PART 6 - EDDY CURRENT

ENGINE STRUT SKIN DOUBLER

1. Purpose

A. This subsurface eddy current (low frequency eddy current) procedure is used to find the end of cracks in the engine strut skin doubler. The cracks start at cutouts and extend above the crown stringer. Other procedures, such as visual or surface eddy current (high frequency eddy current), are used to find the crack. This procedure finds the ends of the cracks within 0.125 inch (3 mm).

B. Service Bulletin Reference: 737-54-1035

2. Equipment

NOTE: Refer to Part 1, 51-01-00, for data about the equipment manufacturers.

A. Instrument - All impedance plane instruments which will operate at a frequency of 4 kHz are permitted for this inspection. The instruments specified below were used to help prepare this procedure:

(1) NDT 19/19e; Staveley Instruments

(2) AV100; Hocking

B. Probe - All spot probes which have an outside diameter of not more than 0.32 inch (8 mm) and which will operate at a frequency of 4 kHz are permitted for this inspection. The probe specified below was used to help prepare this procedure.

(1) SP01284; Staveley Instruments

C. Reference Standard - Make reference standard NDT394 as specified in Figure 1.

D. Reference Standard Positioner - Make reference standard positioner NDT394P as specified in Figure 2.

3. Prepare for the Inspection

A. Clean the inspection area.

B. Use visual and surface eddy current (HFEC) procedures to identify where the crack goes above the crown stringer.

4. Instrument Calibration

A. Put the probe in the probe positioner.

B. Put the probe positioner on the reference standard at probe position 1 as shown in Detail A of Figure 3. Make sure that the probe touches the surface of the reference standard as shown in View A-A of Figure 3.

C. Tighten the retaining screw so that the probe does not move away from the surface of the reference standard.

D. Set the instrument frequency at 4 kHz.

E. Balance the instrument as specified in the instrument's instruction manual.

F. Adjust the instrument for lift-off (phase). The lift-off signal will be in the horizontal plane and will go to the left of the screen as shown in Figure 5.

G. Adjust the position control to put the dot at 20 percent of full screen height and 50 percent of screen width.

H. Move the probe above the EDM notch (Position 2, Detail A in Figure 3). Move the probe back and forth sideways as shown in View B-B of Figure 3 until the signal is at maximum height.

I. Adjust the instrument gain so that the signal from the EDM notch is 80 percent of full screen height as shown in Figure 5.

J. Move the probe/positioner forward and backward (to and away) from the end of the EDM notch (see Position 3 shown in Detail B of Figure 3). Make sure you keep the probe centered above the EDM notch.

K. Monitor the height of the signal as you move the probe/positioner as specified in Paragraph 4.J. When the probe/positioner gets to the end of the EDM notch the signal height will start to decrease. At the point where the signal height decreases by 5 percent, visually check to make sure the scribe lines on the positioner align with the scribe line on the reference standard within 0.125 inch (3 mm). This position indicates you are at the end of the EDM notch.

L. Do Paragraph 4.J. and Paragraph 4.K. again at the other EDM notch location. (Probe position 4, Detail A in Figure 3).

5. Inspection Procedure

A. Calibrate the instrument as specified in Paragraph 4.

B. Put the probe/positioner on the skin surface away from the known crack locations. Refer to Figure 4.

C. Loosen the retaining screw and push the probe/positioner against the skin surface. Make sure the probe is aligned with the skin surface and then tighten the retaining screw.

D. Balance the instrument again with the probe on the skin surface. Refer to Figure 4. Do not change the instrument settings. It is necessary to balance the instrument again to make allowances for conductivity differences between the reference standard and the strut skin.

E. Use visual or surface eddy current procedures to find the crack.

F. Put the probe/positioner above the crack. Move the probe/positioner along the crack to do an inspection of the crack. Refer to Figure 4.

G. When the crack signal begins to decrease, as it did during the calibration procedure, put a mark on the skin surface adjacent to the scribe lines on each side of the positioner.

