ENGINE - H.P. COMPRESSOR STAGE 7 AND 8 ROTOR PATHS WITH REDUCED SPRAYED THICKNESS ABRADABLE LININGS - CATEGORY CODE 6 - MOD.ENG-72-0030

1. Planning Information

A. Effectivity

(1) Aircraft: Airbus A320

(2) Engine: V2500 A1 Engines prior to Serial No.V0071, excluding V0061, V0060, V0038 and V0042 as delivered.

B. Reason

(1) Condition

The abradable lining on the stage 8 rotor has become detached from the parent ring.

(2) Background

Boroscope examination of the rotor paths and subsequent strip of engine V0021 showed that the abradable lining on the stage 8 rotor path has become detached from the parent ring over an arc of 270 degrees.

Laboratory investigation concluded that excessive sprayed thickness of lining material was the cause of this separation, and recommended a reduction in the sprayed thickness. Although there has been no evidence of lining separation occurring in the stage 7 rotor path, this modification is applied to the stage 7 as it has the same sprayed lining material as the stage 8 rotor path.

(3) Objective

The changes in configuration recommended in this Service Bulletin are designed to maintain the reliability of the stage 7 and stage 8 rotor paths of the HP compressor.

(4) Substantiation

Engineering assessment has concluded that the changes introduced by this modification will reduce the level of internal stress at the lining material to parent metal bond joint, which has resulted in tensile stress at the bond interface and subsequent failure of the bond.

(5) Effects of Bulletin on:

Removal/Installation	Not affected
Disassembly/Assembly	Not affected
Cleaning	Not affected
Inspection/Check	Affected (See Supplemental Information)
Repair	Not affected
Testing	Not affected

(6) Supplemental Information

(a) The assembly and disassembly of the Post-Service Bulletin configuration does not change.

C. Description

(1) New rotor paths are introduced at stage 7 and 8 of the HP compressor.

(2) The changes introduced by this Service Bulletin are as follows:

(a) Stage 7 has a total lining thickness, as sprayed and including the bonding coat of 0.048 to 0.058in. (1,21 to 1,47 mm).

(b) Stage 8 has a total lining thickness, as sprayed and including the bonding coat of 0.055 to 0.065in. (1,39 to 1,65 mm).

(3) Existing HP compressor cases can be reworked, see Figure 1 to 4.

D. Approval

The part number changes and/or part modifications described in Sections 2 and 3 of this Service Bulletin have been shown to comply with the applicable Federal Aviation Regulations and are FAA - APPROVED for the Engine Model listed.

E. Compliance

Category Code 6

Accomplish when the sub-assembly (ie modules, accessories, components, build groups) is disassembled sufficiently to afford access to the affected part and all affected spare parts.

F. Manpower

Estimated manhours to incorporate the full intent of this bulletin:

Venue	Estimated Manhours
(1) In service	Not applicable
(2) At overhaul	9 hours

To accomplish rework and re-ident of the Stage 7 and 8 Rotor path ring.

G. Material Price and Availability

(1) Modification kit not required.

(2) See Material Information section for prices and availability of future spares.

H. Tooling - Price and Availability

The following tools are required to accomplish Sub-division 2 of this Service Bulletin:

Tool No.	Qty	Description	Function	Avail.
3R18570	1	Turning fixture	Location of workpiece	(1)
3R18232	1	Lifting tool	Location of turning fixture	(1)

(1) Indicates that tool aperture cards are currently available from I.A.E.

I. Weight and Balance

(1) Weight change .. .. .. None

(2) Moment arm .. .. No effect

(3) Datum .. .. Engine front mount centreline (Power Plant Station (PPS) 100)

J. Electrical Load Data

This Service Bulletin has no effect on the aircraft electrical loads.

K. References

(1) Internal Reference No.

EC89VR005

(2) Other References

V2500 Engine Manual 72-41-00 and 72-41-20, Assembly.

L. Other Publications Affected

(1) V2500 Illustrated Parts Catalog, 72-41-21.

(2) V2500 Engine Manual, 72-41-00, Assembly and Disassembly, 72-41-20, Assembly and 72-41-21, Cleaning and Inspection/Check.

