COMPONENT MAINTENANCE MANUAL WITH ILLUSTRATED PARTS LIST

CFM56-3 TURBINE EXHAUST PLUG ASSEMBLY

PART NUMBER 301A1050–3, 314A1501–11, –13, –14, –16, –17, –18, –9

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COMPONENT MAINTENANCE MANUAL

Revision No. 15
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To: All holders of CFM56-3 TURBINE EXHAUST PLUG ASSEMBLY 78-11-13.

Attached is the current revision to this COMPONENT MAINTENANCE MANUAL

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Location of Change	Description of Change
	NO HIGHLIGHTS

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A = Added, R = Revised, D = Deleted, O = Overflow

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TEMPORARY REVISION AND SERVICE BULLETIN RECORD

BOEING SERVICE BULLETIN	BOEING TEMPORARY REVISION	OTHER DIRECTIVE	DATE OF INCORPORATION INTO MANUAL
		PRR 33617	DEC 05/84
737-78-1045			JUN 05/88
737-78-1046		PRR 34482	JUN 05/90
737-78-1046R1		PRR 34482	DEC 05/90

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

Revision		Filed	
Number	Date	Date	Initials

Revision		Filed	
Number	Date	Date	Initials

Revision		Filed		Revision		Filed	
Number	Date	Date	Initials	Number	Date	Date	Initials

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When the temporary revision is incorporated or cancelled, and the pages are removed, enter the date the pages are removed and the initials of the person who removed the temporary revision.

Temporary Revision		Inserted		Removed	
Number	Date	Date	Initials	Date	Initials

Temporary Revision		Inserted		Removed	
Date	Initials	Number	Date	Date	Initials

Temporary Revision		Inserted		Removed	
Number	Date	Date	Initials	Date	Initials

Temporary Revision		Inserted		Removed	
Date	Initials	Number	Date	Date	Initials

INTRODUCTION

1. General

A. The instructions in this manual supply the data necessary to do the maintenance functions together with the test, fault isolation, repair, and replacement of the defective parts.

B. This manual is divided into different parts:

(1) Title Page

(2) Transmittal Letter

(3) Highlights

(4) List of Effective Pages

(5) Table of Contents

(6) Temporary Revision & Service Bulletin Record

(7) Record of Revisions

(8) Record of Temporary Revisions

(9) Introduction

(10) Procedures & IPL Sections

C. Components that can be repaired have a different repair number for each specified repair. To find the repair number location of a component, look in the Repair-General procedure at the beginning of the REPAIR section. The Repair-General procedure also has an explanation of the True Position Dimension symbols used.

D. All dimensions, measures, quantities and weights included are in English units. When metric equivalents are given they will be in the parentheses that follow the English units.

E. The introduction to the Illustrated Parts List (IPL) shows how the IPL data is used.

F. Design changes, optional parts, configuration differences and Service Bulletin modifications may cause different part numbers. These part numbers are identified in the IPL with an alphabetical letter which is added to the end of the basic item number. This new item number is referred to as an alpha-variant. Throughout the manual, IPL basic item number references also apply to alpha-variants unless shown differently.

G. The tool reference numbers found in the individual procedures and in the Special Tools, Fixtures, and Equipment section are used to identify if a tool is a standard tool (STD-XXXX), a commercial tool (COM-XXXX), or a Special Tool (SPL-XXXX). This reference number is also used to distinguish between tools with similar names in the same procedure. These reference numbers are for use in the documentation only. They are not to be used for ordering tools.

CFM56-3 TURBINE EXHAUST PLUG ASSEMBLY - DESCRIPTION AND OPERATION

1. Description

A. The CFM56-3 turbine exhaust plug assembly is a welded Inconel 625 conical structure consisting of tail ring, forward and aft cones, engine attach ring, and 12 riveted mounting hole access seal assemblies.

2. Operation

A. The plug assembly together with primary sleeve assembly is used to control exhaust nozzle area and establish smooth expansion of the power plant exhaust gas.