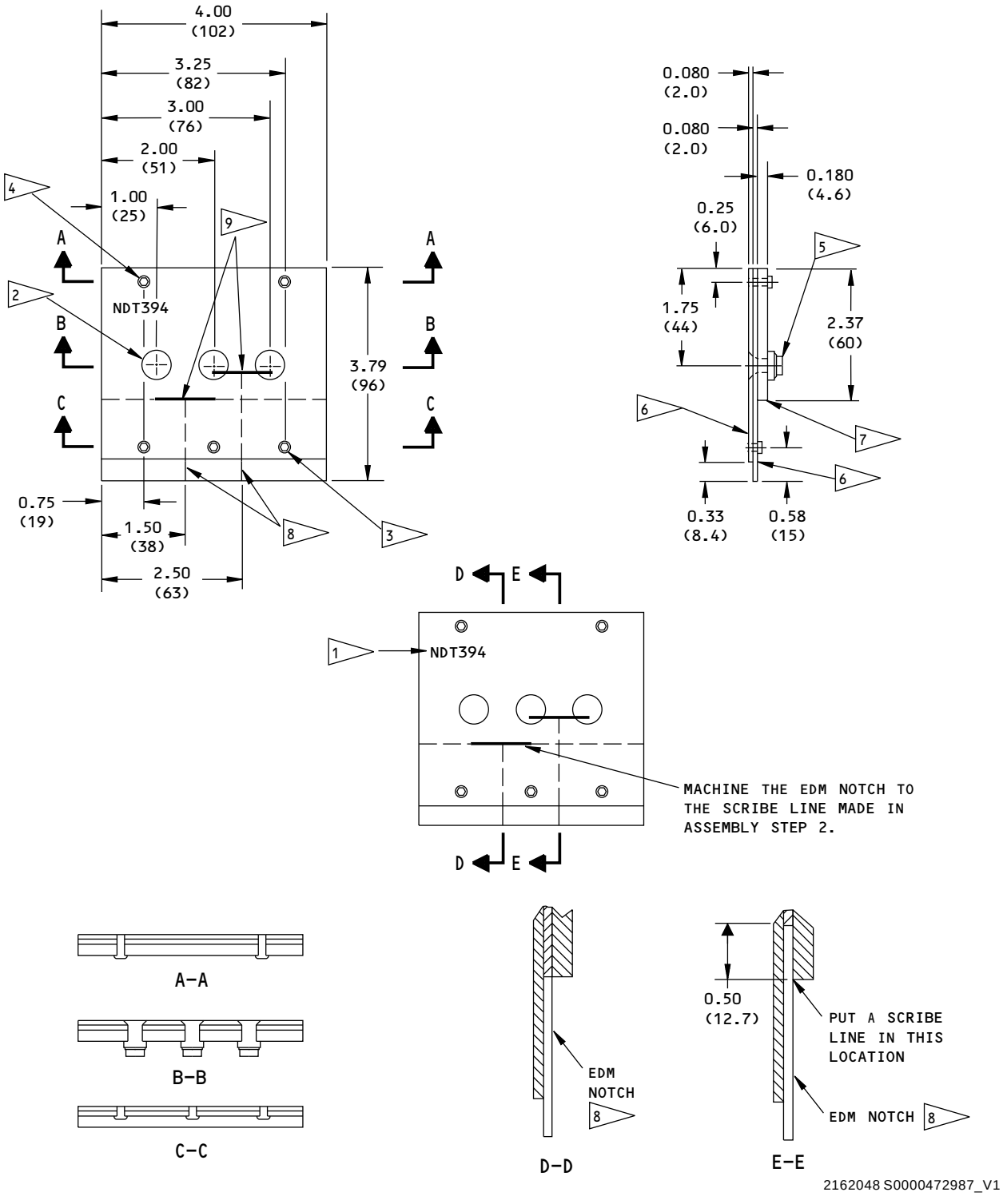
H. Remove the probe/positioner and identify the end of the crack as the point between the marks you made in Paragraph 5.G.

I. Do Paragraph 5.E. thru Paragraph 5.H. again as necessary to make sure you know where the end of the crack is.

NOTE: As the end of the crack gets closer than 0.25 inch (6.4 mm) from a fastener hole, it is difficult to find the crack. The effect of the fastener hole on the eddy current signal will be larger than the crack signal. If this condition occurs, refer to the instructions in Service Bulletin 737-54-1035.

