PART 4 - ULTRASONIC

FORWARD FLANGE OF THE OUTBOARD CHORD AT THE INTERSECTION OF STATION 727 AND STRINGER S-18A

1. Purpose

A. Use this ultrasonic inspection procedure to examine the forward flange of the outboard chord for cracks at the intersection of the Station 727 frame and Stringer S-18A. Cracks can occur in the outboard chord at the fastener holes or away from the fastener holes as shown in the inspection area identified in Figure 1. The type of cracks this procedure can find are those that travel in a forward and aft direction as shown in Figure 1.

B. The inspection is done while in the main landing gear wheel well and again on the outboard side of the wheel well.

C. Service Bulletin Reference: 737-53A1166

2. Equipment

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

A. Instruments

(1) All ultrasonic instruments are permitted for use if they:

(a) Can operate at a frequency between 4 MHz and 6 MHz.

(b) Can find the defect in the reference standard as specified in the calibration instructions of this procedure.

(2) The instruments specified below were used to help prepare this procedure:

(a) USN 50; Krautkramer Branson

(b) Epoch 2002; Panametrics

(c) USL 38; Krautkramer Branson

B. Ultrasonic Transducer

(1) The transducer must have a shear wave angle of 70 degrees in aluminum and operate at 5 MHz. The maximum length of the transducer is 0.75 inch (19 mm). The maximum width of the transducer is 0.33 inch (8.4 mm).

(2) The shear wave transducer specified below was used to help prepare this procedure:

(a) Part number 57A3066TC; 5 MHz, 70 degree in aluminum. Made by Staveley Sensors.

C. Reference Standards - Make reference standard NDT398 as specified in Figure 3.

D. Ultrasonic Couplant - Use oil, grease or an equivalent couplant that will not damage the part.

3. Prepare for the Inspection

A. Fully extend the wing flaps.

B. Get access to the forward flange of the outboard chord at the intersection of Station 727 and Stringer S-18A. See Figure 1 and Figure 2.

C. Disconnect the electrical connector from the aft fire extinguisher bottle that is in the wheel well on the left side of the airplane.

D. Remove the paint on the inboard side of the forward flange of the outboard chord at the intersection of Station 727 and Stringer S-18A, immediately above the edge of the shear beam flange. Also remove the paint on the outboard side of the forward flange of the outboard chord at the intersection of Station 727 and Stringer S-18A, immediately below the S-18A outboard chord. See the transducer scan areas shown in Figure 2. Make sure this is done on each side of the airplane.

4. Instrument Calibration

NOTE: Refer to the instrument instruction manual for the instrument operation instructions.

A. Set the instrument frequency between 4 and 6 MHz.

NOTE: No frequency adjustment is necessary for the USN 50 instrument.

B. Apply sufficient couplant on reference standard NDT398 at transducer positions 1, 2, 3, and 4. See Figure 4.

C. Put the initial pulse signal at 0 percent of full screen width.

D. Put the transducer at position 1 on reference standard NDT398 so it points directly at hole 1. Make sure the front edge of the transducer is at the edge of the reference line. See Figure 4.

E. Adjust the range and delay controls so that the signal from hole 1 shows at 60 percent of full screen width. Make sure that the initial pulse stays at 0 percent of full screen width.

F. Slowly move the transducer along the reference line to position 2 until the signal from the reference standard notch shows at approximately 65 percent of full screen width.

G. Adjust the gain so that the signal from the reference standard notch is between 30 and 70 percent of full screen height.

H. Adjust the position of the transducer at position 2 along the reference line so that the highest signal is shown from the reference standard notch.

I. Adjust the gain so that the notch signal is at 100 percent of full screen height.

J. Increase the gain by 12 dB.

K. Move and turn the probe along the reference line so the signals from the fastener hole and notch show on the screen. Identify the difference between these two signals.

L. Put the transducer at position 3 (see Figure 4) so that the sound points directly at hole 2. If necessary adjust the transducer on the reference line until the signal from the hole shows.

M. Move the transducer along the reference line to the near edge of the reference standard.

N. Turn the transducer in a counterclockwise direction until the sound beam makes a reflection signal (possibly two) from the edge of the reference standard to the hole. See the position 4 signals in Figure 4. Notice how this hole signal from the edge of the reference standard shows on the screen.

NOTE: This large turn of the transducer is done on the reference standard only to show how the signal could show on the outboard chord if the transducer is turned too much. Do not turn the transducer this much during the inspection when the transducer is along the forward edge of the outboard chord.

5. Inspection Procedure

A. Do the inspection on the inboard side of the forward flange of the outboard chord at the Station 727 frame as follows:

NOTE: This inspection cannot be done from the inboard side of the frame chord if a strap is installed on the inboard side of the chord. If a strap is installed on the inboard side of the chord, go to Paragraph 5.B. and do the inspection from the outboard side of the frame chord.

(1) Calibrate the equipment as specified in Paragraph 4.

(2) Apply sufficient couplant on the inboard side of the forward flange of the outboard chord at the Station 727 frame where the transducer will touch. This area is immediately above the edge of the web. See Figure 2.

(3) Put the transducer on the inboard side of the forward flange of the outboard chord at the Station 727 frame above the aft fastener that attaches the shear beam flange to the forward flange of the outboard chord at the STA 727 frame. Make sure the sound beam is pointed down to the aft fastener. See Figure 2.

(4) Slowly turn the transducer to get the highest signal from the aft hole.

(5) Move the transducer in a forward direction and at the same time turn the transducer 15 degrees clockwise and counterclockwise during the scan. Also, slowly move the transducer up and down 0.25 inch (6.3 mm) during the scan.

(6) Continue the scan until the signal from the forward fastener hole shows on the screen.

(7) Move the transducer to the forward edge of the outboard chord.

(8) Turn the transducer so the sound beam points at the forward fastener and the hole signal shows on the screen.

NOTE: The location of the reference standard hole signals on the horizontal baseline compared to the hole signals on the airplane could be different by a small quantity. This can occur because of larger holes in the outboard chord and/or differences in the distance between the edge of web and the hole.

B. Do the inspection on the outboard side of the forward flange of the outboard chord at the STA 727 frame as follows:

NOTE: This inspection cannot be done from the outboard side of the frame chord if a strap is installed on the outboard side of the frame chord. If a strap is installed on the outboard side of the frame chord, go to Paragraph 5.A. and do the inspection from the inboard side of the frame chord.

(1) Calibrate the equipment as specified in Paragraph 4.

(2) Apply sufficient couplant on the outboard side of the forward flange of the outboard chord at the STA 727 frame where the transducer will touch. This area is immediately below the lower edge of the Stringer S-18A outboard chord. See Figure 2.

(3) Put the transducer on the outboard side of the forward flange of the outboard chord at the STA 727 frame below the aft fastener that attaches the Stringer S-18A outboard chord to the outboard chord at the Station 727 frame. Make sure the sound beam is pointed up to the aft fastener. See Figure 2.

(4) Do Paragraph 5.A.(4) thru Paragraph 5.A.(8) but on the outboard side of the forward flange of the outboard chord at the STA 727 frame.

C. Make sure Paragraph 5.A. or Paragraph 5.B. are done on the left and right sides of the airplane.

D. Remove the couplant from the transducer scan areas.

E. Clean the transducer scan areas.

F. Apply primer and paint in the transducer scan areas.

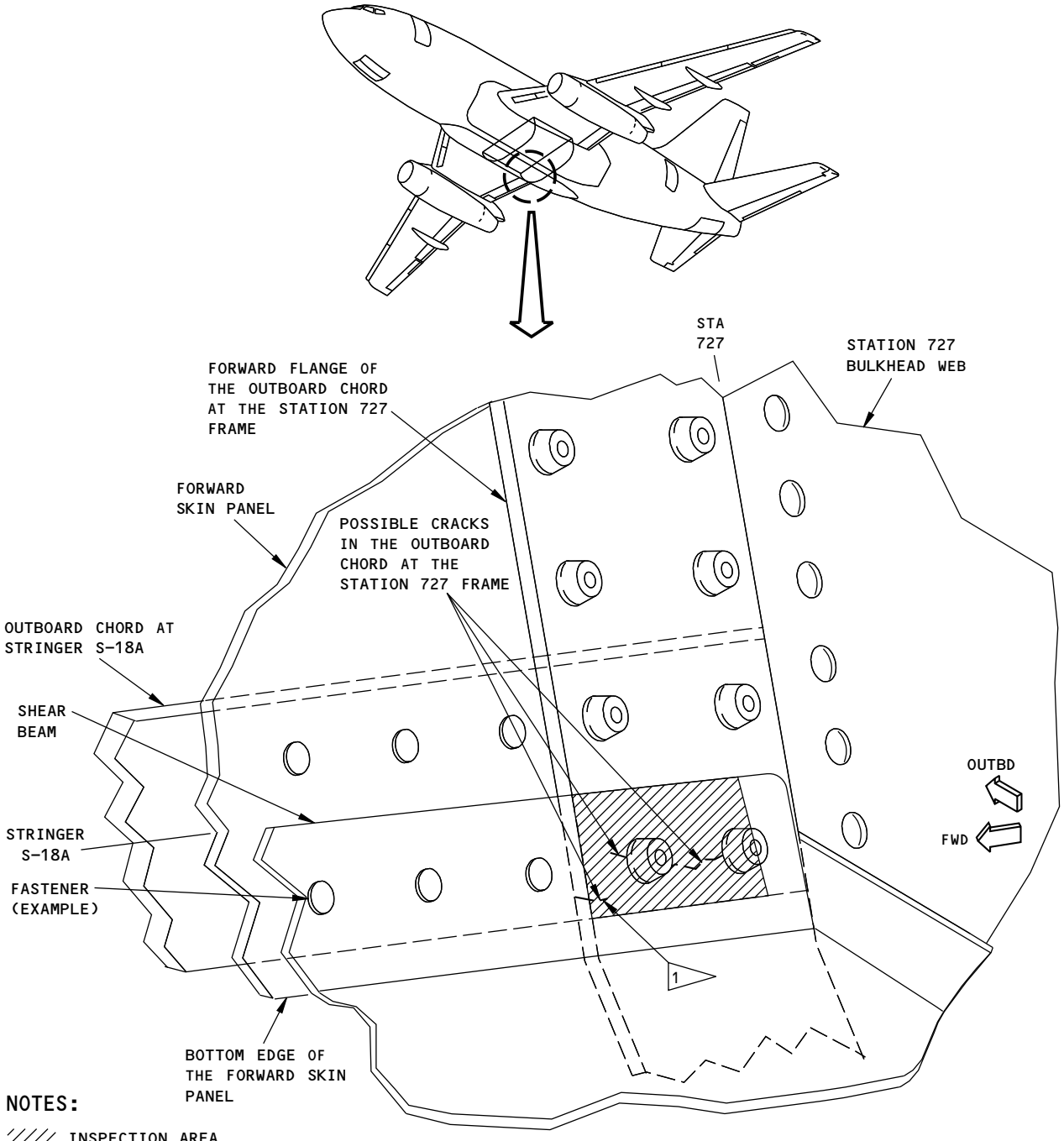
G. Apply corrosion inhibiting compound to areas where it was removed.

6. Inspection Results

A. Signals that are 50 percent of full screen height or higher and are between 30 and 95 percent of full screen width are crack indications. Make sure the fastener hole is not the cause of the signal.

B. If the crack indication comes out of a fastener hole, remove the fastener and do an open hole eddy current inspection as specified in Part 6, 51-00-00, Procedure 1 or Part 6, 51-00-00, Procedure 11.

C. If the crack indication is away from the fastener hole and is 50 percent of full screen height or less, monitor the indication with this procedure as specified in Service Bulletin 737-53A1166. See if the signal height becomes higher or the signal length becomes longer after the specified flight cycles shown in the Service Bulletin. If the signal becomes higher or longer, get access to the outboard chord to examine it more or replace the outboard chord.



NOTES:

//// INSPECTION AREA

- THE OUTBOARD CHORD AT THE STATION 727 FRAME ON THE RIGHT SIDE OF THE AIRPLANE IS SHOWN AS YOU LOOK FROM A POSITION IN THE WHEEL WELL. THE OUTBOARD CHORD CONFIGURATION ON THE LEFT SIDE OF THE AIRPLANE IS EQUIVALENT

1 IT IS POSSIBLE FOR CRACKS TO BE AWAY FROM THE FASTENER HOLES AS SHOWN.

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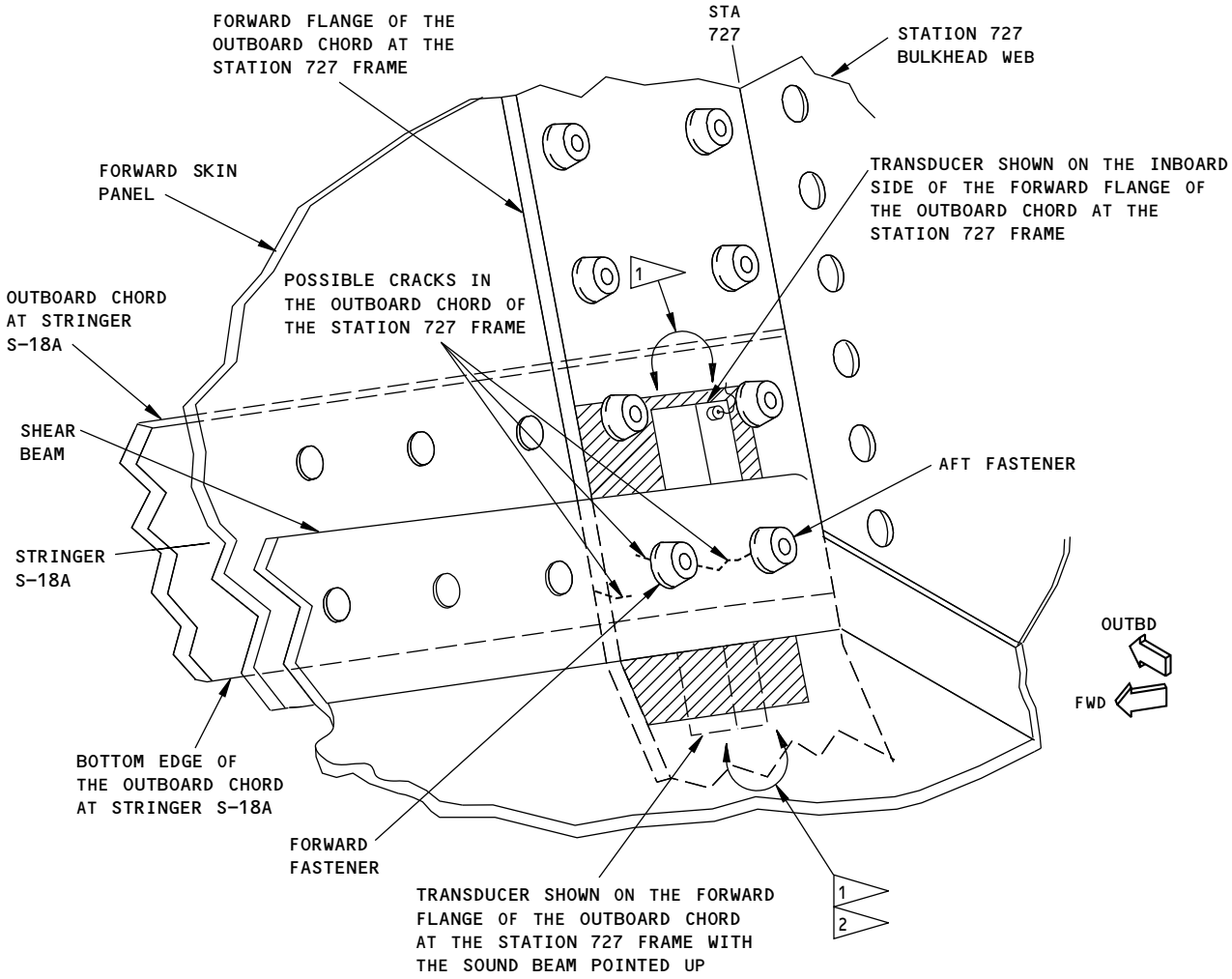
Inspection Area of the Outboard Chord at the Intersection of Stringer 18A and the Station 727 Frame
Figure 1



NOTES:

TRANSDUCER SCAN AREA

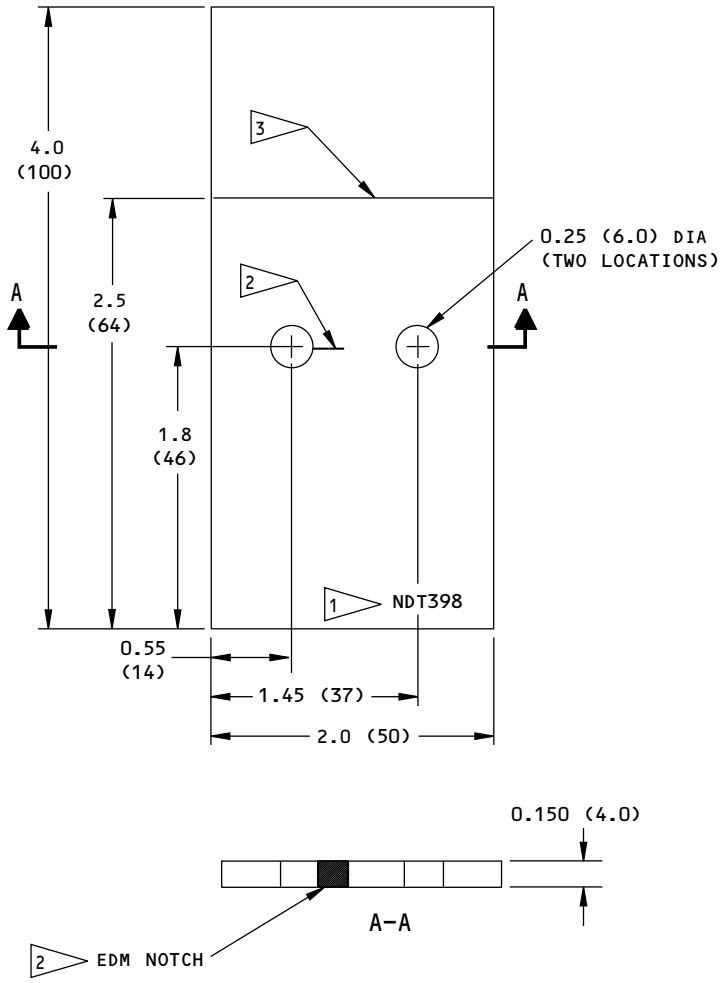
- THE OUTBOARD CHORD OF THE STATION 727 FRAME ON THE RIGHT SIDE OF THE AIRPLANE IS SHOWN AS YOU LOOK FROM A POSITION IN THE WHEEL WELL. THE OUTBOARD CHORD CONFIGURATION ON THE LEFT SIDE OF THE AIRPLANE IS EQUIVALENT.

1 TURN THE TRANSDUCER 15 DEGREES CLOCKWISE AND COUNTERCLOCKWISE DURING THE SCAN. ALSO MOVE THE TRANSDUCER UP AND DOWN 0.25 INCH (6.3 MM) DURING THE SCAN

2 IF THE TRANSDUCER IS TURNED TOO MUCH TO THE FORWARD EDGE OF THE OUTBOARD CHORD AT THE STATION 727 FRAME, THE SOUND BEAM CAN MAKE A REFLECTION FROM THE EDGE OF THE OUTBOARD CHORD TO THE FASTENER HOLE.

2157830 S0000471256_V1

Inspection Locations on the Forward Flange of the Outboard Chord at the Station 727 Frame
Figure 2



NOTES:

- ALL DIMENSIONS ARE IN INCHES (MILLIMETERS ARE IN PARENTHESES)
- TOLERANCES (UNLESS SPECIFIED DIFFERENTLY):

INCHES	MILLIMETERS
X.XXX = ±0.005	X.XX = ±0.10
X.XX = ±0.025	X.X = ±0.5
X.X = ±0.050	X = ±1

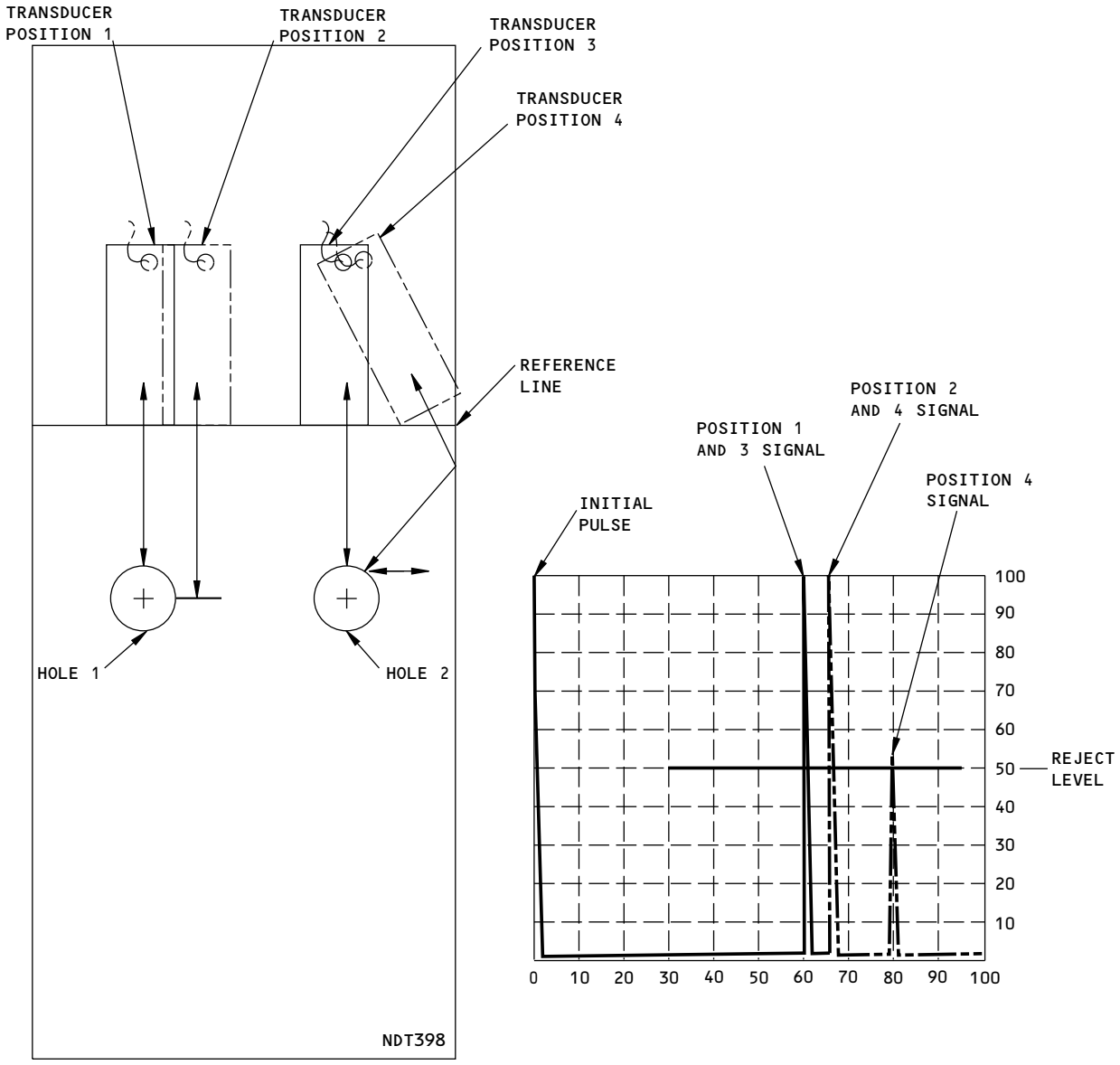
- SURFACE ROUGHNESS = 125 R_a OR BETTER
- MATERIAL: 7075-T6 OR 7075-T73 ALUMINUM (CLAD OR BARE)

1. ETCH OR STEEL STAMP THE REFERENCE STANDARD NUMBER "NDT398".
2. EDM NOTCH: LENGTH: 0.200 (5.10) ±10%
   DEPTH: 0.150 (3.80);
   THROUGH THE REFERENCE STANDARD
   WIDTH: 0.025 (0.630) MAXIMUM

   THE NOTCH MUST BE WITHIN ±0.005 (±0.10) OF THE CENTER OF THE HOLE AS SHOWN.
3. MAKE A SCRATCH REFERENCE LINE FROM EDGE TO EDGE. THE MAXIMUM SCRATCH DEPTH IS 0.005 INCH (0.120)

2157831 S0000471257_V1

Reference Standard NDT398
Figure 3



NOTES:

- THE DOUBLE ARROWS SHOWN ABOVE ON THE REFERENCE STANDARD SHOW THE DIRECTION OF SOUND TRAVEL.
- THE SIGNAL AT 60 PERCENT OF FULL SCREEN WIDTH IS FROM POSITION 1 TO HOLE 1 AND FROM POSITION 3 TO HOLE 2.
- THE SIGNAL AT 65 OF FULL SCREEN WIDTH IS FROM POSITON 2 TO THE NOTCH. ALSO IT IS ONE OF THE SIGNALS FROM POSITION 4 FROM THE EDGE TO HOLE 2.
- THE SIGNAL AT 80 PERCENT OF FULL SCREEN WIDTH IS THE SECOND SIGNAL FROM POSITION 4. THE SOUND AT POSITION 4 TRAVELS FROM POSITION 4, TO THE EDGE, TO HOLE 2 AND BACK TO THE EDGE. THE HEIGHT OF THIS SIGNAL AT 80 PERCENT OF FULL SCREEN WIDTH CAN BE DIFFERENT. THE LARGE TURN OF THE TRANSDUCER AT POSITION 4 IS DONE ONLY DURING CALIBRATION TO SHOW HOW A FALSE CRACK INDICATION COULD SHOW ON THE SCREEN IF THE LARGE TURN IS DONE DURING THE INSPECTION. DO NOT TURN THE TRANSDUCER THIS MUCH WHEN THE SCAN IS DONE AT THE FORWARD EDGE OF THE FRAME CHORD DURING THE INSPECTION.

2157962 S0000471258_V1

Calibration Signals and Transducer Positions
Figure 4

PART 4 - ULTRASONIC

BS 178 PRESSURE WEB INSPECTION

1. Purpose

A. Use this procedure to examine areas of the pressure web that are behind the straps and stiffeners at body station 178.

B. See Figure 1 for the location of the inspection areas.

C. This procedure uses an ultrasonic instrument set for pulse echo.

D. This procedure was made to find cracks that are 0.2 inches (5 mm) or more in length.

E. Service Bulletin Reference: 737-53-1173

2. Equipment

A. General

(1) Use inspection equipment that can be calibrated on the reference standard as specified in Paragraph 4.

(2) Refer to Part 1, 51-04-00 for more data about ultrasonic inspections.

B. Instrument

(1) Use an ultrasonic instrument that:

(a) Can do a pulse echo inspection.

(b) Operates at a frequency of 8 to 12 MHz.

(2) The instruments specified below were used to prepare this procedure:

(a) USN 50; Krautkramer Branson

(b) Sonic 136; Staveley Instruments

(c) Epoch 2002; Panametrics

C. Transducers

(1) Use a transducer that:

(a) Operates at a frequency between 8 and 12 MHz.

(b) Has a refracted angle of 70 degrees in aluminum.

(c) Has a maximum element diameter of 0.25 inch (6.4 mm).

(2) The transducer specified below was used to prepare this procedure.

(a) Part number 57A3087; Staveley Sensors, 10 MHz, (70 degrees in aluminum).

D. Reference Standards

(1) Use reference standard NDT3001. See Figure 2 for data about the reference standard.

E. Couplant

(1) Use an ultrasonic couplant that will not cause corrosion or other damage to the airplane.

NOTE: It is recommended that a thick couplant that is not water based be used during the inspection. A thin water based couplant can get below the strip and cause indications to occur from the couplant. A waterproof grease gives satisfactory results.

3. Preparation for the Inspection

A. Open the radome to show the forward pressure web at body station 178.

B. If there is enamel paint on the forward side of the pressure web, remove the enamel paint from the transducer scan areas.

NOTE: The transducer scan area is the area on the pressure web that the transducer will touch during the inspection of the pressure web. Figure 4 thru Figure 10 identify the transducer scan areas on the web for different groups of airplanes. Refer to Service Bulletin 737-53-1173 to identify the airplanes in each group so you can refer to the figure that is applicable for your airplane.

NOTE: If enamel paint, dirt, sealant or adhesive is in the transducer scan area, sufficient sound will not go into the pressure web.

NOTE: Refer to Service Bulletin 737-53-1173 for data on removal of adhesive from the web.

C. If there is primer on the forward side of the pressure web, remove the primer only if it is soft or loose. Primer that is in good condition can stay on the pressure web. Also remove dirt, adhesive and sealant from the transducer scan areas.

4. Instrument Calibration

A. Supply power to the instrument.

B. Set the frequency between 8 and 12 MHz.

C. Put couplant on reference standard NDT3001 at positions 1 and 2 as shown in Figure 3.

D. Put the transducer at position 1 on the reference standard as shown in Figure 3. Make sure the front of the transducer is at the edge of the reference standard.

E. Adjust the delay to put the left side of the initial pulse at zero percent on the horizontal display. See Figure 3.

F. Adjust the range or sweep to put the edge signal from the reference standard at 30 percent of the horizontal display. See Figure 3, position 1.

G. Adjust the gain so that the signal from transducer position 1 is between 50 percent and 90 percent full screen height.

H. Slowly turn the transducer a short distance left and right to get the highest possible signal from the edge.

I. Adjust the gain so that the signal from the edge is at 100 percent full screen height.

J. Increase the gain by 18 dB. This 18 dB increase is necessary to make allowance for the paint on the forward and aft side of the web. Noise that showed on the baseline from the reference standard will decrease when the transducer is put on the web.

K. Put the transducer at transducer position 2 on the reference standard. This position is where the front of the transducer is at the reference line which is 1.1 inches (28 mm) from the edge of the reference standard. See Figure 3.

L. Make sure that there is no couplant between the front edge of the transducer and the edge of the reference standard.

M. Adjust the range, or sweep, to put the signal from the edge at 70 percent of the horizontal display. See Figure 3.

N. If necessary, adjust the range and delay controls until the signals from positions 1 and 2 are as specified below and as shown in Figure 3.

(1) Make sure that the signal from the edge at position 1 is at 30 percent of the horizontal display.

(2) Make sure that the signal from the edge at position 2 is at 70 percent of the horizontal display.

NOTE: It can be necessary to make different adjustments to the equipment when you use different transducers or shoes to get the edge signals at 30 and 70 percent of the horizontal display. The different adjustments can result in small changes in the location of the initial pulse along the horizontal display.

5. Inspection Procedure

A. Put couplant on the transducer scan area. Try not to get the couplant between the web and the stiffeners or between the web and the straps.

NOTE: The transducer scan area is the area the transducer will touch the pressure web at BS 178. Figure 4 thru Figure 13 show the transducer scan areas for different airplane groups. Service Bulletin 737-53-1173 identifies the airplanes in each group. Make sure you refer to the applicable figure for your airplane to identify the transducer scan area.

NOTE: Most of the fastener holes will cause small signals to occur that are between 5 and 40 percent of full screen height. Some fastener holes will not give a signal at all. When the equipment is calibrated with the added 18 dB, do not add more gain to try to increase the fastener hole signals. Cracks can be found in an area where the hole signals are small.

B. Put the transducer on the pressure web on the transducer scan areas shown in Figure 4 thru Figure 13.

C. Move the transducer slowly along the surface of the pressure web and monitor the instrument display at the same time. During the scan:

(1) Make sure the front of the transducer is against the edge of the stiffeners or straps.

(2) Slowly turn the transducer a short distance (approximately 30 degrees) left and right to find possible cracks that are not parallel to the edge of the stiffeners or straps. See Figure 1 (sheet 2).

(3) Make a mark at the locations that cause signals that are higher than 50 percent full screen height and between 28 and 90 percent of the horizontal display.

(4) Frequently do a check of the instrument calibration as follows:

(a) Decrease the gain 18 dB.

(b) Put the probe on the reference standard at position 1 (see Figure 3) to get a signal from the edge of the reference standard.

(c) Compare the signal you got from the edge of the reference standard during calibration with the signal you get now.

(d) If the signal has decreased 10 percent or more, do the calibration and inspection again.

(e) If the signal has not decreased more than 10 percent, increase the gain 18 dB and continue to do the inspection.

6. Inspection Results

A. Signals that are 50 percent of full screen height or higher and are between 28 percent and 90 percent of the horizontal baseline are possible crack indications.

B. Compare the signals that occur during the inspection to the signal you got from the edge of the reference standard during calibration.

C. Make sure the ultrasonic indication is not a result of other causes. Some possible causes of incorrect crack indications and how to correct them are as follows:

(1) Too much couplant between the straps or stiffeners and the web. Correction procedure:

(a) Use air pressure to remove couplant from between the straps or stiffeners and the web.

(b) Do the ultrasonic inspection again in the indication area.

(2) Surface contamination such as sealant or adhesive. Correction procedure:

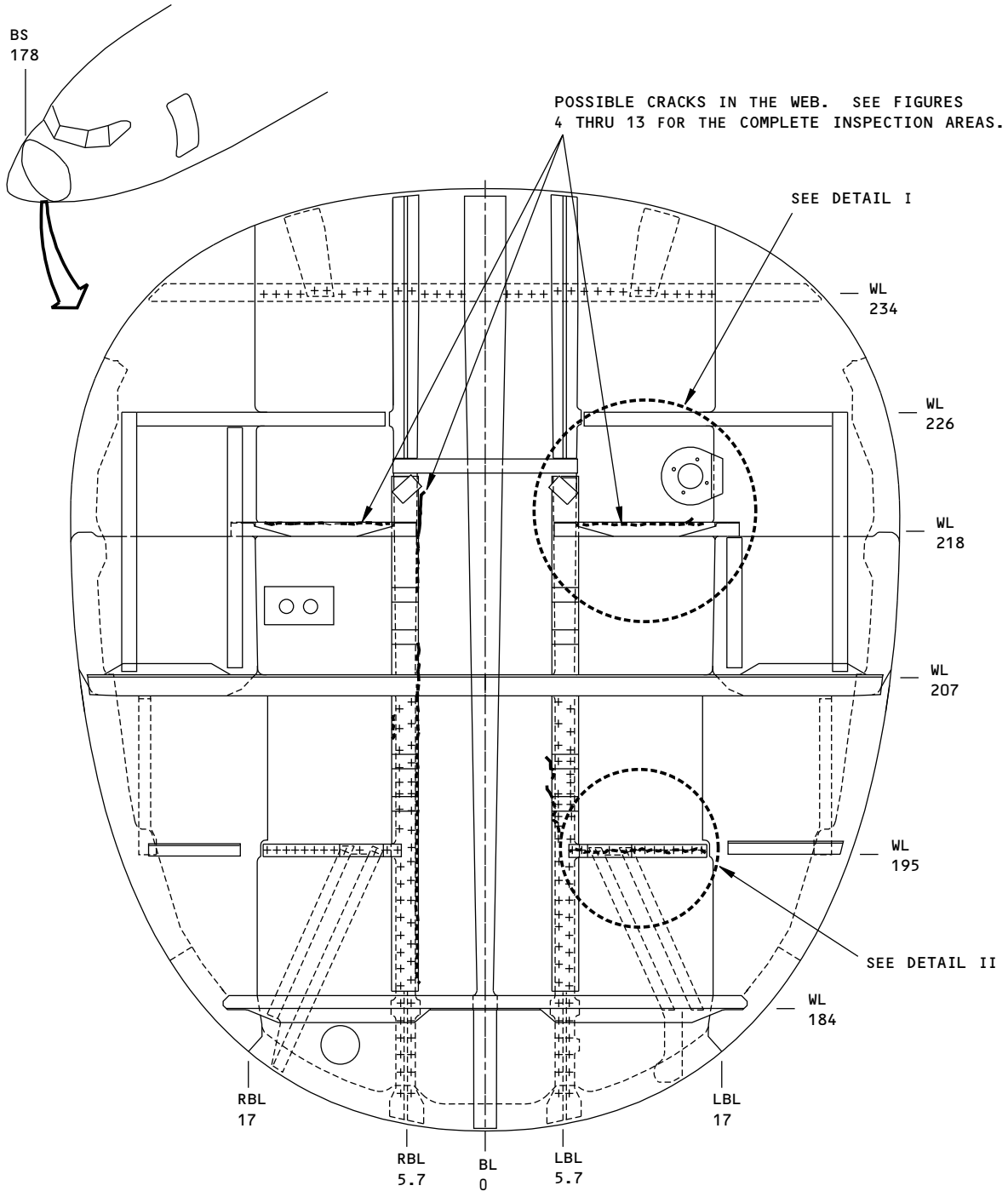
(a) Remove surface contamination to make sure this is not a cause.

(b) Do the ultrasonic inspection again in the indication area.

(3) A reflection from a fastener hole. Correction procedure:

(a) See if the crack indications occur because the transducer is pointed at a fastener hole.

NOTE: It is possible for small cracks to occur in front of the fastener holes. Monitor the signals to see if they decrease like hole signals do when the transducer is moved laterally away from the center of the hole.



NOTE:

- THE FORWARD SIDE OF THE BULKHEAD IS SHOWN

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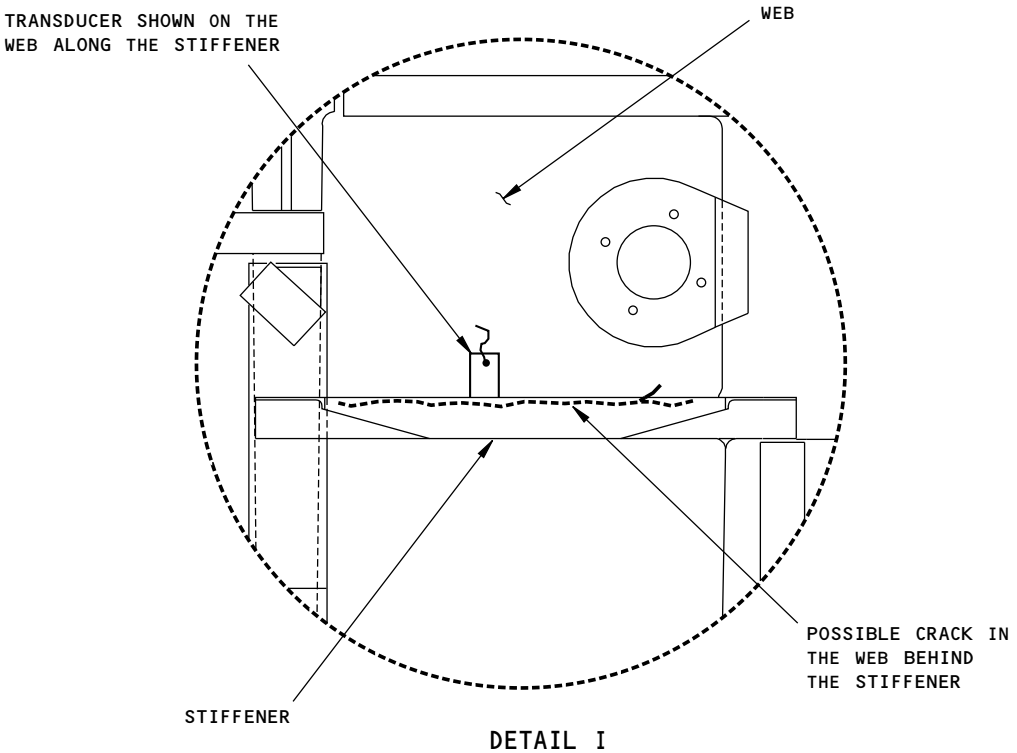
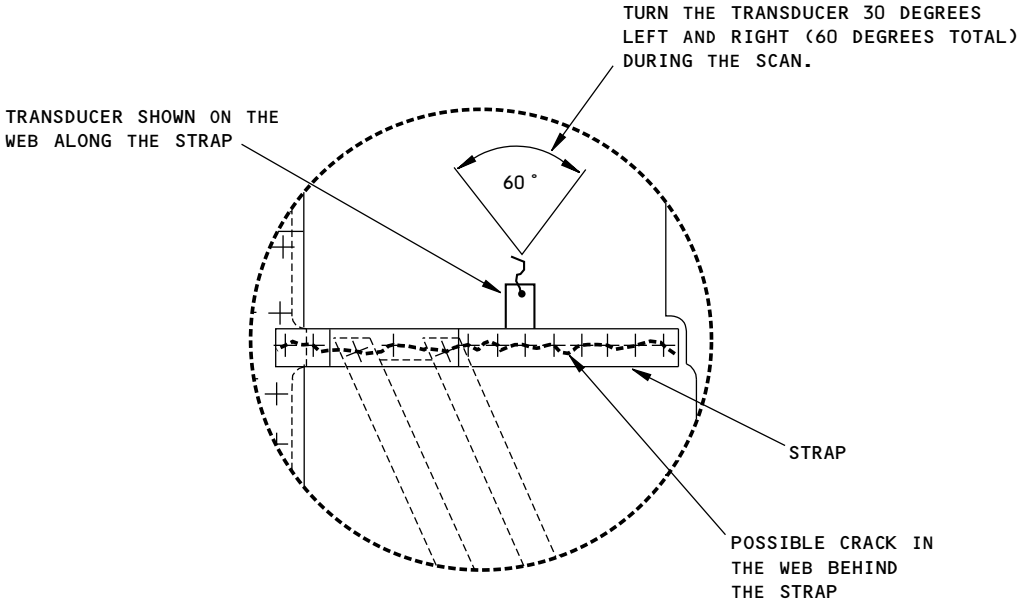
Bulkhead Inspection Areas at Body Station 178
Figure 1 (Sheet 1 of 2)



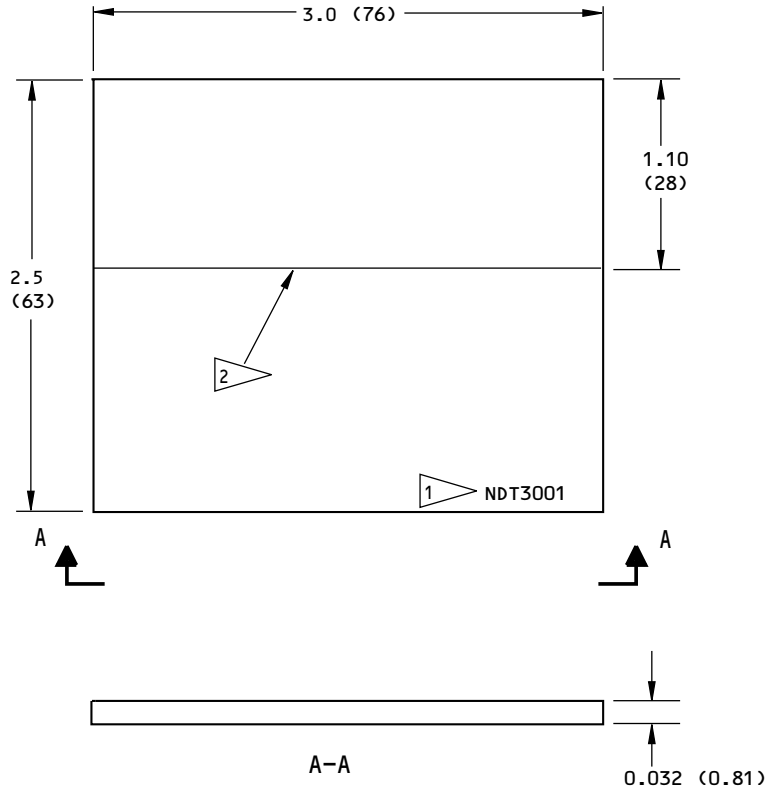
DETAIL I



DETAIL II

2157834 S0000471261_V1

Bulkhead Inspection Areas at Body Station 178
Figure 1 (Sheet 2 of 2)



NOTES:

ALL DIMENSIONS ARE IN INCHES
(MILLIMETERS ARE IN PARENTHESES)

TOLERANCES (UNLESS SPECIFIED DIFFERENTLY):

INCHES	MILLIMETERS
X.XXX = ±0.005	X.XX = ±0.10
X.XX = ±0.025	X.X = ±0.5
X.X = ±0.050	X = ±1

SURFACE ROUGHNESS = 125 Ra OR BETTER

MATERIAL:

2024-T3 OR 7075-T6 ALUMINUM (CLAD OR BARE)

