V2500 International Aero Engines

Date: May 29/99

Subject: Transmittal of Revision 1 To Service Bulletin Number V25000-ENG-72-0321

Service Bulletin Revision History:

Event	Date
Basic Issue	Jul.15/98
Revision 1	May 29/99

Reason For Issuance Of Revision:

(1) To update the engine effectivity.

(2) Add new Turbine Blade configuration that incorporates a protective coating to the under platform areas.

Effect on Prior Compliance:

None.

List of Effective Pages:

Bulletin Page No.	Rev. No.	Effective Date
1 and 2	1	May 29/99
3 and 4	Basic	Jul.15/98
5 to 29	1	May 29/99

V2500 International Aero Engines

SERVICE BULLETIN

Printed in Great Britian

ENGINE - HP TURBINE ROTOR AND STATOR ASSEMBLY - INTRODUCE NEW FIRST AND SECOND STAGE TURBINE BLADES WITH UNDER PLATFORM COATING

MODEL APPLICATION

V2500-A1

BULLETIN INDEX LOCATOR

72-40-00

Compliance Category Code

7

Internal Reference No.

97VA026, 97VA026A, 97VA026B

Jul.15/98
Revision 1 May 29/99

V2500-ENG-72-0321

1. Planning Information

A. Effectivity

(1) Aircraft: Airbus A320, A321

(2) Engine: V2500-A1 Engines Before Serial No. V0362

B. Reason

(1) Condition:

Experience with High Pressure Turbine Blades in other engine models suggests that the HP Turbine Blades in the V2500-A1 model are susceptible to under platform corrosion in the damper pocket area. Under platform corrosion has been shown to have the potential of causing base material cracking.

(2) Background:

The V2500-A1 High Pressure Turbine Blade material has been shown to be susceptible to corrosion upon exposure to corrosive agents typically found in service run hardware.

(3) Objective:

Supply new Stage 1 and 2 High Pressure Turbine Blade Assemblies with PW545 (cobalt-aluminum) coating to the under platform damper pocket area to protect the base metal from the effects of corrosion.

(4) Substantiation

This change was substantiated by experience in similar engines which have successfully applied under platform and localized touch-up coatings to service run blades. Detailed metallurgical lab analysis and testing has demonstrated that the PWA 545 protective coating eliminates the corrosive reaction between the corrosive agent and the base alloy. Blades with no corrosion or existing corrosion within the current limits can accommodate the fatigue debit associated with the application of the protective coating.

(5) Effects of Bulletin on Workshop Procedures:

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

(6) Supplemental Information

Blade cleaning, inspection, and repair procedures are revised with the introduction of this under platform protective coating.

Printed in Great Britian

C. Description

(1) Replace the Stage 1 and 2 High Pressure Turbine Blade Assemblies with new blade assemblies that have PWA 545 coating under the platform.

D. Approval

The Part Number Changes and/or part modifications described in Section 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 7

Accomplish when supply of superseded parts has been depleted.

F. Manpower

Estimated Manhours to incorporate the full intent of this Bulletin:

Venue		Estimated Manhours
(1)	In service	not applicable
(2)	At overhaul	not applicable

NOTE: The parts affected by this Service Bulletin are accessible at overhaul.

(3) Modification kit is not required. Parts are supplied as single line items.

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

G. Tooling - Price and Availability

Special tools are not required to accomplish this Service Bulletin.

H. Weight and Balance

(1)	Weight change	None
(2)	Moment arm	No effect
(3)	Datum	Engine Front mount Centerline (Power Plant station (PPS) 100)

I. Electrical Load Data

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

J. References

(1) IAE V2500 Service Bulletins:

V2500-ENG-70-0154 (Information - Engine - HP Turbine Rotor And Stator Assembly - Introduce Revised Material Stage 2 Blade Assemblies

V2500-ENG-70-0429 (Information - Engine - HP Turbine Rotor And Stator Assembly - To Announce The Availability Of A New Stage 1 HP Turbine Rotor Blade)

V2500-ENG-70-0576 (Information -Engine - HP Turbine Rotor And Stator Assembly - To Announce The Availability Of The Latest Stage 1 And 2 HPT Blade Assemblies)

V2500-ENG-72-0046 (Engine - HP Turbine Rotor And Stator Assembly - Provide A New First Stage HPT Cooling Duct Assembly)

V2500-ENG-72-0220 (Engine - HP Turbine Rotor And Stator Assembly - Introduce New First And Second Stage Turbine Blades With More Durable Tips and Improved Repairability)

(2) The V2500 Engine Illustrated Parts Catalogs (S-V2500-1IA), Chapter/Section72-45-14 and 72-45-32

(3) The V2500 Standard Practices/Processes Manual (SPP-V2500-1IA), Chapter/Section 70-00, 70-09-00, 70-12-09, 70-13-02, 70-37-03, 70-28-01 and 70-38-26.

(4) The V2500 Engine Manual (E-V2500-1IA), Chapter/Section 72-45-14, and 72-45-32

K. Other Publications Affected

(1) The V2500 Engine Illustrated Parts Catalogs (S-V2500-1IA), Chapter/Section 72-45-14 and 72-45-32

(2) The V2500 Engine Manual (E-V2500-1IA), Chapter/Section 72-45-14 and 72-45-32 Cleaning, Inspection and Repair, to add the new parts.

2. Accomplishment Instructions

A. Prerequisite Procedures

(1) Clean and stress relieve the blade by the procedure specified in Reference (3), Engine Manual, Chapter/Section 72-45-14 Inspection/Check-01, Subtask 72-45-14-230-053-001.

NOTE: Cleaning can be done before stress relief, but stress relief must be done before any other cleaning, inspection, or repair of turbine blades by this procedure.

B. Modification Procedure for V2500-A1 Stage 1 Turbine Blades.

NOTE: Whenever IAE Control No. 70-38-23 is specified in this Service Bulletin and in the under platform inspection procedure, CoMat 01-300 (trade name: Blue Gold Industrial Cleaner) may be used as an alternative cleaning solution.

NOTE: Engine-run blades should be returned by the operator in the "as removed" condition to permit analysis of the material under the blade platform by the procedure given in Reference (3), Chapter/Section 72-45-14, Repair 005 (VRS 3357).

NOTE: This modification procedure is applicable to numerous blade part numbers. It is important to note that when statements are made to perform a step per one of many referenced repair procedures, the repair source must only select the repair procedure that is applicable to the specific blade part number being modified. See Table 1.

Blade Part Number	Blade Tip Configuration
2A3001	Sprayed Abrasive Tip
2A3001-001	Turbotip
2A8601	Sprayed Abrasive Tip

Stage 1 High Pressure Turbine Blade Configuration
Table 1

(1) Do a modification of the Stage 1 High Pressure Turbine Blades 2A3001, 2A3001-001 and 2A8601 (64 off). See Reference (2), Chapter/Section 72-45-14. See Figures 1 and 2.

	Procedure	Supplementary Information
(a)	Do an inspection of the blades by the procedure specified.	Refer to Reference (4), Chapter/Section 72-45-14, Repair 005 (VRS 3357).

Procedure	Supplementary Information
1 Overhauled and or repaired blades that have not accumulated additional service must be inspected by the procedure specified.	Refer to Reference (4), Chapter/Section 72-45-14, Inspection/Check 01.
2 Non-engine run blades do not have to be inspected by the procedure specified.	
3 Only blades that are acceptable by the inspection requirements specified can be modified by the procedure that follows.	

NOTE: The blade internal cavity cleaning repair may be performed either before or after the blade protective coating and tip restoration repairs.

(b) Clean the internal cavity, as necessary, by one of the procedures specified.

Refer to Reference (3), Chapter/Section 70-13-02, Ultrasonic Cleaning.

Refer to Reference (4), Chapter/Section 72-45-14, Repair 005, VRS 3357.

NOTE: Airfoil and platform protective coating may be restored by either a strip and recoat repair or an overcoat repair.

(c) If necessary, remove the airfoil and platform coating by the procedure specified.

Refer to Reference (4), Chapter/Section 72-45-14, Repair 014 (VRS 3563).

	Procedure	Supplementary Information
(d)	If necessary, restore blade sprayed Turbotip . by the procedure specified.	Refer to Reference (4), Chapter/Section 72-45-14, Repair 017 (VRS 3548).
(e)	If necessary, restore airfoil and platform coating by the procedure specified.	Refer to Reference (4), Chapter/Section 72-45-14, Repair 014 (VRS 3563).

NOTE: Heat treatment of the airfoil and platform coating, Reference (3), 70-38-23, can be done at the same time as the heat treatment for under platform coating, Reference (3), 70-38-23), if it is done in a dry argon atmosphere. See step (j).

(f)	Dry abrasive blast the under platform area by the procedure specified. Make sure that the areas which need protection are properly masked (root serrations, root openings and coated areas).	Refer to Reference (3), Chapter/Section 70-12-09, Abrasive Cleaning. See Figure 2.
(g)	Apply protective coat to the blade under platform area by the procedure specified.	Refer to Reference (3), Chapter/Section 70-38-26, Surface Treating.

CAUTION: THE PROCEDURE GIVEN IN REFERENCE (3), CHAPTER/SECTION 70-38-14, SURFACE PROTECTION, CANNOT BE USED AS AN OPTION FOR THE PROCEDURE GIVEN IN REFERENCE (3), CHAPTER/SECTION, 70-38-26, SURFACE TREATING.

