PART 4 - ULTRASONIC

VERTICAL STABILIZER REAR SPAR PRIMARY CHORDS

1. Purpose

A. To find cracks in the right and left stabilizer rear spar primary chords at the outboard forward and aft edges of the primary bolt holes.

B. This procedure will find 0.40 inch (10.2 mm) corner cracks and 0.40 inch (10.2 mm) midbore thumbnail cracks.

C. 737 Supplemental Structural Inspection Document (D6-37089) Reference:

(1) Item: E-6

2. Equipment

A. Any ultrasonic equipment which will satisfy performance requirements of this procedure is suitable for this inspection. The following equipment was used during development of this procedure and found acceptable.

(1) Instrument - Pulse Echo ultrasonic instrument capable of operating between 4 and 6 MHz.

(a) NDT 131; Nortec Incorporated

(2) Transducer - 45° shear wave, aluminum, maximum case size approx 1.0 inch (25.4 mm) long, 0.35 inch (8.9 mm) wide and 0.65 inch (16.5 mm) high.

(a) P/N 57A3064, Type SMZ, 5.0 MHz, 45°A; Automation Industries, Inc.

(3) Reference Standard - Make Reference Standards 315 and 316 shown in Figure 1 and Figure 2, or procure P/N 6411-69 and/or P/N 6411-70 from Ideal Speciality Co.

(4) Couplant - Ultrasonic couplant compatible with structure being inspected.

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

3. Prepare for the Inspection

A. Remove rear spar access doors 9505 and 9506.

B. Wipe the surfaces clean in the inspection area and remove loose paint.

4. Instrument Calibration

A. Use Reference Standard 315 for aircraft line numbers 1 through 315. Use Reference Standard 316 for aircraft line numbers 316 and on.

B. Connect transducer and make preliminary instrument adjustments per manufacturers instructions.

C. Apply light film of couplant and place leading edge of transducer at position 1A, Figure 3, approximately 1.6 inches (4.06 cm) from center of hole.

NOTE: Emission point of transducer will be 0.4 inch (1.02 cm) to 0.5 inch (1.27 cm) from leading edge.

D. Rotate and move transducer toward or away from hole to obtain maximum response from hole.

NOTE: Maximized hole signal for Reference Standard 315 will have one signal display. Maximized hole signal for Reference Standard 316, as a result of the hole bushing, will display one major signal and several minor signals. See Figure 3.

E. With hole signal maximized, mark reference standard at leading edge of transducer.

F. Adjust maximized hole response to 75 percent of scope width and 100 percent of full scale height. See Figure 3.

G. Rotate and move transducer toward notch until hole signal is eliminated and notch signal is maximized on scope. Mark reference standard at leading edge of transducer and note transducer travel between hole and notch.

H. Adjust notch response so that minimum response is 90 percent of full scale height. Response should be positioned at 60 percent to 70 percent of scope width distance. See Figure 3.

I. Repeat Paragraph 4.C. through Paragraph 4.F. for transducer positions 1B, 2A and 2B to verify that hole signal responses are between 70 percent and 80 percent full screen width. Verify that notch responses are between 60 percent and 70 percent full screen width with a minimum of 90 percent full screen height at all four notch locations.

5. Inspection Procedure

A. Calibrate instrument according to Paragraph 4.A. through Paragraph 4.I.

B. Identify inspection area on vertical stabilizer rear spar primary chord from Figure 4, Figure 5 and Figure 6.

C. Measure up from bottom edge of spar and place marks at 2.5 inches (6.35 cm), 4.4 inches (11.18 cm), and 7.3 inches (18.54 cm) per Figure 5 and Figure 6.

D. Apply thin coat of couplant from inspar skin to trailing edge skin and from bottom edge of spar to 8.5 inches (21.59 cm) above bottom edge.

E. Place leading edge of transducer on center of spar at 7.3 inch (18.54 cm) mark, scan down until top hole signal is maximized and mark location per Figure 5.

F. Locate forward and aft edges of bolt hole by scanning in forward and aft direction until maximized hole signal disappears.

G. Inspect top forward and aft edges of top bolt hole by scanning down along edges. Crack indications will appear when transducer is between 0.30 inch (9.76 cm) and 1.0 inch (2.54 cm) past maximized hole position.

NOTE: All scans are done by rotating transducer while moving up and down and forward and aft.

H. Place leading edge of transducer on center of spar at 2.5 inch (6.35 cm) mark, scan up until top hole signal is maximized and mark location per Figure 5. Complete top hole inspection per Paragraph 5.F. and Paragraph 5.G., except scan in the upward direction.

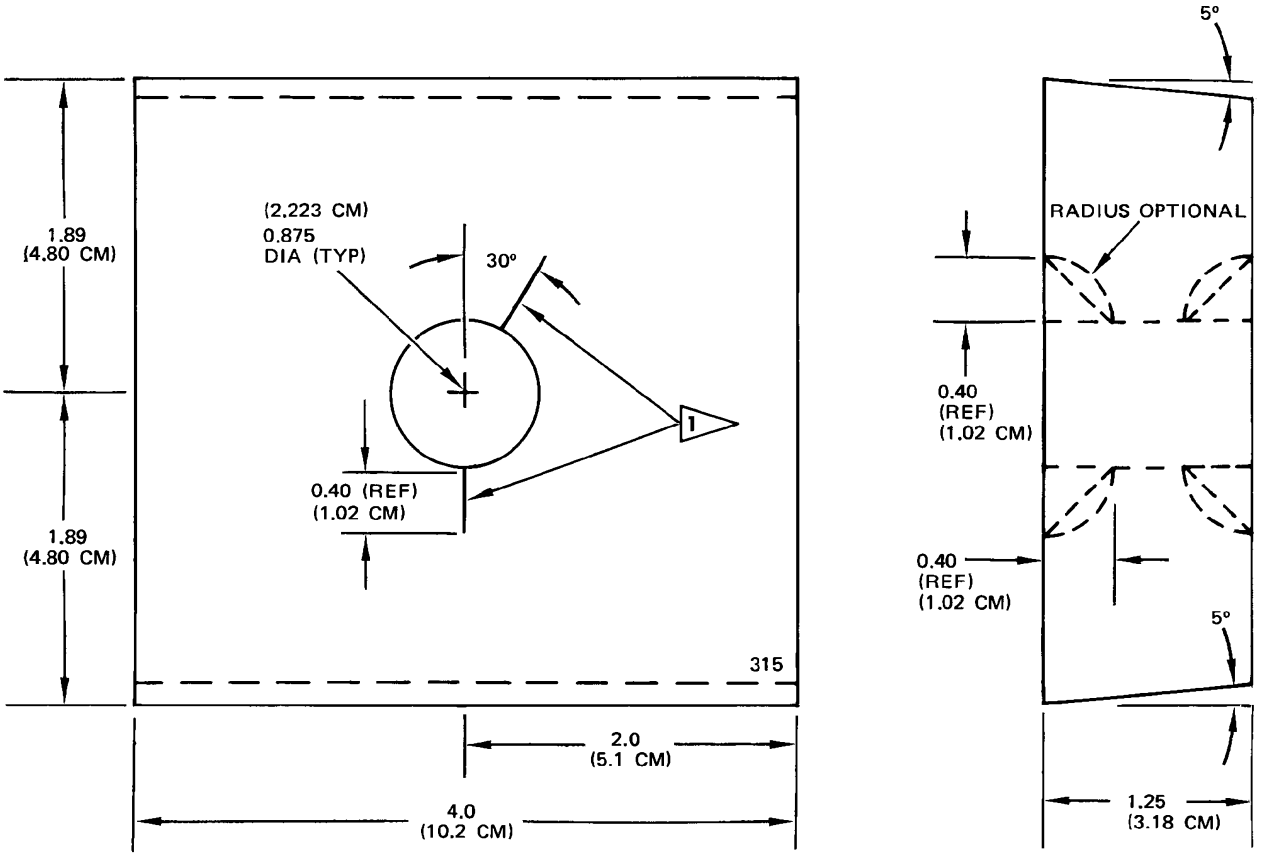
I. Place leading edge of transducer on center of spar at 4.4 inch (11.18 cm) mark, scan down until bottom hole signal is maximized and mark location per Figure 6. Continue inspection of bottom hole per Paragraph 5.F. and Paragraph 5.G.

J. Complete inspection of bottom hole by placing transducer on center of spar at bottom edge, scan up until bottom hole signal is maximized and mark location per Figure 6. Locate aft edge of bottom hole per Paragraph 5.F. Inspect aft edge of bottom hole by scanning up along edge for 0.9 inch (2.28 com) per Paragraph 5.G.

NOTE: Do not scan forward bottom edge of bottom hole as scanning distance is inadequate for inspection area coverage.

6. Inspection Results

A. Ultrasonic indications equal to or greater than 50 percent of full screen height and between 60 percent and 70 percent full screen width are potential cracks and should be investigated further.



NOTES

- ALL DIMENSIONS ARE IN INCHES (CENTIMETERS IN PARENTHESES) EXCEPT AS NOTED
- TOLERANCE: X.X ± 0.05 (0.13 CM), X.XX ± 0.02 (0.05 CM), X.XXX ± 0.005 (0.013 CM)
- MATERIAL: 2024–T3 OR T4 ALUMINUM
- ETCH OR STEEL STAMP WITH 315
- REFERENCE STANDARD 315 EFFECTIVE FOR LINE NUMBERS 1 THRU 315
- P/N 6411–69 AVAILABLE FROM IDEAL SPECIALTY CO.

