parts (50 thru 65) from transducer (45A).

D. Assemblies 315T1040-17, -19, 015T0094-8, -9

(1) Remove shield (80).

E. Assys 315T1040-10, -12, -16, 015T0376-9, -10, -11 only:

(1) Remove shield (80A).

F. Loosen nut (90) and remove adapter (85). Separate nut (90) from adapter (85).

G. Remove nut (110A) and remove pin (115). Remove bearing assembly (120C, 120D), slider (123), and shim washers (117), if used.

NOTE: Remove pin (115) carefully to avoid possible loss of shims (117).

H. Remove gear assembly (125) by installing three 32UNF-3B bolts on 0.20 inch diameter on gear assembly and tighten bolts down to lift gear assembly from housing (155).

NOTE: Do not disassemble gear assembly (125) unless repair or replacement is necessary.

I. For housing (155A) only; remove cover (180) by removing fasteners (165, 170, 175).

J. Remove rack (150).

CLEANING

1. Clean all parts except bearings (120C, 120D, 130, IPL Fig. 1) using standard industry practices and information contained in 20-30-03.

2. Clean carbon graphite bearings (120C, 120D) only by dusting with clean dry cloth. Do not expose bearings to solvent or lubricant.

3. Send bearings (130, 130A, 130B, 130F thru 130L) to manufacturer (V40920) for cleaning and relubricating.

4. Clean bearing (130C, 130D, 130E) per 20-30-01, method 1 (ultrasonic).

5. Relubricate bearing (130C) with Aeroshell 16, and bearing (130D, 130E) with MIL-G-81322 after cleaning.

CHECK

1. Check all parts for obvious defects in accordance with standard industry practices. Refer to FITS AND CLEARANCES for design dimensions and repair limits.

2. Check carbon graphite bearings (120C, 120D, IPL Fig. 1) for external damage, excessive radial play, concentricity, and evidence of cracking or breakdown of carbon graphite. Replace bearings if more than superficial damage is found.

CAUTION: TO PREVENT DAMAGE RESULTING FROM MAGNETIZATION, REMOVE ANY MULTIPLE PART BEARINGS PRIOR TO SUBJECTING PARTS TO MAGNETIC PARTICLE TYPE CHECK.

3. Magnetic particle check per 20-20-01 -- clamp (25), gear (60, 145), adapter (85), rack (150), housing (155,825).

4. Check teeth of gear (60, 145) and rack (150) for excessive wear. Replace parts if excessive wear or galling is evident.

5. Check bearing (130) for track corrosion, jamming, roughness, high rotational torque, and axial rock. Replace bearing if axial rock exceeds 0.004 inch as measured at gear pitch diameter.

REPAIR - GENERAL

1. Content

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

P/N	NAME	REPAIR
315T1035	GEAR	1-1, 1-2, 1-3
315T1037	HOUSING	2-1
- -	MISC PARTS REFINISH	3-1

2. Standard Practices

   A. Refer to the following standard practices as applicable, for details of procedures in REPAIR 1-1 thru 3-1.

      20-10-02 Machining of Alloy Steel
      20-10-04 Grinding of Chrome Plated Parts
      20-30-02 Stripping of Protective Finishes
      20-41-01 Finish Codes (F and SRF)
      20-42-03 Chrome Plating
      20-50-03 Bearing Installation and Retention
      20-50-08 Application of Dry Lubricant

3. Materials

   NOTE: Equivalent substitutes may be used.

   A. Lubricant -- Sermalube 20 (Ref 20-60-03)

B. Lubricant -- Teceram, 520 (Ref 20-60-03)

C. Lubricant -- MIL-L-8937 (Ref 20-60-03)

4. Dimensioning Symbols

A. Standard True Position Dimensioning Symbols used in applicable repair procedures are shown Fig. 601.

—	STRAIGHTNESS
▱	FLATNESS
⊥	PERPENDICULARITY (OR SQUARENESS)
//	PARALLELISM
○	ROUNDNESS
⌭	CYLINDRICITY
⌒	PROFILE OF A LINE
⌓	PROFILE OF A SURFACE
◎	CONCENTRICITY
⌯	SYMMETRY
∠	ANGULARITY
↗	RUNOUT
⌰	TOTAL RUNOUT
⌴	COUNTERBORE OR SPOTFACE
⌵	COUNTERSINK
⌖	THEORETICAL EXACT POSITION OF A FEATURE (TRUE POSITION)
∅	DIAMETER
S ∅	SPHERICAL DIAMETER
R	RADIUS
SR	SPHERICAL RADIUS
()	REFERENCE
BASIC (BSC) OR [DIM]	A THEORETICALLY EXACT DIMENSION USED TO DESCRIBE SIZE, SHAPE OR LOCATION OF A FEATURE FROM WHICH PERMISSIBLE VARIATIONS ARE ESTABLISHED BY TOLERANCES ON OTHER DIMENSIONS OR NOTES.
[-A-]	DATUM
Ⓜ	MAXIMUM MATERIAL CONDITION (MMC)
Ⓛ	LEAST MATERIAL CONDITION (LMC)
Ⓢ	REGARDLESS OF FEATURE SIZE (RFS)
Ⓟ	PROJECTED TOLERANCE ZONE
FIM	FULL INDICATOR MOVEMENT

EXAMPLES

[— | 0.002]	STRAIGHT WITHIN 0.002
[⊥ | 0.002 | B]	PERPENDICULAR TO B WITHIN 0.002
[// | 0.002 | A]	PARALLEL TO A WITHIN 0.002
[○ | 0.002]	ROUND WITHIN 0.002
[⌭ | 0.010]	CYLINDRICAL SURFACE MUST LIE BETWEEN TWO CONCENTRIC CYLINDERS, ONE OF WHICH HAS A RADIUS 0.010 INCH GREATER THAN THE OTHER
[⌒ | 0.006 | A]	EACH LINE ELEMENT OF THE SURFACE AT ANY CROSS SECTION MUST LIE BETWEEN TWO PROFILE BOUNDARIES 0.006 INCH APART RELATIVE TO DATUM PLANE A
[⌓ | 0.020 | A]	SURFACES MUST LIE WITHIN PARALLEL BOUNDARIES 0.02 INCH APART AND EQUALLY DISPOSED ABOUT TRUE PROFILE
[◎ | ∅ 0.0005 | C]	CONCENTRIC TO C WITHIN 0.0005 DIAMETER
[⌯ | 0.010 | A]	SYMMETRICAL WITH A WITHIN 0.010
[∠ | 0.005 | A]	ANGULAR TOLERANCE 0.005 WITH A
[⌖ | ∅ 0.002 Ⓢ | B]	LOCATED AT TRUE POSITION WITHIN 0.002 DIA RELATIVE TO DATUM B, REGARDLESS OF FEATURE SIZE
[⊥ | ∅ 0.010 Ⓜ | A] [0.510 Ⓟ]	AXIS IS TOTALLY WITHIN A CYLINDER OF 0.010-INCH DIAMETER, PERPENDICULAR TO, AND EXTENDING 0.510-INCH ABOVE, DATUM A, MAXIMUM MATERIAL CONDITION
[2.000] OR 2.000 BSC	THEORETICALLY EXACT DIMENSION IS 2.000

NOTE: DATUM MAY APPEAR AT EITHER SIDE OF TOLERANCE FRAME [0.020 | A] [A | 0.020]

True Position Dimensioning Symbols
Figure 601

T22125

GEAR ASSEMBLY - REPAIR 1-1

315T1035-1

1. Bearing Replacement (Fig. 601)

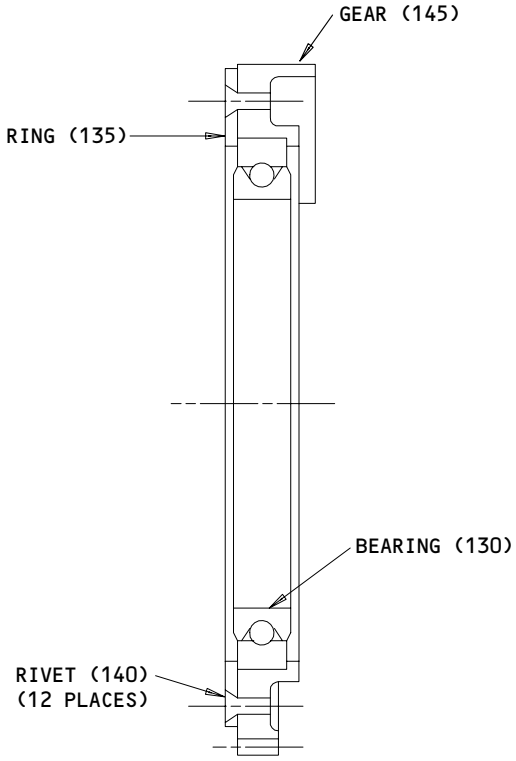
NOTE: Refer to REPAIR-GEN for list of applicable standard practices.

A. Drill out rivets and remove ring (135, IPL Fig. 1). Remove old bearing.

B. Press in new bearing.

C. Install ring (135) and secure with rivets (140).

NOTE: Refer to REPAIR 1-2 if ring (135) requires replacement.



