IAE Propulsion System
NON-MODIFICATION SERVICE BULLETIN

Printed in Great Britain

Date: Aug.11/00

Subject: Transmittal of Revision 3 to Service Bulletin No.V2500-ENG-72-0356

Service Bulletin Revision History:

Event	Date
Basic Issue	Jul.16/99
Revision 1	Jun.02/00
Revision 2	Jul.07/00
Revision 3	Aug.11/00

Reason for Issuance of Revision:

To relax the requirement for replacement of Service Bulletin V2500-ENG-72-0362 High Strength Bolts at the ultrasonic inspection and visual inspection.

Effect on Past Compliance:

None

List of Effective Pages:

	Bulletin Page No.	Rev. No.	Effective Date
R	1	3	Aug.11/00
	2 to 6	2	Jul.07/00
R	7 to 15	3	Aug.11/00

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ENGINE - LP COMPRESSOR- INSPECTION CHECK OF INSTALLED ANNULUS FILLERS (NON-MODIFICATION)

MODEL APPLICATION

V2500-A1

BULLETIN INDEX LOCATOR

72-31-00

Compliance Category Code	Internal Reference No.
3	EC99VJ618 EC99VJ618A EC99VJ618B
R	EC99VJ618C

ENGINE - LP COMPRESSOR- INSPECTION CHECK OF INSTALLED ANNULUS FILLERS (NON-MODIFICATION)

1. Planning Information

A. Effectivity

(1) Aircraft:

(a) Airbus A320

(2) Engines:

(a) V2500-A1 All engines

B. Reason

(1) Problem

R **The purpose of this Non-Modification Service Bulletin is to advise all A1 operators that a small number of instances of Annulus Filler Front Trunnion fracture have occurred on A1 Engines and this Non-Modification Service Bulletin has been**
R **issued to instruct inspection of all high cycle life V2500 A1 Engine Annulus Fillers.**

(2) Background

(a) During walk-round inspection slight twisting/lifting was noted at the front edge of a number of Annulus Fillers. Subsequent removal of Fan Blade/Annulus Filler Front Retaining Rings has revealed that fracture had occurred at the
R **Front Trunnion location on several Annulus Fillers. Although**
R **prevented from release into the airflow path by the Retaining Bolts/ Location Pin the subject Fillers had rotated in an anti-clockwise direction, within the constraints of the clearance between the retaining Bolt/clearance hole in the Front Retaining Ring. This resulted in the front edge of the Annulus Filler protruding approximately 0.060 inch (1,5 mm) above the Retaining Ring at the right hand edge, when viewed from the front of the Engine.**

(b) It has been established that the subject Annulus Fillers had accumulated over 11,000 total cycles prior to Front Trunnion fracture and examination has identified that the fracture is of a low cycle fatigue nature.

R (c) The cause of the cracking/fracture has been determined to be
R due to higher than anticipated stress loading at the
R trunnion to Filler front face radius.

R (d) Due to the above it has been determined that on all A1 Engines which have achieved over 10,000 total cycles, an inspection of the Annulus Filler trunnion must be accomplished in accordance with Paragraph G. of this bulletin to ensure that cracking/fracture is not present.

R (e) The inspection interval can be extended for the Engines that
R have Service Bulletin V2500-ENG-72-0362, which introduces the
R high strength Bolts for the Annulus Filler attachment,
R incorporated.

C. Compliance

Category 3

(1) Installed Engines

R <u>Pre SBE 72-0362</u>

(a) Ensure that the Annulus Fillers are inspected for the aforementioned lifting/twisting condition during post flight inspections.

(b) Accomplish the inspection specified at Paragraph G. (1) or (2) of this bulletin at, or before, the next scheduled A check on any V2500-A1 Engine which has, or will have, achieved in excess of 10,000 cycles by that time.

Repeat this inspection at each A check on any A1 Engines that have achieved over 10,000 cycles, unless it can be established that the installed Annulus Fillers have achieved less than 10,000 cycles.

R Post SBE 72-0362

R (a) Ensure that the Annulus Fillers are inspected for the
R aforementioned lifting/twisting condition during

R (i) A check inspection, if Ultrasonic inspection specified
R at Paragraph G.(1) was performed at the last inspection.

