



737
NON-DESTRUCTIVE TEST MANUAL
PART 6 - EDDY CURRENT
AUXILIARY FUEL TANK INSPECTION

1. Purpose

- A. To find cracks that start in the fastener holes in the outer face sheet below the external angles. The cracks travel from the fastener hole to fastener hole in the external face sheets. These cracks can be found with an eddy current inspection through the external angle flanges. Cracks that are in the areas directly below the sealant around the fasteners cannot be found with this procedure. See Figure 1 and Figure 4 for the areas of the inspection.
- B. Crack sizes that can be found that start at the fastener holes:
 - (1) 0.50-inch long or greater through angles 0.150-inch thick or less.
 - (2) 0.75-inch long or greater through angles 0.190 or 0.250-inch thick.

NOTE: The above crack sizes can be found when there is 0.250-inch thick sealant around the fasteners. Shorter cracks can be found if all of the sealant is removed from around the fasteners.
- C. Service Bulletin Reference: 737-28-1088

2. Equipment

NOTE: Refer to Part 1, 51-01-00 for information on the manufacturers of the equipment.

- A. Eddy Current Instruments
 - (1) All eddy current instruments that can operate between 600 Hz and 1.6 kHz and agree with the necessary conditions of this procedure are permitted. These instruments were used to make this procedure:
 - (a) MIZ 10A; Zetec, Inc.
 - (b) MIZ 10B; Zetec, Inc.
- B. Ultrasonic Thickness Gauge
 - (1) This thickness gauge was used to make this procedure:
 - (a) CL300; Krautkramer Branson
 - (2) The use of other manufacturer's thickness gauge equipment is permitted.
- C. Eddy Current Probes
 - (1) All spot and/or ring probes that can operate at 600 Hz, 900 Hz, 1.2 kHz, and 1.6 kHz can be used for this inspection. It is not necessary for one probe to operate at all of the necessary frequencies. The probe diameter must fit on the angle between the sealant around the fasteners on the external angles. The use of smaller diameter probes will need less sealant removal. These probes were used to make this procedure:



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PROBE AND MANUFACTURER		APPLICABLE ANGLE THICKNESS (INCHES)	OUTER PROBE DIAMETER (INCHES)
VM112	1.0 kHz VM Products	0.075 to 0.155	0.55
VMR112	1.0 kHz VM Products	0.075 to 0.155	0.55
SPO-565	500 Hz Nortec	0.075 to 0.195	0.60
SPO-996	300 Hz to 2 kHz Nortec	0.075 to 0.255	0.75

D. Reference Standard - 2004A, 2004B, 2004C, and 2004D; see Figure 2.

3. Prepare for the Inspection

- A. Wipe the surfaces of the areas of the inspection clean on the external angles shown in Figure 1 and Figure 4.
- B. Use an ultrasonic thickness gauge to identify the thickness of the external angles in the areas of the inspection.
- C. Use the applicable probe to measure the clearance between fasteners on the external angles.
- D. If the probe does not fit on the angle, then cut away sufficient sealant to make a good fit.

NOTE: Some areas are not able to be examined with eddy current because of eye bolts between fasteners and minimum clearance between some fasteners.

4. Instrument Calibration

- A. Calibration for eddy current inspection through angles that are 0.075 to 0.095 inch thick. Calibrate on Reference Standard 2004A.
 - (1) Set the instrument frequency at 1.6 kHz.
 - (2) Put the probe on Reference Standard 2004A at Position 1, Figure 3.
 - (3) Balance the instrument with the instructions from the manufacturer.
 - (4) Set the lift-off at Position 1 so that probe-to-part distances of up to 0.006-inch (thickness of two sheets of paper) give no more than a 5 percent meter movement.
 - (5) Set the location of the needle at 20 percent full scale on the meter.
 - (6) Put the probe at Position 2, Figure 3.
 - (7) Move the probe over the reference notch/sawcut (Position 2, Figure 3) and monitor the upscale needle movement on the meter.
 - (8) Adjust the instrument's sensitivity to get a 50 percent full upscale meter movement from the notch.
 - (9) Make sure the lift-off is equivalent as in Paragraph 4.A.(4). Adjust the lift-off again if the 0.006 lift-off causes a 5 percent or greater meter movement.
- B. Calibration for eddy current inspection through angles that are 0.115 to 0.155 inch thick. Calibrate on Reference Standard 2004B.
 - (1) Set the instrument frequency to 1.2 kHz.