REFINISH

REFER TO REPAIR 1-3 FOR
REFINISH INSTRUCTIONS

315T1035-1

Bearing Replacement
Figure 601

T22117

GEAR ASSEMBLY - REPAIR 1-2

315T1035-1

1. Ring Replacement (Fig. 601)

   A. Position ring (135, IPL Fig. 1) concentrically on gear (145).

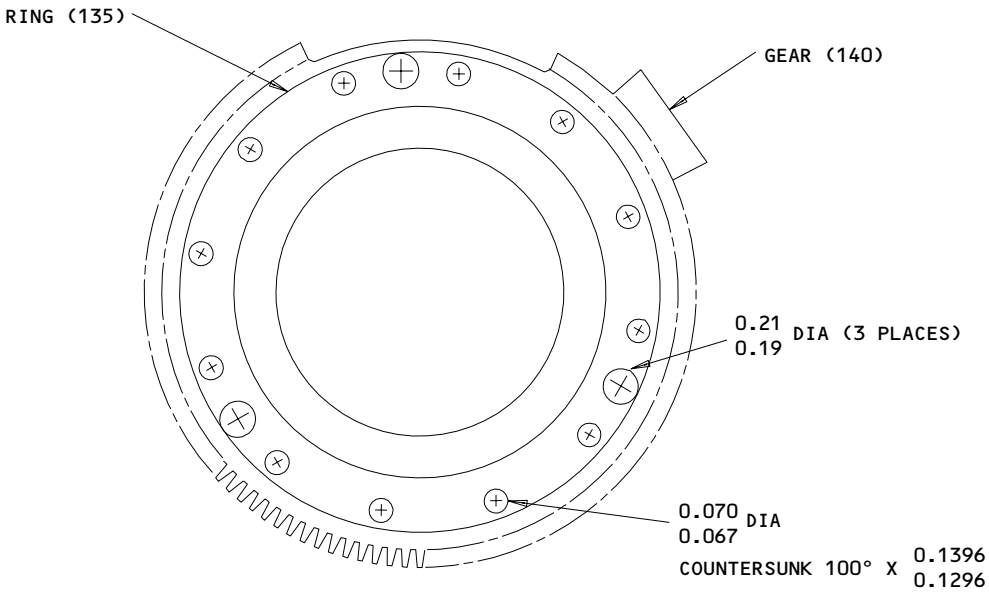
   B. Drill 0.067-0.070 inch diameter rivet holes in ring to match holes in gear (145).

   C. Drill 0.151 inch diameter pilot holes in ring to match tapped holes in gear (145).

   D. Match mark ring and gear to ensure proper alignment.

   E. Remove ring (135) from gear (145), drill and countersink holes as shown.

   F. Install bearing and plate per Repair 1-1.



REFINISH

REFER TO REPAIR 1-3
FOR REFINISH INSTRUCTIONS

ALL DIMENSIONS ARE IN INCHES

315T1035-1
Ring Replacement
Figure 601

T22118

GEAR - REPAIR 1-3

315T1035-2

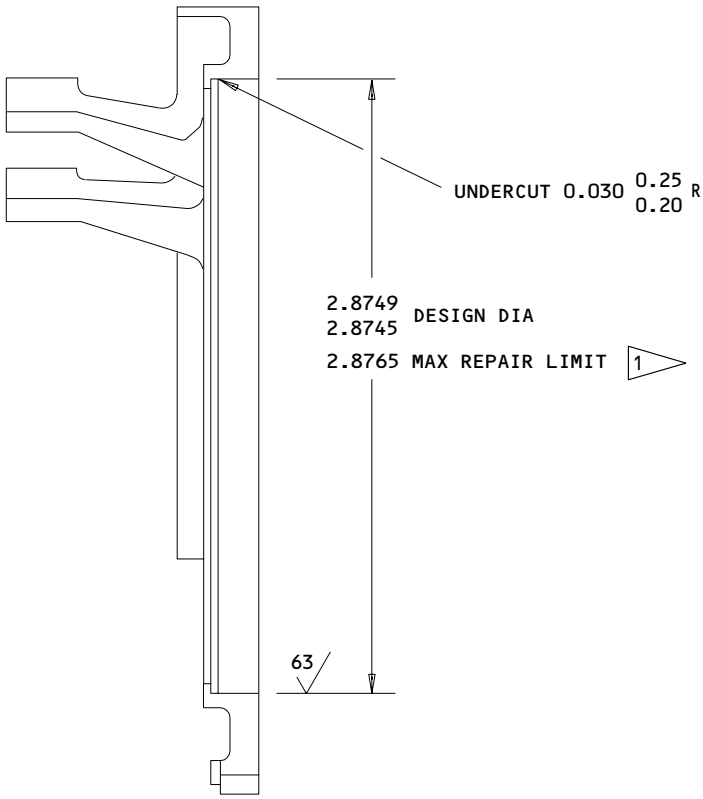
NOTE: Refer to REPAIR-GEN for list of applicable standard practices. For repair of surfaces which may only require restoration of original finish, refer to Refinish instructions, Fig. 601.

1. ID Repair (Fig. 601)

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

   B. Shot peen as noted.

   C. Build up machined surfaces with chrome plate and grind to design dimension and finish shown.



REFINISH

PASSIVATE (F-17.09) ALL OVER.

1 CHROME PLATE BUILD UP AND GRIND TO DESIGN DIMENSION AND FINISH SHOWN. OBSERVE 0.00-0.08 PLATING RUN OUT.

REPAIR

REF 1

SHOT PEEN: 0.023-0.078 SHOT SIZE
0.002-0.005 A INTENSITY

MATERIAL: 17-4PH CRES, 130 KSI MIN

ALL DIMENSIONS ARE IN INCHES

315T1035-2
Gear Repair and Refinish
Figure 601

T22119

HOUSING - REPAIR 2-1

315T1037-4, -6

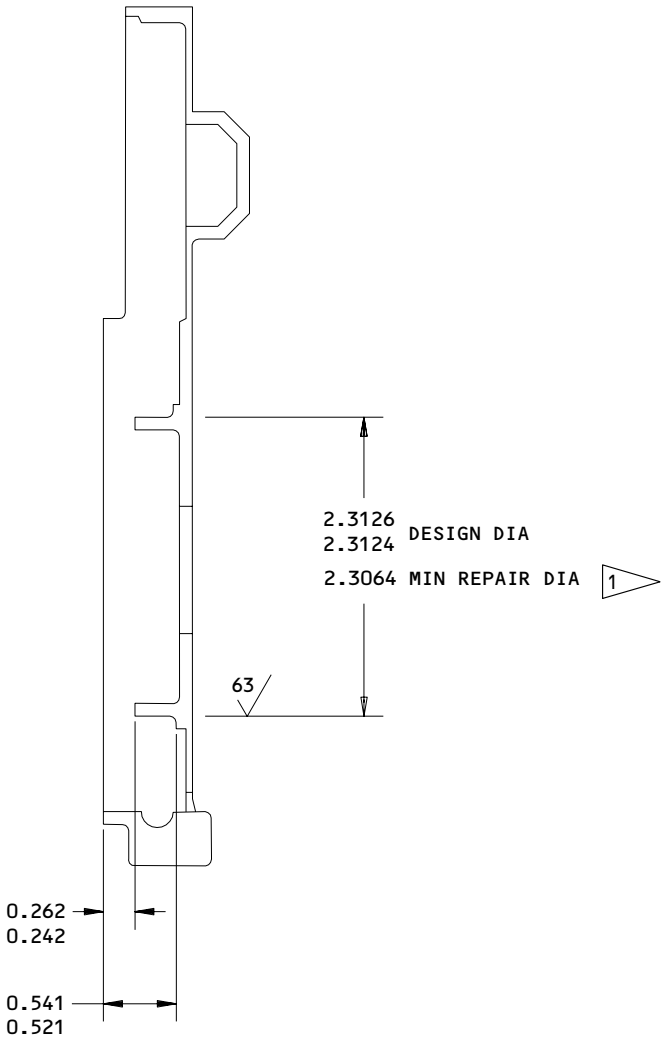
NOTE: Refer to REPAIR-GEN for a list of applicable standard practices. For repair of surfaces which may only require restoration of original finish, refer to Refinish instructions, Fig. 601.

