P U B L I C A T I O N T R A N S M I T T A L

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DATE: Apr.30/02

V2500-A5 SERIES PROPULSION SYSTEMS NON-MODIFICATION SERVICE BULLETIN

This document transmits the Initial Issue of Service Bulletin EV2500-72-0423

Bulletin Initial Issue

Remove	Incorporate	Reason for change
	Pages 1 to 17 of the Service Bulletin	Initial issue
	Page 1 and 2 of Appendix 1	Initial issue

V2500-ENG-72-0423

CHECK THAT ALL PREVIOUS TRANSMITTALS HAVE BEEN INCORPORATED
If any have not been received please advise Publication Services, Rolls-Royce plc, Derby, England

LIST OF EFFECTIVE PAGES

The effective pages to this Service Bulletin are as follows:

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ENGINE - LP COMPRESSOR FAN BLADES - DOVETAIL ROOT FLANK ULTRASONIC INSPECTION (HIGH STRESS EVENT) - NON-MODIFICATION SERVICE BULLETIN

1. Planning Information

A. Effectivity

(1) Airbus A319, A320, A321

V2500-A5 All Engines

(2) ATA Locator

72-31-00

B. Concurrent Requirements

None.

C. Reason

(1) During the shop visit of a V2500-A5 engine, routine inspection of the fan blades revealed cracking of the root dovetail flanks of 18 fan blades.

(2) Analysis of data from engine and rig testing carried out to investigate this condition, has shown that high root stresses sufficient to crack fan blade roots can be generated during stabilised engine running, in the region of 63 percent N1 under specific crosswind conditions.

As a result of this finding:

AOW 1056 issue 4 (09 July 2001) introduced a N1 keep out zone of 61 to 74 percent to avoid conditions where high blade root stresses may occur.

There is however, a possibility that cracks have already been induced prior to the implementation of AOW 1056. The risk that this possibility exists is sufficient to justify an ultrasonic inspection of A5 fan blades to maintain satisfactory levels of safety.

Crack propagation testing has revealed variable crack propagation for the highest thrust rating engines. As a result, in order to eliminate the risk of a crack being missed during the initial inspection, a repeat inspection is instructed on the 27k, 30k and 33k engines.

D. Compliance

Category Code 3

NOTE: 1: This NMSB is split into 3 sections:

SECTION 1. In-service ultrasonic inspections on Non-Metco 58 coated fan blade roots.

SECTION 2. In-service ultrasonic inspections on Metco 58 coated fan blade roots.

SECTION 3. All inspected engines.

NOTE: 2: FIGURES 4 TO 7 SUMMARISE THE IN SERVICE INSPECTIONS REQUIRED BY THIS NMSB ON V2500-A5 ENGINES.

NOTE: 3: FAN BLADES FITTED ON ENGINES OF ANY RATING: (a) WHICH HAVE NEVER BEEN INSTALLED SINCE NEW OR LAST SHOP VISIT INSPECTION (I.E. 0 HRS/ 0 CYCLES) or (b) INSTALLED AS NEW OR FOLLOWING A SHOP VISIT INSPECTION (0 HRS/ 0 CYCLES) AFTER IMPLEMENTATION OF AOW 1056 ISSUE 4 RELEASED ON 09 JULY 2001 (ADHERENCE TO KOZ), ARE NOT AFFECTED BY THIS NMSB ISSUE.

NOTE: 4: IF FAN BLADES HAVE BEEN INSTALLED IN AN ENGINE THAT HAS BEEN USED AT VARIOUS THRUST RATING SINCE LAST FLUORESCENT PENETRANT INSPECTION OR ULTRASONIC INSPECTION, THEN THE HIGHEST THRUST RATING WILL DEFINE THESE FAN BLADE INSPECTION REQUIREMENTS (REF TO SECTIONS 1 AND 2), INDEPENDENTLY OF THE TIME SPENT AT THE HIGHEST THRUST RATING.

NOTE: 5: IN ORDER TO REDUCE THE POTENTIAL FOR MULTIPLE ENGINE IN-FLIGHT SHUTDOWN, POWER LOSS, OR OTHER ANOMALIES DUE TO MAINTENANCE ERROR, IAE RECOMMENDS THAT OPERATORS AVOID PERFORMING MAINTENANCE ON MULTIPLE ENGINES INSTALLED ON THE SAME AIRCRAFT AT THE SAME TIME. IF IT IS NOT POSSIBLE TO AVOID MAINTENANCE ON MORE THAN ONE ENGINE AT THE SAME TIME, IAE RECOMMENDS THAT ADDITIONAL CONTROLS BE APPLIED IN ORDER TO ENSURE THAT MAINTENANCE TASKS HAVE BEEN COMPLETED AS DEFINED. MAINTENANCE GUIDELINES SHOULD BE REVISED WHERE POSSIBLE, TO PROMOTE THIS RECOMMENDATION.