1 Use multiple coats to the blade under platform area to obtain the coating thickness requirement of 0.0005 - 0.0030 in. (0,013 - 0,076 mm) after diffusion heat treat.

NOTE: The coating thickness requirement includes the diffused zone.

	Procedure	Supplementary Information
	2 Diffusion heat treat for 4 hours at 1950 - 2000° F (1065.6 - 1093.6° C) in a dry argon atmosphere.	Refer to Reference (3), Chapter/Section 70-37-03, Heat Treating.
	a The cooling rate must be 10° F/minimum average to 1200° F (648.9° C) and cooling at any convenient rate thereafter.	
(h)	Do a check of the under platform area for the presence of coating by the procedure specified.	Refer to Reference (3), Chapter/Section 70-28-01, Special Inspection. See Figure 2.
(i)	Touch-up under platform areas that have insufficient coating by the procedure specified.	Refer to Reference (3), Chapter/Section 70-38-26, Surface Treating. See Figure 2.
(j)	Diffusion heat treat for 1 to 4 hours at 1950 - 2000° F (1065.6 - 1093.6° C) in a dry argon atmosphere.	Refer to Reference (3), Chapter/Section 70-37-03, Heat Treating. See Figure 2.
	1 The cooling rate must be 10° F/minutes minimum average to 1200° F (648.9 ° C) and cooling at any convenient rate thereafter.	

	Procedure	Supplementary Information
(k)	Precipitation heat treat the blade by heating to 1575 - 1625° F (857.2 - 885° C) and then holding for 8 or the alternate 12 hours. 1 The cooling rate must be 10° F/minutes minimum average to 1200° F (648.9 ° C) and cooling at any convenient rate thereafter.	Refer to Reference (3), Chapter/Section 70-37-03, Heat Treating. See Figure 2.
(l)	Mark the new part number adjacent to the existing part number. Use the vibration peen method.	Existing / New Part Number 2A3001 / 2A3001-002 2A3001-001 / 2A3001-002 2A8601 / 2A8901 Refer to Reference (3), Chapter/Section 70-09-00, Marking of Parts.

C. Postrequisite Procedures

(1) Shotpeen the blade root by the applicable step in the procedure specified in Reference (4), Chapter/Section 72-45-14, Inspection/Check-01, Subtask 72-45-14-230-053-001.

(2) X-Ray inspect the blade internal cavity for foreign material by the procedure specified in Reference (4), Chapter/Section 72-45-14, Inspection/Check-01, Subtask 72-45-14-260-052.

(3) Waterflow check the internal passages and airfoil cooling holes. Any obstructions must be cleared.

(4) Airflow inspect the blade by the procedure specified in Reference (4) , Chapter/Section 72-45-14, Inspection/Check-01, Task 72-45-14-280-059.

3. Accomplishment Instructions - Modification Of The Stage 2 High Pressure Turbine Blades

A. Prerequisite Procedures

(1) Clean and stress relieve the blade by the procedure specified in Reference (4), Engine Manual, Chapter/Section 72-45-32 Inspection/Check-01, Control No./Task No. 72-45-32-230-053-001.

NOTE: Cleaning can be done before stress relief, but stress relief must be done before any other cleaning, inspection, or repair of turbine blades by this procedure.

B. Modification Procedure for V2500-A1 Stage 2 Turbine Blades.

NOTE: Whenever IAE Control No. 70-13-02 is specified in this Service Bulletin and in the under platform inspection procedure, CoMat 01-300 (trade name: Blue Gold Industrial Cleaner) may be used as an alternative cleaning solution.

NOTE: Engine-run blades should be returned by the operator in the "as removed" condition to permit analysis of the material under the blade platform by the procedure given in Reference (4) , Chapter/Section 72-45-32 Inspection/Check-01, Subtask 72-45-32-230-053-001.

NOTE: This modification procedure is applicable to numerous blade part numbers. It is important to note that when statements are made to perform a step per one of many referenced repair procedures, the repair source must only select the repair procedure that is applicable to the specific blade part number being modified. See Table 1.

Blade Part Number	Blade Tip Configuration
2A1102	Sprayed Abrasive Tip
2A1102-001	Turbotip
2A8602	Sprayed Abrasive Tip

Stage 2 High Pressure Turbine Blade Configuration
Table 2

(1) Do a modification of the Stage 2 High Pressure Turbine Blades 2A1102, 2A1102-001 and 2A8602 (72 off). See Reference (2), Chapter/Section 72-45-32 for the applicable engine model. See Figures 3 and 4.

	Procedure	Supplementary Information
(a)	Do an inspection of the blades by the procedure specified.	Refer to Reference (4) , Chapter/Section 72-45-32, Inspection/Check-01.
	1 Overhauled and or repaired blades that have not accumulated additional service must be inspected by the procedure specified.	
	2 Non-engine run blades do not have to be inspected by the procedure specified.	

Procedure	Supplementary Information
3 Only blades that are acceptable by the inspection requirements specified can be modified by the procedure that follows.	
NOTE: The blade internal cavity cleaning repair may be performed either before or after the blade protective coating and tip restoration repairs.	
(b) Clean the internal cavity, as necessary, by one of the procedures specified.	Refer to Reference (3), Chapter/Section 70-13-02, Ultrasonic Inspection. Refer to Reference (4) , Chapter/Section 72-45-32, Repair 005 (VRS 3360).
NOTE: Heat treatment of the platform and airfoil coating, Reference (3), 70-38-29, can be done at the same time as the heat treatment for under platform coating, Reference (3), 70-38-26), if it is done in a dry argon atmosphere. See step (j).	
NOTE: Airfoil and platform protective coating may be restored by either a strip and recoat repair or an overcoat repair.	
(c) If necessary, remove the airfoil and platform coating by the procedure specified.	Refer to Reference (4), Chapter/Section 72-45-32, Repair 009 (VRS 3496).
(d) If necessary, restore blade sprayed abrasive tip by the procedure specified.	Refer to Reference (4), Chapter/Section 72-45-32, Repair 003 (VRS 3243) or Repair 009 (VRS 3494).
(e) If necessary, restore blade sprayed abrasive tip by the procedure specified.	Refer to Reference (4), Chapter/Section 72-45-32, Repair 010, VRS 3496. See Table 2.

	Procedure	Supplementary Information
(f)	If necessary, restore blade sprayed Turbotip . by the procedure specified.	Refer to Reference (4), Chapter/Section 72-45-32, VRS 3550.
(g)	If necessary, restore airfoil and platform coating by the procedure specified.	Refer to Reference (4), Chapter/Section 72-45-32, VRS 3552, VRS 3564, VRS 3569.
(h)	Dry abrasive blast the under platform area by the procedure specified. Make sure that the areas which need protection are properly masked (root serrations, root openings and coated areas).	Refer to Reference (3), Chapter/Section 70-12-09, Abrasive Blasting.
(i)	Apply protective coat to the blade under platform area by the procedure specified.	Refer to Reference (3), Chapter/Section 70-38-26, Surface Treating. See Figure 4.

CAUTION: THE PROCEDURE GIVEN IN REFERENCE (3), CHAPTER/SECTION 70-38-14, SURFACE PROTECTION, CANNOT BE USED AS AN OPTION FOR THE PROCEDURE GIVEN IN REFERENCE (3), CHAPTER/SECTION, 70-38-26, SURFACE TREATING.

1	Use multiple coats to the blade under platform area to obtain the coating thickness requirement of 0.0005 - 0.0030 in. (0,013 - 0,076 mm) after diffusion heat treat.	Refer to Reference (3), Chapter/Section 70-37-03, Heat Treating.

NOTE: The coating thickness requirement includes the diffused zone.

2	Diffusion heat treat for 4 hours at 1950 - 2000° F (1065.6 - 1093.6° C) in a dry argon atmosphere.	Refer to Reference (3), Chapter/Section 70-37-03, Heat Treating.

	Procedure	Supplementary Information
	a The cooling rate must be 10° F/minmum average to 1200° F (648.9° C) and cooling at any convenient rate thereafter.	
(j)	Do a check of the under platform area for the presence of coating by the procedure specified.	Refer to Reference (3), Chapter/Section 70-28-01. See Figure 4.
(k)	Touch-up under platform areas that have insufficient coating by the procedure specified.	Refer to Reference (3), Chapter/Section 70-38-26. See Figure 4.
(l)	Diffusion heat treat for 1 to 4 hours at 1950 - 2000° F (1065.6 - 1093.6° C) in a dry argon atmosphere.	Refer to Reference (3), Chapter/Section 70-37-03 Heat Treating. See Figure 4.
	1 The cooling rate must be 10° F/minutes minimum average to 1200° F and cooling at any convenient rate thereafter.	
(m)	Precipitation heat treat the blade by heating to 1575 - 1625° F (857.2 - 885° C) and then holding for 8 or the alternate 12 hours.	Refer to Reference (3), Chapter/Section 70-37-03, Heat Treating. See Figure 4.
	1 The cooling rate must be 10° F/minutes minimum average to 1200° F (648.9° C) and cooling at any convenient rate thereafter.	

Procedure	Supplementary Information	
(n) Mark the new part number adjacent to the existing part number. Use the vibration peen method.	Existing	New Part Number
	2A1102	2A1102-002
	2A1102-001	2A1102-002
	2A8602	2A8902

Refer to Reference (3), Chapter/Section 70-09-00, Marking of Parts.