1 ETCH OR STEEL STAMP THE REFERENCE STANDARD NUMBER

2 MAKE A REFERENCE LINE FROM EDGE TO EDGE. THE MAXIMUM SCRATCH DEPTH IS 0.005 INCH (0.120)

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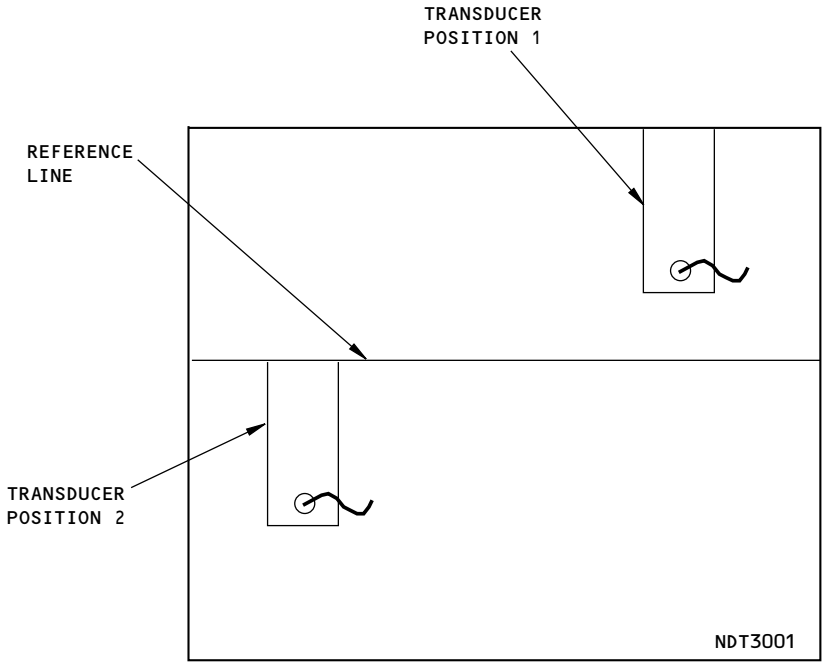
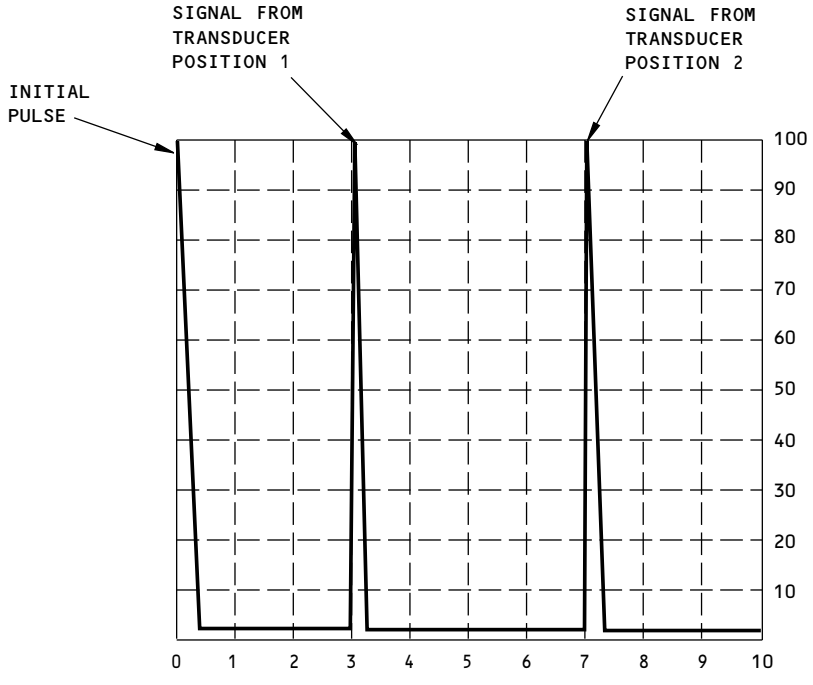
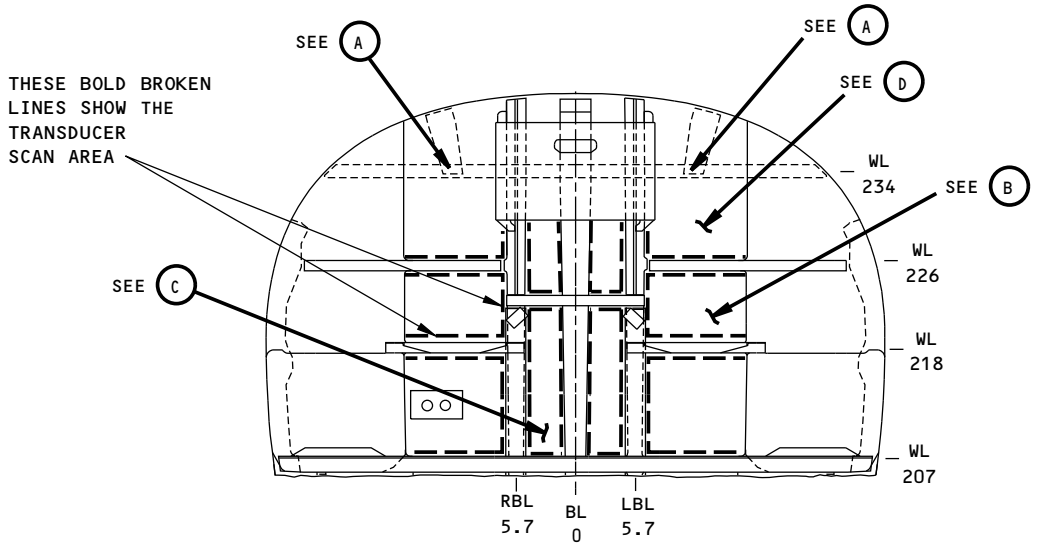
Reference Standard NDT3001
Figure 2



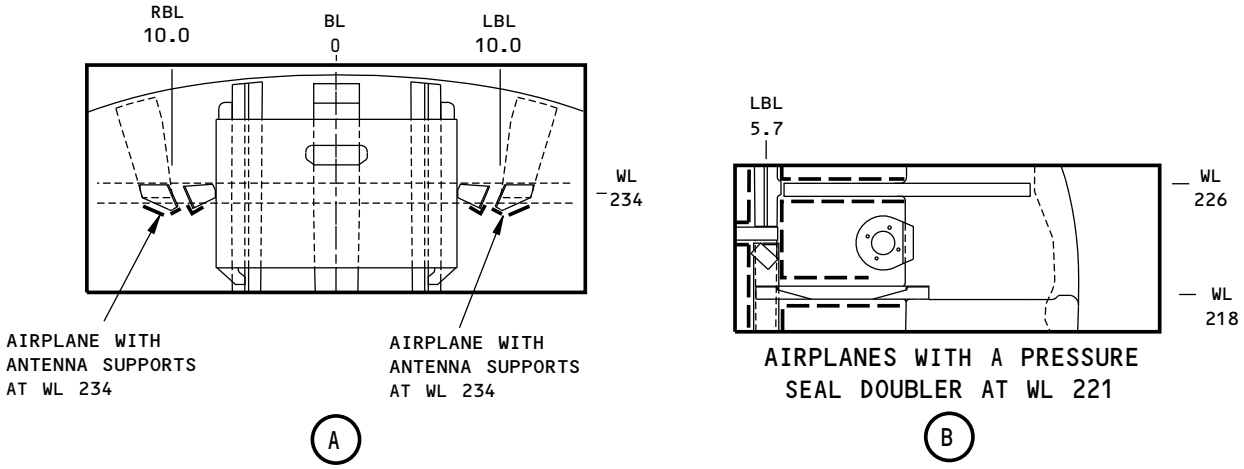


2157840 S0000471263_V1

Calibration Signals and Transducer Positions
Figure 3



GROUPS 1,8,9,11 THRU 14,17,19,21 THRU 31,35,36,37,42 AND 44 - FORWARD SIDE SHOWN



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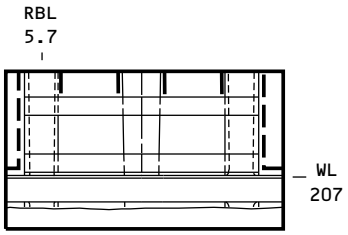
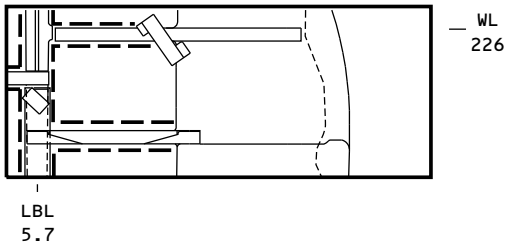
BS 178 Pressure Web Inspection Area - Groups 1, 8, 9, 11 thru 14, 17, 19, 21 thru 31, 35, 36, 37, 42 and 44
Figure 4 (Sheet 1 of 2)



AIRPLANES WITH AN ANTENNA
SUPPORT AT WL 209

C



AIRPLANES WITH A RADOME
ROD SUPPORT AT WL 226

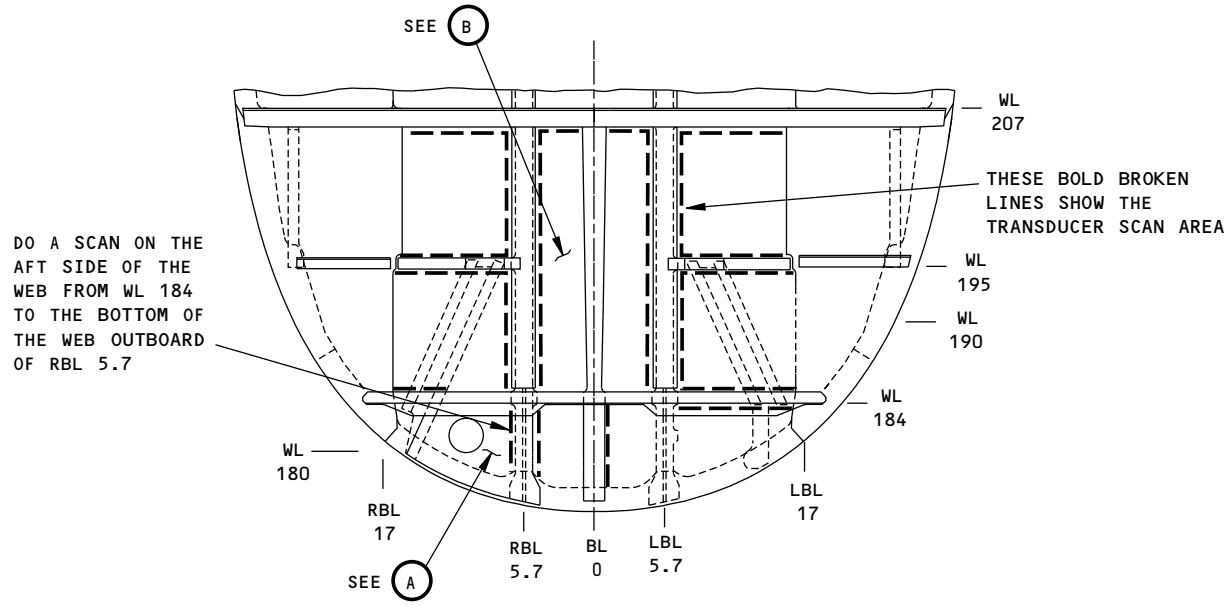
D

NOTES

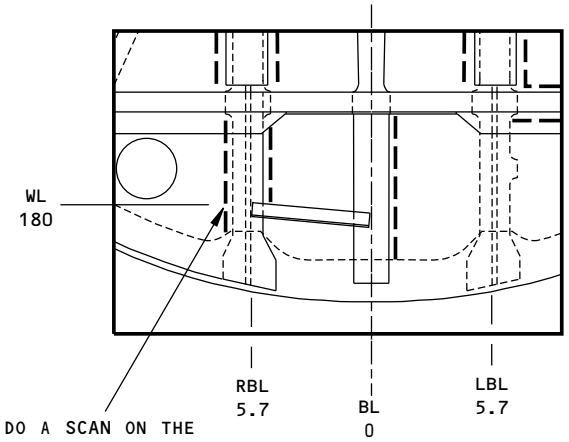
- DO A SCAN WITH THE TRANSDUCER ON THE WEB ALONG THE STIFFENERS AND STRAPS. THE SCAN AREA IS WHERE THE BOLD BROKEN LINES ARE SHOWN.
- REFER TO SERVICE BULLETIN 737-53-1173 TO IDENTIFY THE AIRPLANES IN THE GROUP(S) SPECIFIED IN THE TITLE OF THIS FIGURE.

2157845 S0000471265_V1

BS 178 Pressure Web Inspection Area - Groups 1, 8, 9, 11 thru 14, 17, 19, 21 thru 31, 35, 36, 37, 42 and 44
Figure 4 (Sheet 2 of 2)

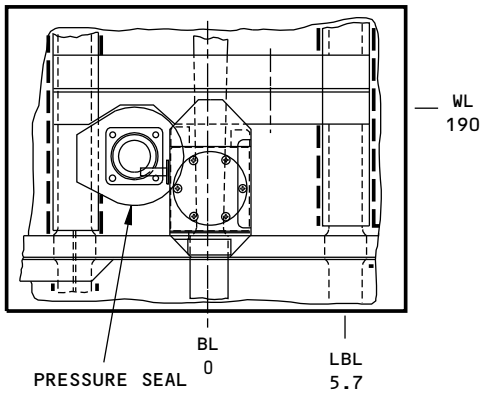


GROUPS 1,8,9,11 THRU 15,17,19,37,42 - FORWARD SIDE SHOWN



AIRPLANES WITH A SUPPORT AT WL 180

A



AIRPLANES WITH AN ANTENNA SUPPORT AT WL 190

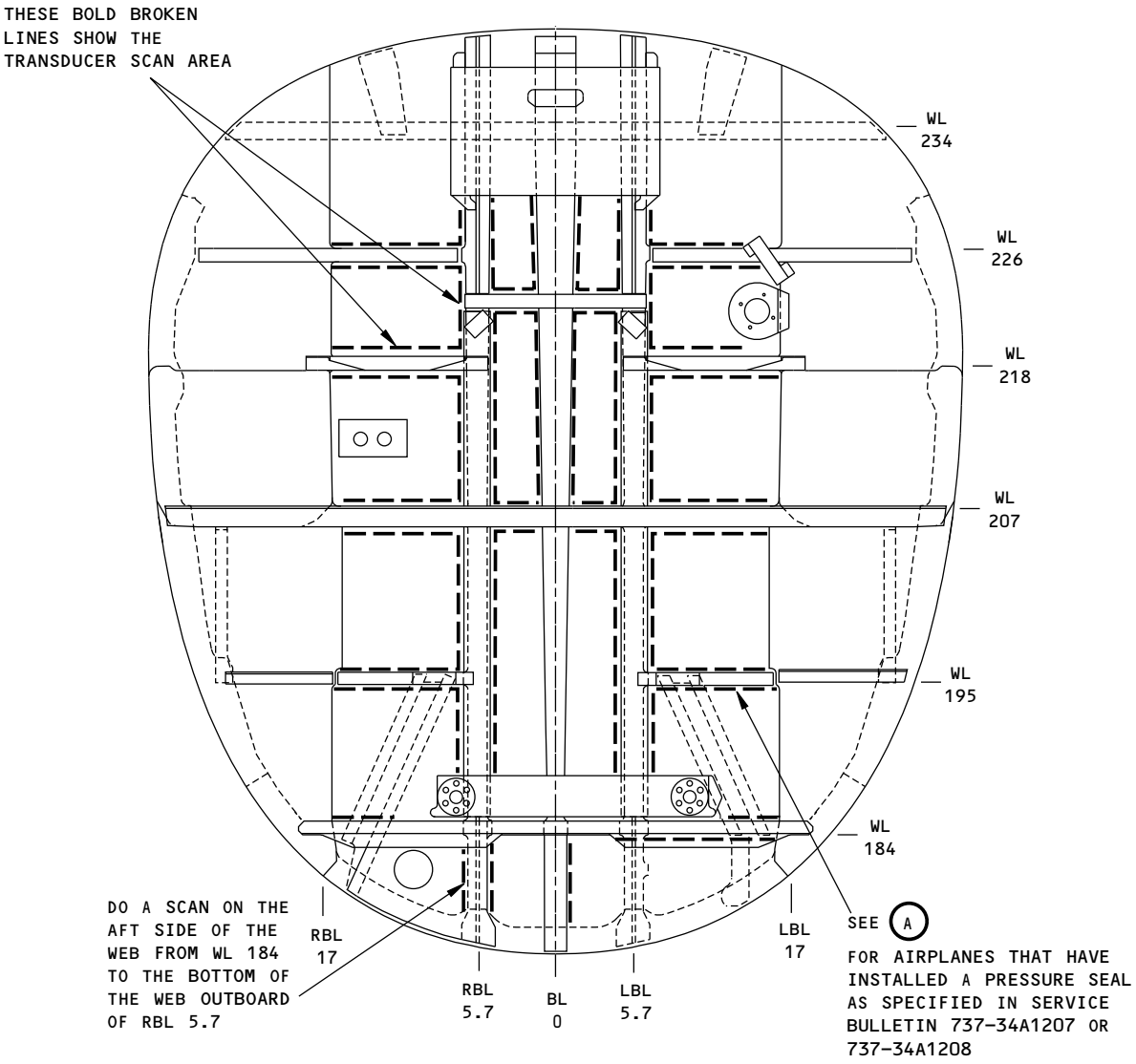
B

NOTES

- DO A SCAN WITH THE TRANSDUCER ON THE WEB ALONG THE STIFFENERS AND STRAPS. THE SCAN AREA IS WHERE THE BOLD BROKEN LINES ARE SHOWN.
- REFER TO SERVICE BULLETIN 737-53-1173 TO IDENTIFY THE AIRPLANES IN THE GROUP(S) SPECIFIED IN THE TITLE OF THIS FIGURE.
- FOR GROUPS 11 THRU 15,17,19,42 SEE FIGURE 12 FOR AN ALTERNATIVE INSPECTION CONFIGURATION.

2157847 S0000471266_V2

BS 178 Pressure Web Inspection Area - Groups 1, 8, 9, 11 thru 15, 17, 19, 37 and 42
Figure 5



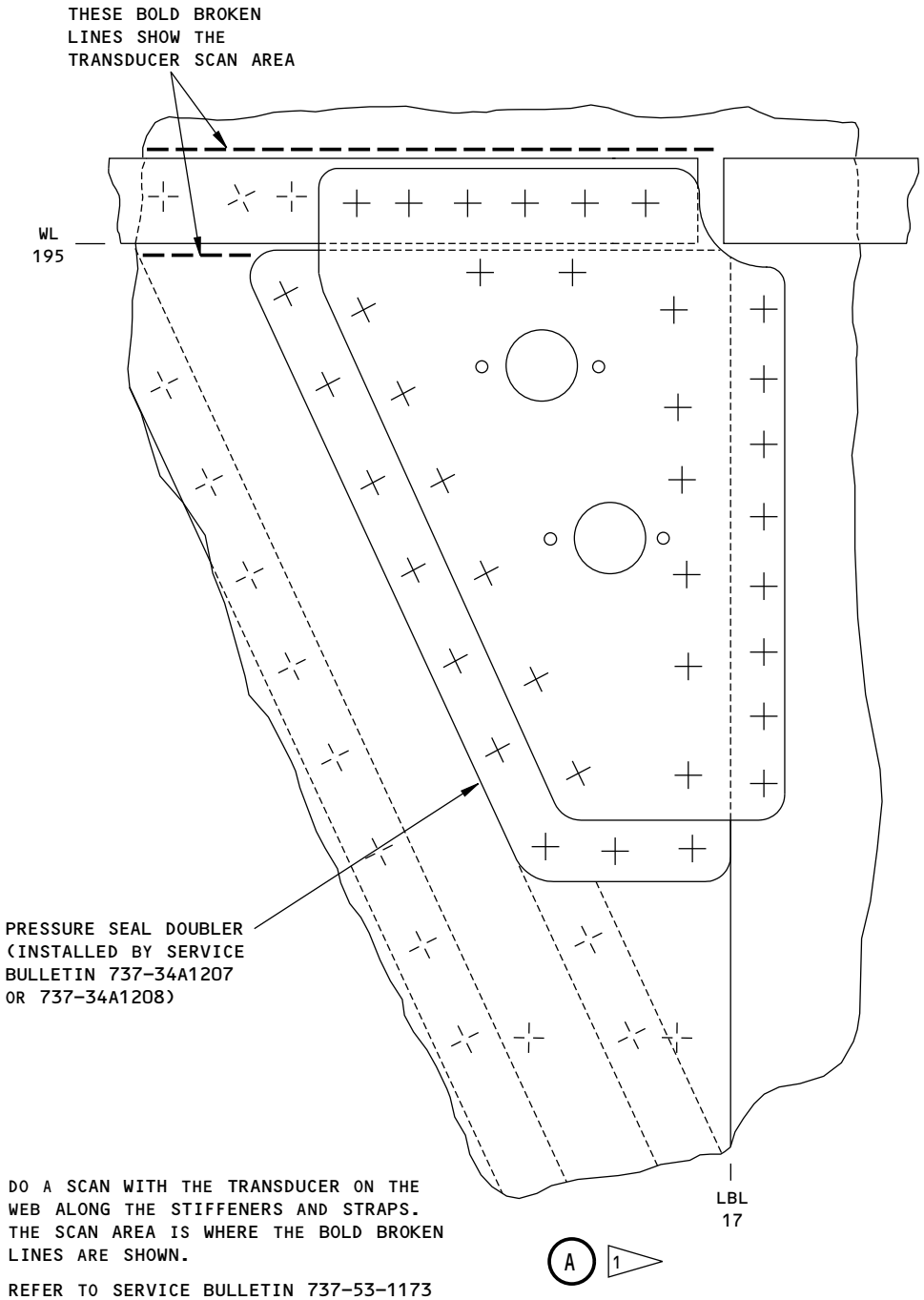
GROUPS 2 AND 38 - FORWARD SIDE SHOWN

NOTES

- DO A SCAN WITH THE TRANSDUCER ON THE WEB ALONG THE STIFFENERS AND STRAPS. THE SCAN AREA IS WHERE THE BOLD BROKEN LINES ARE SHOWN.
- REFER TO SERVICE BULLETIN 737-53-1173 TO IDENTIFY THE AIRPLANES IN THE GROUP(S) SPECIFIED IN THE TITLE OF THIS FIGURE.

2157850 S0000471267_V1

BS 178 Pressure Web Inspection Area - Groups 2 and 38
Figure 6 (Sheet 1 of 2)



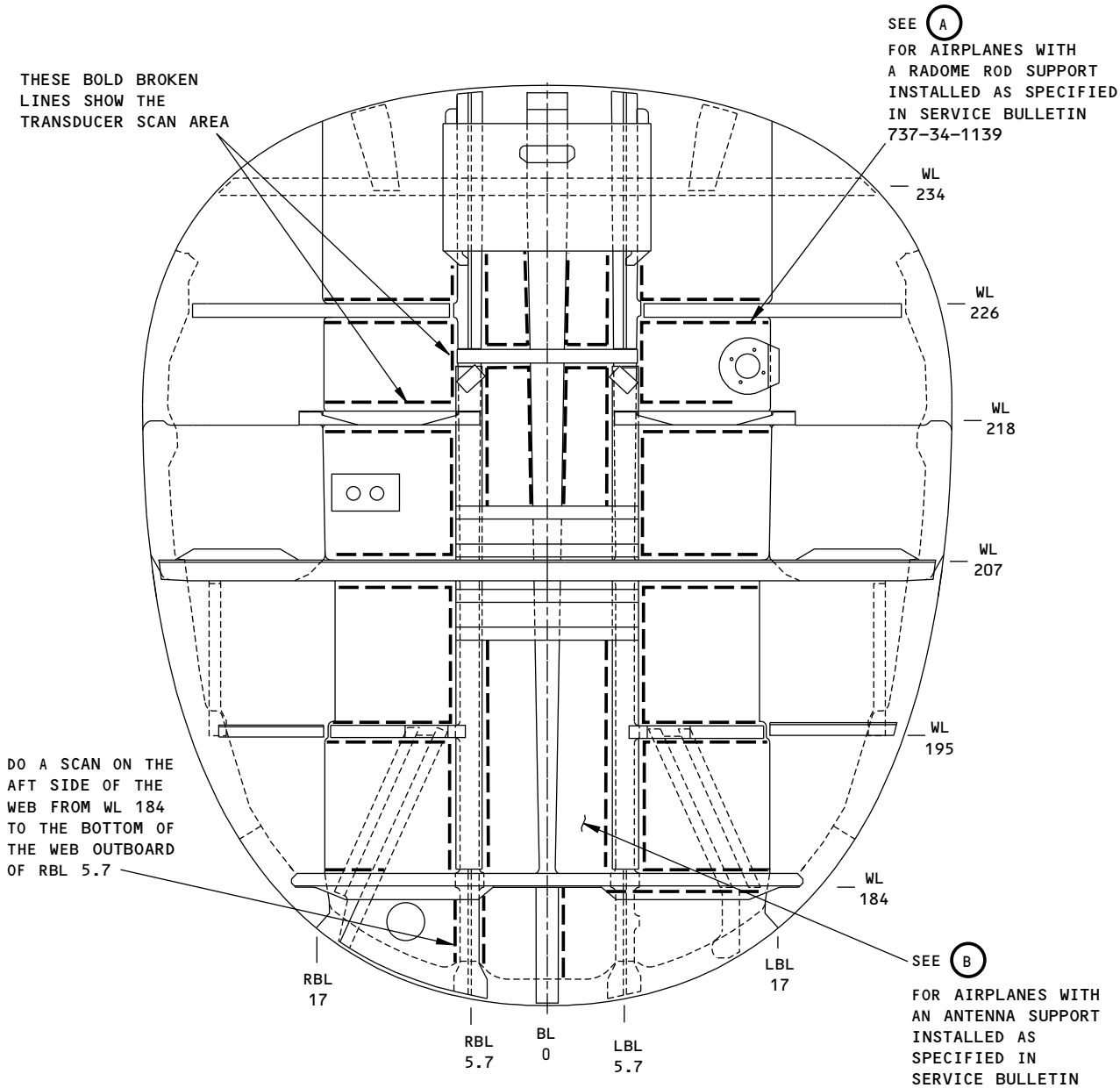
NOTES

- DO A SCAN WITH THE TRANSDUCER ON THE WEB ALONG THE STIFFENERS AND STRAPS. THE SCAN AREA IS WHERE THE BOLD BROKEN LINES ARE SHOWN.
- REFER TO SERVICE BULLETIN 737-53-1173 TO IDENTIFY THE AIRPLANES IN THE GROUP(S) SPECIFIED IN THE TITLE OF THIS FIGURE.

1 VIEW (A) IS ALSO APPLICABLE TO GROUPS 10, 21 THRU 31,35,36 AND 44 AIRPLANES.

2157852 S0000471268_V1

BS 178 Pressure Web Inspection Area - Groups 2 and 38
Figure 6 (Sheet 2 of 2)



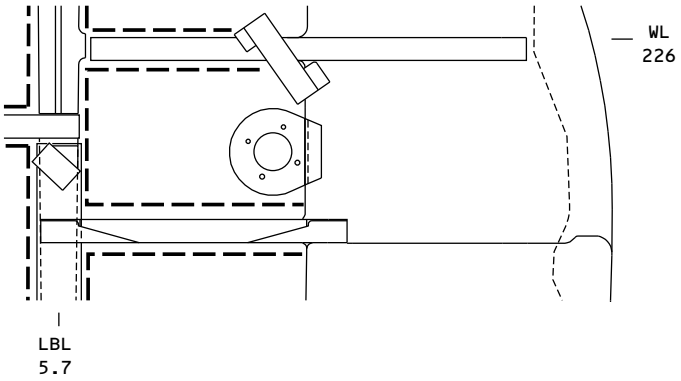
GROUPS 3 THRU 6,20,33,39,40 - FORWARD SIDE SHOWN

NOTES

- DO A SCAN WITH THE TRANSDUCER ON THE WEB ALONG THE STIFFENERS AND STRAPS. THE SCAN AREA IS WHERE THE BOLD BROKEN LINES ARE SHOWN.
- REFER TO SERVICE BULLETIN 737-53-1173 TO IDENTIFY THE AIRPLANES IN THE GROUP(S) SPECIFIED IN THE TITLE OF THIS FIGURE.

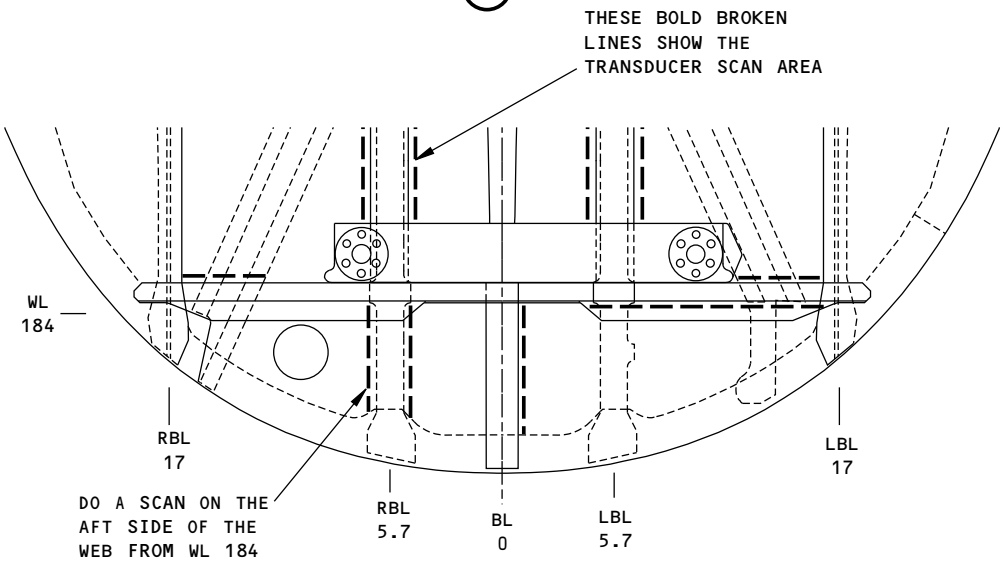
2157853 S0000471269_V1

BS 178 Pressure Web Inspection Area - Groups 3 thru 6, 20, 33, 39 and 40
Figure 7 (Sheet 1 of 2)



AIRPLANES WITH A RADOME ROD SUPPORT INSTALLED AS SPECIFIED IN SERVICE BULLETIN 737-34-1139

A



FORWARD SIDE SHOWN

AIRPLANES WITH AN ANTENNA SUPPORT INSTALLED AS SPECIFIED IN SERVICE BULLETIN 737-34-1139

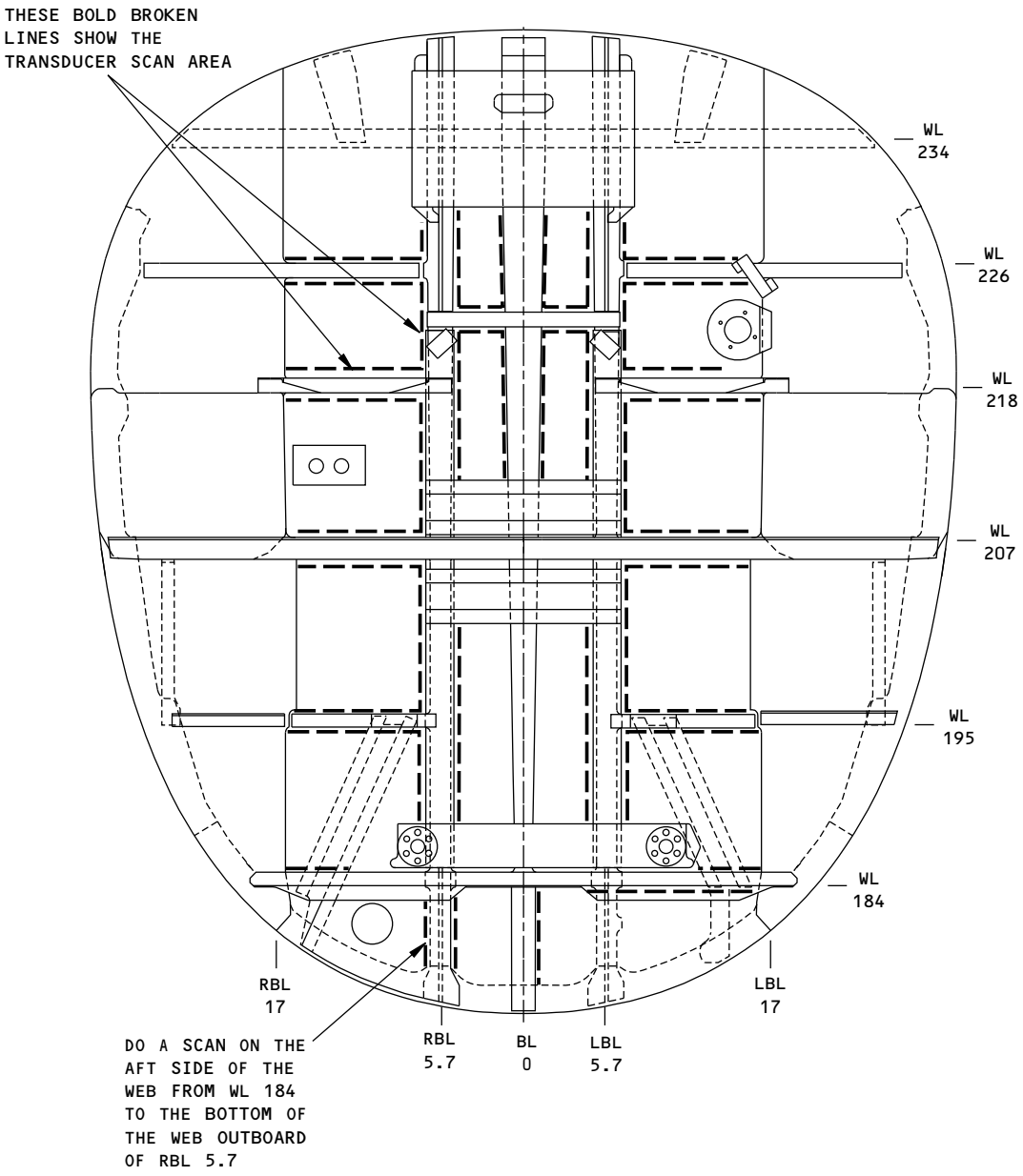
B

NOTES

- DO A SCAN WITH THE TRANSDUCER ON THE WEB ALONG THE STIFFENERS AND STRAPS. THE SCAN AREA IS WHERE THE BOLD BROKEN LINES ARE SHOWN.
- REFER TO SERVICE BULLETIN 737-53-1173 TO IDENTIFY THE AIRPLANES IN THE GROUP(S) SPECIFIED IN THE TITLE OF THIS FIGURE.

2157855 S0000471270_V1

BS 178 Pressure Web Inspection Area - Groups 3 thru 6, 20, 33, 39 and 40
Figure 7 (Sheet 2 of 2)



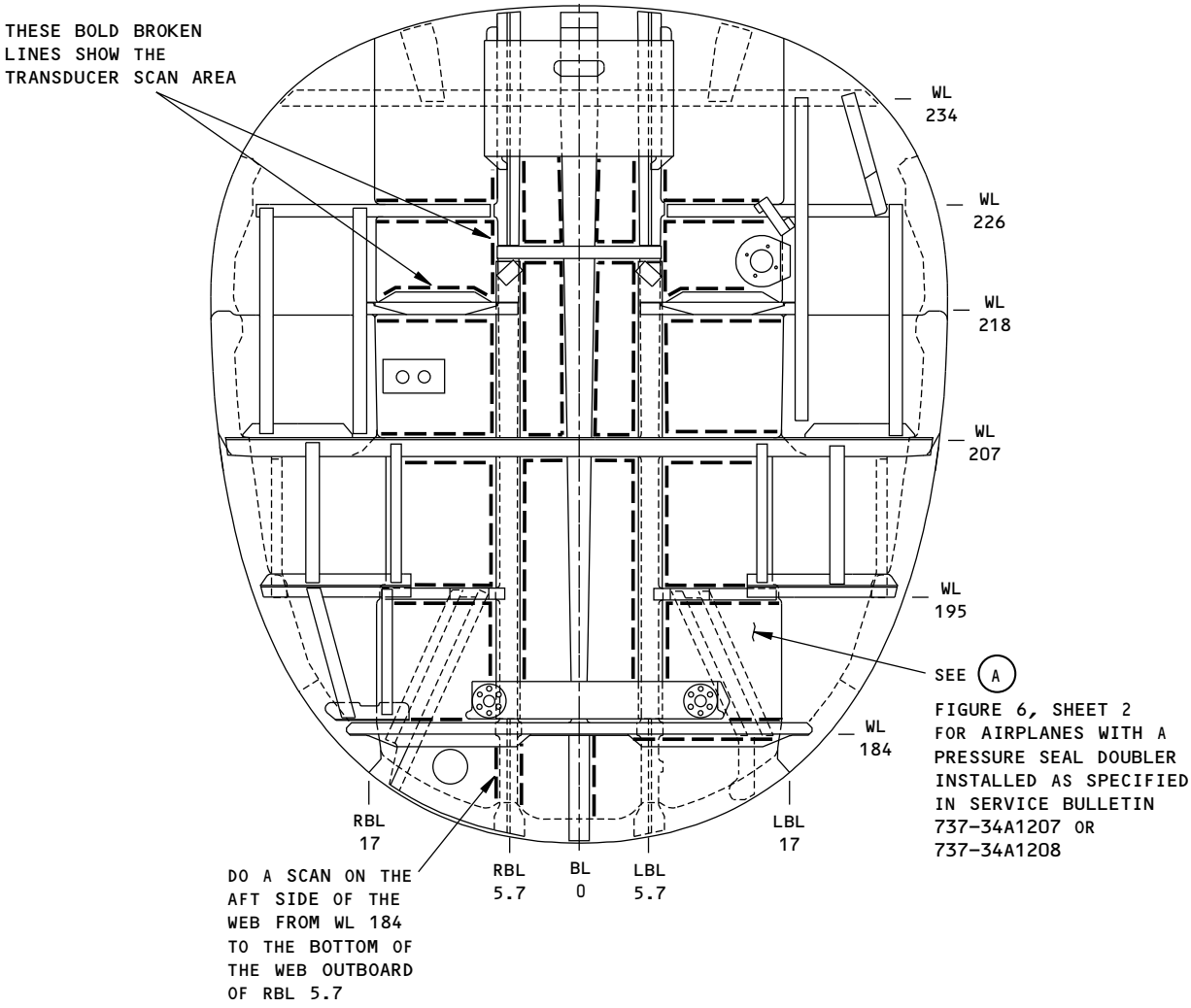
GROUPS 7,18,32,34,41,43 - FORWARD SIDE SHOWN

NOTES

- DO A SCAN WITH THE TRANSDUCER ON THE WEB ALONG THE STIFFENERS AND STRAPS. THE SCAN AREA IS WHERE THE BOLD BROKEN LINES ARE SHOWN.
- REFER TO SERVICE BULLETIN 737-53-1173 TO IDENTIFY THE AIRPLANES IN THE GROUP(S) SPECIFIED IN THE TITLE OF THIS FIGURE.

2157860 S0000471271_V1

BS 178 Pressure Web Inspection Area - Groups 7, 18, 32, 34, 41 and 43
Figure 8



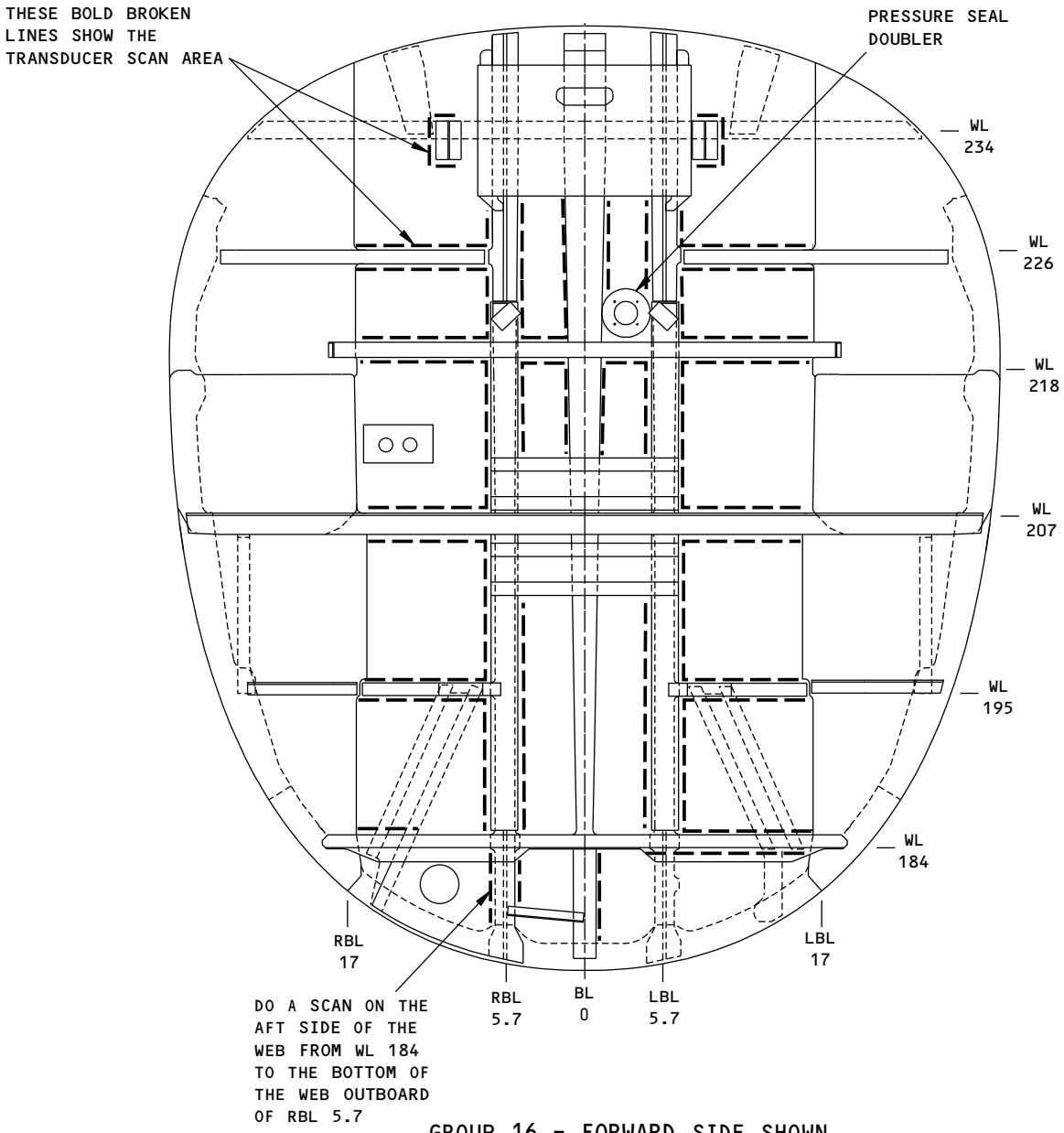
GROUP 10 - FORWARD SIDE SHOWN

NOTES

- DO A SCAN WITH THE TRANSDUCER ON THE WEB ALONG THE STIFFENERS AND STRAPS. THE SCAN AREA IS WHERE THE BOLD BROKEN LINES ARE SHOWN.
- REFER TO SERVICE BULLETIN 737-53-1173 TO IDENTIFY THE AIRPLANES IN THE GROUP(S) SPECIFIED IN THE TITLE OF THIS FIGURE.

2157861 S0000471272_V1

BS 178 Pressure Web Inspection Area - Group 10
Figure 9



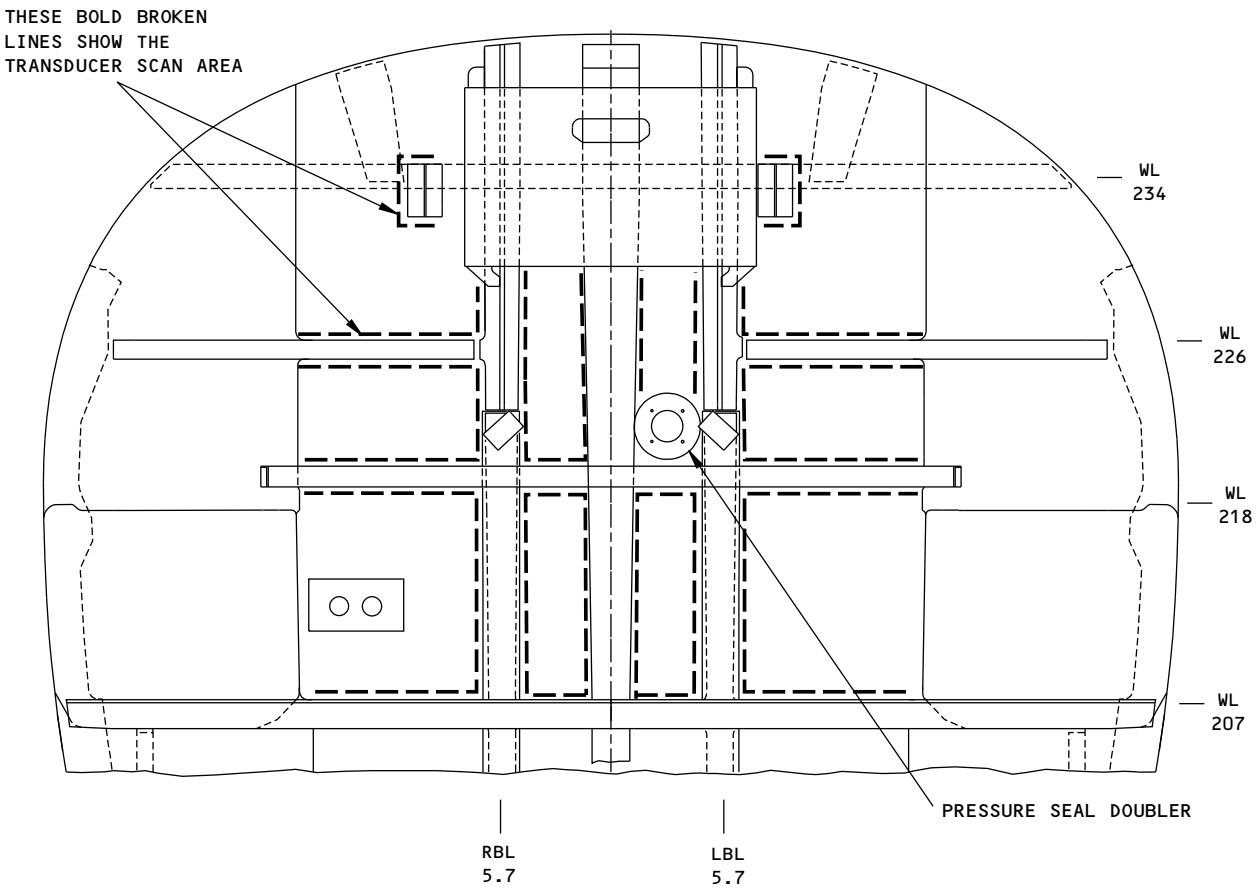
GROUP 16 - FORWARD SIDE SHOWN

NOTES

- DO A SCAN WITH THE TRANSDUCER ON THE WEB ALONG THE STIFFENERS AND STRAPS. THE SCAN AREA IS WHERE THE BOLD BROKEN LINES ARE SHOWN.
- REFER TO SERVICE BULLETIN 737-53-1173 TO IDENTIFY THE AIRPLANES IN THE GROUP(S) SPECIFIED IN THE TITLE OF THIS FIGURE.

