EFFECTIVITY
MODEL: ALL 707 AND 720 SERVICE BULLETIN REFERENCE: 2427

BOEING COMMERCIAL JET

NONDESTRUCTIVE TEST

PART 4 - ULTRASONIC

WINGS - SKIN

1. Purpose

   A. This surface wave technique is recommended for detection of cracks in wing skin under beavertail, from rear spar to stringer number 2 on both wings. (See detail I for fastener layout pattern.)

2. Equipment

   A. Any ultrasonic instrument whch can satisfy requirements of this procedure may be used.

      (1) Transducers

         (a) 2.25-mc/s, 1/2-inch diameter crystal, with a refraction angle of 70 degrees in aluminum

      (2) Transducer positioning fixture, fabricated as shown in details II and IV. For use with transducer

      (3) Template, full size, for locating all wing skin fasteners in inspection area. Make from detail I, which is drawn to scale.

      (4) Scale, approximately 8 inches long, for establishing distance from transducer to point of sound reflection

      (5) Couplant. Light grease or oil is satisfactory.

3. Preparation For Inspection

   A. Removals

      (1) On 707 Stratoliner series airplanes, remove the rear spar fairing which covers the beavertail.

Wing Skin under Beavertail at Rear Spar
Figure 1 (Sheet 1)

B. Surface Preparation

(1) On airplanes requiring the removal of fairings, scrape phenolic, loose paint, and sealant from the fairing seal area of the wing skin adjacent to the beavertail.

(2) On all airplanes, remove loose dirt which could interfere with transducer contact. Sand painted surfaces lightly if roughness interferes with transducer contact.

(3) Clean surface and apply a film of couplant.

4. Instrument Calibration and Inspection Procedure

A. Calibration and procedure for the inspection of the first row of fastener holes under the beavertail is described below. These holes are identified by an asterisk (*) in detail I.

(1) Calibration

(a) Using a scale, position the transducer on the skin surface one inch from the edge of a fastener hole which is not under the beavertail. (This fastener hole is used for calibration.)

(b) Adjust instrument sensitivity to obtain a saturated response from this calibrating fastener hole and identify the response position on the oscilloscope by marking the position of the left-hand edge of the response signal.

(c) Repeat (a) and (b) for distances of two and three inches from the calibrating fastener hole.

(d) From the two-inch position, obtain a maximum signal from the calibrating fastener hole, and set instrument gain for approximately a saturated signal.

(e) With the gain setting and position established in (d), move transducer laterally, relative to the calibrating fastener hole, and note distance traveled by transducer as the ultrasonic response changes from 25 percent of saturation to saturation and back to 25 percent of saturation, (detail V). This lateral travel will aid in crack identification. Lateral transducer movement from the two-inch distance is a satisfactory guide for transducer distances from one to three inches from the fastener hole being tested.

Wing Skin under Beavertail at Rear Spar
Figure 1 (Sheet 2)

(2) Inspection procedure for first row of fasteners under edge of beavertail.

(a) Using the full-scale layout of fastener holes in the wing skin, identify the position of the first row of fasteners under the beavertail. lace transducer near the edge of beavertail and direct sound toward the beavertail.

(b) Locate one of the wing skin fastener holes under the beavertail and nearest to its edge.

(c) Establish approximately a two-inch distance, as indicated on the oscilloscope, between this fastener and the transducer.

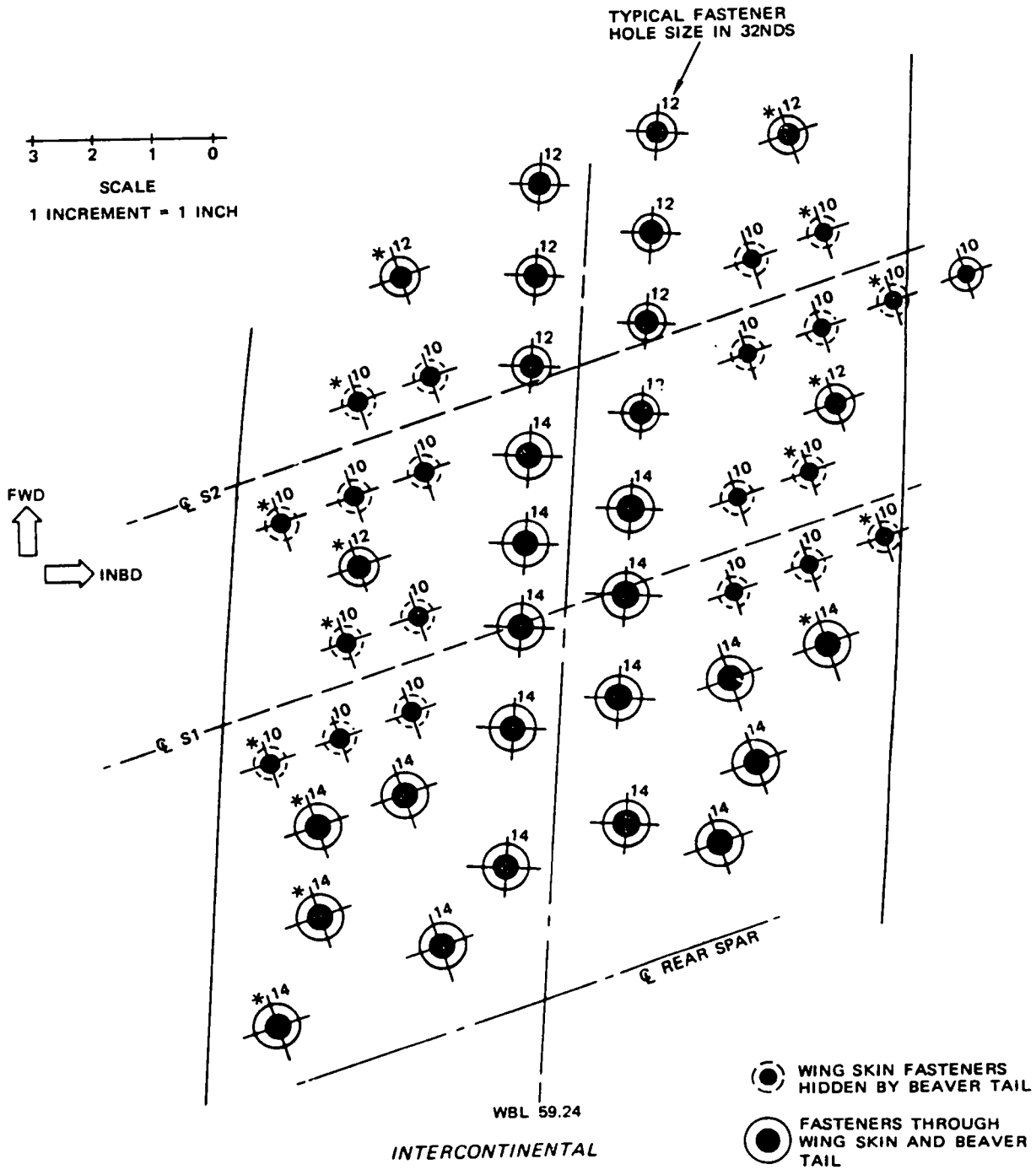
(d) Adjust instrument sensitivity to obtain an approximately saturated signal from this fastener hole.

(e) Move the transducer parallel to the edge of the beavertail. Note distance transducer travels to go from a 25 percent of saturation to a 25 percent of saturation signal as described in step 1.(e).

(f) If lateral transducer travel, when going from a 25 percent to a 25 percent response signal from the test fastener hole, is more than twice the travel obtained from the calibrating fastener hole, a 1/2-inch or greater crack exists. The greater the lateral distance over which an ultrasonic respons is obtained, the longer the crack. A slight horizontal shift in the instrument signal may occur as the response from the front of the fastener hole shifts to a crack initiating at the side of the fastener hole. When measuring lateral transducer travel, this slight horizontal shift in the response pattern is to be considered as a continuous response. (See detail VI.) A slight horizontal shift in response position is added evidence of a crack.

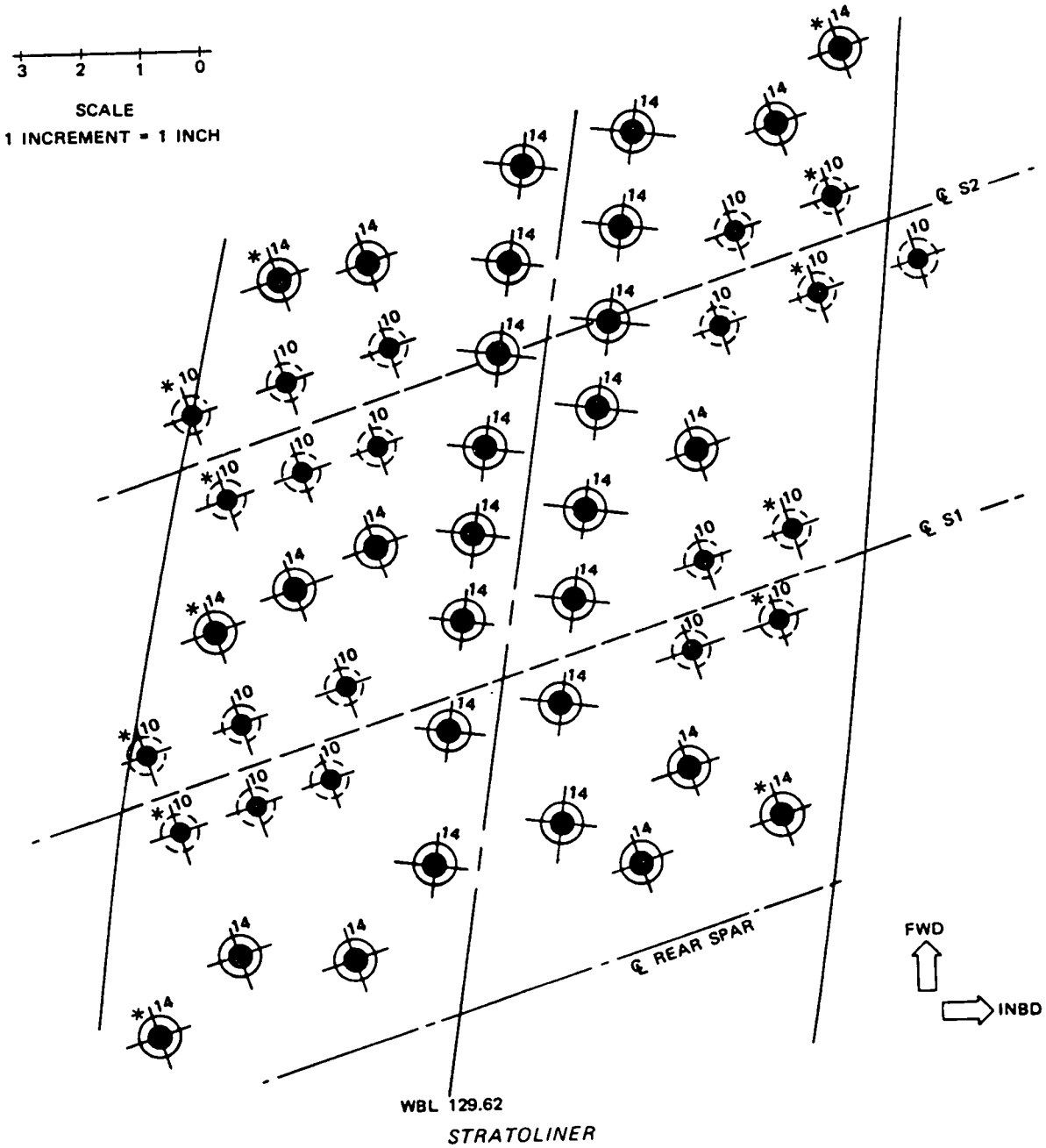
(g) Repeat procedure for all first row fastener holes under the beavertail and from both sides of the beavertail.

Wing Skin under Beavertail at Rear Spar
Figure 1 (Sheet 3)



HOLE PATTERN IN WING SKIN AREA UNDER BEAVERTAIL
DETAIL I

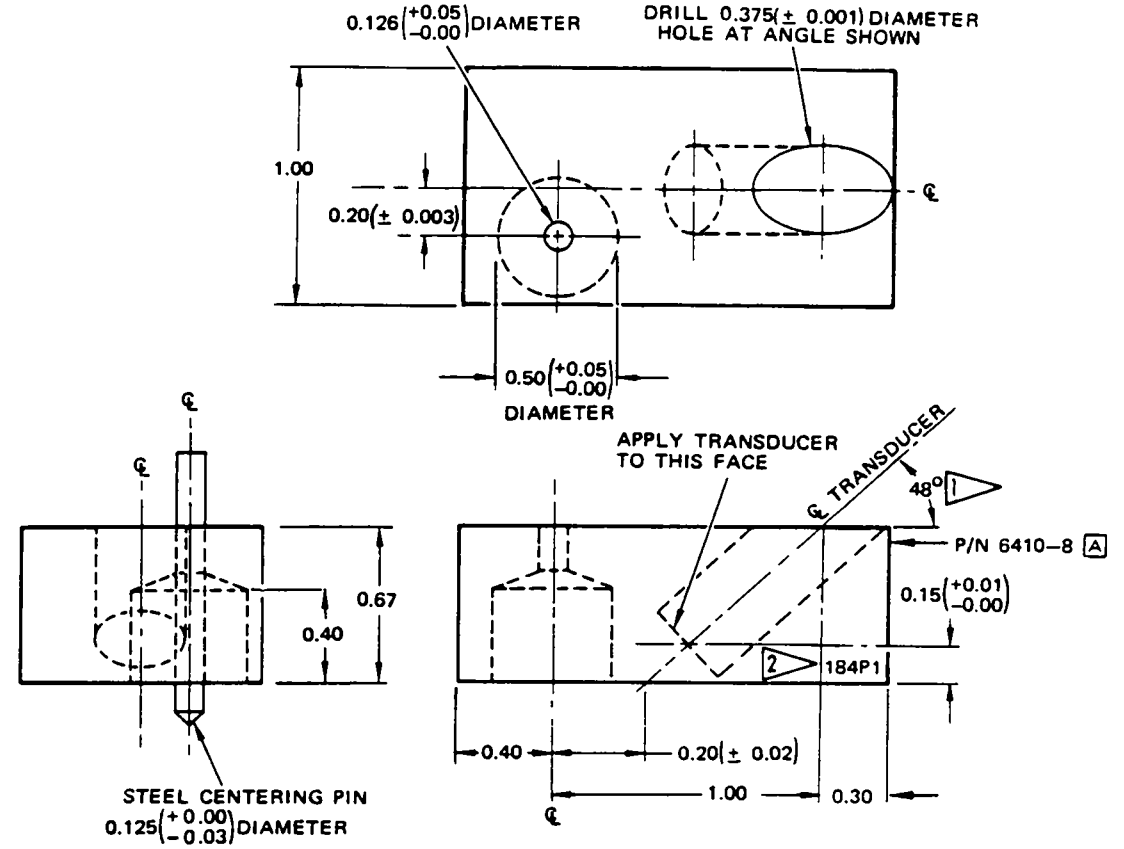
Wing Skin under Beavertail at Rear Spar
Figure 1 (Sheet 4)



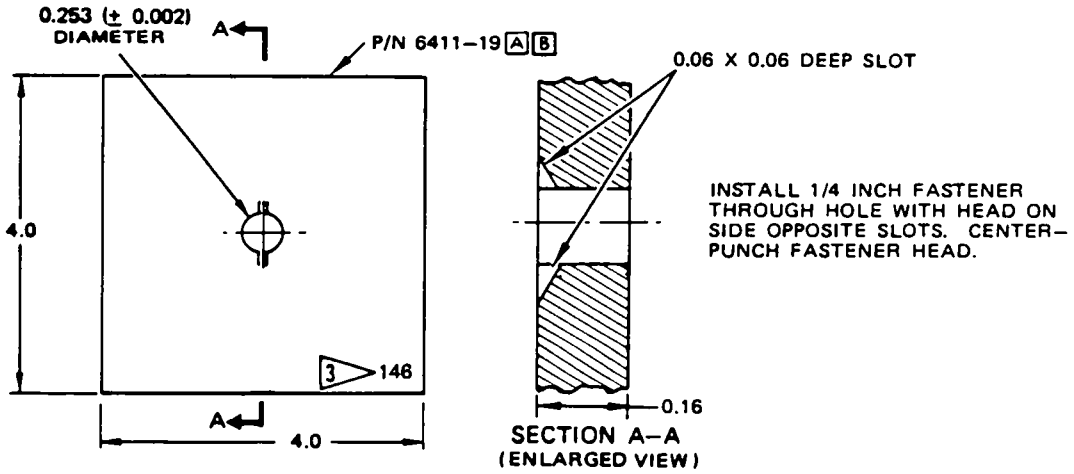
HOLE PATTERN IN WING SKIN AREA UNDER BEAVERTAIL
DETAIL I (CONTINUED)