2. Accomplishment Instructions

A. Rework Instructions

(1) Rework 6A3651 and 6A6352 stage 7 and 8 rotor paths with reduced sprayed thickness abradable linings. Refer to 72-41-21, Fig/Item No's 03-450 and 03-600) as follows:

Consumable Materials

CoMat 02-001	Masking tape
CoMat 02-006	Masking tape
CoMat 05-001	Abrasive
CoMat 05-003	Abrasive
CoMat 03-038	Metco 450 NS)
CoMat 03-089	Amdry 956)
CoMat 03-090	Metco 450 NS) Alternative
CoMat 03-036	Metco 405 NS)
CoMat 03-235	Amdry 357)
CoMat 02-236	Metco 54 NS) Alternative
CoMat 07-035 Type A	Corrosion Resistant Coating) Alternative
CoMat 07-036 Type A	Aluminium High Heat Res.)
	Paint)
CoMat 07-037	Touch Up Coating) Alternative
CoMat 07-038	Touch Up Coating)

Procedure	Supplementary Information
(a) Assemble fixture on machine.	Use lathe, turning fixture 3R18570 and lifting tool 3R18232. Set to machine correctly.
(b) Assemble rotor path ring onto turning fixture and machine to remove abradable lining.	Machine to remove lining. Figure 2 or 4 You must not remove material from the ring.
(c) Remove remaining lining material.	Hand dress. Use air operated grinder with rotary burr or suitable alternative. You must not remove material from ring.
(d) Chemically remove remaining lining material. Alternative to (c).	Refer to Standard Practices Manual, TASK 70-33-63.
(e) Abrasive blast. Alternative to (c).	Refer to SPM, TASK 70-12-02. Use CoMat 05-003.

(f)	Visually/dimensionally inspect.	Refer to SPM, TASK 70-34-01. Figure 2 or 4.
(g)	Do a penetrant crack test.	Refer to SPM, TASK 70-23-01 or 03.
(h)	Remove grease.	Refer to SPM, TASK 70-11-01.
(i)	Put covers over areas not to be sprayed.	Use CoMat 02-001 or locally manufactured fixture.
(j)	Abrasive blast.	Refer to SPM, TASK 70-12-02. Use CoMat 05-001. Remove masks when blasting is completed. Do not touch area which has been blasted.
(k)	Put covers over areas not to be sprayed.	Use CoMat 02-006 or locally manufactured fixture.
(l)	Apply bond coat.	Refer to SPM, TASK 70-34-01. For powder feed plasma spray gun use CoMat 03-038 or CoMat 03-089 or CoMat 03-090. Alternatively for wire feed combustion spray use CoMat 03-036. Preheat seal ring to 105 deg C to 125 deg C. Use spray gun with powder feed off.
(m)	Apply abradable lining.	Refer to SPM, TASK 70-34-01. Figure 3 or 5. Use CoMat 03-235 or CoMat 03-236. Remove covers when spraying is completed.

Spray Data

Parameters for Metco 3MB powder feed plasma spray gun

	Bond Coat	Abradable Coat
Gun	Metco 3MB	Metco 3MB
Cathode	3M11A	3M11A
Nozzle	3M7AGH	3M7AGH
Distribution ring	3A275A	3A275A
Powder port	No 2	No 1
Primary gas flow tube	2M164	2M164
Secondary gas flow tube	2M166	2M166

Gases:

Arc primary	Argon	Argon
Pressure	100 p.s.i.	100 p.s.i.
Arc secondary	Hydrogen	Hydrogen
Pressure	50 p.s.i.	50 p.s.i.

Power Supply:

Operating Conditions:

Gas flow Metco flow meter setting:

Primary	80	150
Secondary	15	5

Power settings:

Current	500 amps	500 amps
Voltage	61-75 volts	55-70 volts

Powder control:

Carrier gas flow meter setting	37	37
Powder feed rate	67-69 gms/min	49-50 gms/min
Spray distance	4-7 ins.	4-6 ins.
Spray thickness	0.004-0.007ins.	See illustrations

Parameters for Plasma Technik plasma burner

	Bond Coat	Abradable Coat
Gun	Plasma Technik F4	Plasma Technik F4
Nozzle dia	6,0 mm.	6,0 mm.
Powder injector dia	1,8 mm.	1,8 mm.
Injector angle	90 degrees	+15 degrees
Powder gauge	6,0 mm.	6,0 mm.
Arc primary gas	Argon	Argon
Flow rate litres/min	55	38
Arc secondary gas	Hydrogen	Hydrogen
Flow rate litres/min	9.5	12
Power supply	600 amps	500 amps
Carrier gas litres/min	3.5	5.0
Powder spreader type	L	L
Powder feed rate grams/min	50	35
Spray distance	5.5 ins.	6.7 ins.
Spray thickness	0.004-0.007 ins.	See illustrations