3. Leading Particulars (Approximate)

A. Length – 56 inches

B. Diameter – Aft 4 inches

Fwd 26 inches

C. Weight – 52 lbs

(NOT APPLICABLE)

DISASSEMBLY

1. General

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

(NOT APPLICABLE)

CHECK

1. General

A. This procedure has the data to find defects in the specified parts.

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

C. Refer to IPL Figure 1 for the item numbers.

2. Check

A. References

Reference	Title
SOPM 20-20-02	PENETRANT METHODS OF INSPECTION
737 SRM 54-40-02	Structural Repair Manual

B. Procedure

(1) Check forward cone (5), aft cone (10), tail ring (15), and seal assemblies (25, 30, 35) for dents, nicks, and pitting.

(2) Perform a visual check of the entire exhaust plug assembly (IPL Figure 1; 1).

(a) Any problems that are noted during visual check shall be submitted to penetrant inspection as shown in SOPM 20-20-02.

(b) Perform a penetrant inspection of the exhaust plug assembly (IPL Figure 1; 1) as shown in SOPM 20-20-02 as follows:

1) All weld locations.

2) All fastener locations.

3) The entire attachment ring.

4) Areas that were tightly formed or heavily stressed during fabrication.

5) All problem areas noted during visual check.

(c) Refer to 737 SRM 54-40-02 for allowable damages and repairs.

REPAIR

1. General

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

Table 601:

P/N	NAME	REPAIR
314A1501-9,-11, -13,-14,-16,-17,-18 301A1050-3	PLUG ASSEMBLY	1-1
314A1501-11,-14, -17	PLUG ASSEMBLY	1-2
314A1501-6,-7	STIFFENER	2-1
314A1505	SEAL ASSEMBLY	2-1

2. Standard Practices and References

A. Refer to the following practices and references, as applicable, for details of procedures in the individual repair.

- SOPM 20-10-05 Application and Finishing of Plasma Flame
- SOPM 20-20-02 Penetrant Method of Inspection
- SOPM 20-30-03 General Cleaning Procedures
- SOPM 20-41-01 Decoding Table for Boeing Finish Codes
- SOPM 20-44-02 Temporary Protective Coatings

B. External References

- BAC 5975 - Boeing Process Specification for Radiographic Inspection
- BAC 5975 - Boeing Process Specification for Fusion Welding of Metal

3. Materials

NOTE: Equivalent substitutes may be used.

A. Scotch-Brite Type S, G50398 Abrasive pad

B. solvent, E50001 Acetone 0-A-51 or JIS-K-1503, Grade 1

C. technical grade methyl ethyl ketone, B50046 TT-M-261

D. weld filler, G50403 Inconel 625

E. flame spray coating, G00167 tungsten carbide with cobalt, BMS 10-76, Type 1

F. coating, C00314 Low emissivity (BMS 10-82)

G. Coating - Temporary, AC-850 Toluene

H. lint-free cloth, G01043 Clean lint-free cloth

I. nitric hydrofluric acid, E00072 Nitric-hydrofluoric acid solution

J. clean dry air, G50321

K. water, G50256, clean and filtered

L. lint-free gloves, G01306 clean oil-free gloves

4. **Tools**

   A. stiff bristle brush, STD-132 Stiff bristle brush

   B. 10x hand held magnifying lens, STD-1070

   C. steam source, STD-1087 Liquid Steam source

PLUG ASSEMBLY - REPAIR 1-1

314A1501–9, –11, –13, –14, –16, –17, –18, 301A1050–3

1. General

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

B. Refer to REPAIR-GENERAL, Paragraph 2. for the Standard Overhaul Practices Manual (SOPM) subjects and references identified in this procedure.

C. Refer to REPAIR-GENERAL, Paragraph 3. for the description of the consumable codes identified in this procedure.

D. Refer to REPAIR-GENERAL, Paragraph 4. for the description of the tools identified in this procedure.

E. Refer to IPL Figure 1 for the item numbers.

2. Repair of Cracked Plug Assemblies

A. Prepare crack area for weld repair.

(1) Clean damaged area for a distance of at least one inch on each side of the area to be weld repaired using an approved carbon/soot remover.