1. OD Repair (Fig. 601)

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

   B. Shot peen as noted.

   C. Build up machined surfaces with chrome plate and grind to design dimensions and finish shown.



REFINISH

PASSIVATE (F-17.09) ALL OVER

1 CHROME PLATE (F-15.03)
BUILD UP AND GRIND TO DESIGN
DIMENSION AND FINISH SHOWN.
OBSERVE 0.00-0.06 PLATING
RUN OUT

REPAIR

REF 1

SHOT PEEN: (REF 20-10-03)
0.023-0.078 SHOT SIZE
0.008 A INTENSITY

MATERIAL: 17-4PH CRES, 130 KSI MIN

ALL DIMENSIONS ARE IN INCHES

315T1037-4,-6
Housing Repair and Refinish
Figure 601

T22121

MISCELLANEOUS PARTS REFINISH - REPAIR 3-1

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

IPL FIG. & ITEM	MATERIAL	FINISH
Fig. 1		
Plate (5) Shield (80)	304 CRES (321 CRES optional)	Passivate (F-17.09).
Shield (80A)	15-5PH CRES, 180-200 ksi	Passivate (F-17.09) and apply MIL-L-8937 dry film lubricant to 0.5 inch dia. threads.
Clamp (25)	15-5PH CRES, 180-200 ksi	Passivate (F-17.09).
Spacers (55, 65)	303 or 304 CRES	Passivate (F-17.09).
Gear (60)	17-4PH CRES, 130 ksi min. (15-5PH CRES optional)	Passivate (F-17.09) followed by hard chrome plate ARMOLOY, (Armoloy of Philadelphia, 1105 Miller Ave., Croydon, Pa.) and apply dry film lubricant, Sermalube 20.
Adapter (85)	15-5PH CRES (17-4PH CRES, 125-145 ksi optional)	Passivate (F-17.09).
Ring (135)	301 CRES	Passivate (F-17.09).
Rack (150)	15-5PH CRES, 180-200 ksi	Passivate (F-17.09) followed by hard chrome plate ARMOLOY, (Armoloy of Philadelphia, 1105 Miller Ave., Croydon, Pa.) and apply dry film lubricant, Sermetal 20.
Cover (180)	6061-T6	Chromic acid anodize (F-17.04) and apply two coats BMS 10-11, type 1 primer (F-20.03).
Housing (825)	17-4PH CRES, 130 ksi min.	Passivate (F-17.09)

Refinish Details
Figure 601

ASSEMBLY

1. Materials

   NOTE: Equivalent substitutes may be used for the listed items.

   A. Lockwire -- MS20995NC32

2. Install rack (150, IPL Fig. 1) in housing (155).

3. Install nut (90) on adapter (85) and install adapter over end of rack (150) in housing (155). Adjust adapter so that distance between end of adapter and centerline of housing is 3.58 to 3.70 inches (Fig. 701).

   NOTE: Lockwire installation on nut (90) and adapter (85) is accomplished on installation of fuel control box assembly (1) during rigging.

4. Assemblies 315T1040-17, -19, 015T0094-8, -9 only:

   A. Install shield (80) and sleeve (75) and secure with nut (70).

5. Assys 315T1040-10, -12, -16, 015T0376-9, -10, -11 only:

   A. Install shield (80A) and lockwire to housing using double twist method per 20-50-02.

CAUTION: CAREFULLY MESH GEAR ASSY (125) WITH RACK (150) DURING ASSEMBLY OR DAMAGE TO GEAR TEETH MAY RESULT.

6. Position rack in housing with the two etch marked index teeth centered. Press gear assembly (125) on housing (155) with etch marked index tooth between indexed teeth of rack (150) (Fig. 701).

7. For housing (155A) only; install cover (180) onto housing with bolt (165), washer (170) and nut (175).

8. Install pin (115), bearing assembly (120C, 120D), slider (123), shim washers (117) if used, and nut (110A).

9. Adjust gear rack (150) and gear assembly (125) positions.

   A. Loosen nut (110A) so pin (115) is free to move.

   B. Rotate eccentric pins (115) clockwise to reduce backlash between gear and rack to 0.003 inch maximum. Maintain a parallel condition between rack and bore in housing to ensure freedom from binding.

   C. Move rack through full travel and check for smoothness of operation. Trim as required and tighten nuts (110A) to 25-50 lb-in.

10. Check friction and backlash.

   A. Position assembly in a vertical position, pull rack up to approximately 5 degrees from its maximum extended travel and release. Rack must travel down to maximum extended position with a force not exceeding 1.5 ounces. Readjust if necessary.

   B. With gear assy (125) and housing (155) held in fixed position, apply 5-lb. force to rack (150) in each direction of travel. Rack backlash must not exceed 0.003 inch Full Indicator Movement (F.I.M.).

11. On completion of step 7, check that nuts (110A) are tightened to 25-50 lb-in. Lockwire nuts (110A) using double twist method per 20-50-02.

12. Assemble transducer (45A).

   A. Install spacer (65), gear (60), spacer (55) on transducer (45A) and secure with nut (50).

   B. Install transducer (45A) with attached parts on housing (155). Align index mark on gear (60) tooth with index mark on housing, and set rack (150) at 4.011 to 4.071 inches from vertical centerline of housing (Fig. 701).

   C. Install clamps (25), coverplate (5) and secure with bolts (30, 10), washers (35, 15) and nuts (40, 20).

13. Use standard industry practices and data given in SOPM 20-44-02 for storage of this component.

14. Do a final bench test check on the assembled Engine Throttle Fuel Control Box Assembly (Fig. 1, Item 1).

    A. Position the assembled Engine Throttle Fuel Control Box Assembly (1) as shown in Fig. 702.

       NOTE: Make sure that the assembly is positioned horizontally, with the gear assembly (125) on the top of the assembly.

    B. For the bench test setup, attach a cable to the end of the throttle rack (150). At the other end of the cable, hang a 5-pound (2.3kg) weight.

    C. Use a pully system to hang the 5-pound (2.3 kg) weight from the end of the test cable.

       NOTE: It is necessary to keep the correct alignment between the throttle rack (150) and the test cable with the hanging weight.

    D. Attach a force gauge to the lever located on the gear assembly (125) as shown in Fig. 702.

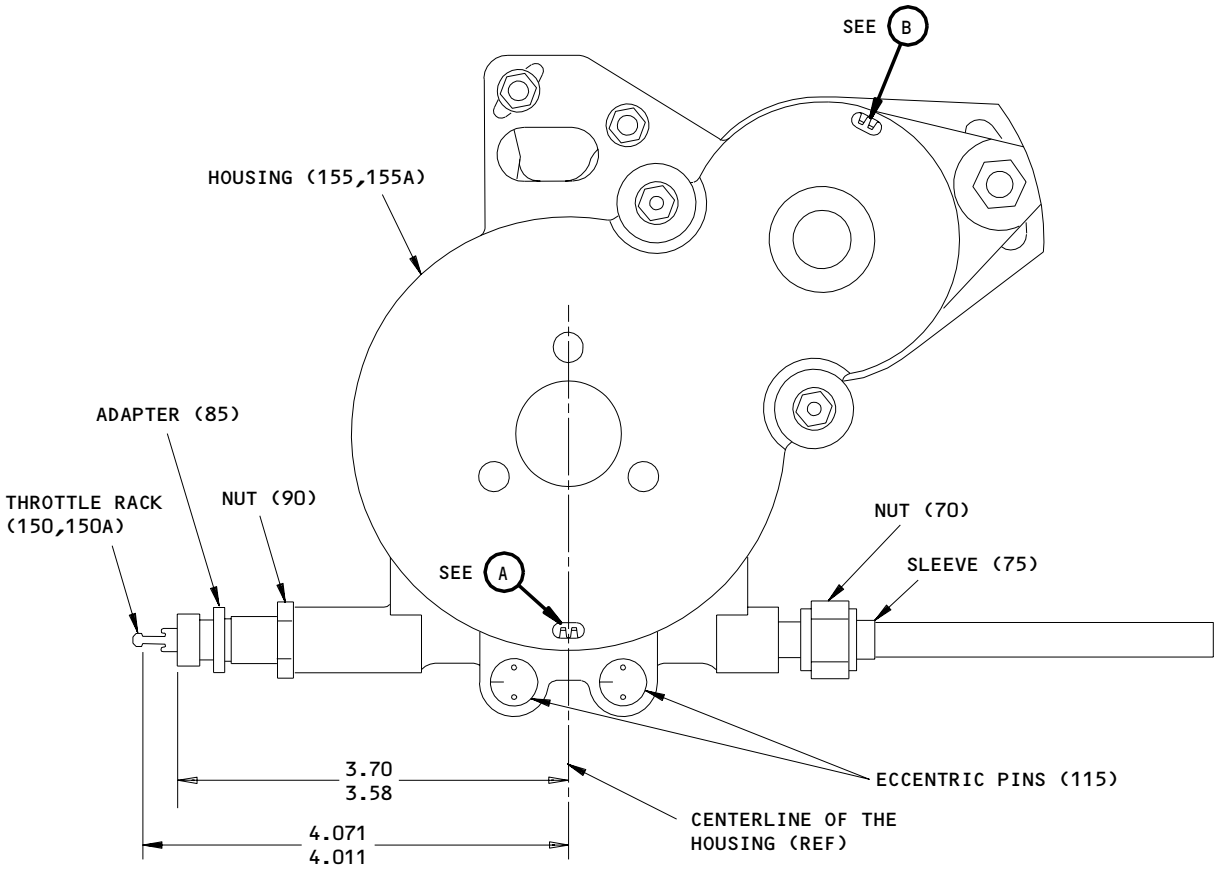
       NOTE: If this test is to work correctly, then the force gauge must be attached perpendicular to the lever on the gear assembly (125).