Parameters for Metco 10E or 12E wire feed combustion spray gun

	Bond Coat
Gun	Metco 10E or 12E*
Nozzle diameter	3,0 mm.
Air cap	C
Gas pressures	
Acetylene	10 p.s.i.
Oxygen	30 p.s.i.
Air	65 p.s.i. or 75 p.s.i.*
Gas flows Metco flow meter setting	
Acetylene	33
Oxygen	46
Air	49 or 65*
Spray distance	5-7 ins.
Wire diameter	0.125 ins.
Deposition per pass	0.001 ins.
Spray thickness	0.004-0.007 ins.

	Procedure	Supplementary Information
(n)	Visually inspect sprayed coating on ring.	Refer to SPM, TASK 70-34-01.
(o)	Make a dimensional inspection.	Figure 3 or 5.
(p)	Hardness test sprayed coating.	Refer to SPM, TASK 70-34-01. Average hardness must be 70-80 R15Y outer limits 65 min. 85 max.
(q)	Apply high heat resisting enamel as necessary.	Refer to SPM, TASK 70-38-21 Figure 3 or 5. Use CoMat 07-035 Type A or CoMat 07-036 Type A, CoMat 07-037 or CoMat 07-038.

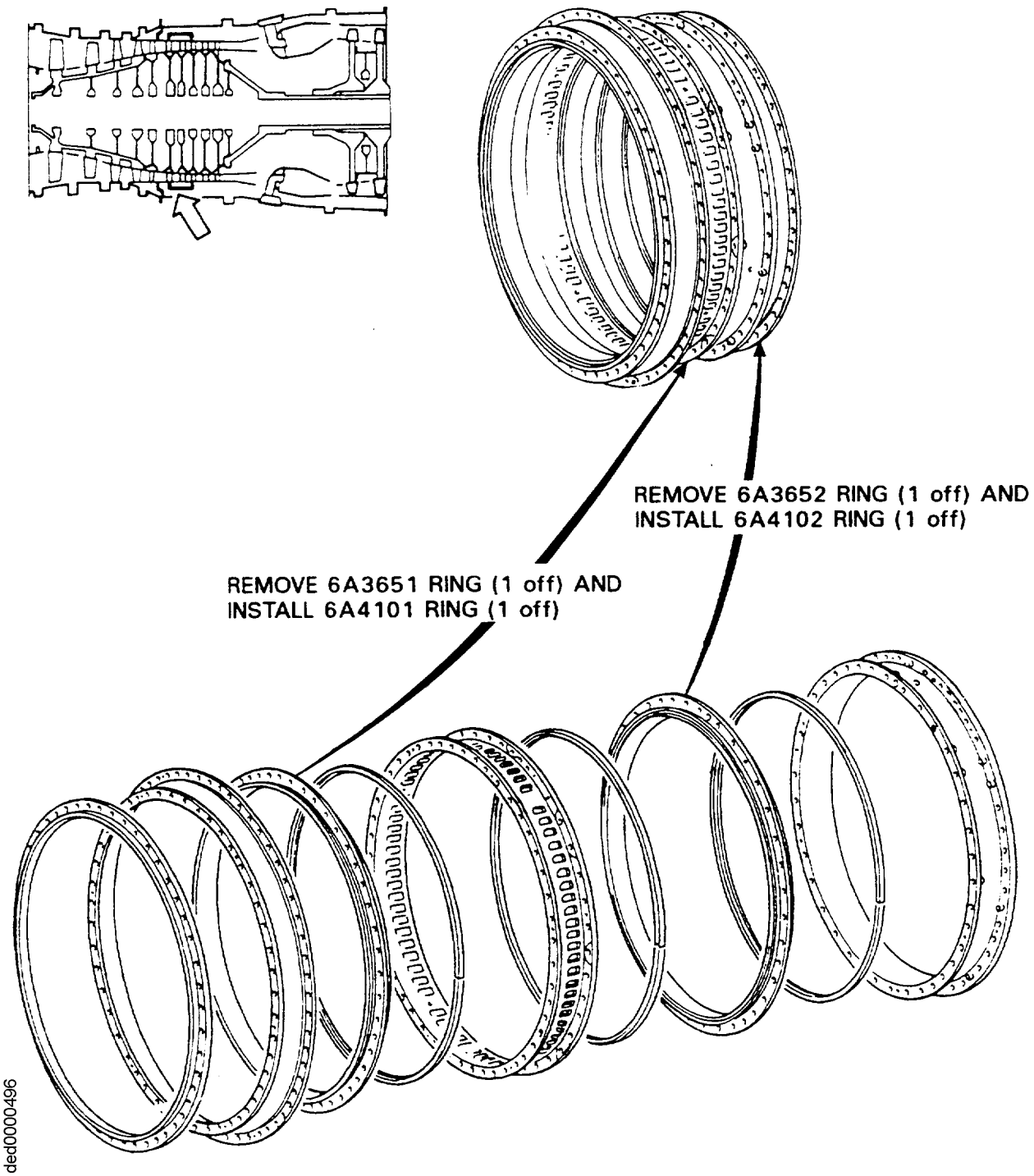
		Old Part Number	New Part Number
(r)	Re-identify with new part number vibro-engrave adjacent to existing part number	6A3651	6A4101
		6A3652	6A4102