NOTE: 6: DURING REMOVAL/INSTALLATION OF FAN BLADES ENSURE THAT BLADES ARE RE-INSTALLED IN THE SAME POSITION THAT THEY WERE REMOVED FROM.

(1) SECTION 1 - In service ultrasonic inspection on non-Metco 58 coated fan blade roots

(a) V2527K, V2530K and V2533K engines with pre SB 72-0375 and/or pre SB 72-0384 (non-Metco 58 coated blade roots) fan blades installed

(i) At receipt of NMSB 72-0386 Aug.20/01, for in service engines with fan blade life of LESS THAN 1500 CYCLES since new or since last ultrasonic inspection or FPI, action as below:

INTERVAL	FIRST INSPECTION At next C check or before 1500 cycles whichever is more convenient SECOND INSPECTION One further final inspection at the following C check At first and second inspection, remove the fan blades from the fan disc (Refer to Fig.1 and AMM, 72-31-11, Removal/Installation) and action as below NOTE 1: A minimum of 1000 cycles must occur between the first and second inspection. Thus if the following C check is scheduled at less than 1000 cycles since the last inspection the second inspection will take place at the C check after next. NOTE 2: First inspection carried out at shop visit, removes the requirement to perform a second inspection.
CLEAN	Remove any loose particles of dry film lubricant on the fan blade root using a lint free cloth.
INSPECT	Do a visual inspection (Refer to AMM, 72-31-11, Inspection/Check) and an ultrasonic inspection (Refer to 3. Accomplishment Instructions A, B and C).
ACTION	Apply a coating of dry film lubricant to the fan blade root dovetail flanks prior to re-installation of the fan blades (Refer to AMM, 72-31-11, Removal/Installation, VRS1030).

(ii) At receipt of NMSB 72-0386 Aug.2001, for in service engines with fan blade life of GREATER THAN 1500 CYCLES since new or since last ultrasonic inspection or FPI, action as below:

INTERVAL	FIRST INSPECTION Within 500 cycles following receipt of NMSB 72-0386 Aug.20/01 issue SECOND INSPECTION One further final inspection at the following C check At first and second inspection, remove the fan blades from the fan disc (Refer to Fig.1 and AMM, 72-31-11, Removal/Installation) and action as below NOTE 1: A minimum of 1000 cycles must occur between the first and second inspection. Thus if the following C check is scheduled at less than 1000 cycles since the last inspection the second inspection will take place at the C check after next. NOTE 2: First inspection carried out at shop visit, removes the requirement to perform a second inspection.
CLEAN	Remove any loose particles of dry film lubricant on the fan blade root using a lint free cloth.
INSPECT	Do a visual inspection (Refer to AMM, 72-31-11, Inspection/Check) and an ultrasonic inspection (Refer to 3. Accomplishment Instructions A, B and C).
ACTION	Apply a coating of dry film lubricant to the fan blade root dovetail flanks prior to re-installation of the fan blades (Refer to AMM, 72-31-11, Removal/Installation, VRS1030).

(b) V2500 engines rated 24K and below with pre SB 72-0375 and/or pre SB 72-0384 (Non-Metco 58 coated blade roots) fan blades installed

(i) At receipt of NMSB 72-0386 Aug.20/01, for in service engines with fan blade life of LESS THAN 2500 CYCLES since new or since last ultrasonic inspection or FPI, action as below:

INTERVAL	Before fan blade life exceeds 2500 cycles* or at next C check, whichever is more convenient, remove the fan blades from the fan disc (Refer to Fig.1 and AMM, 72-31-11, Removal/Installation) and action as below. * From new or since the last ultrasonic inspection (SB 72-0386) or since the last Fluorescent Penetrant Inspection (Refer to Standard Practices/Processes Manual, TASK 70-23-03-230-501).

CLEAN — Remove any loose particles of dry film lubricant on the fan blade root using a lint free cloth.

INSPECT — Do a visual inspection (Refer to AMM, 72-31-11, Inspection/Check) and an ultrasonic inspection (Refer to 3. Accomplishment Instructions A, B and C).

ACTION — Apply a coating of dry film lubricant to the fan blade root dovetail flanks prior to re-installation of the fan blades (Refer to AMM, 72-31-11, Removal/Installation, VRS1030).

(ii) At receipt of NMSB 72-0386 Aug.20/01, for in service engines with fan blade life of GREATER THAN 2500 CYCLES since new or since last ultrasonic inspection or FPI, action as below:

INTERVAL — If fan blade life is greater than 2500 cycles from new or since the last Fluorescent Penetrant Inspection (Refer to Standard Practices/Processes Manual, TASK 70-23-03-230-501) or since a previous ultrasonic inspection, remove the fan blades from the fan disc (Refer Fig.1 and AMM, 72-31-11, Removal/Installation) within 500 cycles following receipt of NMSB 72-0386 Aug.20/01 issue and action as below.

