



737
NON-DESTRUCTIVE TEST MANUAL
PART 4 - ULTRASONIC
ENGINE MOUNT AFT CONE BOLT

1. Purpose

- A. This procedure was developed to detect cracks in the necked-down thread-relief section of the engine-mount-aft-cone bolt, with the engine in place.
- B. Service Bulletin Reference: 737-71A1212

2. Equipment

- A. Instrument -- Any ultrasonic flaw detection instrument which will satisfy the requirements of this procedure is acceptable. The following instruments were used in the development of this procedure:
 - (1) Model USL 38 - Krautkramer Branson
 - (2) Model UJ Reflectoscope - Automation Industries
 - (3) Model NDT 131 - Nortec Inc.
- B. Transducer -- Any 5 MHz, 0.25-inch element, 0.65-inch maximum height transducer with side mounted connector which will satisfy the requirements of this procedure is acceptable. The following transducers were evaluated and found to be acceptable:
 - (1) P/N 2914249, available from:
 - (a) KB - AEROTECH
P.O. Box 350
Lewiston, PA 17044
Telephone (717) 242-0327
 - (2) P/N CHF-052, available from:
 - (a) NDT INSTRUMENTS, INC.
15622 Graham Street
Huntington Beach, CA 92649
Telephone (714) 893-2438
- C. Transducer Guide 365 G
 - (1) Fabricate guide as shown in Detail II in Figure 1.
NOTE: This transducer guide is optional and may be used to help keep the transducer in position during scanning.
- D. Reference Standard -- Refer to Figure 1.
- E. Couplant - The couplant used to develop this procedure, Lubriplate No. 105 water proof grease, was chosen for its ability to remain on the part during this inspection. Do not use gel or liquid type couplant. Use grease or petroleum jelly for couplant.
- F. Soft flexible material - Use a flexible material that is equivalent to clay or putty. A small quantity is necessary to put in the hole at the bolt end.



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3. Prepare for the Inspection

- A. Remove fairing access panels No. 5120L, 5119L, 5220R and 5219R on inboard side of engine strut to gain access to cone bolts (see Figure 3). Removal of the outboard access panels may be required on the No. 2 strut.
- B. Clean the threaded end of the cone bolt to remove any foreign material.
- C. Make a ball approximately 0.15 inch (4.0 mm) in diameter from clay, putty or equivalent flexible material. Push the ball into the hole at the end of the bolt before you apply couplant. This ball is put in the hole to keep couplant out of the hole which could cause incorrect crack indications. Make sure the ball is not above the hole.
- D. Apply couplant to the bolt end. Do not put couplant on the threads of the bolt or in the hole at the end of the bolt. This could cause incorrect crack indications during the inspection.

4. Instrument Calibration

- A. Connect the transducer and make the preliminary instrument adjustments, putting the initial pulse at the left edge of the screen display. Refer to Figure 2. Turn the reject control to the "Off" position. The damping control may be used during calibration to enhance the display.
- B. Apply couplant to the top of the threaded end of the reference standard and put the transducer over the un-notched area, Position 1, as shown in Figure 2.

NOTE: If optional transducer guide is used, thread 1 to 2 turns onto the reference standard before calibration.

- C. Locate the back reflection from the opposite end of the standard and put it at 100 percent of the full screen width. Refer to Figure 2.
- D. Put the transducer at Position 2, above the EDM notch. Maximize the signal amplitude from the EDM notch. Adjust the gain so that the indication from the EDM notch, located at approximately 25 percent of screen width, reaches 80 percent of screen height. Refer to Figure 2.
- E. If necessary, adjust the delay so that the left edge of the notch signal is at 25% of screen width.

NOTE: The indications observed at approximately 35 percent and 45 percent of the screen width, are the interference signals and will appear during bolt inspection as well as during calibration.