R (ii) Post flight inspection, if Visual inspection specified
R at Paragraph G.(2) was performed at the last inspection.

R (b) Accomplish the inspection specified at Paragraph G.(1) or (2)
R of this bulletin at, or before, the next scheduled A check on
R any V2500-A1 Engine which has, or will have, achieved in
R excess of 10,000 cycles by that time.

R Repeat this inspection at the intervals as shown in (i) or
R (ii) below on any A1 Engines that have achieved over 10,000
R cycles, unless it can be established that the installed
R Annulus Fillers have achieved less than 10,000 cycles.

R (i) Within 2,500 cycles, if Ultrasonic inspection specified at
R Paragraph G.(1) was performed at the last inspection.

R (ii) Within 900 cycles, if Visual inspection specified at
R Paragraph G.(2) was performed at the last inspection.

(2) Spare Engines

Accomplish the inspection specified at Paragraph G.(1) or (2) of this bulletin prior to installation on any Engine that has achieved in excess of 9,500 cycles.

(3) Engines in Maintenance and/or Repair Facilities

Accomplish the inspection specified at Paragraph G. (1) or (2) of this bulletin on any Engine/Fan Module which has achieved in excess of 10,000 cycles if the Annulus Fillers are not being subjected to a full overhaul inspection in accordance with the Engine Manual.

D. Approval

The compliance statement and the procedures given in paragraph G. of this Non-Modification Service Bulletin, obey the Federal Aviation Regulations and are FAA approved for the Engine Models Listed.

E. Manpower

Estimated Man-hours to incorporate the full intent of this Bulletin:

Venue	Estimated Man-hours
(1) In service	
(a) Non Ultrasonic method	
(i) To gain access to first Annulus Filler.	**55 minutes**
(ii) Inspect – visually.	**12 minutes**
(iii) Remove damaged Annulus Fillers.	**3 minutes each**
(iv) Install new Annulus Fillers.	**5 minutes each**
(v) To return Engine to flyable status.	**59 minutes**
(b) Ultrasonic method	
(i) To inspect Annulus Filler set including calibration of probe.	**54 minutes**
(ii) To gain access to first damaged Annulus Filler.	**55 minutes**
(iii) Remove damaged Annulus Fillers.	**3 minutes each**
(iv) Install new Annulus Fillers.	**5 minutes each**
(v) To return Engine to flyable status.	**59 minutes**
(2) At overhaul	
(a) Non Ultrasonic method	
NOTE: No additional time is necessary to do this Service Bulletin.	
(b) Ultrasonic method	
(i) To inspect Annulus Filler set including calibration of probe.	**54 minutes**

NOTE: Total times can not be given because it is impossible to predict how many Annulus Fillers (if any) would require changing at any one inspection.

F. References

(1) A320 Aircraft Maintenance Manual (AMM), Chapter/Section 72-31-11 Removal/Installation and Chapter/Section 72-38-11 Removal/Installation.

(2) V2500 Engine Manual (E-V2500-1IA), Chapter/Section 72-31-00 Disassembly/Assembly and Chapter/Section 72-38-11 Removal/ Installation.

(3) V2500 Engine Illustrated Parts Catalog (S-V2500-1IA), Chapter/Section 72-31-11.

R (4) IAE Service Bulletin V2500-ENG-72-0362 Engine - LP Compressor -
R Incorporation of High Strength Bolts for Annulus Filler
R Attachment.

G. Action

(1) Ultrasonic inspection

(a) Equipment

Ultrasonic Flaw Detector capable of working in the 5 MHz range

IAE2R19442	Test Kit Comprising	
	- IAE2R19440	5 MHz Ultrasonic Probe
	- IAE2R19441/QC6857	Test Block
CoMat06-167	Ultrasonic Couplant	

(b) Calibration

(i) Ensure Flaw Detector is set to pulse echo mode.

(ii) Turn time base delay control to zero.

(iii) Connect Probe (IAE 2R19440) to Flaw Detector.