Wing Skin under Beavertail at Rear Spar
Figure 1 (Sheet 5)

NONDESTRUCTIVE TEST



TRANSDUCER POSITIONING FIXTURE
DETAIL II

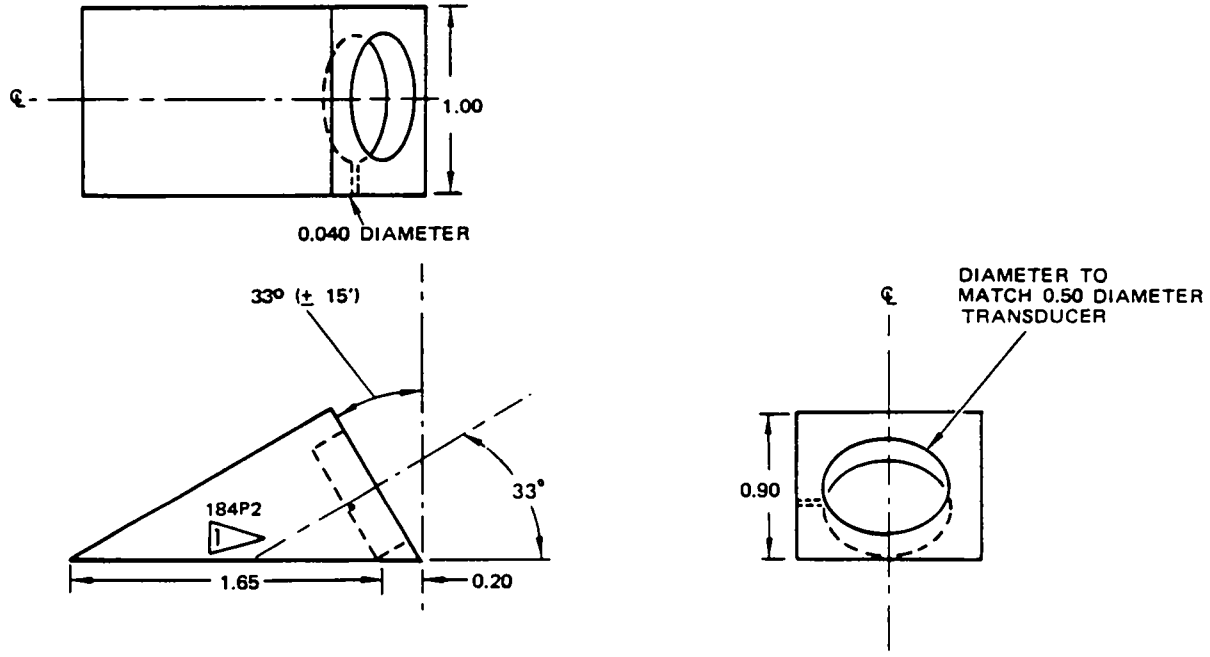


STANDARD TEST BLOCK
DETAIL III

NOTES

- ALL DIMENSIONS ARE IN INCHES
- A AVAILABLE FROM IDEAL SPECIALTY CO.
- B MATERIAL 2024-T6 ALUMINUM
- 1 CRITICAL TOLERANCE ± 0° 15' (℄ OF FIXTURE SHOULD PASS THROUGH ℄ OF TRANSDUCER)
- 2 ETCH WITH 184P1
- 3 ETCH OR STEEL STAMP WITH 146

Wing Skin Under Beavertail at Rear Spar
Figure 1 (Sheet 6)



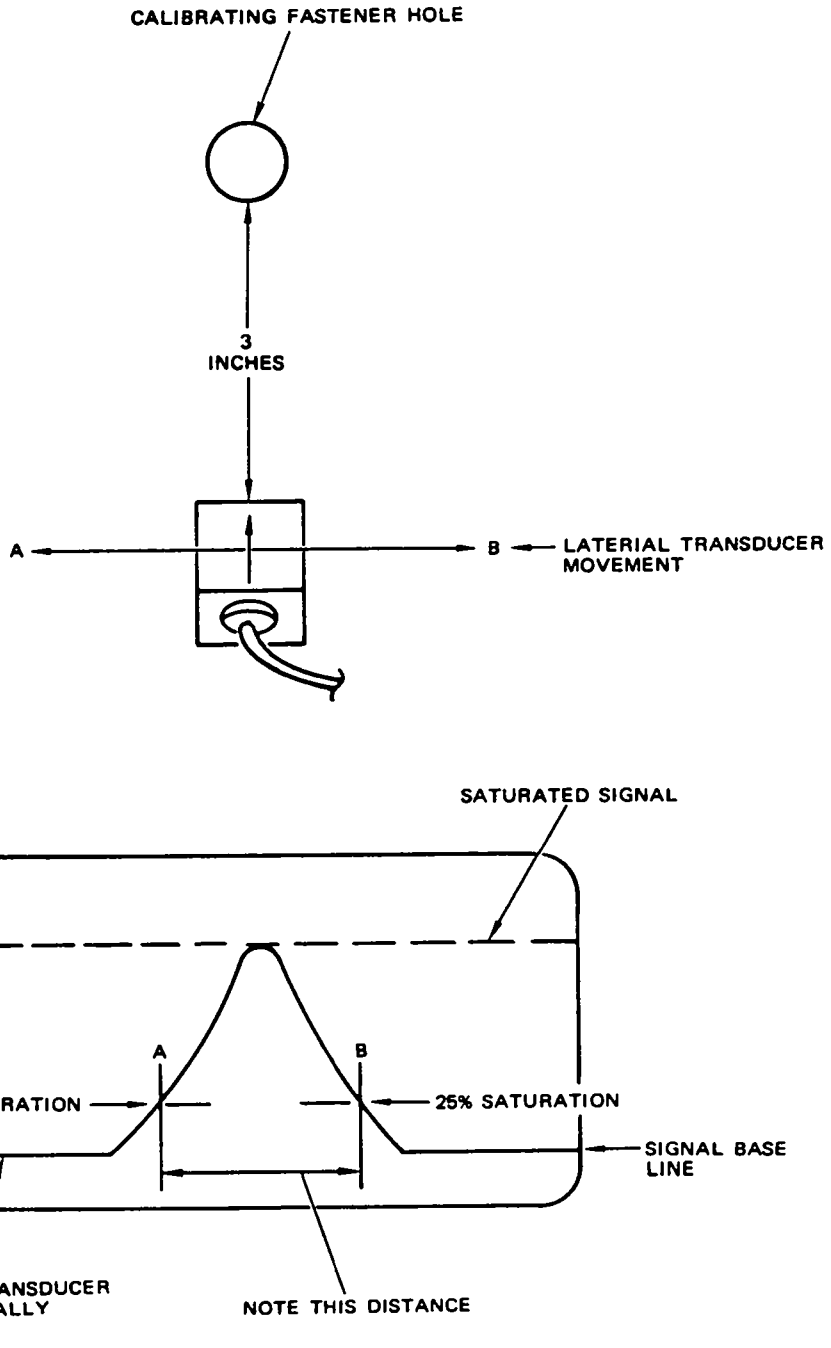
NOTES

- ALL DIMENSIONS ARE IN INCHES
- FABRICATE FROM LUCITE OR PLEXIGLASS
- TOLERANCE ON ALL DIMENSIONS ± 0.030 EXCEPT AS NOTED
- SURFACE FINISH 100 RMS
- P/N: 6410–22
  AVAILABLE FROM
  IDEAL SPECIALTY CO.

1 ETCH WITH 184P2

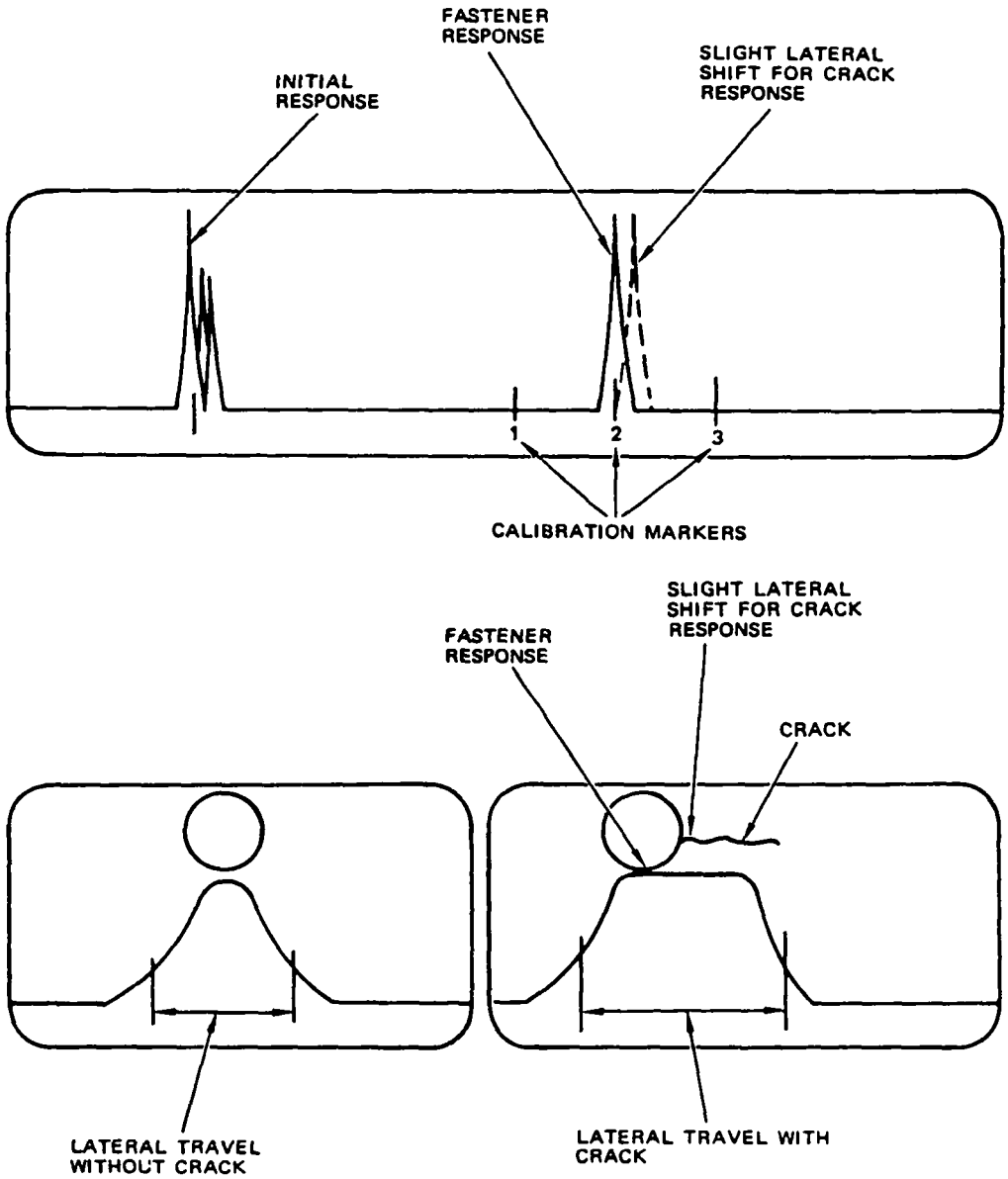
TRANSDUCER POSITIONING FIXTURE
DETAIL IV

Wing Skin Under Beavertail at Rear Spar
Figure 1 (Sheet 7)



ESTABLISHING LATERAL TRANSDUCER MOVEMENT FROM STANDARDIZING FASTENER HOLE AS RESPONSE GOES FROM 25% SATURATION TO SATURATION AND BACK TO 25%

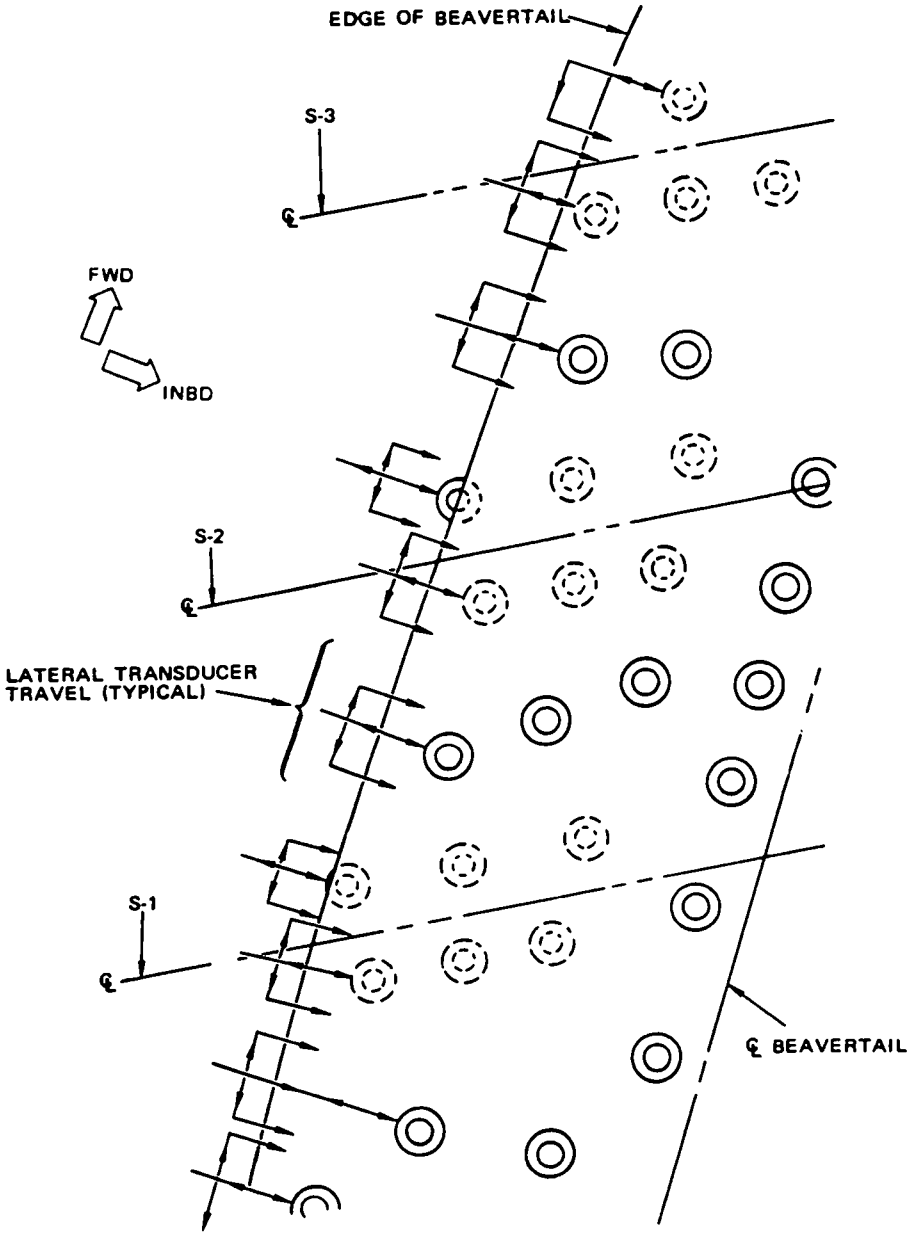
Wing Skin under Beavertail at Rear Spar
Figure 1 (Sheet 8)



NOTE: SEE FIGURE 3.

LATERAL SHIFT IN RESPONSE FROM A FASTENER HOLE AND CRACK AS REFLECTION CHANGES FOR FASTENERS NEAR THE EDGE OF THE BEAVERTAIL
DETAIL VI

Wing Skin under Beavertail at Rear Spar
Figure 1 (Sheet 9)



PLAN VIEW

LATERAL SHIFT IN RESPONSE FROM A FASTENER HOLE AND CRACK AS REFLECTION CHANGES FOR FASTENERS NEAR THE EDGE OF THE BEAVERTAIL DETAIL VI (CONTINUED)

Wing Skin under Beavertail at Rear Spar
Figure 1 (Sheet 10)

PART 4 - ULTRASONIC

WINGS

1. Purpose

   A. This ultrasonic shear wave inspection technique is recommended for detecting cracks in the upper wing skin under the beavertail at the end fastener holes common to the stringer end fittings at S-10 and S-11, inboard and outboard of WBL 59.24. (707-300, -400) or WBL 129 (707 Stratoliner or 720). See Detail I for fastener layout pattern and critical fasteners.

   B. It is recommended that this inspection be performed by experienced personnel only.

2. Equipment

   A. Any ultrasonic instrument which can satisfy the requirements of this inspection procedure may be used. This procedure was developed using the following equipment:

      (1) Curtis-Wright Model 1424A Immerscope

      (2) Branson Sonoray Model 301

   B. Transducer

      (1) 5-MHz, 0.25 diameter transducer in a 0.375-inch diameter case.

   C. Reference Standard

      (1) 0.3125 aluminum plate to simulate upper wing skin fastener pattern at the stringer end fittings.