2157862 S0000471273_V1

BS 178 Pressure Web Inspection Area - Group 16
Figure 10



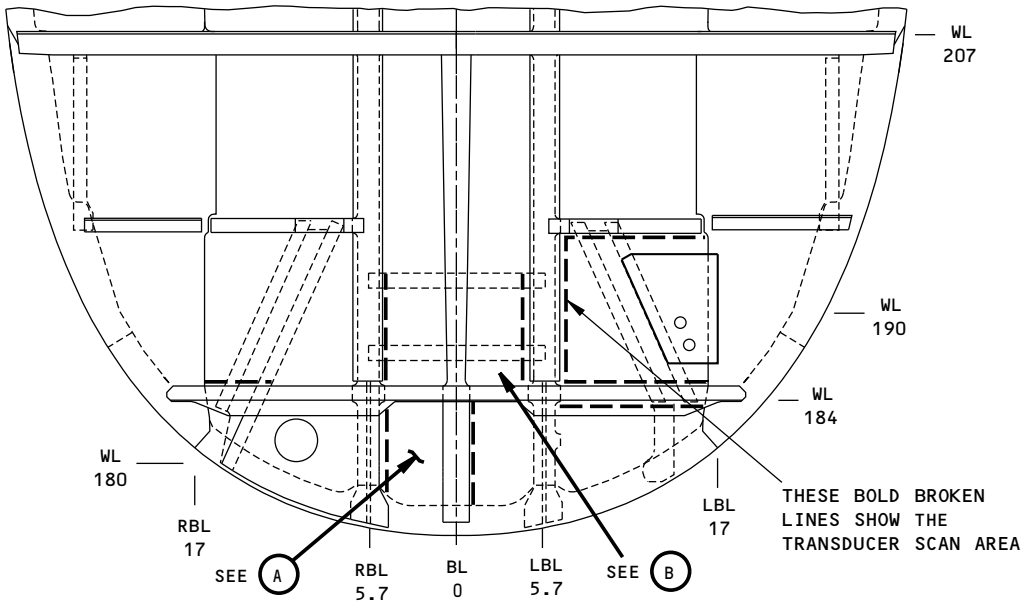
GROUP 15 - FORWARD SIDE SHOWN

NOTES

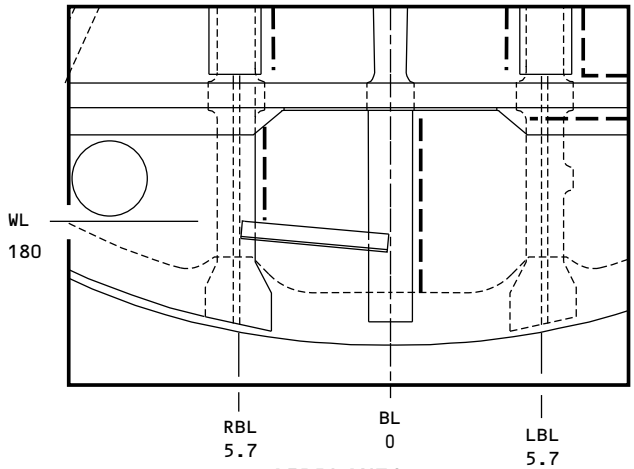
- DO A SCAN WITH THE TRANSDUCER ON THE WEB ALONG THE STIFFENERS AND STRAPS. THE SCAN AREA IS WHERE THE BOLD BROKEN LINES ARE SHOWN.
- REFER TO SERVICE BULLETIN 737-53-1173 TO IDENTIFY THE AIRPLANES IN THE GROUP(S) SPECIFIED IN THE TITLE OF THIS FIGURE.

2157863 S0000471274_V1

BS 178 Pressure Web Inspection Area - Group 15
Figure 11

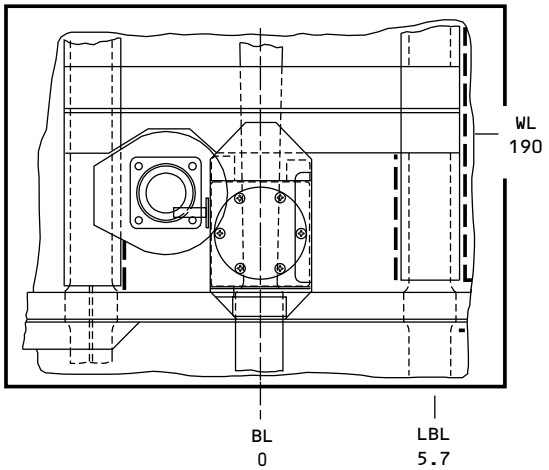


GROUPS 11 THRU 15,17,19,42 - FORWARD SIDE SHOWN



AIRPLANES WITH A
SUPPORT AT WL 180

A



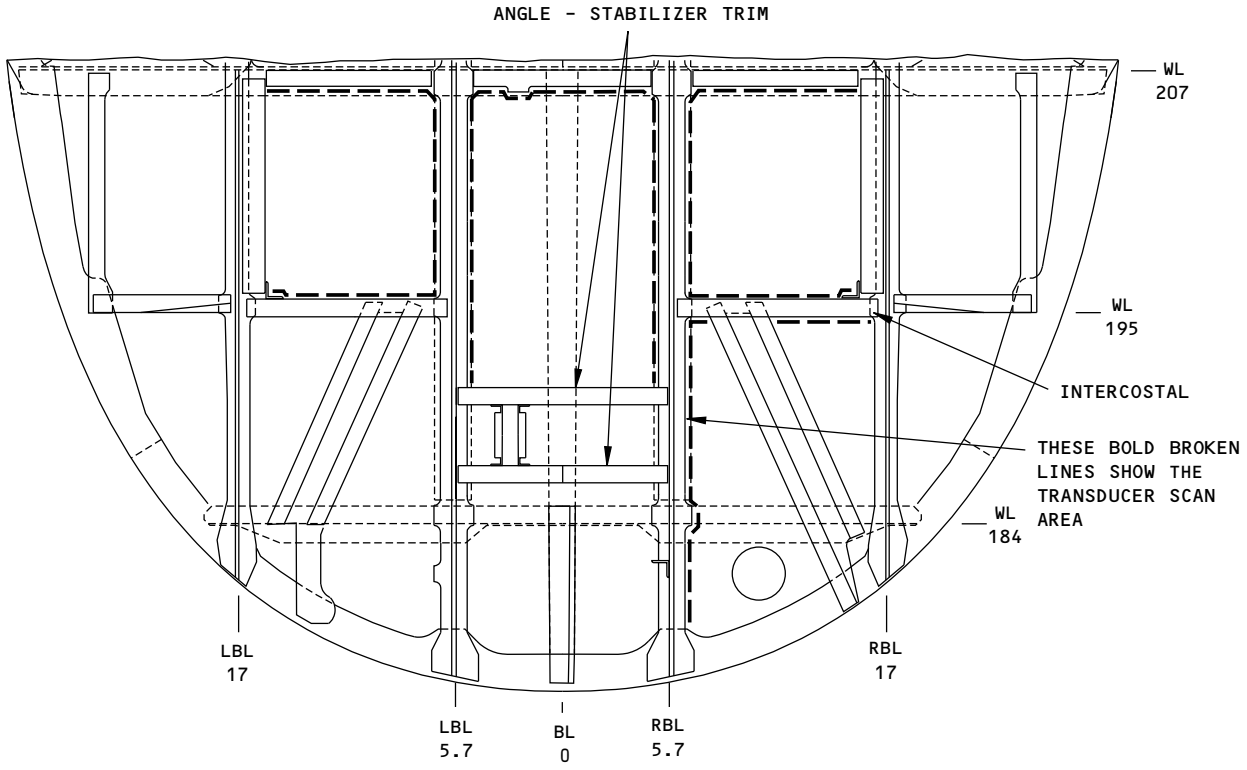
AIRPLANES WITH AN
ANTENNA SUPPORT AT WL 190

B

ALTERNATIVE ULTRASONIC INSPECTION

2157865 S0000471275_V1

BS 178 Pressure Web Inspection Area - Groups 11 thru 15, 17, 19 and 42
Figure 12 (Sheet 1 of 2)



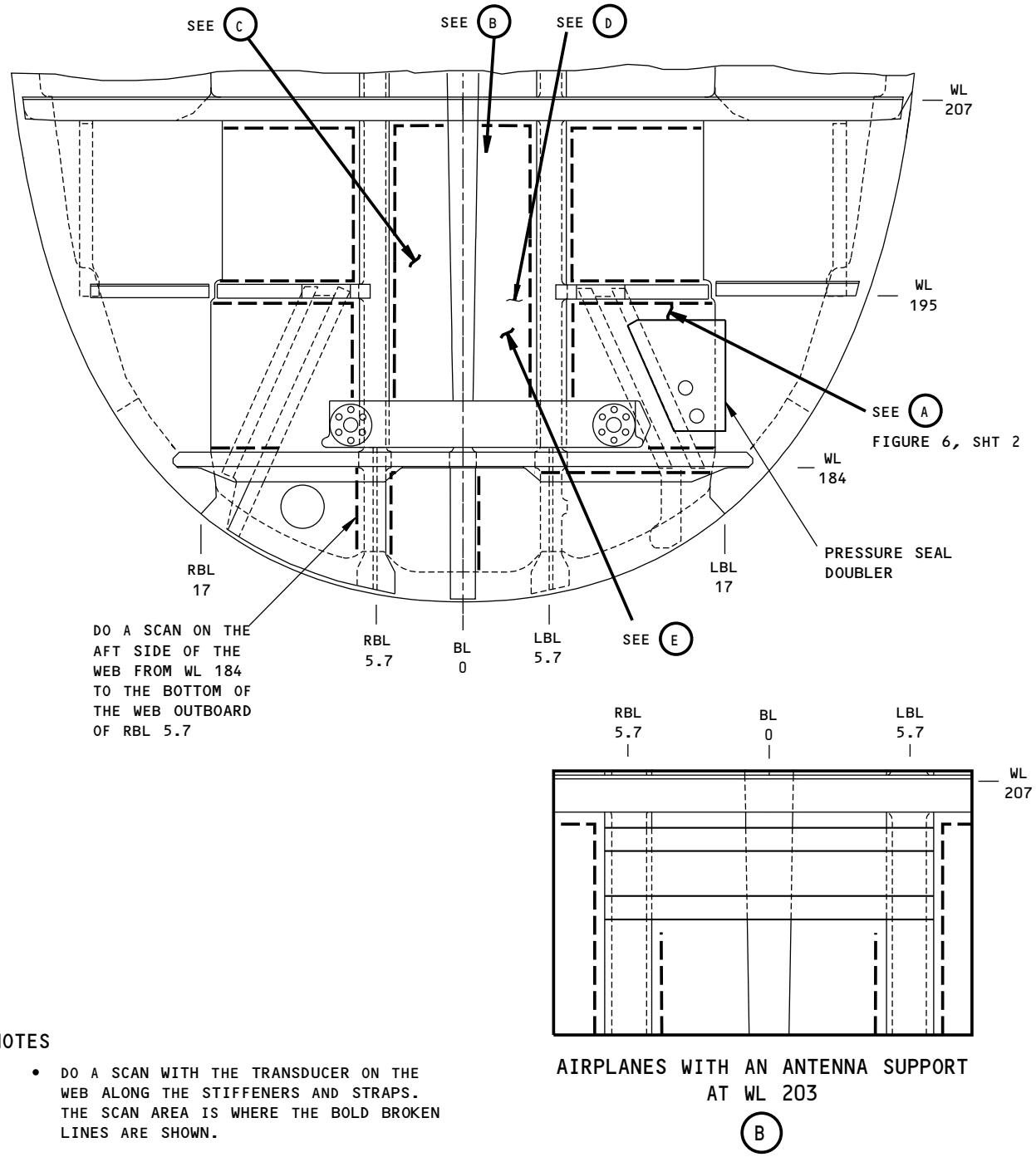
ALTERNATIVE ULTRASONIC INSPECTION
GROUPS 11 THRU 15,17,19,42 - AFT SIDE SHOWN

NOTES

- DO A SCAN WITH THE TRANSDUCER ON THE WEB ALONG THE STIFFENERS AND STRAPS. THE SCAN AREA IS WHERE THE BOLD BROKEN LINES ARE SHOWN.
- REFER TO SERVICE BULLETIN 737-53-1173 TO IDENTIFY THE AIRPLANES IN THE GROUP(S) SPECIFIED IN THE TITLE OF THIS FIGURE.
- THE INSPECTION AREA SHOWN ABOVE IS ON THE AFT SIDE OF THE WEB
- SEE FIGURE 5 FOR AN ALTERNATIVE INSPECTION CONFIGURATION

2157866 S0000471276_V2

BS 178 Pressure Web Inspection Area - Groups 11 thru 15, 17, 19 and 42
Figure 12 (Sheet 2 of 2)



AIRPLANES WITH AN ANTENNA SUPPORT AT WL 203

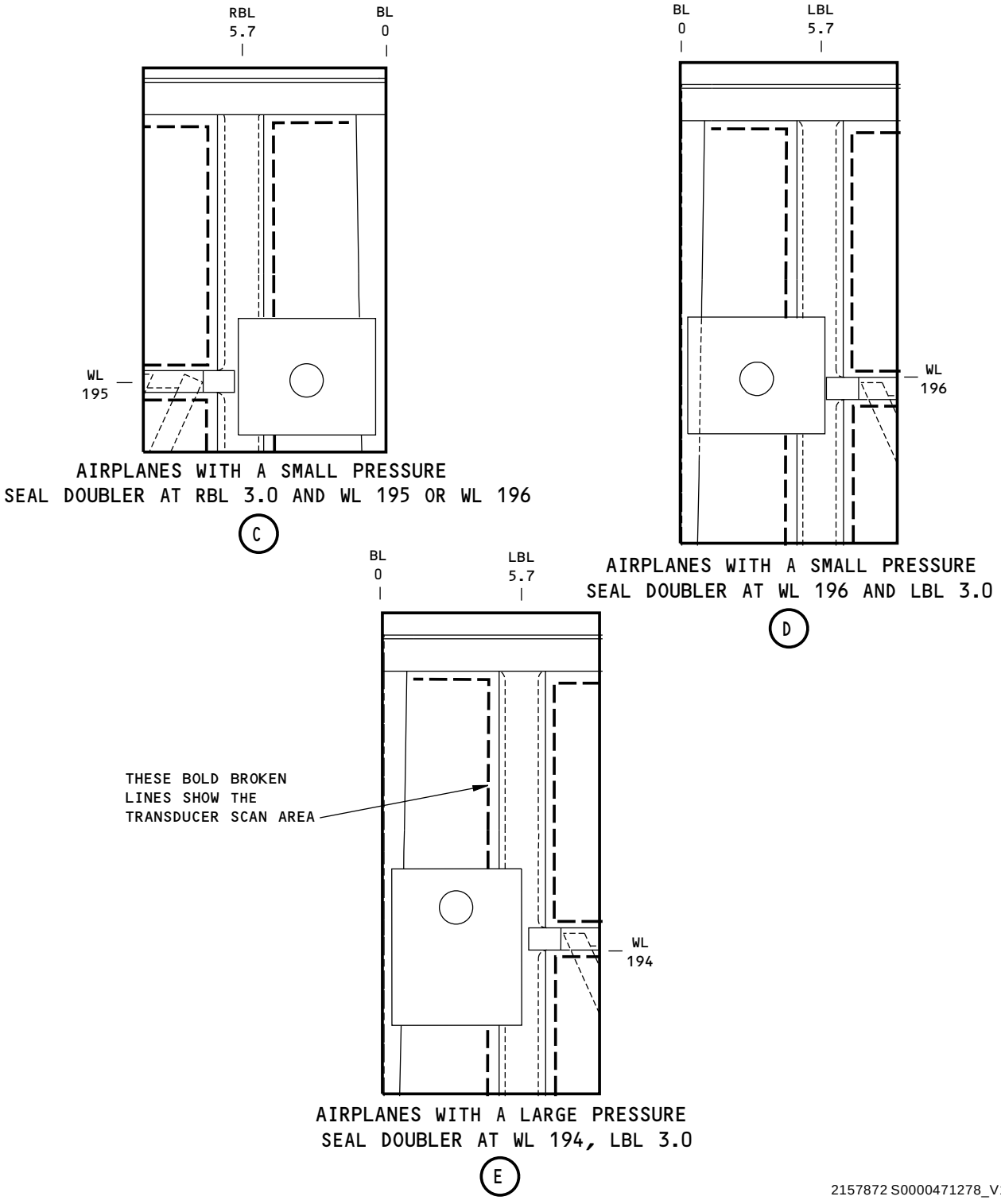
B

NOTES

- DO A SCAN WITH THE TRANSDUCER ON THE WEB ALONG THE STIFFENERS AND STRAPS. THE SCAN AREA IS WHERE THE BOLD BROKEN LINES ARE SHOWN.
- REFER TO SERVICE BULLETIN 737-53-1173 TO IDENTIFY THE AIRPLANES IN THE GROUP(S) SPECIFIED IN THE TITLE OF THIS FIGURE.

2157869 S0000471277_V1

BS 178 Pressure Web Inspection Area - Groups 21 thru 31, 35, 36 and 44
Figure 13 (Sheet 1 of 2)



BS 178 Pressure Web Inspection Area - Groups 21 thru 31, 35, 36 and 44
Figure 13 (Sheet 2 of 2)

PRESSURE WEB INSPECTION AT STATION 227.8 OF THE NOSE WHEEL WELL

1. Purpose

A. Use this procedure to examine areas of the pressure web of the nose wheel well at body station 227.8. This inspection procedure can be used to find cracks that are behind the strips and angle tie at buttock lines 0, 8.45 left, and 8.45 right. This inspection is done on the aft side of the pressure web.

B. See Figure 1 and Figure 2 for the location of the inspection areas.

C. This procedure uses an ultrasonic instrument set for pulse echo.

D. This procedure was made to find cracks that are 0.2 inch (5 mm) or more in length.

NOTE: A subsurface eddy current inspection will give unsatisfactory results since it is possible for small cracks to occur immediately under the edge of the strips or angle tie. Edge effects during an eddy current inspection make it difficult to find cracks at these locations. Also, this ultrasonic inspection can find cracks that do not go through the total thickness of the web.

E. Service Bulletin Reference: 737-53-1054

2. Equipment

A. General

(1) Use inspection equipment that can be calibrated on the reference standard as specified in Paragraph 4.

(2) Refer to Part 1, 51-04-00, for more data about ultrasonic inspection.

B. Instrument

(1) Use an ultrasonic instrument that:

(a) Can do a pulse echo inspection.

(b) Operates at a frequency of 8 to 12 MHz.

(2) The instruments specified below were used to prepare this procedure.

(a) USN 50; Krautkramer Branson.

(b) Sonic 136; Staveley Instruments.

(c) Epoch 2002; Panametrics.

C. Transducers

(1) Use a transducer that:

(a) Operates at a frequency between 8 and 12 MHz.

(b) Has a refracted angle of 70 degrees in aluminum.

NOTE: One piece transducers work better than the transducers that use a wedge. The one piece transducers show less noise on the screen display.

(2) The transducers specified below were used to prepare this procedure.

(a) Part number 57A3087; Staveley Sensors, 10 MHz, (70 degree in aluminum).

(b) Part number 226-590; Krautkramer Branson, 10 MHz, 0.25 inch diameter. Used with a 70 degree wedge (70 degree in aluminum), part number W-203-70.

D. Reference Standards

(1) Use reference standard NDT3012. See Figure 3 for data about the reference standard.

E. Couplant

(1) Use an ultrasonic couplant that will not cause corrosion or other damage to the airplane.

NOTE: It is recommended that a thick couplant that is not water based be used during the inspection. A thin, water-based couplant can get behind the strips and cause indications to occur from the couplant. A water-proof grease gives satisfactory results.

3. Prepare for the Inspection

A. Remove the light from the bracket on the web of the nose wheel well at station 227.8. This must be done so your hand and the transducer will fit in the light bracket. See Figure 1 and Figure 2.

B. Remove loose or soft paint or primer from the surface of the transducer scan areas on the aft surface of the pressure web. Also remove dirt, adhesive, or sealant from the transducer scan area. The transducer scan areas are along the strips and angle tie at buttock lines 0, 8.45 left, and 8.45 right. See Figure 1 and Figure 2 for the transducer scan areas.

4. Instrument Calibration

A. Set the frequency between 8 and 12 MHz.

B. Make sure reject is off.

C. Put couplant on reference standard NDT3012 at positions 1 and 2 as shown in Figure 4.

D. Put the transducer at position 1 on the reference standard as shown in Figure 4.

E. Adjust the delay to put the initial pulse at zero percent of full screen width as shown in Figure 4.

F. Adjust the range or sweep to put the left edge of the signal from reference notch 1 at 30 percent of full screen width as shown in Figure 4.

G. Put the transducer at transducer position 2 on the reference standard as shown in Figure 4.

H. Adjust the range or sweep to put the left edge of the signal from reference notch 2 at 50 percent of full screen width as shown in Figure 4.

I. Adjust the gain so that the signal from reference notch 2 is between 50 and 90 percent full screen height as shown in Figure 4.

J. Slowly turn the transducer a short distance clockwise and counterclockwise at transducer position 2 to get the highest possible signal from the notch.

K. Adjust the gain so that the signal from reference notch 2 is at 100 percent full screen height as shown in Figure 4.

L. If necessary, adjust the range and delay controls until the signals from positions 1 and 2 are as specified below and as shown in Figure 4.

(1) Make sure that the signal from reference notch 1 is at 30 percent of full screen width.

(2) Make sure that the signal from reference notch 2 is at 50 percent of full screen width.

M. For airplane line numbers 237 or higher, increase the gain by 12 dB. This added gain is necessary because of the sealant that is between the strips and web on these airplanes.

N. For airplane line numbers 1 thru 236, increase the gain by 6 dB. These airplanes do not have sealant between the strips and the web but the added 6 dB is necessary for a satisfactory inspection.

5. Inspection Procedure

A. Put couplant on the transducer scan areas on the aft side of the pressure web at station 227.8. Try not to get the couplant between the web and the strips or the angle tie.

NOTE: The transducer scan area is the area the transducer will touch the pressure web at BS 227.8. These transducer scan areas are adjacent to the edge of the strip and angle tie. See the bold broken lines in Figure 1 and Figure 2 for the location of the transducer scan areas.

NOTE: Most of the fastener holes will give no signals or small signals between 5 and 40 percent full screen height. When the equipment is calibrated with the added gain, do not add more gain to try to increase the fastener hole signals. Cracks can be found although the hole signals are small.

B. Put the transducer on the pressure web on the transducer scan areas shown in Figure 1 for group 1 airplanes or Figure 2 for group 2 airplanes.

C. Move the transducer slowly along the surface of the pressure web and monitor the instrument display at the same time. During the scan:

(1) Make sure the front of the transducer is against the edge of the strips or angle tie.

(2) Slowly turn the transducer a short distance (approximately 30 degrees) clockwise and counterclockwise to find possible cracks that are not parallel to the edge of the strips or angle tie. See Detail I in Figure 2.

(3) Make a mark at the locations that cause signals that are higher than 40 percent of screen height and between 29 and 60 percent of full screen width.

(4) Frequently do a check of the instrument calibration as follows:

(a) Decrease the gain by the amount you added in Paragraph 4.M. or Paragraph 4.N.

(b) Put the transducer on the reference standard at position 2 (see Figure 4) to get a signal from reference notch 2.

(c) Compare the signal you got from reference notch 2 during calibration with the signal you get now.

(d) If the signal has decreased 10 percent or more, do the calibration and inspection again.

(e) If the signal has not decreased more than 10 percent, increase the gain by the amount you added in Paragraph 4.M. or Paragraph 4.N. and continue to do the inspection.

6. Inspection Results

A. Signals that are 40 percent of full screen height or higher and are between 34 and 60 percent of full screen width are possible crack indications. See Figure 4, flagnote 2.

B. Signals that are 90 percent of full screen height or higher and are between 29 and 33 percent of full screen width are possible crack indications. See Figure 4, flagnote 1. Signals that are between 29 and 33 percent of full screen width and are less than 90 percent of full screen height could be caused by sealant or too much couplant on the web immediately adjacent to the strip or angle tie. See Paragraph 6.D. for correction procedures.

C. Compare the signals that occur during the inspection to the signals you got from the reference notches in the reference standard during calibration.

D. Make sure the ultrasonic indication occurs because of a crack and is not a result of other causes. Some possible causes of incorrect crack indications and how to correct them are as follows:

(1) Too much couplant between the strips or angle tie and the web. Correction procedure:

(a) Use air pressure or a thin plastic sheet to remove couplant from between the strips/angle tie and the web.

(b) Use a cotton swab to remove couplant from the web in the area that is immediately adjacent to the edge of the strips or angle tie. The area of the web that must be free of couplant is approximately 0.15 inch (3.8 mm) to 0.20 inch (5.0 mm) from the edge of the strip or angle tie. Try this first on the reference standard as follows so that you know it can be done:

1) Remove couplant as specified above from the surface of the reference standard that is immediately adjacent to the edge of the top layer.

2) Do a scan on the reference standard to get a signal from the notch.

(c) Do the ultrasonic inspection again in the area that caused the indication.

(2) Surface contamination such as sealant or adhesive on the web or strips/angle tie. Correction procedure:

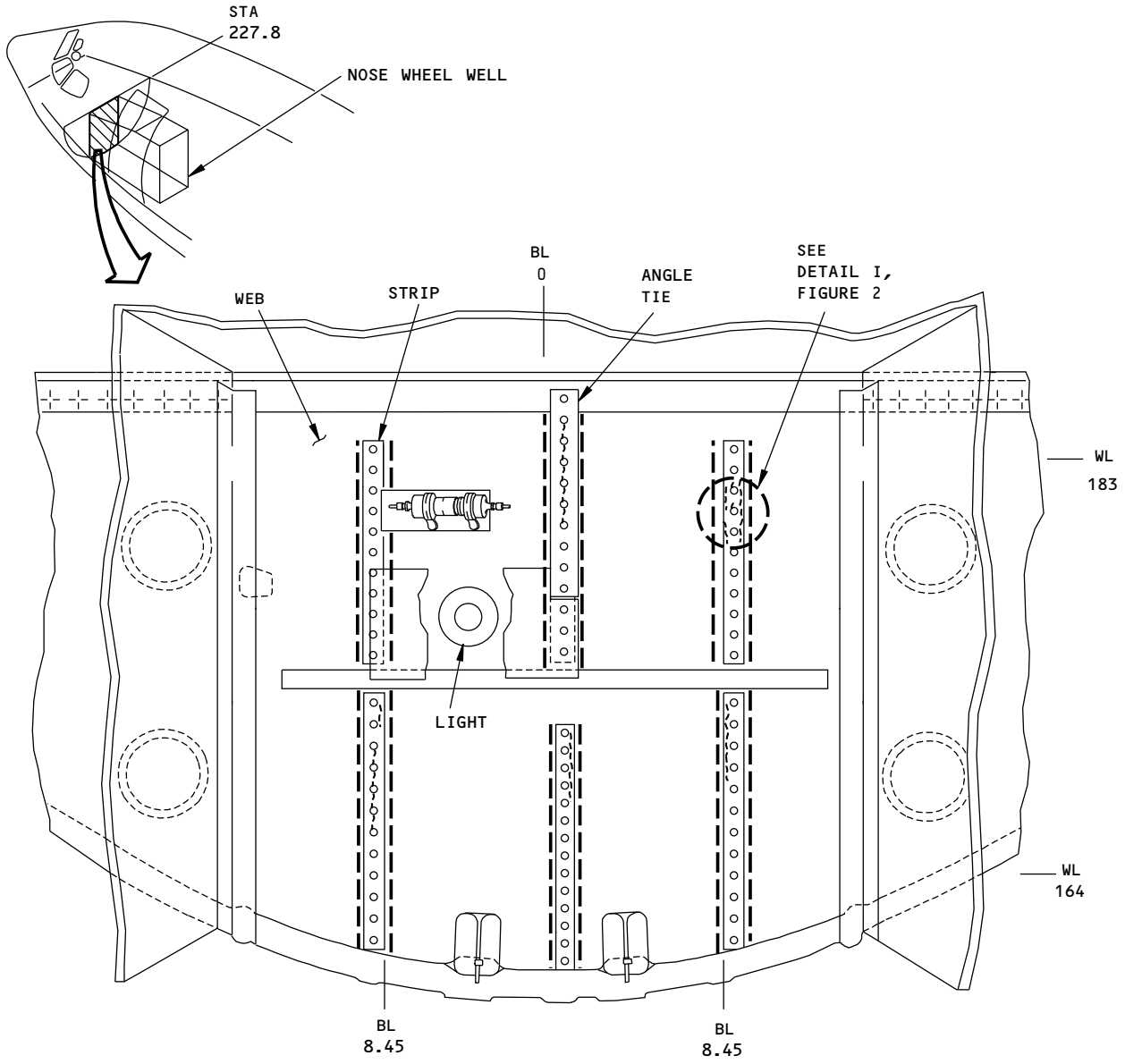
(a) Remove surface contamination to make sure this is not a cause.

(b) Do the ultrasonic inspection again in the area that caused the indication.

(3) A reflection from a fastener hole. Correction procedure:

(a) See if the crack indications occur because the transducer is pointed at a fastener hole. A signal from the hole could possibly occur. Hole signals get smaller when the transducer is moved a small distance from the center of the hole.

E. It is possible for small cracks to occur in front of fastener holes. Monitor the signals to make sure they decrease (as hole signals do) when the transducer is moved away from the center of the hole. If a signal does not decrease (as a hole signal does) when the transducer moves away from the center of a hole, then the signal is from a possible crack.

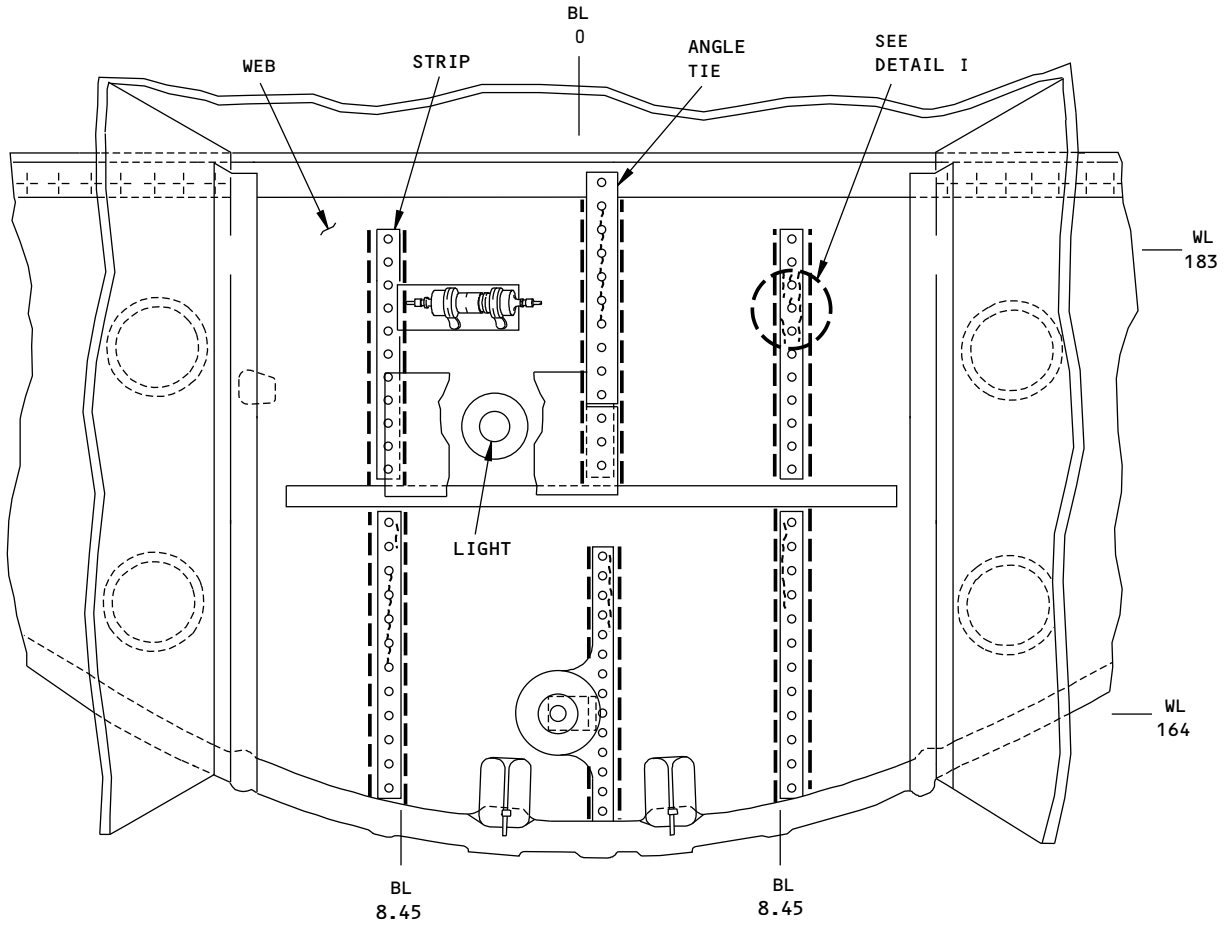


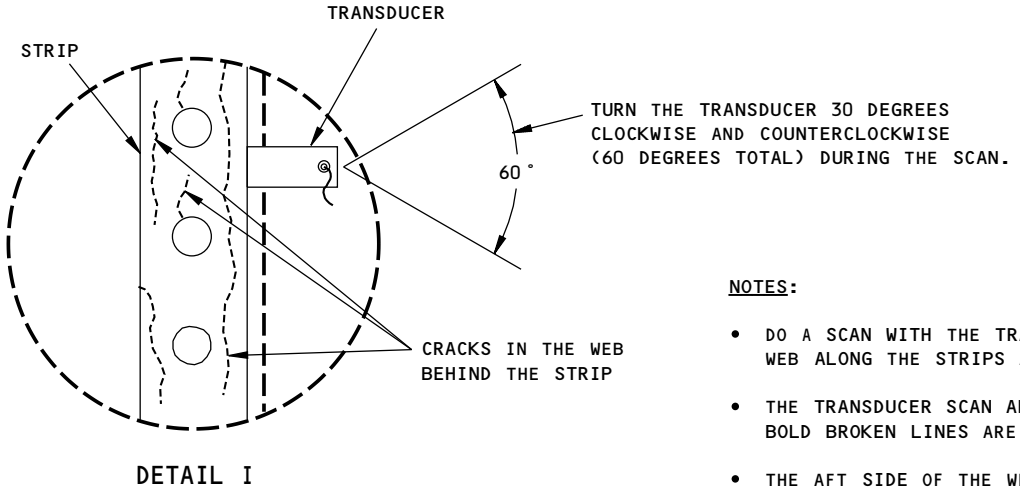
NOTES:

- DO A SCAN WITH THE TRANSDUCER ON THE WEB ALONG THE STRIPS AND ANGLE TIE.
- THE TRANSDUCER SCAN AREA IS WHERE THE BOLD BROKEN LINES ARE SHOWN.
- THE AFT SIDE OF THE WEB IS SHOWN

2157874 S0000471280_V1

Web Inspection at Station 227.8 - Group 1 Airplanes
Figure 1



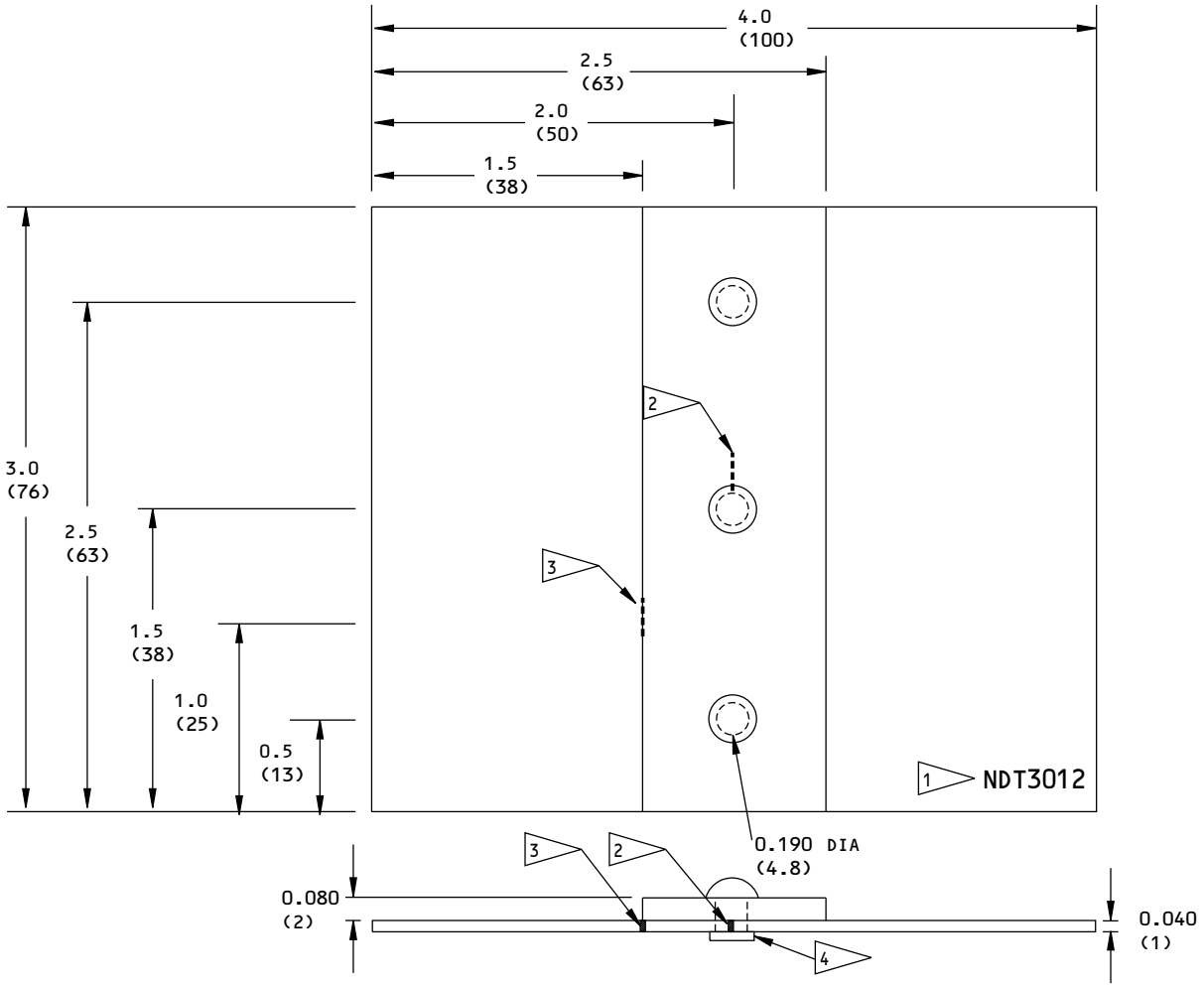


NOTES:

- DO A SCAN WITH THE TRANSDUCER ON THE WEB ALONG THE STRIPS AND ANGLE TIE.
- THE TRANSDUCER SCAN AREA IS WHERE THE BOLD BROKEN LINES ARE SHOWN.
- THE AFT SIDE OF THE WEB IS SHOWN

2157875 S0000471287_V1

Web Inspection at Station 227.8 - Group 2 Airplanes
Figure 2



NOTES:

- MATERIAL: 2024-T3 OR T4 ALUMINUM (CLAD OR BARE)
- ALL DIMENSIONS ARE IN INCHES (MILLIMETERS ARE IN PARENTHESES)
- TOLERANCE (UNLESS SPECIFIED DIFFERENTLY):

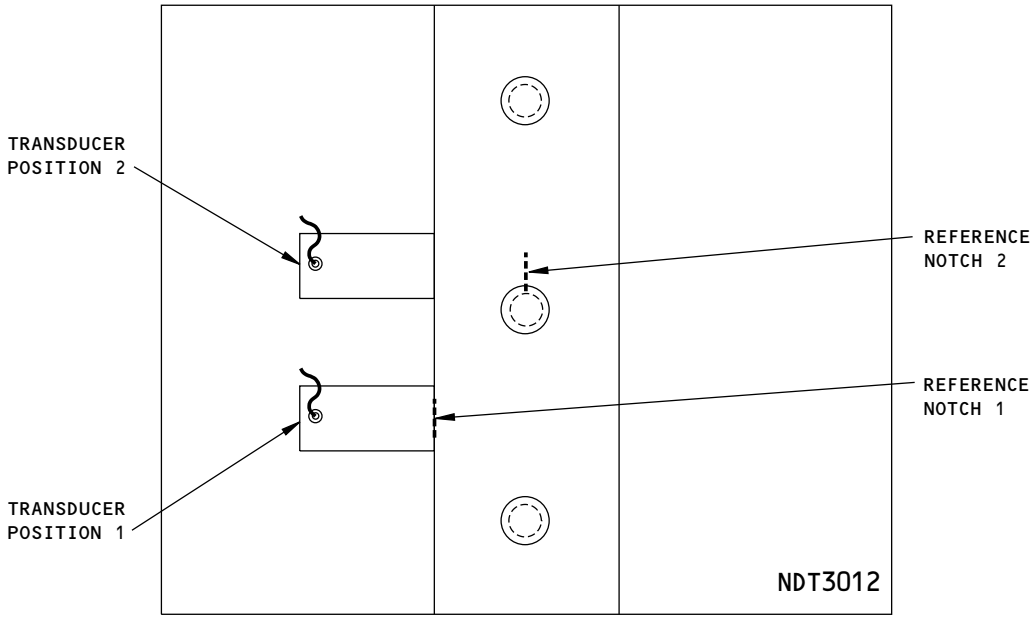
INCHES	MILLIMETERS
X.XXX = ± 0.005	X.XX = ± 0.1
X.XX = ± 0.025	X.X = ± 0.5
X.X = ± 0.050	X = ± 1

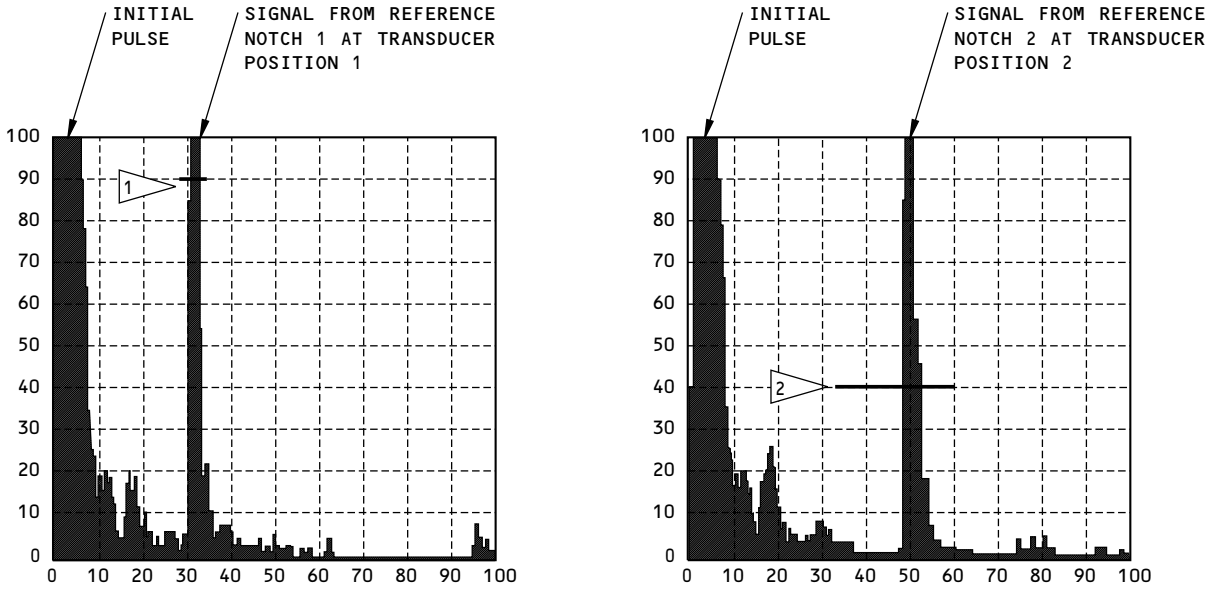
- SURFACE ROUGHNESS = 125 RA OR BETTER
- TWO EDM NOTCHES: LENGTH: 0.20 (5) ±10%
  DEPTH: 0.040 (1)
  WIDTH: 0.025 (0.6) MAXIMUM

1. ETCH OR STEEL STAMP THE REFERENCE STANDARD NUMBER
2. THE NOTCH MUST BE WITHIN ±0.005 (±0.10) OF THE CENTER OF THE HOLE
3. PUT THIS NOTCH IN THE LOWER SKIN IMMEDIATELY BELOW THE EDGE OF THE UPPER SKIN. THE LOCATION TOLERANCE IS ±0.020 (±0.5) FROM THE EDGE OF THE UPPER SKIN
4. INSTALL 0.187 (4.8) DIAMETER BUTTON HEAD RIVETS AT 3 LOCATIONS

2157877 S0000471288_V1

Reference Standard NDT3012
Figure 3





1 THIS REJECT LEVEL IS AT 90 PERCENT OF FULL SCREEN HEIGHT AND BETWEEN 29 PERCENT AND 33 PERCENT OF FULL SCREEN WIDTH.

2 THIS REJECT LEVEL IS AT 40 PERCENT OF FULL SCREEN HEIGHT AND BETWEEN 34 PERCENT AND 60 PERCENT OF FULL SCREEN WIDTH.

2157879 S0000471289_V1

Calibration Signals and Transducer Positions
Figure 4

PART 4 - ULTRASONIC

FRAME WEB CRACK AT STATION 303.9 AND S-16L

1. Purpose

A. Use this ultrasonic procedure to find cracks in the frame web at station 303.9 and stringer 16L. Cracks that start at the outboard and the top inboard sides of the slot in the frame web at STA 303.9 can be found with this inspection procedure. See Figure 1 and Figure 2 for the inspection areas.