CLEAN — Remove any loose particles of dry film lubricant on the fan blade root using a lint free cloth.

INSPECT — Do a visual inspection (Refer to AMM, 72-31-11, Inspection/Check) and an ultrasonic inspection (Refer to 3. Accomplishment Instructions A, B and C).

ACTION — Apply a coating of dry film lubricant to the fan blade root dovetail flanks prior to re-installation of the fan blades (Refer to AMM, 72-31-11, Removal/Installation, VRS1030).

(2) SECTION 2 - In service ultrasonic inspection on Metco 58 coated fan blade roots

For all V2500 engines with post SB 72-0375 and/or post SB 72-0384 (Metco 58 coated blade roots) fan blades installed before implementation of AOW 1056 issue 4 released on 09 July 2001 action as below

INTERVAL	Upon receipt of this NMSB, remove the fan blades from the fan disc (Refer to Fig.1 and AMM, 72-31-11, Removal/Installation) at next C check and action as below.
CLEAN	Remove any loose particles of dry film lubricant on the fan blade root using a lint free cloth.
INSPECT	Do a visual inspection (Refer to AMM, 72-31-11, Inspection/Check) and an ultrasonic inspection (Refer to 3. Accomplishment Instructions, A, B and C).
ACTION	Apply a coating of dry film lubricant to the fan blade root dovetail flanks prior to re-installation of the fan blades (Refer to AMM, 72-31-11, Removal/Installation, VRS1030).

(3) SECTION 3 - All inspected engines

(a) When the Accomplishment Instructions are completed on acceptable parts, record that V2500 Non-Modification Service Bulletin 72-0423 has been completed. It is also recommended to notify the IAE Representative that this NMSB has been accomplished.

(b) In addition IAE would recommend to complete the proforma attached in Appendix 1 for each engine and provide a copy to the IAE Representative.

(c) For tracking purposes, IAE would recommend that all operators record all fan blade change details, along with the Part Number, Serial Number, life and location of all fan blades in their fleet, including any removed and held as serviceable spares.

E. Approval

The compliance of statement 1.D. and the procedures outlined in Section 3 of this Non-Modification Service Bulletin, comply with the Federal Aviation Regulations and are FAA approved for the engine model listed

F. Manpower

Estimate of manhours to embody this Service Bulletin in full:

8 hrs 45 min.

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

G. References

(1) Internal reference number 02VJ606.

(2) Other References

(a) A319/A319CJ/A320/A321 Aircraft Maintenance Manual (AMM):

(i) 72-31-11, Removal/Installation, Inspection/Check and Repair VRS1030.

(b) Powerplant Illustrated Parts Catalogue, 72-31-11.

(c) V2500 Standard Practices/Processes Manual (SPP-V2500-1IA).

(d) V2500 Service Bulletins:

(i) ENG-72-0375 - Engine - LP compressor blades and fillers - Introduction of a revised LP compressor blade with Metco 58.

(ii) ENG-72-0384 - Engine - LP compressor blades and fillers - Introduction of a revised LP compressor blade with Metco 58 - Rework.

(iii) ENG-72-0386 - Engine - LP compressor fan blades - Dovetail root flank ultrasonic inspection and re-application of dry film lubricant.

2. Material Information

None.

3. Accomplishment Instructions

A. Tools and Equipment

(1) Ultrasonic flaw detector - For operation in the 5 - 10 MHz range (IAE recommend use of Buehler Krautkramer - USN52 (Krautkramer Branson - USN52) or EPOCH 3B)

(2) Ultrasonic couplant CoMat 06-148

(3) Items 4) and 5) are included in kit: IAE2R19429

(4) Test block QC6827 - IAE2R19315

(5) Ultrasonic probe - IAE2R19316

B. Calibration of Ultrasonic Detector

(1) Set up the ultrasonic flaw detector for dual or through transmission operation, with zero delay

(2) Set the amplifier switch to 5-10 MHz

(3) Apply couplant to the rear angled flank and position the probe on the test block

(4) Identify the signal produced by the large slot A. With the range control, position this signal at division line 5 on the time base and adjust the amplitude to approximately 50 percent screen height

(5) Increase the gain by 20dB. Move the probe over slot B and identify the signal produced. Adjust the amplifier to bring the signal to 60 percent screen height

(6) If a monitor gate is available, position it between the 4.5 and 5.5 division lines on the time base. Adjust any visual or audible alarms to trigger at 60 percent screen height

C. Ultrasonic Inspection - In-Service (Installed and spare engines)

WARNING: YOU MUST PUT A WARNING NOTICE ON THE INSTRUMENT PANEL IN THE COCKPIT TO TELL PERSONS NOT TO START THE ENGINES.