1 JEWELER'S SAWCUT 0.010 (0.025 CM) WIDE X 0.40 (1.02 CM) X 0.40 (1.02 CM), 4 PLACES

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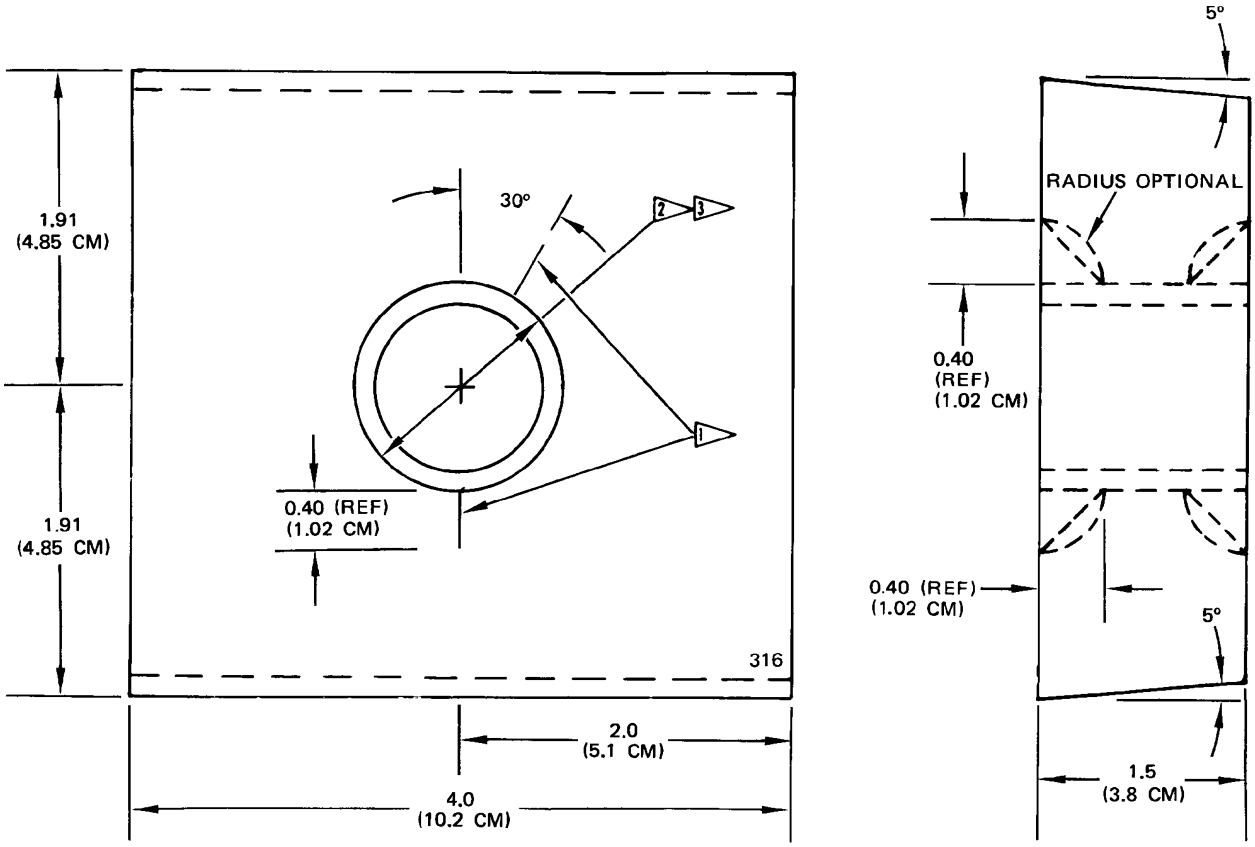
Reference Standard 315
Figure 1



NOTES

- ALL DIMENSIONS ARE IN INCHES (CENTIMETERS IN PARENTHESES) EXCEPT AS NOTED
- TOLERANCE: X.X ±0.05 (0.13 CM), X.XX ± 0.02 (0.05 CM), X.XXX ± 0.005 (0.013 CM) EXCEPT AS NOTED
- MATERIAL: 2024–T3 OR T4 ALUMINUM
- ETCH OR STEEL STAMP WITH 316
- REFERENCE STANDARD 316 EFFECTIVE ON NUMBERS 316 AND ON
- P/N 6411–70 AVAILABLE FROM IDEAL SPECIALTY CO.

1 JEWELER'S SAWCUT 0.010 (0.025 CM), X 0.40 (1.02 CM), X 0.40 (1.02 CM), 4 PLACES

2 PRESS FIT PHOSPHOR BRONZE BUSHING WITH 1.313 $^{+\ 0.0005}_{-\ 0.0000}$ (3.335 $^{+\ 0.0013}_{-\ 0.0000}$ CM) OD X 1.071 (2.72 CM) ID AND 1.55 (3.9 CM) LONG

3 HOLE DIAMETER 1.312 $^{+\ 0.0000}_{-\ 0.0005}$ (3.333 $^{+\ 0.0000}_{-\ 0.0013}$ CM) FOR INTERFERENCE FIT

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Reference Standard 316
Figure 2

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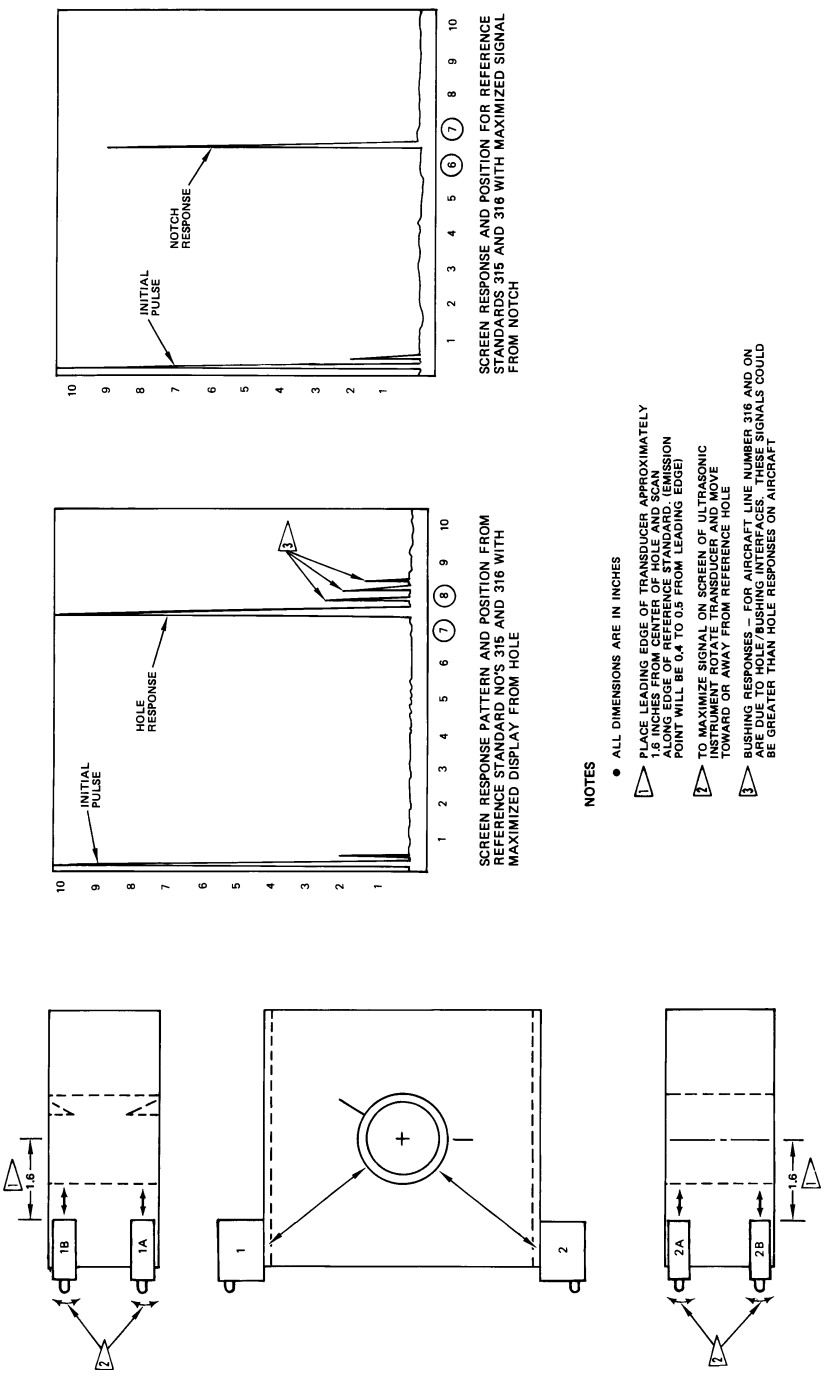
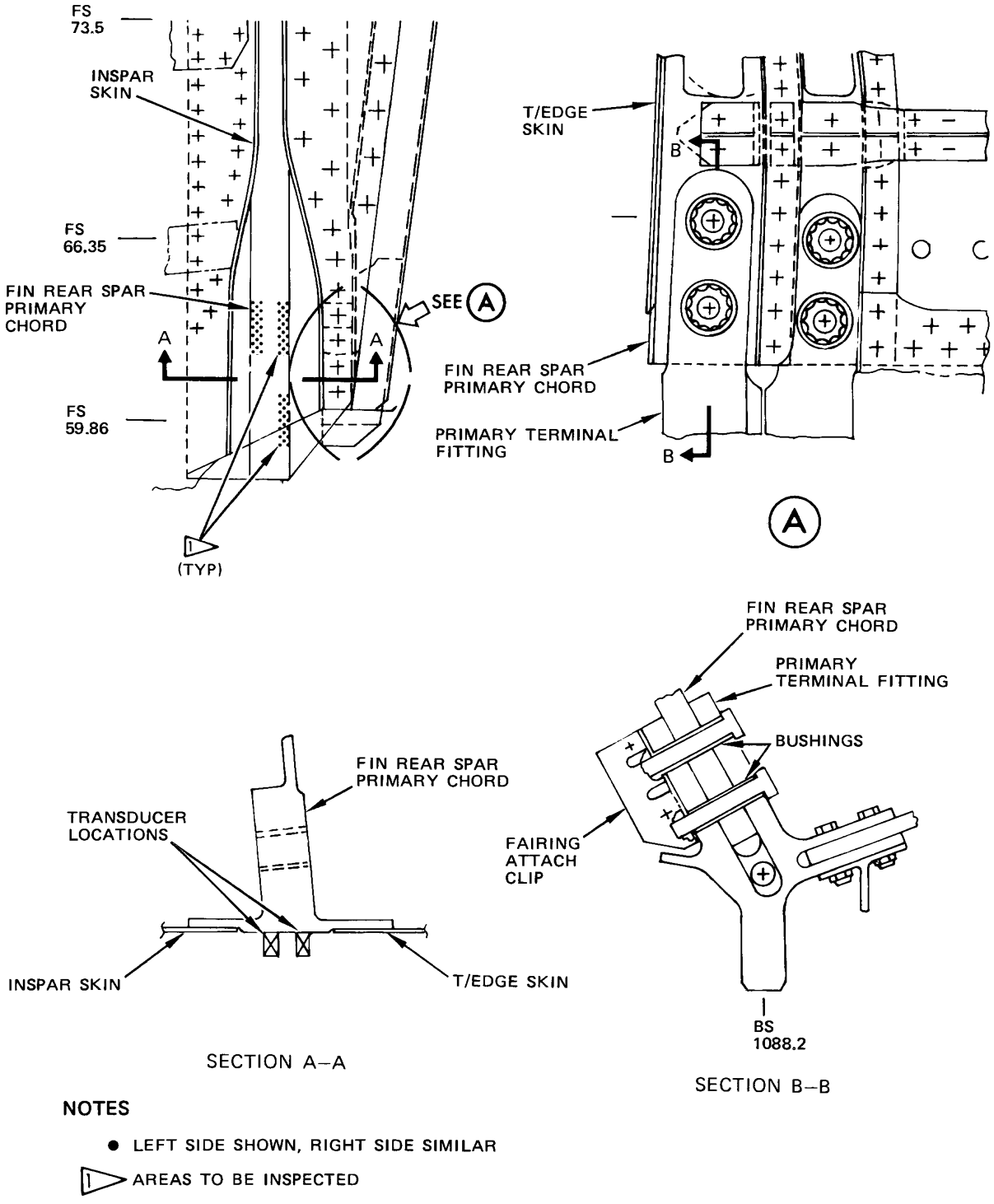