(2) Repeat REPAIR 1-1, Paragraph 2.A.(1) using liquid steam from steam source, STD-1087.

(3) Drill 0.125-inch diameter stop holes at ends of crack.

(4) Remove discoloration (colored oxide film) from crack and area for a distance of at least one inch from crack using Scotch-Brite Type S, G50398 abrasive cleaner.

NOTE: Do not substitute wire brushing or any other abrasive cleaner for Scotch-Brite Type S, G50398. Wire brushing only polishes the oxide film but does not remove it.

(5) Remove all residue by wiping or rinsing with water, G50256.

(6) Flood crack and adjacent area with technical grade methyl ethyl ketone, B50046 or solvent, E50001 Acetone 0-A-51 or JIS-K-1503, Grade 1. Vigorously clean using a stiff bristle brush, STD-132 in order to remove carbon/soot residue remaining in crack.

NOTE: The likelihood of successful weld repair is enhanced by degree of cleanliness achieved prior to welding.

(7) Rinse thoroughly with cold water, G50256 and dry completely with clean clean dry air, G50321 or clean, lint-free cloth, G01043.

NOTE: Parts to be welded should be kept clean, dry, free from oil, grease, fingerprints and other surface contamination and should be handled with clean, oil-free lint-free gloves, G01306.

B. Weld Repair (BAC 5975)

(1) GTA weld crack using argon or helium gas and weld filler, G50403 as follows:

NOTE: Length of crack that may be weld repaired is not limited.

(a) Use copper chill blocks to reduce warpage.

(b) Weld bead must be kept to minimum size.

(c) A 100% penetration is required.

(d) Grind welds flush to skin within -0.000 to 0.010 inch with 32 microinch or less finish. Use care not to grind into base metal.

(e) Stress relieving after weld repair is not required.

(f) Visually check repair using 10x hand held magnifying lens, STD-1070.

(g) Penetrant (SOPM 20-20-02) or radiographically (BAC 5915) check weld zone. Cracks are not acceptable. Porosity and inclusions should not exceed 0.020 inch and must not have sharp terminations.

3. Repair of Damaged Tail Ring

A. Remove damaged tail ring (15) by cutting the turbine exhaust plug assembly (1) forward of the weld.

B. Visually inspect the turbine exhaust plug assembly (1) for cracks in the tail ring area and repair using REPAIR 1-1, Paragraph 2..

C. Deburr edges of turbine exhaust plug assembly (1) and new tail ring (15).

D. Fit up and butt weld (BAC 5975) tail ring (15) to turbine exhaust plug assembly (1) using weld filler, G50403.

NOTE: Axial welds to be staggered radially 45 degrees, plus or minus 10 degrees.

CAUTION: DO NOT CUT INTO PARENT MATERIAL.

E. Grind, machine, or planish welds flush with external surface to within 0.001 to 0.005 inch.

F. Penetrant inspect fusion welds per SOPM 20-20-02.

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PLUG ASSEMBLY - REPAIR 1-2

314A1501–11, –14, –17

1. General

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

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

2. Refinish

A. Consumable Materials

NOTE: Equivalent substitutes may be used.

Reference	Description	Specification
C00314	Coating - Low Emissivity Gold Coating	BMS10-82, Type I

B. References

Reference	Title
SOPM 20-30-03	GENERAL CLEANING PROCEDURES
SOPM 20-41-01	DECODING TABLE FOR BOEING FINISH CODES
SOPM 20-60-02	FINISHING MATERIALS