WARNING: YOU MUST MAKE SURE THAT THE ENGINE HAS BEEN SHUT DOWN FOR AT LEAST 5 MINUTES BEFORE STARTING THE INSPECTION.

WARNING: YOU MUST MAKE SURE THAT THE RED WARNING PENNANTS ON THE WORKMAT CAN BE SEEN AT A DISTANCE FROM THE AIRCRAFT.

(1) Remove the fan blades. (Refer to Aircraft Maintenance Manual (AMM) 72-31-11, Removal/Installation)

(2) Do a general inspection of the fan blades. (Refer to AMM 72-31-11, Inspection/Check)

(3) Do an ultrasonic inspection on each of the fan blades

(a) Apply the couplant to the concave face of the blade root flank at the area to be inspected. Position the probe at the front of the leading edge of the concave blade root flank and move the probe along the first 2.4in. (60mm) of the chordal width of the blade root. (Refer to Fig 2)

(b) Monitor the signal very carefully as you move the probe over this area

(c) Reject the blade if a signal greater than 60 percent screen height is produced between the 4.5 and 5.5 division lines on the time base

(d) Apply the couplant to the convex face of the blade root flank at the area to be inspected. Position the probe at 1.77in. (45mm) from the front face of the blade root (immediately behind the front chocking pad, if still installed) and move the probe along the next 4.33in. (110mm) of the chordal width of the blade root, terminating the inspection at 6.10in. (155mm) from the front face of the blade root (approximately 3.3in. (85mm) from the rear face of the root)

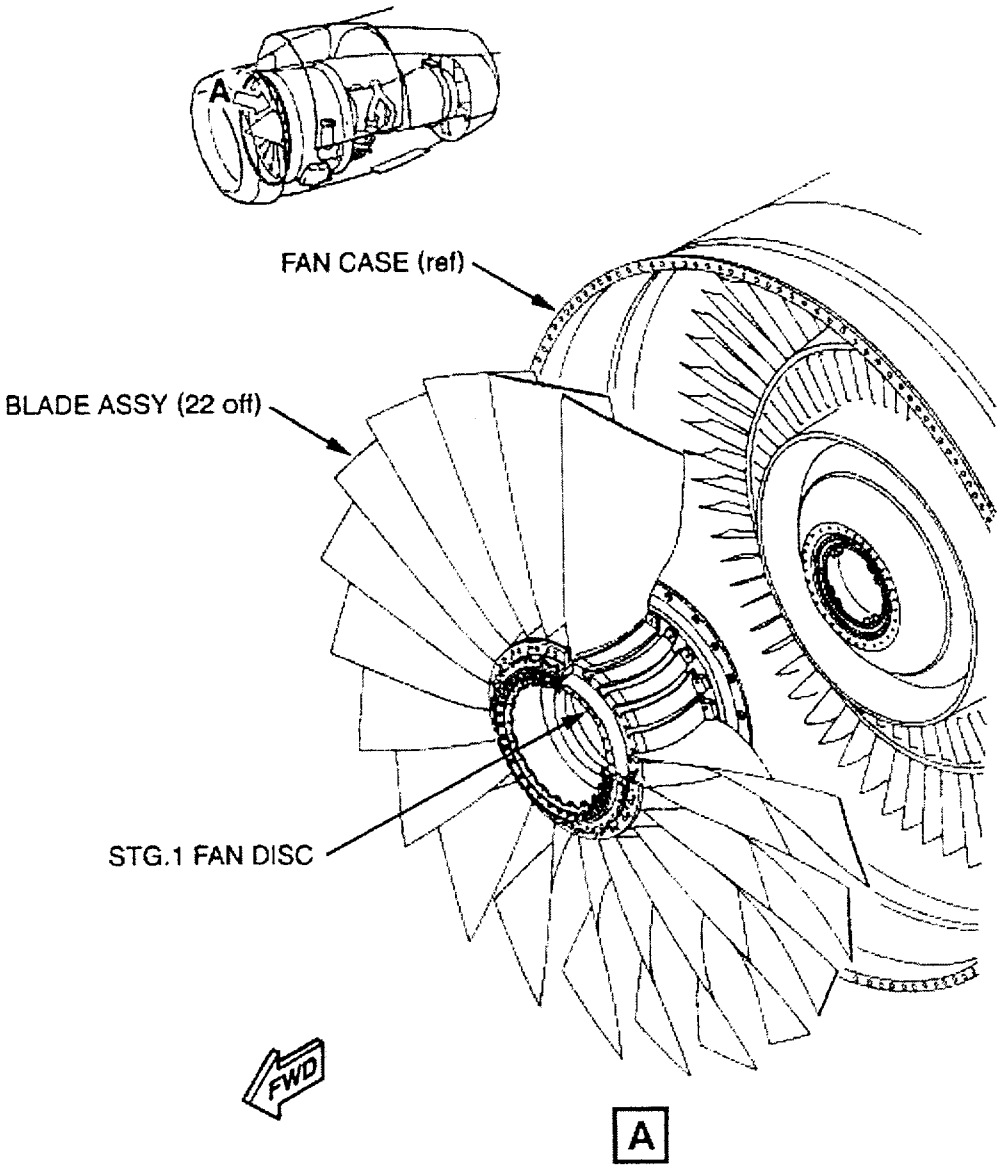
(e) Monitor the signal very carefully as you move the probe over this area