Transducer Placement for Reference Standards 315 and 316
Figure 3



NOTES

- LEFT SIDE SHOWN, RIGHT SIDE SIMILAR

1 AREAS TO BE INSPECTED

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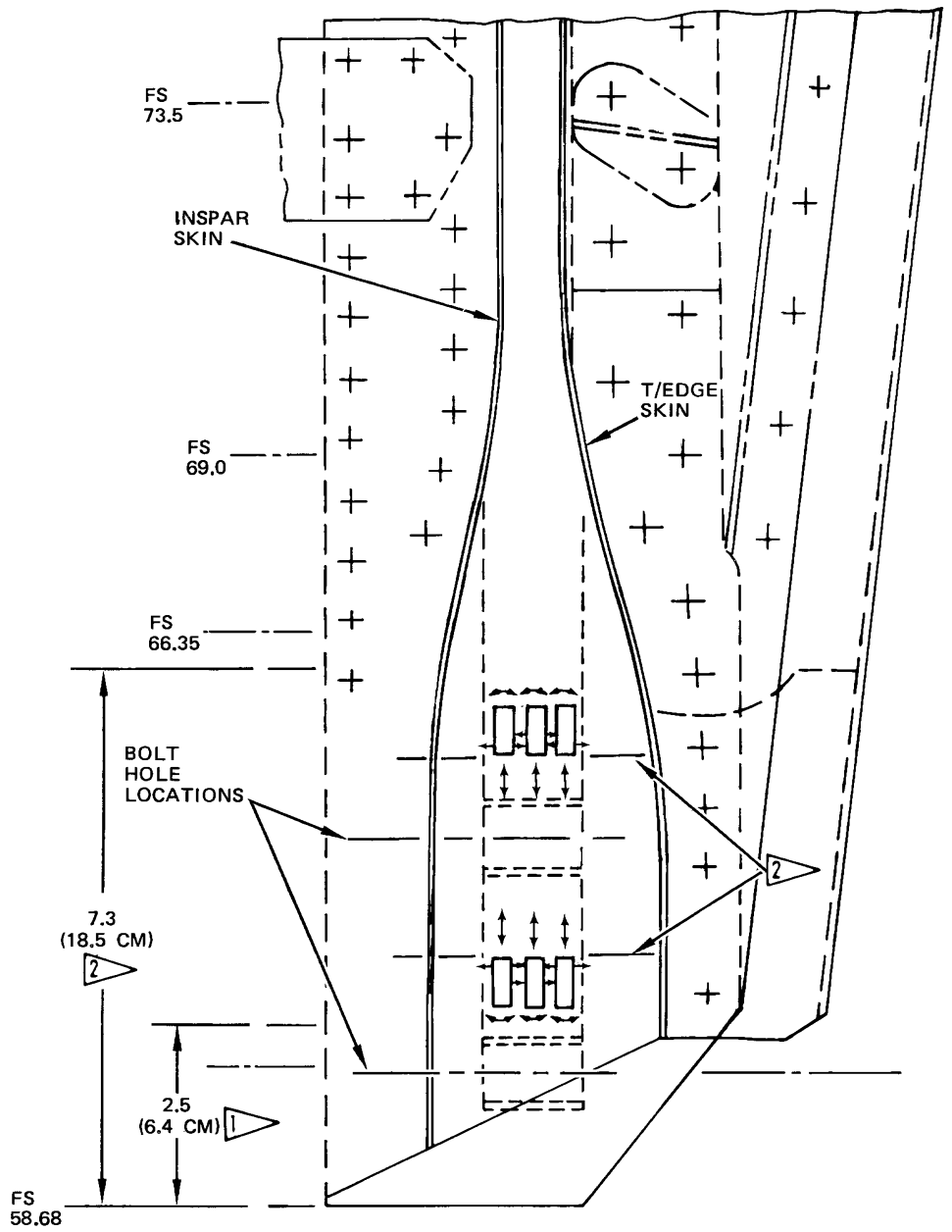
Vertical Stabilizer Rear Spar Primary Chords
Figure 4



NOTES

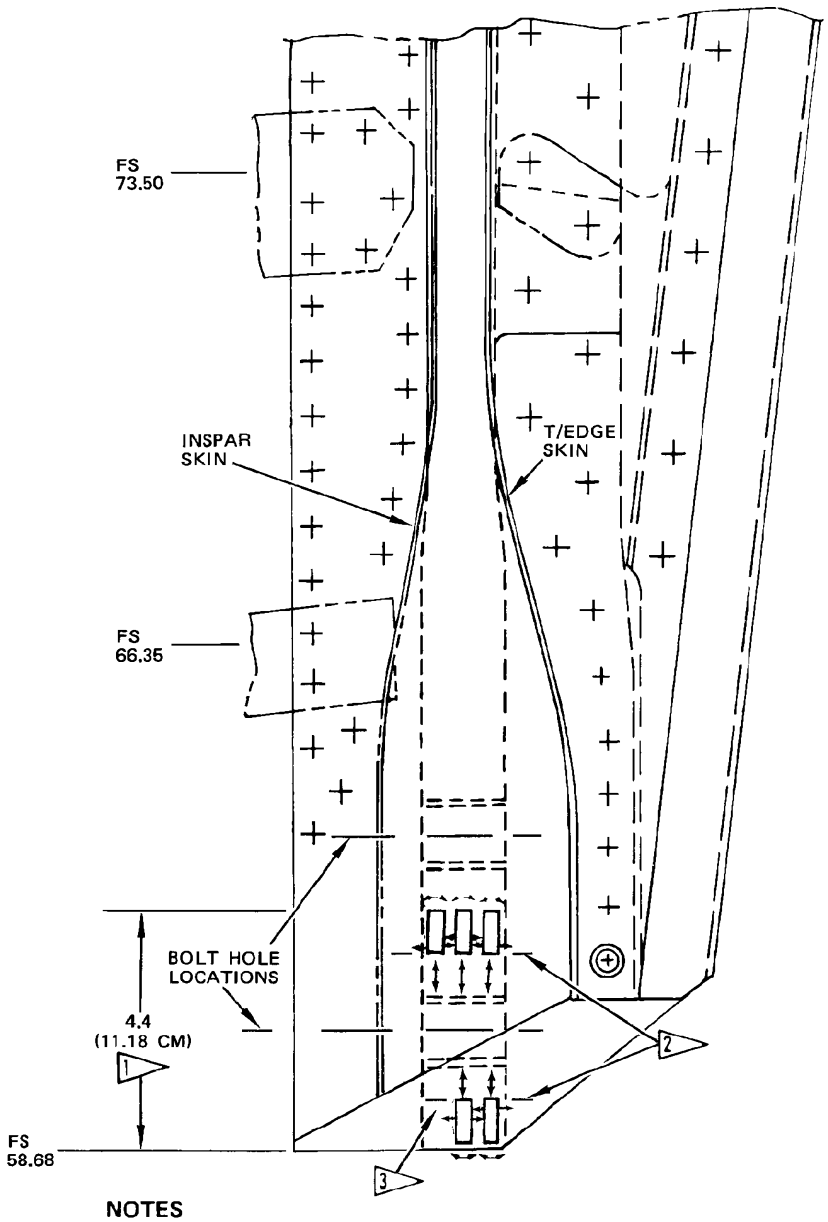
- ALL DIMENSIONS ARE IN INCHES (CENTIMETERS IN PARENTHESES)
- LEFT SIDE SHOWN, RIGHT SIDE SIMILAR

1 MEASURE UP FROM BOTTOM EDGE OF SPAR PER PARAGRAPH 5.C.

2 SCAN PER PARAGRAPH 5.E THRU 5.H, MARK LOCATION WHERE BOLT HOLE SIGNAL RESPONSE IS MAXIMIZED

2158648 S0000471510_V1

Vertical Stabilizer Rear Spar Primary Chords
Figure 5



NOTES

- LEFT SIDE SHOWN, RIGHT SIDE SIMILAR
- ALL DIMENSIONS ARE IN INCHES (CENTIMETERS IN PARENTHESES)

1 MEASURE UP FROM BOTTOM EDGE OF SPAR 4.4 INCHES (11.2 CM) PER PARAGRAPH 5.C.

2 SCAN PER PARAGRAPH 5.I, MARK LOCATION WHERE BOLT HOLE SIGNAL RESPONSE IS MAXIMIZED

3 DO NOT INSPECT LOWER FORWARD EDGE OF BOTTOM HOLE AS SCANNING DISTANCE IS TOO SHORT FOR COVERAGE

2158652 S0000471511_V1

Vertical Stabilizer Rear Spar Primary Chords
Figure 6

PART 4 - ULTRASONIC

VERTICAL STABILIZER - REAR SPAR PRIMARY CHORD

1. Purpose

A. Use this ultrasonic inspection procedure to find cracks in the primary chord of the rear spar of the vertical stabilizer (see Figure 1).