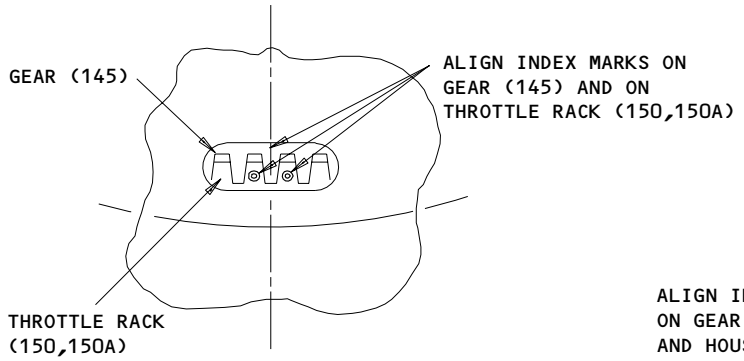
    E. Pull the force gauge in the direction shown in Fig. 702, and then measure the force necessary to lift the 5-pound (2.3 kg) weight.

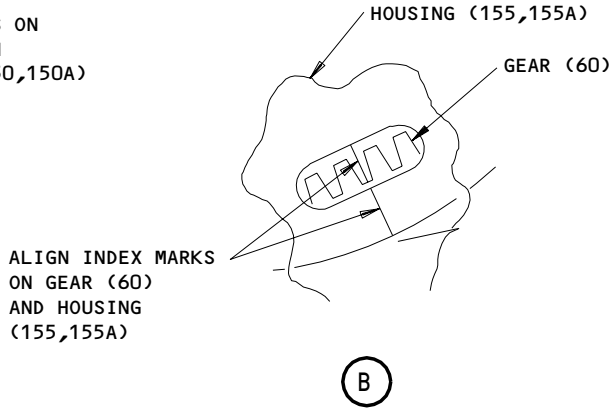
       NOTE: The force to lift the weight must be less than or equal to 6.5 pounds of force (29 Newtons).

    F. If the force to lift the weight is greater than 6.5 pounds of force (29 Newtons), then you must do an adjustment to the eccentric pin (115) and nut (110A).

    G. If necessary, make the adjustments, and then do steps D. and E. again.





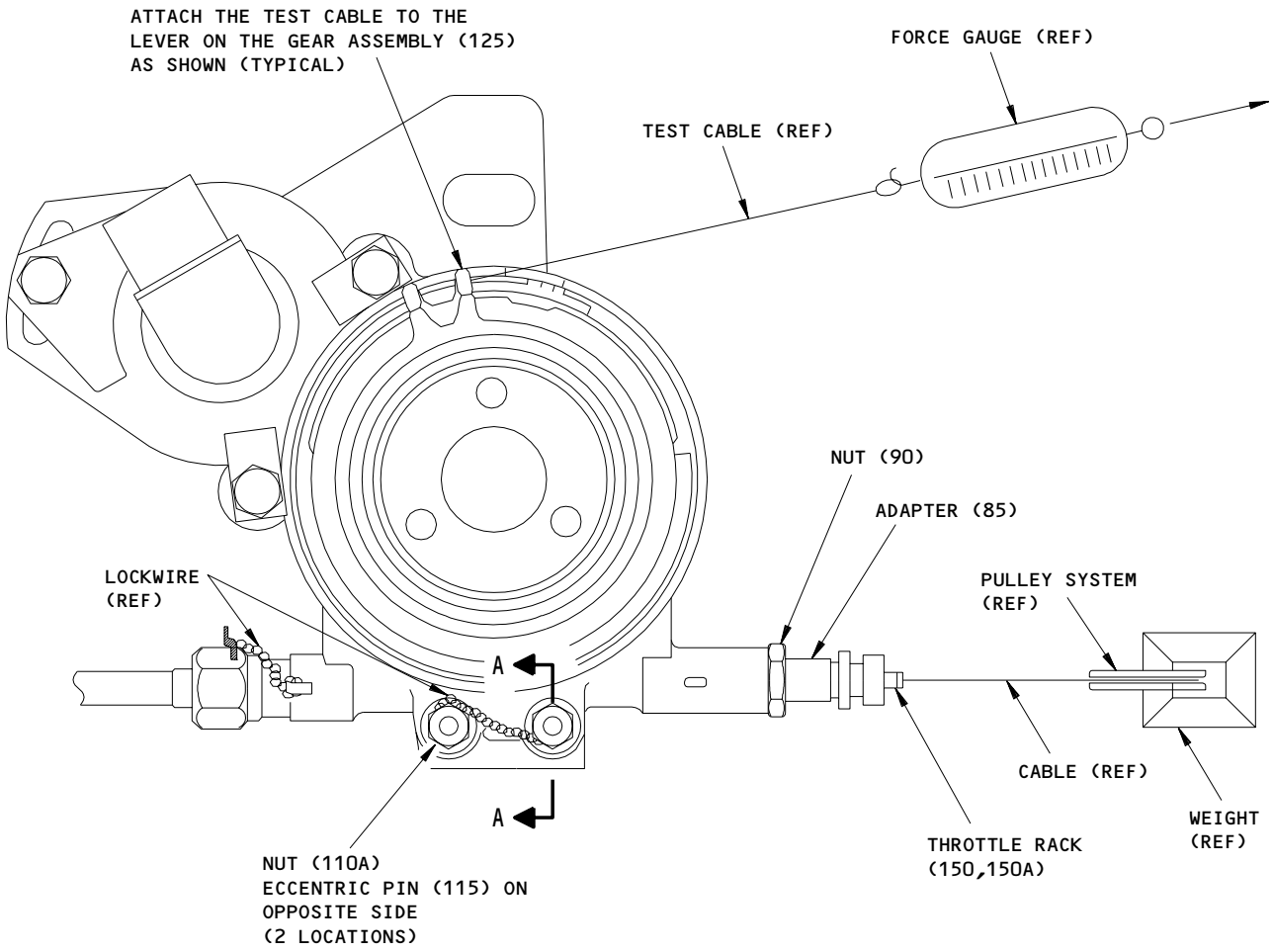


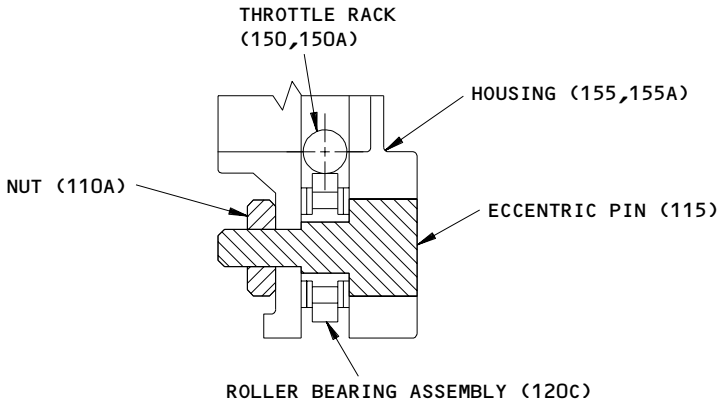
ITEM NUMBERS REFER TO IPL FIG. 1

ALL DIMENSIONS ARE IN INCHES

Assembly Details
Figure 701

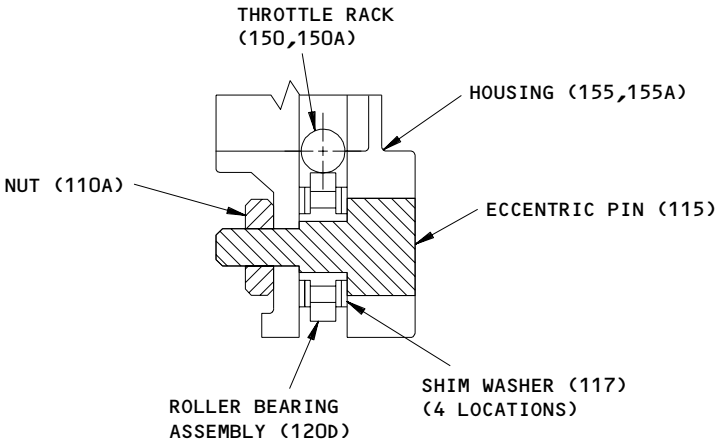
T22126



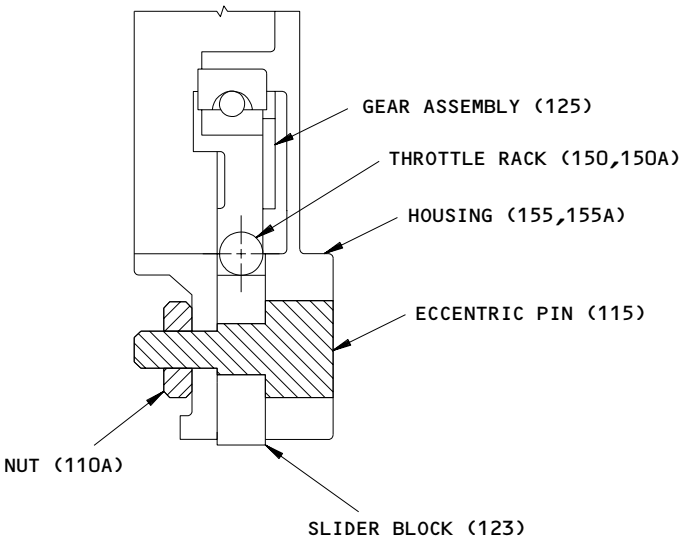


BEARING (120C) INSTALLATION
A-A

Bench Test Setup for the CF6-80 Engine Throttle
Fuel Control Box Assembly
Figure 702 (Sheet 1)