   D. Transducer Positioning Fixture

      (1) Fabricate transducer positioning fixture to transmit an ultrasonic shear wave into the test area as shown in Detail III.

   E. Couplant

      (1) Grease, oil or other suitable couplant media for use between the transducer and the positioning fixture and between the positioning fixture and the skin surface.

Skin Under External Chord - Main Landing Gear Support Rib
Figure 2 (Sheet 1)

3. Preparation for Inspection

A. Remove the paint from the upper wing skin surface in an area 4 inches inboard and 4 inches outboard of the beavertail and 2 inches forward of Stringer 11 to 2 inches aft of Stringer 10.

4. Instrument Calibration

A. Seat the transducer firmly in the transducer positioning fixture with couplant.

B. Coat the reference standard with couplant.

C. Using a guide (straight edge) place the positioning fixture on the reference standard, so the sound beam will parallel the fasteners common to the stringers as shown in Detail I. Slide transducer positioning fixture along the skin surface in the inboard-outboard direction to obtain the maximum signal from the simulated crack. If signals appear from adjacent fastener holes, move the transducer guide away from line of fasteners until these signals disappear.

D. Determine the scanning limitations imposed by the positioning of the beavertail from Detail I and from the actual configuration on the airplane being inspected.

E. Center the simulated crack response on the oscilloscope and note position of the response and transducer that should be used to evaluate indications located during scanning of critical fastener hole area.

5. Inspection Procedure

A. Place the transducer positioning fixture on the skin surface to obtain a response from the critical fastener hole. The response from the fastener hole should appear in approximately the same position on the oscilloscope as the response from the simulated crack. Because of the sound transfer into the sealant, fuel or stringer tie, it may be necessary to raise the instrument sensitivity to obtain a strong signal from the fastener hole.

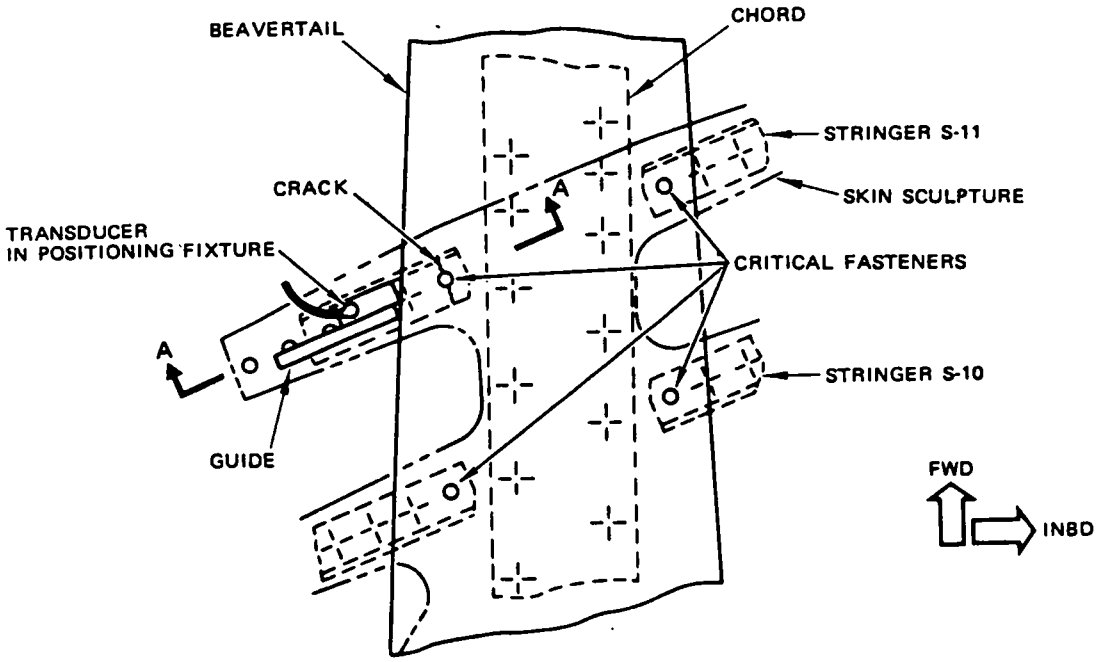
NOTE: It is not necessary that the signal obtained from the fastener under the beavertail equal the reference standard signal.

B. Using a guide, position the transducer positioning fixture on the skin surface so the sound beam will parallel the fasteners common to the stringer.

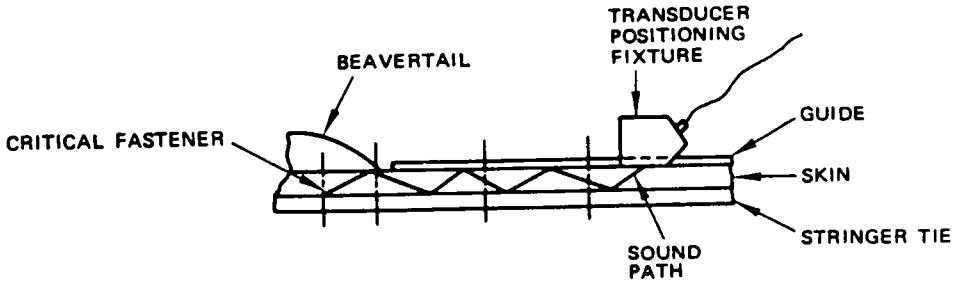
C. Scan the area just forward and aft of the critical fasteners common to Stringers S-10 and S-11 inboard and outboard of WBL 59.24. (707-300, -400) or WBL 129 (707 Stratoliner or 720).

D. Any crack response adjacent to the critical fasteners shall be verified with an eddy current inspection.

Skin Under External Chord - Main Landing Gear Support Rib
Figure 2 (Sheet 1)



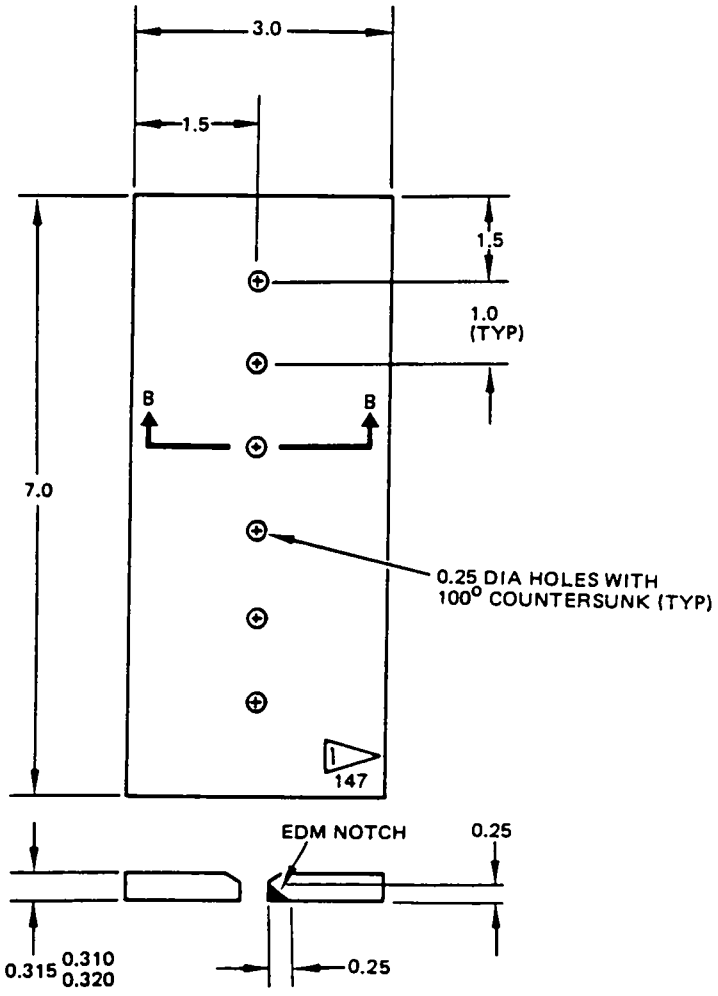
DETAIL I



SECTION A–A

FASTENER LAYOUT PATTERN

Skin Under External Chord - Main Landing Gear Support Rib
Figure 2 (Sheet 3)



SECTION B–B

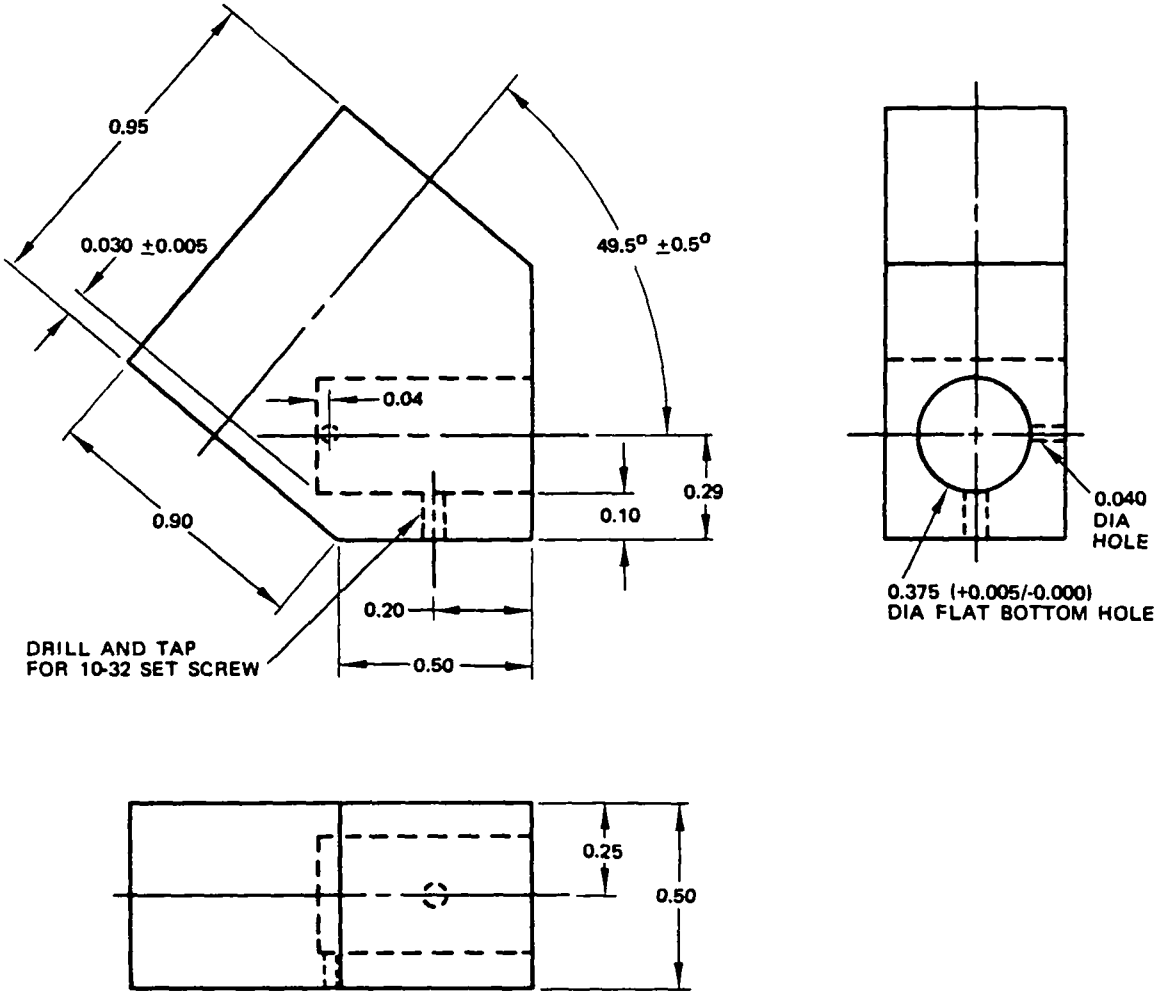
NOTES

- ALL DIMENSIONS ARE IN INCHES
- MATERIAL: 7178-T6, 7075–T6 OR 2024–T4 BARE ALUMINUM
- TOLERANCE: ± 0.03 EXCEPT AS NOTED
- P/N 6411–20
  AVAILABLE FROM IDEAL SPECIALTY CO.
- FASTENER: BACB30LU4–5 OR EQUIVALENT WITH BACN10JC4
  OR EQUIVALENT NUT

147 ETCH OR STEEL STAMP WITH 147

REFERENCE STANDARD
DETAIL II

Skin Under External Chord - Main Landing Gear Support Rib
Figure 2 (Sheet 4)



NOTES

- MATERIAL: LUCITE OR PLEXIGLASS
- TOLERANCE: ±0.010 EXCEPT AS NOTED
- FINISH: 100 MICROINCHES
- P/N 6410-15
  AVAILABLE FROM IDEAL SPECIALTY CO.
  2531 E. INDEPENDENCE ST.
  TULSA, OKLAHOMA 74110

TRANSDUCER POSITIONING FIXTURE
DETAIL III

EFFECTIVITY
MODEL: 707-300/400/ 300B/300C
SERVICE BULLETIN REFERENCE: 2427,2606, 2607,2731
SSI DOCUMENT (D6-44860) REFERENCE: SSD 57-A25-21 57-A35-21 57-A45-21

PART 4 - ULTRASONIC

WINGS - SKIN

1. Purpose

   A. This ultrasonic shear wave inspection technique is recommended for detecting cracks in the upper wing skin under the splice plate at BBL 70.5 common to the upper rear spar chord. Refer to Detail I for location of critical fasteners.

   B. It is recommended that this inspection be performed by experienced personnel only.

2. Equipment

   A. Any ultrasonic instrument which can satisfy the requirements of this inspection procedure may be used. This procedure was developed using the following equipment:

      (1) Curtis-Wright Model 424A Immerscope

      (2) Branson Sonoray Model 301

   B. Transducer

      (1) 5-MHz, 0.25-inch diameter transducer in a 0.375-inch diameter case.

   C. Transducer Positioning Fixture

      (1) Fabricate transducer positioning fixture to transmit an ultrasonic shear wave into the test area as shown in Detail II.

   D. Couplant

      (1) Grease, oil or other suitable couplant media for use between the transducer and the positioning fixture and between the positioning fixture and the skin surface.

3. Preparation for Inspection

   A. Sand lightly to remove thick or loose paint from the upper wing skin surface in an area 4 inches outboard of the splice plate.

Upper Wing Skin Under Splice Plate at BBL 70.5 and Rear Spar
Figure 3 (Sheet 1)

4. Instrument Calibration

A. Using a scale, position the transducer on the skin surface 1 inch from the edge of a fastener hole which is not under the splice plate. (This fastener hole is used for calibration.)

B. Adjust instrument sensitivity to obtain a response amplitude slightly below saturation from this calibrating fastener hole and identify the response position on the oscilloscope by marking the position of the left-hand edge of the response signal.

C. Repeat (A) and (B) for distances of 2 and 3 inches from the calibrating fastener hole.

D. From the 2-inch position, obtain a maximum signal from the calibrating fastener hole, and adjust instrument sensitivity to obtain a response amplitude slightly below saturation.

E. With the gain setting and position established in (D), move transducer laterally, relative to the calibrating fastener hole, and note distance traveled by transducer as the ultrasonic response changes from 25% of saturation to saturation and back to 25% of saturation, (detail III). This lateral travel will aid in crack identification. Lateral transducer movement from the 2-inch distance is a satisfactory guide for transducer distances from 1 to 3 inches from the fastener hole being tested.