B. This ultrasonic inspection will examine the primary chord of the rear spar for cracks at the primary bolt holes where the rear spar attaches to the primary terminal fitting. This procedure will find cracks in the middle of the bore and at the far side of the bore of the primary chord. See Figure 2 for the inspection areas.

C. This inspection uses four shear wave transducers that are specially made to do this inspection. The transducers are put on the outer edge of the rear spar flange with the guide flush against the flange. The transducers are made to point a sound wave beam in the forward and inboard directions. The four transducers together will examine each hole from the upper and lower sides of the hole.

(1) Transducer 8R will examine the middle of the bore at each hole from horizontal to 30 degrees in the clockwise direction. See Paragraph 2.A.(2)(a) for the full transducer part number.

(2) Transducer 8L will examine the middle of the bore at each hole from horizontal to 30 degrees in the counterclockwise direction. See Paragraph 2.A.(2)(b) for the full transducer part number.

(3) Transducer 45R will look for a far side corner crack at each hole from horizontal to 30 degrees in the clockwise direction. See Paragraph 2.A.(2)(c) for the full transducer part number.

(4) Transducer 45L will look for a far side corner crack at each hole from horizontal to 30 degrees in the counterclockwise direction. See Paragraph 2.A.(2)(d) for the full transducer part number.

D. Figure 2 shows the transducer positions on the rear spar.

E. The inspection is easiest to do if the vertical stabilizer is removed from the airplane. It is possible to do the inspection without the removal of the vertical stabilizer. If the vertical stabilizer is on the airplane, it is necessary to remove access panels to get access to the inspection area.

F. 737 Supplemental Structural Inspection Document (D6-82669) Reference:

(1) Item: E-6

2. Equipment

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

A. All ultrasonic equipment that can do the calibration instructions of this procedure can be used.

(1) Instrument -- It is necessary to use an ultrasonic instrument that can operate at a frequency from 4 to 6 MHz. Broadband instruments can be used if they can do the calibration instructions of this procedure. The instruments that follow were used to help prepare this procedure.

(a) Sonic-136; Staveley Instruments, Inc.

(b) USD 15, USN 50, USN 60; Krautkramer Branson

(c) USM Go; GE Inspection Technologies

(2) Transducers -- It is necessary to use four specially made 5 MHz transducers that have a guide on one side to align the transducer on the corner of the flange during the scan (see Figure 5 and Figure 6). The height of the transducer must be 0.300 inch (7.62 mm) or less. Transducers TEK-5109-8R and TEK-5109-45R point the sound in the forward direction with the guide on the right side and transducers TEK-5109-8L and TEK-5109-45L point the sound in the forward direction with the guide on the left side. The transducers that follow were used to help prepare this procedure.

(a) TEK-5109-8R; Techna NDT

(b) TEK-5109-8L; Techna NDT

(c) TEK-5109-45R; Techna NDT

(d) TEK-5109-45L; Techna NDT

(3) Reference Standard -- Make reference standards NDT3080 and NDT3080-B as specified in Figure 3 and Figure 4.

(4) 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 inspection areas. See Figure 1, Figure 2 and Figure 7.

B. If the inspection is done with the vertical stabilizer on the airplane, it is necessary to remove rear spar access doors 9505, 9506, 9507, 9508, 9511, 9523 and 9524.

C. Make sure to fully clean the primary terminal fitting of sealant, loose paint and dirt in the inspection areas that the transducer will touch. It can be necessary to smooth or remove the finish so the transducer can put sufficient sound in the terminal fitting. Remove sealant from the ends of the fasteners if it does not let the transducer move freely.

4. Instrument Calibration

A. Connect the correct transducer to the instrument for the inspection area to be examined. See Figure 2.

B. Set the instrument frequency to 5 MHz.

C. Calibrate the instrument with reference standard NDT3080 as follows:

NOTE: Reference Standard NDT3080 has two thumbnail notches. Notch “A” is 30 degrees from the vertical centerline in relation to the top of the hole. Notch “B” is 180 degrees from the vertical centerline in relation to the top of the hole. See Detail I in Figure 5.

(1) Put the reference standard in position so the side with the 30 degree notch, notch “A”, is on top.

(2) Put a sufficient quantity of couplant on the inspection surface at transducer positions 1 and 2 of reference standard NDT3080. See Detail I in Figure 5.

CAUTION: IT IS NECESSARY TO KEEP THE TRANSDUCER GUIDE FLUSH WITH THE EDGE OF THE REFERENCE STANDARD DURING THE FULL SCAN. UNWANTED INDICATIONS CAN OCCUR IF THE TRANSDUCER DOES NOT CORRECTLY ALIGN WITH THE EDGE OF THE REFERENCE STANDARD.

(3) Put the TEK-5109-8R transducer at position 1 on the inspection surface with the sound beam pointed in the direction of the hole. See Detail I in Figure 5.

(4) Adjust the instrument delay, range and gain controls to get a signal from the hole to be on the screen display.

(5) Move the transducer along the surface to get a maximum signal from hole.

(6) Adjust the instrument delay and range controls to get the maximum hole signal set to 80% of full screen width (FSW) with the initial pulse set to 0%. See Detail II in Figure 5 for the screen display.

(7) Move the transducer to position 2 to get a signal from notch “A”. See Detail III in Figure 5.

(8) Move the transducer backward and forward along the surface to get a maximum signal from the notch. Monitor the screen display for the maximum notch signal to occur at approximately 68% of FSW. See Detail III in Figure 5.

(9) Adjust the instrument gain control to get the notch signal to 80% of full screen height (FSH). See Detail III in Figure 5 for the screen display.

(10) Turn the reference standard over so that the 0 degree notch, notch “B”, is on top.

(11) Put a sufficient quantity of couplant on the inspection surface at transducer position 3 of reference standard NDT3080.

(12) Put the transducer at position 3 on the inspection surface with the sound beam pointed in the direction of the notch to get a signal from notch “B”. See Detail I in Figure 5.

(13) Move the transducer backward and forward along the surface to get a maximum signal from notch “B”. Make sure the maximum signal from the notch is at approximately 62% of FSW. Make sure the signal from notch “B” is 80% (or more) of FSH. If necessary, add gain to get the signal from notch “B” to 80% of FSH. See Detail III in Figure 5.

NOTE: The signal from the 0 degree notch will occur earlier in time than the 30 degree notch “B” signal. See Detail III in Figure 5.

(14) Do Paragraph 4.A. thru Paragraph 4.C. again for calibration with the TEK5109-8L transducer.

D. Calibrate the instrument with reference standard NDT3080-B as follows:

NOTE: Reference Standard NDT3080-B has three corner notches. Notch “A” is 30 degrees from the vertical centerline in relation to the top of the hole and is on each side of the reference standard for calibration of the left and right transducers. Notch “B” is 180 degrees from the vertical centerline in relation to the top of the hole. See Figure 6.

(1) Put the reference standard in position so the side with the “A” notches are on top.

(2) Put a sufficient quantity of couplant on the inspection surface at transducer positions 1 and 2 of reference standard NDT3080-B. See Detail I in Figure 6.

CAUTION: IT IS NECESSARY TO KEEP THE TRANSDUCER GUIDE FLUSH WITH THE EDGE OF THE REFERENCE STANDARD DURING THE FULL SCAN. UNWANTED INDICATIONS CAN OCCUR IF THE TRANSDUCER DOES NOT CORRECTLY ALIGN WITH THE EDGE OF THE REFERENCE STANDARD.

(3) Put the TEK5109-45L transducer at position 1 on the inspection surface with the sound beam pointed in the direction of the hole. See Detail I in Figure 6.

(4) Adjust the instrument delay, range and gain controls to get a signal from the hole to be on the screen display.

(5) Move the transducer along the surface to get a maximum signal from hole.

(6) Adjust the instrument delay and range controls to get the maximum hole signal set to 80% of full screen width (FSW) with the initial pulse set to 0%. See Detail II in Figure 6 for the screen display.

(7) Move the transducer to position 2 to get a signal from notch “A”. See Detail III in Figure 6.

(8) Move the transducer backward and forward along the surface to get a maximum signal from the notch. Monitor the screen display for the maximum notch signal to occur at approximately 77% of FSW. See Detail III in Figure 6.

(9) Adjust the instrument gain control to get the notch signal to 80% of full screen height (FSH). See Detail III in Figure 6 for the screen display.

(10) Turn the reference standard over so that the 0 degree, notch “B”, is on top.

(11) Put a sufficient quantity of couplant on the inspection surface at transducer position 3 of reference standard NDT3080-B.

(12) Put the transducer at position 3 on the inspection surface with the sound beam pointed in the direction of the notch to get a signal from notch “B”. See Detail I in Figure 6.

(13) Move the transducer backward and forward along the surface to get a maximum signal from notch “B”. The maximum signal will occur at approximately 75% of FSW. Make sure the signal from notch “B” is 80% (or more) of FSH. If necessary, add gain to get the signal from notch “B” at 80% of FSH. See Detail III in Figure 6.

NOTE: The signal from the 0 degree notch will occur earlier in time than the 30 degree notch “B” signal. See Detail III in Figure 6.

(14) Do Paragraph 4.A., Paragraph 4.B. and Paragraph 4.D. again for calibration with the TEK5109-45R transducer.

E. Add 6 dB of gain for paint attenuation.

5. Inspection Procedure

NOTE: Sound transfer into the bushing can occur. The signal from the bushing will occur after the hole signal that occurred during calibration. The crack signal will occur at the same FSW position as in the reference standard.

A. Identify all the inspection areas of the rear spar chord. See Figure 1.

B. Put a sufficient quantity of couplant on the transducer inspection surface of the rear spar chord. Figure 2 and Figure 7 show the transducer inspection surface and the transducer positions.