5. Inspection Procedure

- A. Calibrate the instrument. Refer to Paragraph 4.
- B. Put the transducer on the end of the cone bolt. Refer to Figure 3. Observe the back reflection and the two interference signals (at 35 percent and 45 percent of screen width) to assure a secure contact between the transducer and the bolt. The back reflection signal amplitude, from the bore in the lower part of the cone bolt, will be less than that observed on the reference standard, but should still be at 100 percent of the screen width. Refer to the calibration procedure in Paragraph 4.
NOTE: If the optional transducer guide is used during calibration, thread the guide 1 to 2 turns over the cone bolt threads before inspecting.
- C. Move the transducer around the circumference of the bolt end to ensure complete inspection coverage. Refer to Figure 3.
- D. Remove the flexible ball from the hole at the bolt end.



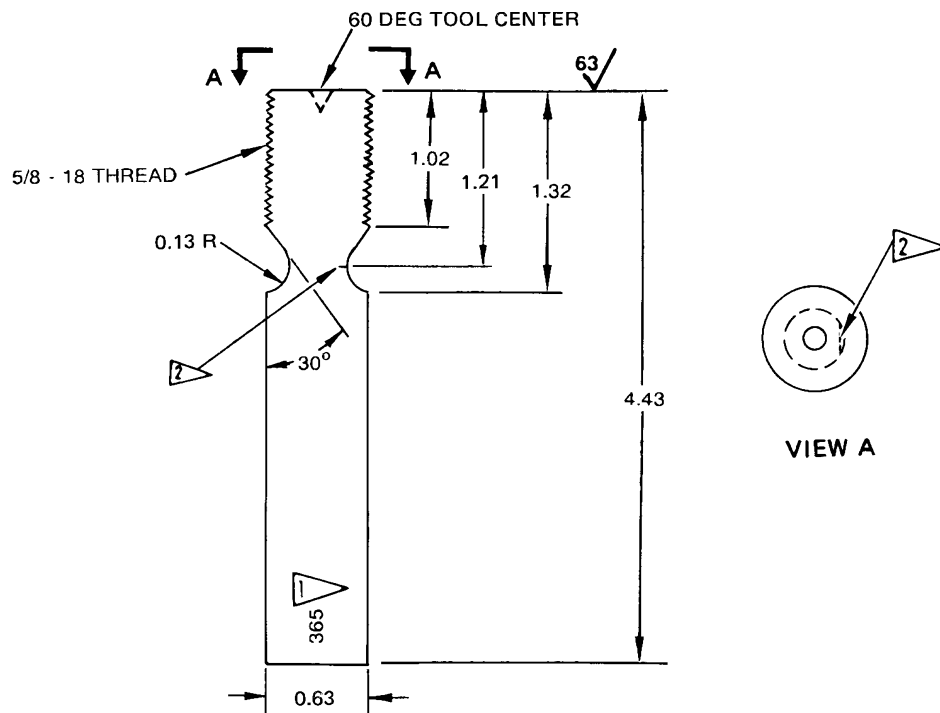
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6. Inspection Results

- A. Signals that occur between 23% and 28% of screen width that are above 20% screen height are crack indications. Make sure the signals are not caused by couplant in the hole or couplant on the bolt threads.
- B. If crack signals occur:
 - (1) Remove the ball from the hole and clean the hole.
 - (2) Remove all of the couplant from the threads. The threads must be dry.
 - (3) Push the flexible ball back in the hole.
 - (4) Carefully apply couplant to bolt end.
 - (5) Do a calibration check and do the inspection again.
- C. If crack signals occur again, remove the aft cone bolt and do a magnetic particle inspection on the necked down area of the bolt.

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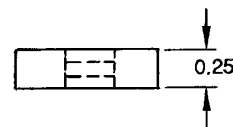
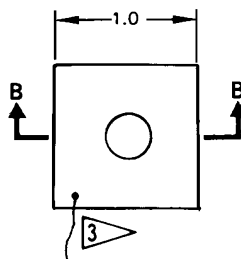


NOTES

- ALL DIMENSIONS ARE IN INCHES
- TOLERANCE: X.XX \pm 0.01
X.XXX 0.005
ANGLES \pm 1°
- MATERIAL: 41XX OR 43XX STEEL
- REFERENCE STANDARD AVAILABLE FROM BOEING