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- (2) Put the probe on Reference Standard 2004B at Position 1, Figure 3.
- (3) Do the steps in Paragraph 4.A.(3) through Paragraph 4.A.(9).
- C. Calibration for eddy current inspection through angles that measure 0.180 to 0.195 inch thick. Calibrate on Reference Standard 2004C.
 - (1) Set the instrument frequency to 900 Hz.
 - (2) Put the probe on Reference Standard 2004C at Position 1, Figure 3.
 - (3) Do the steps in Paragraph 4.A.(3) through Paragraph 4.A.(9).
- D. Calibration for eddy current inspection through angles that measure 0.240 to 0.255 inch thick. Calibrate on Reference Standard 2004D.
 - (1) Set the instrument frequency to 600 Hz.
 - (2) Put the probe on Reference Standard 2004D at Position 1, Figure 3.
 - (3) Do the steps in Paragraph 4.A.(3) through Paragraph 4.A.(9).

5. Inspection Procedure

- A. Use the applicable calibration procedure in Paragraph 4. to calibrate the equipment.
- B. Put the probe on the angle adjacent to the sealant around the fastener. See Figure 4.
- C. Balance the instrument with the instructions of the manufacturer.
- D. Do a scan with the probe in the areas of the inspection shown in Figure 4. Make sure the center of the probe goes across the centerline of the fasteners. See the direction arrow of the scan in Figure 4.