C. Calibrate the instrument as specified in Paragraph 4. to examine the applicable inspection area.

D. Put the applicable transducer on the inspection surface as follows:

(1) Transducer TEK-5109-8R will examine the middle of the bore at each hole from 0 to 30 degrees in the clockwise direction. See Figure 2, Sheet 1.

(2) Transducer TEK-5109-8L will examine the middle of the bore at each hole from 0 to 30 degrees in the counterclockwise direction. See Figure 2, Sheet 1.

(3) Transducer TEK-5109-45R will look for a far side corner crack at each hole from 0 to 30 degrees in the clockwise direction. See Figure 2, Sheet 1.

(4) Transducer TEK-5109-45L will look for a far side corner crack at each hole from 0 to 30 degrees in the counterclockwise direction. See Figure 2, Sheet 1.

E. Make a slow scan on the inspection surface of each bolt hole (upper and lower). As you make a scan, do the steps that follow:

NOTE: It is necessary to keep the transducer guide flush with the edge of the chord flange during the full scan. Unwanted indications can occur if the transducer does not correctly align with the edge of the chord flange.

(1) Monitor the screen display for the hole signal. Look for the signal from the hole to increase to a maximum of 80% of FSH and then decrease as you do the scan away from the hole.

(2) Monitor the screen display for ultrasonic signals that occur between 60 and 80% of FSW.

(3) A crack signal will occur to the left of the hole signal and the hole signal will decrease. An off angle crack can occur at the same screen width location as the hole signal.

(4) Monitor the position of the transducer at all times to help identify the cause of signals.

(5) Remove the 6 dB of added gain and use the reference standard to do a calibration check to make sure that the signals from the calibration notches are 70% of FSH or higher. If the signal from a notch is less than 70% of FSH, do the calibration and inspection again.

6. Inspection Results

A. An ultrasonic signal that is 40% or more of FSH and is between 60 and 80% of FSW is a sign of a possible crack. If you get a signal of a possible crack, do the steps that follow:

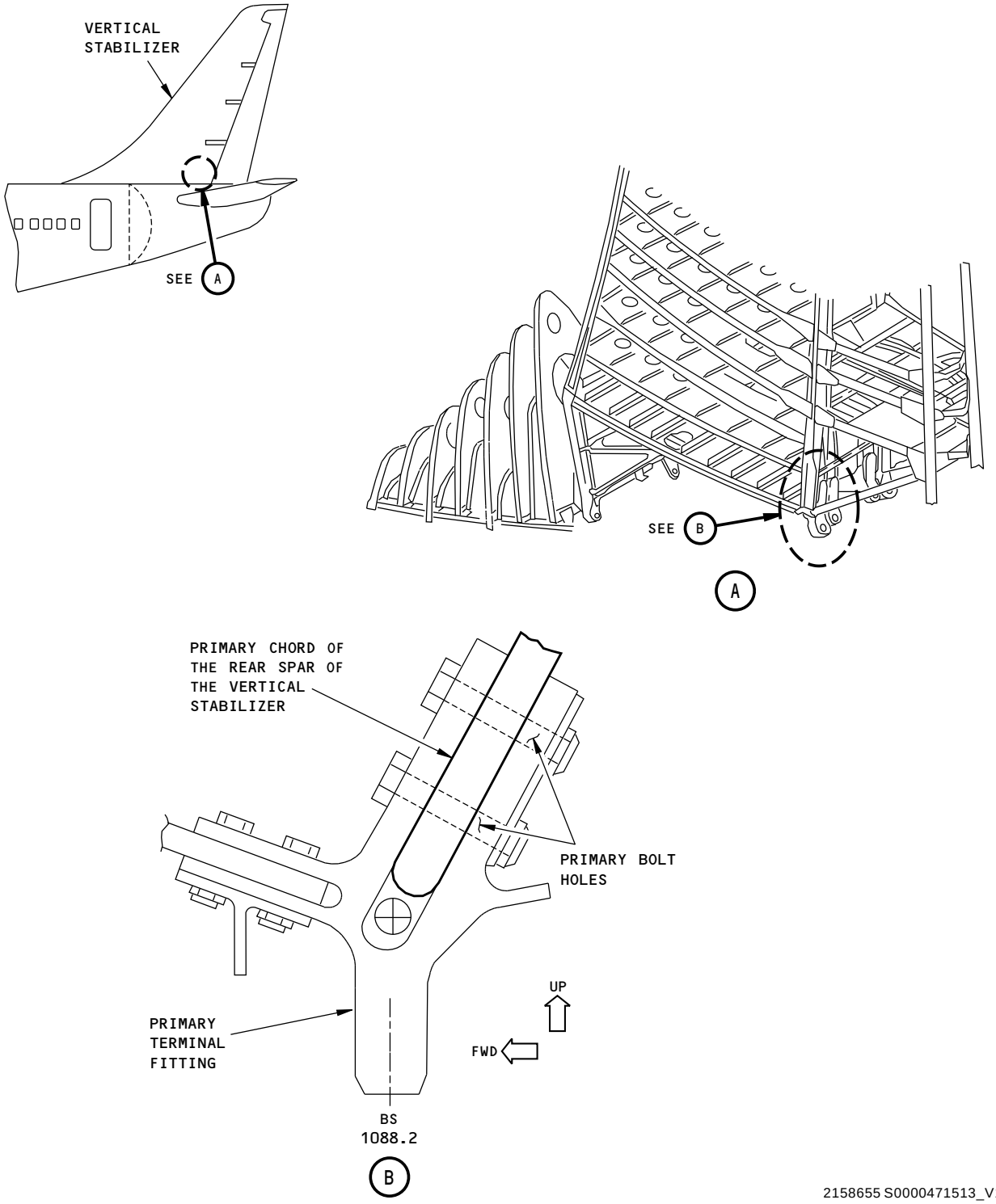
(1) Compare the signals that occur during the inspection with the notch signals you get from the reference standard.

(2) Remove paint and primer from the inspection surface.

(3) Remove the 6 dB gain that was added in Paragraph 4.E. and do the inspection again.

(4) If an indication is equal to or more than 40% of FSH, it is a sign of a possible crack.

(5) Ask Boeing for instructions to help with the analysis of signals.



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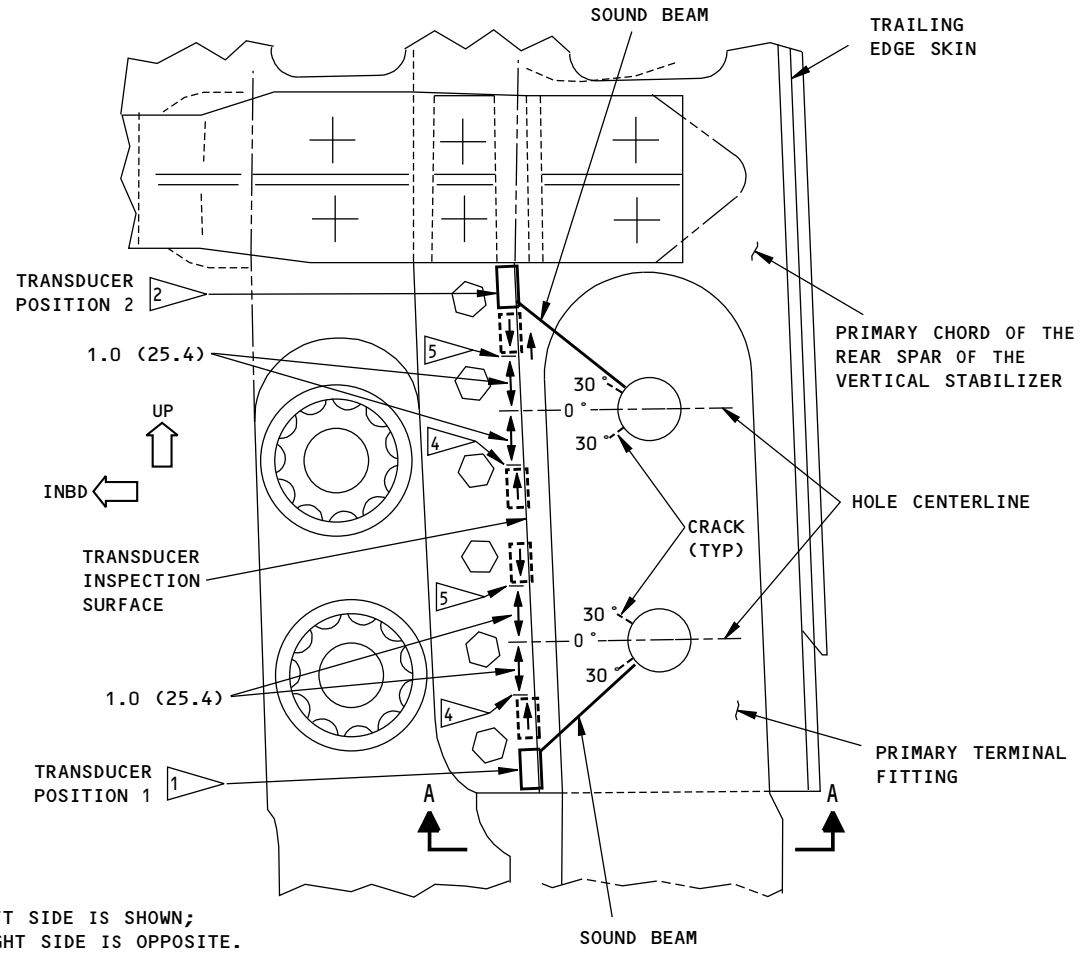
Vertical Stabilizer - Primary Chord of the Rear Spar
Figure 1



NOTES:

- THE LEFT SIDE IS SHOWN; THE RIGHT SIDE IS OPPOSITE.
- ALL DIMENSIONS ARE IN INCHES (MILLIMETERS ARE IN PARENTHESES)

1 TRANSDUCER POSITION 1 IS THE START POINT FOR TRANSDUCERS TEK-5109-45R AND TEK-5109-8R. THE SOUND BEAM IS POINTED IN THE DIRECTION OF THE CENTER OF THE LOWER HOLE. IT IS POSSIBLE TO GET A CRACK INDICATION FROM THE HOLE AT THIS LOCATION. THIS INDICATION IS OUT OF THE INSPECTION AREA.