B. A 70 degree shear wave transducer is used for this inspection. See Paragraph 2.C.

C. This procedure uses an ultrasonic instrument set for pulse echo between 4 MHz and 6 MHz.

D. Two calibrations are done for this inspection. One calibration is done to find cracks that start low on the outboard side of the slot and high on the inboard side of the slot. The other calibration is done to find cracks that start in the middle of the outboard side of the slot. See Figure 2 for the typical crack locations and Figure 4 for the calibration signals.

E. Service Bulletin Reference: 737-53-1197

2. Equipment

A. General

(1) Use inspection equipment that can be calibrated on the reference standard as specified in Paragraph 4.

(2) Refer to Part 1, 51-04-00 for more data about ultrasonic inspections.

(3) Refer to Part 1, 51-01-00 for the names and addresses of the NDT equipment suppliers.

B. Instrument

(1) Use an ultrasonic instrument that:

(a) Can do a pulse echo inspection.

(b) Operates at a frequency between 4 MHz and 6 MHz.

(2) The instruments specified below were used to prepare this procedure (only one instrument is necessary to do this procedure):

(a) USN 50; Krautkramer Branson

(b) Sonic 136; Staveley Instruments

(c) Epoch 2002; Panametrics

(d) USL 38; Krautkramer

C. Transducers

(1) Use a transducer that:

(a) Operates at a frequency between 4 MHz and 6 MHz.

(b) Puts a 70 degree shear wave in aluminum.

(c) Has a maximum case dimension of 0.72 (18.3 mm) long x 0.35 (8.9 mm) wide.

(2) The shear wave transducers identified below were used to prepare this procedure (only one transducer is necessary to do this procedure):

(a) Part number SUSM 570AT (mini case); NDT Engineering Corp.

(b) Part number ¼ x ¼ - 5-70; Nortec Corp.

D. Reference Standard

(1) Make reference standard NDT3024A. Reference standard NDT3024A has two EDM notches in it. See Figure 3 to make this reference standard.

NOTE: It is not necessary to make reference standard NDT3024A if you have NDT3024. The only difference between reference standard NDT3024 and NDT3024A is the word "Higher" has been replaced with "Middle" on NDT3024A. If you choose, you can scratch out the word "Higher" on NDT3024 and replace it with the word "Middle" and add the letter "A" to the reference standard number.

E. Couplant

(1) Use oil, grease or an equivalent couplant that will not cause corrosion or other damage to the airplane. A light grease was used during the inspections that were done to prepare this procedure.

3. Prepare for the Inspection

A. Open the passenger door on the left side of the airplane to get access to the inspection area. See Figure 1.

B. Remove the forward scuff plate and the door reveal that is around the forward door stop fitting at station 303.9 and stringer 16. See Figure 1.

C. Clean the transducer scan areas on the frame web, immediately above the upper edge of the doubler and immediately below the lower edge of the doubler. Remove sealant from the web if it is in this area. See Figure 1 and Figure 2 for the transducer scan areas.

D. Make sure the primer or paint is smooth in the transducer scan area.

4. Instrument Calibration

NOTE: Refer to the instrument instruction manual for the instrument operation instructions.

A. Calibrate the equipment to find cracks in the web that start low on the outboard side of the slot and high on the inboard side of the slot as follows:

NOTE: Views A and B of Figure 4 show the calibration for cracks at the bottom of the slot; this same calibration can be used to find cracks that start high on the slot.

(1) Make lines with a permanent marker on the three scribe lines on reference standard NDT3024A. This will make it easier to see where the transducer must be during the calibration.

(2) Tighten the cable to the transducer and to the instrument.

(3) Set the instrument frequency between 4 MHz and 6 MHz. If a broad band instrument is used, then it is not necessary to adjust the frequency. Make sure the reject is set to off.

(4) Apply sufficient couplant to the transducer scan areas on reference standard NDT3024A that are shown in Figure 4, views A and B. There are two scan areas on the reference standard for this calibration. The first scan area is just below the middle slot that does not have a notch. The other scan area is just below the slot on the right that has the lower notch. See Figure 4.

(5) Put the transducer on the reference standard below the middle slot as shown in Figure 4, view A. Make sure the transducer points to the bottom of the slot and that the transducer is along the two scribe lines as shown.

(6) Adjust the gain to get the signal from the bottom of the slot to be at 90 percent of full screen height. Slowly turn the transducer to the left and right to make sure the maximum signal is at 90 percent of full screen height. If necessary, adjust the gain again to get the slot signal at 90 percent of full screen height.

(7) Increase the gain by 6 dB.

(8) Adjust the range and delay so the slot signal is at 70 percent of full screen width and the initial pulse is at zero. See Figure 4, view A.

(9) Slowly turn the transducer to the left to monitor how the slot signal decreases to zero as the transducer turns from position 1 to position 2. See how the reference hole signal occurs between 35 and 45 percent of full screen width.

NOTE: This reference hole is at the approximate location as the fastener hole on the airplane.

(10) Put the transducer below the slot that is on the right side of the standard. See the transducer position in Figure 4, view B. Make sure the transducer points to the bottom of the slot and the transducer is along the two scribe lines as shown.

(11) Slowly turn the transducer to the left to monitor how the slot signal decreases as the transducer turns from position 1 to position 2. See how the lower notch signal occurs to the right of the slot signal, at approximately 75 percent of full screen width. You must look carefully to see that the notch signal starts to the right of where the slot signal started. See Figure 4, view B for these signals.

B. Calibrate the equipment to find cracks in the web that start near the middle of the outboard side of the slot as follows:

(1) If not done, do Paragraph 4.A.(1) thru Paragraph 4.A.(3).

(2) Apply sufficient couplant to the transducer scan area on reference standard NDT3024A shown in Figure 4, view C.

(3) Put the transducer on the reference standard so that it points to the slot on the left. Make sure the transducer is to the left and below the reference hole shown in Figure 4, view C. Make sure the transducer does not go above the horizontal scribe line.

(4) Adjust the gain so the signal from the bottom of the slot is at 90 percent of full screen height. Slowly turn the transducer to the left and right to make sure the maximum signal is at 90 percent of full screen height. If necessary, adjust the gain again to get the slot signal at 90 percent of full screen height.

(5) Increase the gain by 6 dB.

(6) Adjust the range and delay so the slot signal is at 60 percent of full screen width and the initial pulse is at zero. See Figure 4, view C.

(7) Slowly turn the transducer to the left to monitor how the slot signal decreases as the transducer turns from position 1 to position 2. See how the middle notch signal occurs to the right of the slot signal at approximately 73 percent of full screen width. You will see that there is more distance between the slot signal and the middle notch signal when they are compared to the signals in Figure 4, view B.

NOTE: If the transducer is turned too far to the right, the reference hole signal will show on the screen at approximately 30 percent of full screen width. See Figure 4, view C to see the reference hole and signals. This reference hole is in the approximate location as the fastener hole in the airplane. See Figure 2, view B, flagnote 4 for this fastener hole in the web.

5. Inspection Procedure

A. Examine the outboard side of the web slot at station 303.9 near stringer 16 for cracks that start low on the slot as follows:

(1) Do the calibration as specified in Paragraph 4.A.

(2) Put sufficient couplant on the surface of the web in the transducer scan area just below the doubler. See Figure 2, view A, to see the transducer scan area.

(3) Put the transducer on the web immediately below the doubler edge as shown in Figure 2, view A. See how the right side of the transducer is against the collar on the web. Also, see how the front edge of the transducer is against the bottom edge of the doubler.

(4) Slowly turn the transducer so it points at the slot. Turn the transducer until the signal from the bottom of the slot is at a maximum height on the screen. If the signal from the slot is less than 100 percent of full screen height, then increase the gain until the signal is at 100 percent of full screen height.

NOTE: It is satisfactory if the slot signal from the web is not exactly on 70 percent of full screen width as shown in Figure 4, view B.

(5) Slowly turn the transducer to the left to see if a crack signal occurs on the screen immediately to the right of where the slot signal started.

NOTE: If the transducer is turned too far to the left, a signal from the fastener hole will show on the screen. See Figure 2, view A, flagnote 1 for the location of this fastener hole.

(6) Turn the transducer so it points at the slot again and then slowly turn it to the left as you did in Paragraph 5.A.(5).

NOTE: It is important to look carefully to the right of the slot signal as the transducer is turned to the left. The crack signal could start immediately to the right of where the slot signal started.

(7) A signal that starts immediately to the right of where the slot signal started must be examined more. See Figure 4, view B to see how a crack signal shows on the screen immediately to the right of the slot signal.

B. Examine the outboard side of the web slot at station 303.9, near stringer 16L, for cracks that start near the middle of the slot as follows:

(1) Do the calibration as specified in Paragraph 4.B.

(2) Put sufficient couplant on the surface of the web in the transducer scan area just below the doubler. See Figure 2, view B to see the transducer scan area.

(3) Put the transducer on the web immediately below the doubler edge as shown in Figure 2, view B. Make sure the transducer is below and to the left of the fastener that is shown in flagnote 4.

(4) Slowly turn the transducer so it points to the slot. Turn the transducer until the signal from the bottom of the slot is at a maximum height on the screen. If the signal from the slot is less than 100 percent of full screen height, then increase the gain until the signal is at 100 percent of full screen height.

NOTE: It is satisfactory if the slot signal from the web is not exactly on 60 percent of full screen width as shown in Figure 4, view C.

(5) Slowly turn the transducer to the left to see if a crack signal occurs on the screen to the right of where the slot signal started.

(6) Turn the transducer so it points at the slot again and then slowly turn it to the left as you did in Paragraph 5.B.(5).

(7) A signal that starts immediately to the right of where the slot signal started must be examined more. See Figure 4, view C to see how a crack signal shows on the screen immediately to the right of the slot signal.

(8) Turn the transducer to the left until a signal from the fastener hole shown in Figure 2, view B, flagnote 3 shows on the screen.

(9) Slowly turn the transducer to the right to see if a crack signal shows immediately to the right of the hole signal.

C. Examine the inboard side of the web slot at station 303.9 near stringer 16 for cracks that start high on the slot as follows:

(1) Do the calibration as specified in Paragraph 4.A.

NOTE: Views A and B of Figure 4 show the calibration for cracks at the bottom of the slot; this same calibration can be used to find cracks that start high on the slot.

(2) Put sufficient couplant on the surface of the web in the transducer scan area just above the doubler. See Figure 2, view A to see the transducer scan area.

(3) Put the transducer on the web immediately above the doubler edge as shown in Figure 2, view A. See how the front edge of the transducer is against the top edge of the doubler.

(4) Slowly turn the transducer so it points at the top of the slot. Turn the transducer until the signal from the top of the slot is at a maximum height on the screen. If the signal from the slot is less that 100 percent of full screen height, then increase the gain until the signal is at 100 percent of full screen height.

NOTE: It is satisfactory if the slot signal from the web is not exactly on 70 percent of full screen width as shown in Figure 4, view B.

(5) Slowly turn the transducer to the inboard side of the slot to see if a crack signal occurs on the screen immediately to the right of where the slot signal started. See Figure 2, view A to see the location of a crack that is high on the inboard side of the slot.

(6) Turn the transducer so it points at the slot again and then slowly turn it to the inboard side of the slot as you did in Paragraph 5.C.(5).

NOTE: It is important to look carefully to the right of the slot signal as the transducer is turned to the inboard side of the slot. The crack signal could occur immediately to the right of where the slot signal started.

(7) A signal that starts immediately to the right of where the slot signal started must be examined more. See Figure 4, view B to see how a crack signal shows on the screen immediately to the right of the slot signal.

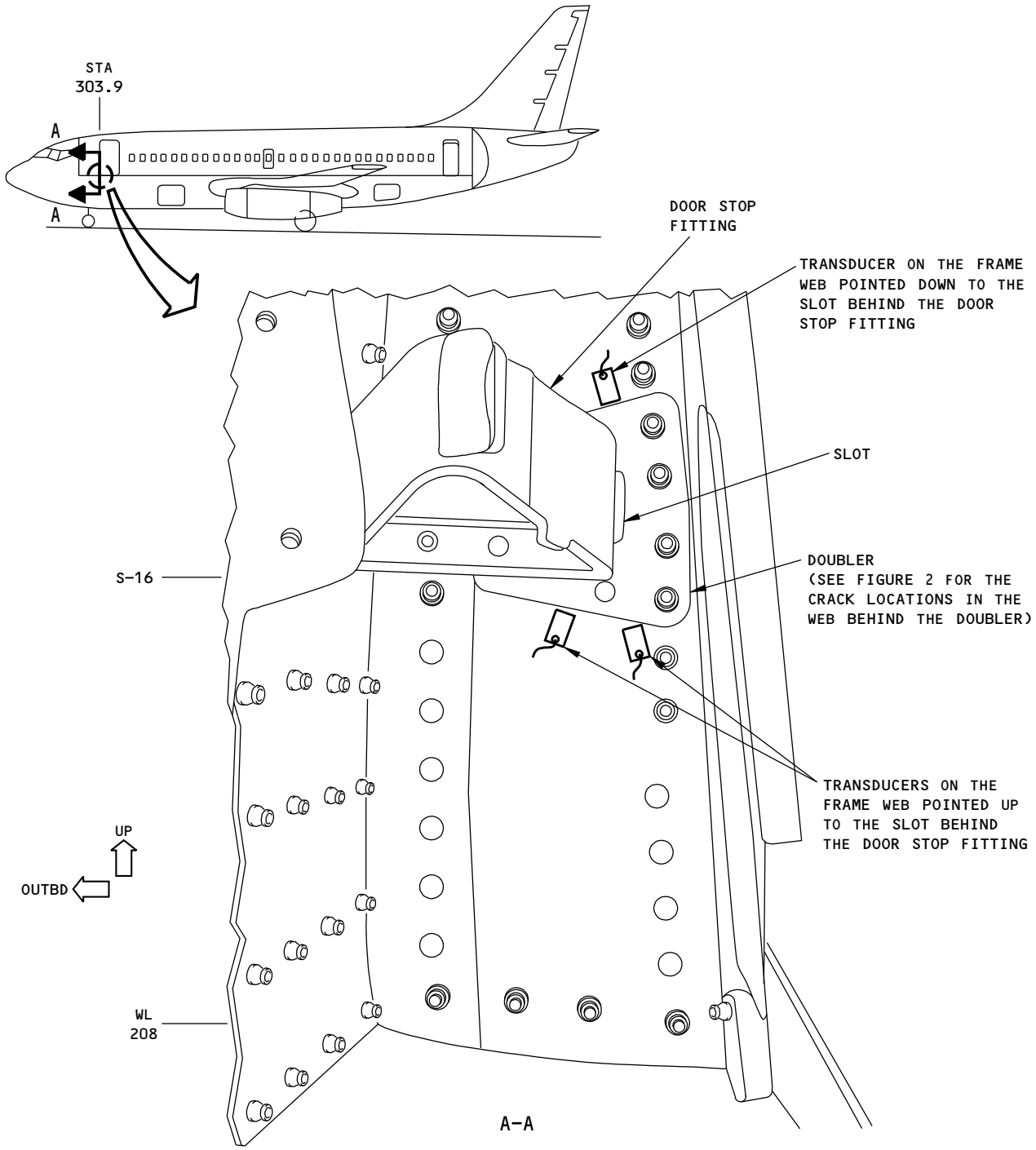
6. Inspection Results

A. An ultrasonic signal is a crack signal if:

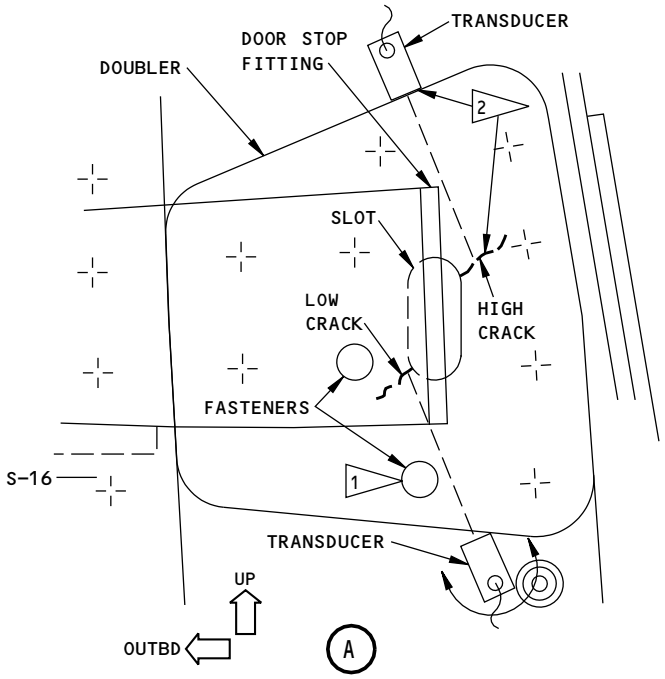
(1) The signal is 30 percent or more of full screen height and occurs to the right of the web slot signal.

(2) The signal is 30 percent or more of full screen height and occurs to the right of the signal from the hole shown in Figure 2, view B, flagnote 3.

B. Compare the signals that occur during the inspection to the signals that you got from the reference standard notches during calibration.



Inspection Location
Figure 1

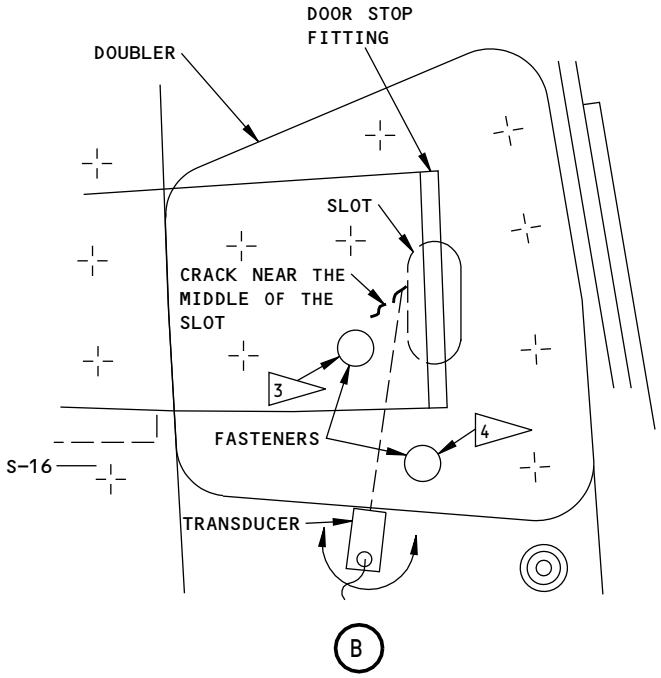


TRANSDUCER SCAN LOCATION TO FIND CRACKS THAT ARE LOW AND HIGH ON THE WEB SLOT

FOR CRACKS AT THE BOTTOM OF THE SLOT: POINT THE TRANSDUCER AT THE BOTTOM OF THE SLOT TO GET THE SLOT SIGNAL ON THE SCREEN. THEN SLOWLY TURN THE TRANSDUCER TO THE LEFT TO FIND CRACKS.

1 IF THE TRANSDUCER IS TURNED TOO FAR TO THE LEFT, A SIGNAL FROM THIS HOLE WILL SHOW ON THE SCREEN.

2 FOR CRACKS AT THE TOP OF THE SLOT: POINT THE TRANSDUCER AT THE TOP OF THE SLOT TO GET THE SLOT SIGNAL ON THE SCREEN. THEN SLOWLY TURN THE TRANSDUCER TO FIND CRACKS ON THE TOP INBOARD SIDE OF THE SLOT AS SHOWN.



TRANSDUCER SCAN LOCATION TO FIND CRACKS THAT ARE HIGH ON THE WEB SLOT

FOR CRACKS NEAR THE MIDDLE OF THE SLOT: POINT THE TRANSDUCER AT THE BOTTOM OF THE SLOT TO GET THE SLOT SIGNAL ON THE SCREEN. THEN SLOWLY TURN THE TRANSDUCER TO THE LEFT TO FIND CRACKS NEAR THE MIDDLE OF THE SLOT.

3 TURN THE TRANSDUCER TO THE LEFT TO GET A SIGNAL FROM THIS FASTENER HOLE. SEE IF THERE IS A CRACK SIGNAL TO THE IMMEDIATE RIGHT OF THE HOLE SIGNAL.

4 IF THE TRANSDUCER IS TURNED TOO FAR TO THE RIGHT, A SIGNAL FROM THIS HOLE WILL SHOW ON THE SCREEN.

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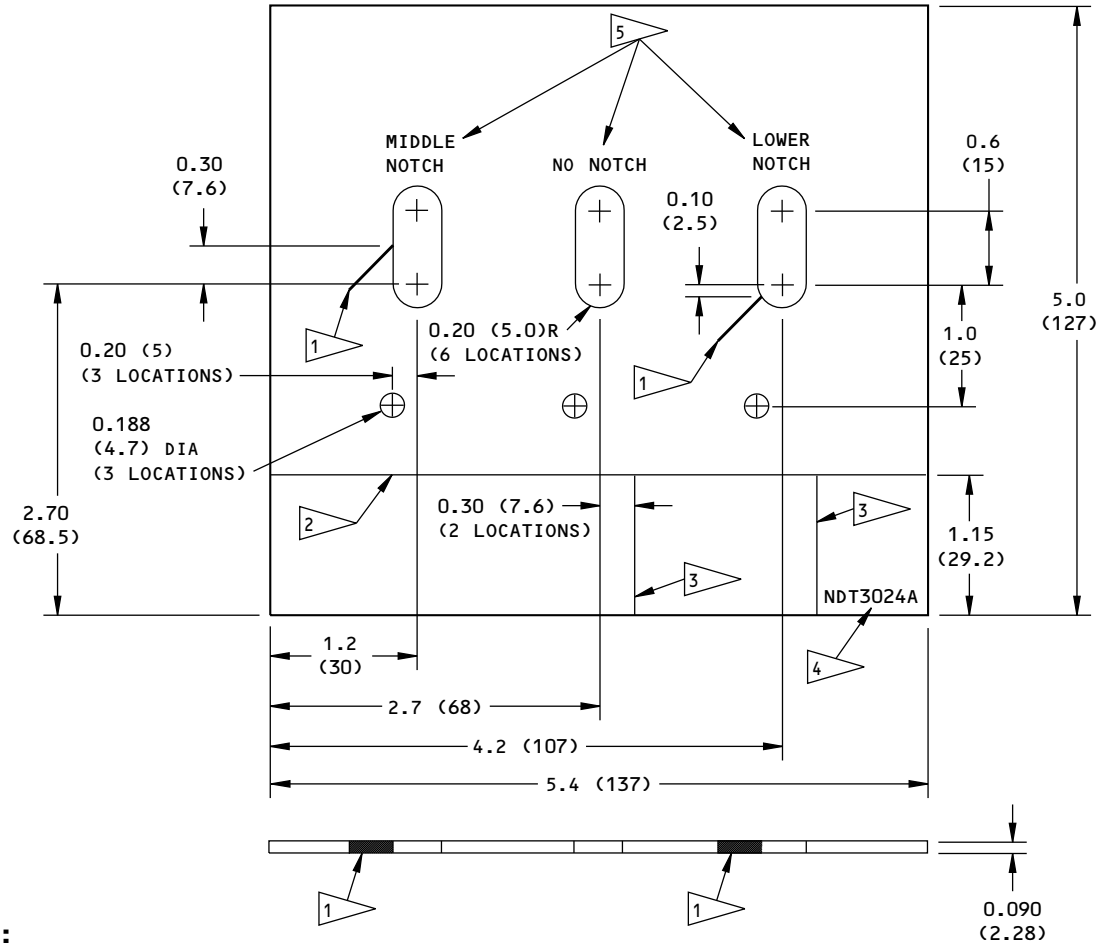
Transducer Scan Positions
Figure 2



NOTES:

- REFERENCE STANDARD NDT3024A REPLACED NDT3024 DURING THE APRIL 5, 2002 REVISION TO THIS PROCEDURE. IF YOU HAVE REFERENCE STANDARD NDT3024, IT IS NOT NECESSARY TO HAVE REFERENCE STANDARD NDT3024A FOR THIS INSPECTION. THE ONLY DIFFERENCE BETWEEN NDT3024 AND NDT3024A IS THE WORD "HIGHER" HAS BEEN REPLACED WITH "MIDDLE" ABOVE THE SLOT ON THE LEFT.
- ALL DIMENSIONS ARE IN INCHES (MILLIMETERS ARE IN PARENTHESES)
- TOLERANCES (UNLESS SPECIFIED DIFFERENTLY):

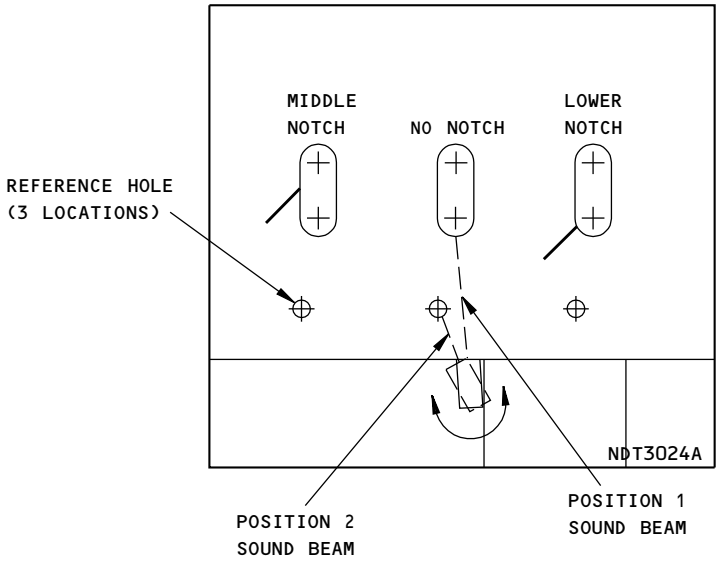
INCHES	MILLIMETERS
X.XXX = ±0.005	X.XX = ±0.10
X.XX = ±0.010	X.X = ±0.3
X.X = ±0.020	X = ±0.5

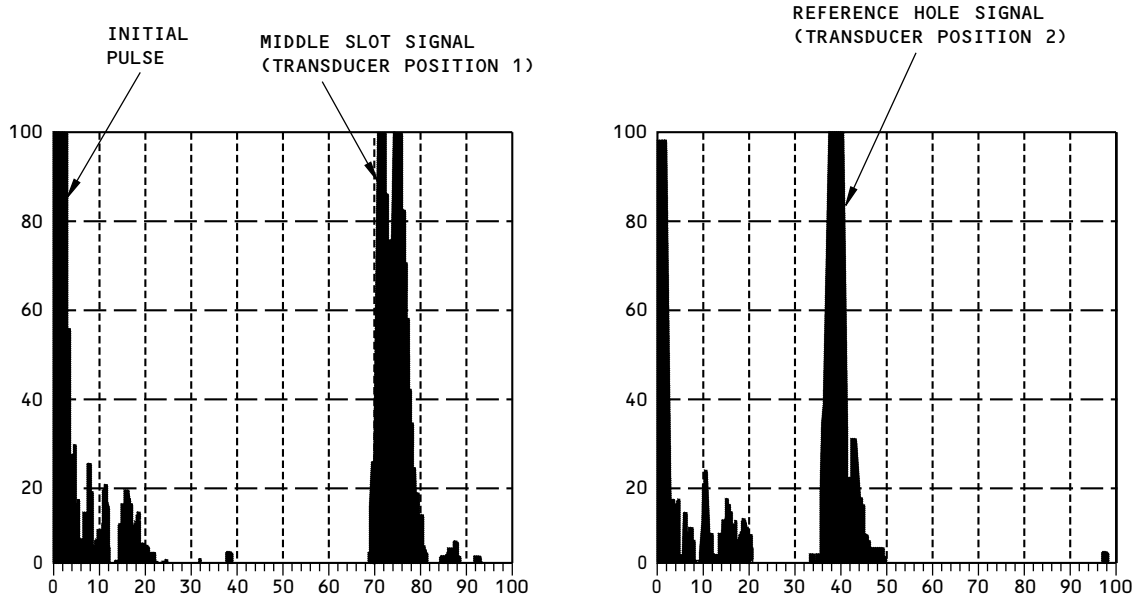
- MATERIAL: 2024-T3 CLAD OR BARE OR 7075-T6 CLAD OR BARE
- SURFACE ROUGHNESS = 125 R_a OR BETTER

1. EDM NOTCHES: 0.50 LONG (13) BY 0.02 (0.5) MAXIMUM WIDTH. DEPTH: THROUGH THE THICKNESS. ANGLE: 45 DEGREES ±1°.
2. MAKE A HORIZONTAL REFERENCE LINE FROM EDGE TO EDGE. THE MAXIMUM SCRATCH DEPTH IS 0.005 INCH (0.13).
3. MAKE TWO VERTICAL REFERENCE LINES 1.15 INCH LONG (29.2). THE MAXIMUM SCRATCH DEPTH IS 0.005 (0.13).
4. ETCH OR STEEL STAMP THE REFERENCE STANDARD NUMBER.
5. ETCH OR STEEL STAMP THE THREE LABELS APPROXIMATELY WHERE SHOWN.

2157888 S0000471294_V1

Reference Standard NDT3024A
Figure 3



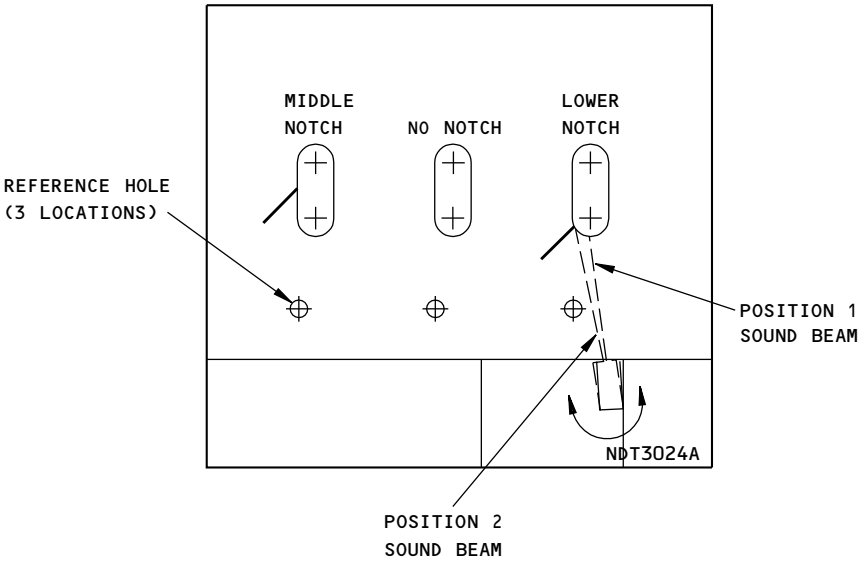


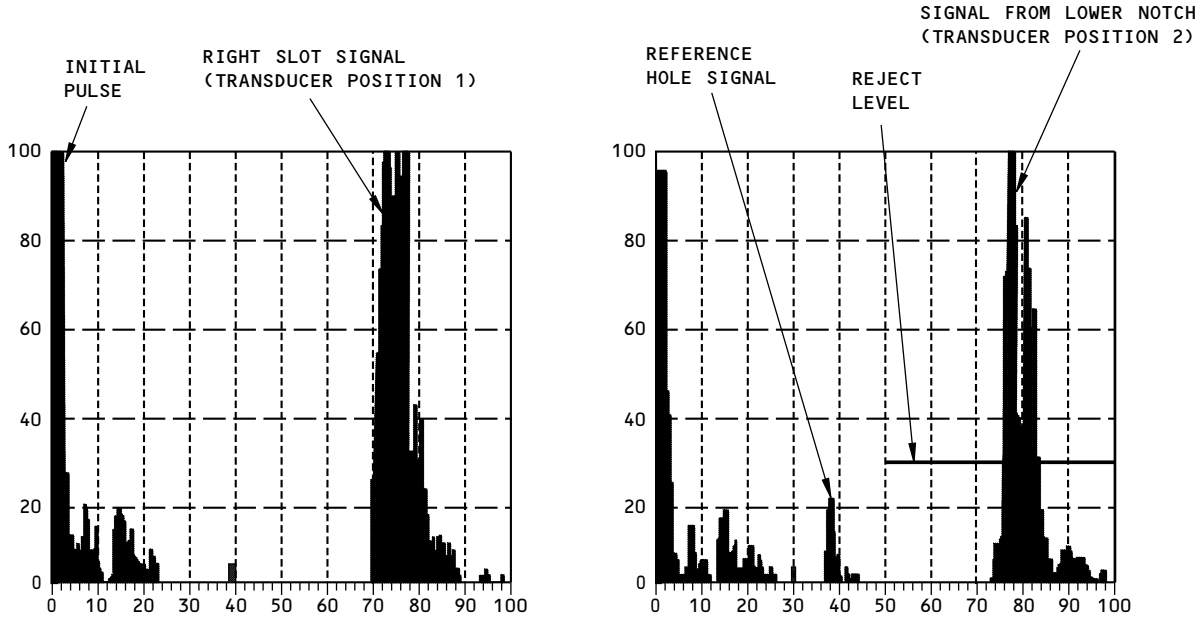
TURN THE TRANSDUCER TO THE LEFT TO SEE THE SLOT SIGNAL DECREASE AND THE REFERENCE HOLE SIGNAL SHOW ON THE SCREEN. THIS REFERENCE HOLE IS AT THE APPROXIMATE LOCATION WHERE A FASTENER IS INSTALLED ON THE FRAME WEB.

(A)

2157889 S0000471295_V1

Calibration
Figure 4 (Sheet 1 of 3)



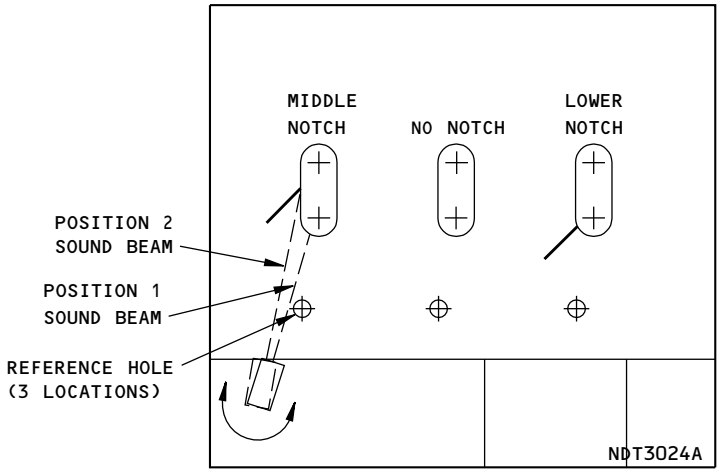


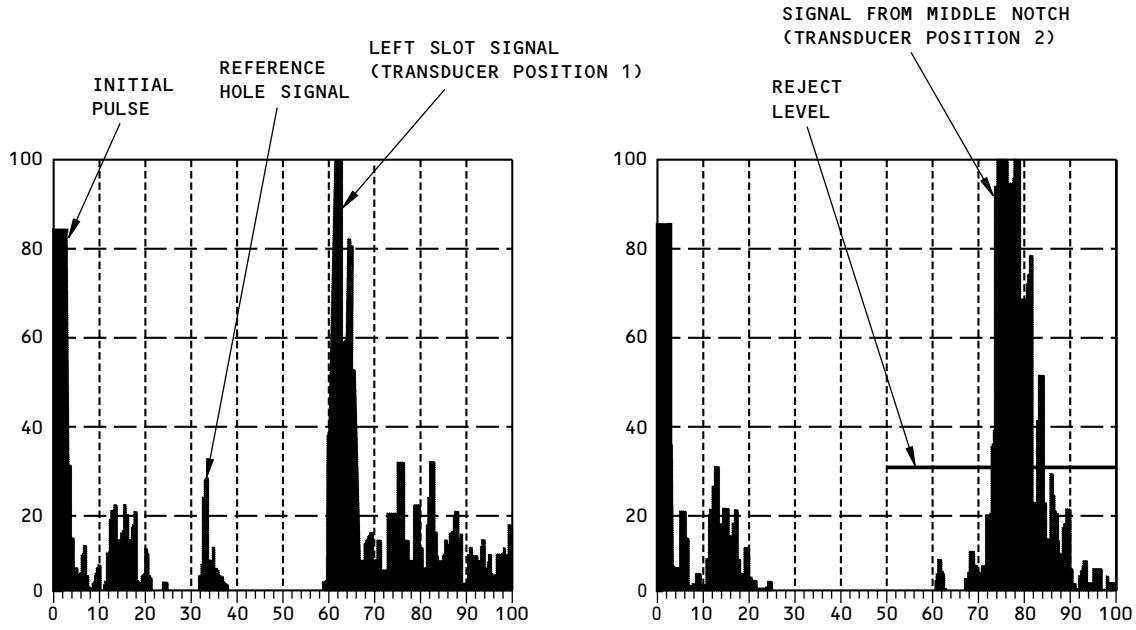
TURN THE TRANSDUCER TO THE LEFT TO SEE THE SLOT SIGNAL DECREASE AND THE NOTCH SIGNAL SHOW AT APPROXIMATELY 75 PERCENT OF FULL SCREEN WIDTH.

B

2157890 S0000471296_V1

Calibration
Figure 4 (Sheet 2 of 3)





TURN THE TRANSDUCER TO THE LEFT TO SEE THE SLOT SIGNAL DECREASE AND THE NOTCH SIGNAL SHOW AT AT APPROXIMATELY 73 PERCENT OF FULL SCREEN WIDTH.

C

NOTE:

- ALL OF THE SIGNALS IN FIGURE 4 ARE SHOWN AFTER THE SLOT SIGNALS WERE SET AT 90 PERCENT OF FULL SCREEN HEIGHT AND THEN 6 dB ADDED.
- REFERENCE STANDARD NDT3024A REPLACED NDT3024 DURING THE APRIL 5, 2002 REVISION TO THIS PROCEDURE. IF YOU HAVE REFERENCE STANDARD NDT3024, IT IS NOT NECESSARY TO HAVE NDT3024A. THE ONLY DIFFERENCE BETWEEN THE TWO IS, THE WORD "HIGHER" HAS BEEN REPLACED WITH "MIDDLE".

2157892 S0000471298_V2

Calibration
Figure 4 (Sheet 3 of 3)

PART 4 - ULTRASONIC

FRAME WEB AND INNER CHORD AT WL 201 OF THE STA 727 BULKHEAD

1. Purpose

A. Use this procedure to examine holes in the inner chord and frame web at the STA 727 bulkhead. There are six holes on each side of the airplane to be examined; five are in the frame web and one hole is in the inner chord. See Figure 1 for the holes to be examined.

B. This procedure examines the forward and aft sides of the holes in the inner chord and the inboard and outboard sides of the holes in the frame webs for cracks that start at the holes. This procedure can find near and far side corner cracks that are 0.10 inch (2.5 mm) long and are in a horizontal direction.

C. This procedure uses two shear wave transducers. One shear wave transducer puts a 45 degree shear wave in the part and the other puts a 60 degree shear wave in the part. These transducers are put above the collars and point down at the holes to be examined. See Figure 1.

D. 737 Damage Tolerance Rating (DTR) Check Form Reference:

(1) Item: 53-40-16-2

(2) Item: 53-40-16-2a

E. 737 Maintenance Planning Data (MPD) Document:

(1) Item: 53-668-00

2. Equipment

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

A. Instruments

(1) All ultrasonic instruments are permitted for use if they:

(a) Can operate at a frequency between 4 MHz and 6 MHz. Broadband instruments can be used if they can do the calibration instructions of this procedure.

(b) Can find the defects in the reference standard as specified in the calibration instructions of this procedure.

(2) The instruments that follow were used to help prepare this procedure.

(a) USN 60; Krautkramer Branson

(b) Sonic 136; Staveley Instruments

B. Transducers

(1) Two transducers with two different shear wave angles are necessary. The frequency must be between 4 MHz and 6 MHz. The transducers that follow were used to help prepare this procedure.

(a) Part number A5014, 5 MHz, 60 degree; Panametrics (This is used for the calibration on thickness “A” and “B” of reference standard NDT3092.)

(b) Part number SUSM 560AT-1, 5 MHz, 60 degree; NDT Engineering (This is used for the calibration on thickness “A” and “B” of reference standard NDT3092.)

NOTE: An SUSM 560ST transducer can also be used to do this procedure.

(c) Part number XA-455T, 5 MHz, 45 degree; Techna NDT (This is used for the calibration on thickness “C” of reference standard NDT3092.)

(d) Part number SX545AT, 5 MHz, 45 degree; NDT Engineering (This is used for the calibration on thickness “C” of reference standard NDT3092.)

NOTE: The maximum case length is 0.55 inch (14.0 mm).

C. Reference Standards - Make reference standard NDT3092 as specified in Figure 2.

D. Couplant - All ultrasonic couplants that will not damage the airplane structure can be used. A light commercial grease works good.

3. Prepare for the Inspection

A. Identify the transducer inspection surfaces that are immediately above the collars at the holes to be examined. The inspection surface is on the aft side of the aft bulkhead at station 727. See Figure 1 for the inspection areas at WL 201.

B. Remove the sealant caps from the collars that are in the inspection area. Five of these collars are on the web of the bulkhead frame. One of the collars is on the outboard side of the inner chord. See Figure 1.

C. Remove paint that is on the frame web, from the top edge of the collar to 1 inch (25.4 mm) above the top edge of the collar. Remove paint that is on the inner chord, from the top edge of the collar to 1.5 inch (38 mm) above the top edge of the collar. The width of the area above the collars that must have the paint removed is 1 inch (25.4 mm). See Figure 1 to see the transducer locations in the inspection area.

NOTE: It is not necessary to remove the primer.

D. Make sure the transducer scan areas above the collars are clean and smooth.

4. Instrument Calibration

A. Calibrate the instrument to examine holes “A”, “B” and “C” on reference standard NDT3092 as follows:

(1) Set the instrument frequency between 4 and 6 MHz.

NOTE: Frequency adjustment is not necessary if you use a broadband instrument.

(a) Make sure reject is set to off

(2) Apply a sufficient quantity of couplant on reference standard NDT3092 at the transducer location shown in Figure 3.

(3) For the calibration on hole “A” and “B”, put the front edge of the 60 degree transducer near the scribe circle at holes “A” or “B” as shown in Figure 3. For the calibration on hole “C”, put the front edge of the 45 degree transducer away from hole “C” as shown in Figure 3. Point the transducer at the hole.

(4) Move the transducer a small quantity so the hole signal is at a maximum height on the screen display. Make sure the transducer does not go across the scribe circle.

(5) Adjust the instrument delay and range controls to set the signal from the hole at 60 percent of full screen width. Set the initial pulse to 0 percent of full screen width. See Figure 3 for the screen display.

(6) Turn the transducer and move it to and away from the notch to get a maximum signal from the notch. See Figure 3.

(7) Adjust the instrument gain to set the notch signal to 80 percent of full screen height. For calibration at the “C” hole (only) with the 45 degree transducer, increase the instrument gain 6 dB.

(8) Turn the transducer to the hole and then back to the notch to compare the hole and notch signals. The notch signal occurs immediately to the right of the hole signal.

NOTE: The transducer is turned here to see how a hole signal and crack signal will occur when a scan is done on the airplane.

5. Inspection Procedure

A. Examine the holes in the frame webs and inner chords at the STA 727 bulkhead for cracks as follows:

(1) Calibrate the instrument as specified in Paragraph 4. for the holes to be examined.