(2) Rework 6A3652, HP compressor stage 8 rotor path ring in accordance with Repair Scheme VRS6020 and re-identify 6A4102.

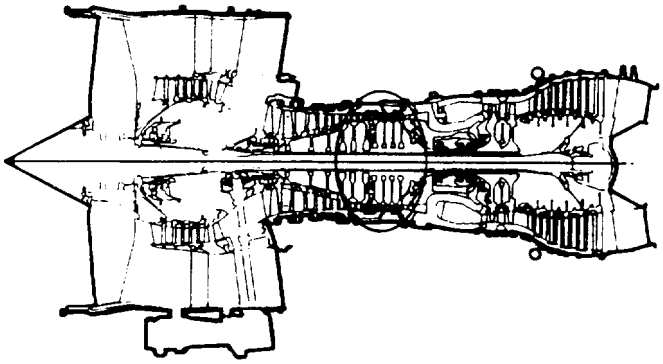
B. Assembly Instructions

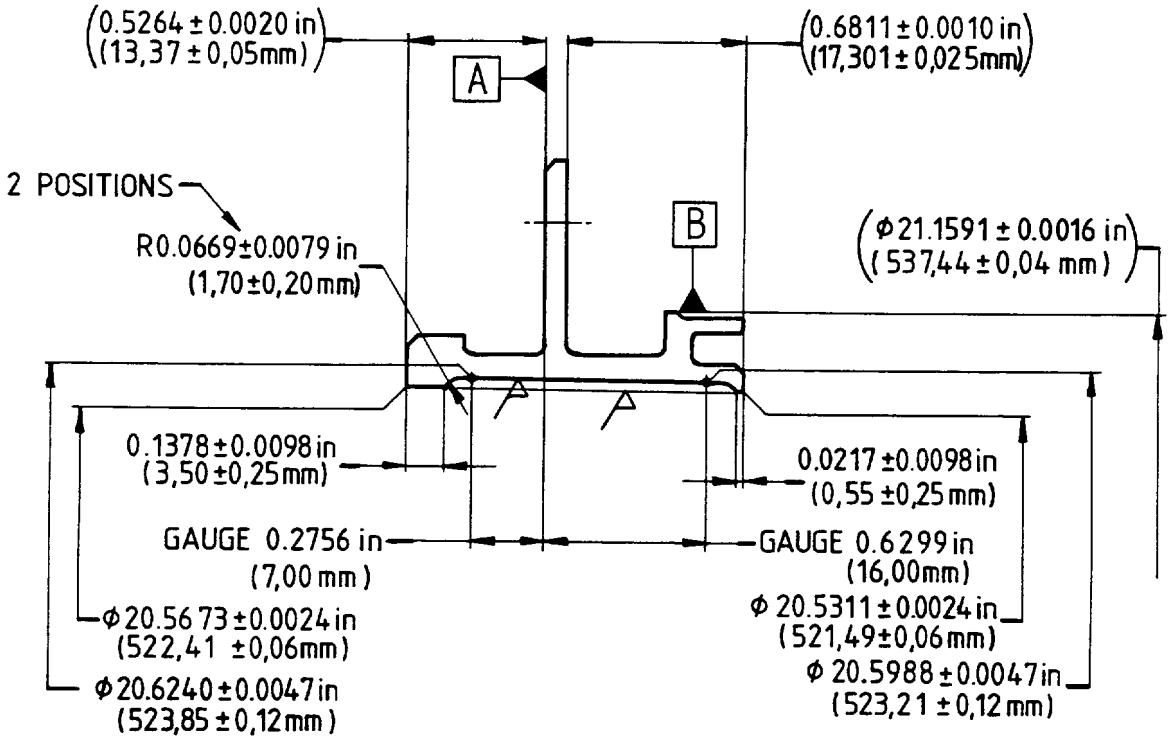
(1) New 6A4101 and 6A4102 HP compressor with reworked stage 7 and 8 rotor paths are interchangeable with in use HP compressor cases.