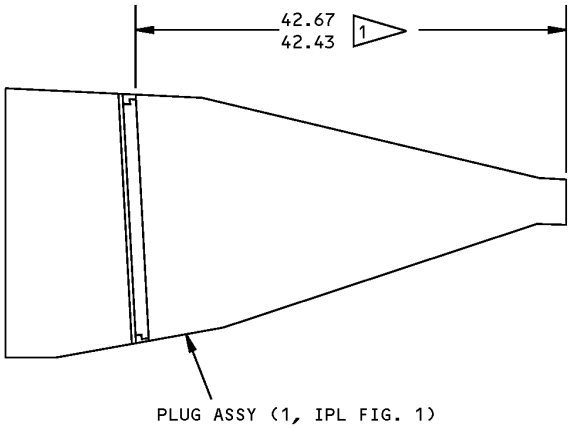
C. Procedures

NOTE: For general cleaning procedures, refer to SOPM 20-30-03. For the decoding table for Boeing finish codes, refer to SOPM 20-41-01. For finishing materials, refer to SOPM 20-60-02.

(1) Repair consists of restoration of original finish. Refinish the outer surface of the plug assembly as designated by flag note 1 of REPAIR 1-2, Figure 601.

(a) Clean the designated area by descaling and surface preparation of the nickel and cobalt bas alloys using nitric-hydrofluoric acid solution per SOPM 20-30-03.

(b) Apply low emissivity coating, C00314 (F-17.14).



REFINISH

REFINISH OUTER SURFACE OF PLUG ASSEMBLY, AREA DESIGNATED BY 1, AS FOLLOWS:

1. CLEAN AREA PER 20-30-03, DESCALING AND SURFACE PREPARATION OF NICKEL AND COBALT BASE ALLOYS, USING NITRIC-HYDROFLUORIC ACID SOLUTION
2. APPLY ONE COAT LOW EMISSIVITY COATING (F-17.14)
3. APPLY PEELABLE TEMPORARY COATING AC-850 TOLUENE PER 20-44-02

NOTE: TOLERANCE FOR OUTER SURFACE FINISH OF PLUG ASSEMBLIES IS ±0.50.

MATERIAL: INCONEL 625

ALL DIMENSIONS ARE IN INCHES

314A1501-11,-14,-17 ONLY

Plug Assembly Refinish
Figure 601

3. Storage

A. References

Reference	Title
SOPM 20-60-04	MISCELLANEOUS MATERIALS

B. Procedure

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

(1) Use standard industry practices and information contained in 20-44-02 to store this component.

(a) Apply peelable temporary coating AC-850 Toluene as designated by flag note 1 of REPAIR 1-2, Figure 601.

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SEAL ASSEMBLY & STIFFENER - REPAIR 2-1

314A1505–4, –5, –6, –10, –11, –12, –16, –17, –18, 314A1501–6, –7

1. General

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

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

C. Refer to IPL Figure 1 for the item numbers.

2. Seal Assembly Replacement

A. Procedure

(1) Remove damaged seal assembly (25, 30, 35, IPL Figure 1) by removing attaching rivets (40).

(2) Install new seal assembly (25, 30, 35) using rivets (40), machined heads of rivets (40) must be flush to surface within +0.001 to +0.003 inch.

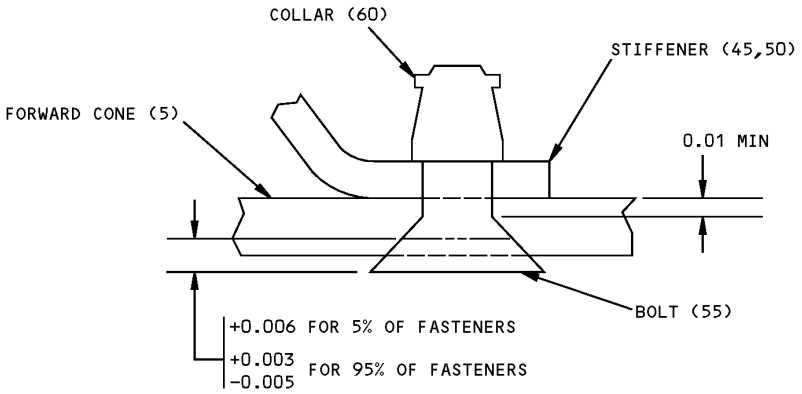
(3) Ensure that gap between flange of seal assembly (25, 30, 35) and forward cone (5) and engine attach ring (20) does not exceed 0.005 inch.