(a) Make sure the correct transducer is calibrated on the correct thickness of reference standard NDT3092 for the holes to be examined on the airplane. See Figure 1.

1) To calibrate the instrument to examine the frame web:

a) Do a visual check to see if the frame web has two different thicknesses on the frame web. See Figure 1, Flag notes 1, 2 and 5 to make sure that the correct thickness (“A” or “B”) on reference standard NDT3092 was used during calibration.

2) Use thickness “C” on reference standard NDT3092 to calibrate the instrument to examine the inner chord.

(2) Put sufficient couplant on the frame web and inner chord immediately above the inspection collars. See Figure 1, Views A and B to see the transducer locations above the collars on the frame web and inner chord.

(3) Put the correct transducer on the scan area immediately above one of the collars in the inspection area on the frame web or inner chord.

(a) See Figure 1 to make sure that the correct transducer and the correct hole on reference standard NDT3092 were used during calibration.

(4) Move the transducer to and away from the collar so that the hole signal is at a maximum height.

(a) If the hole signal does not occur on the screen display, increase the gain until the hole signal is between 10 and 20 percent of full screen height. Do not lower the gain if the hole signal is initially above 20 percent of full screen height.

(5) Move the transducer from side to side with the front of the transducer at the edge of the collar until the hole signal occurs. Then turn the transducer approximately 10 to 15 degrees to the left and right to look for and find possible cracks.

NOTE: This will help find cracks that are off angle and will show the difference between the hole signal and a crack signal.

NOTE: If a crack is on the inboard side of the inner chord, it is possible that the crack signal will be farther to the right of the hole signal as compared to the signals shown in Detail III in Figure 3.

(a) Do the steps that follow, as applicable, at each hole location:

1) Refer to the transducer positions and scans you did during calibration.

2) During examination of the frame web, slowly move the transducer away (up) from the collar as much as 0.5 to 0.75 inch (13 to 19 mm) and monitor the instrument for crack signals to occur to the right of the hole signal.

3) During examination of the inner chord, slowly move the transducer away (up) from the collar as much as 1.0 inch (25.4 mm) and monitor the instrument for crack signals to occur to the right of the hole signal.

4) Examine each side of each hole in the inspection area for cracks.

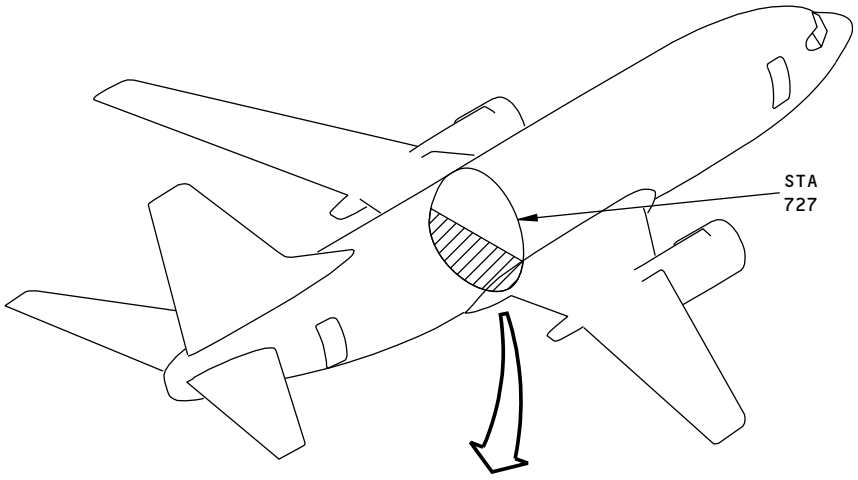
(6) Continue to do Paragraph 5. until all of the holes in the inspection areas have been examined for cracks. During each inspection, make sure the correct calibration is done for all of the holes in the inspection areas on each side of the airplane.

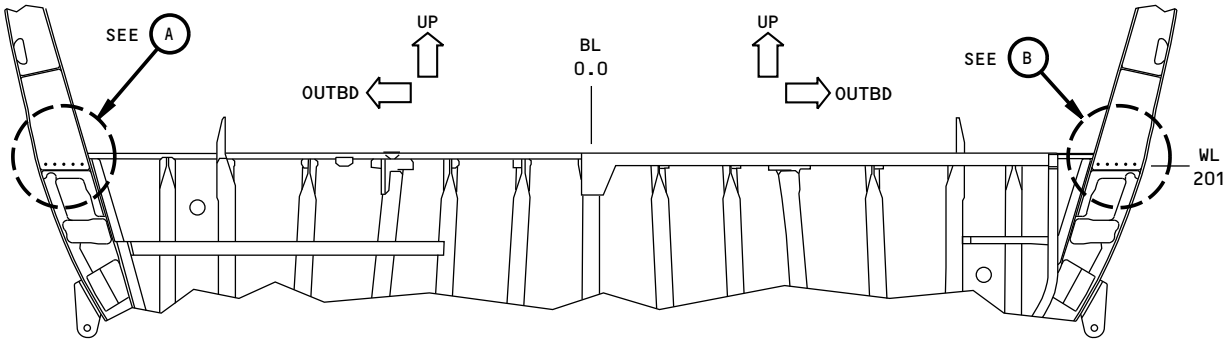
(7) When this inspection has been completed, apply paint and sealant at the locations where it was removed to do this inspection. Refer to the Airplane Maintenance Manual for more data on paint and sealant.

6. Inspection Results

A. Ultrasonic signals that are 40% (or more) of full screen height and are to the right of the hole signal are possible crack indications. Compare the signals that occurred during the inspection with the signals from the notch on the reference standard. See Figure 3 for the reject level on the screen display.

B. To make sure that a crack signal is from a crack, remove the bolt and do an open hole eddy current inspection as specified in Part 6, 51-00-00, Procedure 16.

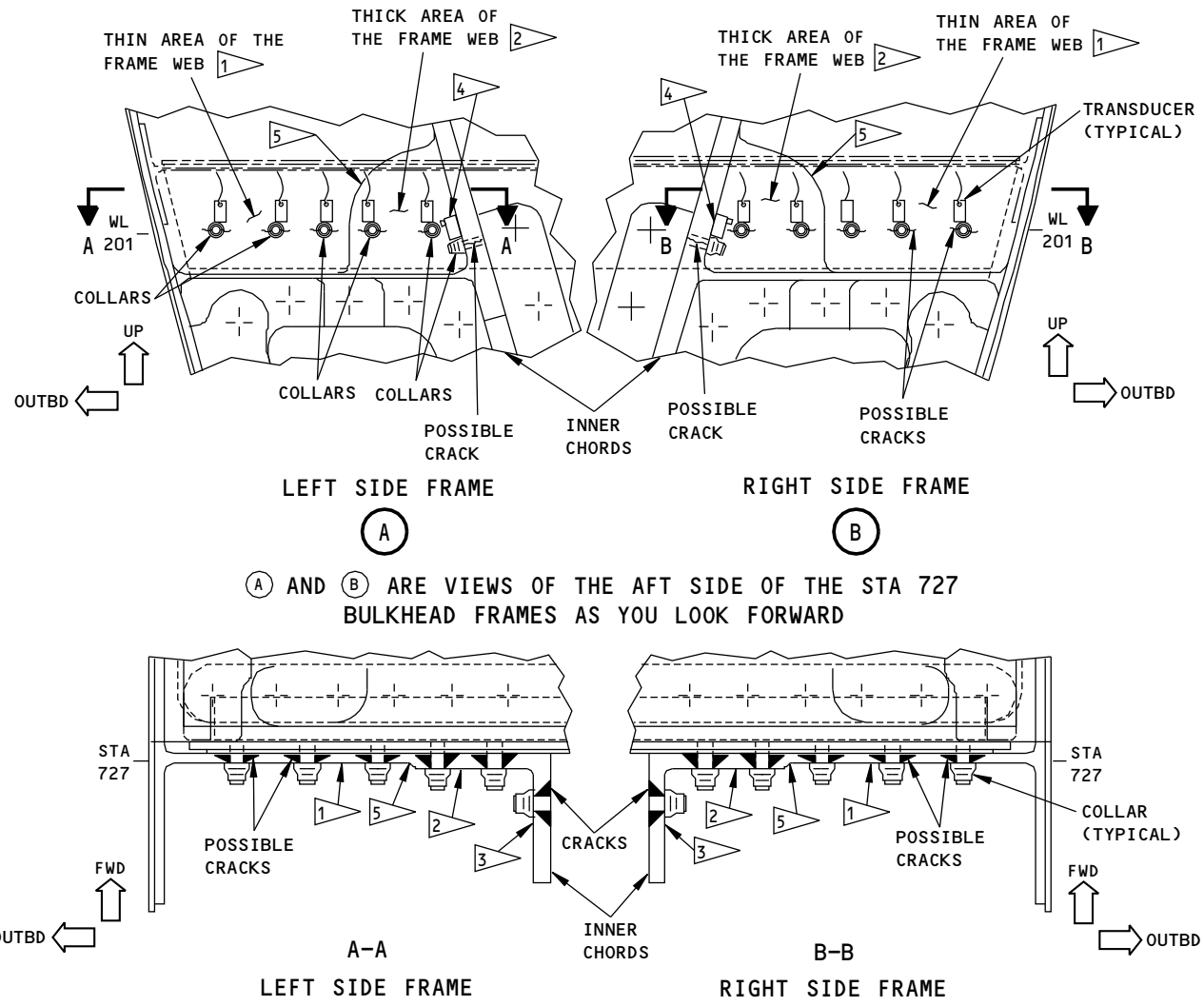




VIEW OF THE STATION 727 BULKHEAD
AS YOU LOOK FORWARD

2157893 S0000471304_V1

Inspection Areas - Frame Webs and Inner Chords at the BS 727 Bulkhead
Figure 1 (Sheet 1 of 2)



1 THIS IS THE THIN AREA OF THE FRAME WEB. USE A 60 DEGREE TRANSDUCER ON THICKNESS "A" OF REFERENCE STANDARD NDT3092 DURING CALIBRATION TO EXAMINE THE 3 HOLES FROM THIS SURFACE. SEE FLAG NOTE 5 FOR MORE DATA.

2 THIS IS THE THICK AREA OF THE FRAME WEB. USE A 60 DEGREE TRANSDUCER ON THICKNESS "B" OF REFERENCE STANDARD NDT3092 DURING CALIBRATION TO EXAMINE THE 2 HOLES FROM THIS SURFACE. SEE FLAG NOTE 5 FOR MORE DATA.

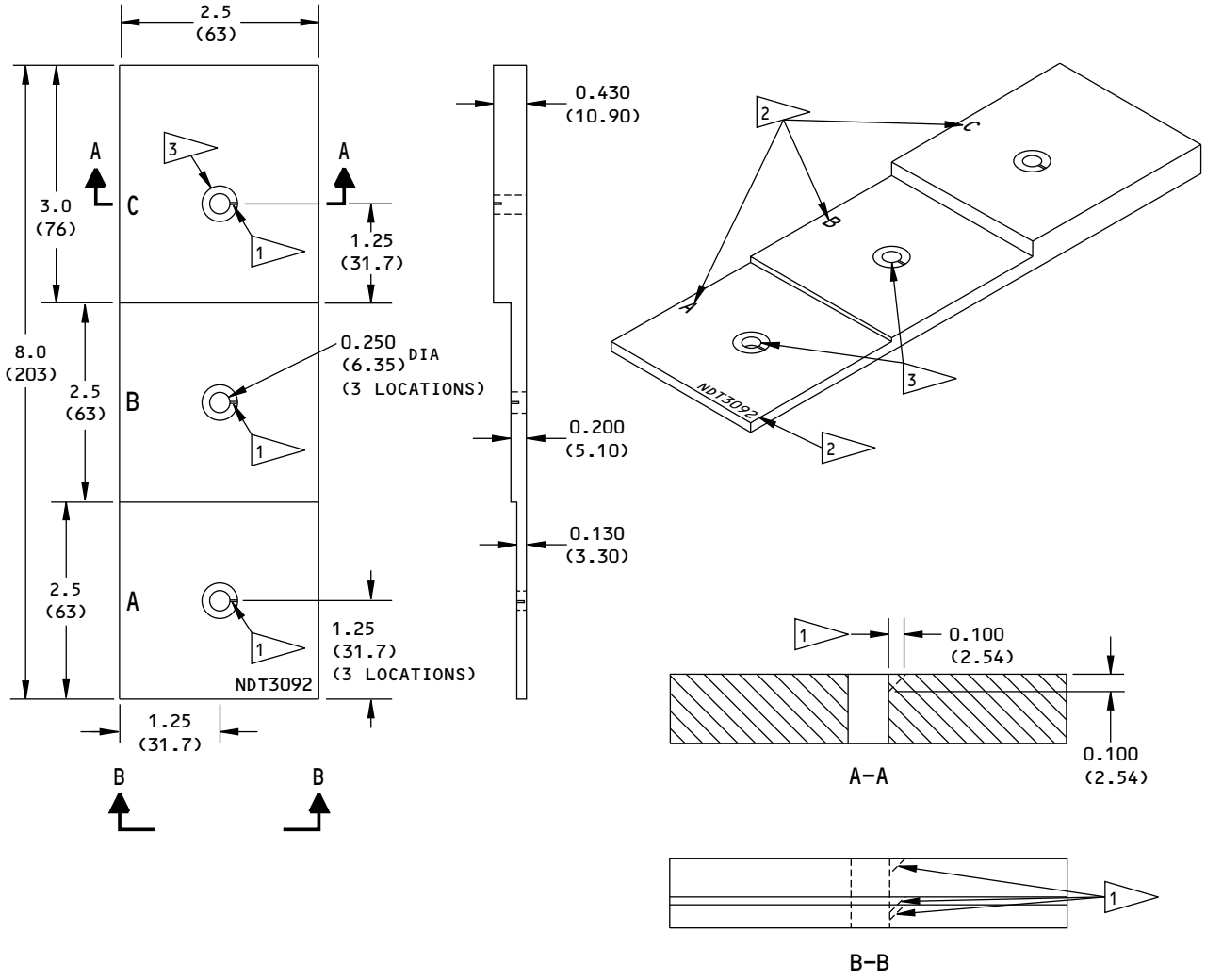
3 THIS IS THE INNER CHORD OF THE FRAME. USE A 45 DEGREE TRANSDUCER ON THICKNESS "C" OF REFERENCE STANDARD NDT3092 DURING CALIBRATION TO EXAMINE THE HOLE FROM THIS SURFACE OF THE INNER CHORD.

4 THIS IS THE TRANSDUCER ON THE INNER CHORD. SEE PAR. 5 FOR MORE DATA ON THE TRANSDUCER SCANS.

5 THIS IS THE MACHINED LINE THAT DIVIDES THE TWO THICKNESSES ON THE FRAME WEB. SOME AIRPLANES DO NOT HAVE THIS MACHINED LINE THAT DIVIDES THE THICK AND THIN AREAS OF THE FRAME WEB. IF THIS MACHINED LINE IS NOT ON THE FRAME WEB, CALIBRATE THE EQUIPMENT ON THICKNESS "A" OF REFERENCE STANDARD NDT3092 TO EXAMINE ALL 5 HOLES OF THE FRAME WEB.

2157895 S0000471305_V1

Inspection Areas - Frame Webs and Inner Chords at the BS 727 Bulkhead
Figure 1 (Sheet 2 of 2)



NOTES:

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

INCHES	MILLIMETERS
X.XXX = ±0.005	X.XX = ±0.10
X.XX = ±0.010	X.X = ±0.3
X.X = ±0.020	X = ±0.5

- MATERIAL: 2024-T3 ALUMINUM (7075-T6 OPTIONAL) (CLAD OR BARE)
- THE CORNER EDM NOTCH DIMENSIONS AND LOCATIONS ARE THE SAME AT ALL THREE HOLES ("A", "B" AND "C").

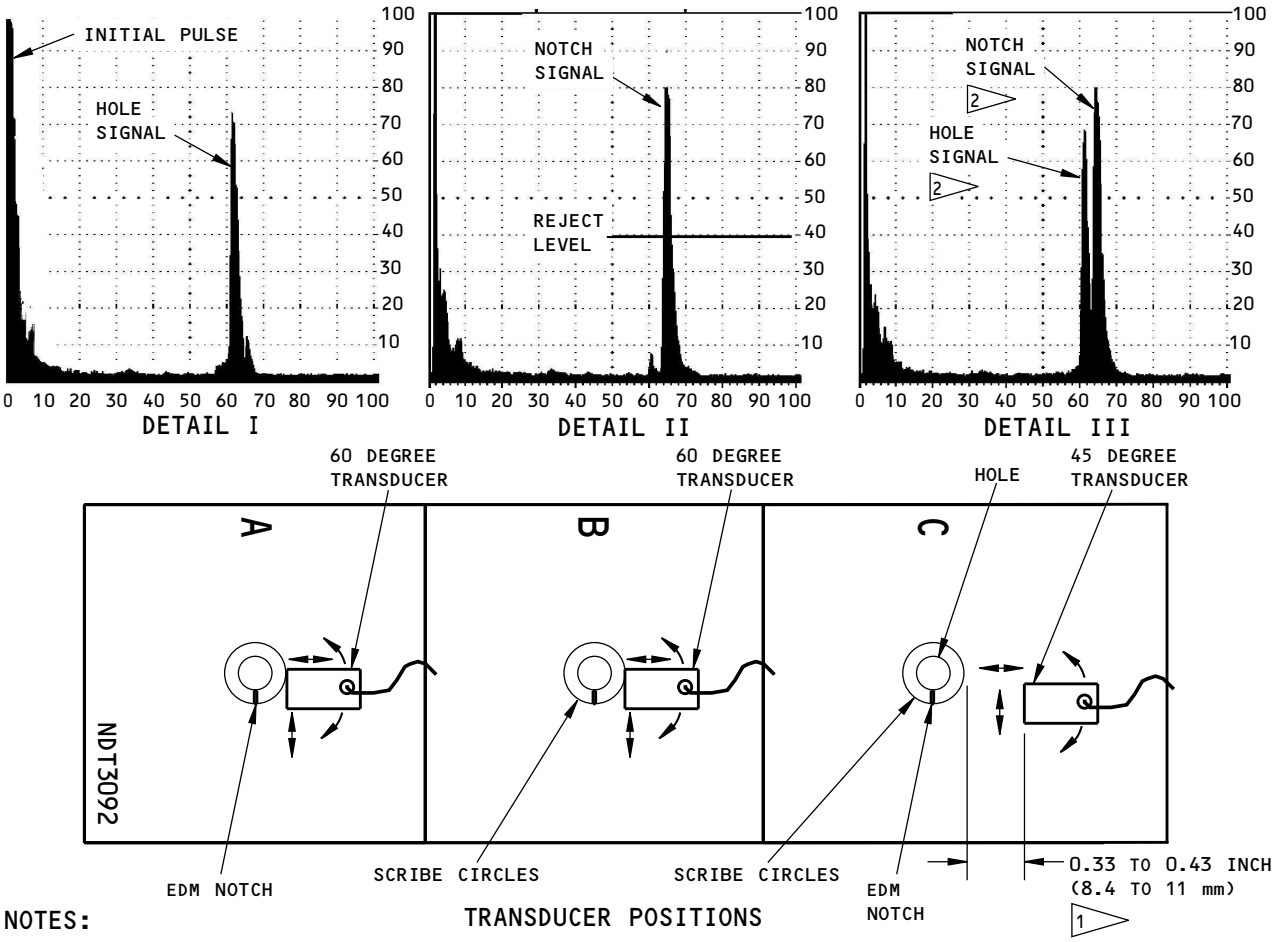
1 EDM CORNER NOTCHES ON THE UPPER SURFACES AT ALL THREE HOLES AS SHOWN ABOVE. MAXIMUM NOTCH WIDTH: 0.007 (0.18)

2 ETCH OR STEEL STAMP THE REFERENCE STANDARD NUMBER NDT3092, AND "A", "B" AND "C", WHERE SHOWN.

3 MACHINE A "SCRIBE CIRCLE" ON THE SURFACE AROUND ALL 3 HOLES. SCRIBE CIRCLE CHARACTERISTICS:
DIAMETER: 0.45 (11.4)
MAXIMUM SCRATCH DEPTH: 0.005 (0.13)
MAXIMUM SCRATCH WIDTH: 0.005 (0.13)
(THESE ARE NOT COUNTERSUNK HOLES)

2157896 S0000471306_V1

Reference Standard NDT3092
Figure 2



NOTES:

- THE SIGNALS SHOWN IN DETAILS I, II AND III WERE FROM CALIBRATION ON NDT3092, THICKNESS "C", WITH A 45 DEGREE TRANSDUCER.
- DO THE CALIBRATION ON NDT3092 THICKNESS "A" AND "B" WITH A 60 DEGREE TRANSDUCER. THE SIGNALS FROM CALIBRATION ON NDT3092 THICKNESS "A" AND "B" WILL BE ALMOST EQUIVALENT TO THE SIGNALS SHOWN ABOVE.
- DO THE CALIBRATION ON THICKNESS "A", "B" OR "C", AS APPLICABLE, FOR THE HOLE IN FIGURE 1 TO BE EXAMINED.
- PUT THE TRANSDUCER AT THE LOCATIONS SHOWN ABOVE.
- TURN THE TRANSDUCER TO THE LEFT AND RIGHT TO SEE THE HOLE AND NOTCH SIGNALS ON THE SCREEN DISPLAY.
- SET THE HOLE SIGNAL TO OCCUR AT 60 PERCENT OF FULL SCREEN WIDTH AS SHOWN ABOVE.
- TURN AND ADJUST THE TRANSDUCER UNTIL THE NOTCH SIGNAL IS AT A MAXIMUM HEIGHT. THEN SET THE NOTCH SIGNAL AT 80 PERCENT OF FULL SCREEN HEIGHT. FOR THE CALIBRATION ON HOLE "C" WITH THE 45 DEGREE TRANSDUCER, INCREASE THE INSTRUMENT GAIN 6 DB. DO NOT INCREASE THE GAIN BY 6 DB DURING THE CALIBRATION ON HOLES "A" AND "B".

1 THIS DISTANCE FROM THE TRANSDUCER TO THE SCRIBE CIRCLE APPLIES ONLY TO NDT3092, THICKNESS "C", WITH A 45 DEGREE TRANSDUCER.

2 THESE HOLE AND NOTCH SIGNALS WILL NOT OCCUR AT THE SAME TIME AT THIS SCREEN HEIGHT. THE TWO SIGNALS ARE SHOWN TOGETHER HERE TO SHOW HOW NEAR THE TWO SIGNALS ARE. AS THE TRANSDUCER IS TURNED TO THE NOTCH, THE HOLE SIGNAL WILL DECREASE AND THE NOTCH SIGNAL WILL INCREASE. THE DISTANCE BETWEEN THE HOLE SIGNALS AND THE NOTCH SIGNALS FOR HOLES "A" AND "B" WILL BE MORE.

2157900 S0000471307_V1

Calibration Signals and Transducer Positions
Figure 3

PART 4 - ULTRASONIC

FORWARD CARGO DOOR SURROUND - FORWARD AND AFT EDGE FRAMES AT STA 440 AND 492.4

1. Purpose

A. Use this procedure to examine the outer chord of the forward and aft edge frames of the forward cargo door surround for cracks. The chord is examined at two fastener hole locations for each door stop and at two fastener hole locations for each sill clip. See Figure 1 for the inspection areas.

B. 737 Damage Tolerance Rating (D626A001-DTR) Reference:

(1) Item: 53-30-08-2

2. Equipment

A. General

(1) All ultrasonic test instruments are permitted for use if they can be calibrated on the reference standard as specified in Paragraph 4.

(2) Refer to Part 1, 51-01-00, for data about the equipment manufacturers.

B. Instrument

(1) The pulse-echo, ultrasonic instruments that follow were used to help prepare this procedure.

(a) USN 60; GE Inspection Technologies

(b) 380M; Sonatest

C. Transducer

(1) Use a transducer that:

(a) Operates at 5 MHz.

(b) Causes a 45 degree shear wave in aluminum.

(c) Has a maximum length of 0.375 inch (9.53 mm).

(d) Has a maximum width of 0.25 inch (6.3 mm).

(2) The transducers that follow were used to help prepare this procedure.

(a) XA-455T; Techna NDT

(b) SX 545AT; Olympus (NDT Engineering)

D. Reference Standard

(1) Use reference standard NDT3116. See Figure 2 for data about the reference standard.

E. Couplant

(1) Use couplant that is permitted for use with airplane structure.

3. Prepare for the Inspection

A. Identify the inspection area. See Figure 1.

B. Remove the latches (and other brackets or fittings that will get in the way when you use the ultrasonic transducer to examine the door stops) from the forward and aft door surround edge frames.

C. Remove sealant or loose paint. Clean the area that the transducer will touch.

4. Instrument Calibration

A. Door Stops

(1) Connect the transducer to the instrument.

(2) Put couplant on the reference standard at transducer position 1 as shown in Detail A in Figure 3.

(3) Set the initial pulse at 0% of full screen width (see Detail C in Figure 3).

(4) Put the transducer on the reference standard at transducer position 1 (see Detail A in Figure 3).

(5) Adjust the transducer to get a signal from the hole.

(6) Adjust the hole signal so that it is at 50% of full screen width (see Detail C in Figure 3).

(7) Turn the transducer to Position 2 (see Detail B in Figure 3) and monitor the signal that occurs from the EDM notch. Keep the transducer as near as possible to the scribe line because, on the airplane, there is a cutout on the opposite side of the chord that can cause a signal if the transducer is moved too far back.

NOTE: Do not move the transducer across the scribe lines.

(8) Adjust the gain so the notch signal is at 80 percent of full screen height.

(9) Turn the transducer toward the hole and monitor how the height of the notch signal decreases and the hole signal increases.

B. Sill Clips

(1) Connect the transducer to the instrument.

(2) Put couplant on the reference standard at transducer position 1 as shown in Detail A in Figure 4.

(3) Set the initial pulse at 0% of full screen width (see Detail C in Figure 4).

(4) Put the transducer on the reference standard at transducer position 1 (see Detail A in Figure 4).

(5) Adjust the transducer to get a signal from the hole.

(6) Adjust the hole signal so that it is at 30% of full screen width (see Detail C in Figure 4).

(7) Move the transducer to transducer position 2 (see Detail A in Figure 4) and monitor the signal that occurs from the EDM notch. Keep the transducer as near as possible to scribe line A.

NOTE: Do not move the transducer across the scribe lines.

(8) Adjust the gain so the notch signal is at 80 percent of full screen height.

(9) Move the transducer to the hole and monitor how the position of the signal moves back to 30% of the full screen width and the hole signal increases.

(10) Move the transducer to the side of the hole without a notch. Make sure that a notch signal does not occur.

(11) Put couplant on the reference standard at transducer position 3 as shown in Detail B in Figure 4.

(12) Keep the instrument settings from Paragraph 4.B.(6) and Paragraph 4.B.(8).

(13) Put the transducer on the reference standard at transducer position 3 (see Detail B in Figure 4).

(14) Monitor the hole signal. It will be almost the same as the hole signal with the transducer at transducer position 1.

(15) Move the transducer to transducer position 4 (see Detail B in Figure 4) and monitor the position of the notch signal. The notch signal will be nearer to the hole signal than the transducer position 2 notch signal (see Detail C in Figure 4).

5. Inspection Procedure

A. Door Stops - Examine the outer chord of the forward and aft edge frames of the forward cargo door surround for cracks at each door stop as follows:

(1) Find the inspection area. See Figure 1.

(2) Calibrate the equipment as specified in Paragraph 4.A. for door stops.

(3) Put couplant on the surface of the outer chord at the approximate transducer locations shown in Figure 1 for the door stops.

(4) Put the transducer on the outer chord at one of the transducer locations shown in Figure 1 for the door stops (see Section B-B).

(5) Point the transducer so sound is transmitted to the fastener hole in the inspection area as shown by flagnote 2 in Figure 1 (see Section B-B).

(6) Move the transducer to get a signal from the hole (keep the transducer as near as possible to the scribe line because there is a cutout on the opposite side of the outer chord that can cause a signal if the transducer is backed off too far). If you cannot get a signal from the fastener hole, increase the gain until you get a signal that is 30% of full screen height.

(7) Turn the transducer away from the hole as shown by flagnote 3 in Figure 1 (see Section B-B) and monitor the screen display for crack signals. Do Paragraph 5.A.(3) thru Paragraph 5.A.(7) on the opposite side of the fastener hole.

(8) Do Paragraph 5.A.(3) thru Paragraph 5.A.(7) for the fastener hole on the opposite side of the door stop.

(9) Do Paragraph 5.A.(3) thru Paragraph 5.A.(8) at the remaining door stops shown in Figure 1. There are 10 door stops total; 5 on the aft edge frame (STA 492.4) and 5 on the forward edge frame (STA 440).

B. Sill Clips - Examine the outer chord of the forward and aft edge frames of the forward cargo door surround for cracks at the forward and aft lower sill clips as follows:

(1) Find the inspection area. See Figure 1, View B.

(2) Calibrate the equipment as specified in Paragraph 4.B. for sill clips.

(3) Put couplant on the surface of the outer chord at the approximate transducer location shown by flagnote 5 in Figure 1.

(4) Put the transducer on the outer chord at the location shown by flagnote 5 in Figure 1.

(5) Point the transducer so sound is transmitted to the fastener hole in the inspection area as shown by flagnote 5 in Figure 1.

(6) Move the transducer to get a signal from the hole. If you cannot get a signal from the fastener hole, increase the gain until you get a signal that is 30% of full screen height.

(7) Move the transducer away from the hole as shown by flagnote 6 in Figure 1 and monitor the screen display for crack signals. Turn the transducer a small quantity as you move it to find off-angle cracks.

NOTE: This transducer position is used to find cracks on the near and the far holes. As shown in the calibration procedure in Paragraph 4.B., the near and far hole crack signals will be almost the same, but the near hole crack signals will be nearer to where the hole signal is (approximately 40% of full screen width). Far hole crack signals will be farther from the hole signal position (approximately 80% of full screen width).

(8) Do Paragraph 5.A.(3) thru Paragraph 5.A.(7) on the inboard side of the fastener hole.

(9) Do Paragraph 5.A.(3) thru Paragraph 5.A.(8) at the other sill clip location. There are 2 sill clips, one on the aft edge frame (STA 492.4) and one on the forward edge frame (STA 440).

6. Inspection Results

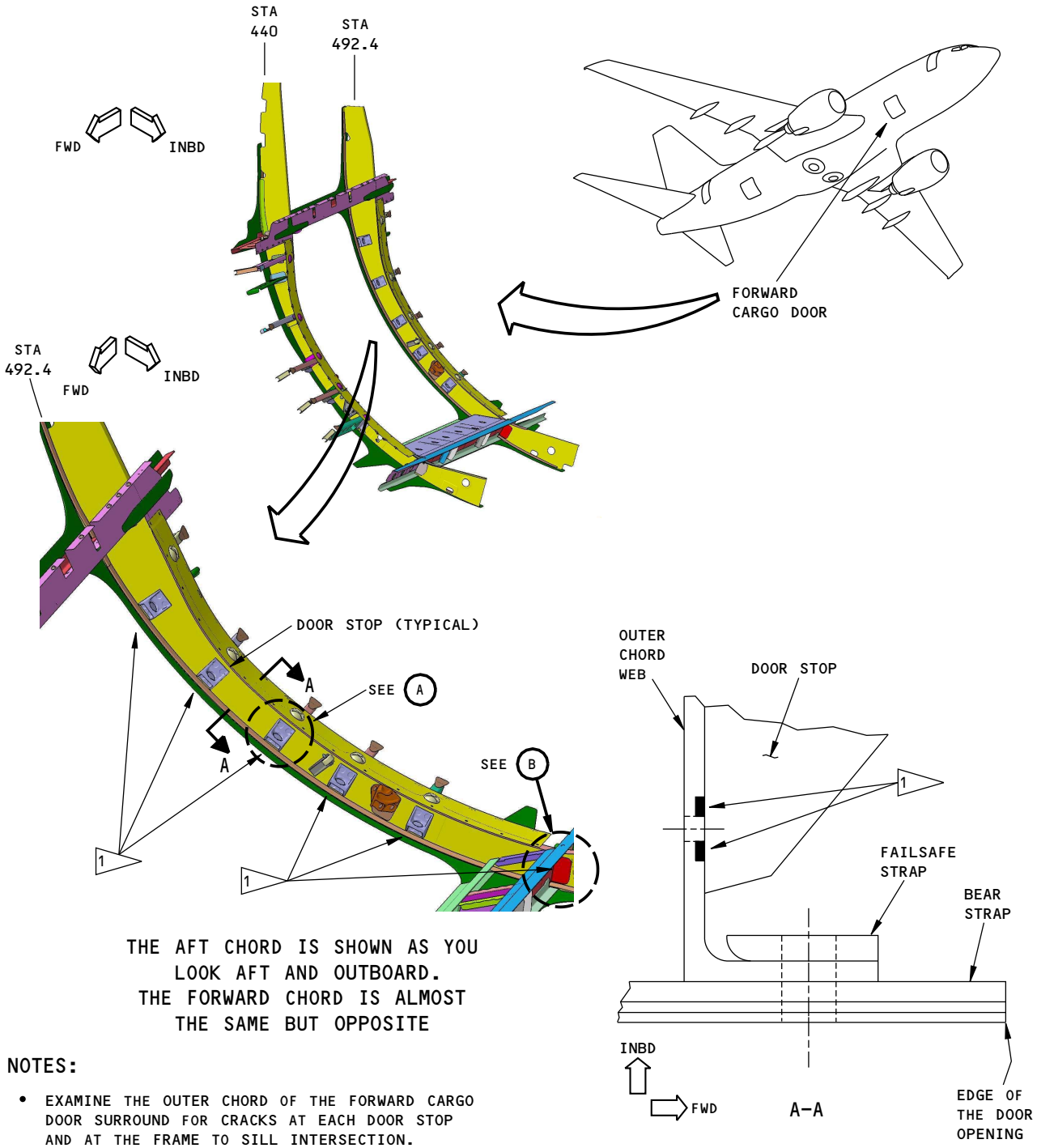
A. Signals that are 40 percent (or more) of full screen height and are immediately to the right of the hole signal can be crack indications.

B. If you get a crack indication, remove the couplant from the surface of the outer chord in front of the transducer and do the scan again. Too much couplant on the surface can cause an incorrect crack indication to occur.

C. Compare the signal from the crack indication with the signal you get from the EDM notch in the reference standard. Put the transducer on the reference standard at the same distance between the fastener hole and the transducer that you had on the airplane.

D. A signal that is almost the same as the one you got from the EDM notch in the reference standard is a crack indication.

E. Remove the fastener to do an open hole eddy current inspection as specified in Part 6, 51-00-00, Procedure 16, to make sure there is a crack.



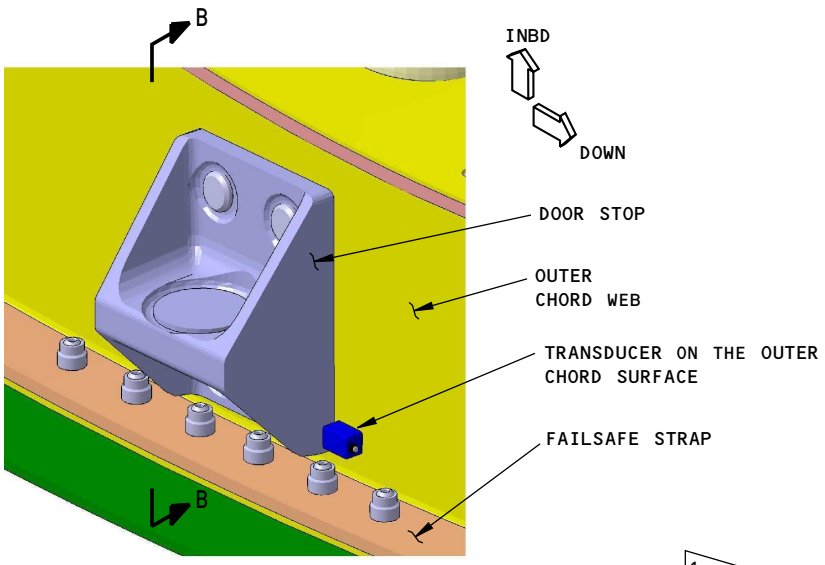
NOTES:

- EXAMINE THE OUTER CHORD OF THE FORWARD CARGO DOOR SURROUND FOR CRACKS AT EACH DOOR STOP AND AT THE FRAME TO SILL INTERSECTION.

1 DTR CHECK FORM ITEM 53-30-08-2 INSPECTION AREA

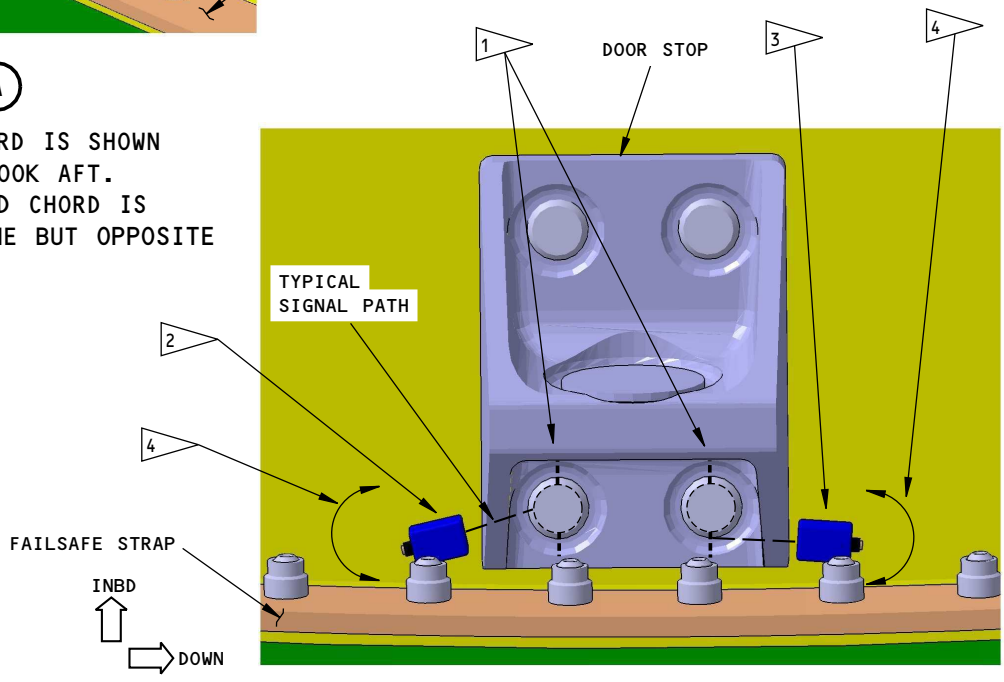
2157903 S0000471309_V1

Inspection Area
Figure 1 (Sheet 1 of 4)



A

THE AFT CHORD IS SHOWN
AS YOU LOOK AFT.
THE FORWARD CHORD IS
ALMOST THE SAME BUT OPPOSITE



B-B

NOTES:

- EXAMINE THE OUTER CHORD OF THE FORWARD CARGO DOOR SURROUND AT EACH DOOR STOP FOR CRACKS ON EACH (INBOARD AND OUTBOARD) SIDE OF THE FASTENER HOLES AS SHOWN. THERE ARE 2 HOLES TO EXAMINE FOR EACH DOOR STOP.

1 DTR CHECK FORM ITEM 53-30-08-2 INSPECTION AREA

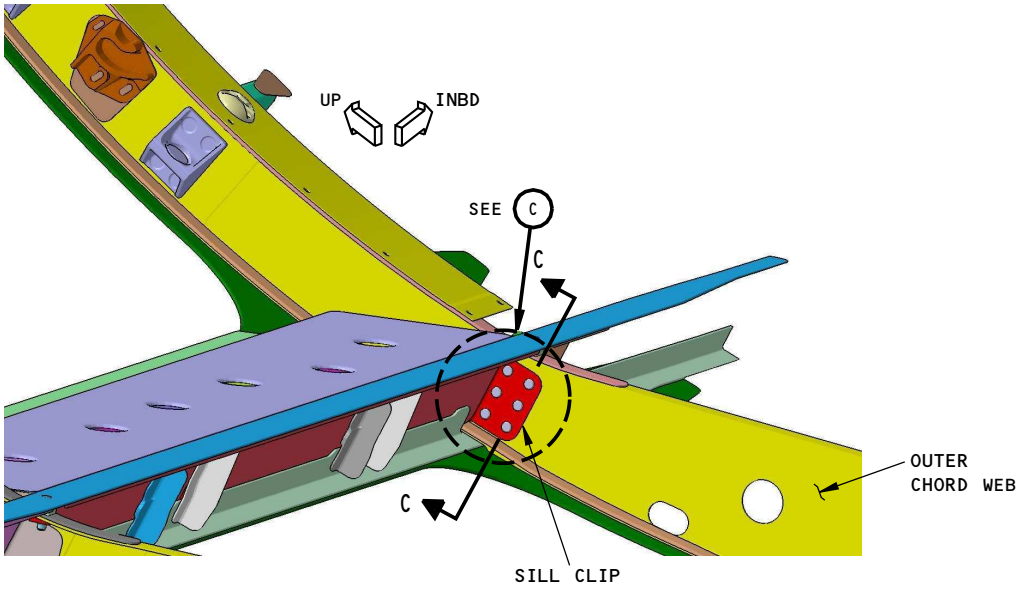
2 TYPICAL TRANSDUCER DIRECTION TO GET A HOLE SIGNAL

3 TYPICAL TRANSDUCER DIRECTION TO LOOK FOR A CRACK SIGNAL

4 MOVE AND TURN THE TRANSDUCER IN THE AREA SHOWN TO FIND THE HOLE OR CRACK SIGNALS.

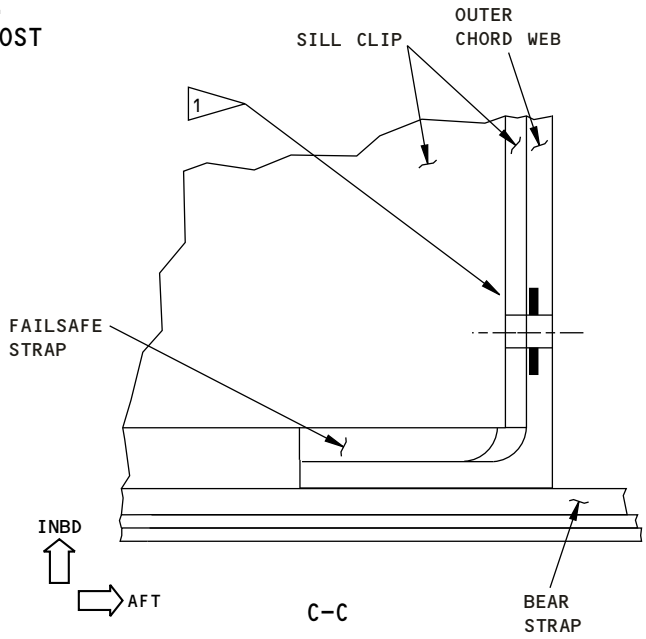
2157905 S0000471310_V1

Inspection Area
Figure 1 (Sheet 2 of 4)



THE AFT CHORD IS SHOWN AS YOU LOOK AFT AND OUTBOARD. THE FORWARD CHORD IS ALMOST THE SAME BUT OPPOSITE

B



THE AFT CHORD IS SHOWN; THE FORWARD CHORD IS ALMOST THE SAME BUT OPPOSITE

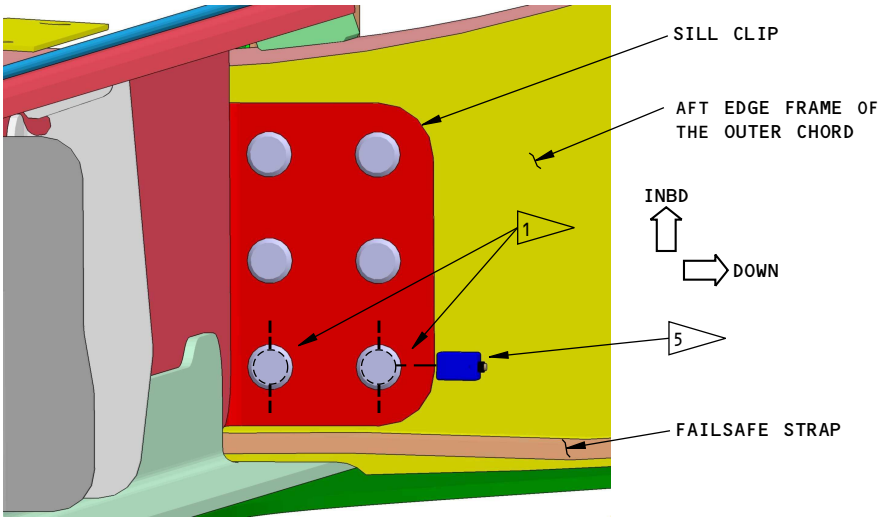
NOTES:

- EXAMINE THE OUTER CHORD OF THE FORWARD CARGO DOOR SURROUND AT EACH SILL CLIP FOR CRACKS ON EACH SIDE OF 2 FASTENER HOLES AS SHOWN.