(iv) Apply Couplant to Test Block and position Probe on Test Block (IAE 2R19441) as shown in Figure 2.

(v) Identify and maximize the signal reflected from the EDM notch in the lug radius and with the time base range control, position the signal at the 5 division mark on the time base. Adjust the Signal Amplitude to full screen height.

NOTE: Signals appearing between 8.5 and 9 divisions on the time base are reflections from the Test Block geometry.

(vi) If a monitor gate is available, position it over signal (between the 4.5 and 6.5 division marks on the time base) to help identify correct signal during inspection.

(vii) The Flaw Detector is now calibrated.

(c) Inspection

NOTE: This can be accomplished on either installed or uninstalled Annulus Fillers.

(i) Clean Annulus Filler to remove any surface dirt, oil or grease. Refer to Figure 1.

(ii) Apply Couplant to the Annulus Filler and position the Probe as shown in Figure 3. The Probe should be positioned on the extended center line of the lug which is approximately 0.67 inch (17 mm) from the Fan Blade leading edge radius on the Filler. The front of the Probe should be approximately 0.20 inch (5 mm) from the front edge of the Filler.

(iii) Move the Probe a small amount from side to side, backwards and forwards and maximize any signal seen.

NOTE: Excessive amounts of Probe movement either side of the lug extended center line may result in reflections from the Bolt hole, which will appear approximately at the 5 division mark on the time base; or reflections from the edge structure of the Filler, which will appear approximately at the 4 division mark on the time base.

(d) Acceptance criteria

(i) Signals appearing between 5.0 and 6.5 division marks on the time base and over 15% screen height indicates that cracking is present at the trunnion location and the part must be rejected.

NOTE: Signals appearing at approximately 8 to 9 division marks on the time base are caused by reflections from the geometry on the lower part of the front lug.

R R (ii) If any Annulus Fillers are rejected at step (i), the removed Annulus Fillers must be discarded – refer to tasks shown in paragraph.(2) (a) and (c) overleaf. Remaining Fillers must still be inspected in accordance with the requirements in paragraph C.

NOTE 1. IAE recommend that if 50 percent, or greater, of the Annulus Fillers are rejected at (i) then the full set should be replaced and the removed parts discarded - refer to tasks shown in (2) (a) and (c) overleaf.

2. Where the full set of Fillers are replaced, inspection is not required until the installed Fillers have achieved over 10,000 cycles since new.

R (iii) If any Annulus Filler trunnion is found detached, or gives
R a reject signal during ultrasonic inspection, the
R retaining Bolts must be actioned as follows;

R 1) If the retaining Bolts are Pre Service Bulletin
R V2500-ENG-72-0362 standard, reject and discard the
R full set of Bolts.

R 2) If Service Bulletin V2500-ENG-72-0362 retaining Bolts
R had been previously installed, reject and discard any
R associated with

R a) any Annulus Filler that has experienced trunnion
R detachment.

R b) any Annulus Filler that gives a reject signal during
R ultrasonic inspection. Provided new Annulus Fillers
R are installed and the Bolts to be replaced are
R used for retaining the new Fillers, the replacement
R of the Bolts may be deferred until next shop visit.

(iv) When removing or replacing the Annulus Fillers for any reason, (for instance – following rejection to the criteria in this Non-Modification Service Bulletin or during routine 'in-service' or maintenance/repair shop inspections for NMSB 72-0316/Fan Blade removal following FOD damage or for root lubrication, etc.) record the Filler S/N's which are installed on any Engine, with their relationship to No.1 Fan Blade, and retain a copy with the Engine records for future reference.

(2) Visual inspection

NOTE: This is an alternative inspection procedure that can be applied if ultrasonic inspection equipment is not available.

(a) Remove the Inlet Cone Fairing, Inlet Cone, Trim Balance Weights and Fan Blade Front Retaining Ring to gain access to the Annulus Fillers as shown in Figure 1. (Refer to the A320 Aircraft Maintenance Manual (AMM), Chapter/Section, 72-38-11, Removal/Installation and 72-31-11 Removal/ Installation (for in service) or refer to the A1 Engine Manual (EM), Chapter/Section 72-38-11, Disassembly and 72-31-00, Disassembly (for in shop)).