5. Inspection Procedure

A. Locate the three fasteners identified in detail I.

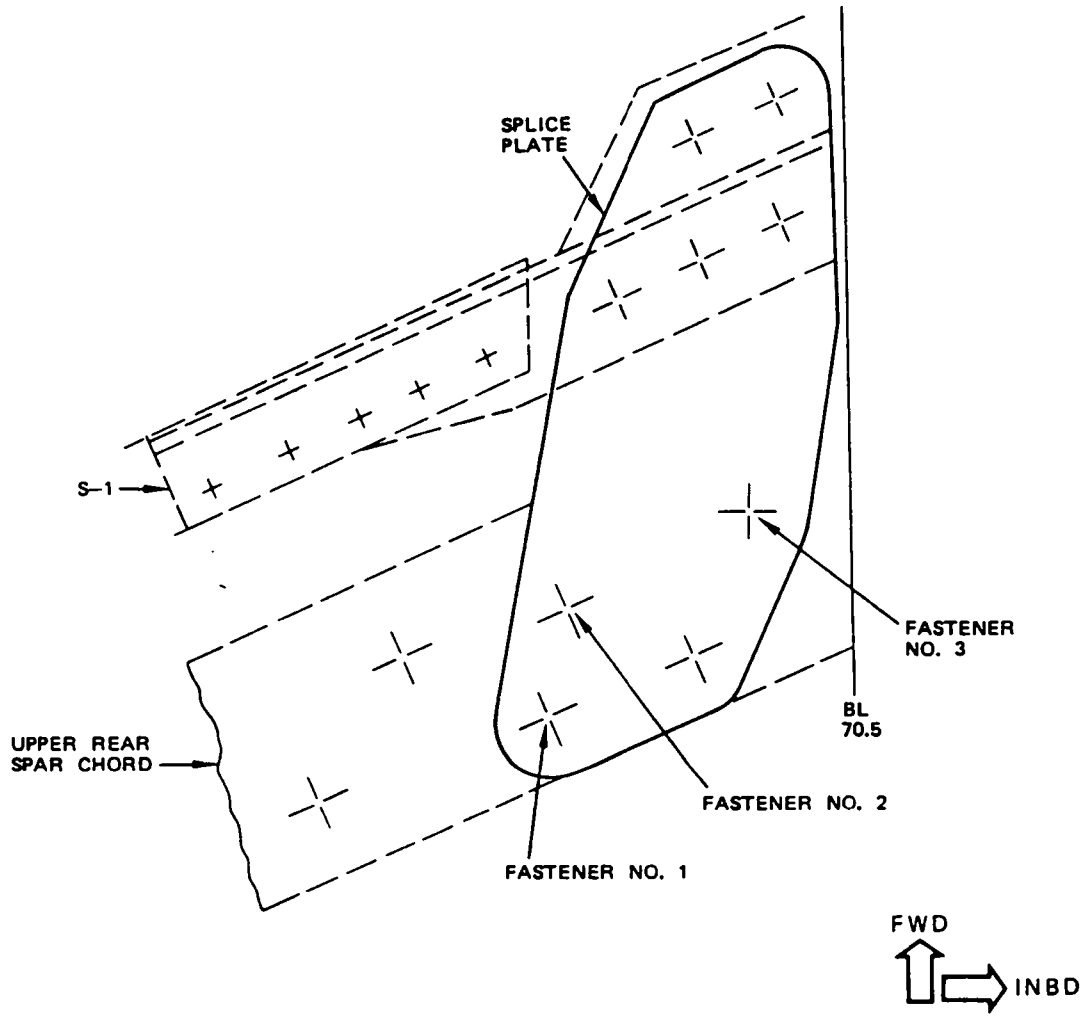
B. Position transducer approximately 2 inches from fastener No. 1, as indicated on the oscilloscope.

C. Move the transducer parallel to the fuselage. Note distance transducer travels to go from a 25% of saturation to a 25% of saturation as described in par. 4.E.

D. If lateral transducer travel, when going from a 25% to a 25% response signal from the test fastener hole, is more than twice the travel obtained from the calibrating fastener hole, a 1/2-inch or greater crack exists. The greater the lateral distance over which an ultrasonic response is obtained, the longer the crack. A slight horizontal shift in the instrument signal may occur as the response from the front of the fastener hole shifts to a crack initiating at the side of the fastener hole. When measuring lateral transducer travel, this slight horizontal shift in the response pattern is to be considered as a continuous response (detail IV). A slight horizontal shift in response position is added evidence of a crack.

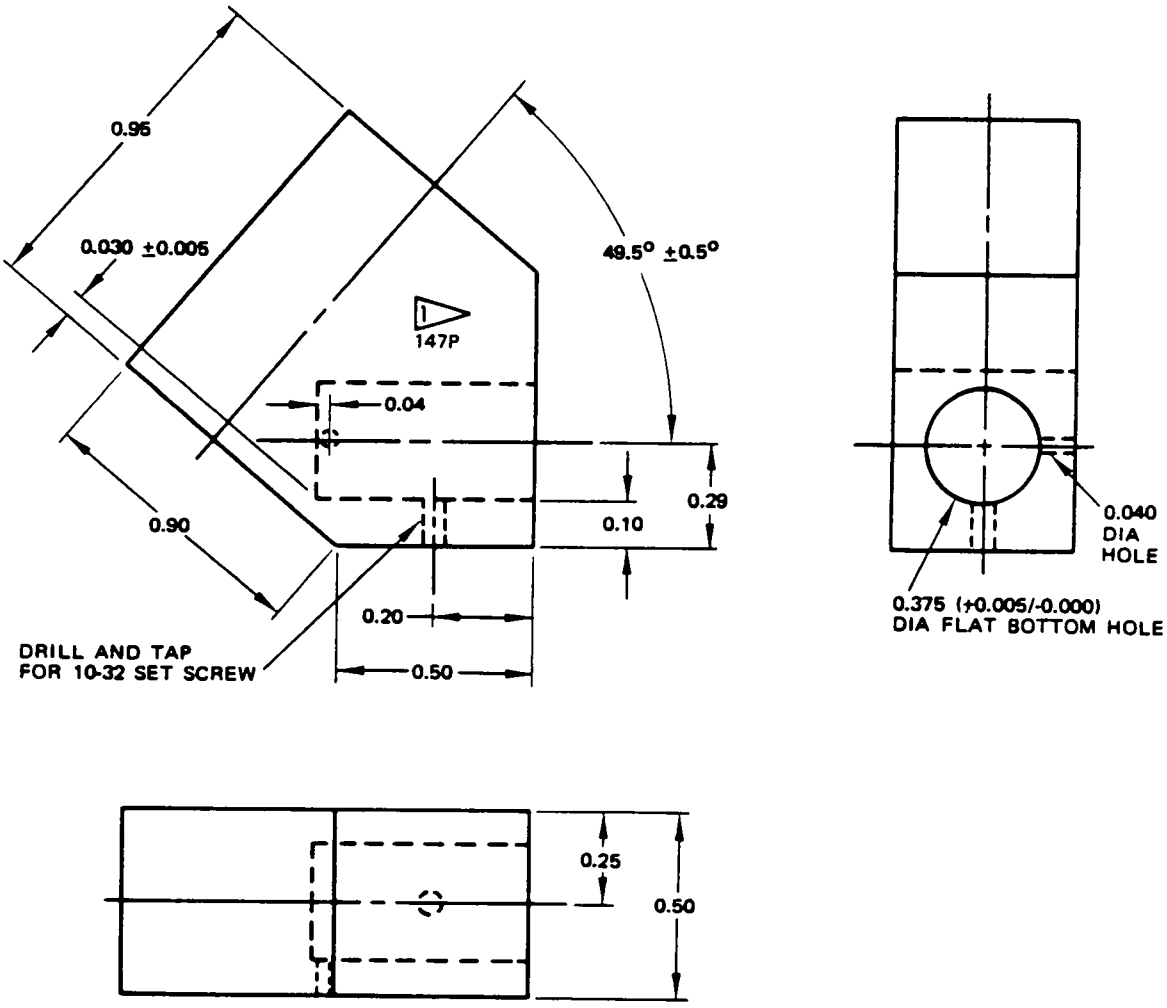
E. Repeat procedure for all three fasteners identified in detail I.

Upper Wing Skin under Splice Plate at BBL 70.5 and Rear Spar
Figure 3 (Sheet 2)



CRITICAL FASTENERS IN INSPECTION AREA
DETAIL I

Upper Wing Skin under Splice Plate at BBL 70.5 and Rear Spar
Figure 3 (Sheet 3)



NOTES

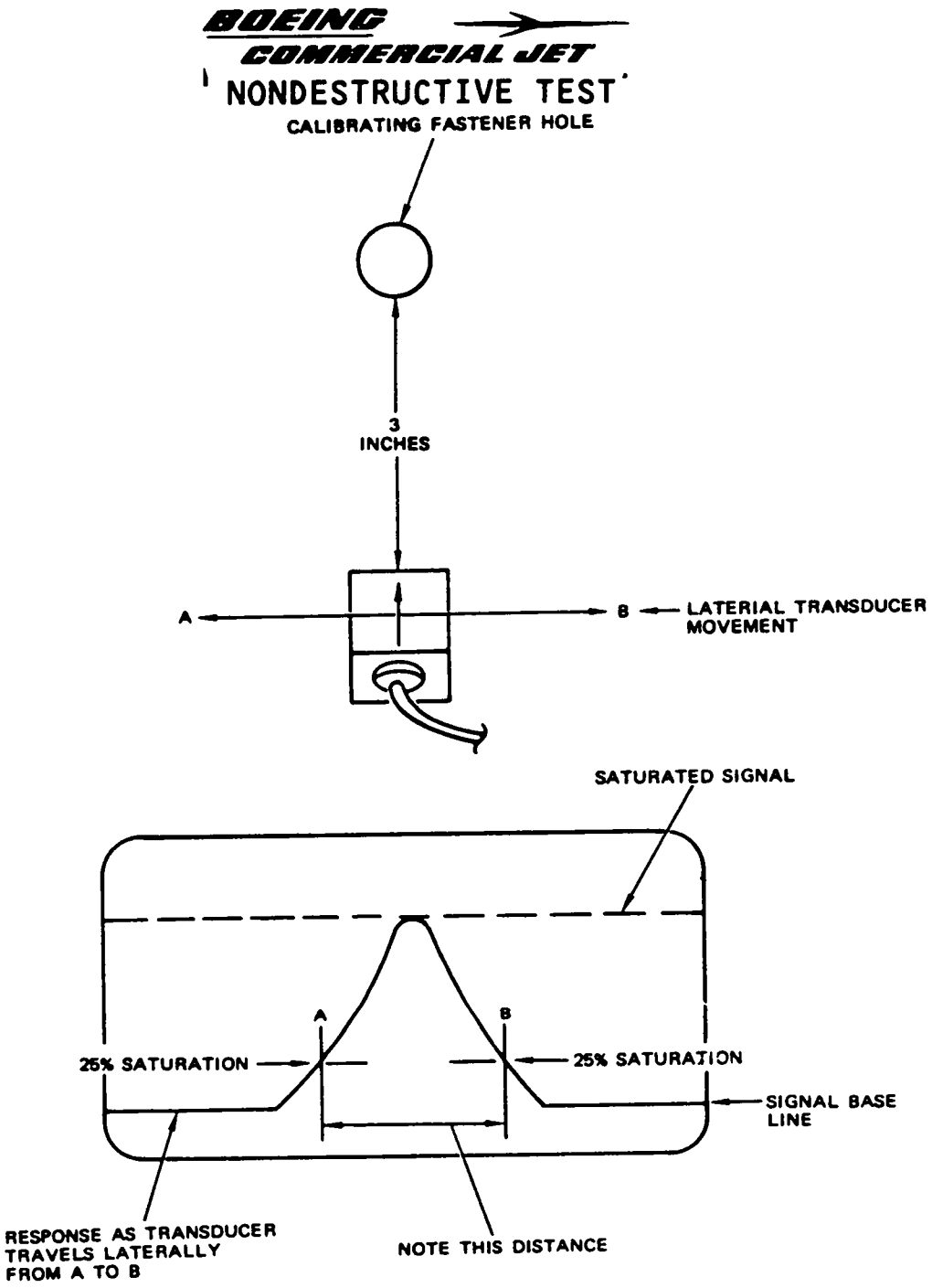
- ALL DIMENSIONS ARE IN INCHES
- MATERIAL: LUCITE OR PLEXIGLASS
- TOLERANCE: ±0.010 EXCEPT AS NOTED
- FINISH: 100 MICRO INCHES
- P/N: 6410–15
  AVAILABLE FROM IDEAL SPECIALTY CO.

1 ETCH WITH 147P

TRANSDUCER POSITIONING FIXTURE

DETAIL II

Upper Wing Skin under Splice Plate at BBL 70.5 and Rear Spar
Figure 3 (Sheet 4)



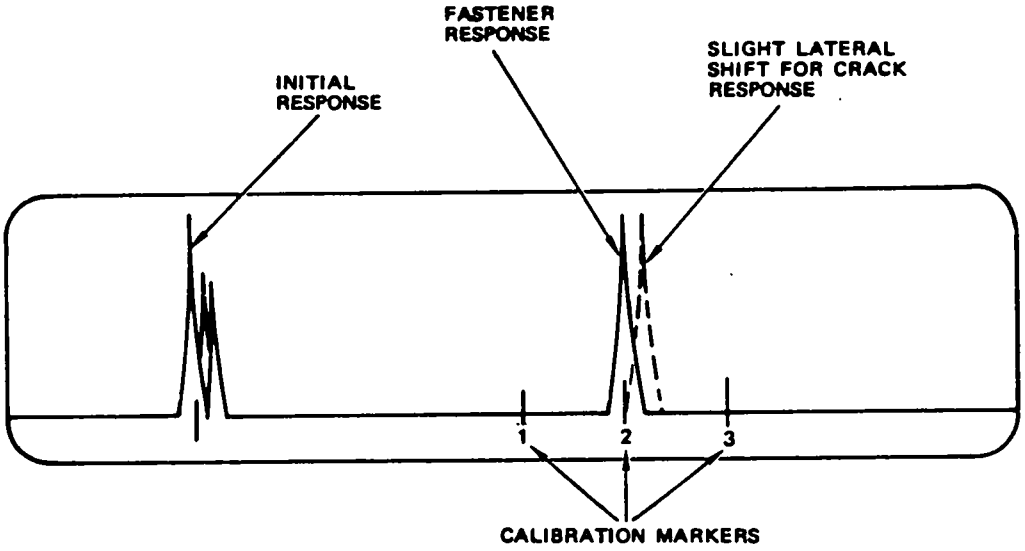
ESTABLISHING LATERAL TRANSDUCER MOVEMENT FROM STANDARDIZING FASTENER HOLE AS RESPONSE GOES FROM 25% SATURATION TO SATURATION AND BACK TO 25%

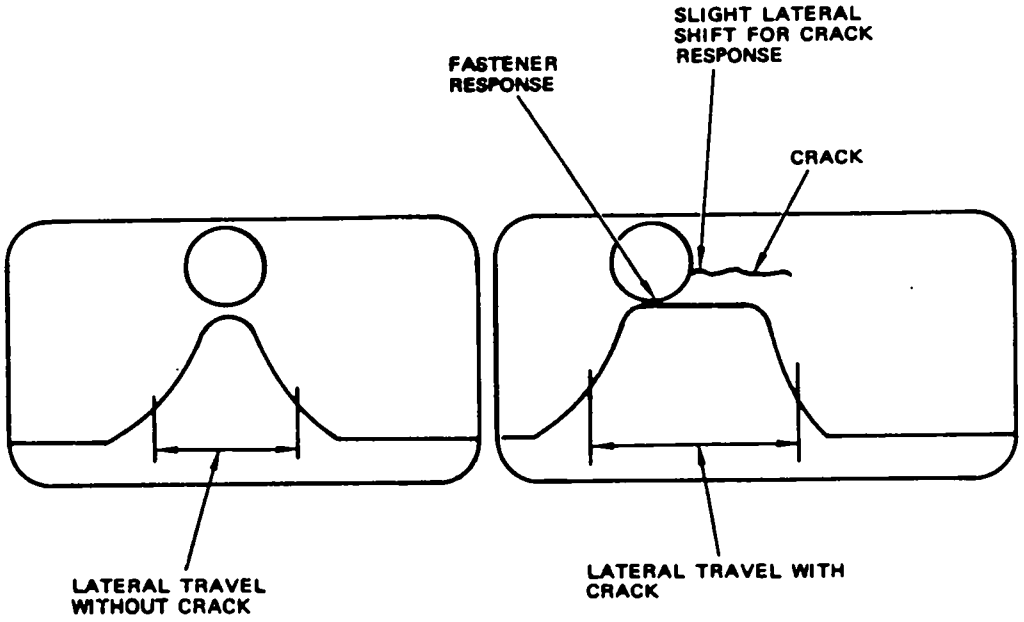
INSTRUMENT CALIBRATION

DETAIL III

Upper Wing Skin under Splice Plate at BBL 70.5 and Rear Spar
Figure 3 (Sheet 5)

NONDESTRUCTIVE TEST





NOTE
SEE DETAIL III

LATERAL SHIFT IN RESPONSE FROM A FASTENER HOLE AND CRACK

INSPECTION PROCEDURE
DETAIL IV

Upper Wing Skin under Splice Plate at BBL 70.5 and Rear Spar
Figure 3 (Sheet 6)

EFFECTIVITY
MODEL: 707-720
SSI DOCUMENT (D6-44860)
REFERENCE:
SSD 57-A00-02
SSD 57-A10-02
SSD 57-A20-02
SSD 57-A30-02
SSD 57-A40-02

PART 4 - ULTRASONIC

WINGS PLATES/SKIN

1. Purpose

   A. Internal

      (1) To detect cracks out of fastener holes in the rear spar at clip fittings, LBL 70.5 to RBL 70.5.

   B. External

      (1) To detect cracks in the skin forward of the upper rear spar pressure seal, at floor beam intersections on all models.

      (2) To detect cracks out of fastener holes in the upper skin at stringer S-12-to-floor beam intersections on 707-300/400, 300B, 300C models.

   C. This inspection requires wing tank entry. Fuel tank must be drained and purged to a health safe condition (as defined by Chapter 28 of the Maintenance Manual) before entering tank with an ultrasonic instrument. The ultrasonic instrument must be battery powered.