3. Stiffener Replacement

A. Procedures

(1) Remove stiffener (45, 50) by removing collars (60) and bolts (55).

(2) Install new stiffener (45, 50) using bolts (55), and collars (60) per REPAIR 2-1, Figure 601.



ALL DIMENSIONS ARE IN INCHES

314A1501-6,-7

Stiffener Replacement
Figure 601

(NOT APPLICABLE)

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FITS AND CLEARANCES

(NOT APPLICABLE)

(NOT APPLICABLE)

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ILLUSTRATED PARTS LIST

1. Introduction

A. The Illustrated Parts List (IPL) contains an illustration and a list of component parts you can repair or replace. The Illustrated Parts Catalog (IPC) shows how to use the Boeing part number system.

B. This shows how parts are related: The relation of each item to its next higher assembly (NHA) is shown in the NOMENCLATURE column. Use the indenture system that follows:

1 2 3 4 5 6 7

. Assembly

. Attaching parts for assembly

. . Detail parts for assembly

. . Subassembly

. . Attaching parts for subassembly

. . . Detail parts for subassembly

. . . Sub-subassembly

. . . Attaching parts for subassembly

. . . . . Details parts for sub-subassembly

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

C. Each top assembly is given one use code letter (A, B, C, etc.) in the USAGE CODE column. All subsequent component parts in the list can have one or more of the use code letters to show effectivity to top assemblies. A component part without a use code applies to all top assemblies.

D. An alphabetical letter is added after the item number for optional parts, parts changed by a Service Bulletin, configuration differences (except left-handed and right-handed parts), last engineering releases, and parts added between item numbers in a sequence. The alphabetical letter will not be shown on the illustration for equivalent parts of the same part number.

E. Color-coded parts are identified with a single digit alpha following the dash number or with ''SP'' suffix. If the ''SP'' suffix is used, it represents consolidation of all color codes applicable for a given usage which are not separately listed. Orders for color-coded parts should include the registry number of the airplane for which the parts are ordered.

F. If a part number is 15 characters long but will not fit in the part number column, the part number will be displayed with a ''~'' at the end of the line and will be continued on the next line. The ''~'' denotes that the part number continues on the next line.

G. Parts changed by a Service Bulletin are shown by PRE SB XXXX and POST SB XXXX added to the NOMENCLATURE column.

(1) When a new top assembly is added by a Service Bulletin, PRE SB XXXX and POST SB XXXX will be added at the top assembly level only. The configuration differences at the detail part level are shown by use code letters.

(2) When the top assembly part number is not changed by the Service Bulletin, PRE SB XXXX and POST SB XXXX will be added at the detail level.