(i) Find the Fan Blade nearest to the mark " 1 " on the outer diameter of the Fan Blade Front Retaining Ring at the top position and make this the "No.1 Fan Blade". If the mark " 1 " is not on the outer diameter, " * " is marked on the front surface of the Front Retaining Ring.

(ii) Make a record of the relationship of the Inlet Cone /Inlet Cone Fairing to the No.1 Fan Blade. (This action may be deferred and accomplished in conjunction with the requirements in step (iv) or (vi) below, if the " 1 " mark cannot be found prior to removal of the inlet cone).

(iii) Remove the Inlet Cone Fairing.

(iv) Make a record of location and size of any Trim Balance Weights installed at the Inlet Cone Fairing attachment locations.

(v) Remove the Inlet Cone and any installed Trim Balance Weights, retaining all parts as a set for re-installation.

(vi) Make a record of the location and size of any Trim Balance Weights on the 36-Bolt-holes Flange of the Fan Blade Front Retaining Ring.

(vii) Remove the Retaining Ring and any installed Trim Balance Weights on the 36-Bolt-holes flange, retaining all parts as a set for re-installation.

NOTE: Do not remove the Balance Weights on the 22-Bolt-holes flange of the Fan Blades Front Retaining Ring.

(b) Visually inspect the front trunnion of the still installed Annulus Fillers for detachment, or evidence of cracking at the trunnion to Filler Front face radius.

(i) If any evidence of trunnion detachment and/or cracking is present, the Annulus Fillers and the retaining Bolts must be actioned as follows;

1) Number all the Annulus Fillers relative to No.1 Fan Blade and then replace the full set of Fillers. Advise the local IAE Representative.

2) The retaining Bolts must be actioned as follows;

a) If the retaining Bolts are Pre Service Bulletin V2500-ENG-72-0362 standard, reject and discard the full set of Bolts.

b) If Service Bulletin V2500-ENG-72-0362 retaining Bolts had been previously installed prior to fracture, reject and discard the full set of Bolts. Provided the following conditions are all met, the replacement of the Bolts, except the Bolts which were retaining the fractured Fillers, may be deferred until next shop visit.

i) Full set of new Fillers are installed.

ii) Engine log book entry is made to ensure that full set of new Bolts are installed at next shop visit.

(c) If no cracking/detachment detected, re-assemble the parts removed at (a) (i) through (vii) above, or alternatively install new replacement Annulus Filler and Service Bulletin V2500-ENG-72-0362 attaching Bolts and return the Engine to service/spares holding (Refer to the A320 Aircraft Maintenance Manual (AMM), Chapter/Section, 72-31-11, Removal/Installation and 72-38-11 Removal/Installation (for in service) or refer to the A1 Engine Manual (EM), Chapter/Section 72-31-00, Assembly and 72-38-11, Installation (for in shop)).