2 TRANSDUCER POSITION 2 IS THE START POINT FOR TRANSDUCERS TEK-5109-45L AND TEK-5109-8L. THE SOUND BEAM IS POINTED IN THE DIRECTION OF THE CENTER OF THE UPPER HOLE. IT IS POSSIBLE TO GET A CRACK INDICATION FROM THE HOLE AT THIS LOCATION. THIS INDICATION IS OUT OF THE INSPECTION AREA.

3 KEEP THE TRANSDUCER GUIDE FLUSH WITH THE EDGE OF THE CHORD FLANGE DURING THE FULL SCAN.

4 THE START OF THE INSPECTION AREA FOR TRANSDUCERS TEK-5109-45R AND TEK-5109-8R IS WHEN THE FRONT OF THE TRANSDUCER IS 1.0 (25.4) BEFORE THE HOLE CENTERLINE. THE END OF THE INSPECTION AREA IS WHEN THE FRONT OF THE TRANSDUCER IS AT THE HOLE CENTERLINE. THIS WILL EXAMINE EACH HOLE FROM 0 TO 30 DEGREES IN THE CLOCKWISE DIRECTION.

5 THE START OF THE INSPECTION AREA FOR TRANSDUCERS TEK-5109-45L AND TEK-5109-8L IS WHEN THE FRONT OF THE TRANSDUCER IS 1.0 (25.4) BEFORE THE HOLE CENTERLINE. THE END OF THE INSPECTION AREA IS WHEN THE FRONT OF THE TRANSDUCER IS AT THE HOLE CENTERLINE. THIS WILL EXAMINE EACH HOLE FROM 0 TO 30 DEGREES IN THE COUNTERCLOCKWISE DIRECTION.

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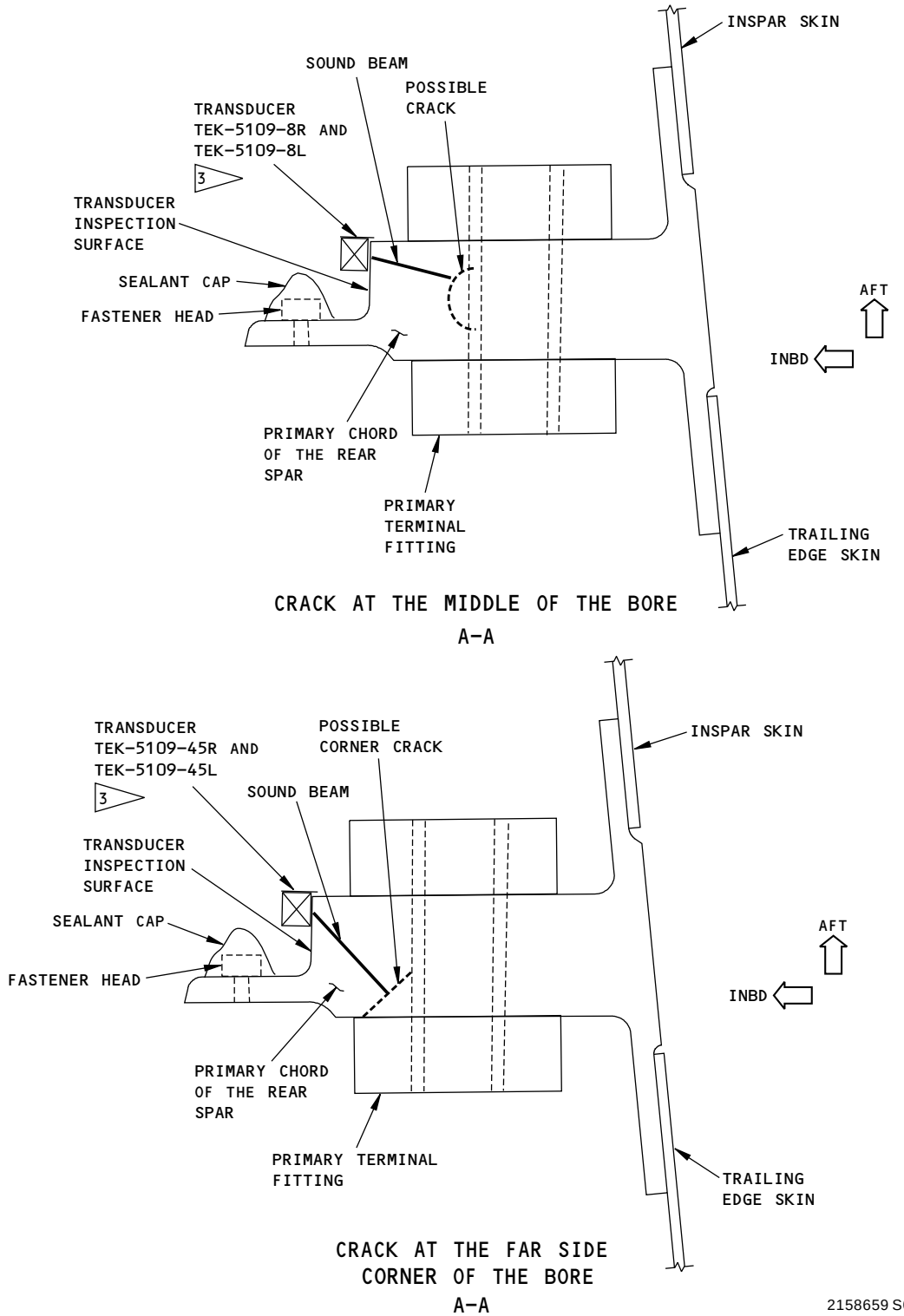
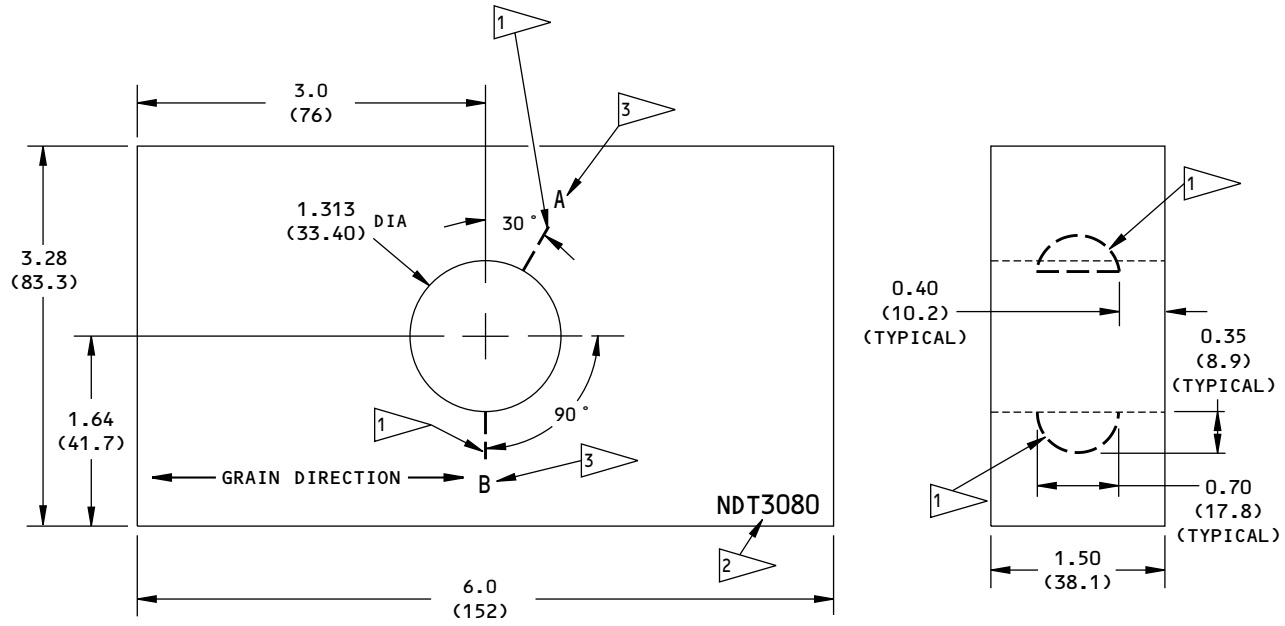
Inspection Area
Figure 2 (Sheet 1 of 2)



Inspection Area
Figure 2 (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	±2 °
X.XX = ±0.025	X.X = ±0.05	
X.X = ±0.05	X = ±1	

- SURFACE ROUGHNESS: 63 Ra OR BETTER
- MATERIAL: 2024-T3, 7050 OR 7075 AIRCRAFT ALUMINUM

1 EDM THUMBNAIL NOTCH: 0.015 (0.38) MAXIMUM WIDTH X 0.35 (8.9) RADIUS

2 ETCH OR STAMP THE REFERENCE STANDARD NUMBER, NDT3080, AT THIS LOCATION

3 ETCH OR STAMP THE LETTERS SHOWN TO IDENTIFY THE EDM NOTCH LOCATION. ALIGN THE LETTERS SO THAT THEY ARE APPROXIMATELY IN LINE WITH THE NOTCH AS SHOWN.