      NOTE: Approval for operating ultrasonic equipment in a fuel tank with the conditions stated above must be obtained from local Airline/Airport fire department.

2. Equipment

   A. Any ultrasonic equipment which satisfies the requirements of this procedure may be used. The following equipment was used during the development of this procedure and found acceptable:

      (1) Instrument

      Nortec NDT-131
      Nortec Corp.
      421 N. Quay
      Kennewick, WA. 99336

      (2) Transducer

      Automation Industries, 5 MHz, 70° A miniature transducer, or a transducer and wedge assembly not wider than 0.3 inch.

Wing Center Section Upper Skin and Rear Spar Upper Chord
Figure 4 (Sheet 1)

B. Reference Standard

(1) Fabricate reference standard per Detail I and Table I.

3. Preparation for Inspection

A. Wing Center Section Upper Rear Spar - Internal

(1) Gain access to interior of wing center section through lower center section access panels.

(2) Remove fuel cells and upper surface backing panels as necessary to gain access to the upper rear spar.

(3) Remove sealant or surface coating as necessary for good transducer contact to surface of upper rear spar horizontal leg at floor beam attach points (five locations).

B. Wing Center Section Upper Surface - External

(1) Remove floor panels as necessary for access to center section upper rear spar at floor beam intersections.

(2) Remove excess sealant which extends more than 0.15 inch beyond the forward edge of the upper rear spar pressure seal for 3 to 4 inches either side of each floor beam (Detail V).

(3) On 707-300/400, 300B, 300C models remove floor panels as necessary for access to upper center section stringer S-12 at floor beam intersections.

4. Instrument Calibration

A. Calibration for internal inspection of rear spar at floor beam clip fitting. Use the applicable rear spar reference standard (137A1, 137B1 or 137C1) that is specified in Table I. See Detail II and III.

(1) Coat the rear spar standard (Detail I) with a thin film of couplant.

(2) Place the transducer on the standard with transducer's leading edge behind the scribe line which is 0.9 inch from the hole edge.

NOTE: There are two scribe lines on the calibration standard, one on each side of the holes (Detail I). The scribe lines represent the approach limit of the transducer to the airplane fastener hole as a result of intervening structure, such as a clip fitting or floor beam flange. The calibration procedure uses the two scribe lines to show the response pattern associated with the restriction on fastener hole-to-transducer proximity.

Wing Center Section Upper Skin and Rear Spar Upper Chord
Figure 4 (Sheet 2)

(3) Move the transducer to the unnotched hole and manipulate to obtain a maximum signal from the hole.

NOTE: Transducer must remain behind the scribe line during calibration.

(4) Adjust the instrument sweep controls so the indication from the hole appears at approximately 3/4 of screen width (Detail II).

(5) Adjust instrument sensitivity so that the amplitude of the hole signal is between 90 and 100% of maximum.

(6) Move the transducer to the notched hole and note position of hole response as compared to position of notch response (Detail III).

(7) Place the transducer on the standard with the transducer's leading edge behind the scribe line which is 0.5-inch from the hole.

(8) Move the transducer to the notched hole and note the locations of the hole and notch signals.

(9) Final adjustment for ultrasonic test sensitivity should be accomplished on the airplane.

B. Calibration for external inspection of the wing skin under floor beams at the rear spar. Use the applicable center-section skin reference standard (137A2, 137B2 or 137C2) that is specified in Table I. See Detail II and III.

(1) Calibrate instrument per par. 4.A. except use the center section skin standard related to inspection just forward of pressure seal (Detail I).

C. Calibration for external inspection of the wing skin at Stringer S-12-to-floor beam intersections (Detail VI).

(1) Calibrate the instrument as specified in par. 4.A. but use the Stringer S-12 reference standard 137C3 (see Table I). See Detail II and III.

Wing Center Section Upper Skin and Rear Spar Upper Chord
Figure 4 (Sheet 3)

5. Inspection Procedure

A. Internal inspection of upper rear spar at clip fittings (calibration is per par. 4.A.).

WARNING: PRECAUTIONS AND SAFETY PROCEDURES CONTAINED IN CHAPTER 28 OF THE MAINTENANCE MANUAL MUST BE FOLLOWED BY PERSONNEL ENTERING ANY TANK THAT HAS CONTAINED FUEL. USE ONLY BATTERY-OPERATED, EXPLOSIONPROOF LIGHTS IN VICINITY OF OPEN FUEL TANKS. POSSIBILITY OF EXPLOSION AND TOXIC DANGER EXISTS IN VICINITY OF FUEL TANKS WHICH HAVE CONTAINED FUEL.

(1) Place transducer on the rear spar upper chord horizontal flange and position to detect hole A (Detail IV, Position 1). Maximize the hole response and readjust instrument sensitivity to obtain a 90 to 100% hole signal.

(2) Scan the transducer on the rear spar to detect cracks out of fastener holes A and B, Detail IV.

(3) For 707-300/400,300B,300C models, place transducer at Position 2, Detail IV, and inspect for cracks aft of hole B.

(4) Any ultrasonic indication occurring at the inspection area, see Detail IV, which is 50% or more of screen height is a potential crack and should be investigated.

B. Inspection of skin forward of center section upper rear spar. Inspection is from outside the center section. Calibration is per par. 4.B.

(1) Place the transducer on the wing skin just forward of the upper rear spar pressure seal to detect hole A (Detail V, probe position 1). Maximize the hole response and readjust instrument sensitivity to obtain a 90 to 100% hole signal.

(2) Scan transducer to detect crack at either side of hole A.

(3) Move transducer to Position 2 and scan to detect cracks out of hole C.

(4) Any ultrasonic indication from the inspection area which is 50% or more of screen height is a potential crack and should be investigated.

C. 707-300/400, 300B, 300C. Inspection of the wing skin at Stringer 12 floor beam intersections. Inspection is from outside the center section. Calibration is per par. 4.C.

(1) Place transducer on the wing skin to detect hole A (Detail VI, probe position 1). Maximize the hole response and readjust instrument sensitivity to obtain a 90 to 100% hole signal.

Wing Center Section Upper Skin and Rear Spar Upper Chord
Figure 4 (Sheet 4)

(2) Scan transducer to detect crack at hole B (Detail VI).

(3) Move transducer to Position 2 and scan to detect cracks out of hole C (Detail VI).

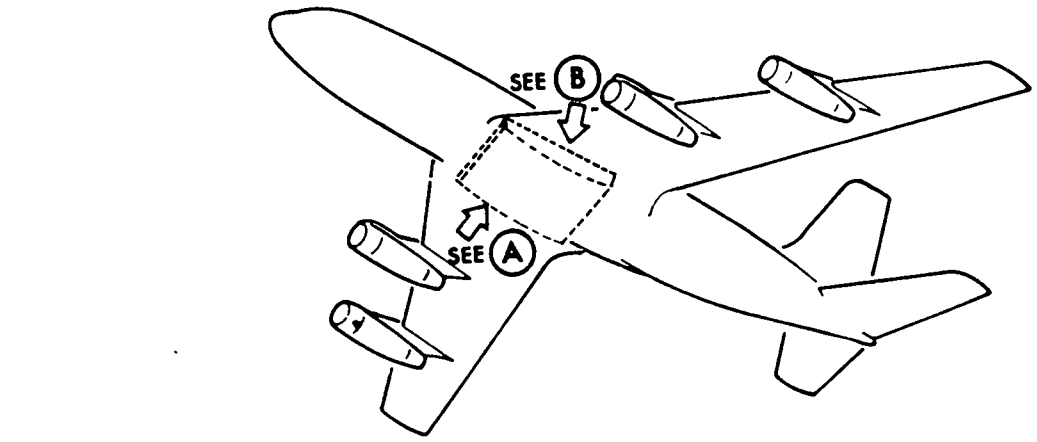
NOTE: Manipulate transducer to detect the 7/16-inch clip fitting hole and to detect crack at side of hole The distance between hole edge response and a crack response will be greater than for the standard because of the larger 7/16-inch hole.

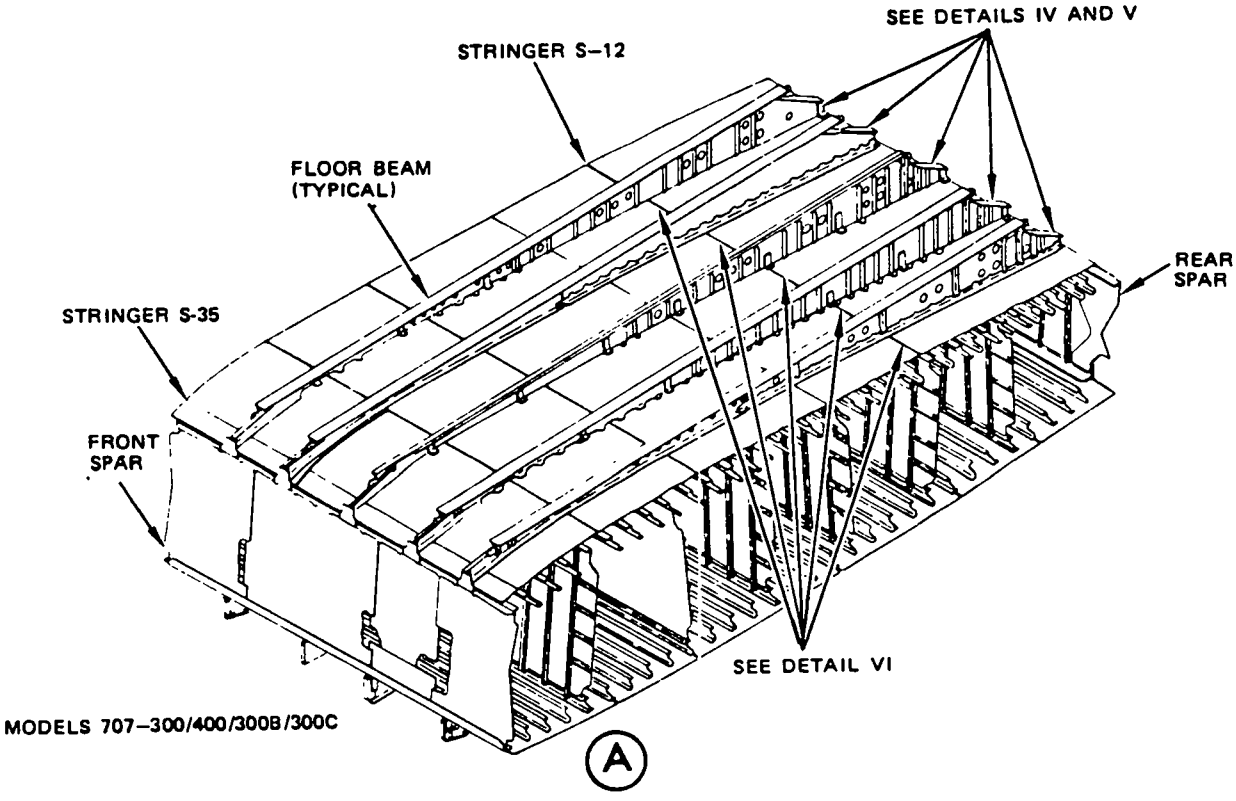
(4) Any ultrasonic indication from the inspection area which is 50% or more of screen height is a potential crack and should be investigated.

A/P MODEL	REAR SPAR REFERENCE STANDARD NUMBER	REAR SPAR THICKNESS	CENTER-SECTION SKIN REFERENCE STANDARD NUMBER	CENTER-SECTION SKIN THICKNESS	FASTENER DIAMETER
720	137A1	0.28	137A2	0.17	5/16
707-100/200	137B1	0.25	137B2	0.20	5/16
707-300/400 300B/300C	137C1	0.37	137C2	0.21	1/4
S-12	-----	----	137C3	0.10	1/4

REFERENCE STANDARD THICKNESS AND HOLE DIAMETER
TABLE I

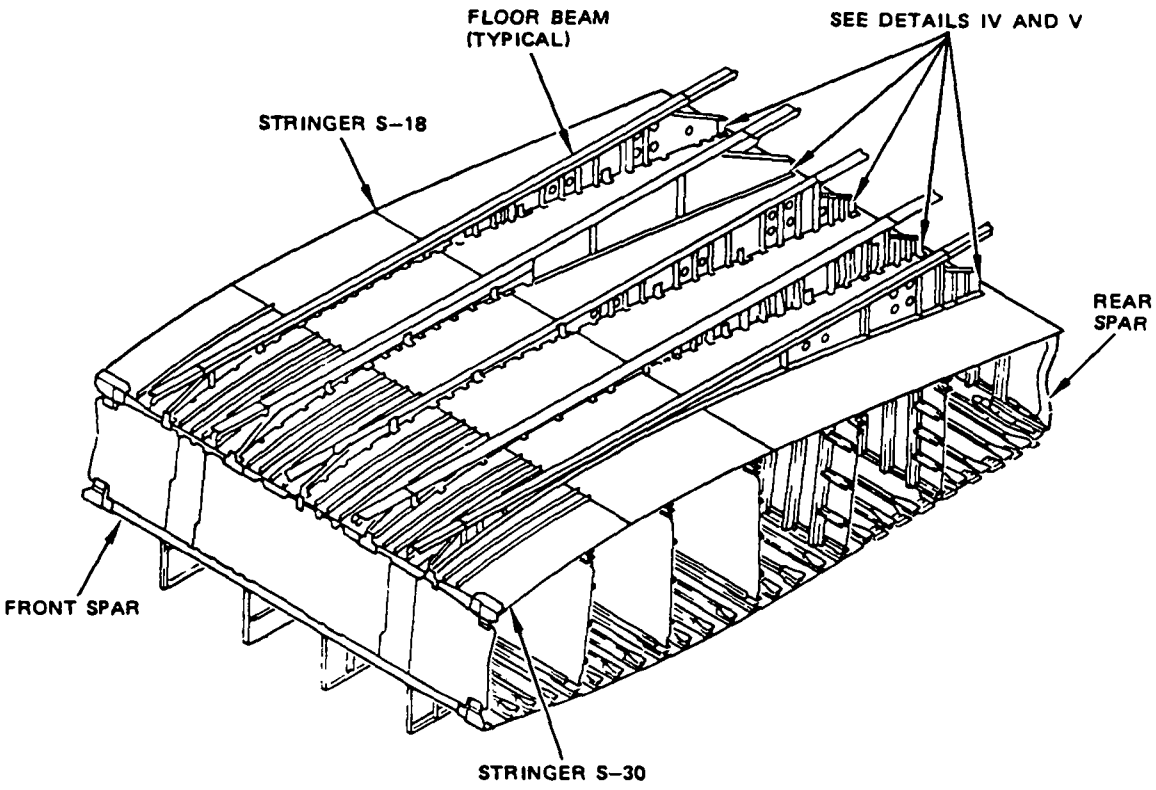
Wing Center Section Upper Skin and Rear Spar Upper Chord
Figure 4 (Sheet 5)





WING CENTER SECTION STRUCTURE

Wing Center Section Upper Skin and Rear Spar Upper Chord
Figure 4 (Sheet 6)

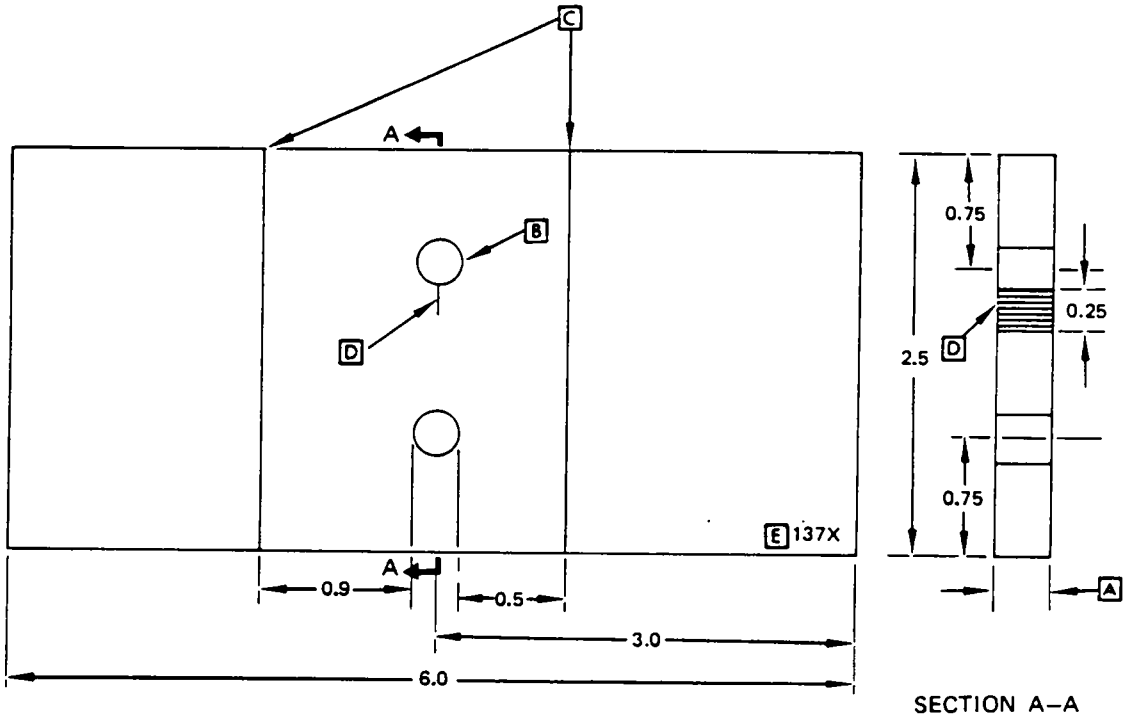


B

MODELS 720 AND 707-100/200

WING CENTER SECTION STRUCTURE (CONT)

Wing Center Section Upper Skin and Rear Spar Upper Chord
Figure 4 (Sheet 7)



NOTES

- FABRICATE TWO REFERENCE STANDARDS ONE REPRESENTING THE SKIN AND ONE REPRESENTING THE REAR SPAR
- ALL DIMENSIONS IN INCHES
- MATERIAL: 2024–T4 OR T6
- TOLERANCE: X.X = ± 0.05 X.XX = ± 0.05

[A] DETERMINE THICKNESS FROM TABLE I

[B] DETERMINE FASTENER DIAMETER FROM TABLE I

[C] SCRIBE LINES LESS THAN 0.001 DEEP, REPRESENTING THE EDGE OF THE CLIP FITTING OR FLOOR BEAM CHORD.