(2) Assemble new 6A4101 and 6A4102 HP compressor case with reworked stage 7 and 8 rotor path linings in accordance with approved procedures. Engine Manual, 72-41-00 and 72-41-20, Assembly.



Location of H.P. compressor stages 7 and 8 rotor paths
Fig.1





THE REMOVAL OF THE SEAL MATERIAL FROM
THE STAGE 7 COMPRESSOR ROTOR PATH

MACHINE WHERE SHOWN ∇

REMOVE THE SHARP EDGES 0.012 ± 0.008 in (0,30 ± 0,20 mm)

MACHINED SURFACE FINISH TO BE 250 MICROINCHES (6,30 MICROMETRES)

GEOMETRIC SYMBOLS CONFORM TO ISO R1101-1969.

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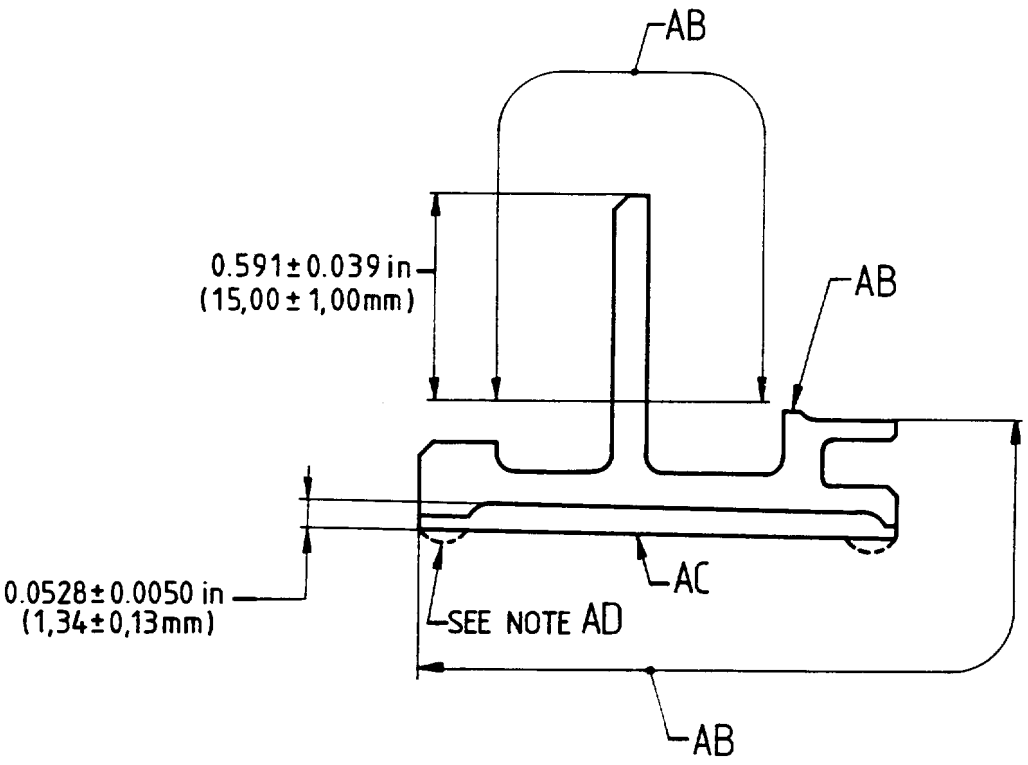
Modification of HP Compressor Stage 7 Rotor Path
Fig.2



THE REPLACEMENT OF THE SEAL MATERIAL IN THE STAGE 7 COMPRESSOR ROTOR PATH

MAKE GOOD ALL DAMAGE TO ENAMEL AS GIVEN IN TEXT.
DO NOT LET THE ENAMEL TOUCH THE AREAS SPECIFIED AB OR GO INTO THE HOLES.
APPLY THE SEAL MATERIAL AS GIVEN IN THE TEXT ON THE AREA SPECIFIED AC.
NOTE AD:-
IT IS PERMITTED TO MAKE SURFACE NOT SMOOTH.