BEARING (120D) WITH 4 SHIM WASHERS (117) INSTALLATION
A-A

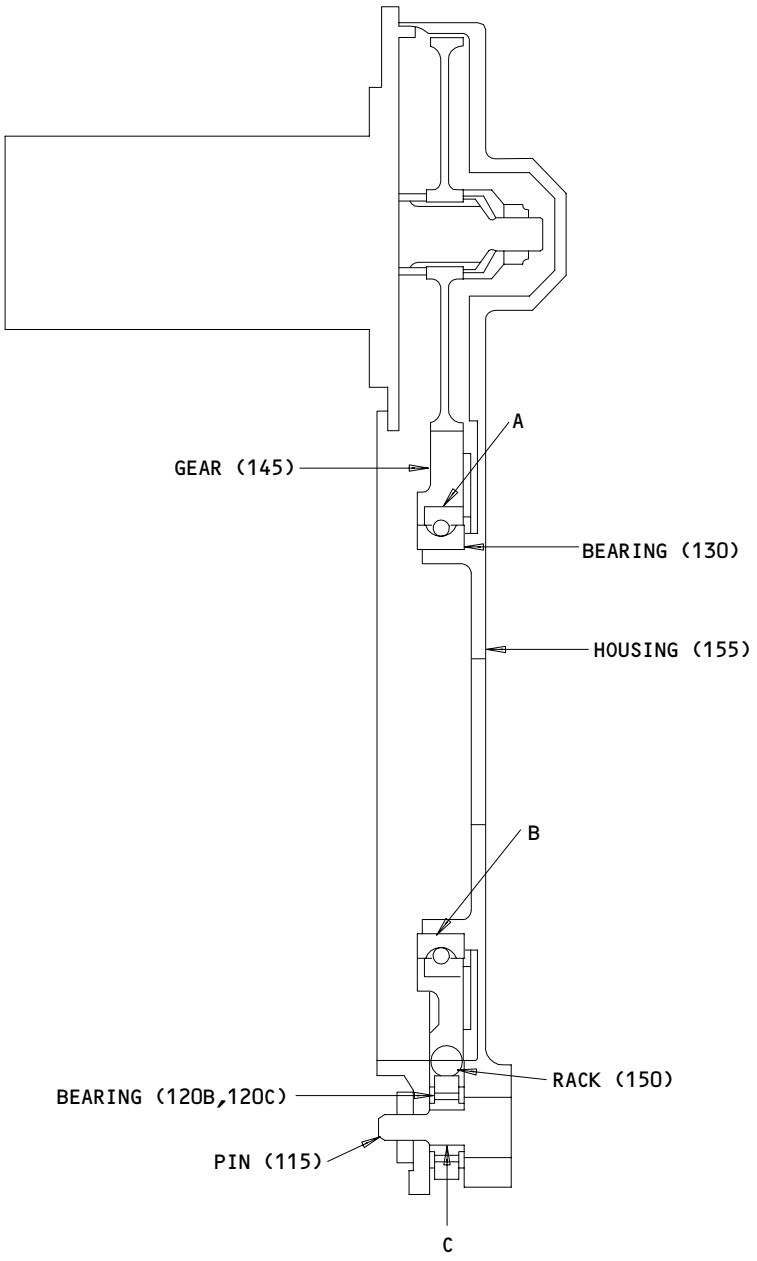


SLIDER BLOCK (123) INSTALLATION
A-A

Bench Test Setup for the CF6-80 Engine Throttle
Fuel Control Box Assembly
Figure 702 (Sheet 2)

L46214

FITS AND CLEARANCES



Fits and Clearances
Figure 801 (Sheet 1)

Ref Letter Fig.801	Mating Item No. IPL Fig.1	Design Dimension				Service Wear Limit		
		Dimension		Assembly Clearance		Dimension		Maximum Clearance
		Min	Max	Min	Max	Min	Max	
A	ID 145 OD 130	2.8745 2.8750	2.8749 2.8742	-0.0001 [1]	0.0003			
B	ID 130 OD 155	2.3120 2.3124	2.3130 2.3126	-0.0006 [1]	0.0006			
C	ID 120D 120C OD 115	0.2498 0.2490	0.2503 0.2495	0.0003	0.0013			
D	OD 125 150		0.003 [2]					

[1] INTERFERENCE FIT
[2] MAXIMUM BACKLASH

ALL DIMENSIONS ARE IN INCHES

Fits and Clearances
Figure 801 (Sheet 2)

E38724

FOR TORQUE VALUES OF STANDARD FASTENERS, REFER TO SOPM 20-50-01			
ITEM NO. IPL FIG. 1	NAME	TORQUE	
		POUND-INCHES	POUND-FEET
110A	NUT	25-50	

Torque Table
Figure 802

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

02758 NETWORKS ELECTRONIC CORP U S BEARING DIV
9750 DE SOTO AVENUE
CHATSWORTH, CALIFORNIA 91311-4409

06710 LAMSON AND SESSIONS CO THE VALLEY-TODECO
12975 BRADLEY AVENUE
SYLMAR, CALIFORNIA 91342-3830

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

06950 SCREWCORP VSI AEROSPACE PRODUCTS DIV FAIRCHILD IND DIV
13001 EAST TEMPLE AVENUE PO BOX 730
CITY OF INDUSTRY, CALIFORNIA 91746-1417

08524 DEUTSCH FASTENER CORP SEE CODE V97928

10630 ANILLO INDUSTRIES, INCORPORATED
2090 NORTH GLASSELL
ORANGE, CALIFORNIA 92667

11328 AEROQUIP CORP LINAIR DIV
651 WEST KNOX STREET
GARDENA, CALIFORNIA 90248-4409

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

14397 FABER ENTERPRISES, INCORPORATED
6606 VARIEL AVE
CANOGA PARK, CALIFORNIA 91303-2808

14798 DEUTSCH CO METAL COMPONENTS DIV
14800 SOUTH FIGUEROA STREET
GARDENA, CALIFORNIA 90248-1719

15653 MICRODOT INC AEROSPACE FASTENING SYS KAYNAR MFG DIV
800 SOUTH STATE COLLEGE BLVD PO BOX 3001
FULLERTON, CALIFORNIA 92634-3001