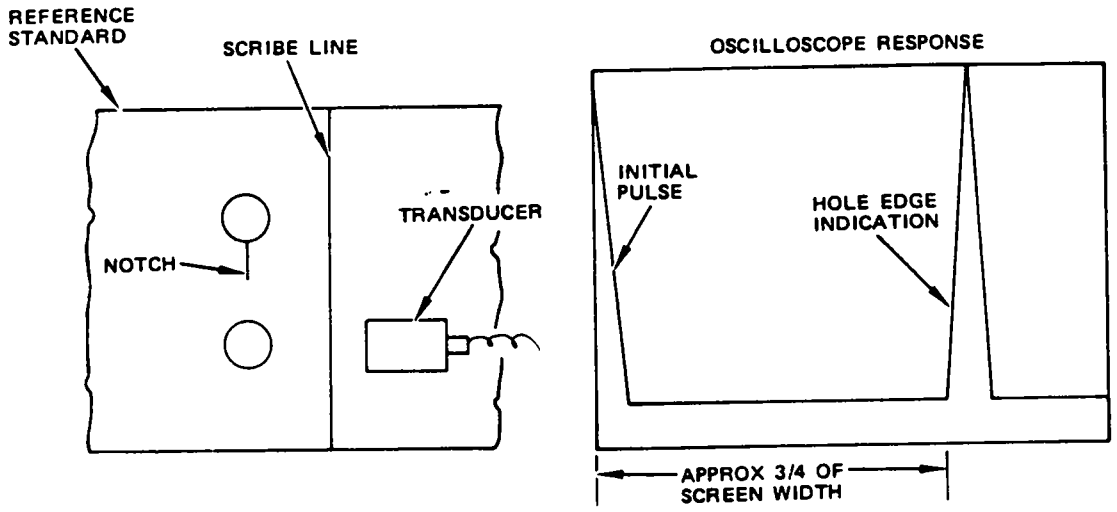
- P/N: 6411–8, –8A, –8B AVAILABLE FROM IDEAL SPECIALTY CO.

[D] JEWELER'S SAWCUT 0.03 MAX WIDTH

[E] ETCH OR STEEL STAMP WITH 137A, 137B, OR 137C

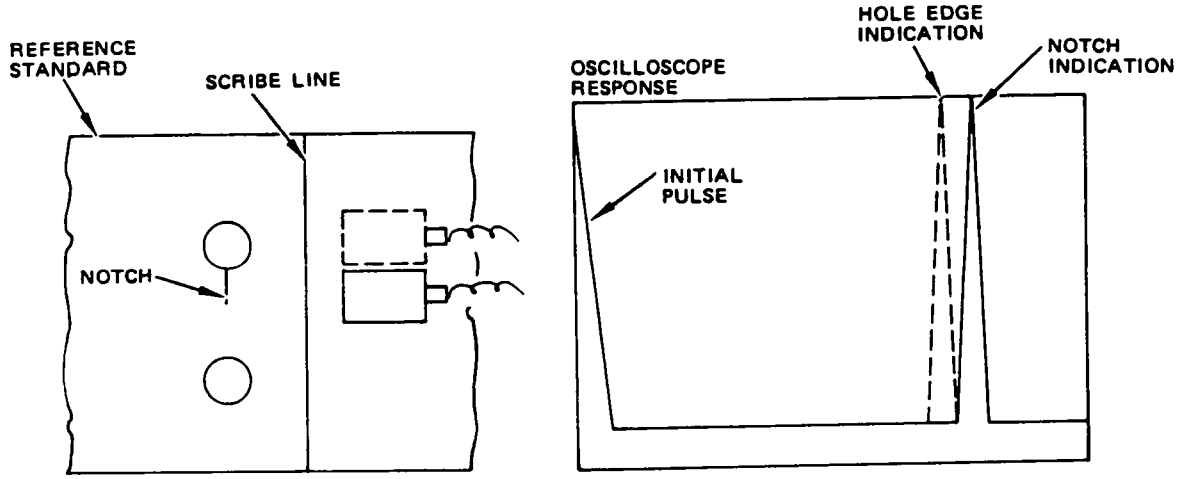
REFERENCE STANDARD
DETAIL I

Wing Center Section Upper Skin and Rear Spar Upper Chord
Figure 4 (Sheet 8)



CALIBRATION INDICATION FROM UNNOTCHED HOLE EDGE

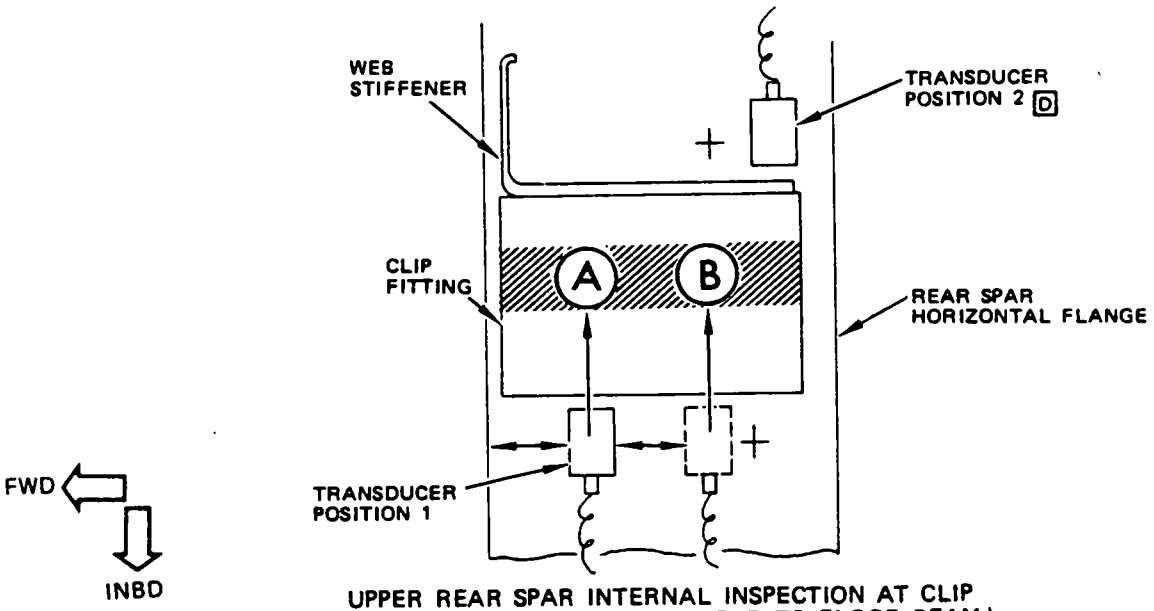
DETAIL II



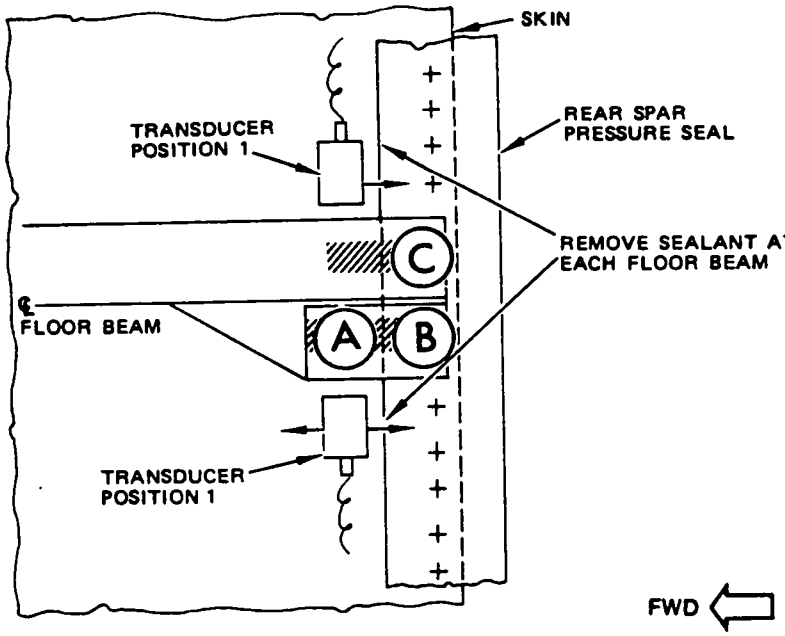
CALIBRATION INDICATION FROM NOTCH AND HOLE EDGE

DETAIL III

Wing Center Section Upper Skin and Rear Spar Upper Chord
Figure 4 (Sheet 9)



UPPER REAR SPAR INTERNAL INSPECTION AT CLIP FITTING (TYPICAL AT REAR SPAR TO FLOOR BEAM)
DETAIL IV



EXTERNAL SKIN INSPECTION OF REAR SPAR PRESSURE SEAL AT FLOOR BEAMS
DETAIL V

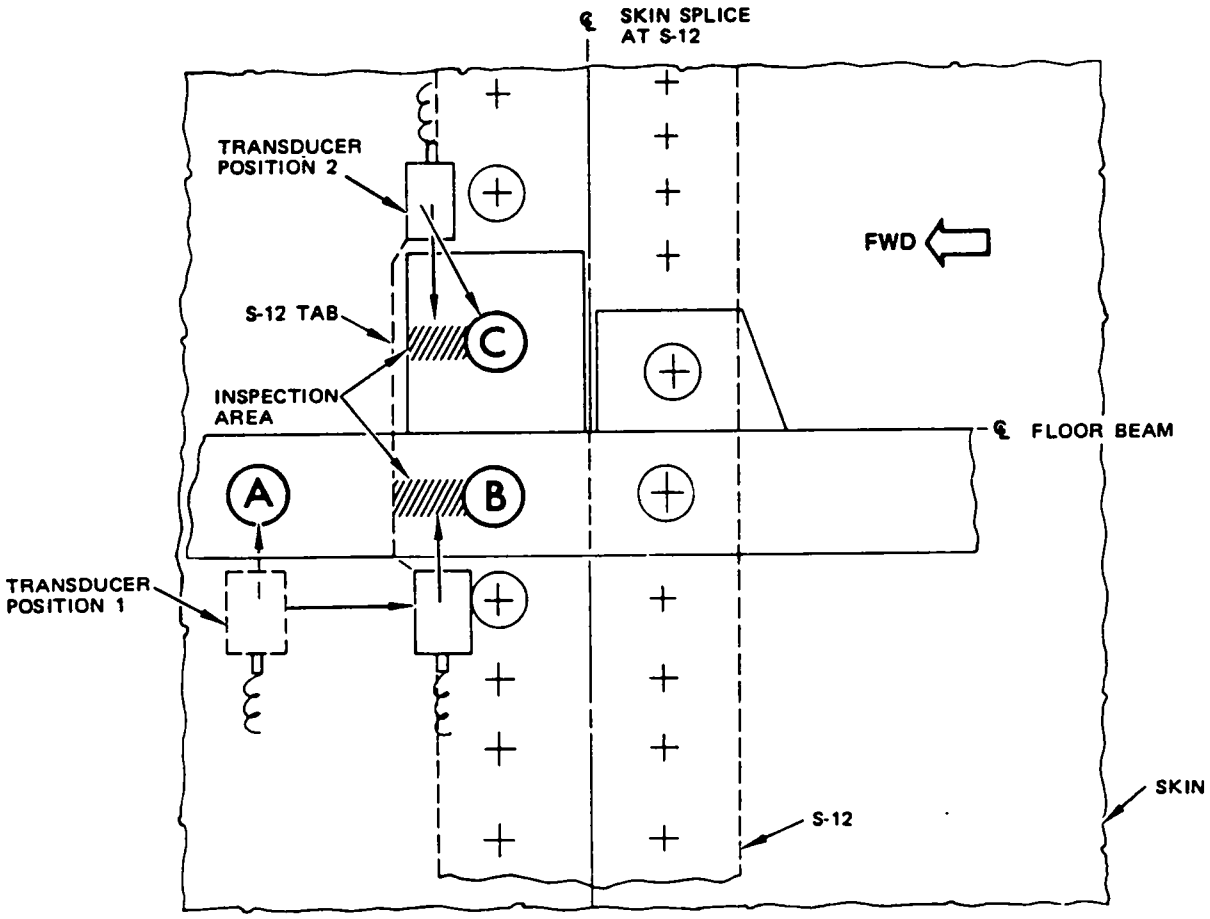
NOTES

▨ INSPECTION AREA

(A) FASTENER HOLE LOCATION

[D] 707-300/400/300B/300C ONLY

Wing Center Section Upper Skin and Rear Spar Upper Chord
Figure 4 (Sheet 10)



EXTERNAL SKIN INSPECTION AT S–12 TO FLOOR BEAM INTERSECTION (SIMILAR AT OTHERS)
707–300/400/300B/300C ONLY
DETAIL VI

Wing Center Section Upper Skin and Rear Spar Upper Chord
Figure 4 (Sheet 11)

PART 4 - ULTRASONIC

WINGS - MAIN FRAME

1. Purpose

   A. Detect cracks emanating from selected fastener holes on upper wing skin wholly or partially covered by beavertail. These fasteners are located near the periphery of the beavertail and are common to the upper wing skin and stringer end.

2. Equipment

   A. Any ultrasonic instrument which satisfies the requirements of this procedure may be used. The following equipment was used during the development of this procedure and found acceptable.

      (1) Instrument

         (a) Nortec NDT-131

            Nortec Corporation
            421 N. Quay
            Kennewick, WA 99336

      (2) Transducer Automation Industries, Type SMZ, 5MHz, 0.25-inch element, 70° A, 57A3066

   B. Reference Standard

      (1) Fabricate reference standard per Detail I.

   C. Couplant

      (1) Light oil or grease

Upper Wing Skin at Beavertail
Figure 5 (Sheet 1)

3. Preparation for Inspection

A. This inspection can be performed from outside the wing and with the part in place on the airplane.

B. Remove paint in the inspection area. Smooth out any surface roughness by sanding lightly.

C. Wipe surface clean.

D. Apply a thin film of couplant to the inspection area.

4. Instrument Calibration

A. Coat the inspection surface of the standard with a thin film of couplant.

B. Place the transducer on the reference standard and aim the sound beam at the notch located at the edge of the standard (Details I and II). Note the distance between the leading edge of the transducer case and the plane of the notch (Detail II, 2).

C. Move the transducer to the unnotched hole and obtain a signal from the hole lower edge. The distance between leading edge of transducer case and the hole edge should be approximately the same as the distance noted in par. 4.B.

D. Position this signal at approximately 3/4 of the total screen width away from the initial pulse (Detail III).

E. Adjust instrument sensitivity so that the hole lower edge signal is 90% of maximum signal height.

F. Move the transducer to the notched hole, and obtain a signal from the hole's lower edge. Move the transducer to detect the notch indication (Detail IV).

G. Note the difference in response position between the notch indication and hole edge indication.

Upper Wing Skin at Beavertail
Figure 5 (Sheet 2)

5. Inspection Procedure

A. Determine which configuration exists for a particular airplane by comparing the airplane to Details VII, VIII and IX. See NOTES regarding fasteners to be inspected.

B. Determine the location of the fastener holes to be inspected using Detail X. Select a hole and place the leading edge of the transducer the same distance away from the fastener hole edge that was established in par. 4.B. (Detail V, Position 1).

C. Manipulate the transducer to obtain a signal from the hole lower edge. If another fastener blocks the sound beam, move the transducer to either side of this fastener and manipulate to obtain a signal from the fastener hole being inspected (Detail V, Position 2).