- 1 ETCH OR STEEL STAMP WITH 365
- 2 EDM NOCH 0.030 DEEP, 0.020 MAX WIDTH

DETAIL I



SECTION B-B

- 5/8-18 THREAD
- MATERIAL: PLEXIGLASS APPLY SUITABLE MATERIAL
- STAMP WITH 365 G

- 3 ATTACH STRING TO THE GUIDE TO KEEP THE GUIDE FROM FALLING INTO THE ENGINE COMPARTMENT

TRANSDUCER GUIDE 365G (OPTIONAL) DETAIL II

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Reference Standard Figure 1

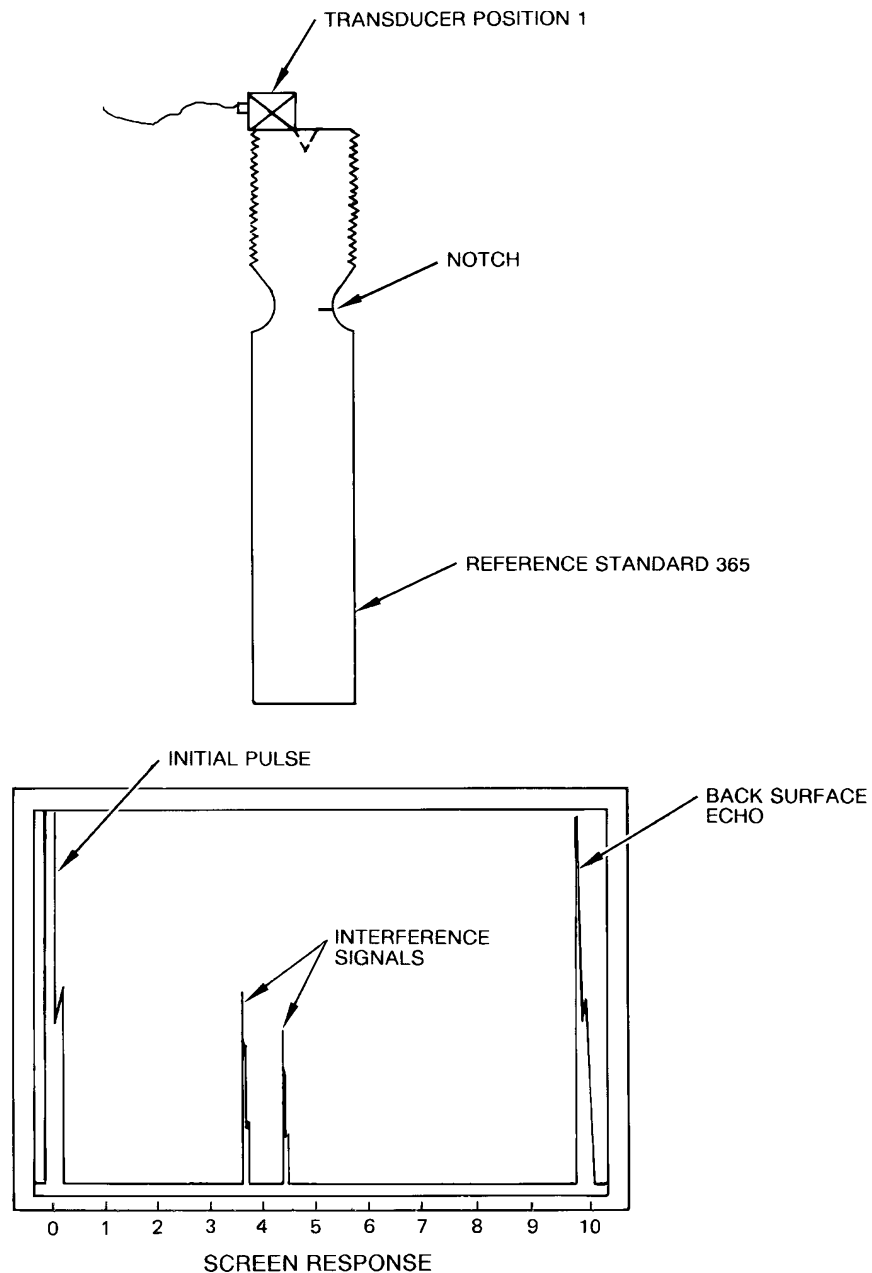
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NOTE:

FOR FIGURE 2, SHEETS 1 AND 2, THE INSTRUMENT CALIBRATION IS SHOWN WITHOUT A TRANSDUCER GUIDE. IF THE OPTIONAL TRANSDUCER GUIDE IS USED, THREAD GUIDE ONTO REFERENCE STANDARD BEFORE FOLLOWING CALIBRATION PROCEDURE.