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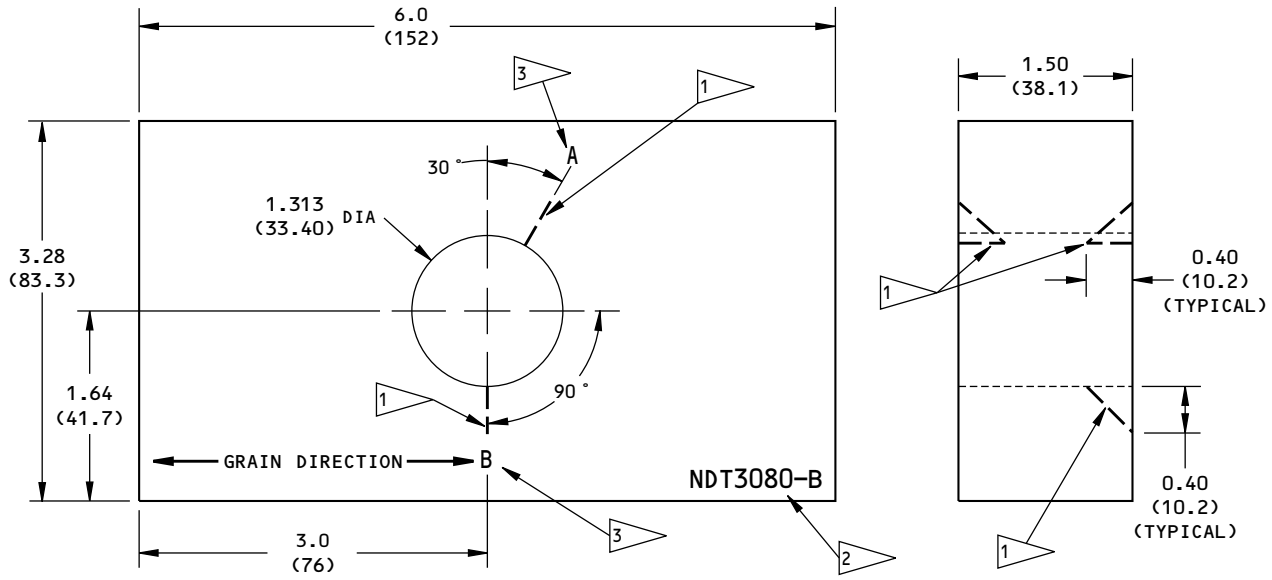
Reference Standard NDT3080
Figure 3



NOTES:

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

INCHES	MILLIMETERS	ANGULAR
X.XXX = ±0.005	X.XX = ±0.010	±2 °
X.XX = ±0.025	X.X = ±0.05	
X.X = ±0.050	X = ±1	

- SURFACE ROUGHNESS: 63 Ra OR BETTER
- MATERIAL: 2024-T3, 7050 OR 7075 AIRCRAFT ALUMINUM

1 EDM CORNER NOTCH (3 LOCATIONS):
LENGTH - 0.40 (10.2) X 0.40 (10.2) CORNER NOTCH
WIDTH - 0.015 (0.38) MAXIMUM WIDTH

2 ETCH OR STAMP THE REFERENCE STANDARD NUMBER, NDT3080-B, AT THIS LOCATION.

3 ETCH OR STAMP THE LETTERS SHOWN TO IDENTIFY THE EDM NOTCH LOCATION. ALIGN THE LETTERS SO THAT THEY ARE APPROXIMATELY IN LINE WITH THE NOTCH AS SHOWN.

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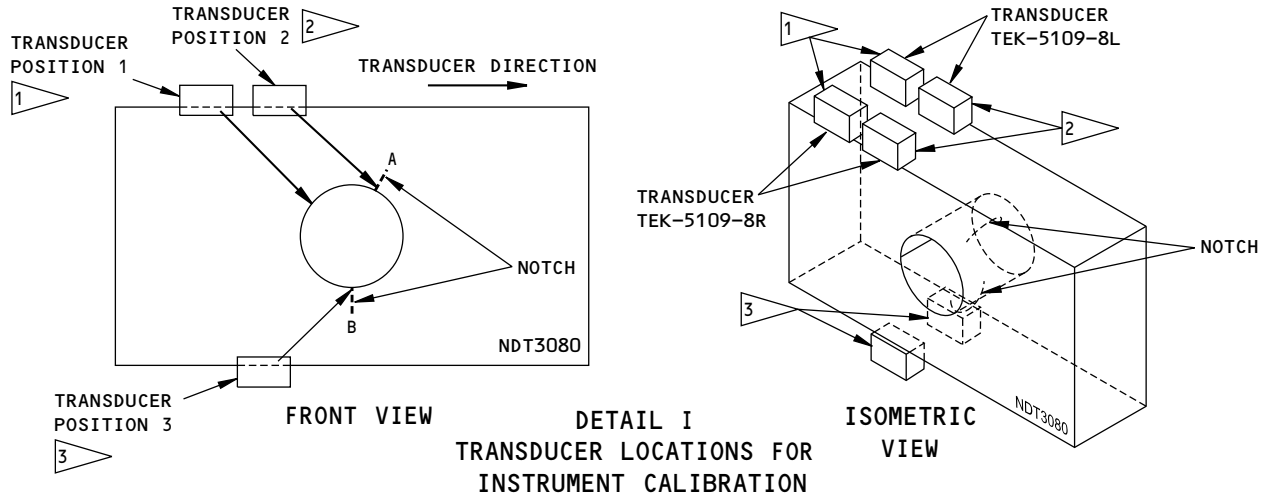
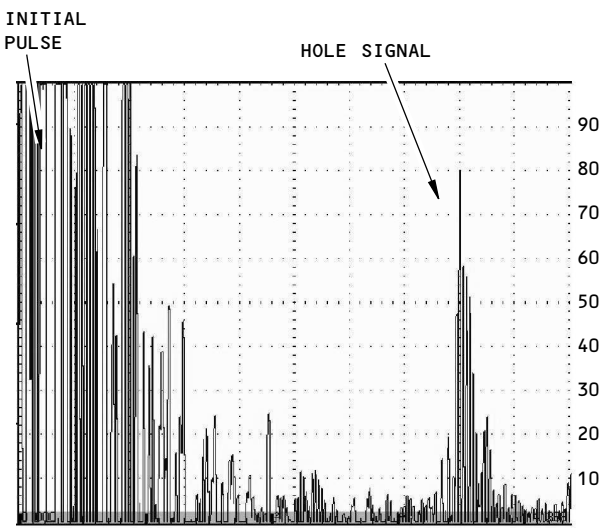
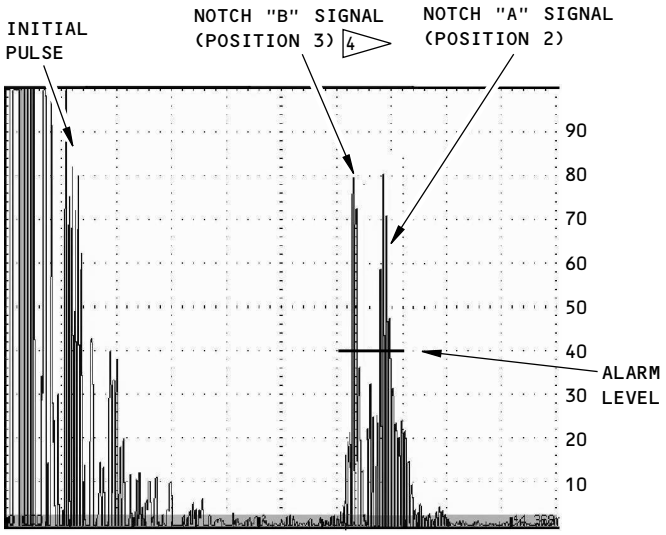
Reference Standard NDT3080-B
Figure 4



DETAIL I
TRANSDUCER LOCATIONS FOR INSTRUMENT CALIBRATION



DETAIL II
EXAMPLE SCREEN DISPLAY OF THE HOLE SIGNAL AT TRANSDUCER POSITION 1



DETAIL III
EXAMPLE SCREEN DISPLAY OF THE NOTCH SIGNALS AT TRANSDUCER POSITIONS 2 AND 3

NOTES:

- THE TRANSDUCERS FOR THIS INSPECTION ARE MADE WITH A TRANSDUCER GUIDE. IT IS NECESSARY TO KEEP THE TRANSDUCER GUIDE FLUSH WITH THE EDGE OF THE REFERENCE STANDARD DURING THE FULL SCAN. UNWANTED INDICATIONS CAN OCCUR IF THE TRANSDUCER DOES NOT CORRECTLY ALIGN WITH THE EDGE OF THE REFERENCE STANDARD.

1 TRANSDUCER POSITION 1 IS WHERE THE HOLE SIGNAL IS AT ITS MAXIMUM SCREEN HEIGHT.

2 TRANSDUCER POSITION 2 IS WHERE THE "A" NOTCH SIGNAL IS AT ITS MAXIMUM SCREEN HEIGHT. IT CAN BE NECESSARY TO ADJUST THE GAIN TO GET THE SIGNAL FROM THE NOTCH TO 80% OF FULL SCREEN HEIGHT (FSH).

3 TRANSDUCER POSITION 3 IS WHERE THE "B" NOTCH SIGNAL IS AT ITS MAXIMUM SCREEN HEIGHT. MAKE SURE THE SIGNAL FROM THE "B" NOTCH IS AT LEAST 80% OF FSH. IF NECESSARY, ADD GAIN TO GET THE SIGNAL FROM THE "B" NOTCH TO 80% OF FSH.

4 THIS SIGNAL IS ADDED TO THE SCREEN DISPLAY FOR REFERENCE ONLY. MONITOR THE SCREEN FOR ULTRASONIC INDICATIONS THAT OCCUR BETWEEN 60 AND 70% OF FULL SCREEN WIDTH (FSW).