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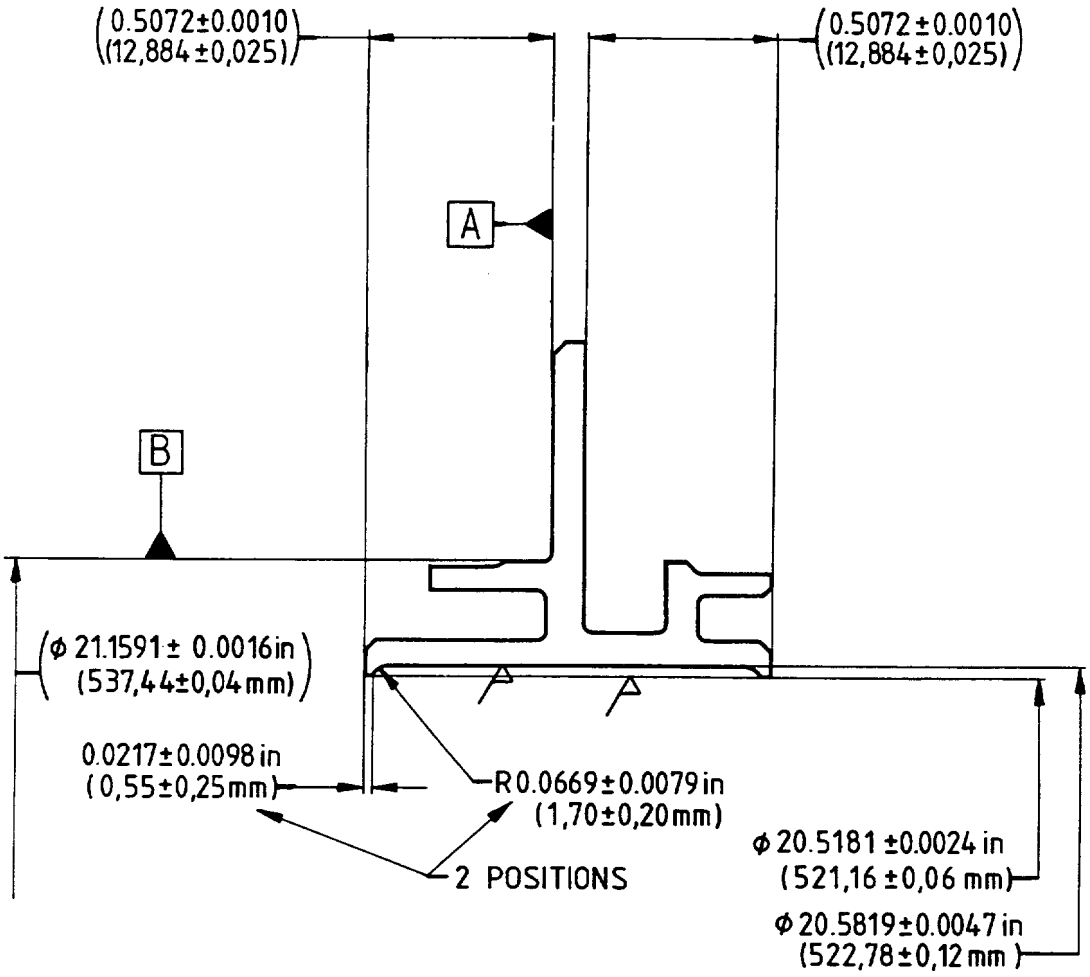
Modification of HP Compressor Stage 7 Rotor Path Abradable Lining
Fig.3



THE REMOVAL OF THE SEAL MATERIAL FROM
THE STAGE 8 COMPRESSOR ROTOR PATH.