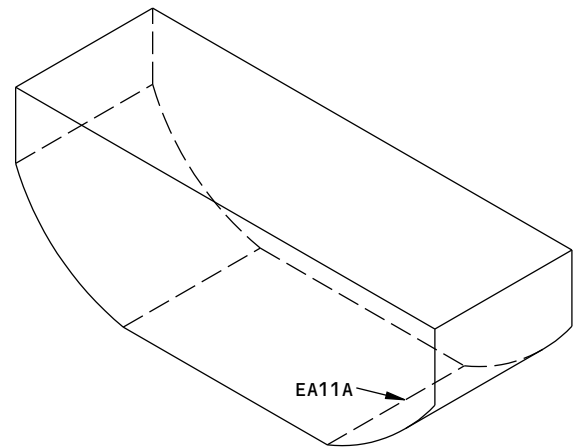
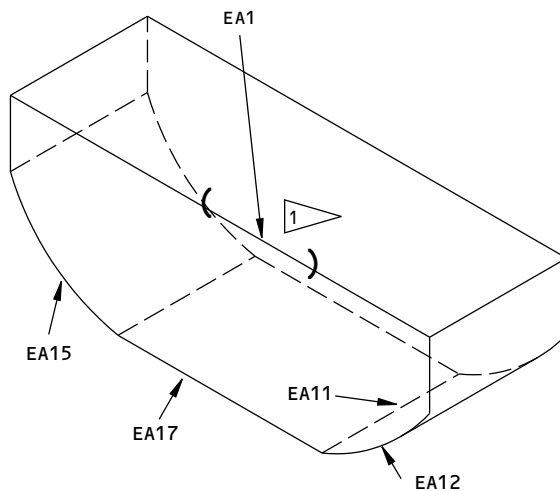
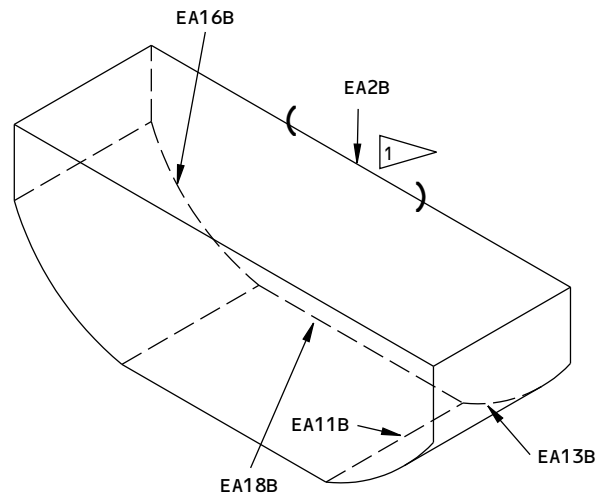
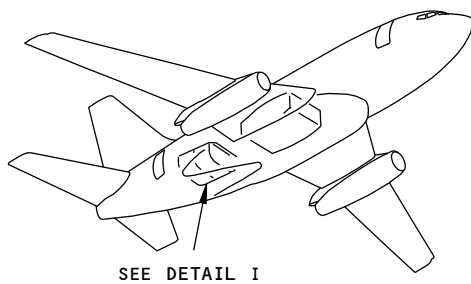
NOTE: Make sure the same scan speed is used as in the calibration procedure.
- E. Do the inspection only on the angles that are labeled as shown in Figure 1. Make sure the correct calibration procedure is used on each angle.
- F. Do a calibration check on the applicable reference standard after each angle inspection. Make sure the needle indication from the notch/sawcut is between 50 and 60 percent full scale. If the needle indication is less than 50 percent, calibrate the instrument and do an inspection on that angle again. If the needle response is greater than 60 percent full scale and no indications were found, then calibrate the equipment again. Inspection of that angle again is not necessary.

6. Inspection Results

- A. An upscale needle indication of 40 percent full scale or greater is a crack-like indication. The needle indication must look equivalent to the needle indication from the reference standard. If these conditions are true, then the area below the angle must be examined more.

NOTE: If the probe goes near the edge of an angle, an upscale meter movement will occur. Make sure that crack-like meter indications are not caused by an "edge effect".

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DETAIL I

NOTES

- DO AN INSPECTION ON ALL OF THE ANGLES THAT ARE IDENTIFIED ABOVE.
- "EA" IS EXTERNAL ANGLE
- THREE TANK ASSEMBLY SHOWN DISCONNECTED
- ONE OR TWO TANKS ARE APPLICABLE ON SOME ASSEMBLIES.
- IT IS NOT NECESSARY TO DISASSEMBLE THE TANKS TO DO AN INSPECTION.

- IT WILL BE NECESSARY TO MOVE THE TANK TO GET ACCESS TO EA11, EA11A AND EA11B.
- 1 FOR ANGLES EA1 AND EA2B, DO AN INSPECTION OF THE MIDDLE ONE THIRD OF THESE ANGLES ONLY AS SHOWN ABOVE BY THE PARENTHESES.

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Inspection Areas on External Angles
Figure 1