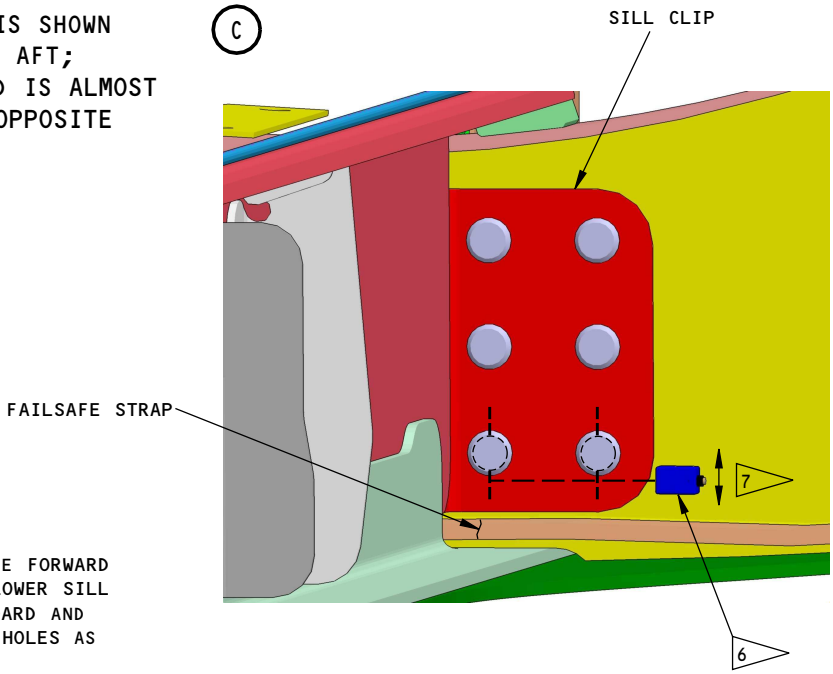
1 DTR CHECK FORM ITEM 53-30-08-2 INSPECTION AREA

2157906 S0000471311_V1

Inspection Area
Figure 1 (Sheet 3 of 4)



THE AFT CHORD IS SHOWN AS YOU LOOK AFT; THE FORWARD CHORD IS ALMOST THE SAME BUT OPPOSITE



NOTES:

- EXAMINE THE OUTER CHORD OF THE FORWARD CARGO DOOR SURROUND AT EACH LOWER SILL CLIP FOR CRACKS ON EACH (INBOARD AND OUTBOARD) SIDE OF 2 FASTENER HOLES AS SHOWN.

1 DTR CHECK FORM ITEM 53-30-08-2 INSPECTION AREA

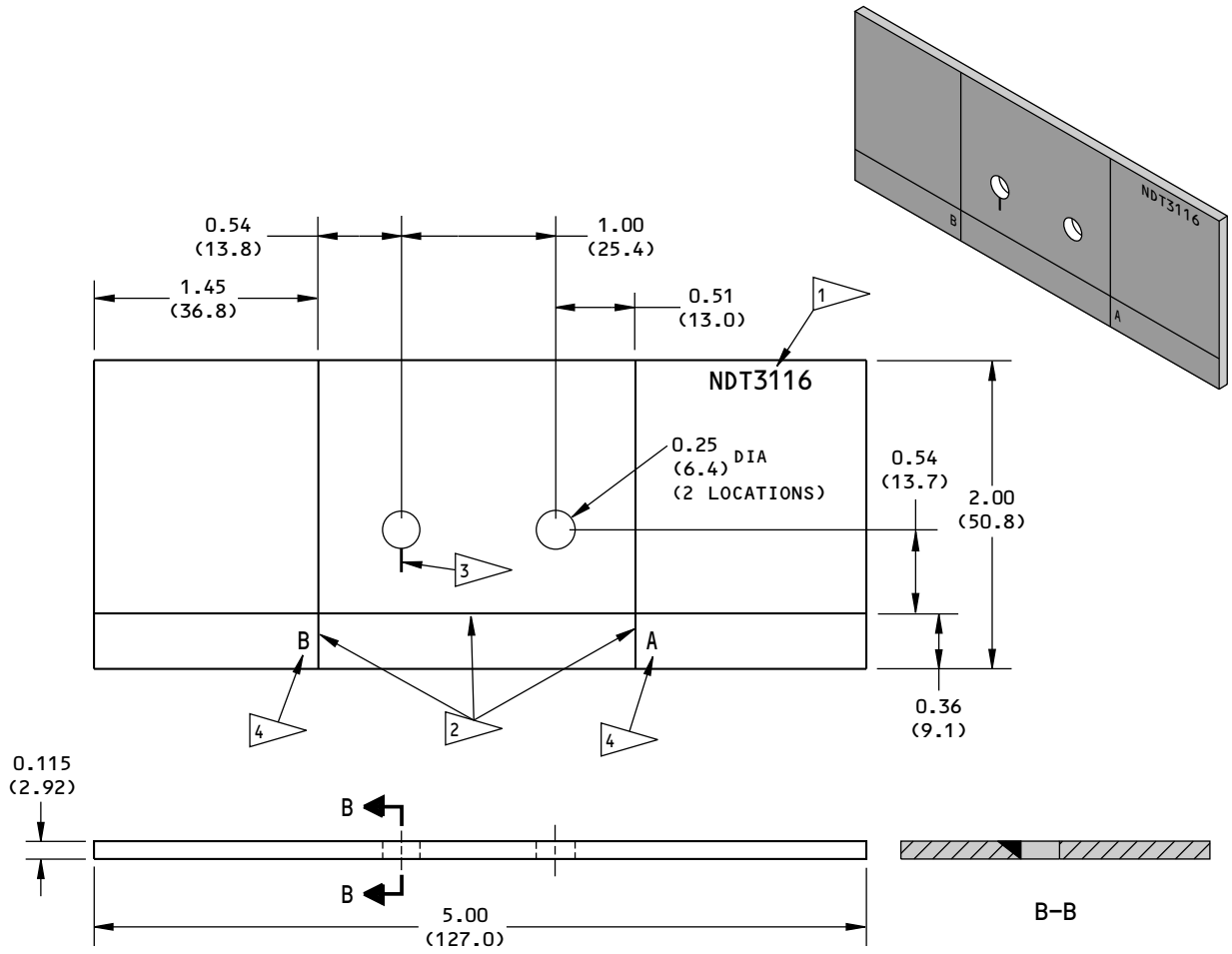
5 TYPICAL TRANSDUCER POSITION TO GET A HOLE SIGNAL

6 TYPICAL TRANSDUCER POSITION TO LOOK FOR A CRACK SIGNAL

7 MOVE THE TRANSDUCER IN THE DIRECTION SHOWN TO FIND THE HOLE OR CRACK SIGNALS.

2157912 S0000471312_V1

Inspection Area
Figure 1 (Sheet 4 of 4)



NOTES:

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

INCHES	MILLIMETERS	ANGLE TOLERANCE
X.XXX = ±0.005	X.XX = ±0.010	±1 DEGREE
X.XX = ±0.025	X.X = ±0.05	
X.X = ±0.050	X = ±1	

- SURFACE ROUGHNESS: 63 Ra OR BETTER
- MATERIAL: 2024-T3/T4 ALUMINUM

1 ETCH OR STAMP THE REFERENCE STANDARD NUMBER, NDT3116, AT APPROXIMATELY THIS LOCATION.

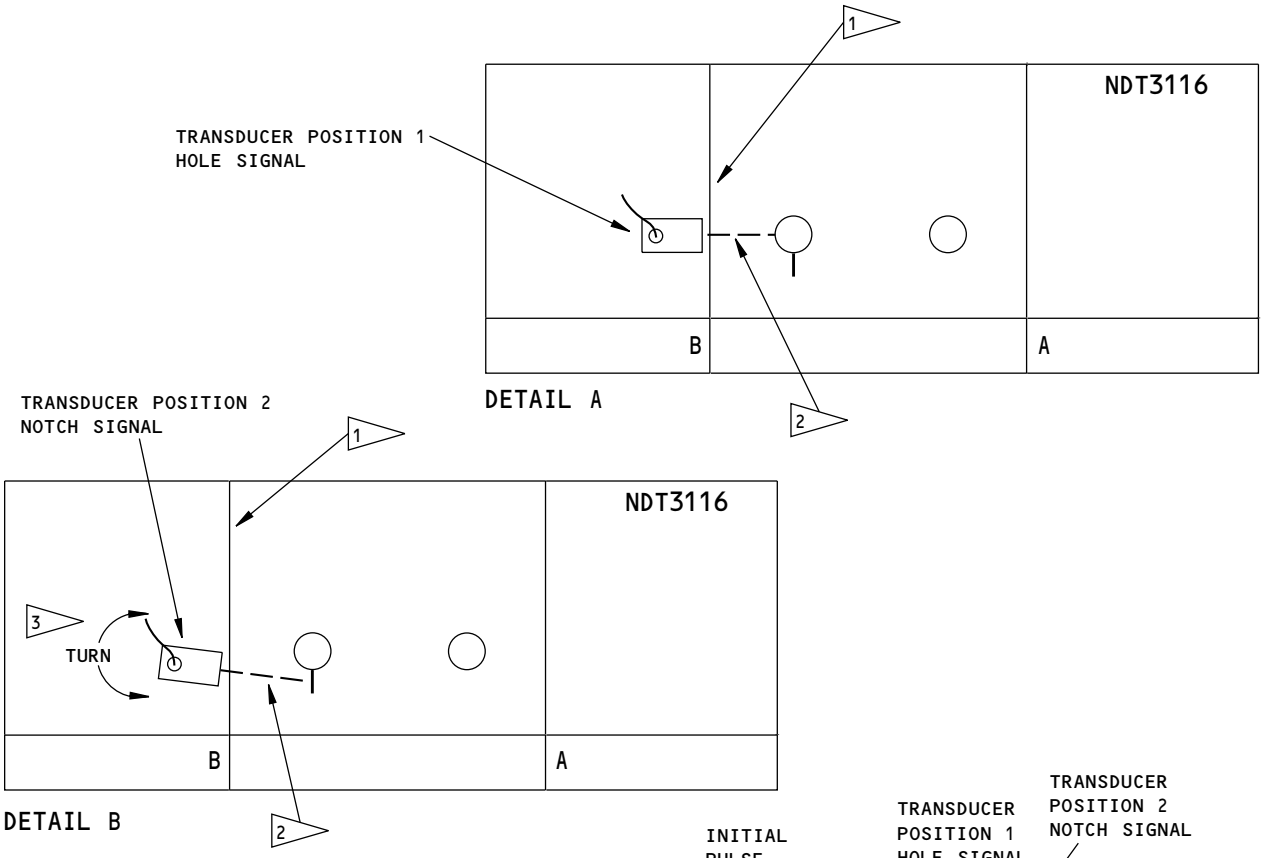
2 ETCH SCRIBE LINES AT THE LOCATIONS SHOWN TO A MAXIMUM DEPTH OF 0.005 (0.13).

3 EDM NOTCHES:
0.150 X 0.115 (3.15 X 2.92) CORNER NOTCH,
0.012 (0.30) MAXIMUM WIDTH

4 ETCH A AND B AT THE LOCATIONS SHOWN.

2157914 S0000471313_V1

Reference Standard NDT3116
Figure 2

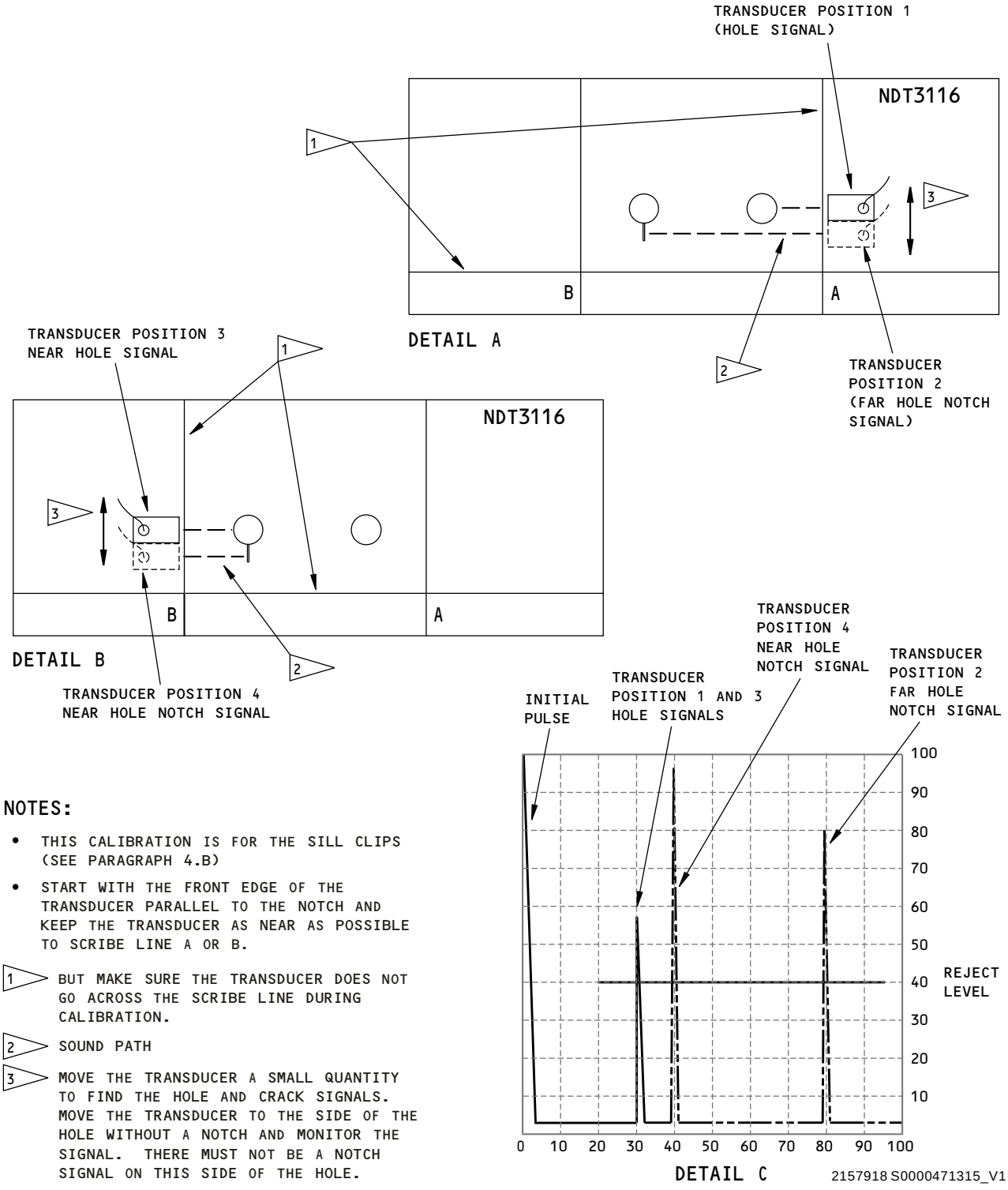


NOTES:

- THIS CALIBRATION IS FOR THE DOOR STOPS (SEE PARAGRAPH 4.A)

1. KEEP THE TRANSDUCER AS NEAR AS POSSIBLE TO SCRIBE LINE B DURING CALIBRATION BUT MAKE SURE THE TRANSDUCER DOES NOT GO ACROSS THE SCRIBE LINE.
2. SOUND PATH
3. TURN THE TRANSDUCER A SMALL QUANTITY TO GET THE HOLE AND CRACK SIGNALS.

Instrument Calibration with Reference Standard NDT3116
Figure 3



NOTES:

- THIS CALIBRATION IS FOR THE SILL CLIPS (SEE PARAGRAPH 4.B)
- START WITH THE FRONT EDGE OF THE TRANSDUCER PARALLEL TO THE NOTCH AND KEEP THE TRANSDUCER AS NEAR AS POSSIBLE TO SCRIBE LINE A OR B.

1 BUT MAKE SURE THE TRANSDUCER DOES NOT GO ACROSS THE SCRIBE LINE DURING CALIBRATION.

2 SOUND PATH

3 MOVE THE TRANSDUCER A SMALL QUANTITY TO FIND THE HOLE AND CRACK SIGNALS. MOVE THE TRANSDUCER TO THE SIDE OF THE HOLE WITHOUT A NOTCH AND MONITOR THE SIGNAL. THERE MUST NOT BE A NOTCH SIGNAL ON THIS SIDE OF THE HOLE.

Instrument Calibration with Reference Standard NDT3116
Figure 4

PART 4 - ULTRASONIC

FORWARD CARGO DOOR SURROUND - BEAR STRAP AT S-24R, BS 440 AND BS 492.4

1. Purpose

A. Use this procedure to examine the bear strap for cracks at the intersection of S-24R and the forward and aft edge frames of the forward cargo door surround. The bear strap is examined at four fastener hole locations for each door stop backup fitting. See Figure 1 for the inspection areas.

B. 737 Damage Tolerance Rating (D626A001-DTR):

(1) Item: 53-30-08-6

(2) Item: 53-60-08

2. Equipment

A. General

(1) All ultrasonic test instruments are permitted for use if they can be calibrated on the reference standard as specified in Paragraph 4.

(2) Refer to Part 1, 51-01-00, for data about the equipment manufacturers.

B. Instrument

(1) The pulse-echo ultrasonic instruments that follow were used to help prepare this procedure.

(a) USN 60; GE Inspection Technologies

(b) 380M; Sonatest

C. Transducer

(1) Use a transducer that:

(a) Operates at 5 MHz.

(b) Causes a 45 degree shear wave in aluminum.

(c) Has a maximum length of 0.375 inch (9.53 mm).

(d) Has a maximum width of 0.25 inch (6.3 mm).

(2) The transducers that follow were used to help prepare this procedure.

(a) XA-455T; Techna NDT

(b) SX 545AT; Olympus (NDT Engineering)

D. Reference Standard

(1) Use reference standard NDT3139. See Figure 2 for data about the reference standard.

E. Couplant

(1) Use couplant that is permitted for use with airplane structure.

3. Prepare for the Inspection

A. Identify the inspection area shown in Figure 1.

B. Remove sealant or loose paint. Clean the area that the transducer will touch.

4. Instrument Calibration

A. Calibrate the instrument to examine the bear strap for cracks at the door stop backup fittings as follows:

(1) Connect the transducer to the instrument.

(2) Put couplant on the reference standard at transducer position 1 as shown in Detail A in Figure 3.

(3) Set the initial pulse at 0% of full screen width (see Detail C in Figure 3).

(4) Put the transducer on the reference standard at Position 1 (see Detail A in Figure 3).

(5) Adjust the transducer to get a signal from the near hole.

(6) Adjust the hole signal so that it is at 30% of full screen width (see Detail C in Figure 3).

(7) Move the transducer to transducer position 2 (see Detail A in Figure 3) and monitor the signal that occurs from the EDM notch. Keep the transducer as close to the scribe line as possible.

NOTE: Do not move the transducer across the scribe lines.

(8) Adjust the gain so the notch signal is at 80 percent of full screen height.

(9) Move the transducer back to the near hole (position 1) and monitor how the position of the signal moves back to 30% of full screen width and the hole signal increases.

(10) Move the transducer to the side of the near hole without a notch. Make sure that a notch signal does not occur.

(11) Put couplant on the reference standard at transducer position 3 as shown in Detail B in Figure 3.

(12) Keep the instrument settings from Paragraph 4.A.(6) and Paragraph 4.A.(8).

(13) Put the transducer on the reference standard at Position 3 (see Detail B in Figure 3).

(14) Monitor the near hole signal. It will look the same as the hole signal in Paragraph 4.A.(6) with the transducer at position 1.

(15) Move the transducer to position 4 (see Detail B in Figure 3). Monitor the position of the notch signal. The notch signal will be nearer to the near hole signal than the notch signal in Paragraph 4.A.(7) (see Detail C in Figure 3).

5. Inspection Procedure

A. Examine the bear strap for cracks at the door stop backup fittings at the intersection of the forward and aft edge frames and S-24R at the forward cargo door surround as follows:

(1) Find the inspection area on the forward edge frame of the forward cargo door. See Figure 1.

(2) Calibrate the equipment as specified in Paragraph 4.

(3) Put couplant on the surface of the bear strap of the forward edge frame at the approximate transducer location shown by flagnote 2 in Figure 1.

(4) Put the transducer on the bear strap at the location shown by flagnote 2 in Figure 1.

(5) Point the transducer so sound is transmitted to the fastener hole in the inspection area as shown by flagnote 2 in Figure 1.

(6) Move the transducer to get a signal from the hole. If you cannot get a signal from the fastener hole, increase the gain until you get a signal that is 30% of full screen height.

(7) Move the transducer away from the hole in the aft direction as shown by flagnote 4 in Figure 1 and monitor the screen display for crack signals. Turn the transducer clockwise and counterclockwise a small quantity as you move it to find off-angle cracks.

NOTE: This transducer position is used to find cracks at the near and the far holes. As shown in the calibration procedure in Paragraph 4., the near and far hole crack signals will be almost the same, but the near hole crack signals will be nearer in time to the hole signal (approximately 40% of full screen width). Far hole crack signals will be farther in time from the hole signal position (approximately 80% of full screen width).

(8) Do Paragraph 5.A.(3) thru Paragraph 5.A.(7) again but with the transducer on the forward side of the fastener hole.

(9) Do Paragraph 5.A.(3) thru Paragraph 5.A.(8) to examine the bear strap at the two fastener holes on the other side of the door stop backup fitting.

(10) Do Paragraph 5.A.(3) thru Paragraph 5.A.(9) to examine the bear strap for cracks at the door stop backup fitting of the aft edge frame (BS 492.4) at S-24R.

NOTE: The door stop backup fitting at the aft edge frame is the same but opposite of the door stop backup fitting at the forward edge frame.

6. Inspection Results

A. Signals that are 40 percent (or more) of full screen height and are immediately to the right of the hole signal can be crack indications.

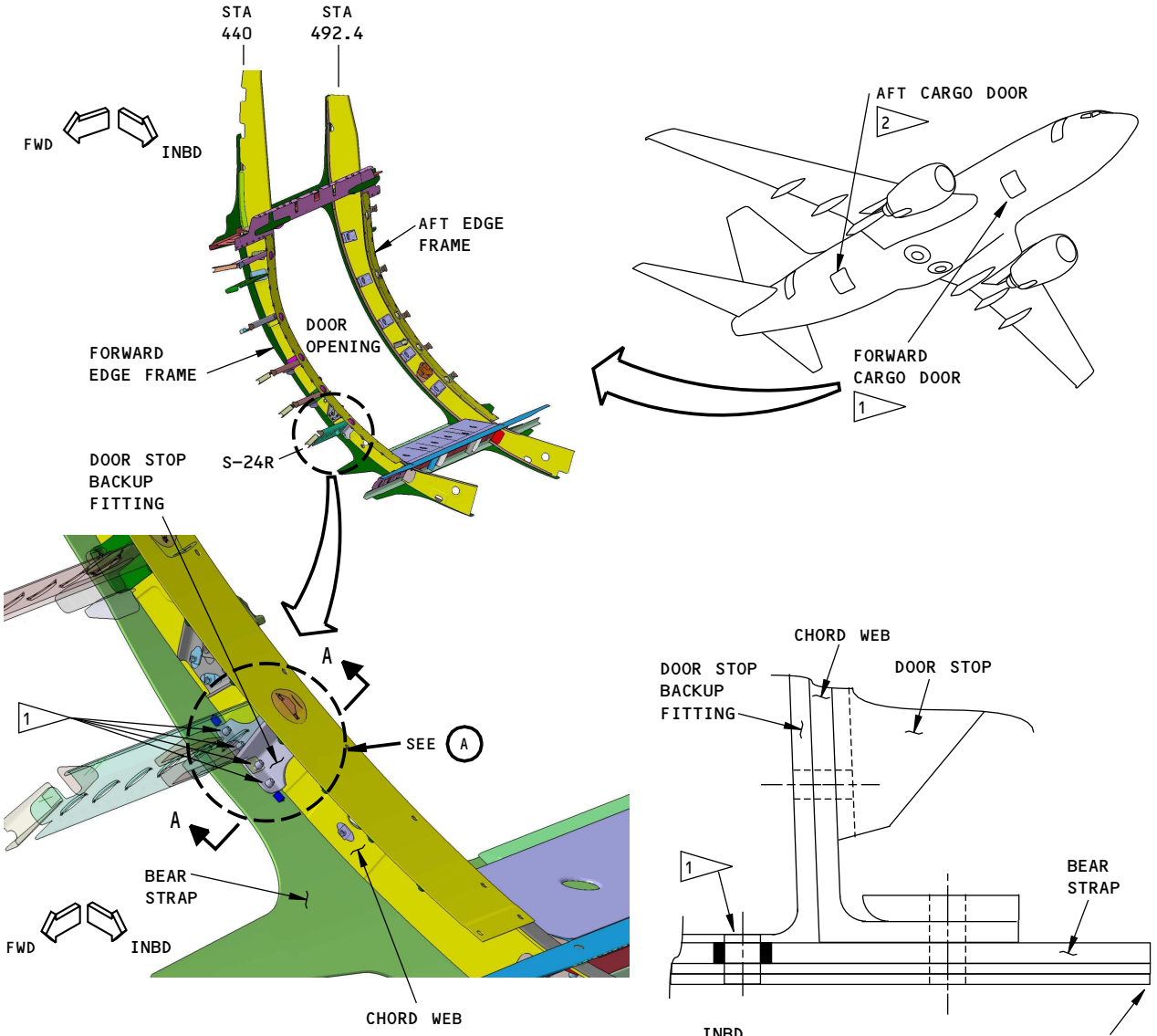
B. If you get a crack indication, remove the couplant from the surface in front of the transducer and do the scan again. Too much couplant on the surface can cause an incorrect crack indication to occur.

C. Compare the signal from the crack indication with the signal you get from the EDM notch in the reference standard.

(1) Put the transducer on the reference standard at the same distance from the fastener hole that it was on the airplane.

(2) A signal that is almost the same as the one you got from the EDM notch in the reference standard is a crack indication.

D. Remove the fastener to do an open hole eddy current inspection as specified in Part 6, 51-00-00, Procedure 16, to make sure there is a crack



THE FORWARD FRAME OF THE FORWARD CARGO DOOR SURROUND IS SHOWN AS YOU LOOK AFT AND OUTBOARD. THE AFT FRAME OF THE FORWARD CARGO DOOR SURROUND IS ALMOST THE SAME BUT OPPOSITE

NOTES:

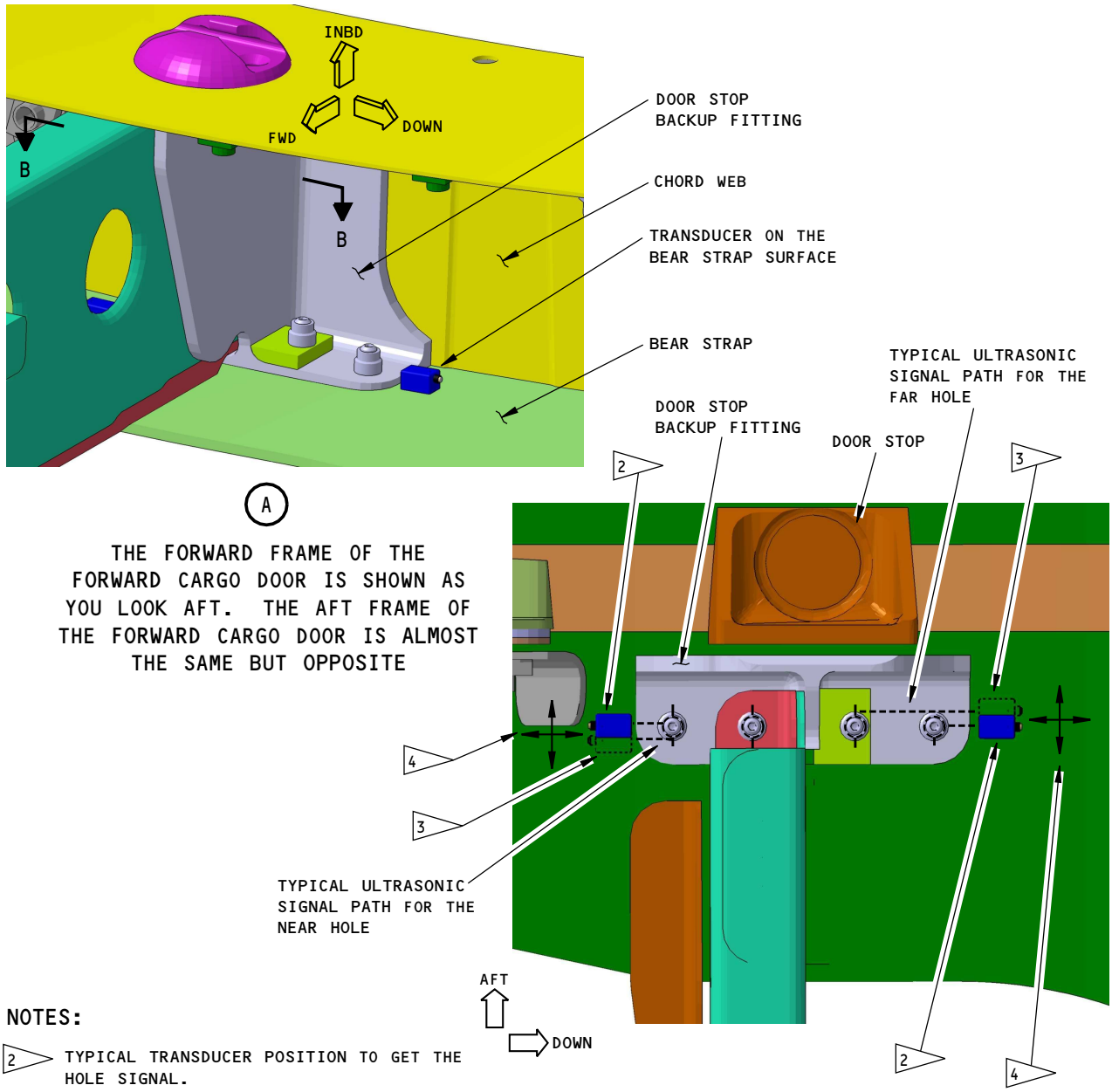
EXAMINE THE BEAR STRAP FOR CRACKS AT THE FORWARD CARGO DOOR SURROUND AT S-24R. THERE ARE FOUR HOLES TO EXAMINE AT THE DOOR STOP BACKUP FITTING AT THE FORWARD EDGE FRAME AND FOUR HOLES TO EXAMINE AT THE DOOR STOP BACKUP FITTING AT THE AFT EDGE FRAME. A TOTAL OF EIGHT HOLES ARE EXAMINED.

1 DTR CHECK FORM ITEM 53-30-08-6 INSPECTION AREA.

2 DTR/PSE 53-60-08 INSPECTION AREA AT BS 794.4 AND BS 847.

2157923 S0000471317_V2

Inspection Area
Figure 1 (Sheet 1 of 2)



NOTES:

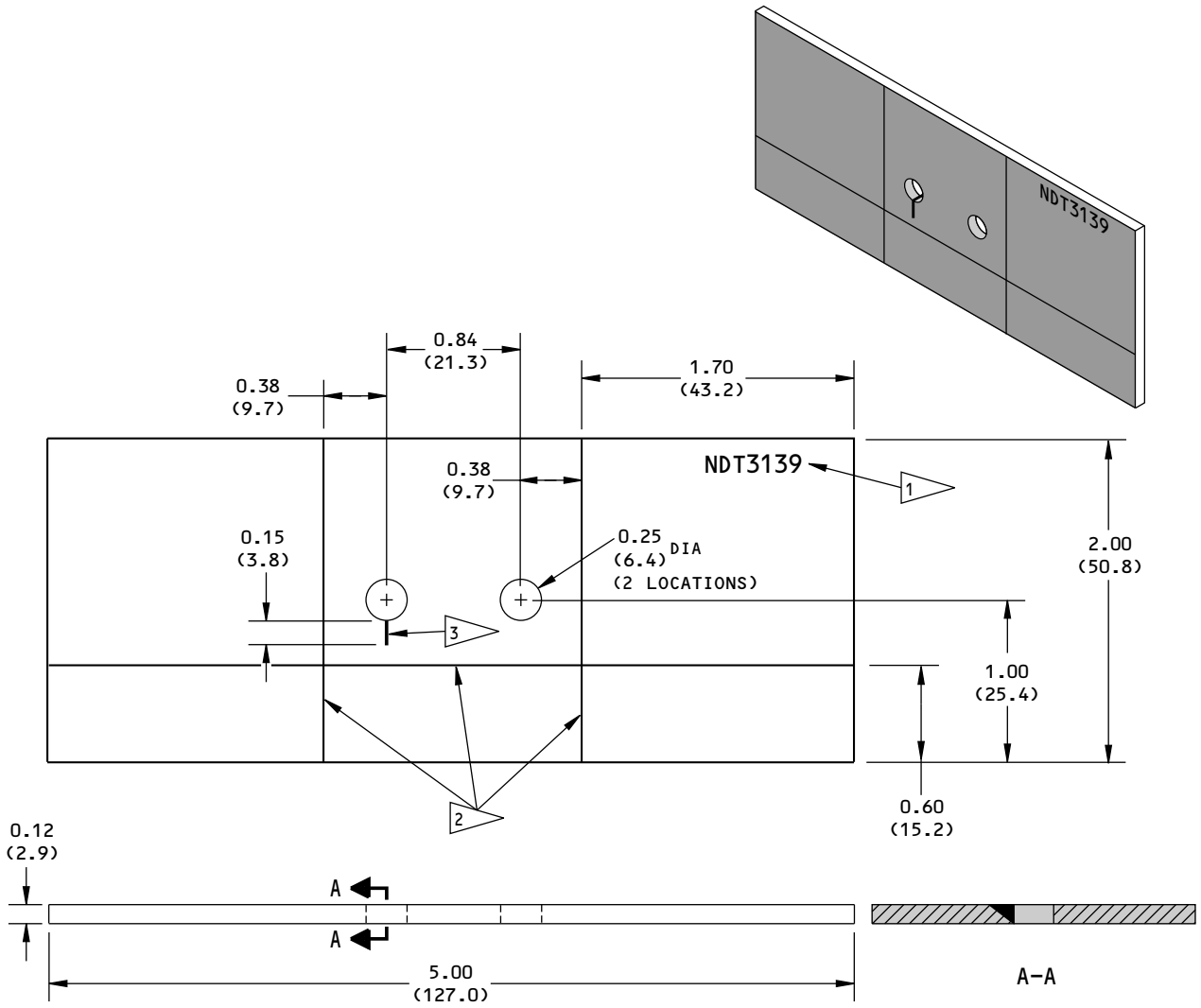
2 TYPICAL TRANSDUCER POSITION TO GET THE HOLE SIGNAL.

3 TYPICAL TRANSDUCER POSITION TO GET A CRACK SIGNAL.

4 MOVE THE TRANSDUCER IN AND OUT, BACK AND FORWARD AS SHOWN TO FIND THE HOLE OR CRACK SIGNALS. NOTE THAT NEAR AND FAR HOLE CRACK SIGNALS WILL LOOK ALMOST THE SAME, BUT THE FAR HOLE SIGNAL WILL BE FARTHER TO THE RIGHT ON THE INSTRUMENT DISPLAY.

2157925 S0000471318_V1

Inspection Area
Figure 1 (Sheet 2 of 2)



NOTES:

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

INCHES	MILLIMETERS	ANGULAR
X.XXX = ±0.005	X.XX = ±0.010	±1 DEGREE
X.XX = ±0.025	X.X = ±0.05	
X.X = ±0.050	X = ±1	

- SURFACE ROUGHNESS: 63 Ra OR BETTER
- MATERIAL: 2024-T3/T4 ALUMINUM

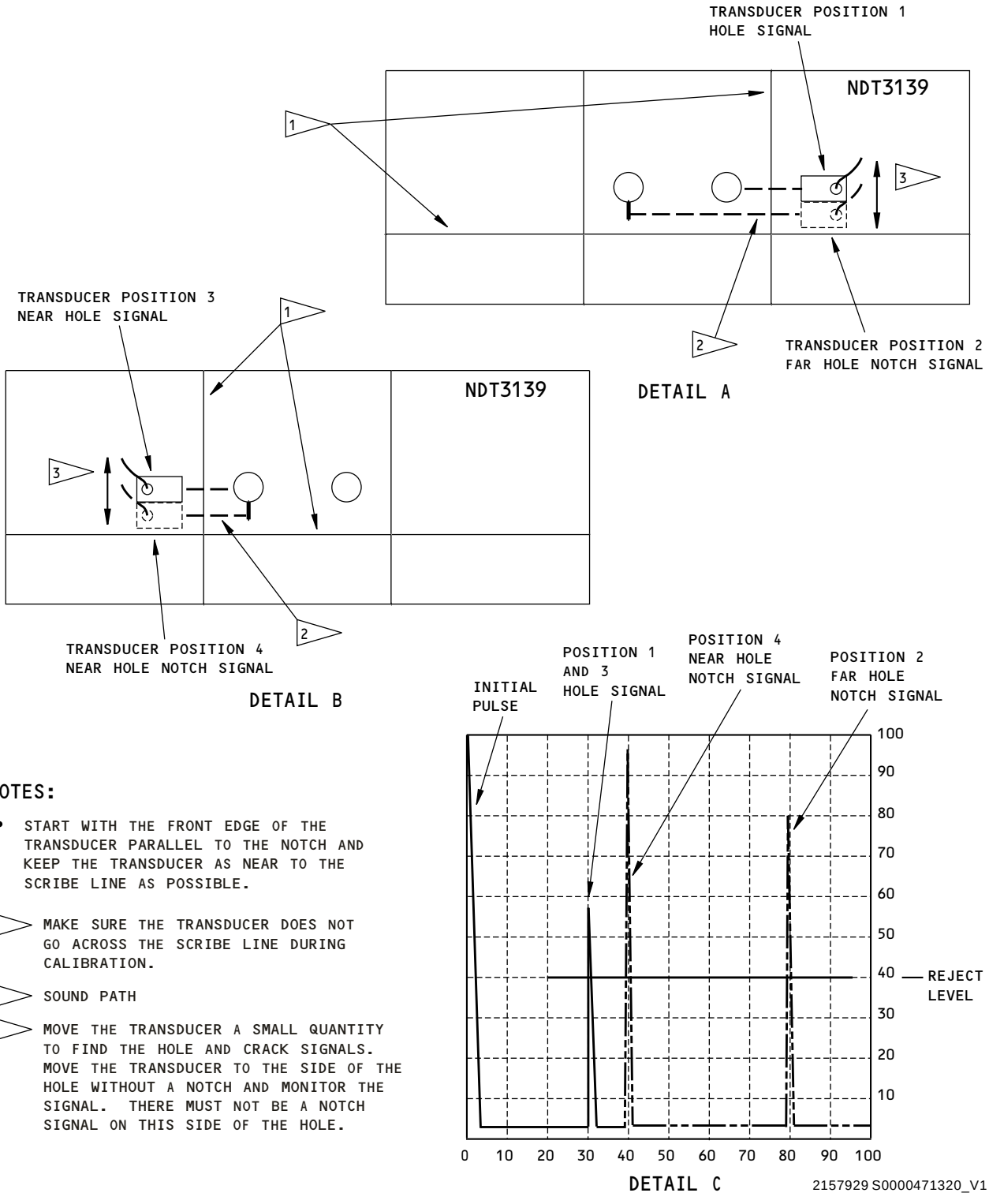
1 ETCH OR STAMP THE REFERENCE STANDARD NUMBER, NDT3139, AT APPROXIMATELY THIS LOCATION.

2 ETCH SCRIBE LINES AT THE LOCATIONS SHOWN, TO A MAXIMUM DEPTH OF 0.005 (0.13).

3 EDM NOTCHES: 0.150 X 0.120 (3.81 X 3.05) CORNER NOTCH; 0.012 (0.30) MAXIMUM WIDTH

2157927 S0000471319_V1

Reference Standard NDT3139
Figure 2



NOTES:

- START WITH THE FRONT EDGE OF THE TRANSDUCER PARALLEL TO THE NOTCH AND KEEP THE TRANSDUCER AS NEAR TO THE SCRIBE LINE AS POSSIBLE.

1. MAKE SURE THE TRANSDUCER DOES NOT GO ACROSS THE SCRIBE LINE DURING CALIBRATION.
2. SOUND PATH
3. MOVE THE TRANSDUCER A SMALL QUANTITY TO FIND THE HOLE AND CRACK SIGNALS. MOVE THE TRANSDUCER TO THE SIDE OF THE HOLE WITHOUT A NOTCH AND MONITOR THE SIGNAL. THERE MUST NOT BE A NOTCH SIGNAL ON THIS SIDE OF THE HOLE.

Instrument Calibration with Reference Standard NDT3139
Figure 3

PART 4 - ULTRASONIC

AFT CARGO DOOR SURROUND - FORWARD AND AFT EDGE FRAMES AT BS 794.37 AND BS 847

1. Purpose

A. Use this procedure to examine the forward and aft edge frames of the aft cargo door surround for cracks. The forward and aft edge frames are examined for cracks at the sill clips at the upper and lower sills and at the five door stops along each edge frame. See Figure 1 for the inspection areas.

B. 737 Maintenance Planning Document (MPD) Damage Tolerance Record (DTR) Check Form Reference:

(1) Item: 53-60-08-5

2. Equipment

A. General

(1) All ultrasonic test instruments are permitted for use if they can be calibrated on the reference standard as specified in Paragraph 4.

(2) Refer to Part 1, 51-01-00, for data about the equipment manufacturers.

B. Instrument

(1) The pulse-echo, ultrasonic instruments that follow were used to help prepare this procedure.

(a) USM Go; GE Inspection Technologies

(b) Epoch 600; Olympus NDT

C. Transducer

(1) Use a transducer that:

(a) Operates at 5 MHz.

(b) Causes a 45 degree shear wave to occur in aluminum.

(c) Has a maximum length of 0.50 inch (12.7 mm).

(d) Has a maximum width of 0.25 inch (6.3 mm).

(2) The transducers that follow were used to help prepare this procedure.

(a) SA-455T; Techna NDT

(b) SUSM545AT; Olympus NDT

D. Reference Standard

(1) Use reference standard NDT3204 as shown in Figure 2.

E. Couplant

(1) Use couplant that is permitted for use with airplane structure.

3. Prepare for the Inspection

A. Identify the inspection areas shown in Figure 1.

B. Remove the latches and other brackets or fittings, as necessary, to get access to the transducer inspection surfaces to examine the door stops at the edge frames of the aft cargo door surround.

C. Remove sealant or loose paint. Clean the area that the transducer will touch.

4. Instrument Calibration

A. Connect the transducer to the instrument.

B. Put couplant on the reference standard at transducer position 1 as shown in Figure 3, Detail A.

C. Set the initial pulse at 0% of full screen width (see Figure 3, Detail C).

D. Put the transducer on the reference standard at transducer position 1 (see Figure 3, Detail A).

E. Adjust the transducer to get a signal from the hole.

F. Adjust the signal from the hole so that it occurs at 80% of full screen width (FSW) (see Figure 3, Detail C).

G. Move the transducer to transducer position 2 (see Figure 3, Detail A) and monitor the signal that occurs from the EDM notch. The EDM notch signal must occur at approximately 85% of FSW.

H. Adjust the gain so that notch signal is at 80% of full screen height (FSH).

I. Move the transducer back to transducer position 1 and monitor the screen display to see that the hole signal occurs at 80% of FSW and the notch signal decreases.

J. Put couplant on the reference standard at transducer position 3 (see Figure 3, Detail B).

K. Put the transducer on the reference standard at transducer position 3 (see Figure 3, Detail B).

L. Monitor the hole signal that will occur at approximately 35% of FSW.

M. Move the transducer to transducer position 4 (see Figure 3, Detail B) and get the maximum notch signal (see Figure 3, Detail C).

5. Inspection Procedure

A. Examine the edge frames for cracks at the sill clips of the lower sill as follows:

(1) Find the two fastener locations to be examined at the lower sill clip of the aft edge frame. See Figure 1, View A, for the two fastener locations.

(2) Calibrate the equipment as specified in Paragraph 4.

(3) Put couplant on the surface of the aft edge frame at, and adjacent to, the approximate transducer location shown by flagnote 1 in View A of Figure 1.

(4) Examine the near hole for cracks as follows:

(a) Put the transducer on the aft edge frame as shown by flagnote 1 in View A of Figure 1.

(b) Get a signal from the near fastener hole. It will occur at approximately 35% of FSW.

(c) Move the transducer to get a maximum signal from the near hole. If you cannot get a signal from the near fastener hole, increase the gain until you get a signal from the near hole that is 30% of FSH. Then move the transducer a short distance to examine one side of the near fastener hole for cracks as shown by flagnote 2 in View A of Figure 1. As you move the transducer, monitor the screen display for crack signals and turn the transducer a small quantity to look for off-angle cracks.

(d) Do Paragraph 5.A.(4)(a) thru Paragraph 5.A.(4)(c) again to examine the opposite side of the near fastener hole for cracks.

(5) Examine the far hole for cracks as follows:

(a) Put the transducer on the aft edge frame as shown by flagnote 1 in View A of Figure 1.

(b) Get a signal from the near fastener hole. It will occur at approximately 35% of FSW.

(c) Move the transducer to get a maximum signal from the near hole. If you cannot get a signal from the near fastener hole, increase the gain until you get a signal from the near hole that is 30% of FSH. Then move the transducer a short distance to examine one side of the far fastener hole for cracks as shown by flagnote 2 in View A of Figure 1. As you move the transducer, monitor the screen display for crack signals at approximately 85% of FSW and turn the transducer a small quantity to look for off-angle cracks.