H. Interchangeable Parts

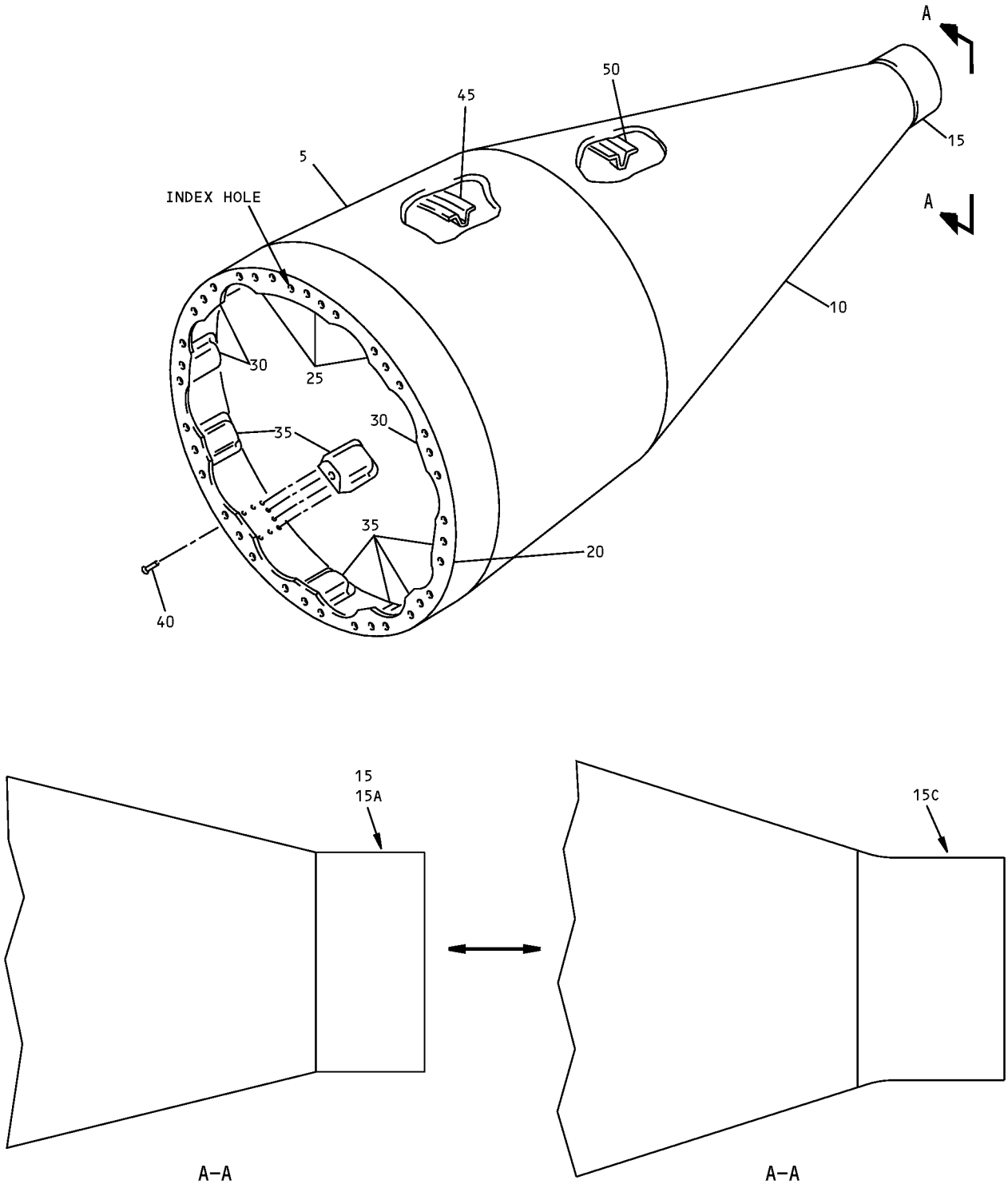
Optional (OPT)	The part is optional to and interchangeable with other parts that have the same item number.
Replaces, Replaced by and not interchangeable with (REPLACES, REPLACED BY AND NOT INTCHG/W)	The part replaces and is not interchangeable with the initial part.
Replaces, Replaced by (REPLACES,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

VENDOR CODES

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

NUMERICAL INDEX

PART NUMBER	AIRLINE PART NUMBER	FIGURE	ITEM	UNITS PER ASSEMBLY
301A1050-3		1	1L	RF
301A1050-4		1	15C	1
314A1501-10		1	5	1
314A1501-11		1	1A	RF
314A1501-12		1	20A	1
314A1501-13		1	1B	RF
314A1501-14		1	1C	RF
314A1501-15		1	15A	1
314A1501-16		1	1D	RF
314A1501-17		1	1E	RF
314A1501-18		1	1F	RF
314A1501-19		1	10A	1
314A1501-20		1	15B	1
314A1501-4		1	10	1
314A1501-5		1	15	1
314A1501-6		1	45	1
314A1501-7		1	50	1
314A1501-8		1	20	1
314A1501-9		1	1	RF
314A1505-10		1	25A	3
314A1505-11		1	30A	3
314A1505-12		1	35A	6
314A1505-16		1	25B	3
314A1505-17		1	30B	3
314A1505-18		1	35B	6
314A1505-4		1	25	3
314A1505-5		1	30	3
314A1505-6		1	35	6
BACR15CE4M		1	40	72
HL657-5-2		1	55	336
HL88TB-5		1	60	336