C. Postrequisite Procedures

(1) Shotpeen the blade root by the applicable step in the procedure specified in Reference (4), Chapter/Section 72-45-32, Inspection/Check-01, Subtask 72-45-14-230-053-001.

(2) X-Ray inspect the blade internal cavity for foreign material by the procedure specified in Reference (4), Chapter/Section 72-45-32, Inspection/Check-01.

(3) Waterflow check the internal passages and airflow cooling holes. Any obstructions must be cleared.

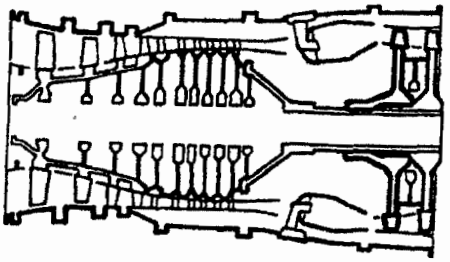
(4) Airflow inspect the blade by the procedure specified in Reference (4) , Chapter/Section 72-45-32, Inspection/Check-01, Task 72-45-14-280-058.

D. Replace the Stage 1 HPT Blades (64 off) by the approved procedure given in Reference (4), Chapter/Section 72-45-10, Assembly-01 and Figure 1.

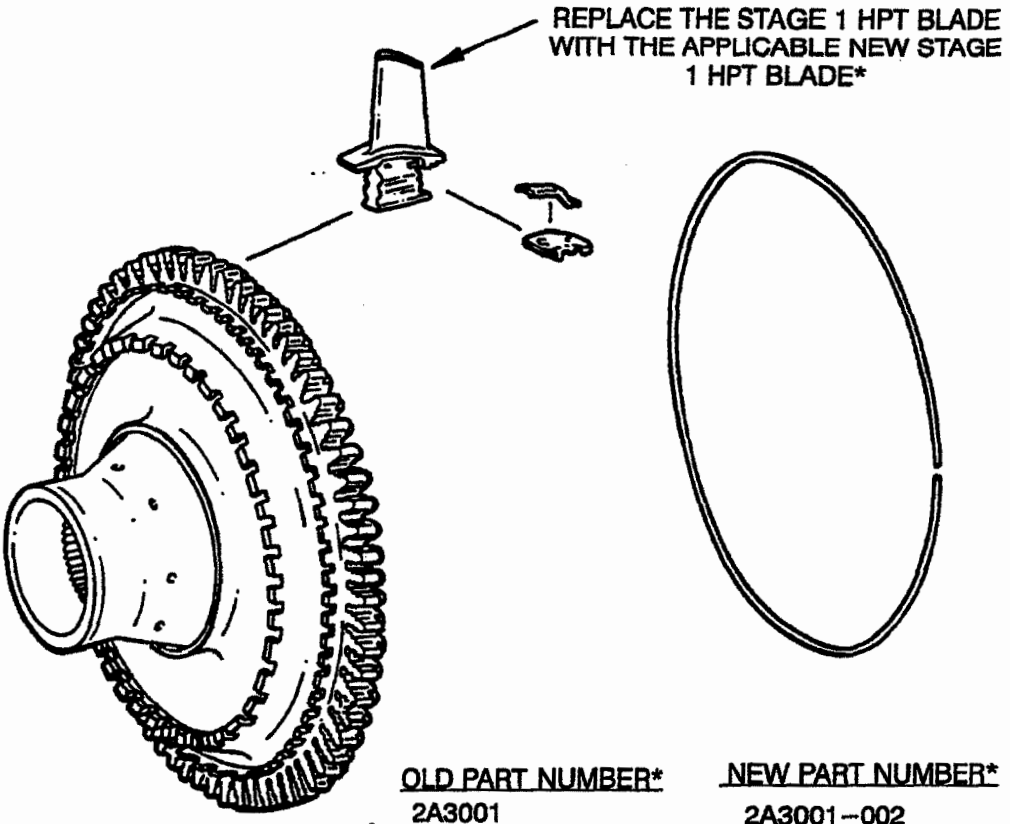
E. Replace the Stage 2 HPT Blades (72 off) by the approved procedure given in Reference (4), Chapter/Section 72-45-30, Assembly-01 and Figure 3.

F. Recording Instructions

(1) A record of accomplishment is necessary.