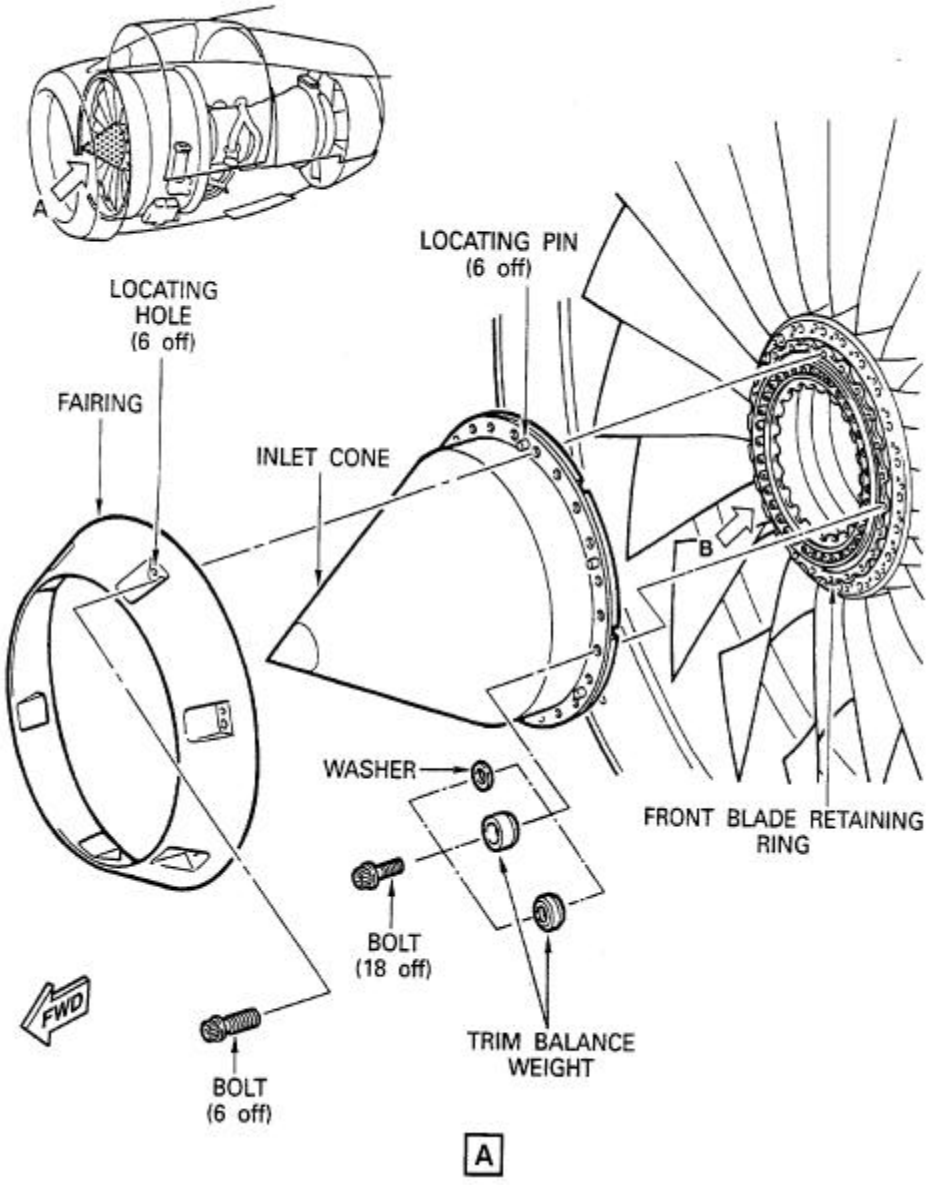
NOTE: Where the full set of Fillers are replaced, inspection is not required until the installed Fillers have achieved over 10,000 cycles since new.

(d) When removing or replacing the Annulus Fillers for any reason, (for instance – following rejection to the criteria in this Non-Modification Service Bulletin or during routine 'in-service' or maintenance /repair shop inspections for NMSB 72-0316 / fan blade removal following FOD damage or for root lubrication, etc.) record the Filler S/N's which are installed on any Engine, with their relationship to No.1 Fan Blade, and retain a copy with the Engine records for future reference.

H. Record of Accomplishment

When the above action is completed write V2500 Non-Modification

Service Bulletin ENG 72-0356 in the Engine Log Book advising the IAE Representative that the action at Paragraph G. has been completed on the respective Engine and the findings of same.