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Instrument Calibration Figure 2 (Sheet 1 of 2)

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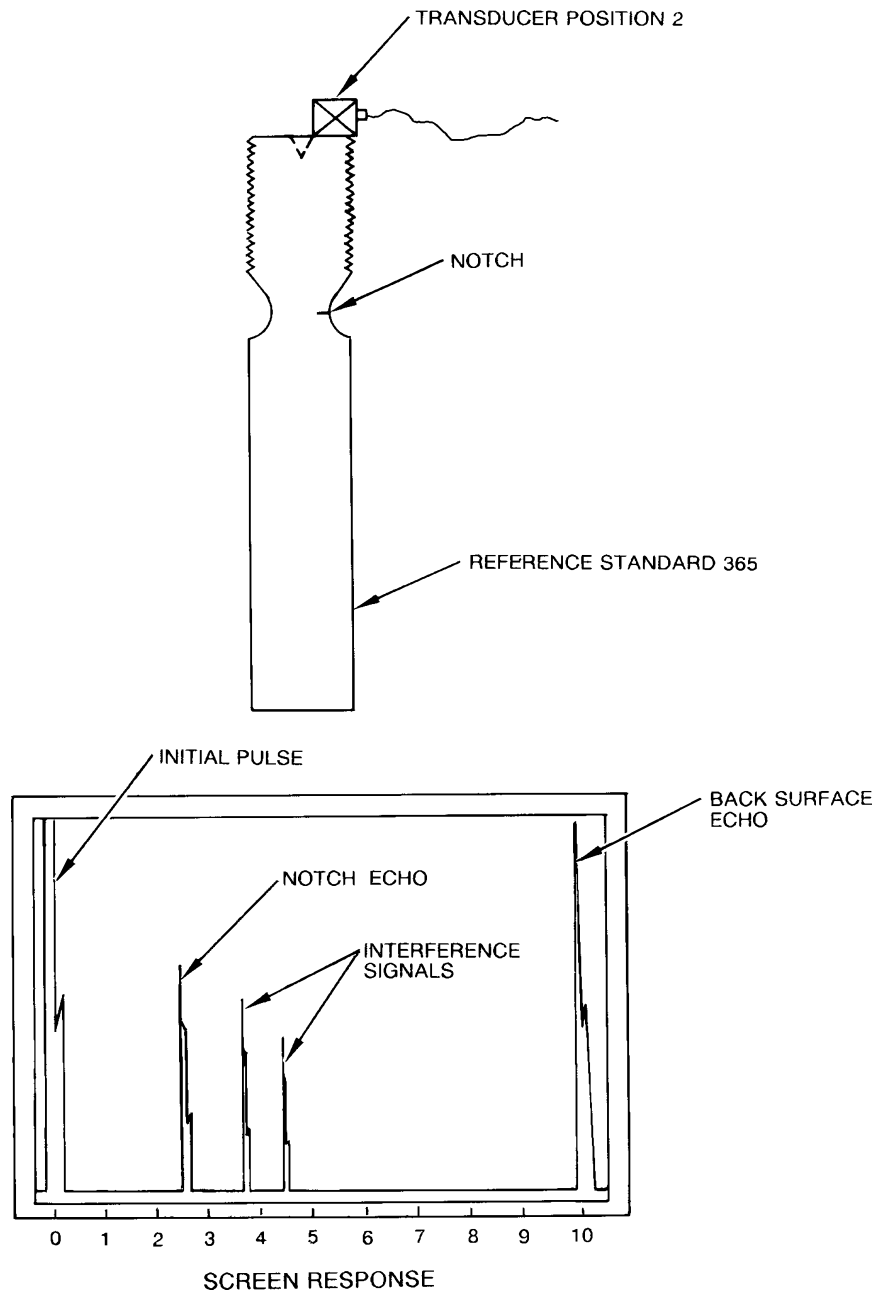
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Instrument Calibration
Figure 2 (Sheet 2 of 2)