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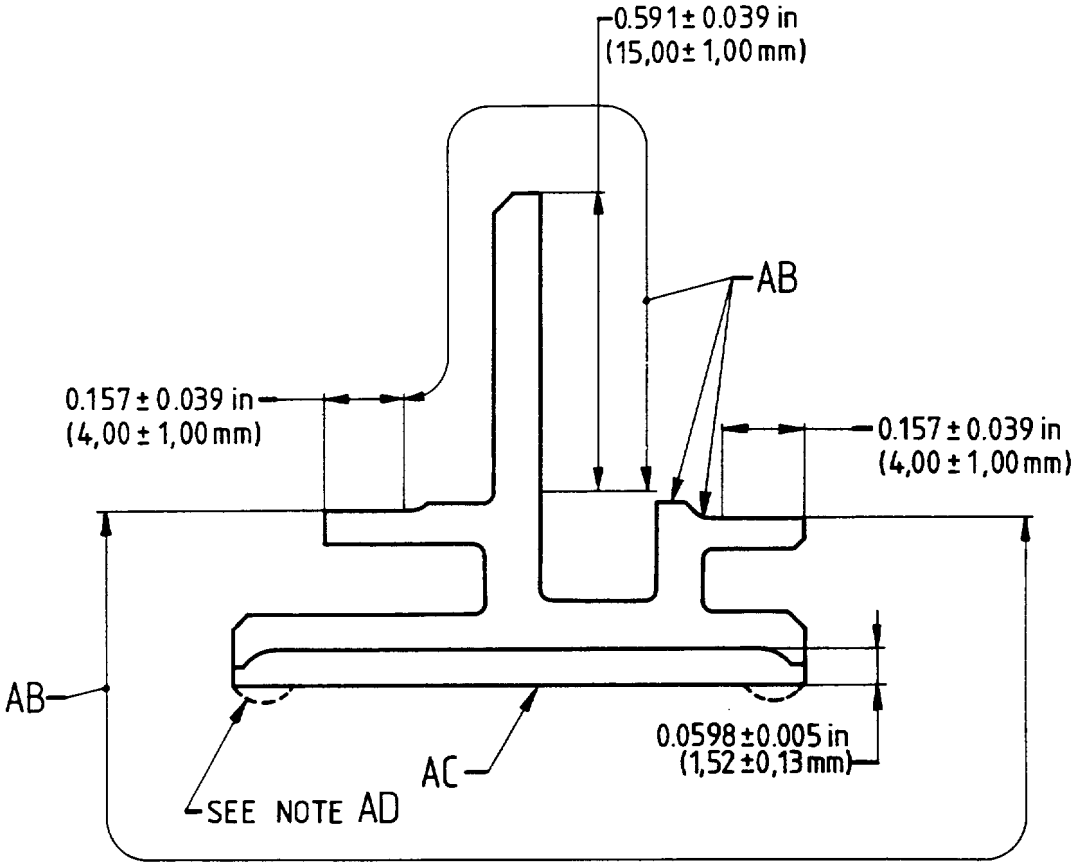
Modification of HP Compressor Stage 8 Rotor Path Abradable Lining
Fig.4



THE REPLACEMENT OF THE SEAL MATERIAL IN THE STAGE 8 COMPRESSOR ROTOR PATH.

MAKE GOOD ALL DAMAGE TO ENAMEL AS GIVEN IN TEXT.
DO NOT LET THE ENAMEL TOUCH THE AREAS SPECIFIED AB OR GO INTO THE HOLES.

APPLY THE SEAL MATERIAL AS GIVEN IN THE TEXT ON THE AREA SPECIFIED AC.
NOTE AD:-
IT IS PERMITTED TO MAKE THE SURFACE NOT SMOOTH.

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Modification of HP Compressor Stage 8 Rotor Path Abradable Lining
Fig.5

3. Material Information

NEW PART NO. (ATA NO.)	QTY	EST'D UNIT PRICE ($)	KEYWORD	OLD PART NO. (IPC NO.)	INSTRUCTIONS DISPOSITION
Applicability: For each V2500 Engine to incorporate Sub-division 1 of this Bulletin.					
A. Kits associated with the Bulletin:					
None					
B. Parts affected by this Bulletin:					
6A4101 (72-41-21)	1	1913,00	Ring Stage 7 Rotor Path	6A3651 (03-450)	(2D)(S1) (A)(B)
6A4102	1	1913,00	Ring Stage 8 Rotor Path	6A3652 (03-600)	(2D)(S1) (A)(B)

C. Instruction/Disposition Code Statements:

(2D) Old part can be reworked and re-identified to the new part number

(S1) Old and new parts may be freely interchanged

(A) New part currently available

(B) Old part no longer available for sale

NOTE: The estimated 1989 Unit Prices shown are provided for planning purposes only and do not constitute a firm quotation. Contact IAE Spare Parts Sales Department for information concerning firm prices.