(f) Reject the blade if a signal greater than 60 percent screen height is produced between the 4.5 and 5.5 division lines on the time base

(g) Subsequently to the above, if excess dry film lubricant is still present at the ultrasonic reject indication position on the blade root flank in the areas X and Y defined in Fig.3, remove this by lightly rubbing with Scotchbrite (using CoMat 05-125 to 05-127). Repeat the ultrasonic check as in (a), (b), (d) and (e) above. Reject the blade if a signal greater than 60 percent screen height is still present between the 4.4 and 5.5 division lines on the time base

(h) If any fan blades are rejected at (g) above, it is recommended to identify the location of any such indication(s) on the blade and record on the proforma (Refer Appendix 1) the ultrasonic signal percentage height and position from the root front face and advise the IAE Representative

(i) If no cracking is present following step (g), it is recommended to record, on the proforma, that an ultrasonic inspection has been successfully completed.



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Location of blade assembly and stage 1 fan disc
Fig.1

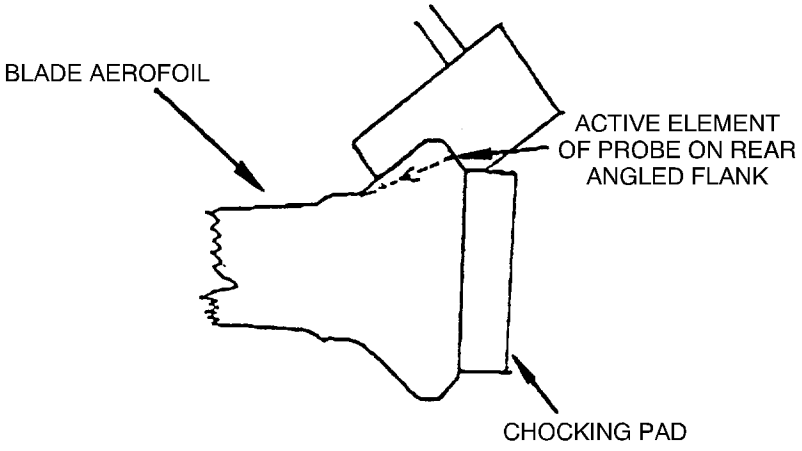

FIGURE 2

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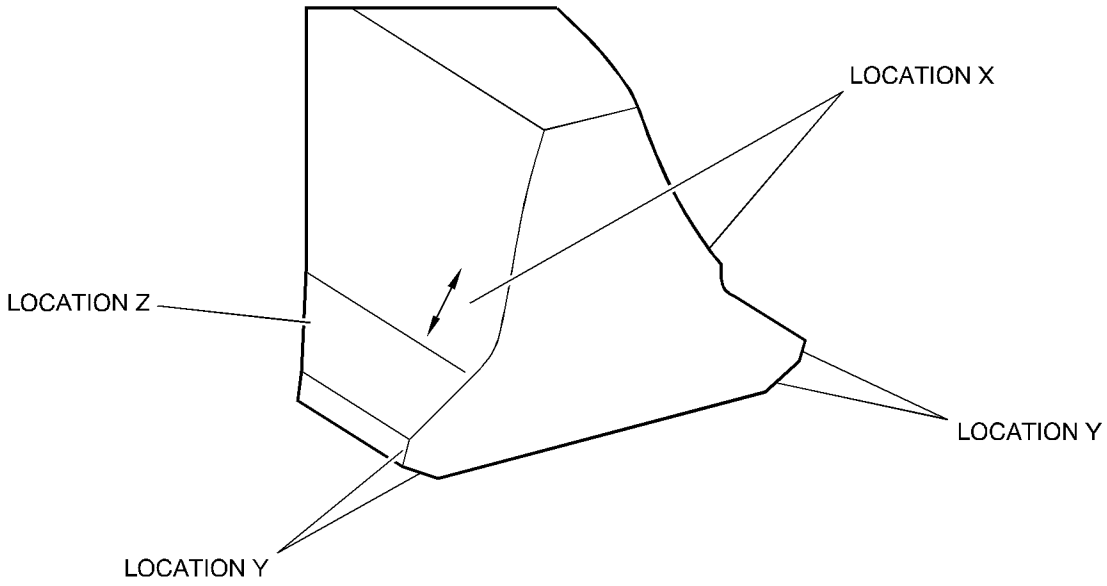
Schematic diagram showing position of probe on blade root flank
Fig.2