6. Inspection Results

A. The location identified as the end of the crack is accurate within 0.125 inch (3 mm). Refer to Service Bulletin 737-54-1035 for the stop drill instructions.



Reference Standard NDT394
Figure 1 (Sheet 1 of 2)

NOTES:

- ALL DIMENSIONS ARE IN INCHES (MILLIMETERS ARE IN PARENTHESES).

- ASSEMBLY STEPS:
  (1) DRILL THE BOLT HOLES AND TEMPORARILY INSTALL BOLTS BACB30FN8K5.
  (2) MAKE A SCRIBE LINE ON THE BACK OF THE SECOND LAYER AT THE EDGE OF THE THIRD LAYER.
  (3) REMOVE THE BOLTS AND MACHINE THE EDM NOTCHES. USE THE SCRIBE LINE YOU MADE IN STEP 2 AND THE DIMENSIONS SPECIFIED IN THIS FIGURE TO HELP MAKE THE EDM NOTCHES.
  (4) MAKE A LINE ON THE OUTER PANEL SURFACE SO THAT THE LINE IS ALIGNED WITH THE END OF THE EDM NOTCHES.
  (5) PUT A 0.006 (0.2) LAYER OF NONCONDUCTIVE MATERIAL BETWEEN EACH LAYER.
  (6) INSTALL THE BOLTS.
  (7) DRILL HOLES FOR THE RIVETS AND INSTALL THE RIVETS.
  (8) PUT A 0.004 - 0.006 (0.1 - 0.15) THICK NONCONDUCTIVE MATERIAL ON THE UPPER SURFACE OF REFERENCE STANDARD NDT394 TO REPRESENT PAINT.

- TOLERANCE (UNLESS SPECIFIED DIFFERENTLY):

INCHES	MILLIMETERS
X.XXX = ±0.005	X.XX = ±0.1
X.XX = ±0.025	X.X = ±0.5
X.X = ±0.050	X = ±1

1> ETCH OR STEEL STAMP THE REFERENCE STANDARD NUMBER NDT394 IN THIS LOCATION

2> BACB30FN8K (3 LOCATIONS); BACB30FN8A5U CAN BE USED AS AN ALTERNATIVE TO BACB30FN8K.

3> BACR15CE3(X)3 (3 LOCATIONS); (X) CAN BE AD, B, D, KE

4> BACR15CE3(X)6 (2 LOCATIONS); (X) CAN BE AD, B, D, KE

5> BACC30M8

6> 2024-T3, -T4 CLAD

7> 2024-T3, -T4 BARE

8> EDM NOTCH (2 LOCATIONS), THE MAXIMUM WIDTH OF THE EDM NOTCH IS 0.025 (0.6)

9> PUT SCRIBE LINES ON THE OUTER PANEL SO THEY ARE ALIGNED WITH THE END OF THE EDM NOTCHES (2 LOCATIONS). THE LENGTH OF THE SCRIBE LINES MUST BE AT LEAST 1.0 INCH.