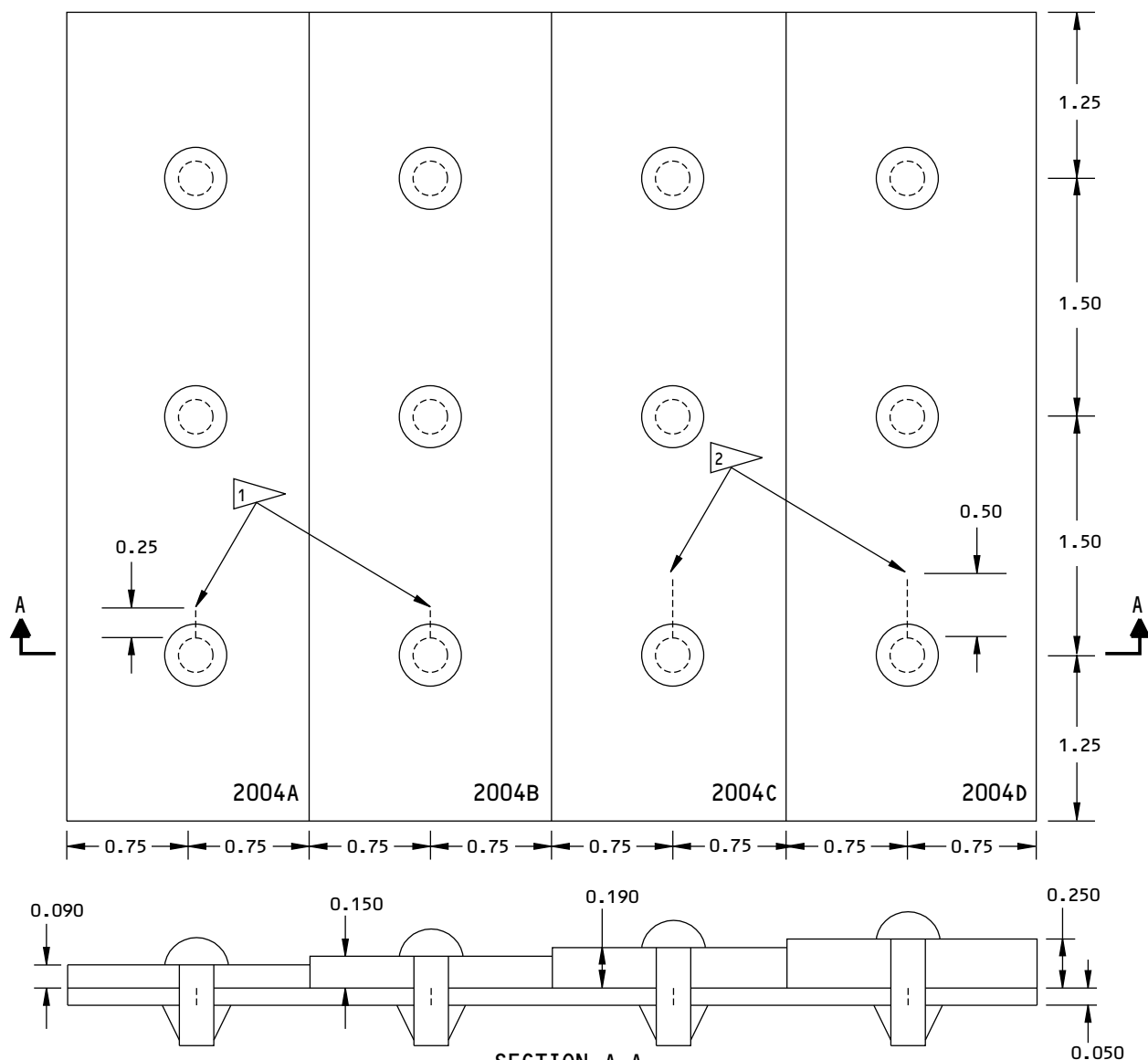
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NOTES

- ALL DIMENSIONS ARE IN INCHES
- TOLERANCE: X.XX \pm 0.02
X.XXX \pm 0.005
- ALL SKIN MATERIAL ABOVE IS 2024-T3 ALUMINUM
- FASTENERS: BACB30GP8-2 (3 EACH),
BACB30GP8-3 (3 EACH),
BACB30GP8-4 (3 EACH),
BACB30GP8-5 (3 EACH)
(OR EQUIVALENT ALUMINUM FASTENERS)