ACTIONS :

1) At the ultrasonic reject indication locations, on either the concave or the convex flanks, remove any excess Dry Film Lubricant (DFL) by lightly rubbing with 'Scotchbrite' using CoMat No 05-125 to 05-127 in the following areas:
   - above the top edge of the bedding (location X)
   - at the lower corner of the root where the ultrasonic probe locates (location Y)

   CAUTION 1: On post SB 72-0375 and post SB72-0384 (Metco 58 coated root) fan blades it is essential not to "scotchbrite" the fan blade bedding surface (Location Z) as this will have a detrimental effect to the coating.

2) If excessive DFL is present, at location X and/or Y that cannot be removed by lightly rubbing with 'Scotchbrite' it is permissable to remove this using a non metallic scraper and then remove any loose residual DFL using 'Scotchbrite'

   CAUTION 2: On post SB 72-0375 and post SB72-0384 (Metco 58 coated root) fan blades it is important not to damage the fan blade bedding surface (Location Z) when using a scraper

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Removal of excess Dry Film Lubricant (DFL)
Fig.3

CHART 1: V2500-A5 ENGINES ALL RATINGS

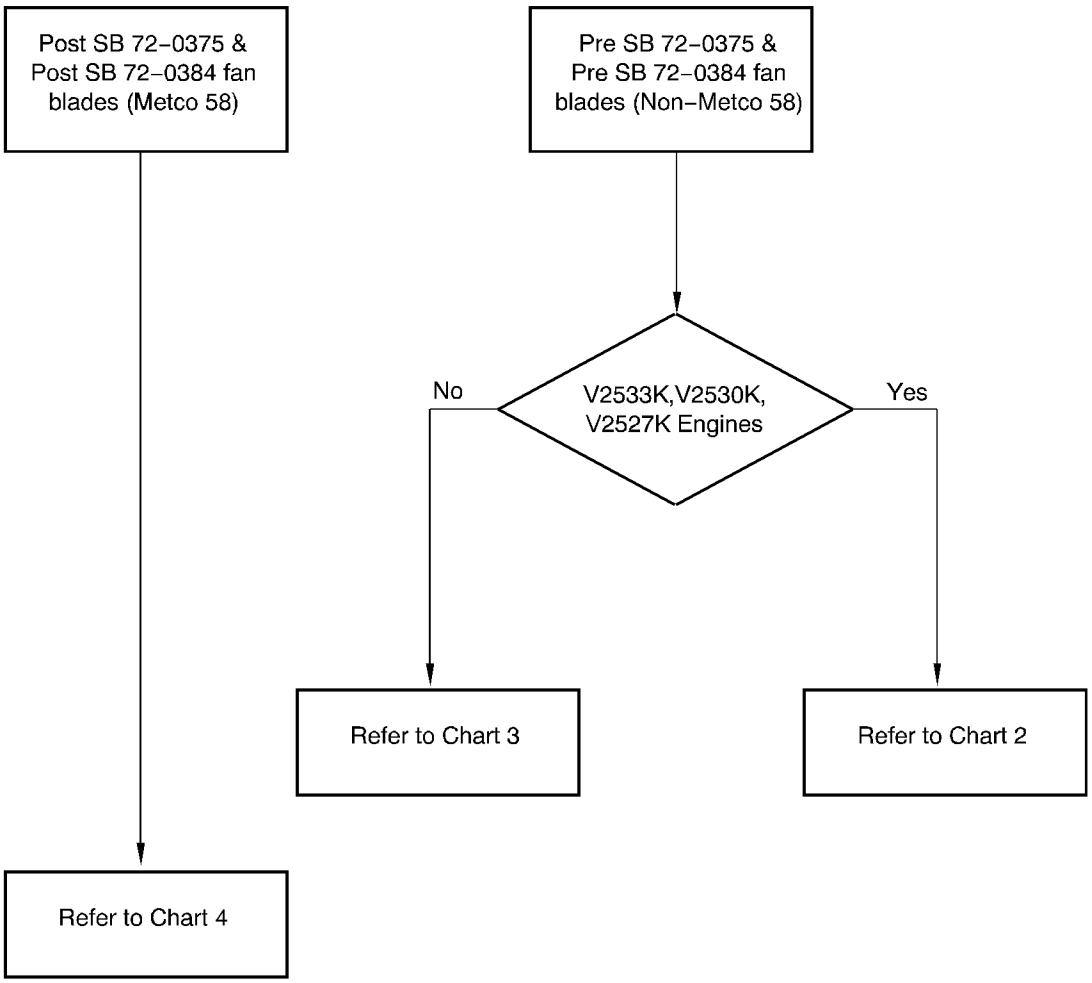

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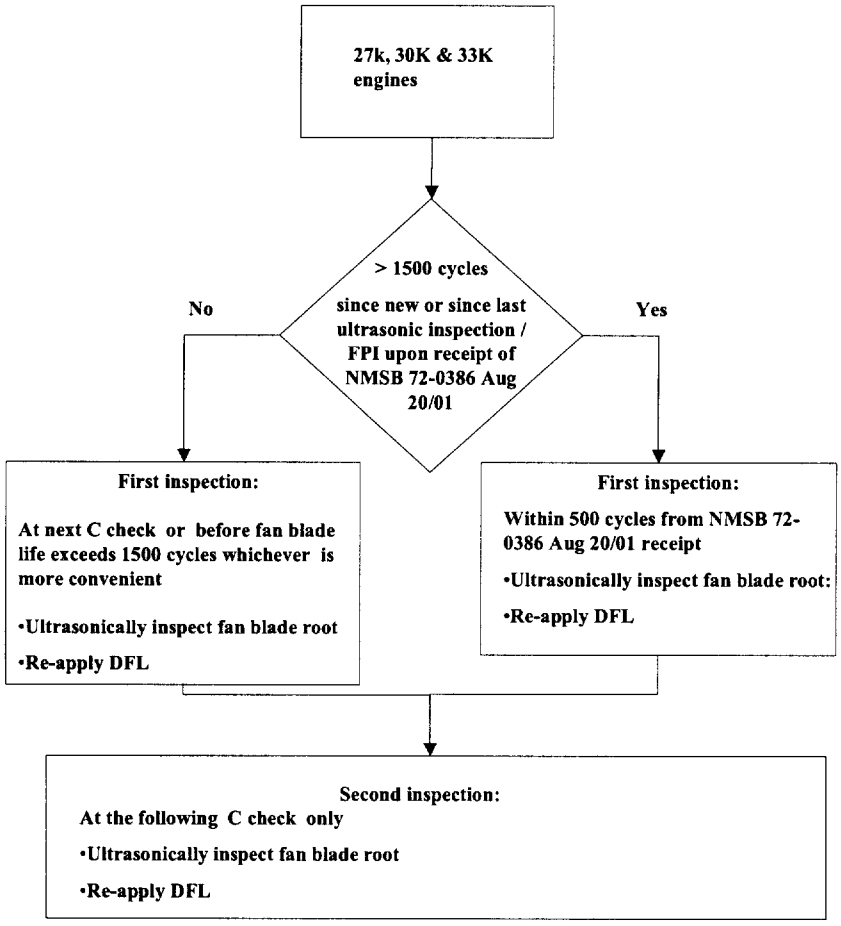
Chart 1: V2500-A5 fan blade in-service inspection requirements - All engines
Fig.4

Chart 2:
A5 Engines -33K-30K-27K Rating



NOTE 1: A minimum of 1000 cycles must occurred between the first and second inspection.

NOTE 2: First inspection carried out at shop visit removes the requirement to perform a second inspection.

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Chart 2: In-service inspection requirements for V2527K, V2530 and V2533 engines with pre SB 72-0375 and pre SB 72-0384 fan blades installed
Fig.5