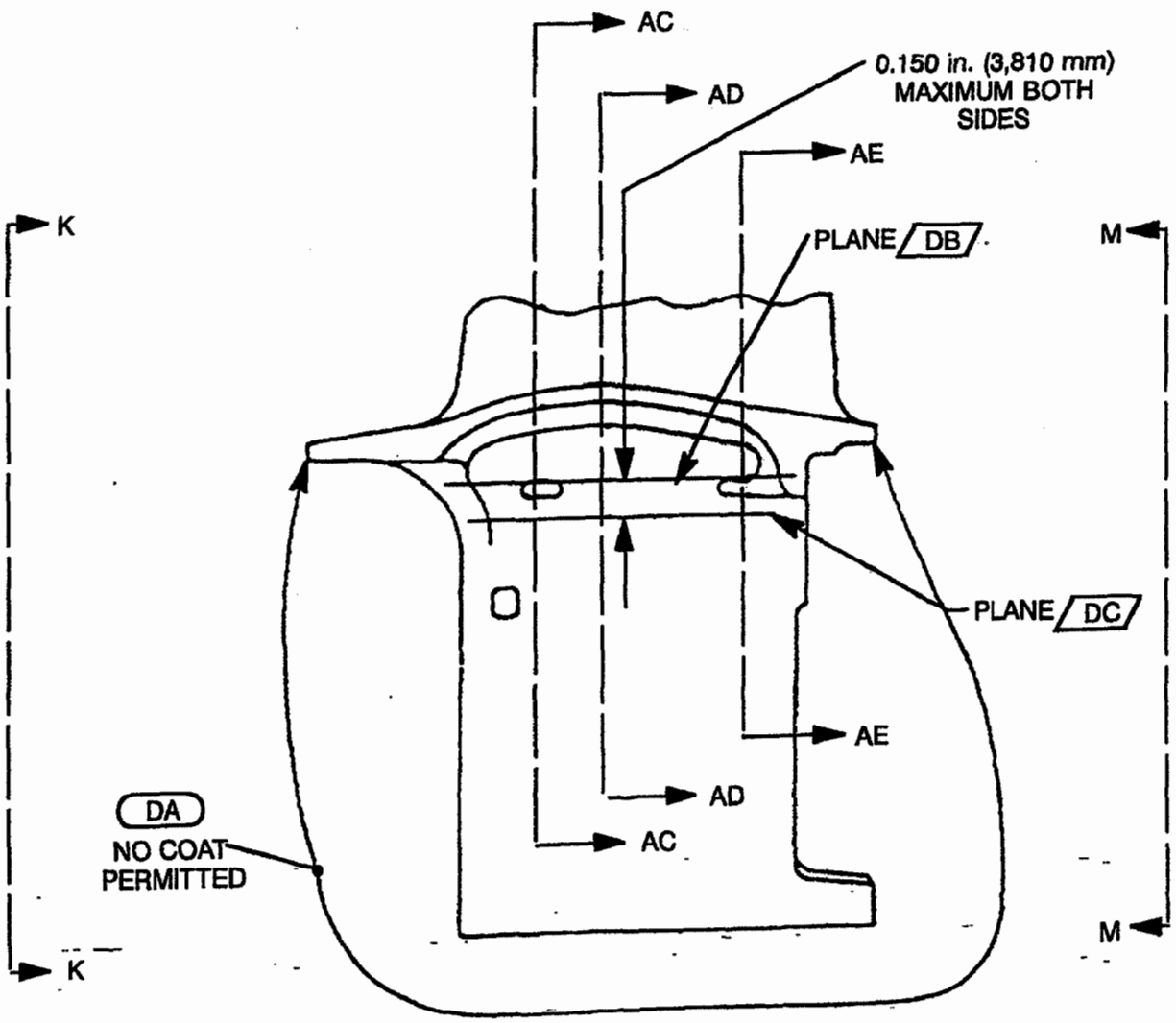
MODULE 40



OLD PART NUMBER*	NEW PART NUMBER*
2A3001	2A3001–002
2A3001–001	2A3001–002
2A8601	2A8901

E7995A

Location of the Stage 1 High Pressure Turbine Blade
Figure 1

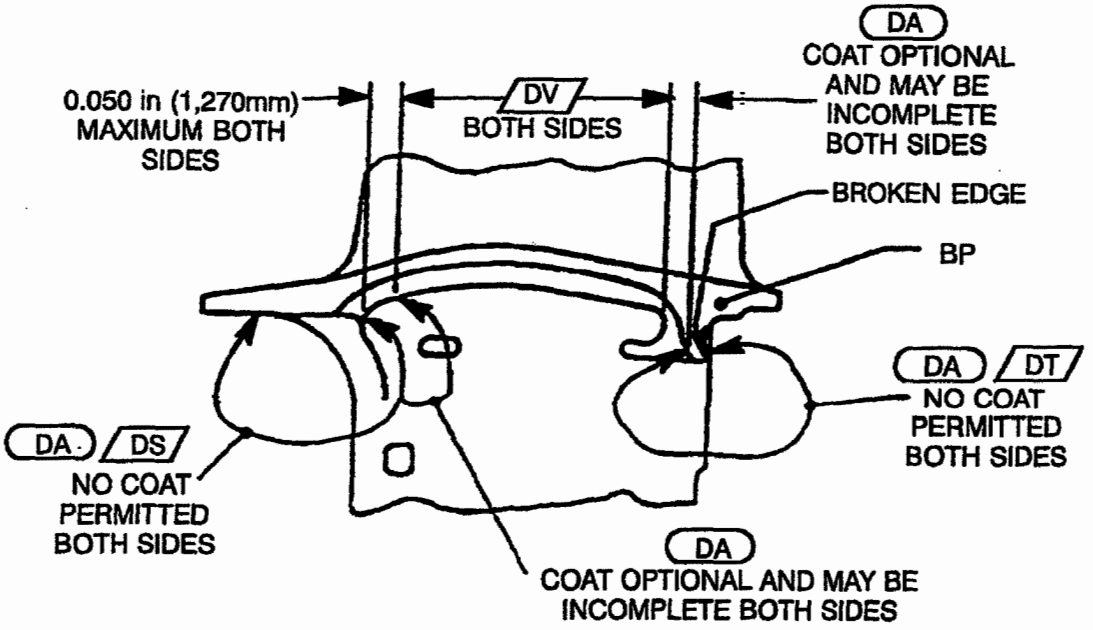


VIEW OF STAGE 1 HIGH PRESSURE
TURBINE BLADE ROOT

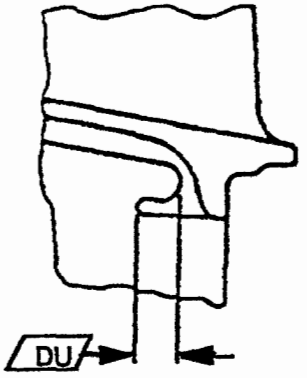
(DA) COAT IN THE APPLICABLE AREA BY THE PROCEDURE SPECIFIED IN THE TEXT

E8135

Modification of the Stage 1 High Pressure Turbine Blade Assembly
Figure 2 (Sheet 1)



VIEW OF STAGE 1 HIGH PRESSURE TURBINE BLADE ROOT

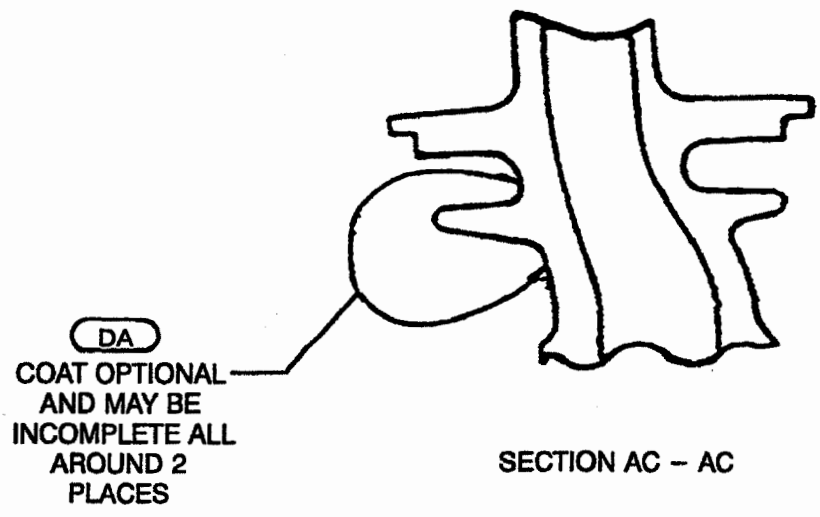


VIEW BP

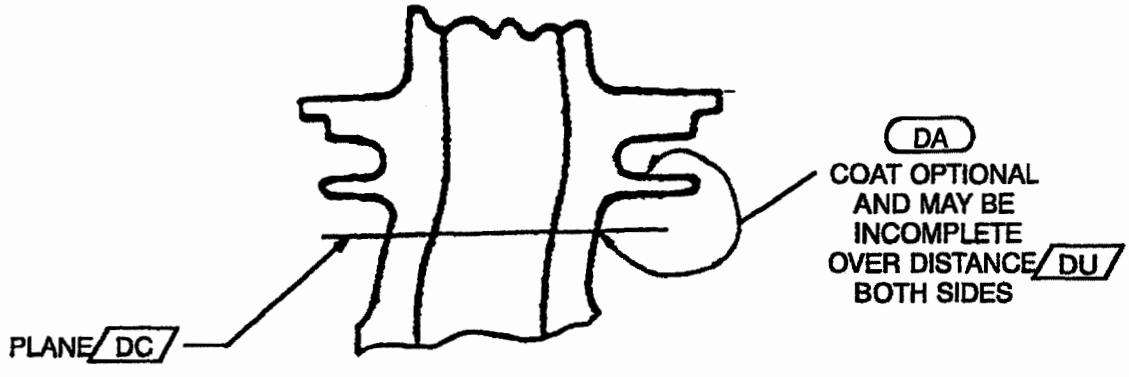
DA COAT IN THE APPLICABLE AREA BY THE PROCEDURE SPECIFIED IN THE TEXT

E8136

Modification of the Stage 1 High Pressure Turbine Blade Assembly
Figure 2 (Sheet 2)



SECTION AC – AC

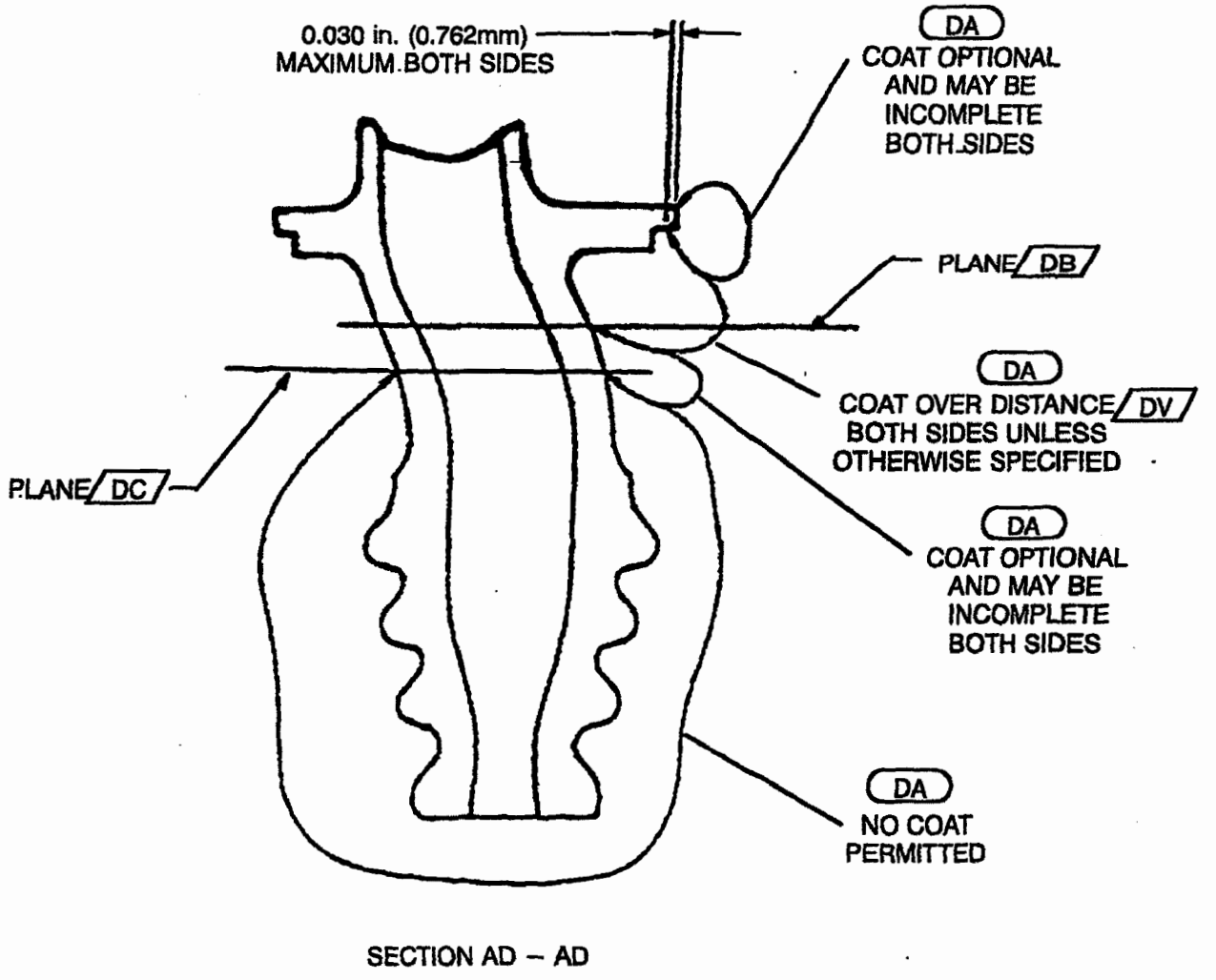


SECTION AE – AE

DA COAT IN THE APPLICABLE AREA BY THE PROCEDURE SPECIFIED IN THE TEXT

E8137

Modification of the Stage 1 High Pressure Turbine Blade Assembly
Figure 2 (Sheet 3)