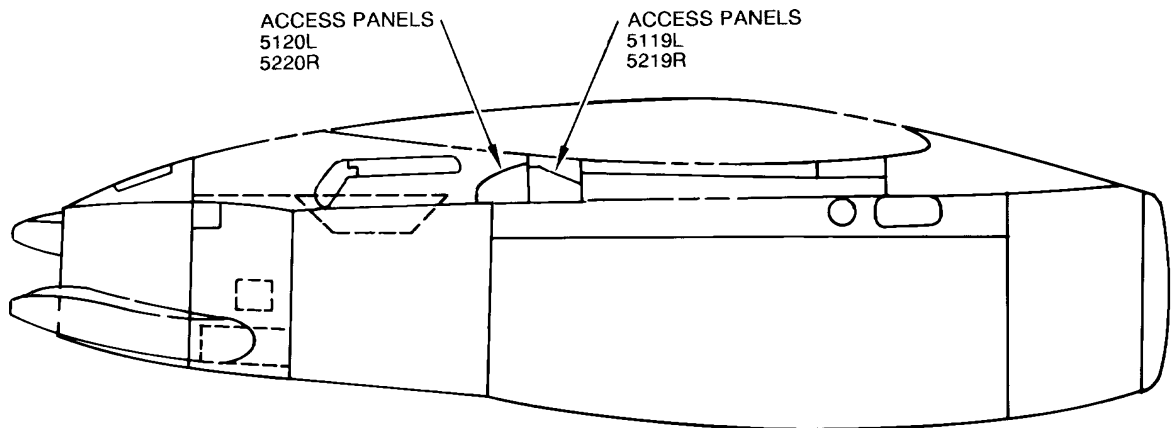
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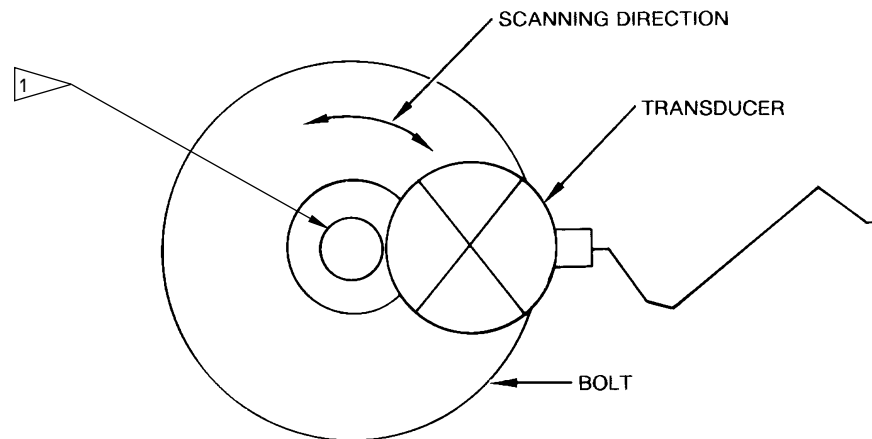
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RIGHT SIDE VIEW NO. 1 AND NO. 2 ENGINE AND
INBOARD SIDE OF THE WING-TO-NACELLE FAIRING
JT8D



TOP VIEW OF BOLT END

NOTES

- REMOVE ACCESS PANELS 5120L, 5119L, 5220R AND 5219R TO GAIN ACCESS TO CONE BOLTS
- PLACE TRANSDUCER ON BOLT END AND SCAN AROUND CIRCUMFERENCE OF BOLT END TO ENSURE COMPLETE COVERAGE
- IF THE OPTIMAL GUIDE IS USED DURING CALIBRATION, THREAD THE GUIDE ONTO THE CONE BOLT BEFORE FOLLOWING THE INSPECTION PROCEDURE.

1 MAKE A BALL APPROXIMATELY 0.15 (4 MM) IN DIAMETER FROM CLAY, PUTTY OR EQUIVALENT FLEXIBLE MATERIAL. PUSH THE BALL INTO THE HOLE AT THE END OF THE BOLT BEFORE YOU APPLY COUPLANT.

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Transducer Placement
Figure 3

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