NOTE: Higher instrument sensitivity may be needed to compensate for the signal loss due to the tight interface between the skin and beavertail. Readjust the instrument sensitivity to obtain a 90% signal height from the hole being inspected.

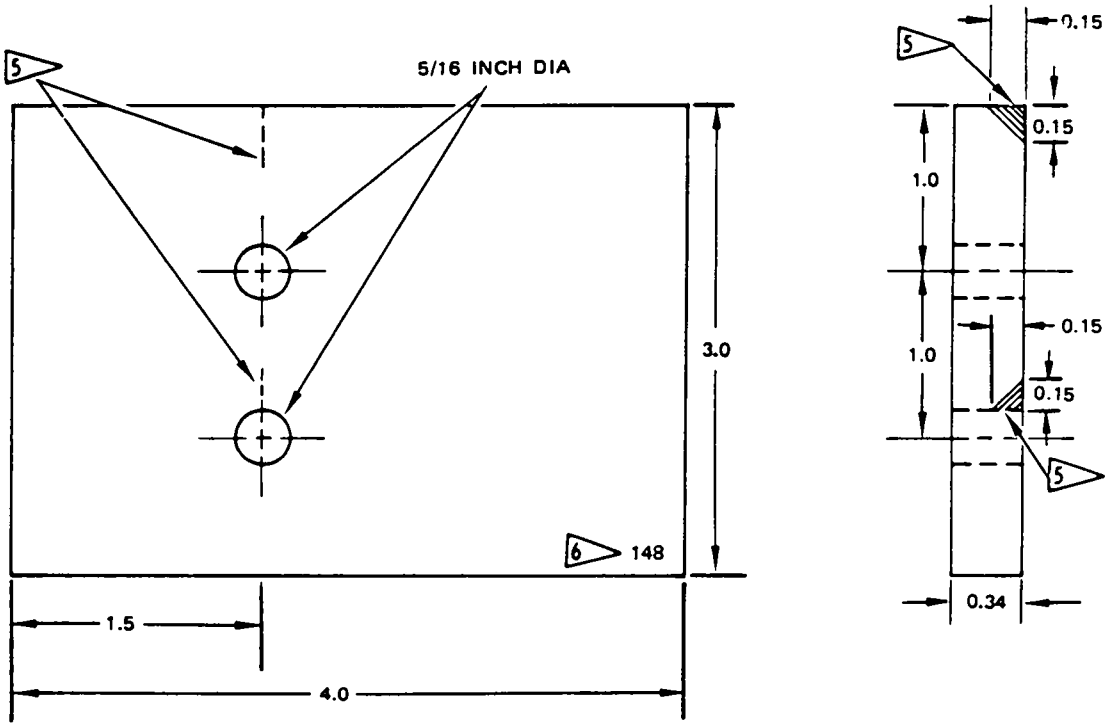
D. Move the transducer laterally and manipulate to inspect the vicinity of the fastener hole for cracks (Detail VI).

E. Any signal from the inspection area which is 50% or more of screen height and which is not identified as a hole edge response should be considered a crack and investigated further.

F. The following responses are potential crack indications:

(1) A signal on the oscilloscope which occurs a short distance to the right of the response from the hole edge - compare with the oscilloscope response pattern obtained from the notched hole in the standard.

(2) A signal which occurs approximately at the same location but slightly to the side of the hole response, or, a response from a hole edge occurring over a wider range of transducer lateral movement than that experienced from the reference standard hole or known good hole in similar structure on the airplane.



NOTES

- ALL DIMENSIONS ARE IN INCHES
- MATERIAL: 2024–T4, 7075–T6, ALUMINUM
- TOLERANCES: X.X ± 0.05, X.XX ± 0.02
- P/N 6411–21
  AVAILABLE FROM IDEAL SPECIALTY CO.

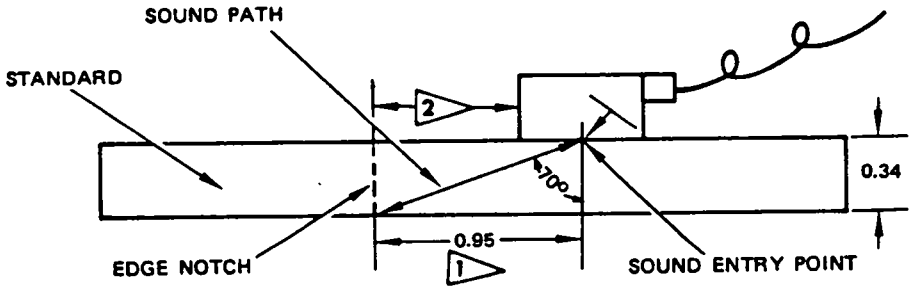
5 JEWELER'S SAWCUT 0.030 MAX WIDTH

6 ETCH OR STEEL STAMP WITH 148

REFERENCE STANDARD

DETAIL I

Upper Wing Skin at Beavertail
Figure 5 (Sheet 4)

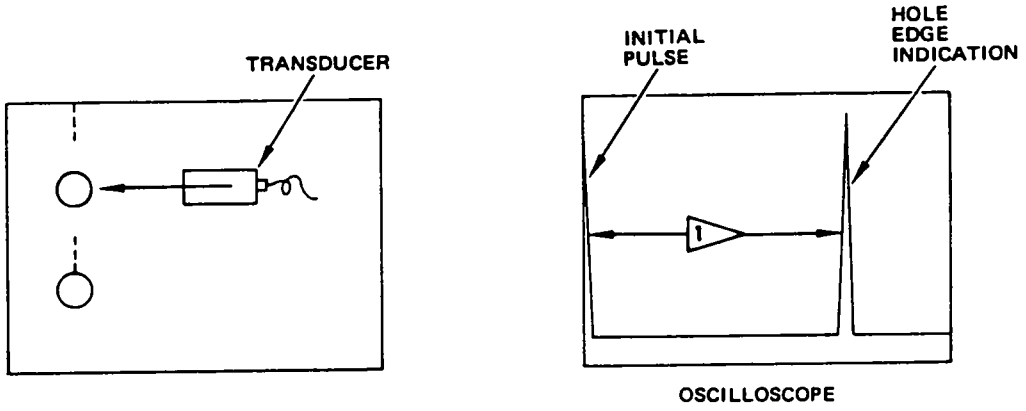


NOTES

1. APPROXIMATE SURFACE DISTANCE BETWEEN EDGE NOTCH AND SOUND ENTRY POINT FOR A 70° SHEAR WAVE.
2. DETERMINE REFERENCE DISTANCE BETWEEN LEADING EDGE OF TRANSDUCER CASE AND PLANE OF THE NOTCH.

TRANSDUCER TO NOTCH DISTANCE
DETAIL II

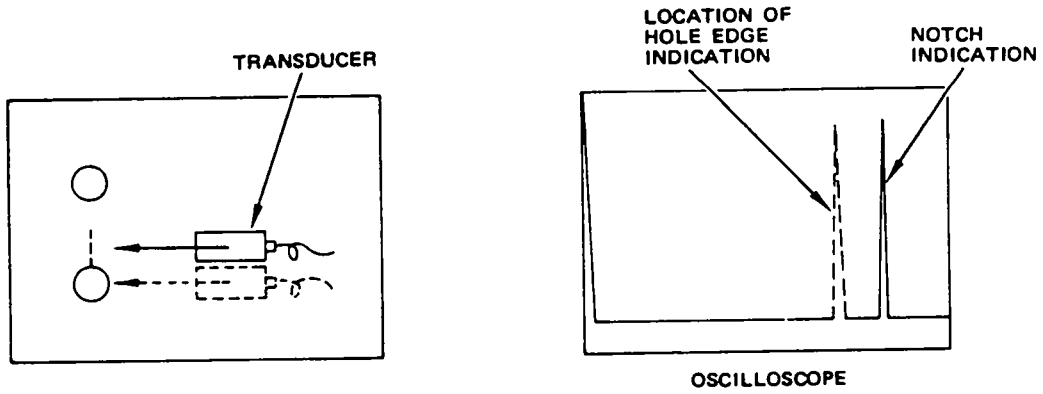
Upper Wing Skin At Beavertail
Figure 5 (Sheet 5)



NOTES

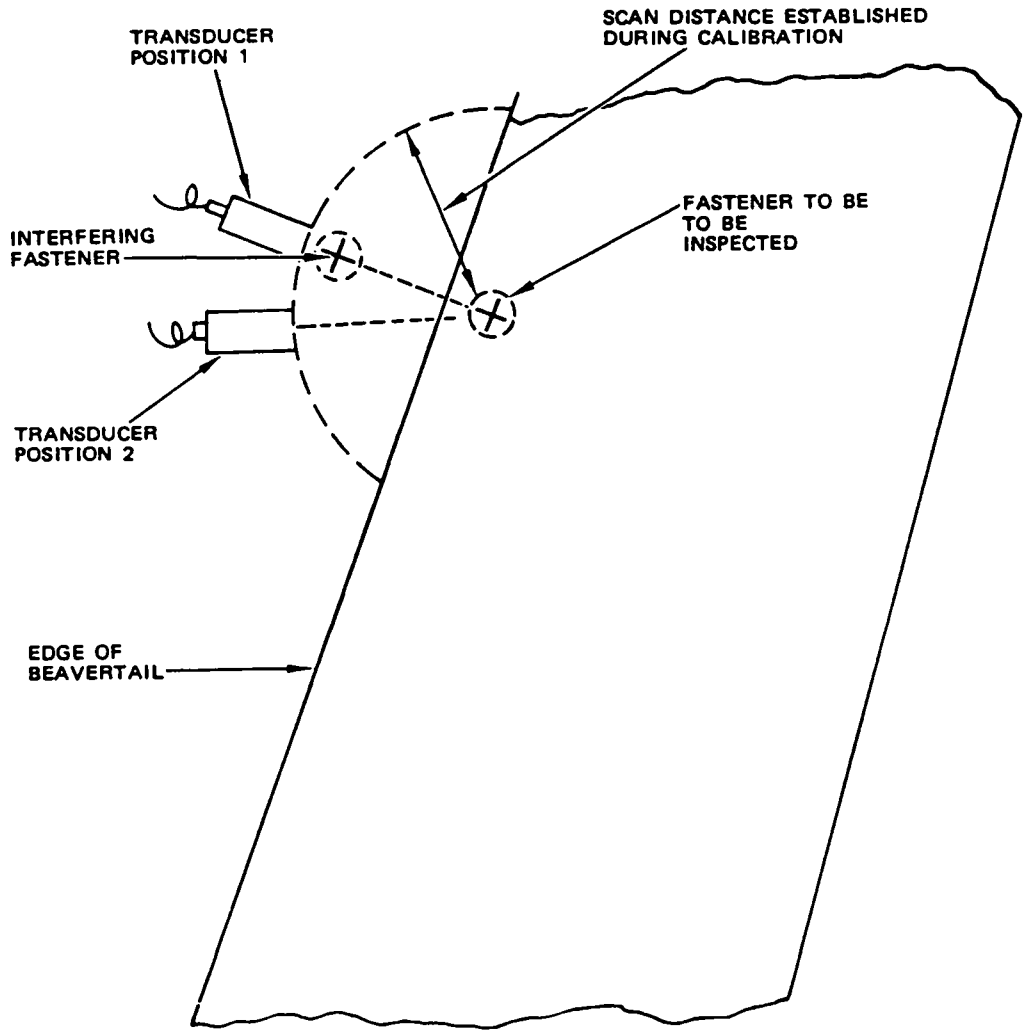
1 POSITION HOLE LOWER EDGE INDICATION APPROXIMATELY 3/4 OF SCREEN WIDTH FROM INITIAL PULSE.

OSCILLOSCOPE DISPLAY, UNNOTCHED HOLE
DETAIL III



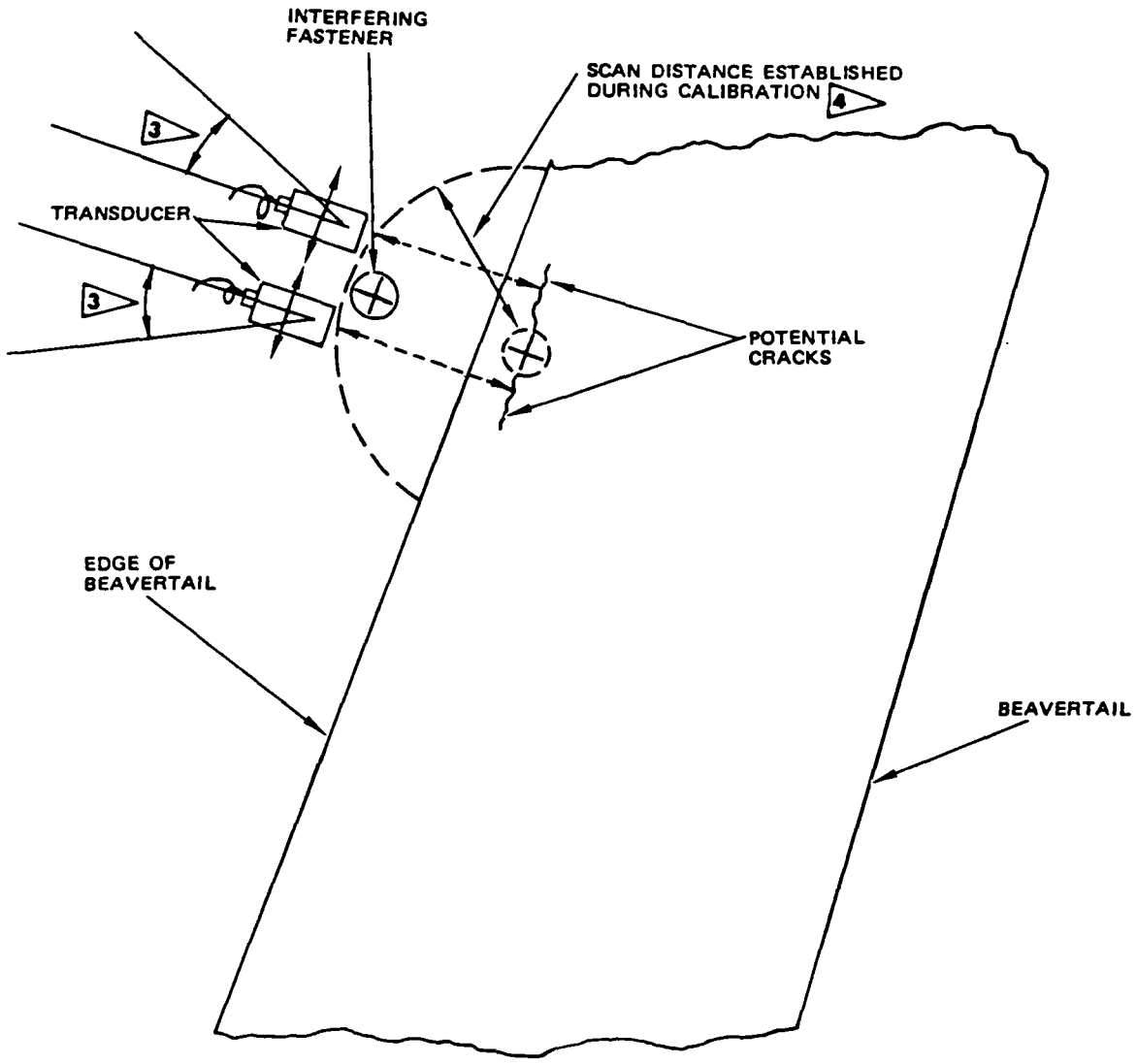
OSCILLOSCOPE DISPLAY, HOLE NOTCH
DETAIL IV

Upper Wing Skin At Beavertail
Figure 5 (Sheet 6)



INSPECTION PROCESS
DETAIL V

Upper Wing Skin At Beavertail
Figure 5 (Sheet 7)



NOTES

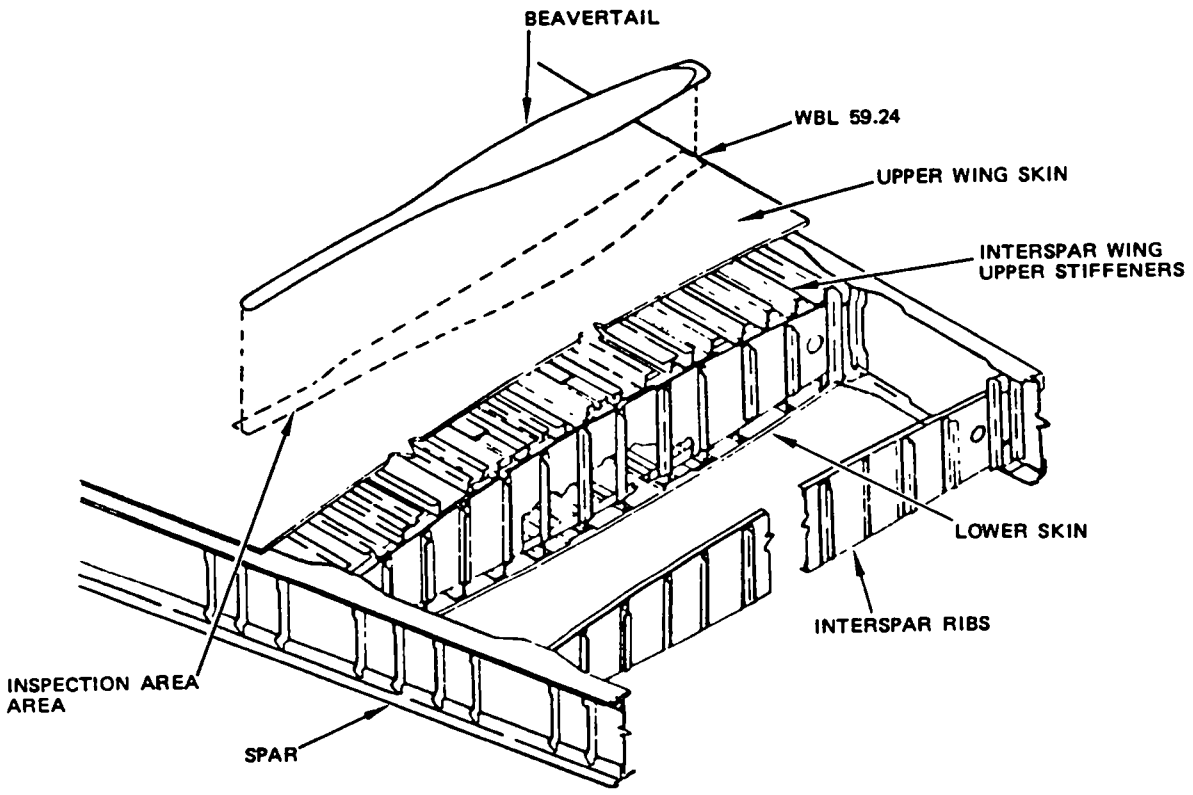
3 ROTATE TRANSDUCER TO OBTAIN SIGNALS FROM THE FASTENER HOLE AND POTENTIAL CRACKS

4 FASTENER HOLE RESPONSE MAY BE IMPROVED BY MOVING THE TRANSDUCER CLOSER TO OR FARTHER FROM THE FASTENER THAN THE ESTABLISHED SCAN DISTANCE.