17943 FEDERAL MANUFACTURING CORPORATION
9825 DESOTO AVENUE
CHATSWORTH, CALIFORNIA 91311

VENDORS

19710 MPC PRODUCTS CORP
7426 NORTH LINDER AVENUE
SKOKIE, ILLINOIS 60077-3219

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

27624 PB FASTENERS DIV OF BRILES PAUL R
1700 WEST 132ND STREET
GARDENA, CALIFORNIA 90249

30974 AEROFIT PRODUCTS INC
8531 WHITAKER STREET
BUENA PARK, CALIFORNIA 90621-3129

34336 L AND S MACHINE COMPANY INCORPORATED
2019 SOUTHWEST BLVD PO BOX 12264
WICHITA, KANSAS 67277

40920 MPB MINIATURE PRECISION BEARING DIV
PRECISION PARK PO BOX 547
KEENE, NEW HAMPSHIRE 03431

50632 KAMATICS CORP SUB OF KAMAN CORP
1335 BLUE HILLS ROAD
BLOOMFIELD, CONNECTICUT 06002-1304

50948 PARKER-HANNIFIN CORP HUNTSVILLE AIRCRAFT FACILITY
9400 SOUTH MEMORIAL PARKWAY
HUNTSVILLE, ALABAMA 35802

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

55231 TRIBON BEARING COMPANY
5581 WEST 164TH STREET
CLEVELAND, OHIO 44142-1513

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

VENDORS

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

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

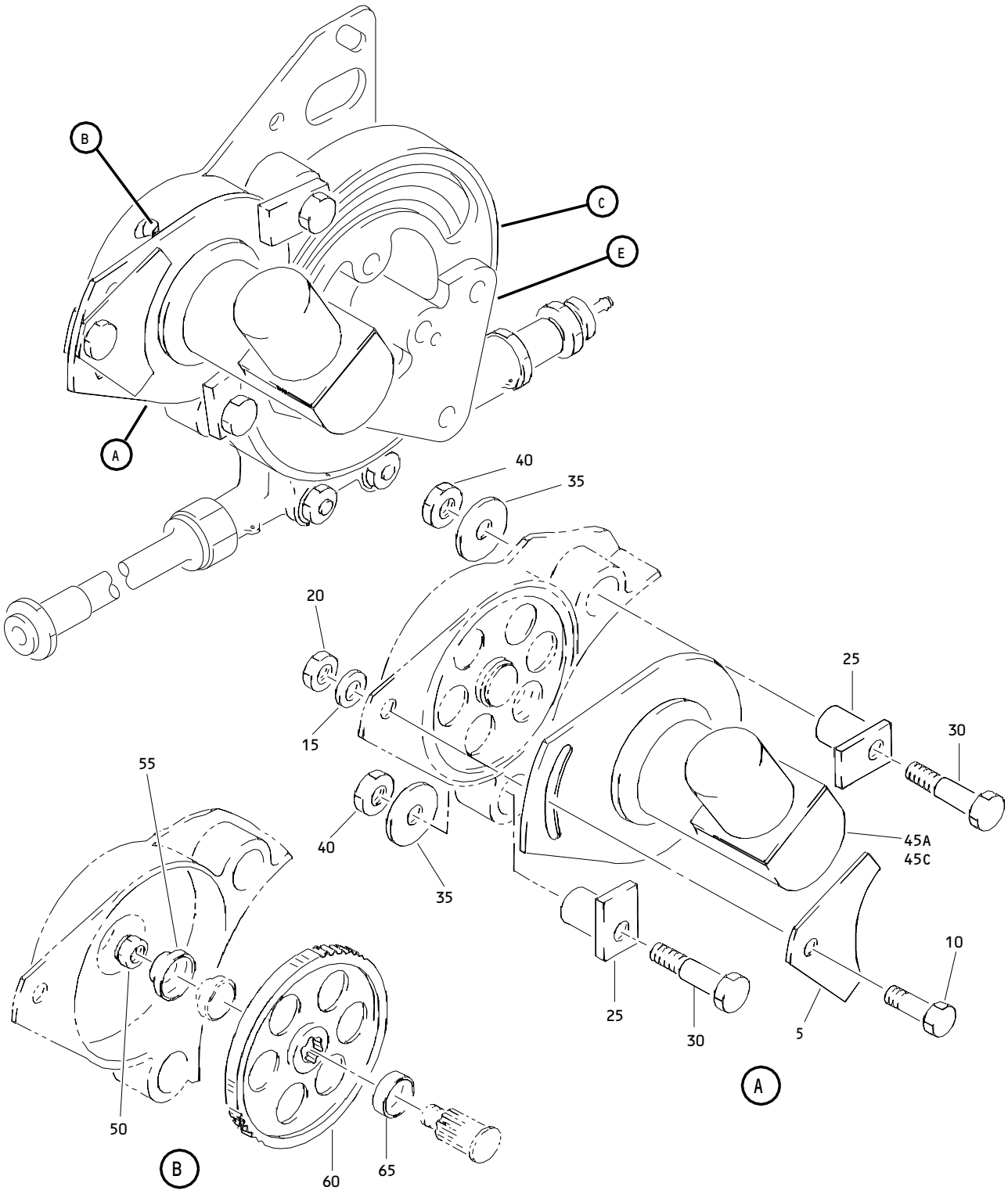
97393 SHUR-LOK CORPORATION
2541 WHITE ROAD PO BOX 19584
IRVINE, CALIFORNIA 92713

97928 DEUTSCH FASTENER CORP
3969 PARAMONT BOULEVARD
LAKEWOOD, CALIFORNIA 90712-4193

PART NUMBER	AIRLINE PART NO.	FIG.	ITEM	TTL REQ
AN960C10L		1	170	4
AN960C416		1	15	1
AN960C416L		1	810	3
BACB30LK4-3		1	815B	3
BACB30LL4-4		1	815	3
BACN10DP5J		1	70	1
BACN10JC3C		1	50	1
		1	175	2
BACN10JC4C		1	20	1
		1	40	2
BACW10P186C		1	35	2
BCREFA2378		1	130K	1
BCREFA2379		1	130J	1
BCREFA2380		1	130H	1
BCREFA2423		1	130L	1
BCREFA2424		1	130M	1
BCREFA2425		1	130N	1
BRH10C3		1	50	1
BRH10C4		1	20	1
		1	40	2
HSP4TL104		1	120C	2
H31-3BAC		1	50	1
H31-4BAC		1	20	1
		1	40	2
KJT115204B		1	123	1
KRP114804BT		1	120C	2
LA3628A		1	120D	2
LS5097		1	90C	1
MB546DDA3257		1	130C	1
MB546DDFS464		1	130D	1
MS20427M2-4		1	140	12
MS20819-5C		1	75	1
NAS509-4C		1	84	1
NAS6703-3		1	165	2
NAS6704-11		1	30	2
NAS6704-4		1	10	1
NAS6704HU1		1	805	3
NS202101S02		1	50	1
NS202101S048		1	20	1
		1	40	2
P56B		1	45A	1
SL2997C7R		1	90	1
SL2999C3		1	110A	2
S315N166-1		1	120C	2
S37-46BIE3P515L		1	130H	1

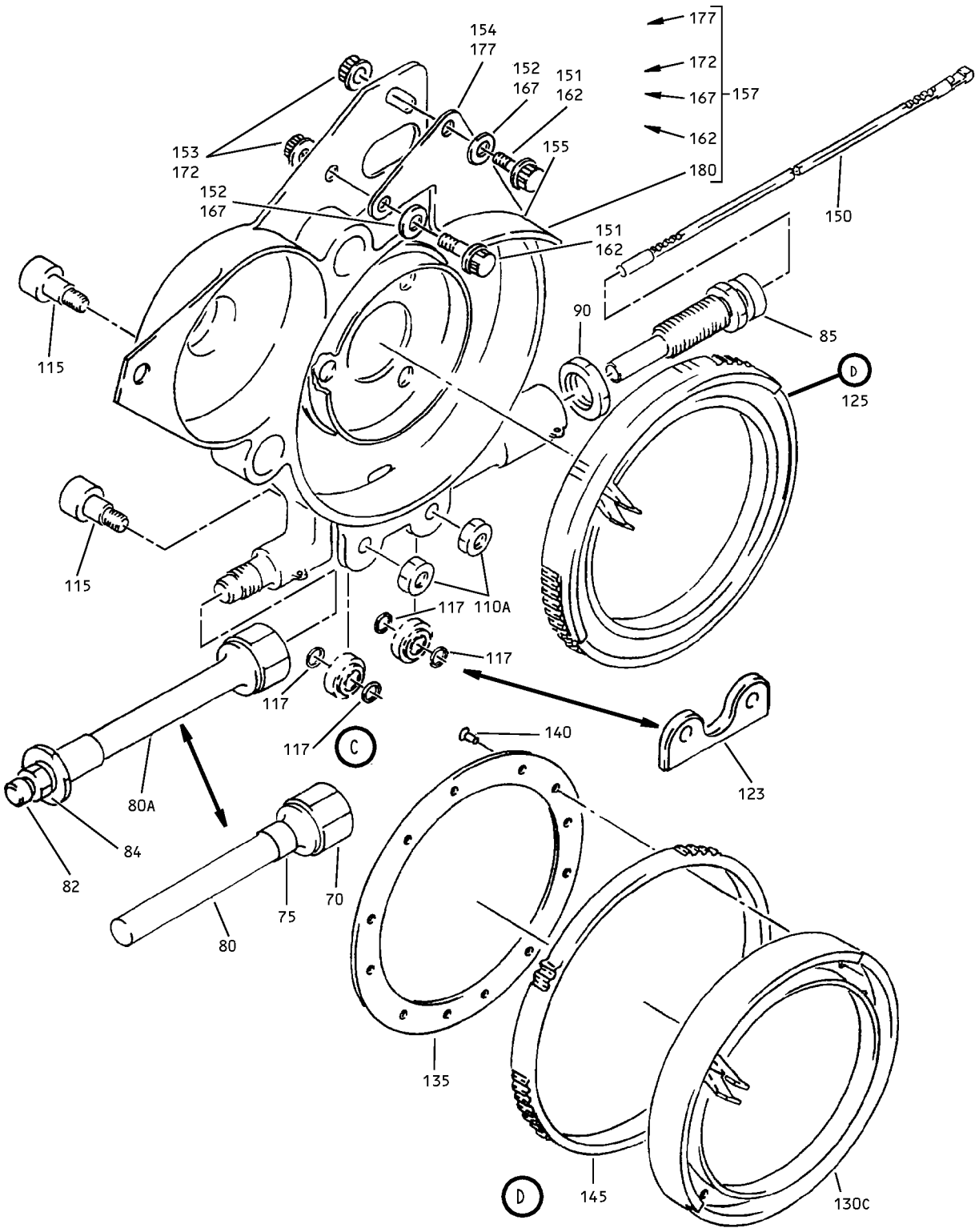
PART NUMBER	AIRLINE PART NO.	FIG.	ITEM	TTL REQ
S37-46BIE5P515L		1	130J	1
S37-46BIE7P515L		1	130K	1
T6C1032J		1	50	1
T6C428J		1	20	1
		1	40	2
VN303B02		1	50	1
VN303B048		1	20	1
		1	40	2
015T0094-8		1	1M	RF
015T0094-9		1	1N	RF
015T0376-10		1	1Q	RF
015T0376-11		1	1R	RF
015T0376-9		1	1P	RF
101LH9075-3W		1	50	1
101LH9075-4W		1	20	1
		1	40	2
3TWF3746PLY198		1	130E	1
315T1005-1		1	90E	1
315T1012-1		1	180	1
315T1017-1		1	60	1
315T1019-3		1	825	1
315T1019-5		1	825A	1
315T1019-6		1	825F	1
315T1019-7		1	825B	1
315T1019-8		1	825G	1
315T1024-1		1	150	1
315T1024-2		1	150A	1
315T1026-1		1	135	1
315T1027-1		1	85	1
315T1029-1		1	115	2
315T1035-1		1	125	1
315T1035-2		1	145	1
315T1037-4		1	155	1
315T1037-6		1	155A	1
315T1040-10		1	1D	RF
315T1040-12		1	1E	RF
315T1040-16		1	1H	RF
315T1040-17		1	1J	RF
315T1040-19		1	1L	RF
315T1045-1		1	820	1
315T1045-2		1	820A	1
315T1045-4		1	820B	1