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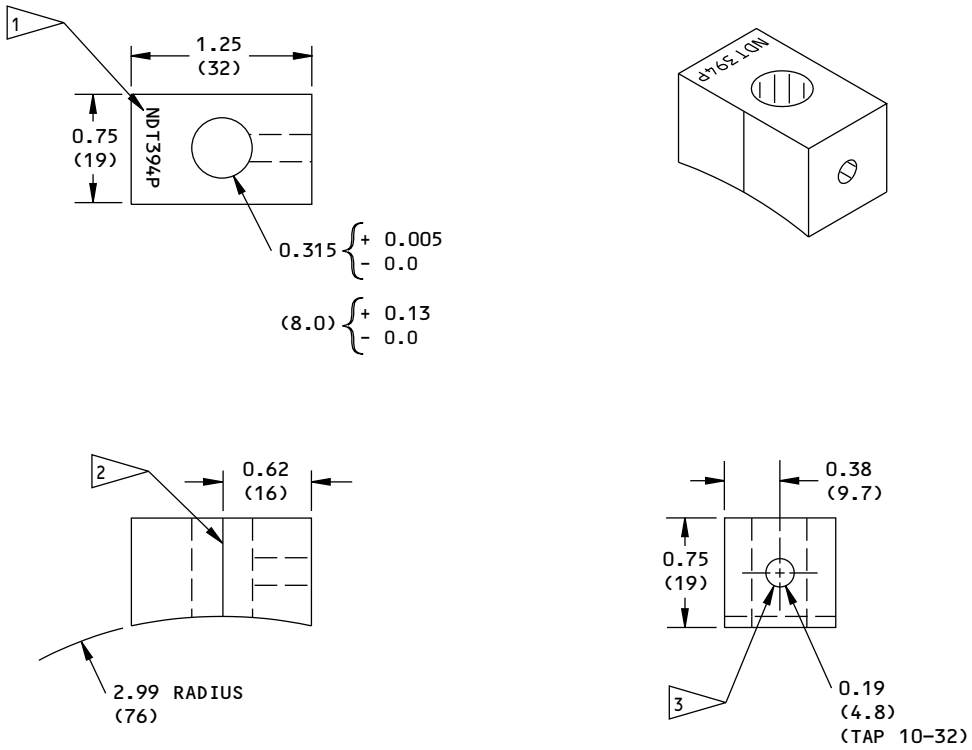
Reference Standard NDT394
Figure 1 (Sheet 2 of 2)



NOTES:

- ALL DIMENSIONS ARE IN INCHES (MILLIMETERS ARE IN PARENTHESES)
- MATERIAL: ACRYLIC
- TOLERANCE (UNLESS SPECIFIED DIFFERENTLY):