(d) Do Paragraph 5.A.(5)(a) thru Paragraph 5.A.(5)(c) again to examine the opposite side of the far fastener hole for cracks.

(6) Do Paragraph 5.A.(1) thru Paragraph 5.A.(5) again on the forward edge frame.

B. Examine the edge frames for cracks at the sill clips of the upper sill as follows:

(1) Find the fastener location to be examined at the upper sill clip of the aft edge frame. See Figure 1, View B, for the fastener location.

(2) If not already done, calibrate the equipment as specified in Paragraph 4.

(3) Put couplant on the surface of the aft edge frame at, and adjacent to, the approximate transducer location shown by flagnote 1 in View B of Figure 1.

(4) Put the transducer on the aft edge frame at the location shown by flagnote 1 in View B of Figure 1.

(5) Point the transducer to transmit sound to the fastener hole in the inspection area.

(6) Move the transducer to get a signal from the hole. If you cannot get a signal from the fastener hole, increase the gain until you get a signal from the hole that is 30% of FSH. Then move the transducer a short distance to examine one side of the fastener hole for cracks as shown by flagnote 2 in View B of Figure 1. As you move the transducer, monitor the screen display for crack signals and turn the transducer a small quantity to look for off-angle cracks.

(7) Do Paragraph 5.B.(3) thru Paragraph 5.B.(6) again to examine the opposite side of the fastener hole for cracks.

(8) Do Paragraph 5.B.(1) thru Paragraph 5.B.(7) again to examine the forward edge frame for cracks.

C. Examine the edge frames for cracks at the door stops as follows:

(1) Find the inspection area. See Figure 1.

(2) If not already done, calibrate the equipment as specified in Paragraph 4.

(3) Put couplant on the surface of the aft edge frame at, and adjacent to, the approximate transducer locations shown in View C of Figure 1 to examine the door stop areas for cracks.

(4) Put the transducer on the aft edge frame at one of the transducer locations shown in View C of Figure 1 for the door stops.

(5) Point the transducer to transmit sound to the fastener hole in the inspection area as shown by flagnote 1 in View C of Figure 1.

(6) Move the transducer away from the hole and monitor the screen display for crack signals. Turn the transducer a small quantity as you move it to look for off-angle cracks.

(7) Do Paragraph 5.C.(3) thru Paragraph 5.C.(6) again on the opposite side of the fastener hole.

(8) Do Paragraph 5.C.(3) thru Paragraph 5.C.(7) again to examine the fastener hole on the opposite side of the door stop for cracks.

(9) Do Paragraph 5.C.(3) thru Paragraph 5.C.(8) again at the other door stops shown in Figure 1. There are a total of 5 door stops on the edge frame (STA 847).

(10) Do Paragraph 5.C.(1) thru Paragraph 5.C.(9) again to examine the door stop areas for cracks at the forward edge frame.

6. Inspection Results

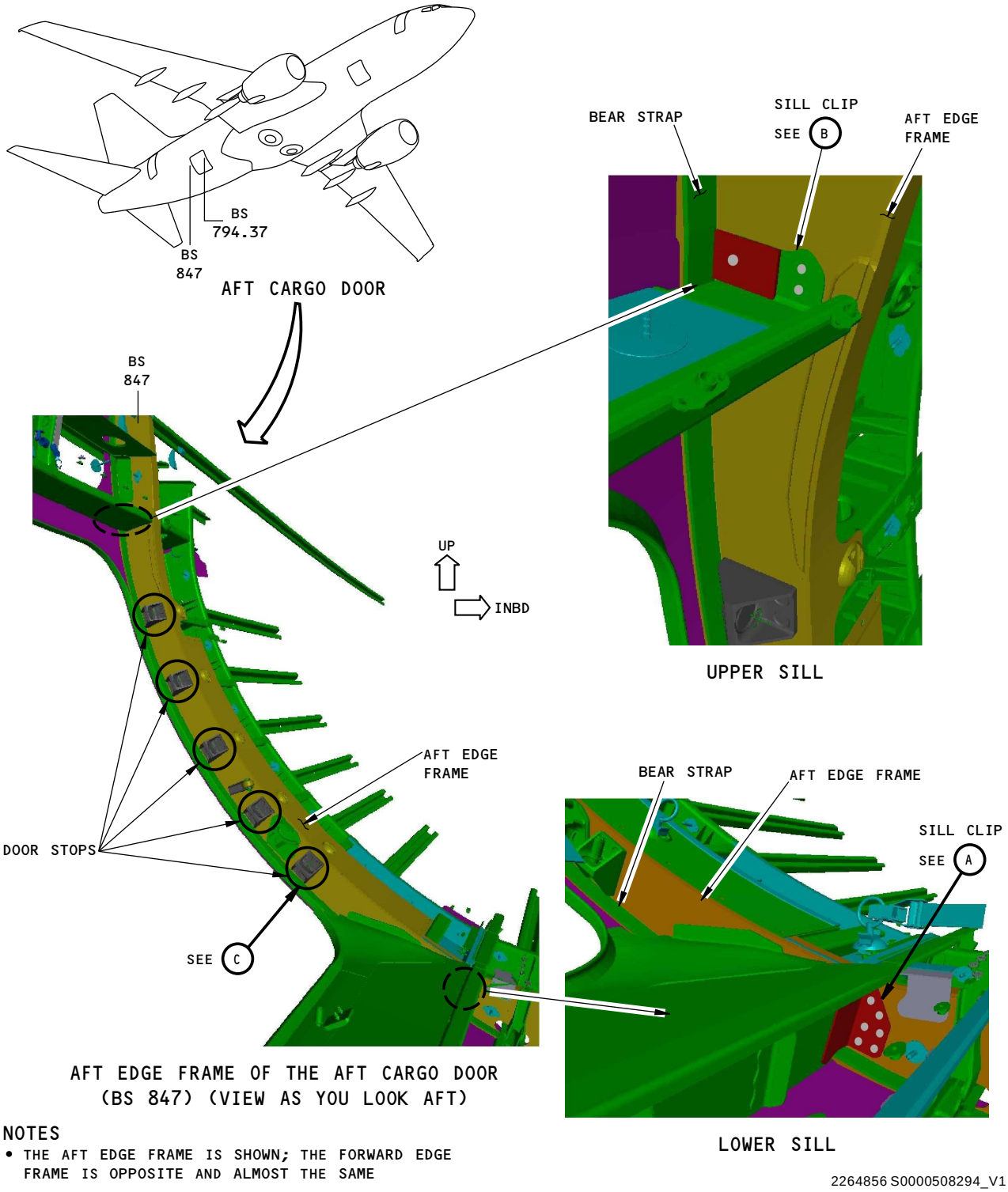
A. Signals that are 40% (or more) of full screen height that occur immediately to the right of the hole signal can be crack indications.

B. If you get a crack indication, remove the couplant from the surface of the edge frame in front of the transducer and do the scan again. Too much couplant on the inspection surface can cause an incorrect crack indication to occur.

C. Compare the signal from a crack indication with the signal you get from the EDM notch in the reference standard. Put the transducer on the reference standard at the same distance from the fastener hole that it was on the airplane.

D. A signal that is almost the same as the one you got from the EDM notch in the reference standard is a crack indication.

E. Remove the fastener to do an open hole eddy current inspection as specified in Part 6, 51-00-00, Procedure 16, to make sure there is a crack.

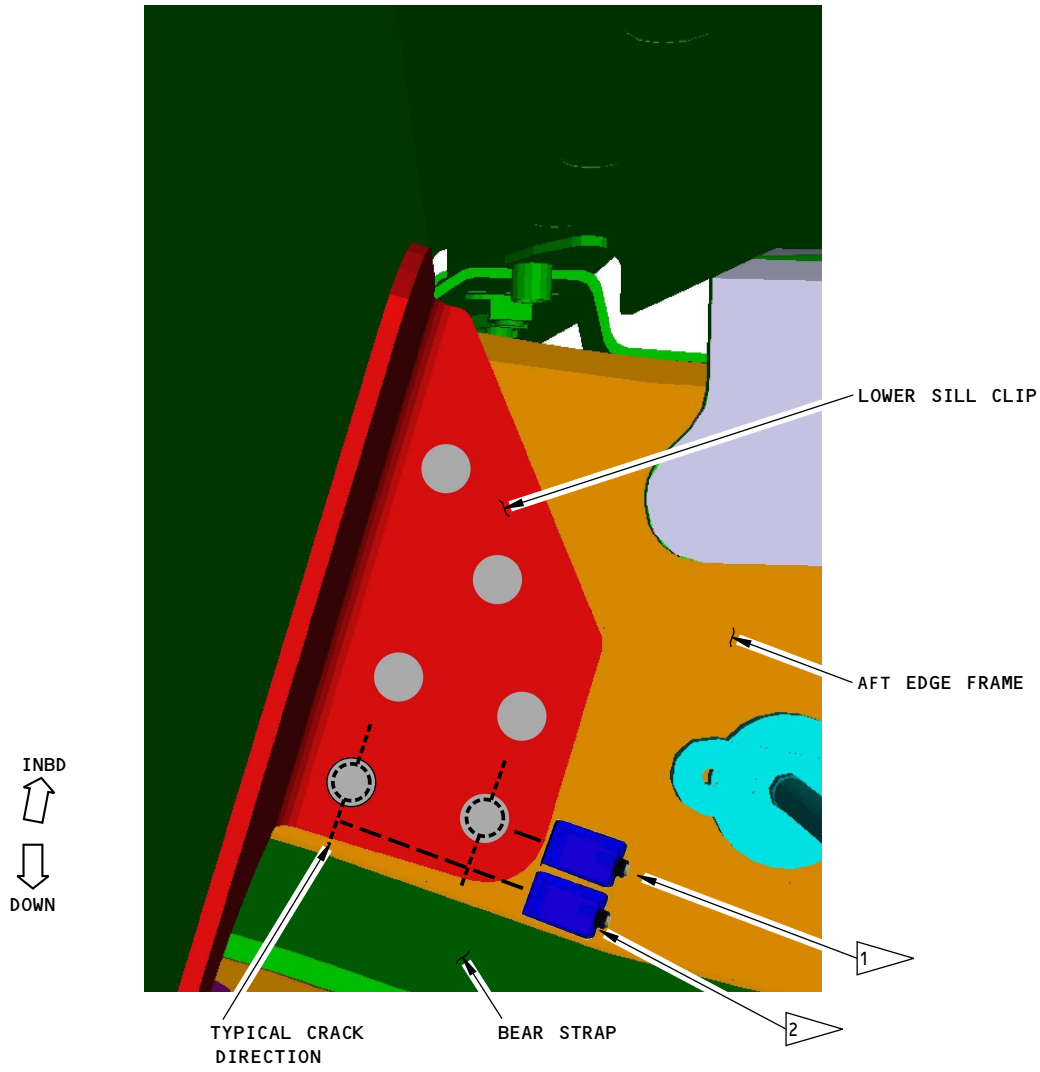


AFT EDGE FRAME OF THE AFT CARGO DOOR
(BS 847) (VIEW AS YOU LOOK AFT)

NOTES
- THE AFT EDGE FRAME IS SHOWN; THE FORWARD EDGE FRAME IS OPPOSITE AND ALMOST THE SAME

2264856 S0000508294_V1

Inspection Area
Figure 1 (Sheet 1 of 4)



LOWER SILL OF THE AFT FRAME
(VIEW AS YOU LOOK AFT)

A

NOTES

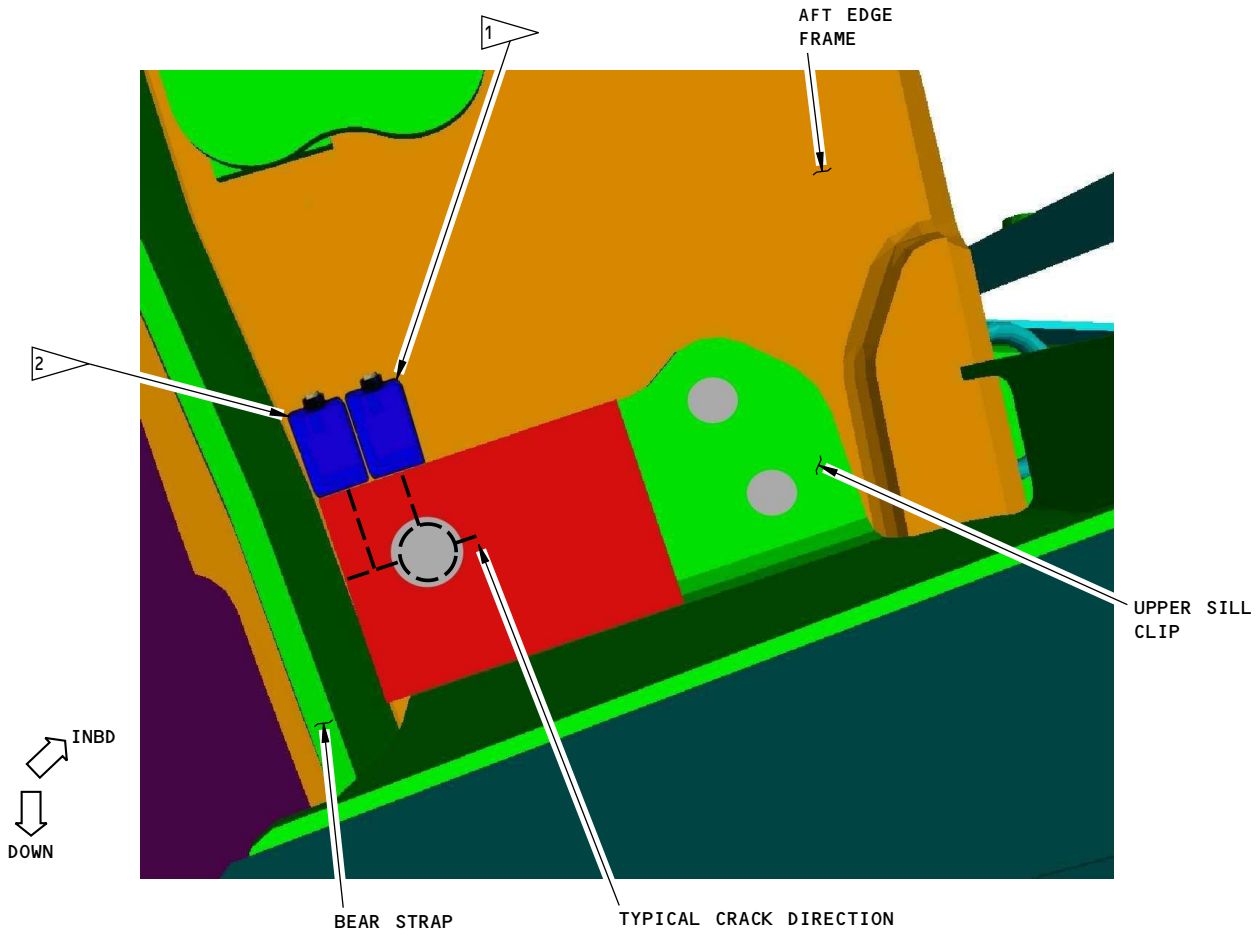
- EXAMINE THE AFT EDGE FRAME AT THE LOWER SILL CLIP FOR CRACKS ON EACH SIDE OF THE TWO FASTENER HOLES AS SHOWN

1 TYPICAL TRANSDUCER POSITION TO GET A HOLE SIGNAL

2 TYPICAL TRANSDUCER POSITION TO LOOK FOR (AND GET) A CRACK SIGNAL

2264859 S0000508295_V1

Inspection Area
Figure 1 (Sheet 2 of 4)



UPPER SILL OF THE AFT FRAME
(VIEW AS YOU LOOK AFT)

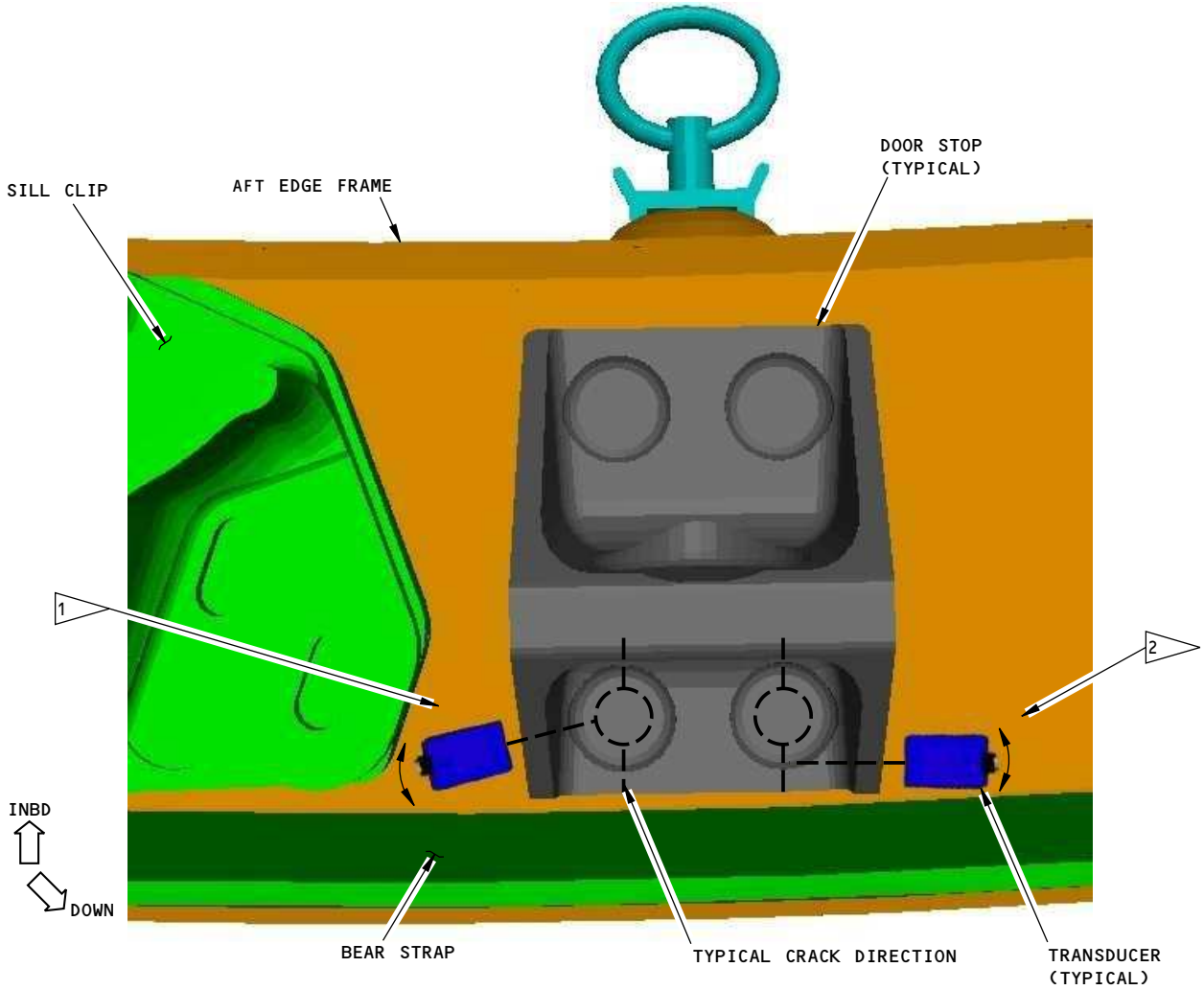
B

NOTES

- EXAMINE THE AFT EDGE FRAME AT THE UPPER SILL CLIP FOR CRACKS ON EACH SIDE OF THE FASTENER HOLE AS SHOWN

2264918 S0000508296_V1

Inspection Area
Figure 1 (Sheet 3 of 4)



TYPICAL DOOR STOP INSPECTION AREA
(VIEW AS YOU LOOK AFT)

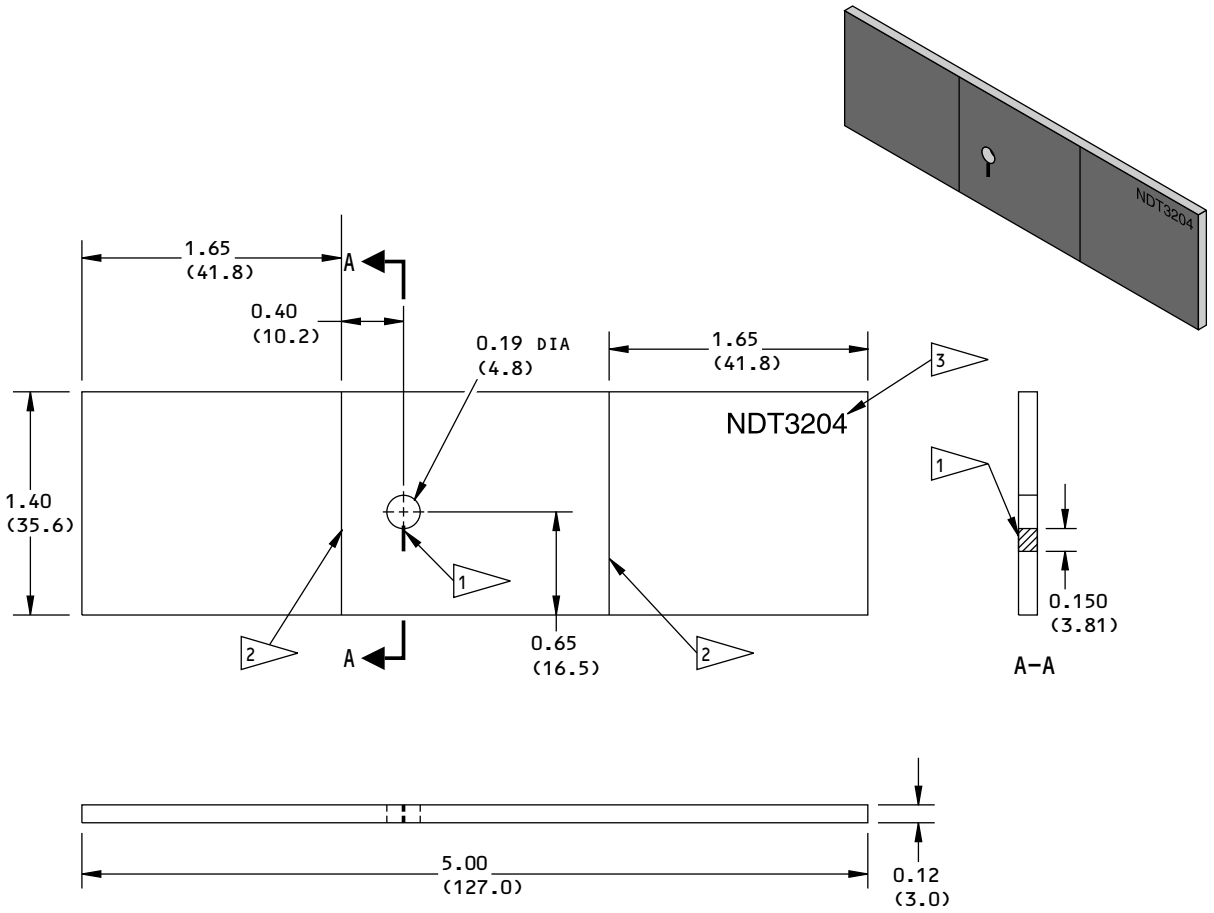
C

NOTES

- EXAMINE THE AFT EDGE FRAME FOR CRACKS AT ALL 5 DOOR STOPS ON EACH SIDE OF THE FASTENER HOLES AS SHOWN. THERE ARE TWO HOLES TO EXAMINE FOR EACH DOOR STOP.

2264964 S0000508298_V1

Inspection Area
Figure 1 (Sheet 4 of 4)



NOTES

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

INCHES	MILLIMETERS
X.XXX = ± 0.005	X.XX = ± 0.10
X.XX = ± 0.025	X.X = ± 0.5
X.X = ± 0.050	X = ± 1

- MATERIAL: 7075-T7451 ALUMINUM
- SURFACE ROUGHNESS: 63 RA OR BETTER

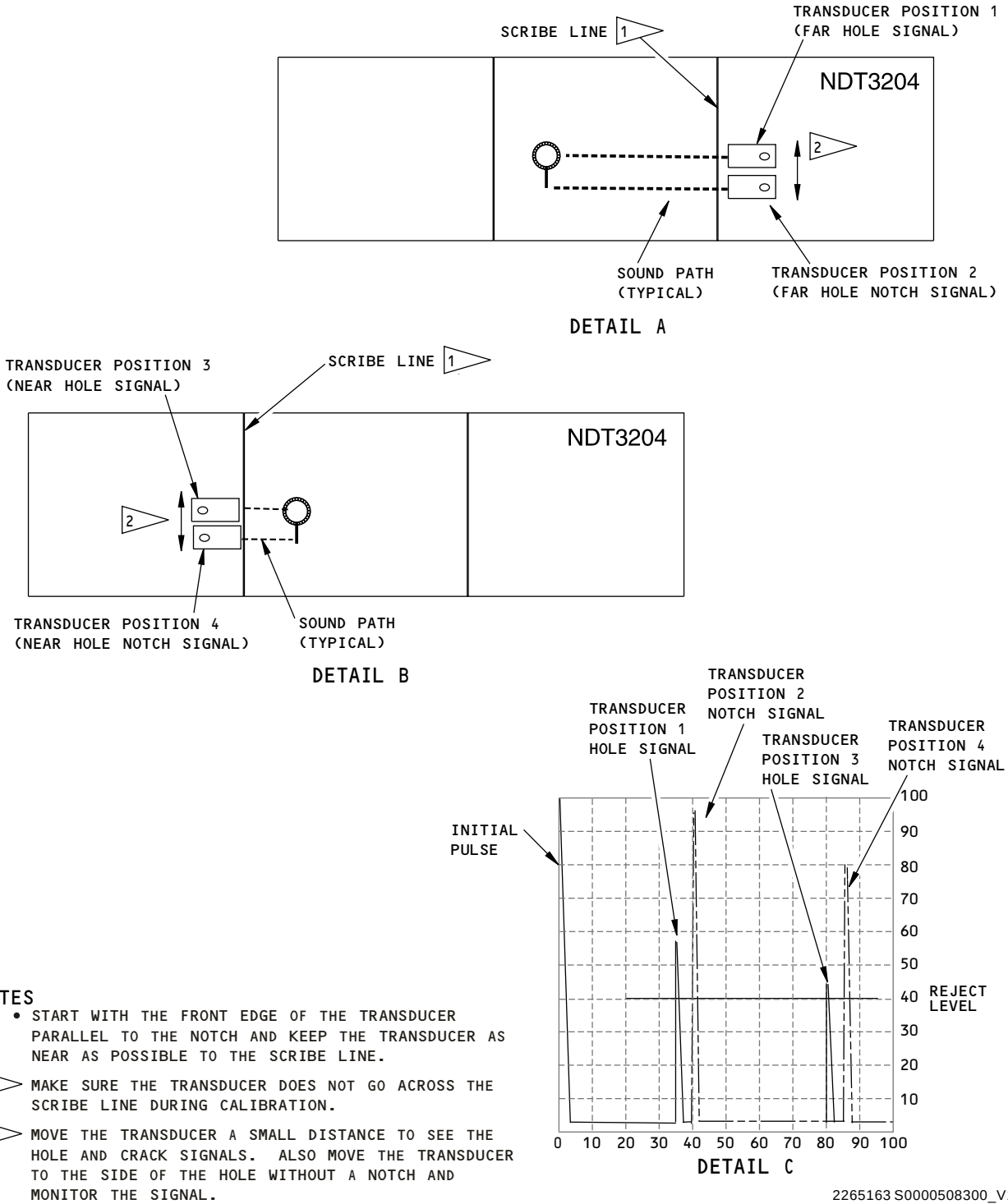
1 EDM NOTCH:
LENGTH: 0.150 (3.81)
WIDTH : 0.012 (0.30) MAXIMUM
DEPTH: THROUGH THE THICKNESS

2 ETCH SCRIBE LINES AT THE LOCATIONS SHOWN TO A MAXIMUM DEPTH OF 0.005 (0.13)

3 ETCH OR STAMP THE REFERENCE STANDARD NUMBER, NDT3204, AT APPROXIMATELY THIS LOCATION

2265026 S0000508299_V2

Reference Standard NDT3204
Figure 2



NOTES

- START WITH THE FRONT EDGE OF THE TRANSDUCER PARALLEL TO THE NOTCH AND KEEP THE TRANSDUCER AS NEAR AS POSSIBLE TO THE SCRIBE LINE.

1 MAKE SURE THE TRANSDUCER DOES NOT GO ACROSS THE SCRIBE LINE DURING CALIBRATION.

2 MOVE THE TRANSDUCER A SMALL DISTANCE TO SEE THE HOLE AND CRACK SIGNALS. ALSO MOVE THE TRANSDUCER TO THE SIDE OF THE HOLE WITHOUT A NOTCH AND MONITOR THE SIGNAL.

2265163 S0000508300_V1

Instrument Calibration with Reference Standard NDT3204
Figure 3

PART 4 - ULTRASONIC

FLANGE AND WEB OF THE FRAME INNER CHORD AT BS 727 AND WL 201

1. Purpose

A. Use this procedure to examine the flange and the web of the frame inner chord at BS 727 and WL 201 for cracks. See Figure 1 for the inspection area.

B. This procedure uses ultrasonic shear waves to examine the flange and the web of the frame inner chord for cracks that can occur at the fastener locations shown in Figure 1.

C. The frame inner chord is aluminum.

D. This inspection is done from inside the airplane.

E. 737 Maintenance Planning Data (MPD) Damage Tolerance Rating (DTR) Check Form Reference:

(1) Item: 53-40-16-2

(2) Item: 53-40-16-2a

2. Equipment

A. General

(1) Use equipment that can be calibrated on the reference standard as specified in Paragraph 4.

(2) Refer to Part 1, 51-01-00, for data about the equipment manufacturers.

B. Instruments

(1) Use a pulse-echo ultrasonic instrument. The instruments that follow were used to help prepare the procedure.

(a) Epoch 600; Olympus NDT

(b) USMGo; GE Inspection Technologies

(c) USN 60; GE Inspection Technologies

C. Transducers

(1) Use a 5 MHz transducer that can put 45 and 70 degree shear waves in aluminum. The transducer must have a width of 0.25 inches (6.4 mm) and a length of 0.375 inches (9.53 mm), or less, with a top mount connector. The transducers that follow were used to help prepare this procedure.

(a) XA-455T; Techna NDT

(b) XA-705T; Techna NDT

D. Reference Standards

(1) Use reference standard NDT3214 to help calibrate the instrument. See Figure 2 for data about reference standard NDT3214.

E. Couplant

(1) Use couplant that is permitted for use with the airplane structure.

3. Prepare for the Inspection

A. Identify the inspection areas shown in Figure 1.

B. Get access to the lower frame at BS 727. See Figure 1.

C. Clean the inspection surface.

(1) Remove sealant, loose paint and dirt from the inspection surface.

4. Instrument Calibration

A. Calibrate the instrument to examine the flange of the frame inner chord at BS 727 and WL 201 with a 45 degree transducer.

(1) Connect the transducer to the instrument and set the instrument to the Pulse-Echo mode.

(2) Set Delay to zero and set Reject to zero.

(3) Put couplant on the reference standard at fastener hole 1, Position A. See Figure 3, Detail I.

(4) Put the transducer at Position A on the reference standard. See Figure 3, Detail I.

(5) Move the transducer until the fastener hole signal is at a maximum height on the screen display.

(6) Adjust the range to put the fastener hole signal at approximately 70 percent of full screen width (FSW) as shown in Figure 3, Detail II.

(7) Monitor the screen display and move the transducer to Position B. As you move the transducer, the signal from the fastener hole will decrease and a signal from the EDM notch will occur immediately to the right of the fastener hole signal as shown in Figure 3, Detail II.

(8) Move the transducer to get the maximum signal from the EDM notch and adjust the gain to set the signal at 80 percent of full screen height (FSH). See Figure 3, Detail II.

(9) Move the transducer to Position C. Move the transducer until the fastener hole signal is at a maximum height on the screen display.

(10) The fastener hole signal will occur at approximately 35% of FSW as shown in Figure 3, Detail II.

(11) Monitor the screen display and move the transducer to Position D. As you move the transducer, the signal from the fastener hole will decrease and a signal from the EDM notch will occur immediately to the right of the fastener hole signal as shown in Figure 3, Detail II.

NOTE: Do not change the instrument settings.

B. Calibrate the instrument to examine the web of the frame inner chord at BS 727 and WL 201 with a 70 degree transducer.

(1) Connect the transducer to the instrument and set the instrument to the Pulse-Echo mode.

(2) Set Delay to zero and set Reject to zero.

(3) Put couplant on the reference standard at fastener hole 2, Position E. See Figure 3, Detail I.

(4) Put the transducer at Position E on the reference standard. See Figure 3, Detail I.

(5) Move the transducer until the fastener hole signal is at a maximum height on the screen display. See Figure 3, Detail II.

(6) Adjust the range to put the fastener hole signal at approximately 70 percent of full screen width (FSW) as shown in Figure 3, Detail II.

(7) Monitor the screen display and move the transducer to Position F. As you move the transducer the signal from the fastener hole will decrease and a signal from the EDM notch will occur immediately to the right of the fastener hole signal as shown in Figure 3, Detail II.

(8) Move the transducer to get the maximum signal from the EDM notch and adjust the gain to set the signal at 80 percent full screen height (FSH). See Figure 3, Detail II.

(9) Move the transducer to Position G. Move the transducer until the fastener hole signal is at a maximum height on the screen display.

(10) The fastener hole signal will occur at approximately 40% of FSW as shown in Figure 3, Detail II.

(11) Monitor the screen display and move the transducer to Position H. As you move the transducer, the signal from the fastener hole will decrease and a signal from the EDM notch will occur immediately to the right of the fastener hole signal as shown in Figure 3, Detail II.

NOTE: Do not change the instrument settings.

5. Inspection Procedure

A. Examine the flange of the frame inner chord at BS 727 and WL 201 for cracks at the fastener location shown in Figure 1 with a 45 degree transducer.

(1) Identify the inspection area on the flange of the frame inner chord

(2) Calibrate the instrument as specified in Paragraph 4.A.

(3) Examine the one fastener location on the flange of the frame inner chord for cracks that are in the near area of the fastener hole as follows:

NOTE: The area of the fastener hole that is on the same surface as the transducer is the near area of the fastener hole.

(a) Apply a thin layer of couplant on the inspection surface.

(b) Put the transducer on the inspection surface and move the transducer to get a signal from the fastener hole.

NOTE: If the hole signal does not occur on the screen display, increase the gain until the hole signal is between 10 and 20 percent of FSH. Do not lower the gain if the signal is initially higher than 20 percent of FSH.

(c) Make a scan as you slowly turn the transducer approximately 10 to 15 degrees to the left and right to find possible cracks. While you turn the transducer to the left and right, slowly move the transducer away from the hole and toward the hole. Move the transducer a minimum of one full transducer length (if possible) on the inspection surface when you make your scan.

(d) Do Paragraph 5.A.(3)(a) thru Paragraph 5.A.(3)(c) again to examine the frame for cracks that can occur at the far area of the fastener hole.

NOTE: The area of the fastener hole that is on the opposite surface that the transducer is on is the far area of the fastener hole.

B. Examine the web of the frame inner chord at BS 727 and WL 201 for cracks at the fastener locations shown in Figure 1 with a 70 degree transducer.

(1) Identify the inspection area on the web.

(2) Calibrate the instrument as specified in Paragraph 4.B.

(3) Examine the five fastener locations on the web of the frame inner chord for cracks that can occur in the near area of the fastener holes.

(a) Apply a thin layer of couplant on the inspection surface.

(b) Put the transducer on the inspection surface and move the transducer to get a signal from the fastener hole.

NOTE: If the hole signal does not occur on the screen display, increase the gain until the hole signal is between 10 and 20 percent of FSH. Do not lower the gain if the signal is initially higher than 20 percent of FSH.

(c) Make a scan as you slowly turn the transducer approximately 10 to 15 degrees to the left and right to find possible cracks. While you turn the transducer to the left and right, slowly move the transducer away from the hole and toward the hole. Move the transducer a minimum of one full transducer length (if possible) on the inspection surface when you make your scan.

(d) Do Paragraph 5.B.(3)(a) thru Paragraph 5.B.(3)(c) again to examine the web for cracks that can occur in the far area of the fastener holes.

C. Do Paragraph 5.A. and Paragraph 5.B. again to examine the flange and web of the frame inner chord at the BS 727 and WL 201 inspection area on the opposite side of the airplane.

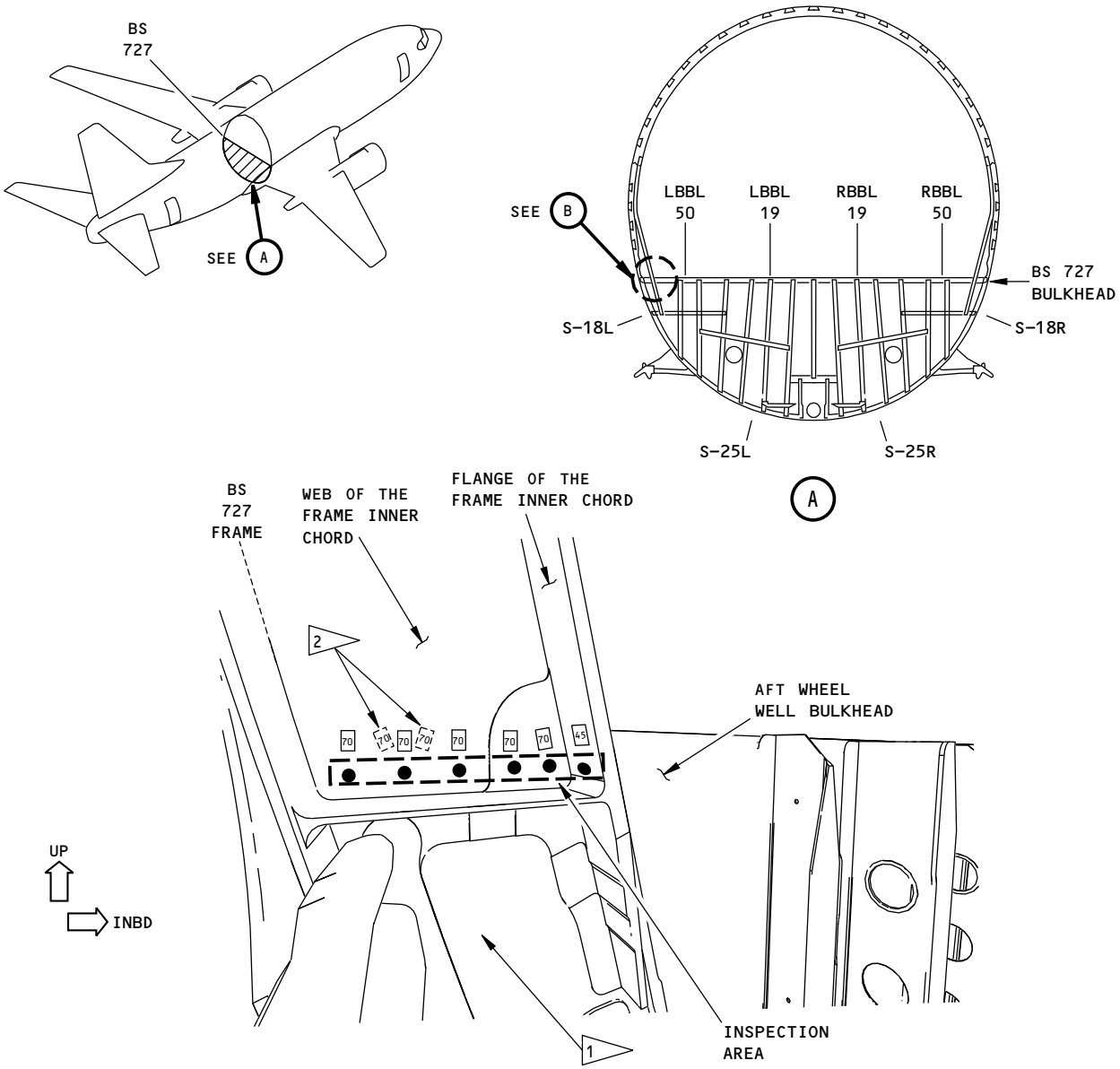
6. Inspection Results

A. Areas that cause signals to occur that are 40 percent (or more) of FSH that are to the right of the fastener hole signal in the inspection area must be rejected. Areas that cause these signals to occur must be examined some more for possible cracks.

(1) Compare the signals that occur during the inspection with the signals that you get from the reference standard.

(2) Compare the signals that occur with the signals that occur from a different area that has the same (or almost the same) structure on the same airplane or on a different airplane.

B. To make sure there is a crack, remove the fastener and do an eddy current fastener hole inspection as specified in Part 6, 51-00-00, Procedure 16.

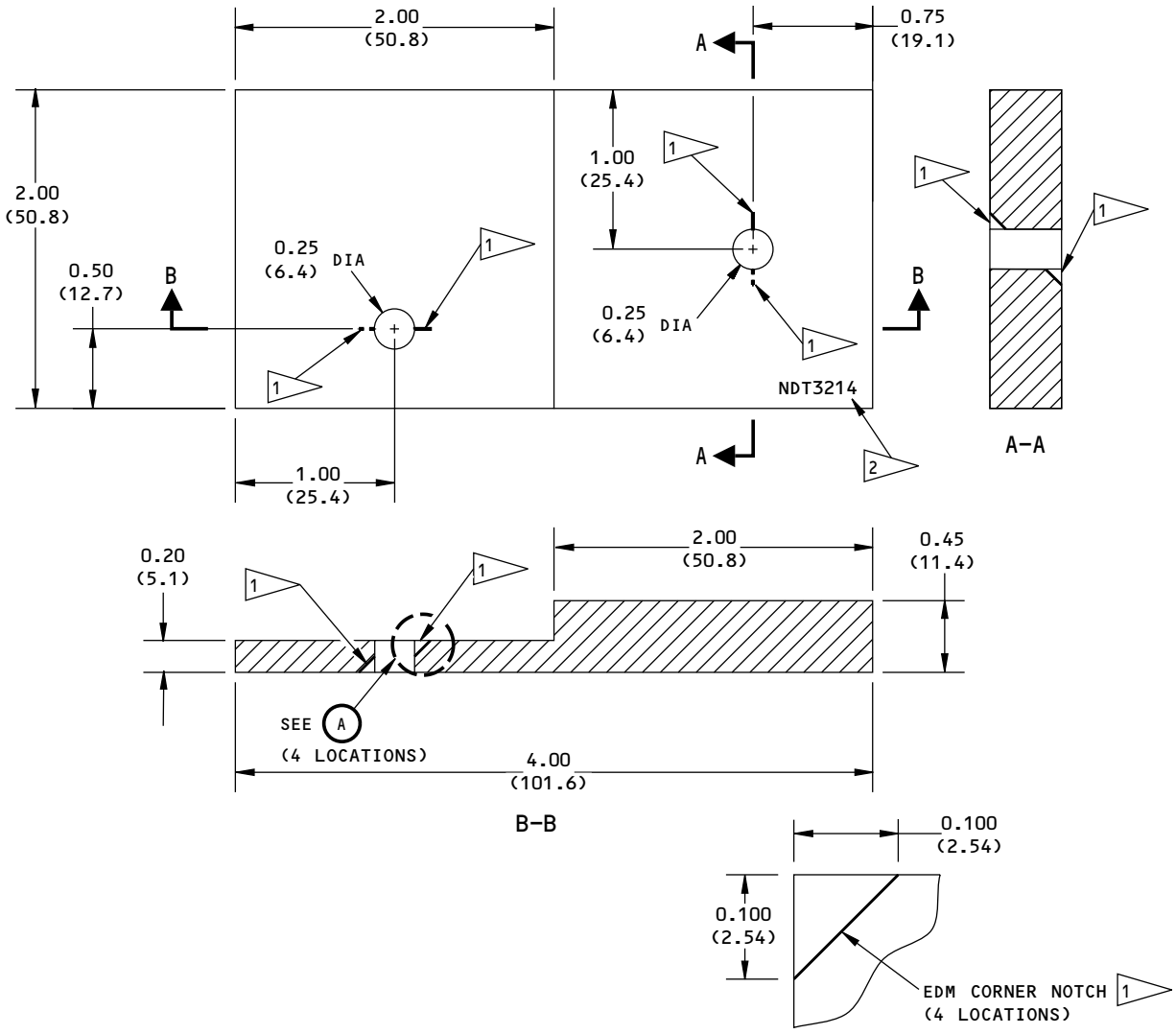


NOTES

- ● INSPECTION FASTENER LOCATIONS
- □ TRANSDUCER POSITIONS. THE SHEAR WAVE ANGLE OF THE TRANSDUCER IS SPECIFIED IN THE TRANSDUCER SYMBOL AT EACH POSITION.
- 1 THE AIR DUCT AND INSULATION ARE NOT SHOWN TO GIVE A CLEAR VIEW OF THE INSPECTION AREA
- 2 SCAN AREA AT ALL FASTENER LOCATIONS.