CFM56-3 Turbine Exhaust Plug Assembly
IPL Figure 1

FIG/ ITEM	PART NUMBER	AIRLINE PART NUMBER	NOMENCLATURE 1 2 3 4 5 6 7	USAGE CODE	UNITS PER ASSY
1–					
–1	314A1501-9		PLUG ASSY-CFM56-3 TURBINE EXHAUST (PRE SB 737-78-1045) (PRE SB 737-78-1046R1)	A	RF
1A	314A1501-11		PLUG ASSY-CFM56-3 TURBINE EXHAUST (PRE SB 737-78-1045) (PRE SB 737-78-1046R1)	B	RF
–1B	314A1501-13		PLUG ASSY-CFM56-3 TURBINE EXHAUST (POST SB 737-78-1045) (PRE SB 737-78-1046R1)	C	RF
–1C	314A1501-14		PLUG ASSY-CFM56-3 TURBINE EXHAUST (POST SB 737-78-1045)	D	RF
–1D	314A1501-16		PLUG ASSY-CFM56-3 TURBINE EXHAUST (PRE SB 737-78-1046R1)	E	RF
–1E	314A1501-17		PLUG ASSY-CFM56-3 TURBINE EXHAUST	F	RF
–1F	314A1501-18		PLUG ASSY-CFM56-3 TURBINE EXHAUST	G	RF
–1L	301A1050-3		PLUG ASSY-CFM56-3 TURBINE EXHAUST (POST SB 737-78-1046R1)	H	RF
5	314A1501-10		. CONE-FWD		1
10	314A1501-4		. CONE-AFT	A-F, H	1
–10A	314A1501-19		. CONE-AFT	G	1
15	314A1501-5		. RING-TAIL (PRE SB 737-78-1046)	A-D	1
15A	314A1501-15		. RING-TAIL (PRE SB 737-78-1046)	E, F	1
–15B	314A1501-20		. RING-TAIL	G	1
15C	301A1050-4		. RING-TAIL (POST SB 737-78-1046)	H	1
20	314A1501-8		. RING-ENGINE ATTACH	A, B, H	1
–20A	314A1501-12		. RING-ENGINE ATTACH	C-G	1

–Item not Illustrated

FIG/ ITEM	PART NUMBER	AIRLINE PART NUMBER	NOMENCLATURE 1 2 3 4 5 6 7	USAGE CODE	UNITS PER ASSY
1–					
25	314A1505-4		. SEAL ASSY (LIMITED USAGE)	A, B, H	3
–25A	314A1505-10		. SEAL ASSY (LIMITED USAGE)		3
–25B	314A1505-16		. SEAL ASSY (LIMITED USAGE)		3
30	314A1505-5		. SEAL ASSY (LIMITED USAGE)	A, B, H	3
–30A	314A1505-11		. SEAL ASSY (LIMITED USAGE)		3
–30B	314A1505-17		. SEAL ASSY (LIMITED USAGE)		3
35	314A1505-6		. SEAL ASSY (LIMITED USAGE)	A, B, H	6
–35A	314A1505-12		. SEAL ASSY (LIMITED USAGE)		6
–35B	314A1505-18		. SEAL ASSY (LIMITED USAGE)		6
			ATTACHING PARTS		
40	BACR15CE4M		. RIVET		72
			- - - - - - - * - - - - - - -		
45	314A1501-6		. STIFFENER		1
50	314A1501-7		. STIFFENER		1
			ATTACHING PARTS		
–55	HL657-5-2		. BOLT-HI-LOCK (V73197)		336
–60	HL88TB-5		. COLLAR (V73197)		336
			- - - - - - - * - - - - - - -		

–Item not Illustrated