- COLLARS: NAS1080D08 (12 EACH)
- ETCH OR STEEL STAMP WITH 2004A, 2004B, 2004C, 2004D AS SHOWN

- 1 JEWELER'S SAWCUT 0.050 BOTTOM SKIN
0.25 X 0.050 X 0.030 MAXIMUM WIDTH
(ALL SAWCUTS START AT THE FASTENER HOLES
IN THE 0.050 SKIN)
- 2 JEWELER'S SAWCUT IN 0.050 BOTTOM SKIN
0.50 X 0.050 X 0.030 MAXIMUM WIDTH

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Reference Standard 2004
Figure 2

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TANKS

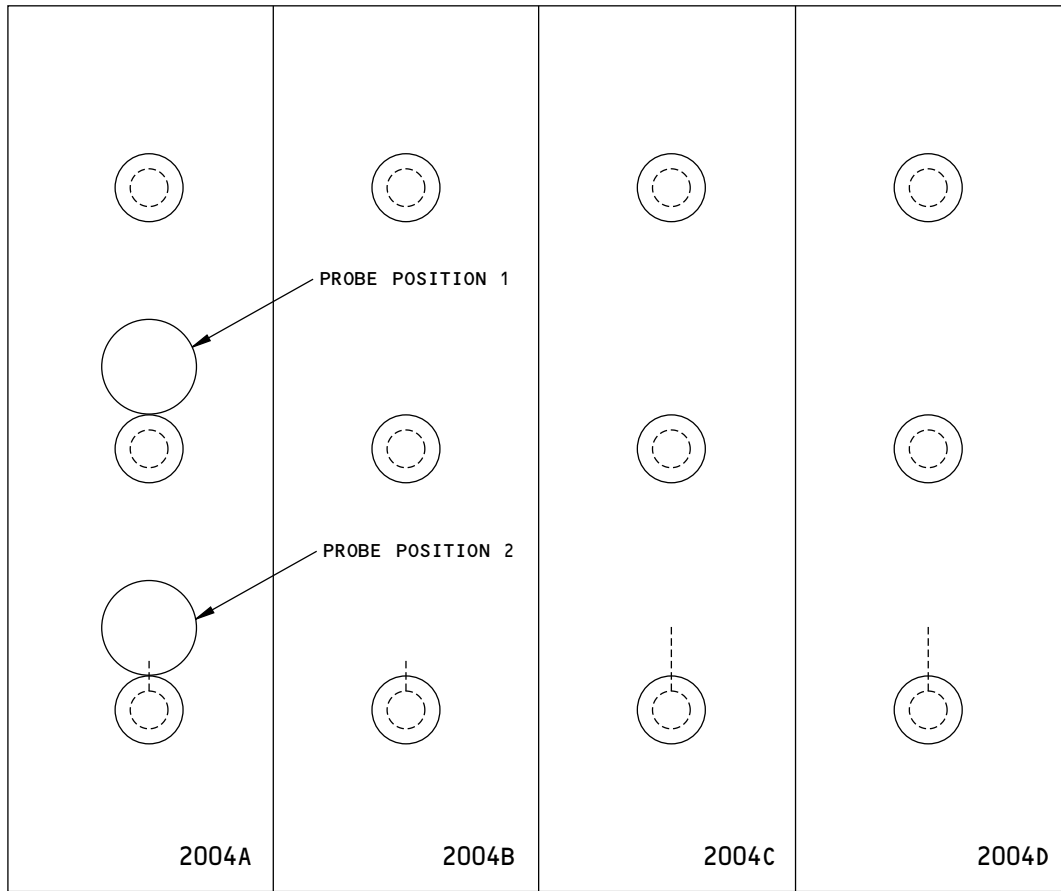
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NOTES