Chart 3:
V2524K and V2522K A5 Engines

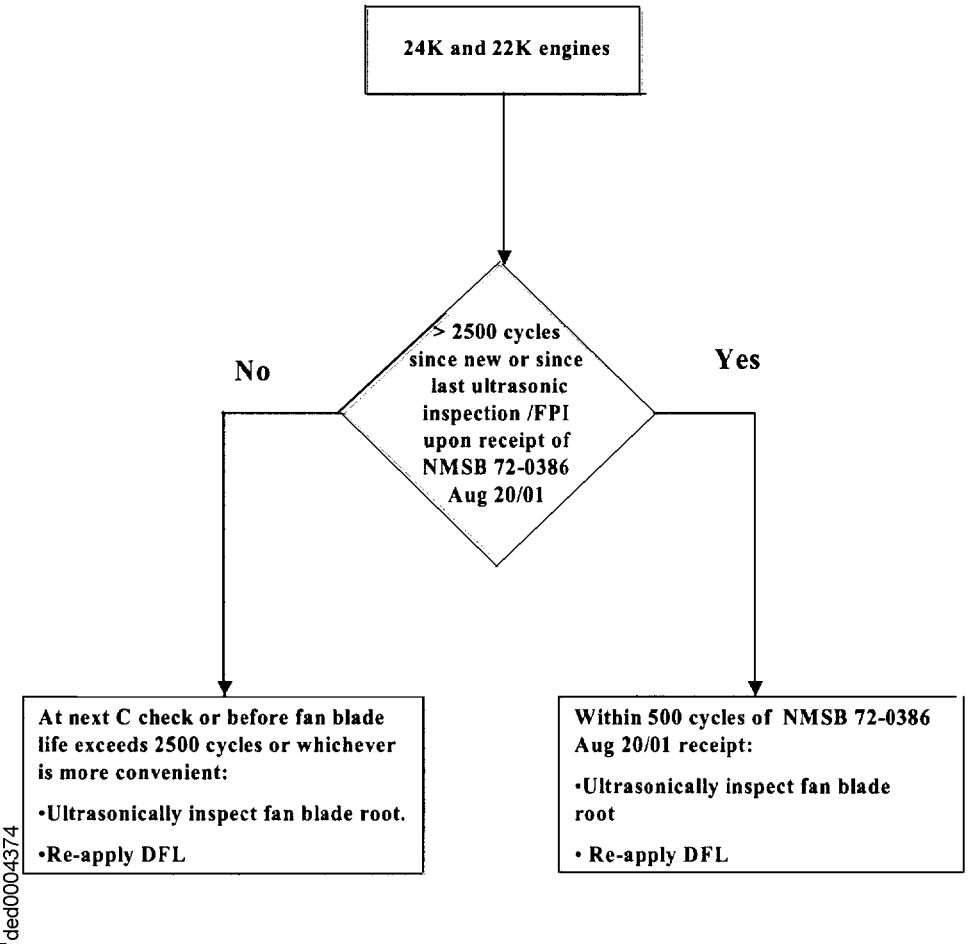

Chart 3: In-service inspection requirements for V2500-A5 engines rated at 24K and 22K with pre SB 72-0375 and pre SB 72-0384 fan blades installed
Fig.6

CHART 4:
A5 ENGINES WITH POST SB 72-0375 &
SB 72-0384 (Metco 58 coated blade root)
FAN BLADES INSTALLED

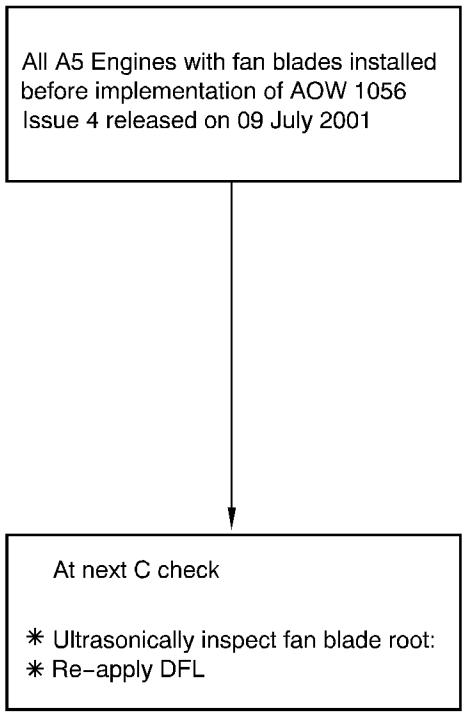

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Chart 4: In-service inspection requirements for V2500-A5 engines with SB 72-0375 and SB 72-0384 fan blades installed
Fig.7

APPENDIX 1

Inspection Proforma

Appendix 1
Proforma for reporting inspection results

After completion fax this information to the IAE representativeI

Operator:	**Rating:**	**Date of Inspection:**
Engine S/N:	**Previous rating if applicable:**	Engine **TSN / CSN:**
Fan Set TSN/CSN (If different to engine cycles)		**TSN/CSN:**
U/Sonic Inspection of Fan Set		**Yes/No** (delete as appropriate)
Are the Fan Blades Metco 58 standard		**Yes/No** (delete as appropriate)

Note: The information contained above is required as a minimum.

The table below is to be completed if any Fan Blade/s are rejected by Ultrasonic inspection.

NMSB 72-0423 In-Field				% DFL loss on contact surface	Frettage on contact surface	Time (TSN / CSN) since		U/sonic Inspection (Rejection Indication Data)		
Position	Rejected Fan Blade P/N	Rejected Fan Blade S/N	TSN/CSN (If different to engine cycles)	Concave/ Convex	Yes/No	Last DFL lubri-cation	Last U/Sonic insp.	U/sonic signal (% screen height)	CX or CV side of Fan Blade	position from Fan Blade Leading Edge (mm)
	6A	RG								

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Inspection proforma
Appendix 1, Fig.1