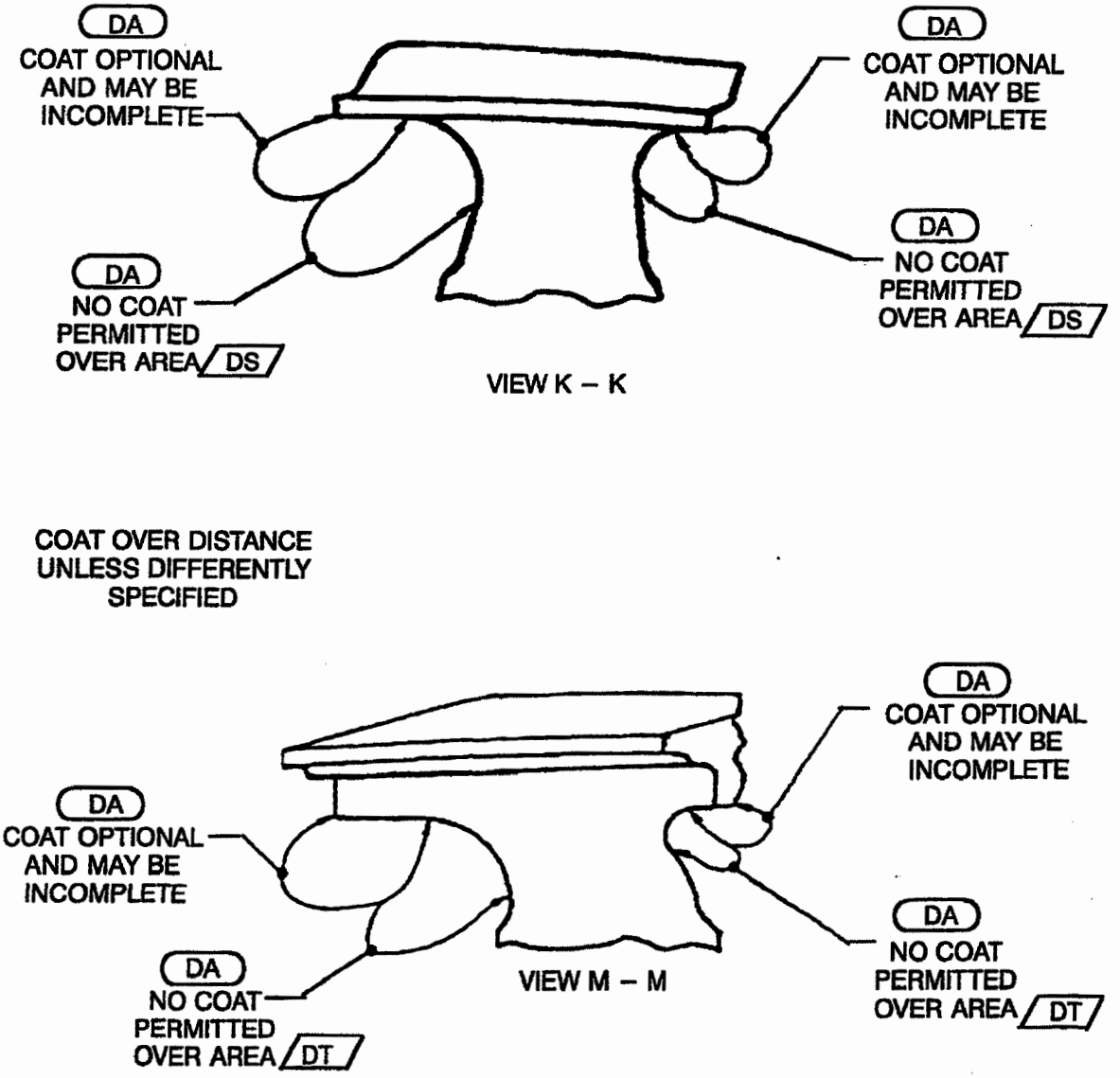


SECTION AD – AD

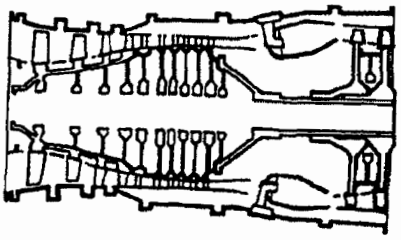
DA COAT IN THE APPLICABLE AREA BY THE PROCEDURE SPECIFIED IN THE TEXT

E8138

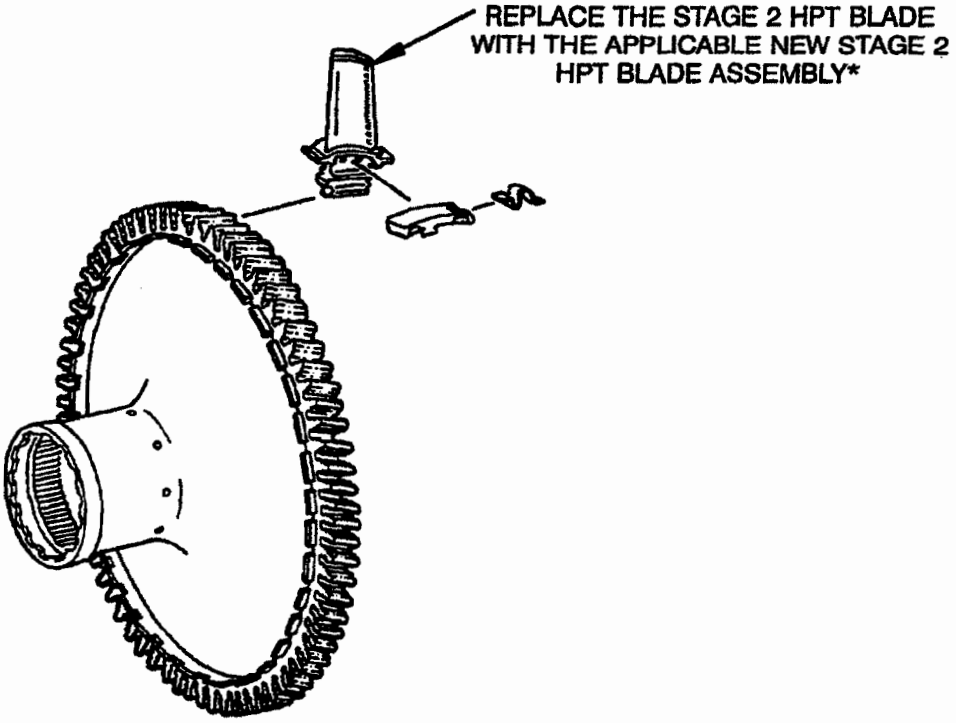
Modification of the Stage 1 High Pressure Turbine Blade Assembly
Figure 2 (Sheet 4)



Modification of the Stage 1 High Pressure Turbine Blade Assembly
Figure 2 (Sheet 5)