- PROBE POSITION 1 AND 2 ARE SHOWN ON REFERENCE STANDARD 2004A.
- PROBE POSITIONS FOR 2004B, 2004C AND 2004D ARE SIMILAR.
- IF THE ANGLE THICKNESS (IN INCHES) MEASURES BETWEEN:
 0.075 AND 0.095 THEN CALIBRATE ON STANDARD 2004A
 0.115 AND 0.155 THEN CALIBRATE ON STANDARD 2004B
 0.180 AND 0.195 THEN CALIBRATE ON STANDARD 2004C
 0.240 AND 0.255 THEN CALIBRATE ON STANDARD 2004D

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**Calibration Probe Positions
Figure 3**

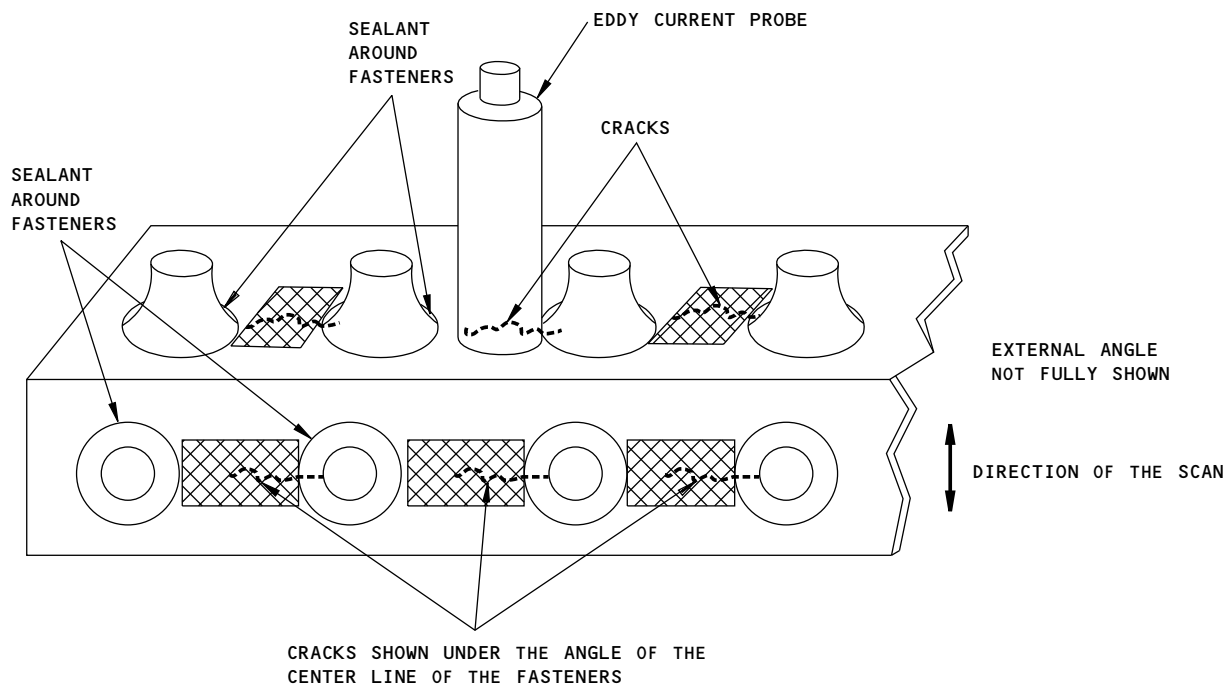
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AREA OF THE INSPECTION

NOTES

- IF THE PROBE DOES NOT FIT ON THE ANGLE, THEN REMOVE SUFFICIENT SEALANT TO PERMIT THE PROBE TO FIT.
- THE SIDE OF THE PROBE DOES NOT HAVE TO MAKE DIRECT CONTACT WITH THE FASTENER HEADS OR COLLARS.
- MAKE SURE THE CENTER OF THE COIL FACE GOES ACROSS THE CENTER LINE OF THE FASTENERS.
- REPLACE ALL SEALANT THAT WAS REMOVED.

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External Angle Areas of Inspection Between the Fasteners
Figure 4

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