INCHES	MILLIMETERS
X.XXX = ±0.005	X.XX = ±0.1
X.XX = ±0.025	X.X = ±0.5
X.X = ±0.050	X = ±1

1 ETCH OR ENGRAVE NDT394P IN THIS LOCATION

2 MAKE A SCRIBE LINE IN THIS LOCATION ON BOTH SIDES OF THE POSITIONER

3 INSTALL A 10-32 RETAINING SCREW

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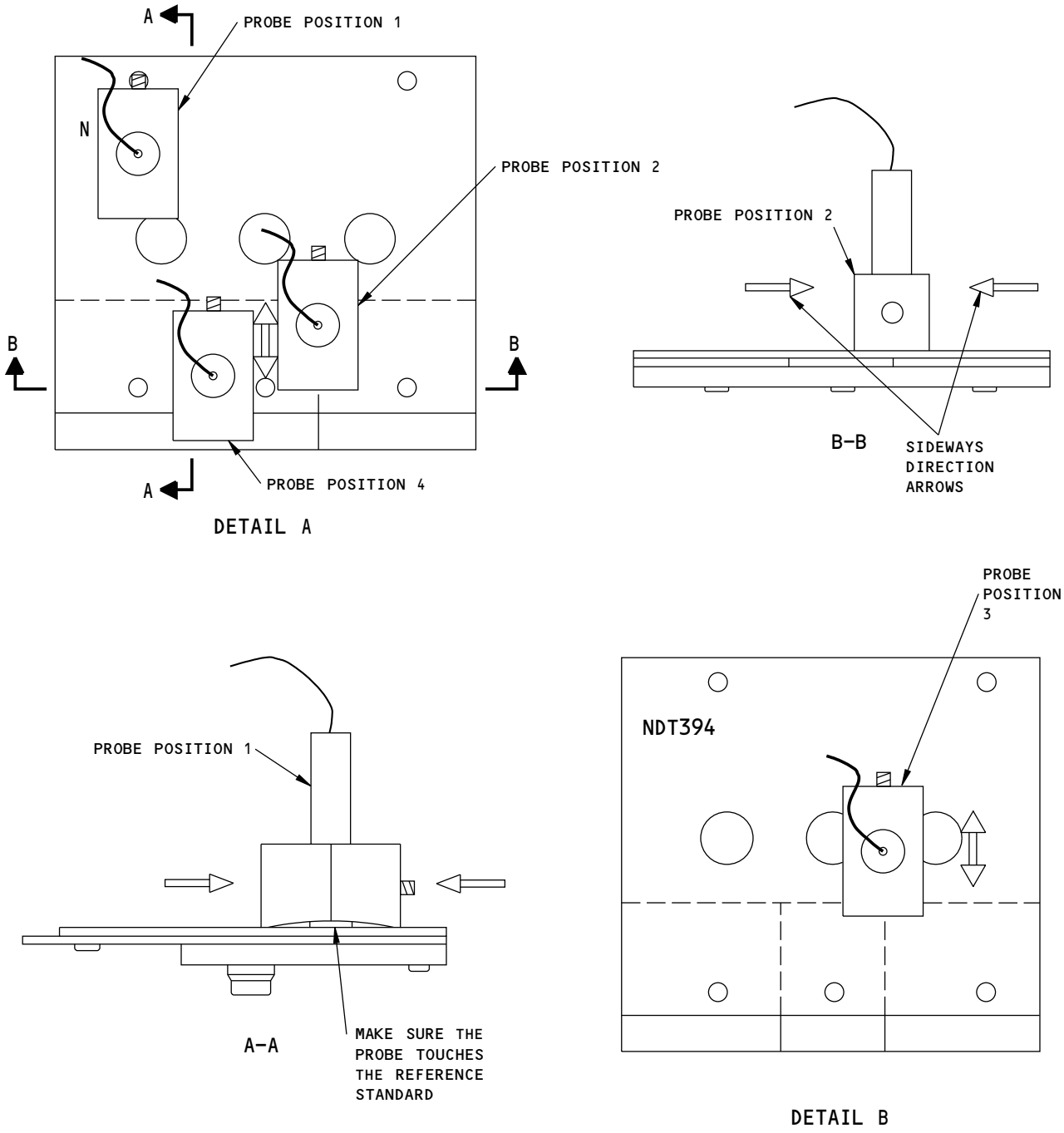
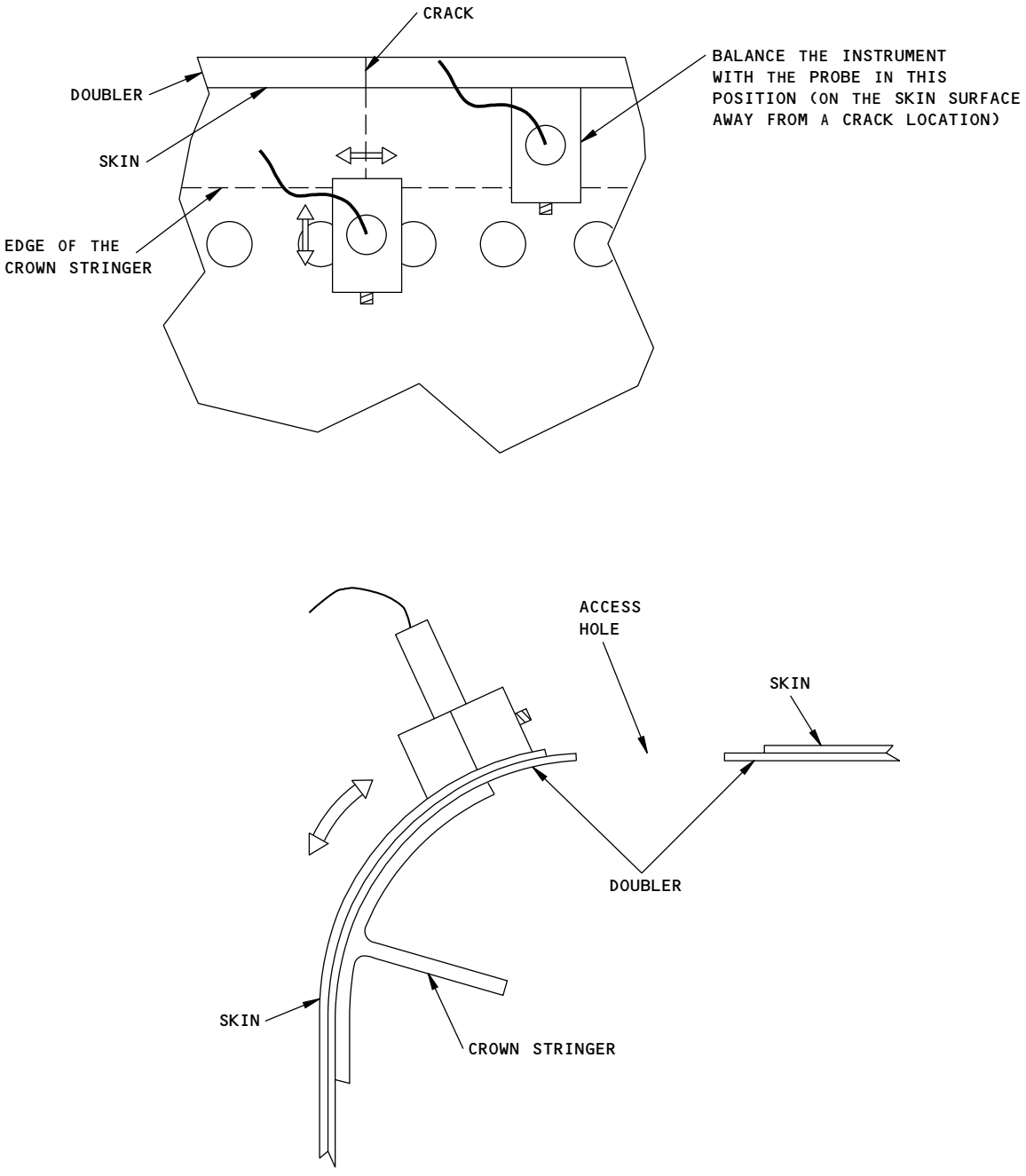
Reference Standard Positioner NDT394P
Figure 2