PART NUMBER	AIRLINE PART NO.	FIG.	ITEM	TTL REQ
315T1045-5		1	82OC	1
315T1063-1		1	80A	1
315T1064-1		1	82	1
315T3041-1		1	25	2
315T3370-1		1	117	4
60B90034-2		1	45A	1
60B90034-3		1	45C	1
66B90023-1		1	5	1
66B90025-1		1	55	1
66B90025-2		1	65	1
69B96280-1		1	80	1
97-02		1	50	1
97-048		1	20	1
		1	40	2



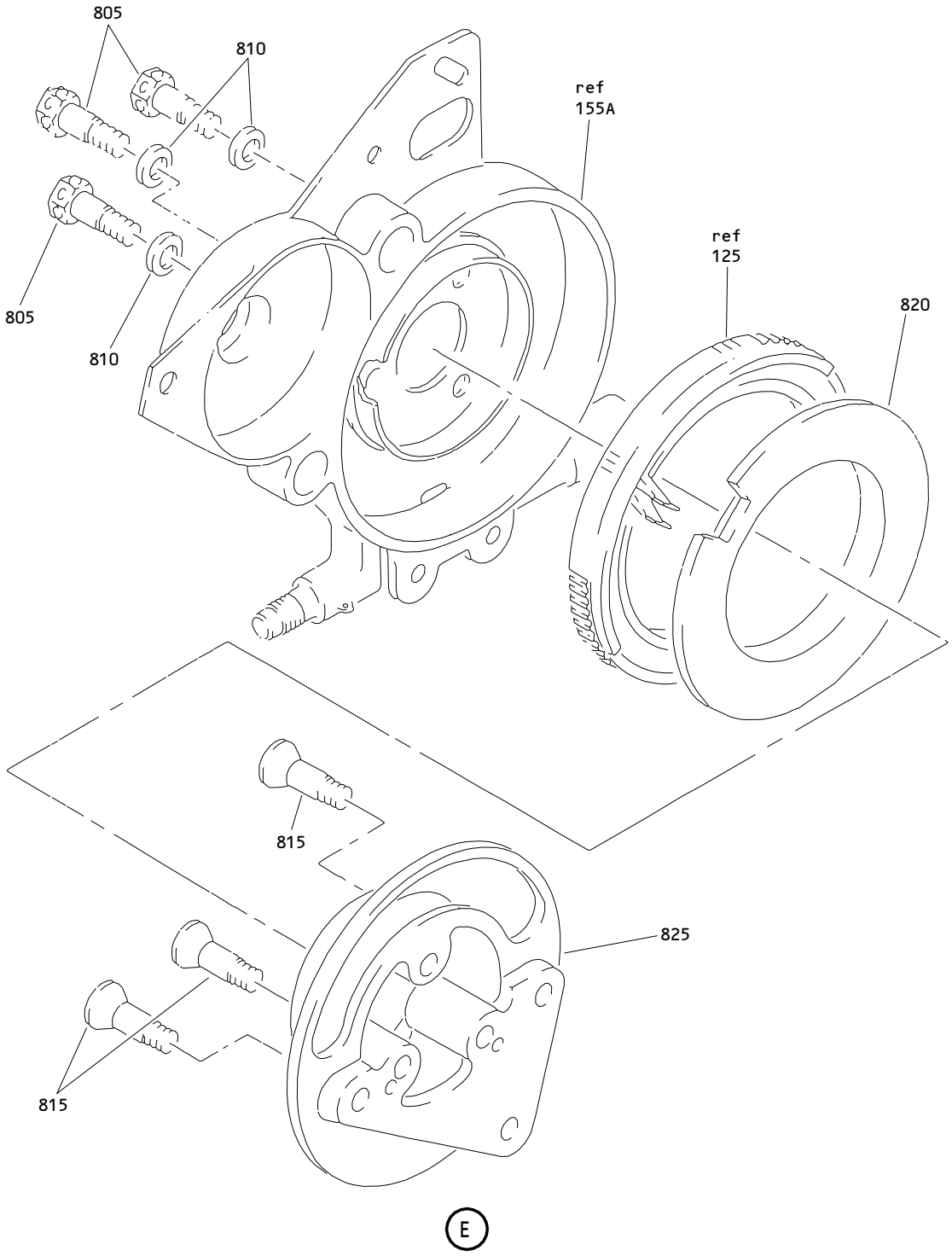
CF6-80 Engine Throttle Fuel Control Box Assembly
Figure 1 (Sheet 1)

T72984



CF6-80 Engine Throttle Fuel Control Box Assembly
Figure 1 (Sheet 2)

T72985



CF6-80 Engine Throttle Fuel Control Box Assembly
Figure 1 (Sheet 3)

C76122

FIG. & ITEM	PART NO.	AIRLINE PART NUMBER	NOMENCLATURE 1234567	EFF CODE	QTY PER ASSY
01-					
-1D	315T1040-10		BOX ASSY-CF6-80A ENG THROT FUEL CONT (PRE SB 767-78-0004, 767-76-0018,-0018R2)	A	RF
-1E	315T1040-12		BOX ASSY-CF6-80A ENG THROT FUEL CONT (PRE SB 767-78-0004, 767-76-0018,-0018R2)	B	RF
-1H	315T1040-16		BOX ASSY-CF6-80A ENG THROT FUEL CONT (PRE SB 767-78-0004, 767-76-0018,-0018R2)	C	RF
-1J	315T1040-17		BOX ASSY-CF6-80A ENG THROT FUEL CONT (PRE SB 747-76-2070, 767-76-0018,-0018R2) (POST SB 767-78-0004)	D	RF
-1L	315T1040-19		BOX ASSY-CF6-80A ENG THROT FUEL CONT (POST SB 747-76-2070, 767-76-0018)	E	RF
-1M	015T0094-8		BOX ASSY-CF6-80A ENG THROT FUEL CONT (POST SB 767-78-0004)	F	RF
-1N	015T0094-9		BOX ASSY-CF6-80A ENG THROT FUEL CONT (POST SB 767-78-0004)	G	RF
-1P	015T0376-9		BOX ASSY-CF6-80A ENG THROT FUEL CONT (POST SB 767-76-0018R2)	H	RF
-1Q	015T0376-10		BOX ASSY-CF6-80A ENG THROT FUEL CONT (POST SB 767-76-0018R2)	J	RF
-1R	015T0376-11		BOX ASSY-CF6-80A ENG THROT FUEL CONT (POST SB 767-76-0018R2)	K	RF

FIG. & ITEM	PART NO.	AIRLINE PART NUMBER	NOMENCLATURE 1234567	EFF CODE	QTY PER ASSY
01-					
5	66B90023-1		.PLATE-COVER		1
			ATTACHING PARTS		
10	NAS6704-4		.BOLT-		1
15	AN960C416		.WASHER		1
20	BRH10C4		.NUT-		1
			(V52828)		
			(SPEC BACN10JC4C)		
			(OPT H31-4BAC		
			(V15653))		
			(OPT NS202101S048		
			(V80539))		
			(OPT T6C428J		
			(V11815))		
			(OPT VN303B048		
			(V92215))		
			(OPT 101LH9075-4W		
			(V72962))		
			(OPT 97-048		
			(V80539))		
			-------*-------		
25	315T3041-1		.CLAMP		2
			ATTACHING PARTS		
30	NAS6704-11		.BOLT-		2
35	BACW10P186C		.WASHER-		2
			(V10630)		
			(SPEC BACW10P186C)		
40	BRH10C4		.NUT-		2
			(V52828)		
			(SPEC BACN10JC4C)		
			(OPT H31-4BAC		
			(V15653))		
			(OPT NS202101S048		
			(V80539))		
			(OPT T6C428J		
			(V11815))		
			(OPT VN303B048		
			(V92215))		
			(OPT 101LH9075-4W		
			(V72962))		
			(OPT 97-048		
			(V80539))		
			-------*-------		