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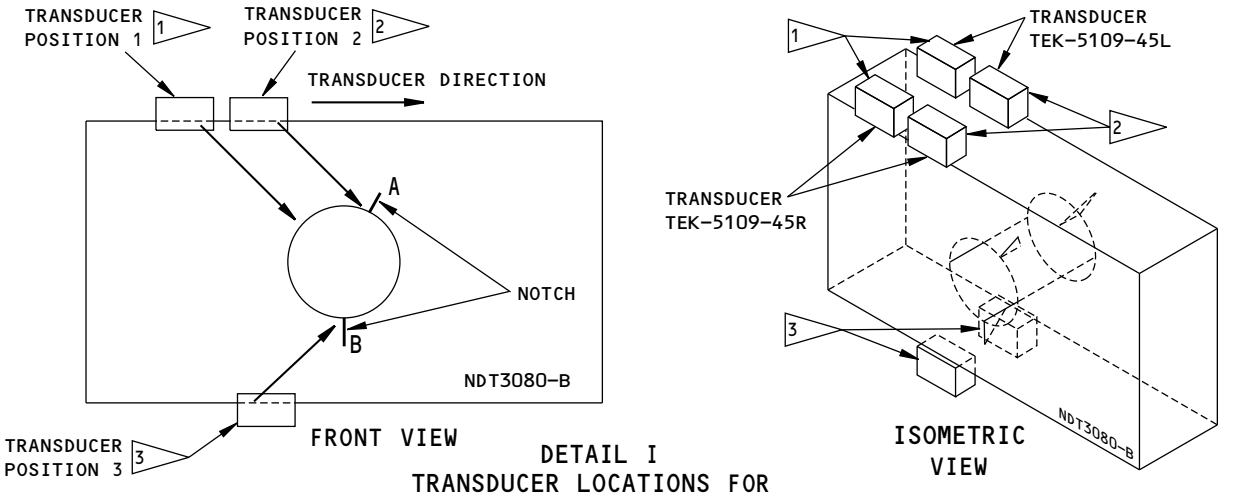
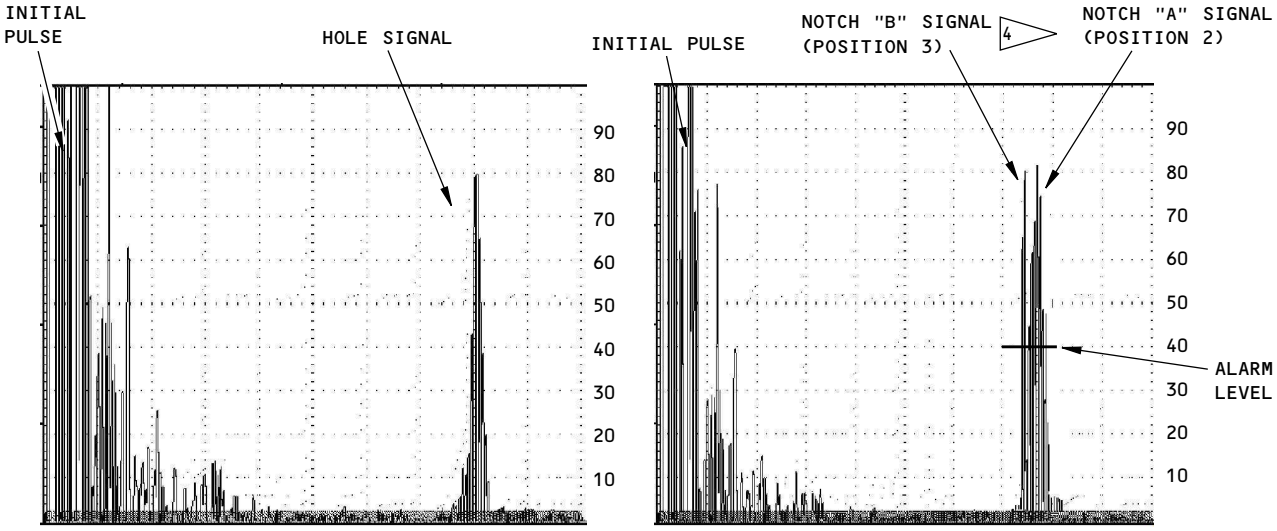
Instrument Calibration
Figure 5



DETAIL I
TRANSDUCER LOCATIONS FOR
INSTRUMENT CALIBRATION



DETAIL II
EXAMPLE SCREEN DISPLAY OF THE HOLE
SIGNAL AT TRANSDUCER POSITION 1

DETAIL III
EXAMPLE SCREEN DISPLAY OF THE NOTCH
SIGNALS AT TRANSDUCER POSITIONS 2 AND 3

NOTES:

- THE TRANSDUCERS FOR THIS INSPECTION ARE MADE WITH A TRANSDUCER GUIDE. IT IS NECESSARY TO KEEP THE TRANSDUCER GUIDE FLUSH WITH THE EDGE OF THE REFERENCE STANDARD DURING THE FULL SCAN. UNWANTED INDICATIONS CAN OCCUR IF THE TRANSDUCER DOES NOT CORRECTLY ALIGN WITH THE EDGE OF THE REFERENCE STANDARD.

1. TRANSDUCER POSITION 1 IS WHERE THE HOLE SIGNAL IS AT ITS MAXIMUM SCREEN HEIGHT.
2. TRANSDUCER POSITION 2 IS WHERE THE "A" NOTCH SIGNAL IS AT ITS MAXIMUM SCREEN HEIGHT. IT CAN BE NECESSARY TO ADJUST THE GAIN TO GET THE SIGNAL FROM THE NOTCH TO 80% OF FULL SCREEN HEIGHT (FSH).
3. TRANSDUCER POSITION 3 IS WHERE THE "B" NOTCH SIGNAL IS AT ITS MAXIMUM SCREEN HEIGHT. MAKE SURE THE SIGNAL FROM THE "B" NOTCH IS AT LEAST 80% OF FSH. IF NECESSARY, ADD GAIN TO GET THE SIGNAL FROM THE "B" NOTCH TO 80% OF FSH.
4. THIS SIGNAL IS ADDED TO THE SCREEN DISPLAY FOR REFERENCE ONLY. MONITOR THE SCREEN FOR ULTRASONIC INDICATIONS THAT OCCUR BETWEEN 70 AND 80% OF FULL SCREEN WIDTH (FSW).

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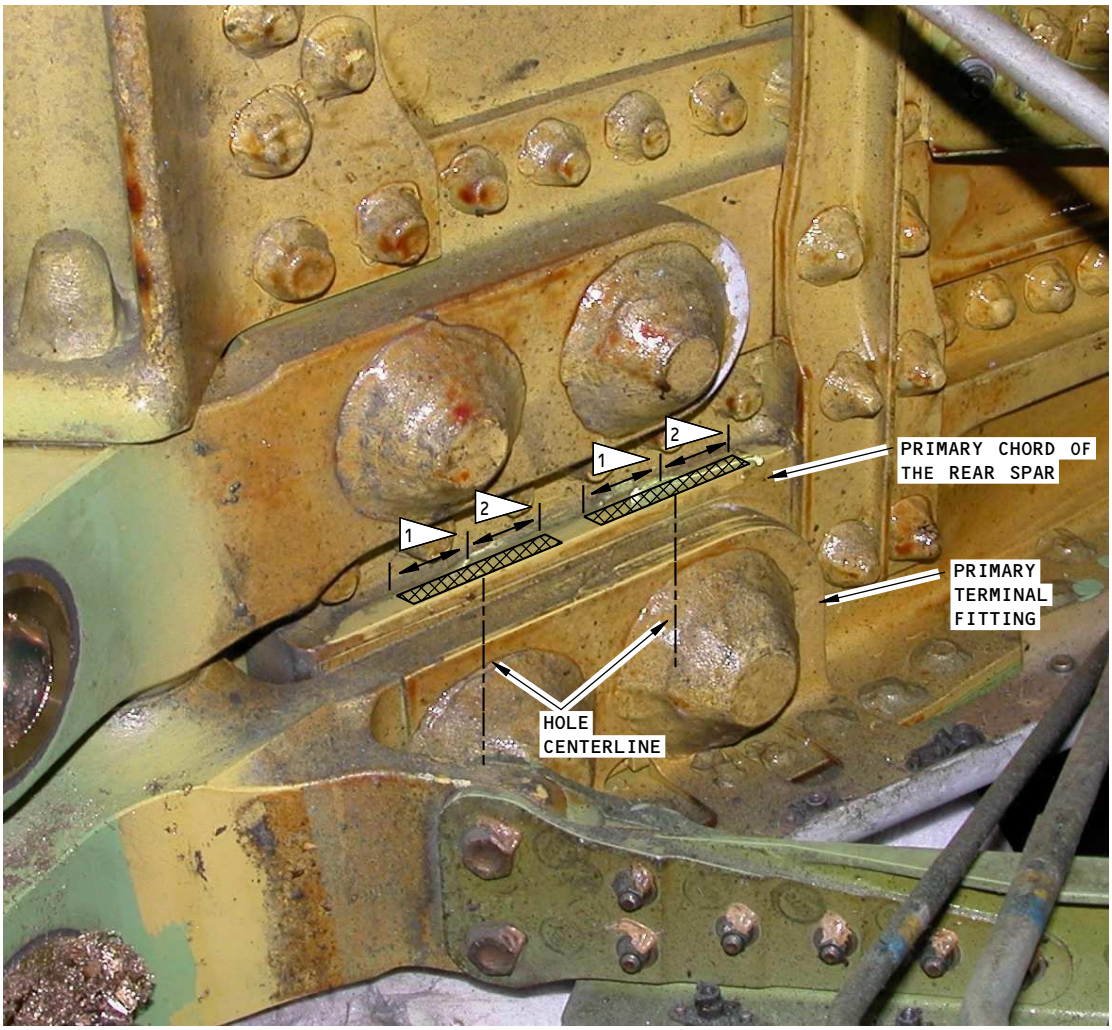
Instrument Calibration for NDT3080-B
Figure 6



NOTES:

TRANSDUCER INSPECTION SURFACE

- THE LEFT SIDE IS SHOWN;
  THE RIGHT SIDE IS OPPOSITE

1 THE INSPECTION AREA FOR TRANSDUCER TEK-5109-45R AND TEK-5109-8R IS WHEN THE FRONT OF THE TRANSDUCER IS 1.0 INCH (25.4 MM) BEFORE THE CENTERLINE OF THE HOLE. THE END OF THE INSPECTION AREA IS WHEN THE FRONT OF THE TRANSDUCER IS AT THE HOLE CENTERLINE. THIS WILL EXAMINE THE HOLE FROM 0 TO 30 DEGREES IN THE CLOCKWISE DIRECTION ON EACH HOLE.

1 THE INSPECTION AREA FOR TRANSDUCER TEK-5109-45L AND TEK-5109-8L IS WHEN THE FRONT OF THE TRANSDUCER IS 1.0 INCH (25.4 MM) BEFORE THE CENTERLINE OF THE HOLE. THE END OF THE INSPECTION AREA IS WHEN THE FRONT OF THE TRANSDUCER IS AT THE HOLE CENTERLINE. THIS WILL EXAMINE THE HOLE FROM 0 TO 30 DEGREES IN THE COUNTERCLOCKWISE DIRECTION ON EACH HOLE.

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Example Picture of the Inspection Area of the Primary Chord of the Rear Spar of the Vertical Stabilizer
Figure 7