Calibration
Figure 3



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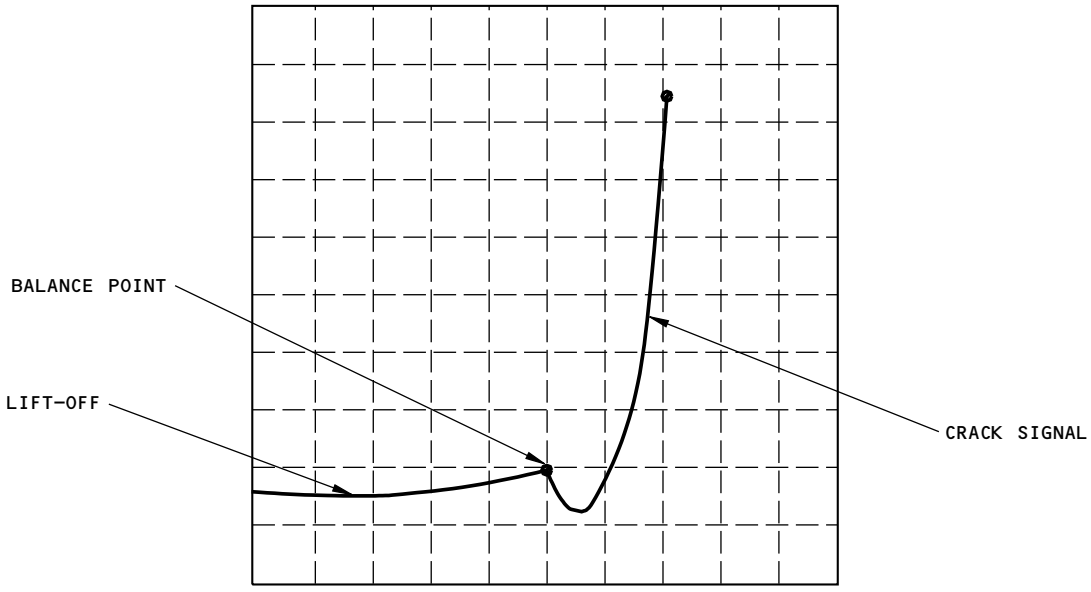
Inspection of the Skin Doubler
Figure 4



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Impedance Plane Screen Display
Figure 5