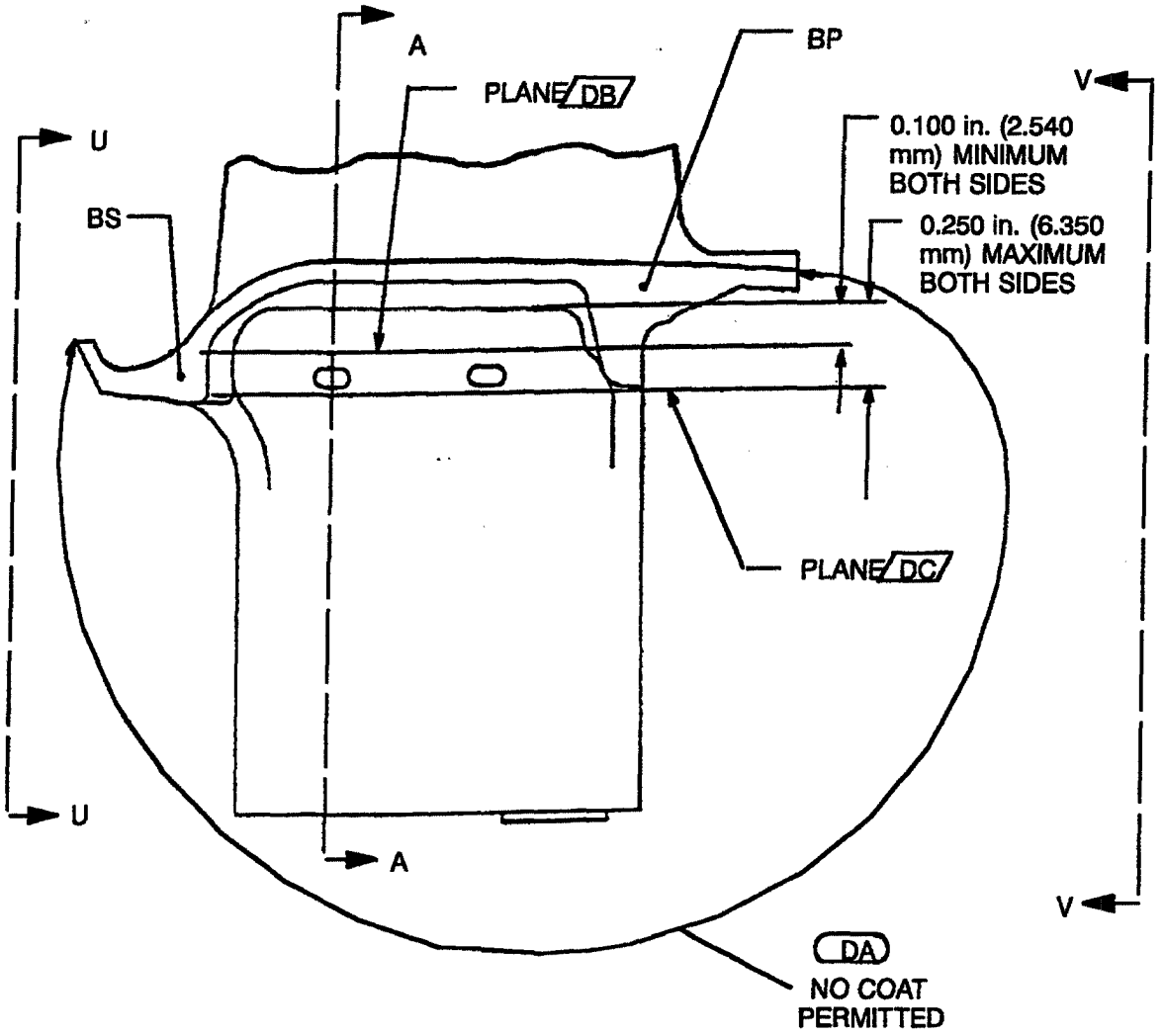
MODULE 40



OLD PART NUMBER*	NEW PART NUMBER*
2A1102	2A1102–002
2A1102–001	2A1102–002
2A8602	2A8902

E7996A

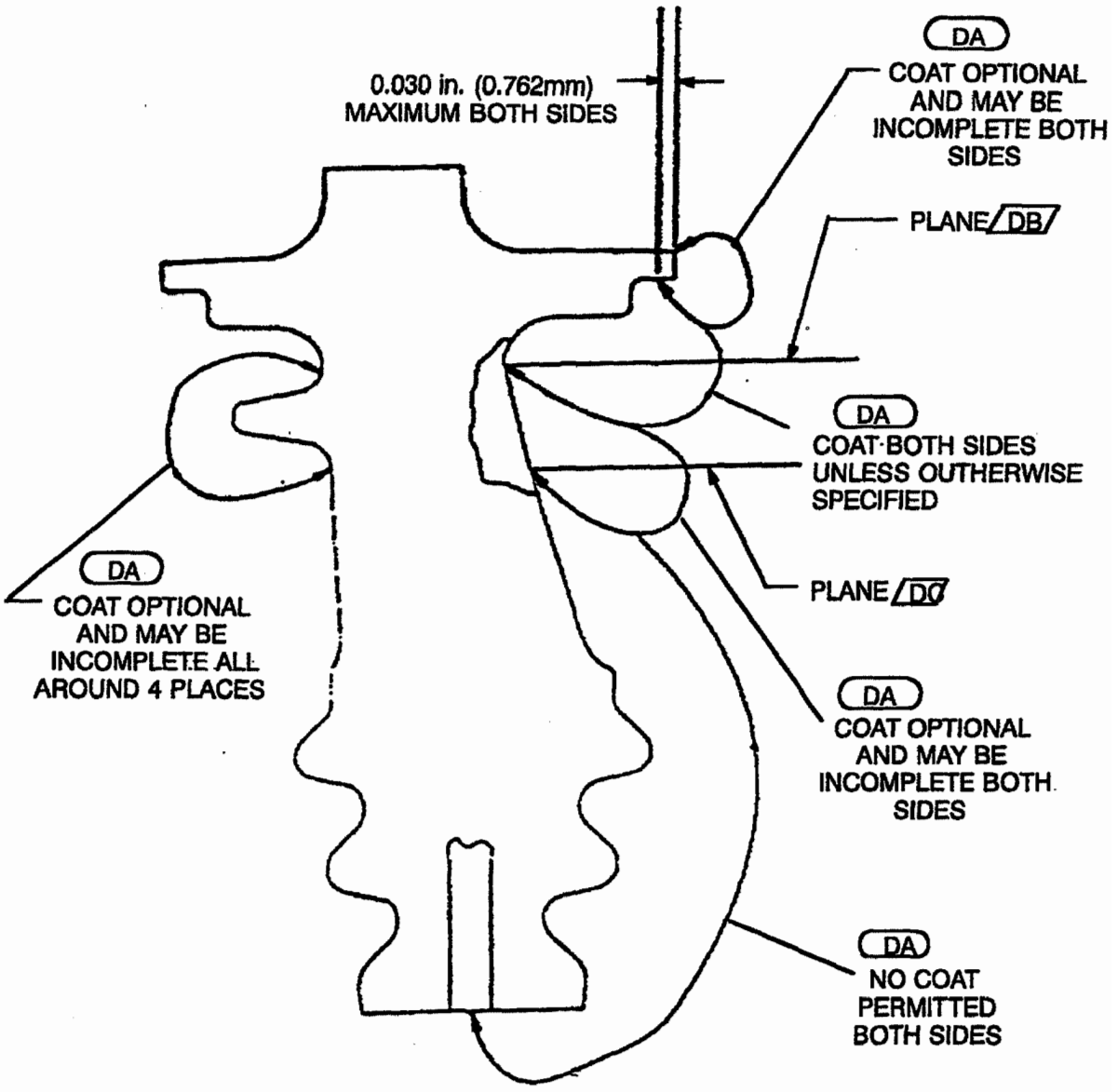
Location of the Stage 2 High Pressure Turbine Blade Assembly
Figure 3



DA COAT IN THE APPLICABLE AREA BY THE PROCEDURE SPECIFIED IN THE TEXT

E8140

Modification of the Stage 2 High Pressure Turbine Blade Assembly
Figure 4 (Sheet 1)

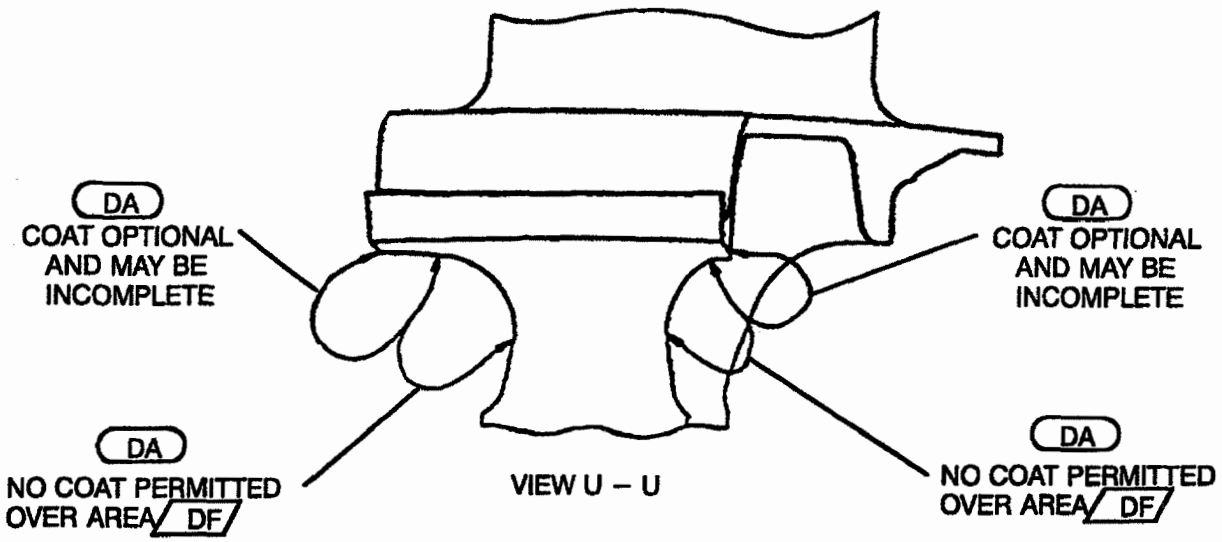


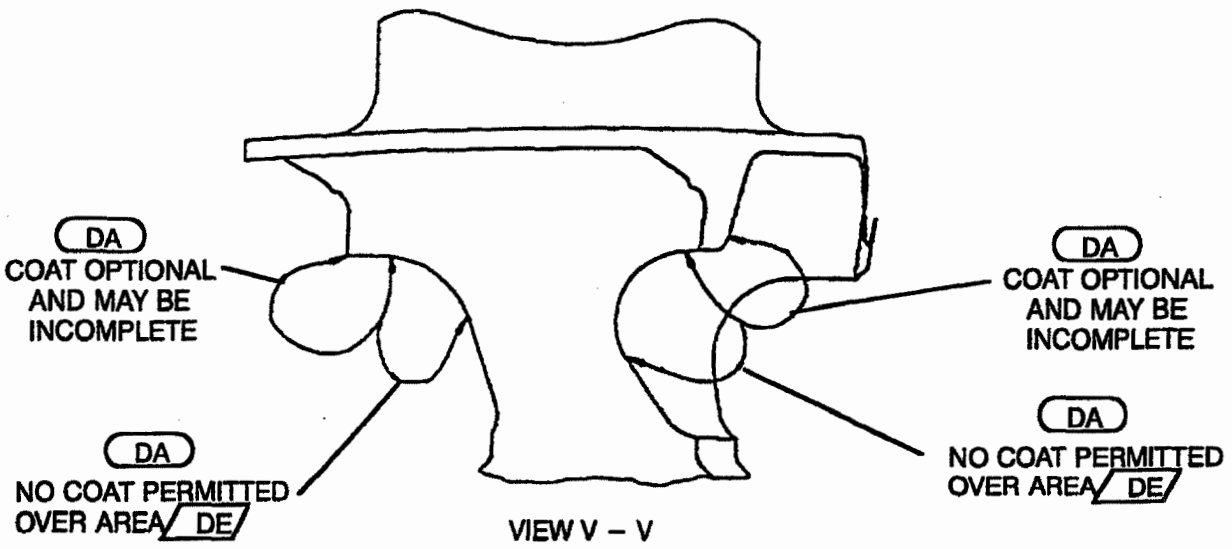
SECTION A – A

DA COAT IN THE APPLICABLE AREA BY THE PROCEDURE SPECIFIED IN THE TEXT

E8141

Modification of the Stage 2 High Pressure Turbine Blade Assembly
Figure 4 (Sheet 2)