FIG. & ITEM	PART NO.	AIRLINE PART NUMBER	NOMENCLATURE 1234567	EFF CODE	QTY PER ASSY
01-					
45A	P56B		.TRANSDUCER- (V19710) (SPEC 60B90034-2)	AFH	1
45C	P56C		.TRANSDUCER- (V19710) (SPEC 60B90034-3)	B-EGJ K	1
50	BRH10C3		.NUT- (V52828) (SPEC BACN10JC3C) (OPT H31-3BAC (V15653)) (OPT NS202101S02 (V80539)) (OPT T6C1032J (V11815)) (OPT VN303B02 (V92215)) (OPT 101LH9075-3W (V72962)) (OPT 97-02 (V80539))		1
55	66B90025-1		.SPACER		1
60	315T1017-1		.GEAR		1
65	66B90025-2		.SPACER		1
70	BACN10DP5J		.NUT- (V11328) (SPEC BACN10DP5J) (OPT BACN10DP5J (V14397)) (OPT BACN10DP5J (V14798)) (OPT BACN10DP5J (V30974)) (OPT BACN10DP5J (V50948))	D-G	1
75	MS20819-5C		.SLEEVE	D-G	1
80	69B96280-1		.SHIELD	D-G	1
80A	315T1063-1		.SHIELD-RACK	A-C H-K	1
82	315T1064-1		.BOLT	A-C	1
84	NAS509-4C		.SPACER	A-C	1
85	315T1027-1		.ADAPTER		1
90	SL2997C7R		.NUT- (V97393)	A-C F-K	1

FIG. & ITEM	PART NO.	AIRLINE PART NUMBER	NOMENCLATURE 1234567	EFF CODE	QTY PER ASSY
01-					
-90B	SL2997C7R		.NUT- (V97393) (OPT ITEMS 90C, 90E)	D	1
-90C	LS5097		.NUT- (V34336) (OPT ITEMS 90B, 90E)	D	1
-90D	LS5097		.NUT- (V34336) (OPT ITEM 90F)	E	1
-90E	315T1005-1		.NUT- (OPT ITEMS 90B, 90C)	D	1
-90F	315T1005-1		.NUT- (OPT ITEM 90D)	E	1
110A	SL2999C3		.NUT- (V97393)		2
115	315T1029-1		.PIN		2
117	315T3370-1		.WASHER-SHIM (USED WITH ITEM 120D)	A-DFG	4
120	60B96210-1		DELETED		
120C	10602-00		.ROLLER BEARING ASSY (V55231) (SPEC S315N166-1) (OPT ITEM 120D WITH ITEM 117) (OPT KRP114804BT (V50632)) (OPT HSP4TL104 (V02758))	A-DFG	2
120D	LA3628A		.ROLLER BEARING ASSY (V80894) (SPEC 60B96210-1) (OPT ITEM 120C) (USED WITH ITEM 117)	A-DFG	2
123	KJT115204B		.SLIDER-BLOCK (V50632)	EH-K	1
125	315T1035-1		.GEAR ASSY		1
130	3TWF37-46SLY198		DELETED		
-130A	3TWF37-46PLY198		DELETED		

FIG. & ITEM	PART NO.	AIRLINE PART NUMBER	NOMENCLATURE 1234567	EFF CODE	QTY PER ASSY
01-					
-130B	3TWF37-46ULY198		DELETED		
130C	MB546DDA3257		..BEARING- (V21335) (OPT ITEMS 130D, 130E, 130F, 130G, 130H, 130J, 130K, 130L, 130M, 130N)		1
-130D	MB546DDFS464		..BEARING- (V21335) (OPT ITEMS 130C, 130E, 130F, 130G, 130H, 130J, 130K, 130L, 130M, 130N)		1
-130E	3TWF3746PLY198		..BEARING- (V21335) (OPT ITEMS 130C, 130D, 130F, 130G, 130H, 130J, 130K, 130L, 130M, 130N)		1
-130F	3TWF3746SULY198		..BEARING- (V21335) (OPT ITEMS 130C, 130D, 130E, 130G, 130H, 130J, 130K, 130L, 130M, 130N)		1
-130G	3TWF3746ULY198		..BEARING- (V21335) (OPT ITEMS 130C, 130D, 130E, 130F, 130H, 130J, 130K, 130L, 130M, 130N)		1

FIG. & ITEM	PART NO.	AIRLINE PART NUMBER	NOMENCLATURE 1234567	EFF CODE	QTY PER ASSY
01-					
-130H	BCREFA2380		..BEARING- (V21335) (S37-46BIE3P515LY198) (OPT ITEMS 130C, 130D, 130E, 130F, 130G, 130J, 130K, 130L, 130M, 130N)		1
-130J	BCREFA2379		..BEARING- (V21335) (S37-46BIE5P515LY198) (OPT ITEMS 130C, 130D, 130E, 130F, 130G, 130H, 130K, 130L, 130M, 130N)		1
-130K	BCREFA2378		..BEARING- (V21335) (S37-46BIE7P515LY198) (OPT ITEMS 130C, 130D, 130E, 130F, 130G, 130H, 130J, 130L, 130M, 130N)		1
-130L	BCREFA2423		..BEARING- (V40920) (S37-46BIE3P515LY304) (OPT ITEMS 130C, 130D, 130E, 130F, 130G, 130H, 130J, 130K, 130M, 130N)		1
-130M	BCREFA2424		..BEARING- (V21335) (S37-46BIE5P515LY304) (OPT ITEMS 130C, 130D, 130E, 130F, 130G, 130H, 130J, 130K, 130L, 130N)		1
-130N	BCREFA2425		..BEARING- (V21335) (S37-46BIE7P515LY304) (OPT ITEMS 130C, 130D, 130E, 130F, 130G, 130H, 130J, 130K, 130L, 130M)		1
135	315T1026-1		..RING-BRG CLAMP ATTACHING PARTS		1
140	MS20427M2-4		..RIVET -------*-------		12
145	315T1035-2		..GEAR		1
150	315T1024-1		.RACK	ABF-J	1
-150A	315T1024-2		.RACK	CDEK	1
-155	315T1037-4		.HOUSING (OPT ITEM 155A)		1

	FIG. & ITEM	PART NO.	AIRLINE PART NUMBER	NOMENCLATURE 1234567	EFF CODE	QTY PER ASSY
	01-					
	155A	315T1037-6		.HOUSING (OPT ITEM 155) (USED WITH ITEMS 165, 170,175,180)		1
	165	NAS6703-3		.BOLT (USED WITH ITEMS 155A, 170,175,180)		2
	170	AN960C10L		.WASHER (USED WITH ITEMS 155A, 165,175,180)		4
	175	BACN10JC3C		.NUT (USED WITH ITEMS 155A, 165,170,180)		2
	180	315T1012-1		.COVER (USED WITH ITEMS 155A, 165,170,175)		1
R				INSTALLATION PARTS		
R	805	NAS6704HU1		BOLT		3
R	810	AN960C416L		WASHER		3
R	815	BACB30LL4-4		BOLT	A-C F-K	3
R	-815A	BACB30LL4-4		BOLT- (LIMITED)	DE	3
R	-815B	BACB30LK4-3		BOLT- (V06710) (SPEC BACB30LK4-3) (OPT BACB30LK4-3 (V06725)) (OPT BACB30LK4-3 (V06950)) (OPT BACB30LK4-3 (V08524)) (OPT BACB30LK4-3 (V17943)) (OPT BACB30LK4-3 (V80539)) (OPT BACB30LK4-3 (V27624)) (OPT BACB30LK4-3 (V92215)) (OPT BACB30LK4-3 (V97928)) (LIMITED)	DE	3

	FIG. & ITEM	PART NO.	AIRLINE PART NUMBER	NOMENCLATURE 1234567	EFF CODE	QTY PER ASSY
	01-					
R	820	315T1045-1		COVER- (LIMITED)		1
R	-820A	315T1045-2		COVER- (LIMITED)		1
R	-820B	315T1045-4		COVER- (LIMITED)		1
R	-820C	315T1045-5		COVER- (LIMITED)		1
R	825	315T1019-3		BODY-HOUSING (OPT ITEMS 825A, 825B)	A-C F-K	1
R	-825A	315T1019-5		BODY-HOUSING (OPT ITEMS 825, 825B)	A-C F-K	1
R	-825B	315T1019-7		BODY-HOUSING (OPT ITEMS 825, 825A)	A-C F-K	1
R	-825C	315T1019-3		BODY-HOUSING (LIMITED) (OPT ITEMS 825D, 825E)	DE	1
R	-825D	315T1019-5		BODY-HOUSING (LIMITED) (OPT ITEMS 825C, 825E)	DE	1
R	-825E	315T1019-7		BODY-HOUSING (LIMITED) (OPT ITEMS 825C, 825D)	DE	1
R	-825F	315T1019-6		BODY-HOUSING (LIMITED) (OPT ITEM 825G)	DE	1
R	-825G	315T1019-8		BODY-HOUSING (LIMITED) (OPT ITEM 825F)	DE	1