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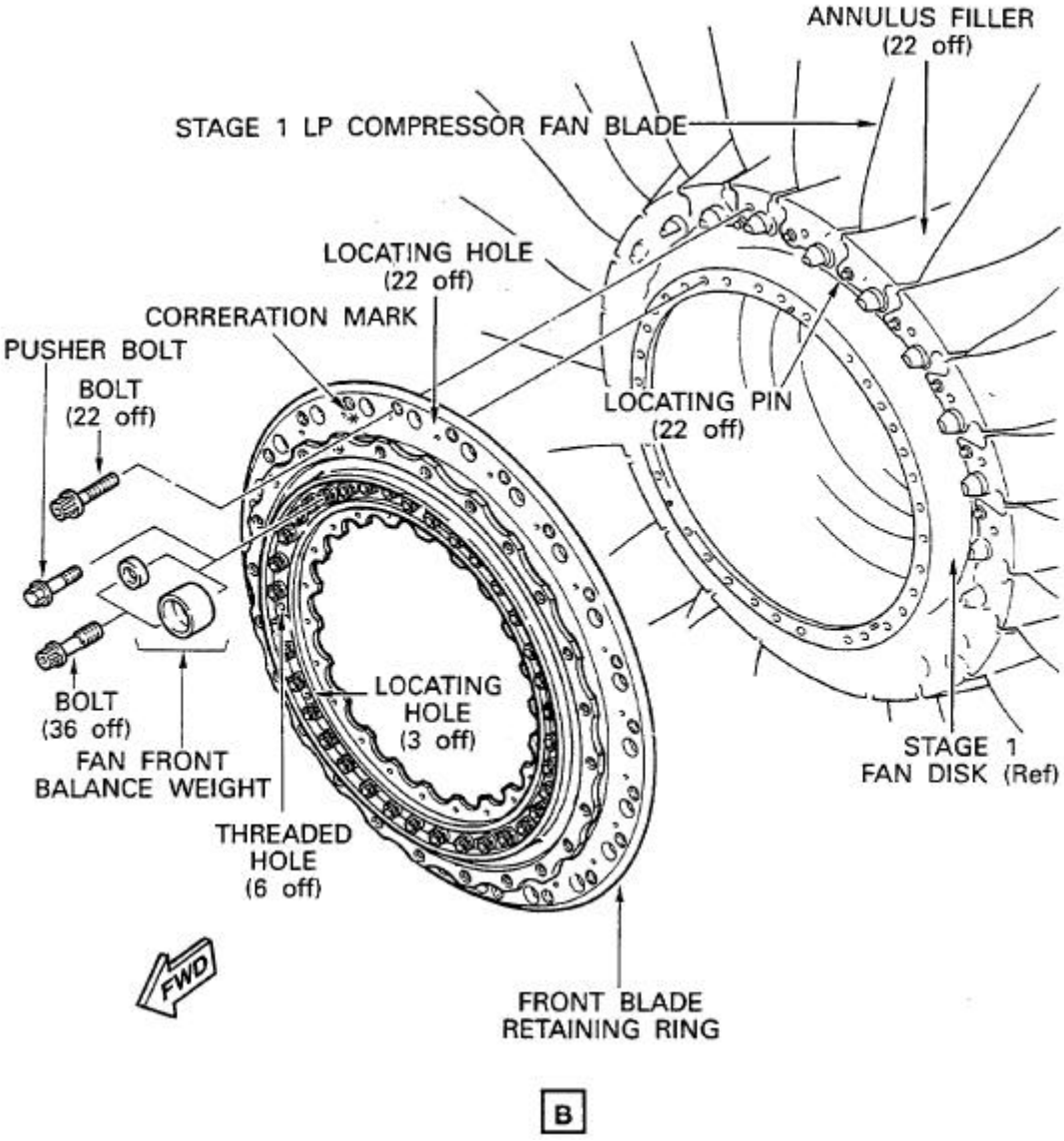
Location of Annulus Fillers
Figure 1 (Sheet 1 of 2)