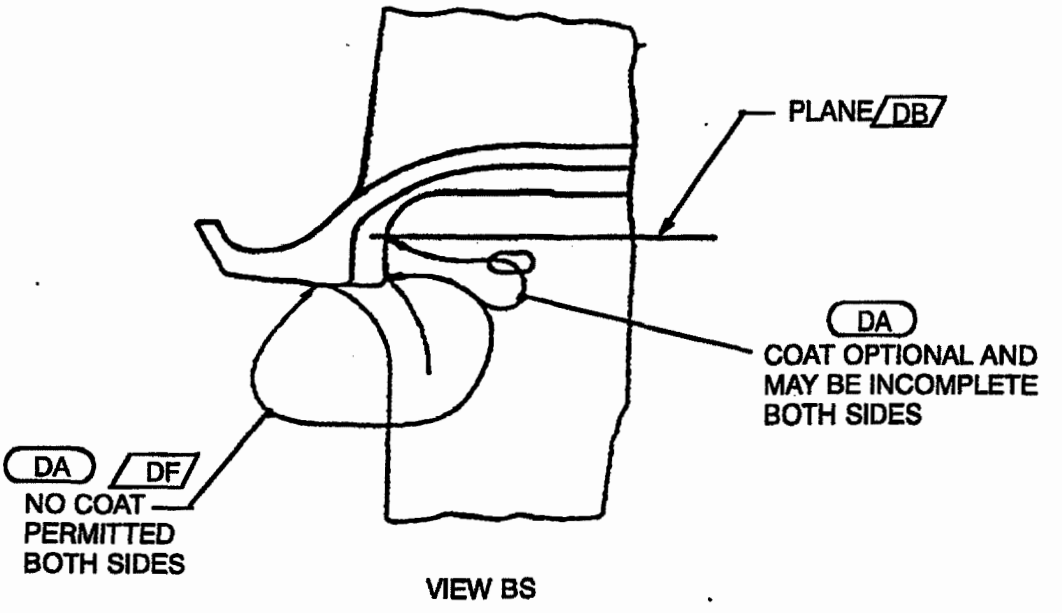




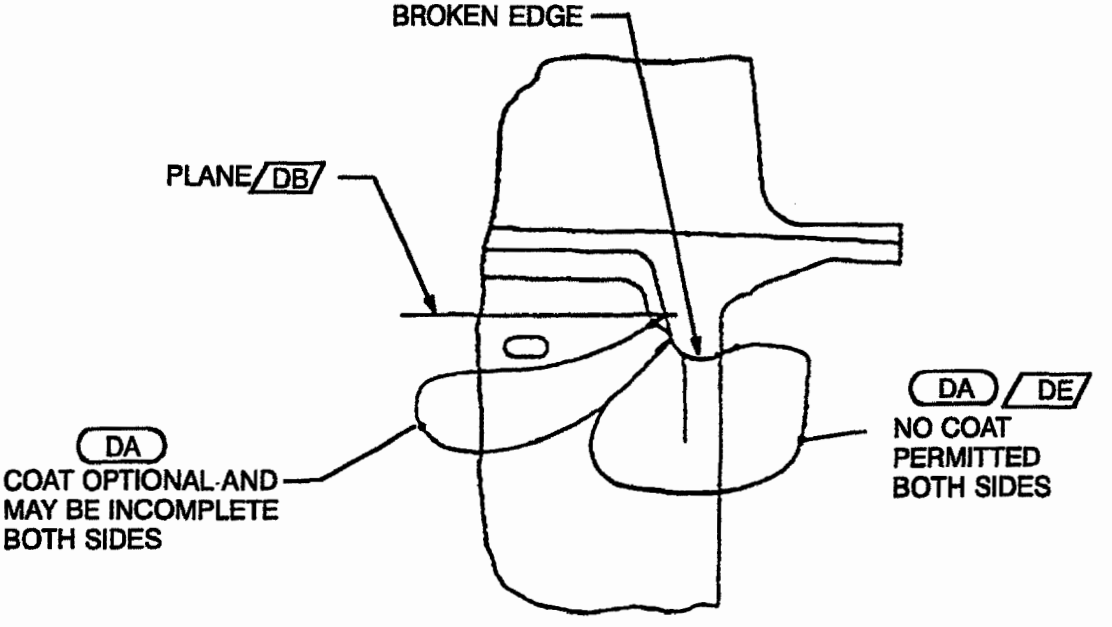
DA COAT IN THE APPLICABLE AREA BY THE PROCEDURE SPECIFIED IN THE TEXT

E8142

Modification of the Stage 2 High Pressure Turbine Blade Assembly
Figure 4 (Sheet 3)



VIEW BS



VIEW BP

DA COAT IN THE APPLICABLE AREA BY THE PROCEDURE SPECIFIED IN THE TEXT

E8143

Modification of the Stage 2 High Pressure Turbine Blade Assembly
Figure 4 (Sheet 4)

4. Material Information

Applicability: For each V2500-A1 Engine to incorporate this Bulletin.

A. Kit associated with this bulletin.

None

B. Parts affected by this bulletin.

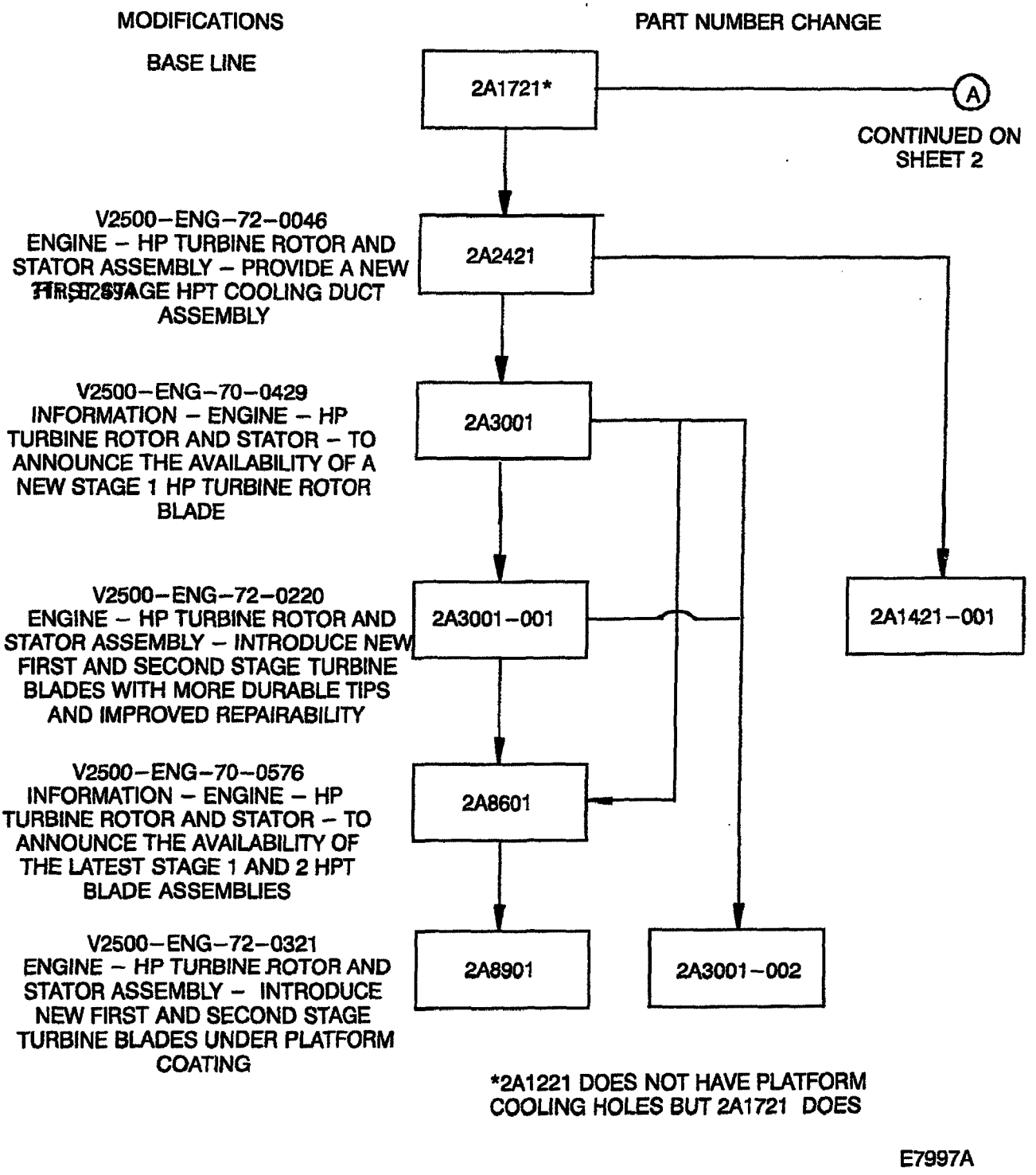
New Part No. (ATA No.)	Qty	Est'd Unit Price($)	Keyword	Old Part No. (IPC No.)	Instructions Disposition
2A3001-002 (72-45-14)	64		Blade, Stg. 1 High Pressure Turbine	2A3001 (01-010)	(S1)(1D)(A)(B)
2A3001-002 (72-45-14)	64		Blade, Stg. 1 High Pressure Turbine	2A3001-001 (01-010)	(S1)(1D)(A)(B)
2A8901 (72-45-14)	64		Blade, Stg. 1 High Pressure Turbine	2A8601 (01-010)	(S1)(1D)(B)(C)
2A1102-002 (72-45-32)	72		Blade, Stg. 2 High Pressure Turbine	2A1102 (01-010)	(S1)(1D)(A)(B)
2A1102-002 (72-45-32)	72		Blade, Stg. 2 High Pressure Turbine	2A1102-001 (01-010)	(S1)(1D)(A)(B)
2A8902 (72-45-32)	72		Blade, Stg. 2 High Pressure Turbine	2A8602 (01-010)	(S1)(1D)(B)(C)