2350365 S0000536356_V1

Inspection Area
Figure 1



NOTES

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

INCHES	MILLIMETERS
X.XXX = ±0.005	X.XX = ±0.10
X.XX = ±0.025	X.X = ±0.5
X.X = ±0.050	X = ±1

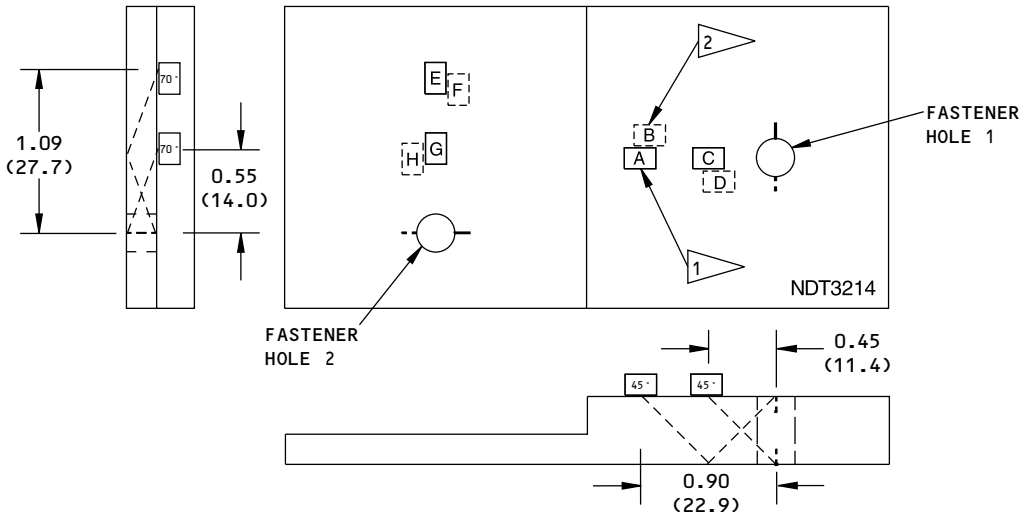
- MATERIAL: 7050–T7451 ALUMINUM OR EQUIVALENT AIRCRAFT GRADE ALUMINUM
- SURFACE ROUGHNESS: 63 Ra OR BETTER

1 EDM CORNER NOTCH: 0.100 (2.54) DEEP X 0.007 (0.18) WIDE (±0.002 (±0.05))

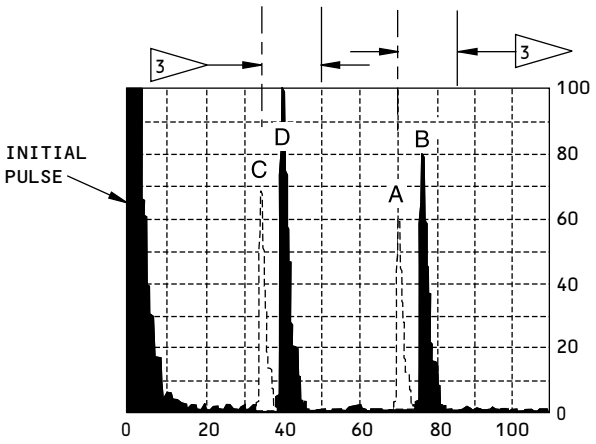
2 ETCH OR STAMP THE REFERENCE STANDARD NUMBER, NDT3214, AT APPROXIMATELY THIS LOCATION

2350420 S0000536358_V1

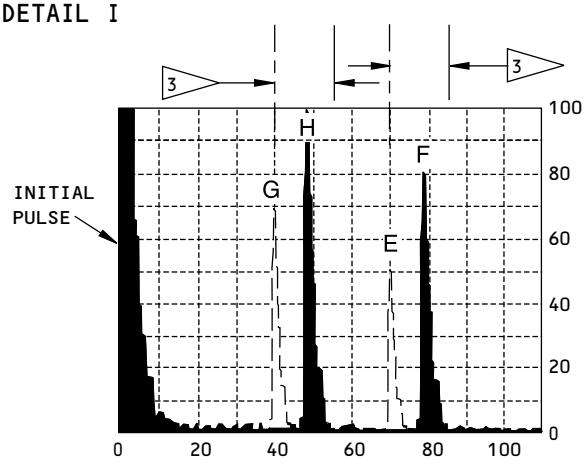
Reference Standard NDT3214
Figure 2



CALIBRATION TRANSDUCER POSITIONS
DETAIL I



CALIBRATION SCREEN DISPLAYS AT
FASTENER HOLE 1 WITH A 45° TRANSDUCER



CALIBRATION SCREEN DISPLAYS AT
FASTENER HOLE 2 WITH A 70° TRANSDUCER

CALIBRATION SCREEN DISPLAYS
DETAIL II

NOTES

1. PUT THE TRANSDUCER AT POSITION A. THEN MOVE IT A SMALL DISTANCE FORWARD AND BACKWARD TO AND AWAY FROM THE FASTENER HOLE WHILE YOU TURN IT A SMALL QUANTITY TO THE LEFT AND RIGHT. DO THIS UNTIL THE SIGNAL FROM THE FASTENER HOLE IS AT A MAXIMUM ON THE SCREEN DISPLAY. FOLLOW THE SAME PROCEDURE FOR POSITIONS C, E, AND G.
2. MONITOR THE SCREEN DISPLAY AND MOVE THE TRANSDUCER TO POSITION B AND GET THE MAXIMUM SIGNAL FROM THE NOTCH. THE FASTENER HOLE SIGNAL AT TRANSDUCER POSITION A WILL DECREASE AND GO OUT OF VIEW AND THE NOTCH SIGNAL WILL COME INTO VIEW WHILE YOU MOVE THE TRANSDUCER TO POSITION B. FOLLOW THE SAME PROCEDURE FOR POSITIONS D, F, AND H
3. ULTRASONIC SIGNALS THAT ARE 40% (OR MORE) OF FSH AND TO THE RIGHT OF THE FASTENER HOLE SIGNAL ARE POSSIBLE CRACK INDICATIONS. AREAS THAT CAUSE THESE SIGNALS TO OCCUR MUST BE EXAMINED MORE FULLY. THE CENTERLINE OF THE FASTENER HOLE SIGNAL WILL OCCUR AT DIFFERENT LOCATIONS ON THE SCREEN DISPLAY WHEN THE TRANSDUCER IS AT DIFFERENT DISTANCES FROM THE FASTENER HOLE.

2350576 S0000536359_V1

Calibration on Reference Standard NDT3214
Figure 3

PART 4 - ULTRASONIC

OVERWING EMERGENCY EXIT CUTOUT - OUTER CHORD OF THE EDGE FRAME

1. Purpose

A. Use this procedure to examine the outer chord of the edge frame at the overwing emergency exit cutout. The inspection area is at fastener locations that attach the backup fittings to the outer chord. The backup fittings are between S-11 and S-13. See Figure 1 for the inspection areas for the different airplane models.

B. This procedure uses an ultrasonic shear wave to examine the outer chord of the edge frame for cracks that start at fastener locations.

C. The outer chord is aluminum.

D. This inspection is done in the airplane.

E. 737 Maintenance Planning Document (MPD) Damage Tolerance Rating (DTR) Check Form Reference:

(1) Item: 53-40-22-7 (UT)

2. Equipment

A. General

(1) Use equipment that can be calibrated on the reference standard as specified in Paragraph 4.

(2) Refer to Part 1, 51-01-00, for data about the equipment manufacturers.

B. Instruments

(1) Use a pulse echo ultrasonic instrument. The instruments that follow were used to help prepare the procedure:

(a) Epoch 600; Olympus NDT

(b) USMGo; GE Inspection Technologies

C. Transducers

(1) Use a 5 MHz transducer that can put a 45 degree shear wave in aluminum. The transducer must have a minimum width of 0.25 inch (6.4 mm). The transducers that follow were used to help prepare this procedure.

(a) AFS-545AT; Aerofab NDT

(b) SA-455T; Techna NDT

D. Reference Standards

(1) Use reference standard NDT3231 to help calibrate the equipment. See Figure 2 for data about reference standard NDT3231.

E. Couplant

(1) Use couplant that is permitted for use with the airplane structure.

3. Prepare for the Inspection

A. Identify the inspection areas shown in Figure 1.

B. Get access to the inspection areas.

C. Clean the inspection surfaces.

(1) Remove sealant, loose paint and dirt from areas the transducer will touch.

4. Instrument Calibration

A. Calibrate the instrument to examine the outer chord of the edge frame at the overwing emergency exit cutout.

(1) Connect the transducer to the instrument and set the instrument to the Pulse-Echo mode.

(2) Set Delay to zero and Reject to zero.

(3) Put couplant on the reference standard at position 1. See Figure 3, Detail 1.

(4) Put the transducer behind the scribe line and point the sound beam at the fastener hole. See Figure 3, Detail 1.

(5) Turn the transducer a small quantity clockwise and counterclockwise and move the transducer to and away from the fastener hole to get a maximum signal from the fastener hole. This is transducer position 1.

(6) Adjust the range to put the fastener hole signal at approximately 60 percent of full screen width (FSW) as shown in Figure 3, Detail 2.

(7) Monitor the screen display and move the transducer a minimum of one transducer width to the right and keep it the same distance from the scribe line as it was at transducer position 1. As you move the transducer, the signal from the fastener hole will decrease and a signal from the EDM notch will occur to the right of the fastener hole signal. See Figure 3, Detail 3.

(8) Move the transducer to get the maximum signal from the EDM notch and adjust the gain to set the signal at 80 percent of full screen height (FSH). Make sure the transducer does not go across the scribe line. See Figure 3, Detail 3.

(9) Add 6 dB of gain to adjust for paint.

5. Inspection Procedure

A. Examine the outer chord of the edge frame at the overwing emergency exit cutout as shown in Figure 1.

(1) Identify the inspection areas at the outer chord of the edge frame at the overwing emergency exit cutout.

NOTE: Different airplane models will have different overwing emergency exit cutout configurations. Make sure that you identify the applicable views in Figure 1 for the airplane model to be examined.

(2) Calibrate the instrument as specified in Paragraph 4.

(3) Examine the outer chord for cracks behind one of the backup fittings shown in Figure 1.

NOTE: There are two fastener locations to be examined at each backup fitting.

(a) Apply a thin layer of couplant to the outer chord flange.

(b) Put the transducer on the outer chord so the front of the transducer touches the edge of the backup fitting. Then move the transducer a small distance to the right and left to get a maximum signal from the fastener hole. See Figure 1.

NOTE: If the signal from the fastener hole does not occur on the screen display, increase the gain until the signal from the fastener hole is between 10 and 20 percent of FSH. Do not lower the gain if the signal from the fastener hole is initially more than 20 percent of FSH.

(c) Move the transducer a minimum of one full transducer width away from the cutout of the overwing emergency exit. Then turn the transducer a small quantity clockwise and counterclockwise and monitor the screen display for signals that occur to the right of the signal from the fastener hole.

(d) Do Paragraph 5.A.(3)(a) thru Paragraph 5.A.(3)(c) again for each of the backup fitting inspection locations identified in Figure 1.

(e) Do Paragraph 5.A.(3)(a) thru Paragraph 5.A.(3)(d) again to examine the outer chord for cracks behind the backup fittings on the opposite side of the airplane.

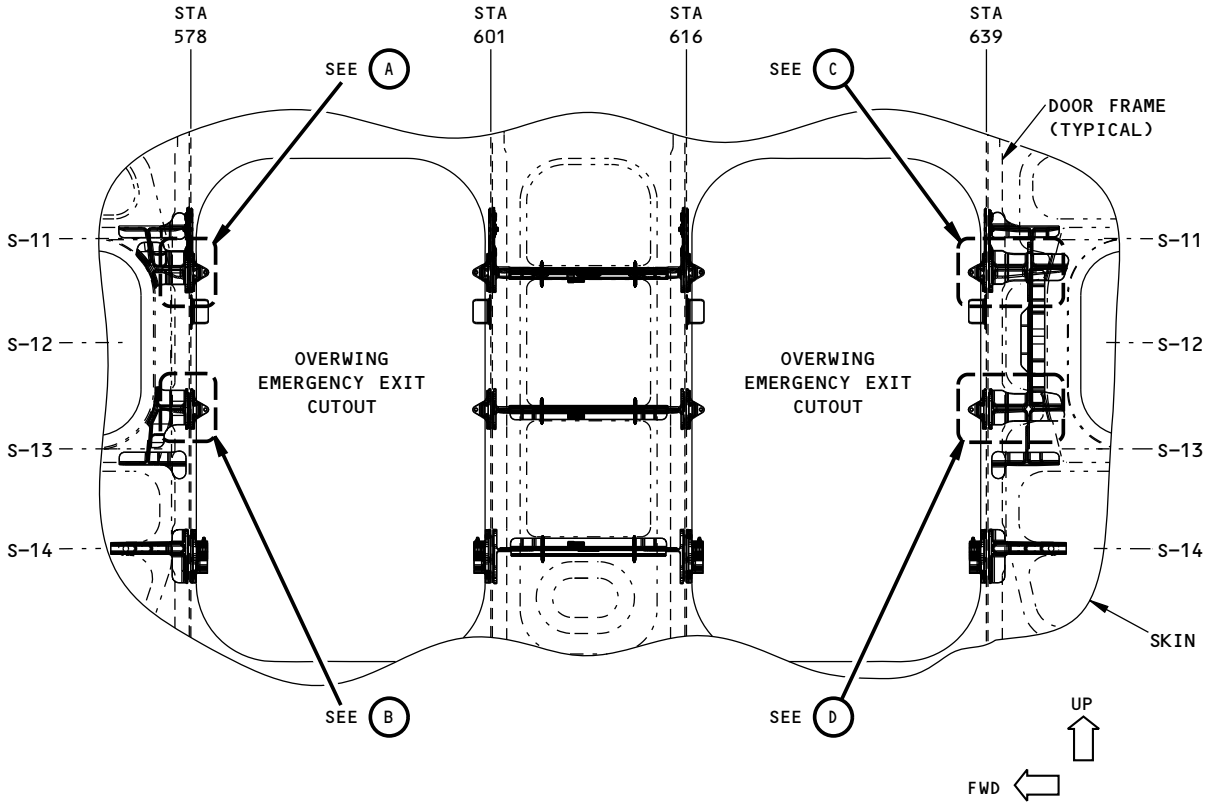
6. Inspection Results

A. Signals that are 40 percent (or more) of FSH and are no more than 20 percent of FSW to the right of the signal from the fastener hole are possible crack indications. Areas that cause possible crack indications to occur must be rejected for possible cracks. Examine these areas as follows:

(1) Compare the signals with the signals you get from the reference standard.

(2) Compare the signals with the signals that occur from other structure on the same or a different airplane that is almost the same as the structure that causes the crack signal to occur.

B. To make sure there is a crack, remove the fastener and do an open hole eddy current inspection as specified in Part 6, 51-00-00, Procedure 16.



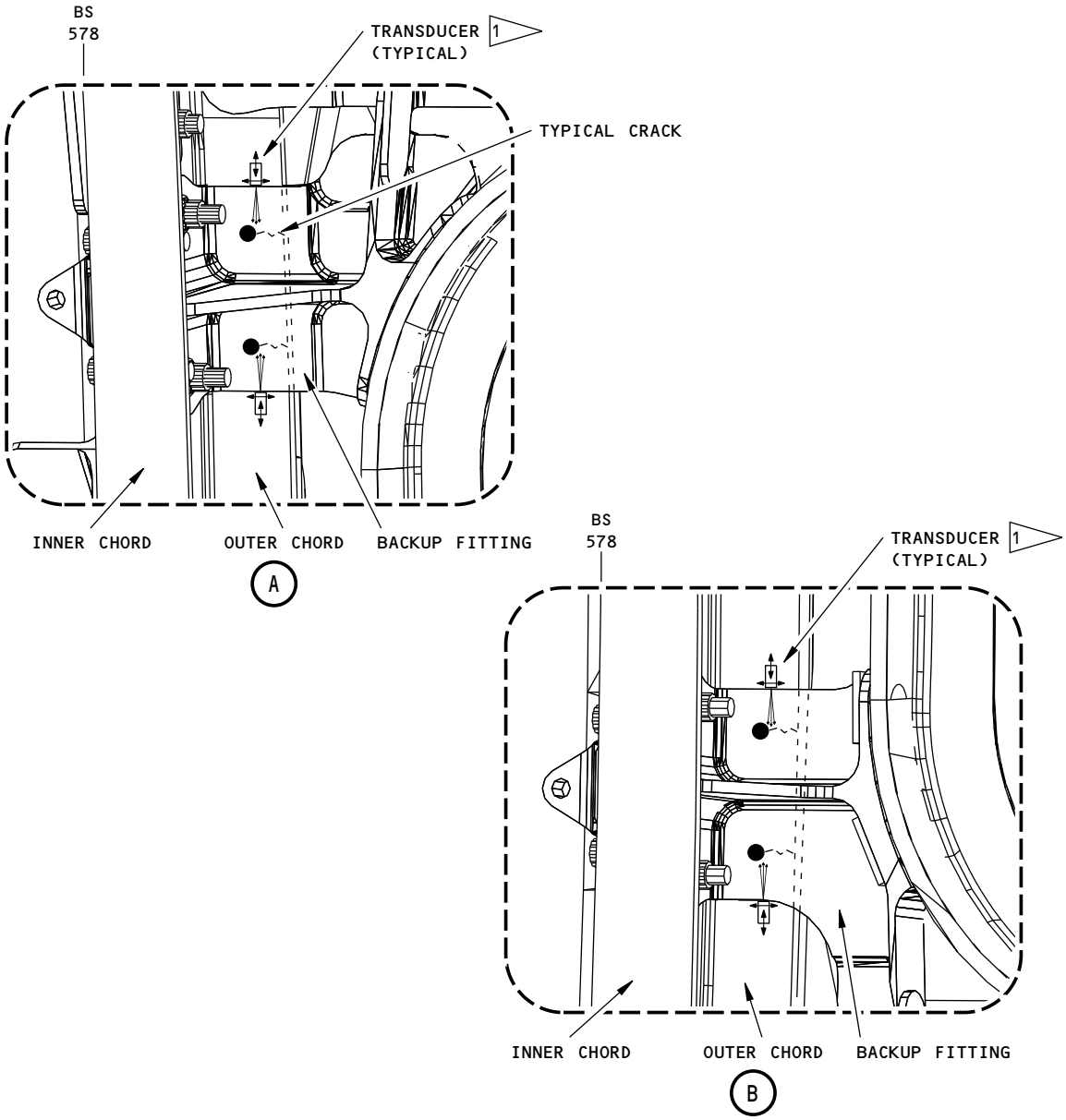
737-800/900/900ER
OVERWING EMERGENCY EXIT CUTOUTS
(THIS IS AN EXTERNAL VIEW OF THE AIRPLANE AS YOU LOOK IN)

NOTES

- THE INSPECTION IS DONE IN THE AIRPLANE
- THE 737-800 MODEL IS SHOWN; THE 737-900/900ER MODELS ARE ALMOST THE SAME
- THE LEFT SIDE IS SHOWN; THE RIGHT SIDE IS OPPOSITE

2375195 S0000543578_V1

Inspection Areas
Figure 1 (Sheet 1 of 6)



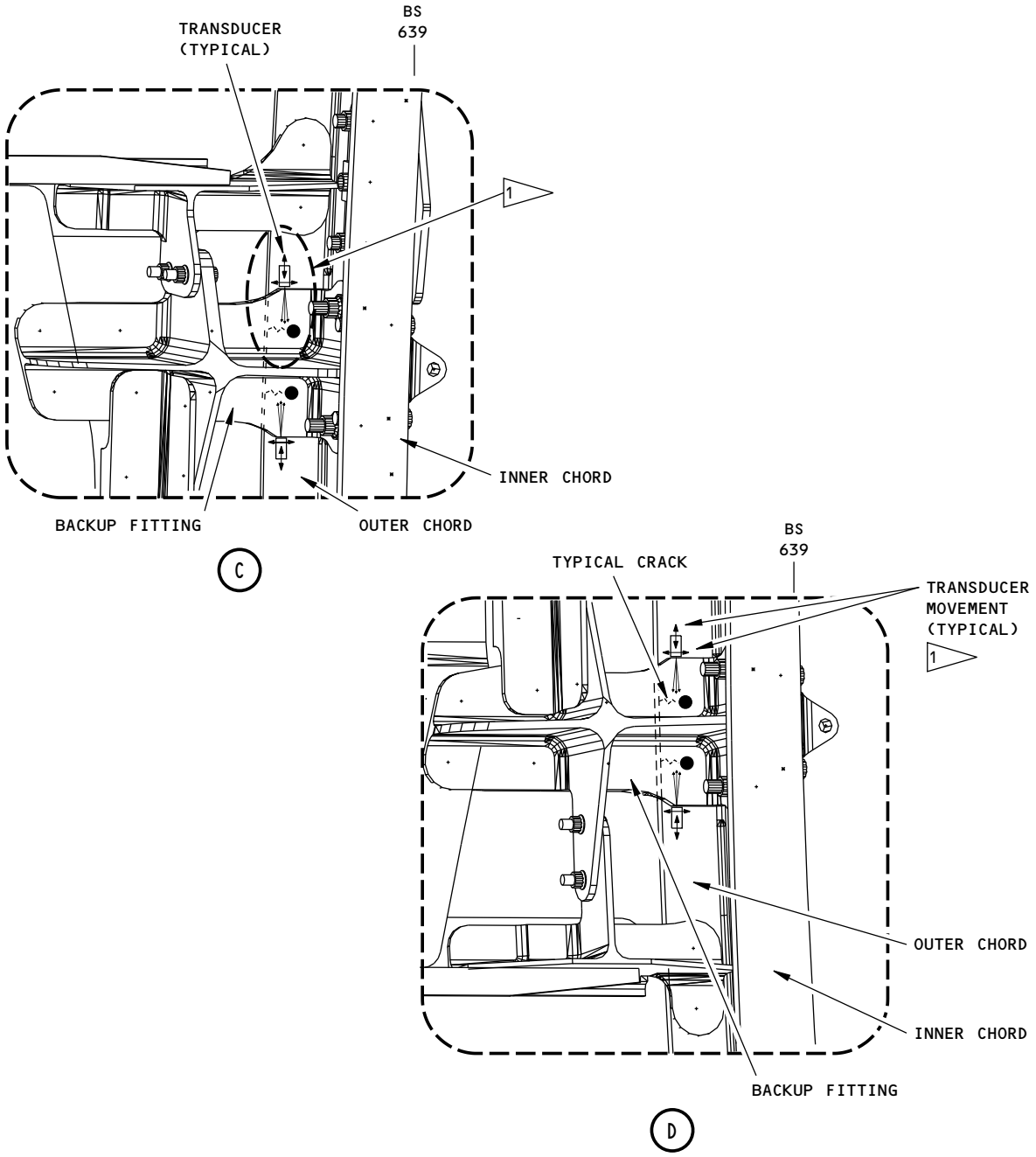
737-800/900/900ER
OVERWING EMERGENCY EXIT CUTOUT
SIDE VIEW AT BS 578
(VIEWS ARE AS YOU LOOK OUT)

NOTES

- ● FASTENER LOCATIONS TO BE EXAMINED
- 1 TRANSDUCER POSITION AND MOVEMENT TO EXAMINE THE OUTER CHORD BELOW THE BACKUP FITTINGS.

2375154 S0000543579_V1

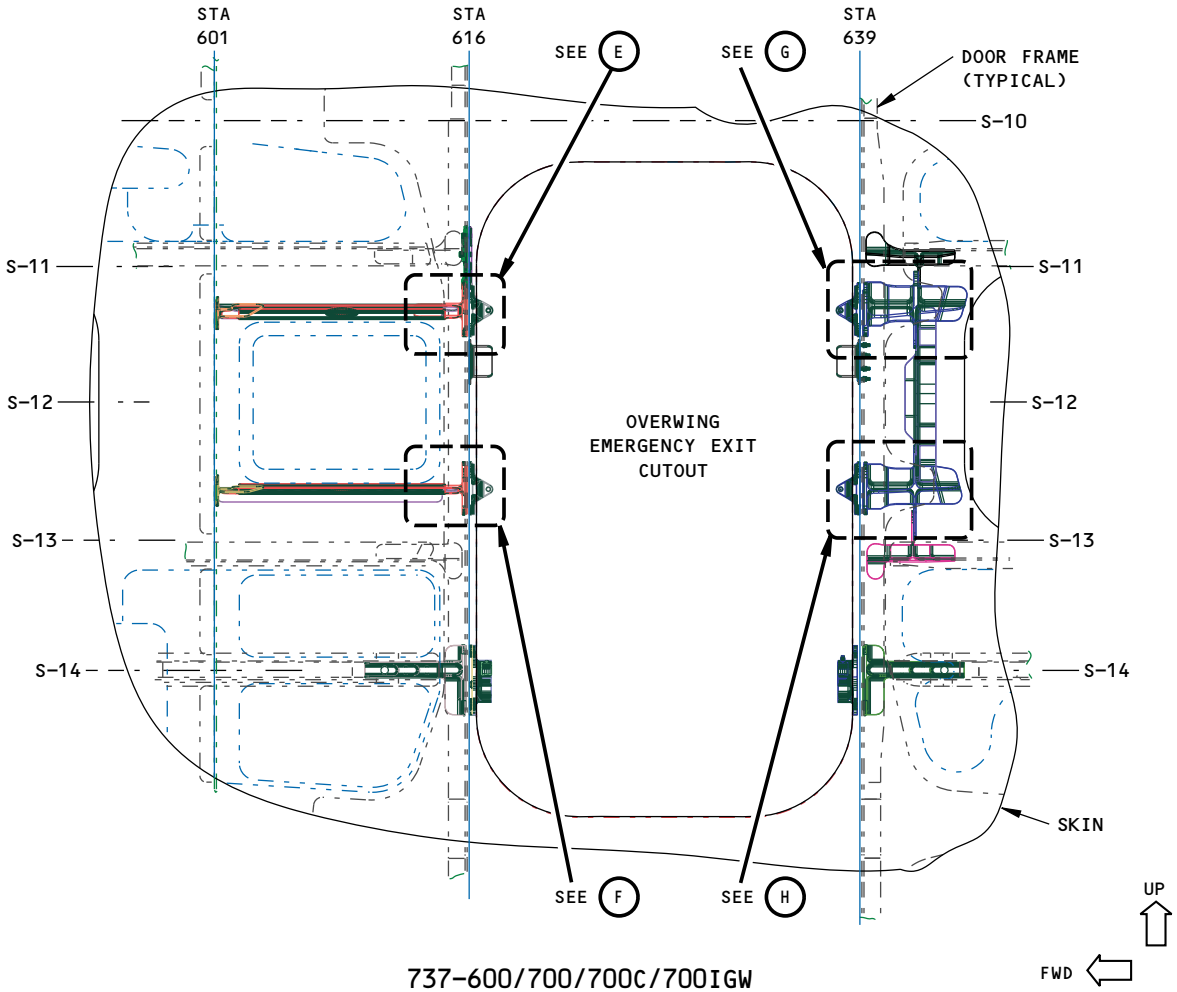
Inspection Areas
Figure 1 (Sheet 2 of 6)



737-800/900/900ER
OVERWING EMERGENCY EXIT CUTOUT
SIDE VIEW AT BS 639
(VIEWS ARE AS YOU LOOK OUT)

2375168 S0000543580_V1

Inspection Areas
Figure 1 (Sheet 3 of 6)



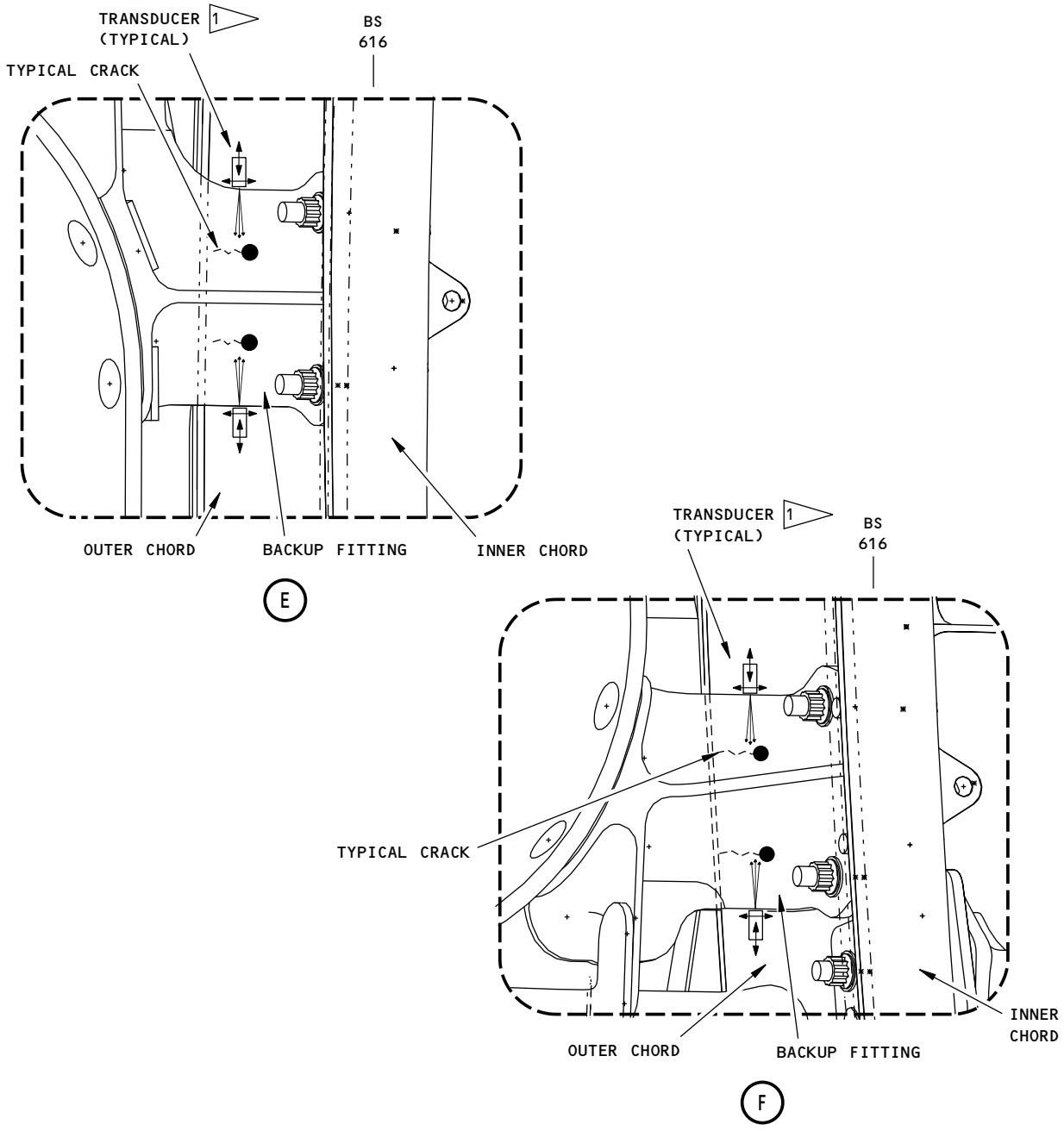
737-600/700/700C/700IGW
OVERWING EMERGENCY EXIT CUTOUT
(THIS IS AN EXTERNAL VIEW OF THE AIRPLANE AS YOU LOOK IN)

NOTES

- THE INSPECTION IS DONE IN THE AIRPLANE
- THE 737-600 MODEL IS SHOWN; THE 737-700/700C/700IGW MODELS ARE ALMOST THE SAME
- THE LEFT SIDE IS SHOWN; THE RIGHT SIDE IS OPPOSITE

2375182 S0000543581_V1

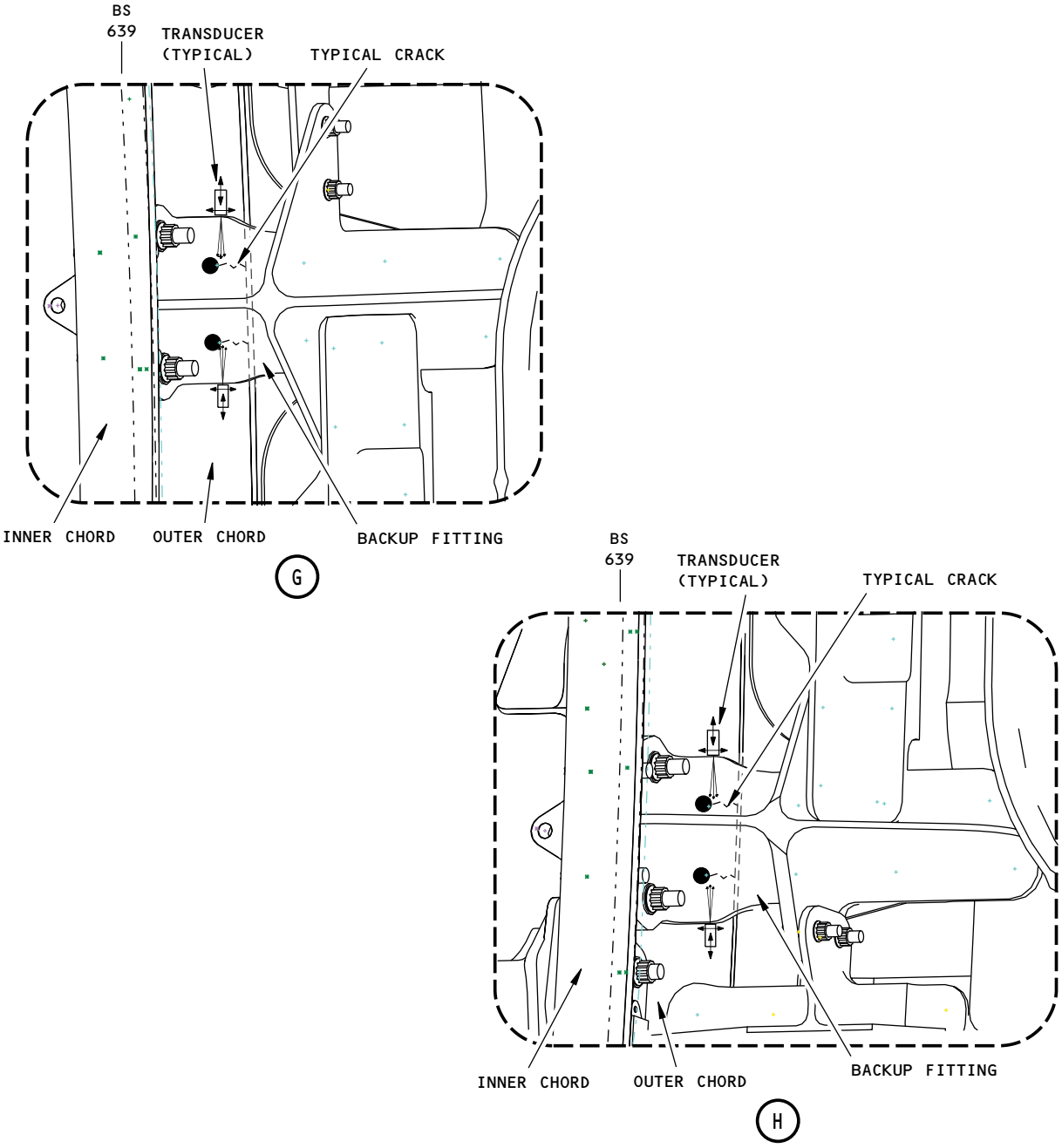
Inspection Areas
Figure 1 (Sheet 4 of 6)



737-600/700/700C/700IGW
OVERWING EMERGENCY EXIT CUTOUT
SIDE VIEW AT BS 616
(VIEWS ARE AS YOU LOOK OUT)

2375213 S0000543582_V1

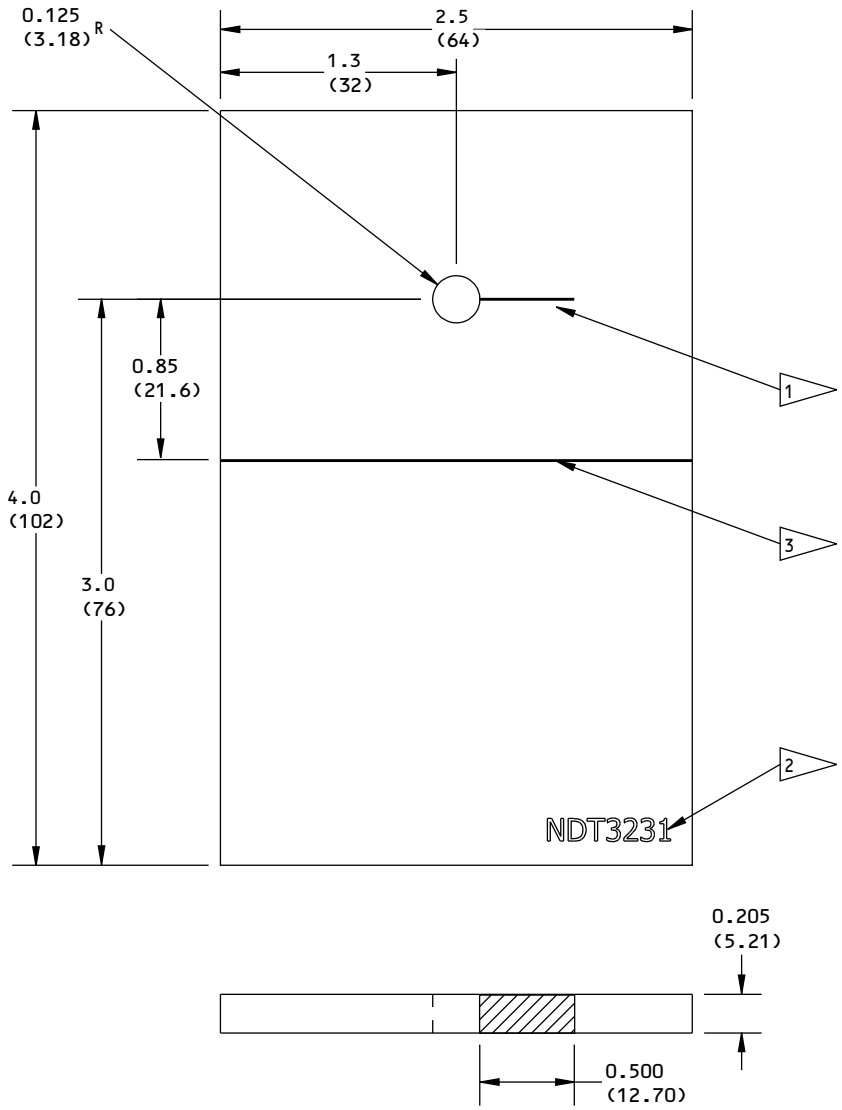
Inspection Areas
Figure 1 (Sheet 5 of 6)



737-600/700/700C/700IGW
OVERWING EMERGENCY EXIT CUTOUT
SIDE VIEW AT BS 639
(VIEWS ARE AS YOU LOOK OUT)

2375238 S0000543583_V1

Inspection Areas
Figure 1 (Sheet 6 of 6)



NOTES

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

INCHES	MILLIMETERS
X.XXX = ±0.005	X.XX = ±0.10
X.XX = ±0.025	X.X = ±0.5
X.X = ±0.050	X = ±1

- MATERIAL: 2024 SERIES OR 7075 SERIES ALUMINUM (CLAD OR BARE)
- SURFACE ROUGHNESS: 63 Ra OR BETTER

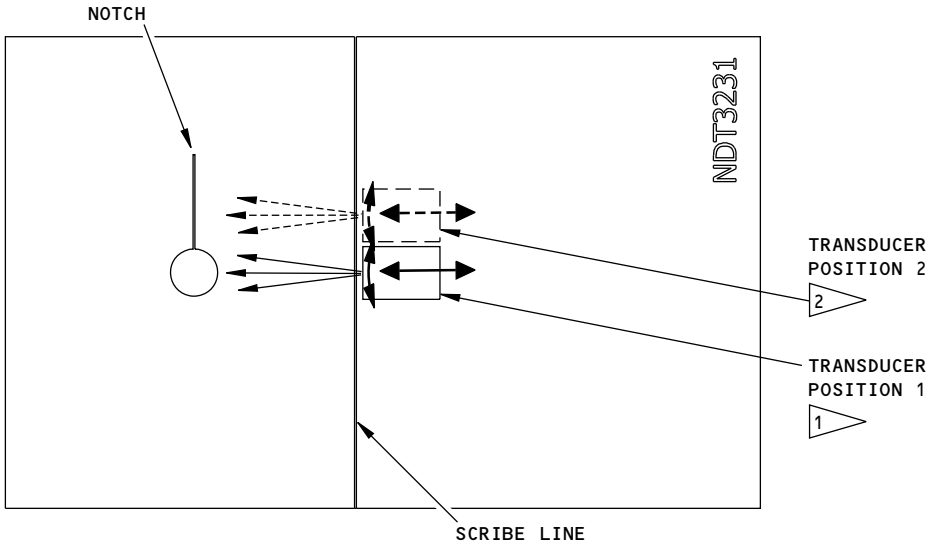
1 EDM NOTCH:
WIDTH: 0.010 (0.25) MAXIMUM
DEPTH: THROUGH THE THICKNESS
LENGTH: 0.500 (12.70)

2 ETCH OR STAMP THE REFERENCE STANDARD NUMBER, NDT3231, AT APPROXIMATELY THIS LOCATION

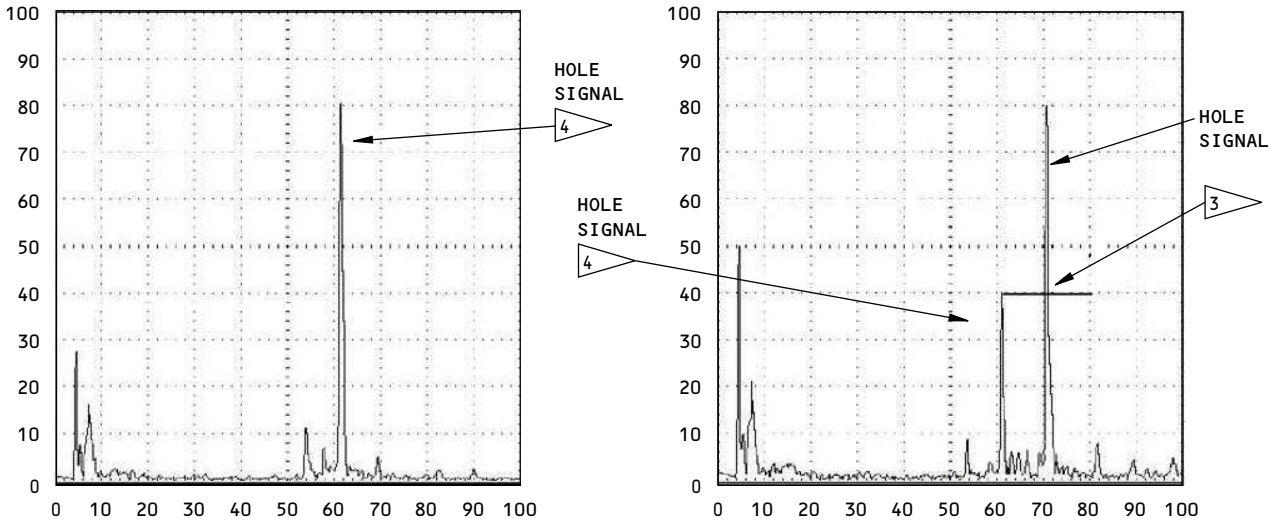
3 ETCH OR LASER CUT A LINE ON THE REFERENCE STANDARD AT THIS LOCATION

2375450 S0000543584_V1

Reference Standard NDT3231
Figure 2



TRANSDUCER POSITIONS
DETAIL 1



TRANSDUCER POSITION 1 SIGNAL
DETAIL 2

TRANSDUCER POSITION 2 SIGNAL
DETAIL 3

CALIBRATION SIGNALS FOR THE TRANSDUCER POSITIONS

2375453 S0000543585_V1

Instrument Calibration
Figure 3 (Sheet 1 of 2)

NOTES

1. PUT THE TRANSDUCER BEHIND THE SCRIBE LINE AND POINT THE SOUND BEAM AT THE FASTENER HOLE. TURN THE TRANSDUCER A SMALL QUANTITY CLOCKWISE AND COUNTERCLOCKWISE AND MOVE THE TRANSDUCER A SMALL QUANTITY TO AND AWAY FROM THE FASTENER HOLE TO GET A MAXIMUM SIGNAL FROM THE FASTENER HOLE. THIS IS TRANSDUCER POSITION 1.
2. MOVE THE TRANSDUCER A MINIMUM OF 1 TRANSDUCER WIDTH TO THE RIGHT AND KEEP IT THE SAME DISTANCE FROM THE SCRIBE LINE AS IT WAS AT TRANSDUCER POSITION 1. MAKE SURE THE TRANSDUCER DOES NOT MOVE ACROSS THE SCRIBE LINE ON THE REFERENCE STANDARD.
3. EXAMINE AREAS THAT CAUSE SIGNALS TO OCCUR THAT ARE 40% (OR MORE) OF FSH AND WITHIN 20% OF FSW TO THE RIGHT OF THE HOLE SIGNAL. THE SIGNAL FROM THE FASTENER HOLE WILL CHANGE IN FSW AS THE DISTANCE FROM THE EDGE OF THE BACKUP FITTING TO THE FASTENER HOLE CHANGES AT SOME LOCATIONS.
4. SIGNALS FROM THE FASTENER HOLE CAN OCCUR AT DIFFERENT SCREEN HEIGHTS ON THE DISPLAY.

2375475 S0000547158_V1

Instrument Calibration
Figure 3 (Sheet 2 of 2)