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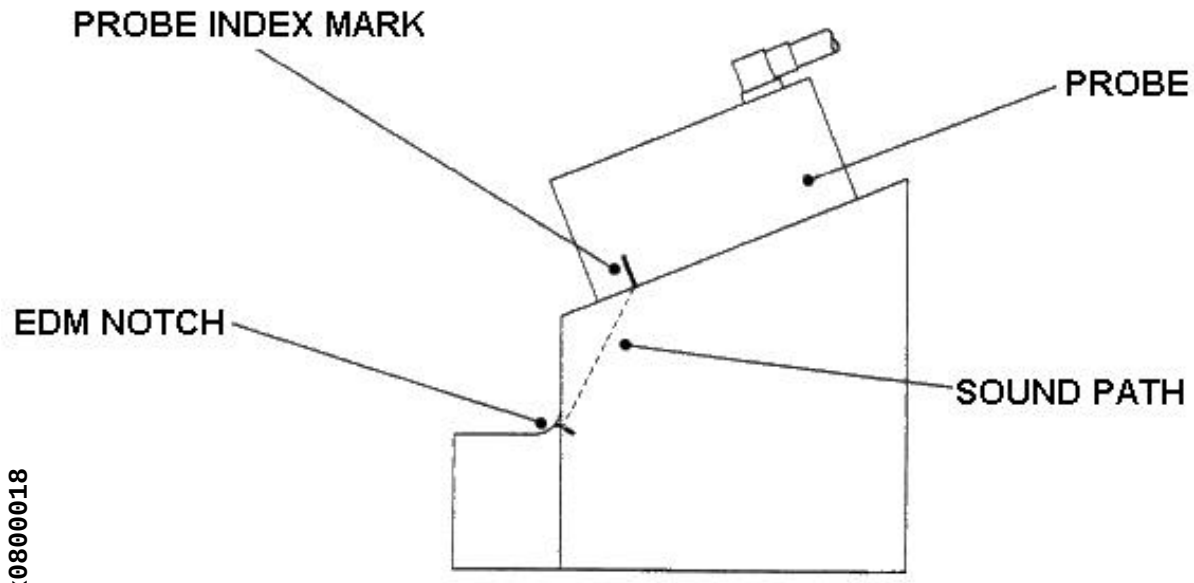
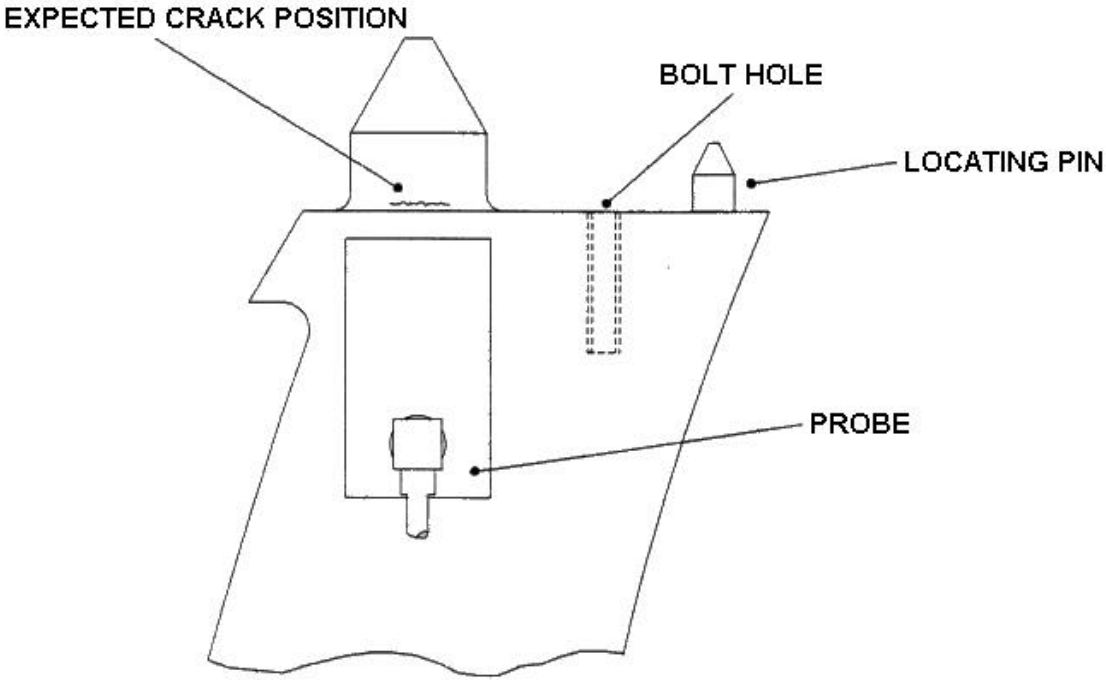
Location of Annulus Fillers
Figure 1 (Sheet 2 of 2)



Probe Position on Test Block for Calibration
Figure 2



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Probe Position on Annulus Filler Upper Surface for Inspection
Figure 3