C. Consumable Materials

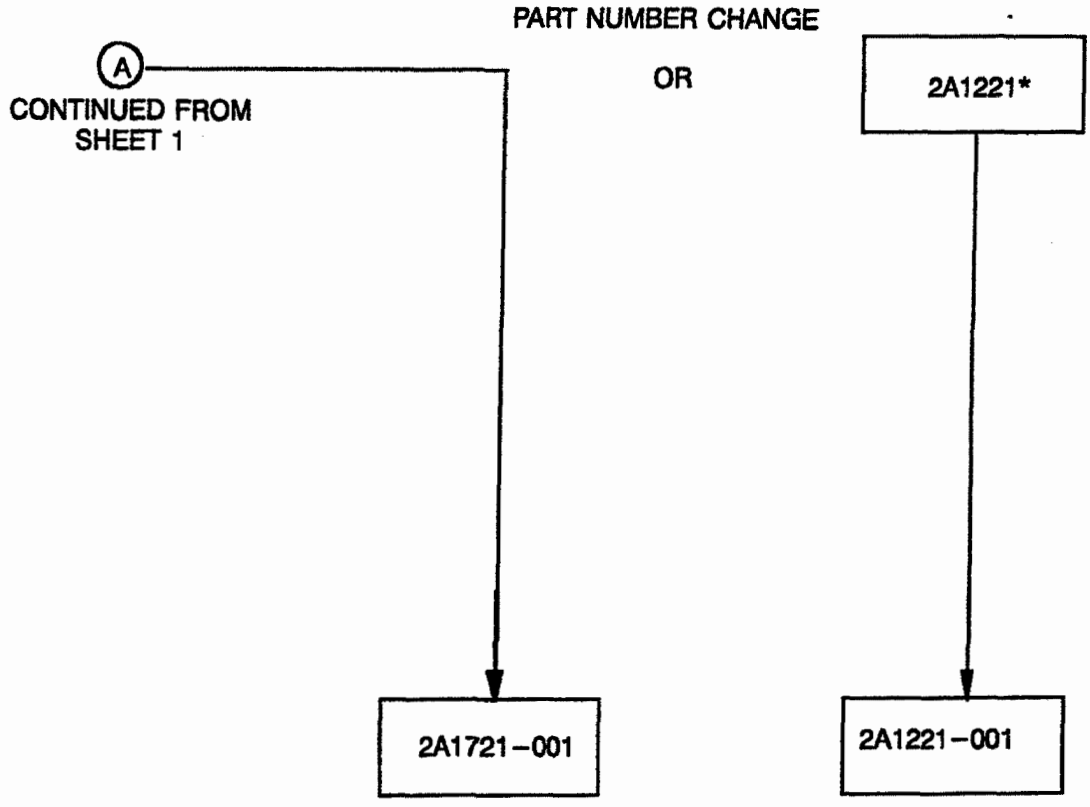
D. Instructions/Disposition Code Statements:

(S1)Old and New Parts are freely and fully interchangeable
(1D)You can obtain the new part by modification of the old part and identification to the new part number.
(A) The new part can only be obtained by modification.
(B) The old part will no longer be supplied.
(C) The new part is currently available.

NOTE: The estimated 1998 unit prices shown are provided for planning purposes only and do not constitute a firm quotation. Consult the IAE Price Catalog or contact IAE's Spare Parts Sales Department for information concerning firm prices.



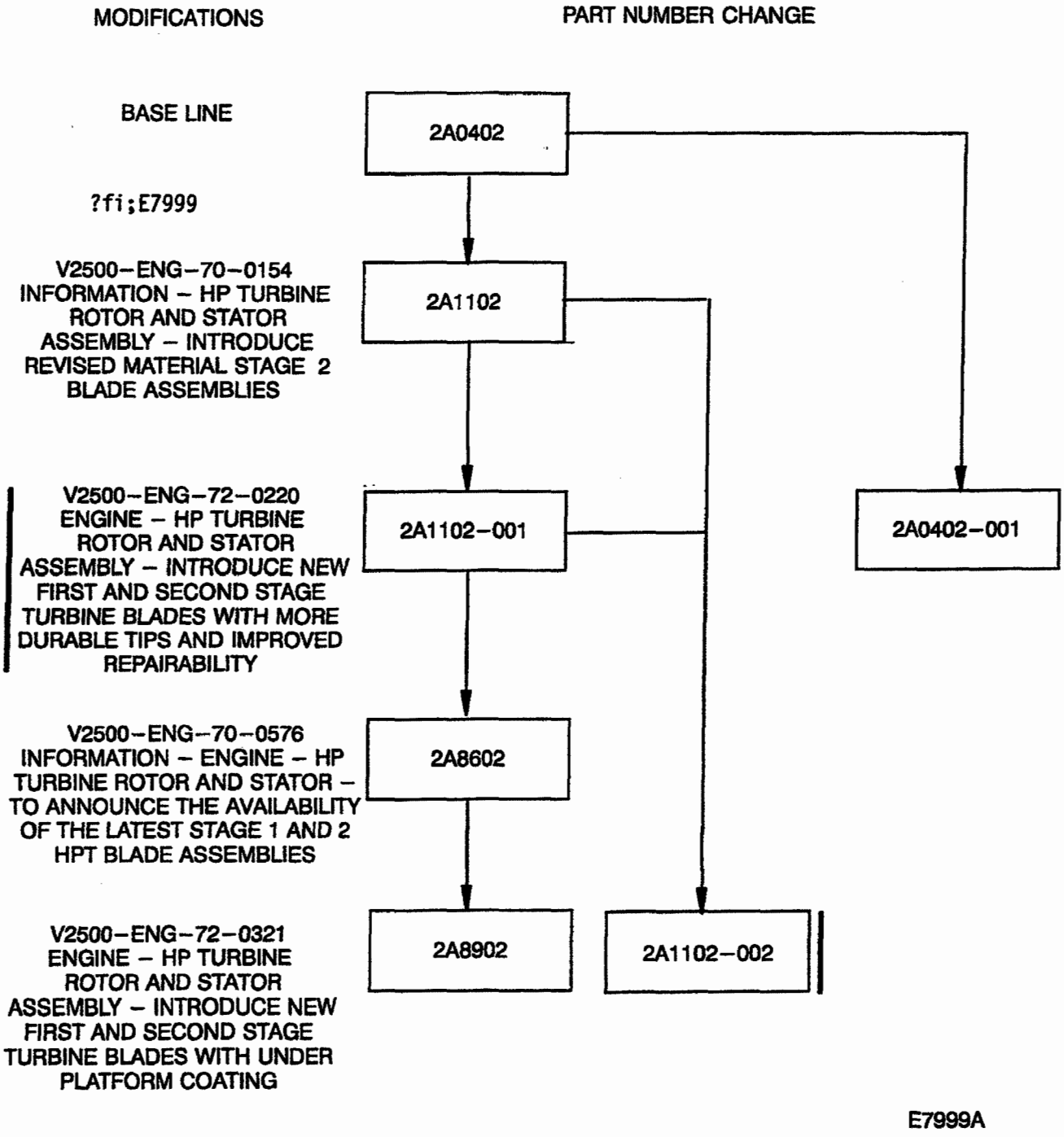
Family Tree - Stage 1 High Pressure Turbine Blades
Ref. Catalog Sequence No 72-45-14. Fig. 01 Item 010
Figure 5 (Sheet 1)



*2A1221 DOES NOT HAVE PLATFORM
COOLING HOLES BUT 2A1721 DOES

E7998

Family Tree - Stage 1 High Pressure Turbine Blades
Ref. Catalog Sequence No 72-45-14. Fig. 01 Item 010
Figure 5 (Sheet 2)



Family Tree - Stage 2 High Pressure Turbine Blades
Ref. Catalog Sequence No 72-45-32. Fig. 01 Item 010
Figure 6