INSPECTION PROCESS

DETAIL VI

Upper Wing Skin At Beavertail
Figure 5 (Sheet 8)

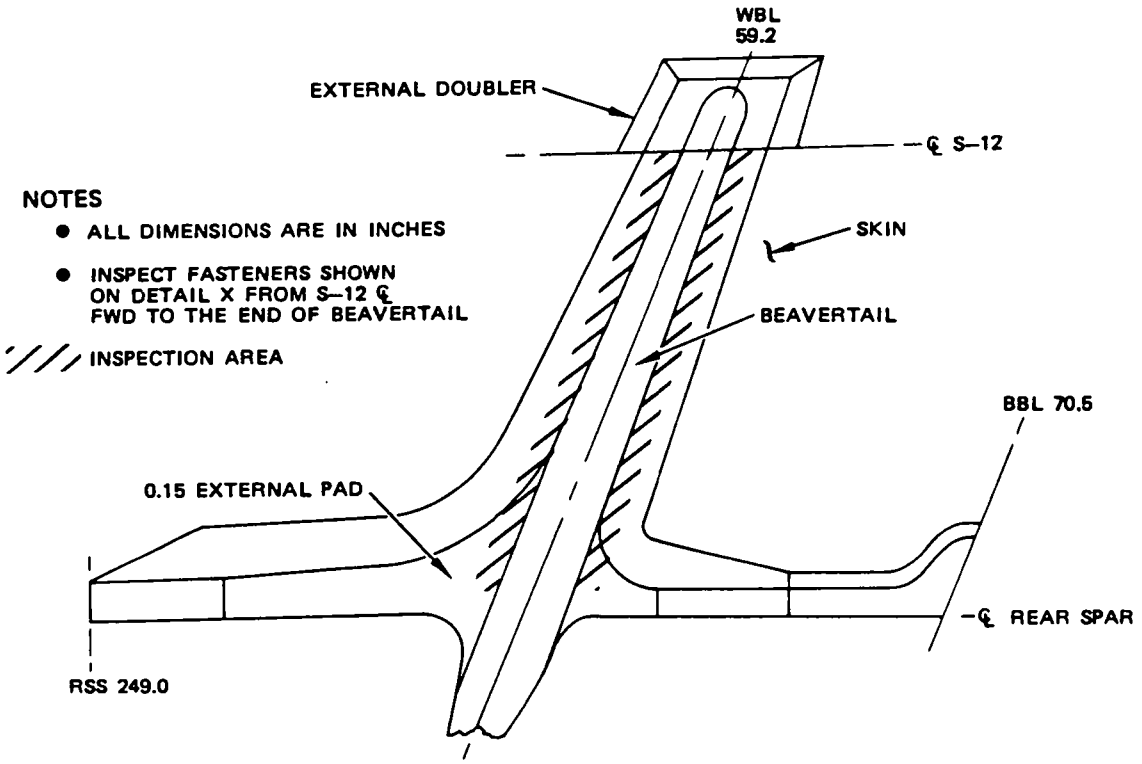


NOTE

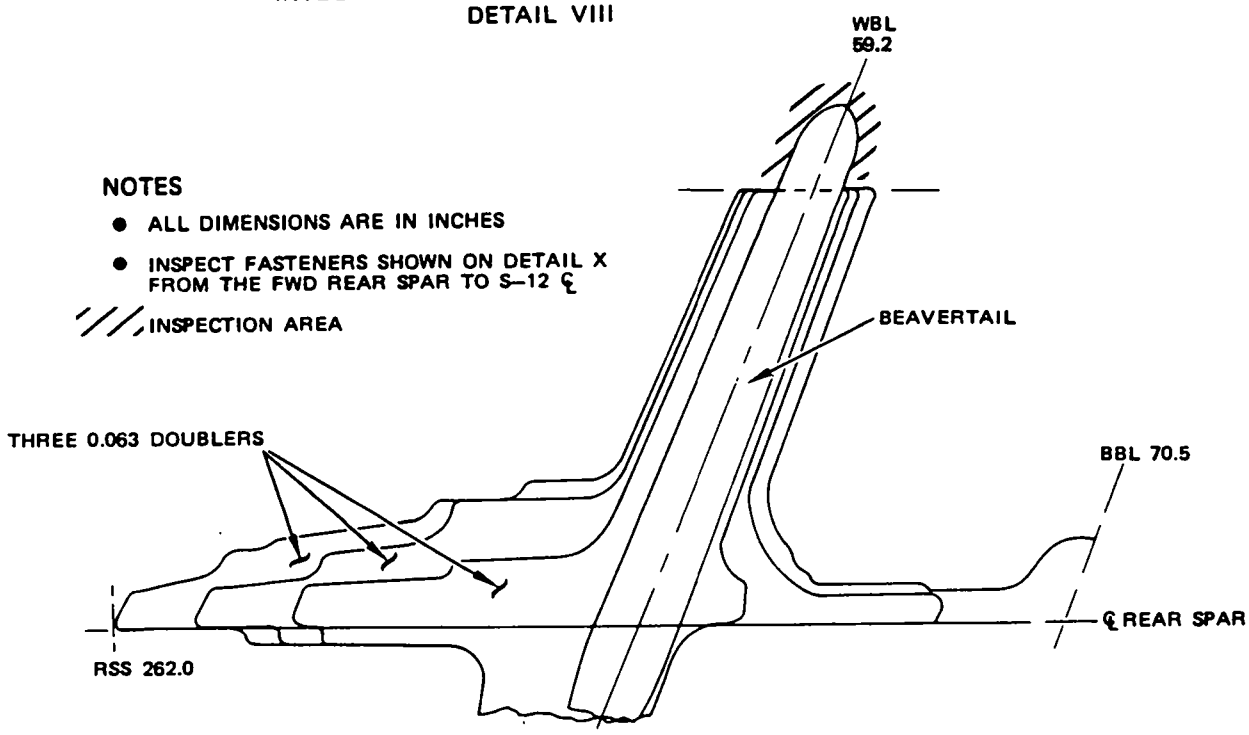
- INSPECT ALL FASTENERS SHOWN ON DETAIL X FROM THE FORWARD REAR SPAR TO FORWARD END OF THE BEAVERTAIL.

ORIGINAL CONFIGURATION INSPECTION
DETAIL VII

Upper Wing Skin At Beavertail
Figure 5 (Sheet 9)

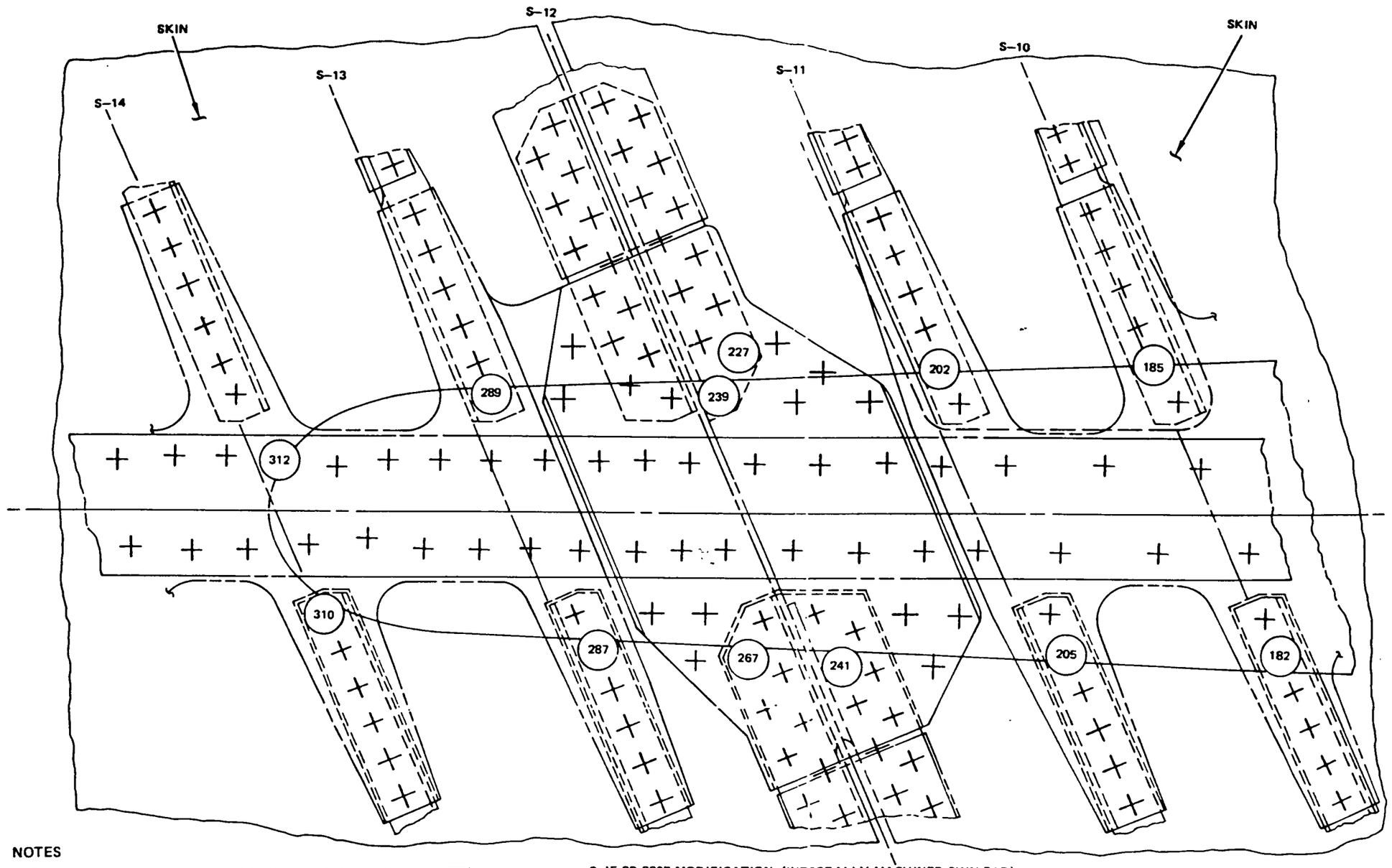


INTEGRAL MACHINED PAD CONFIGURATION
DETAIL VIII



THREE EXTERNAL DOUBLERS CONFIGURATION
DETAIL IX

Upper Wing Skin At Beavertail
Figure 5 (Sheet 10)

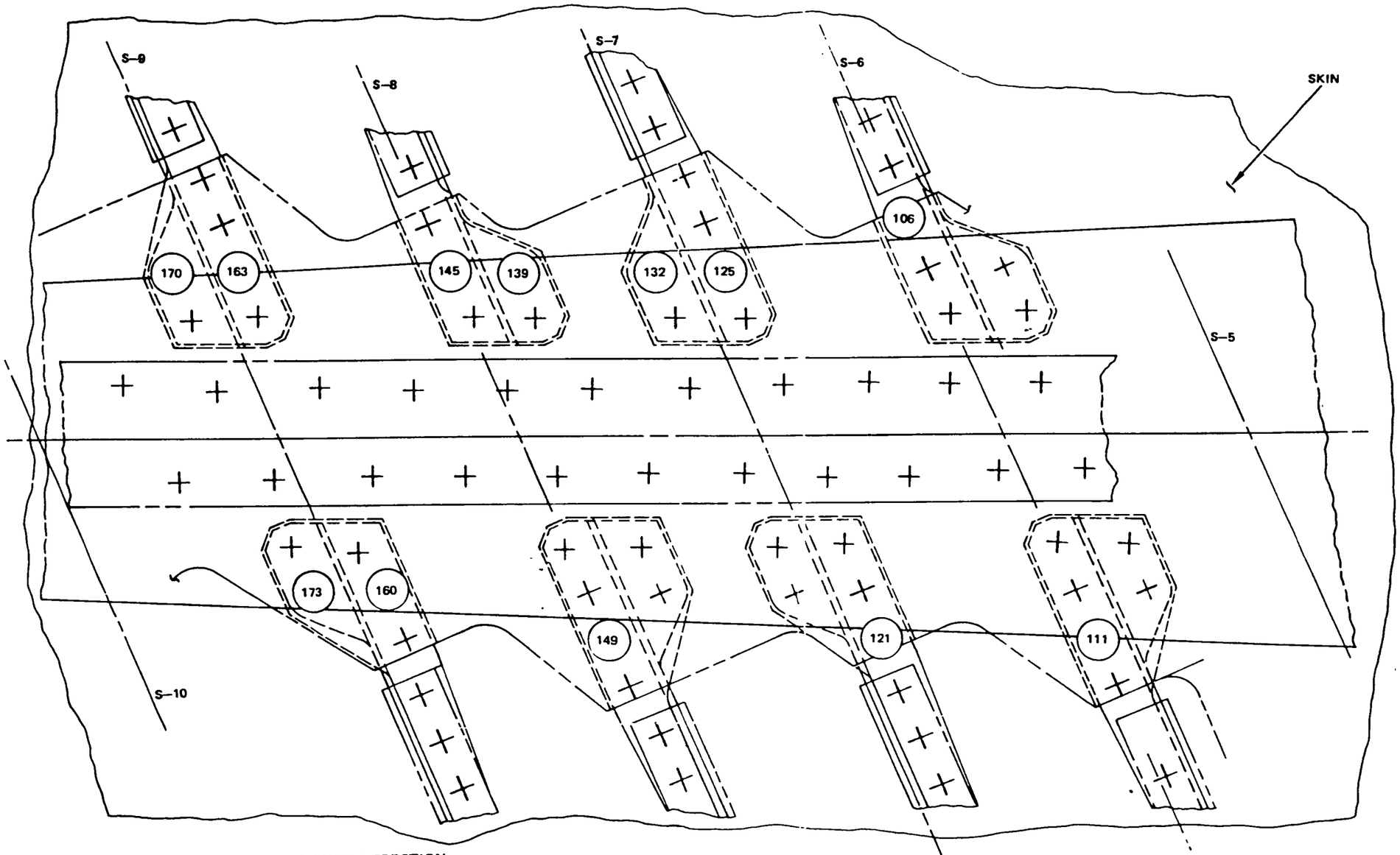


NOTES

- IF SB 2607 MODIFICATION (ADDITION OF THREE 0.063 DOUBLERS FROM REAR SPAR TO S-12 ℄ HAS BEEN ACCOMPLISHED, INSPECT ONLY THOSE FASTENERS FORWARD OF S-12 ℄. SEE DETAIL IX.
- IF SB 2607 MODIFICATION (INTEGRALLY MACHINED SKIN PAD) HAS BEEN ACCOMPLISHED, FASTENERS FORWARD OF S-12 ℄ ARE COVERED BY AN EXTERNAL DOUBLER, INSPECT ONLY THOSE FASTENERS AFT OF S-12. SEE DETAIL VIII.

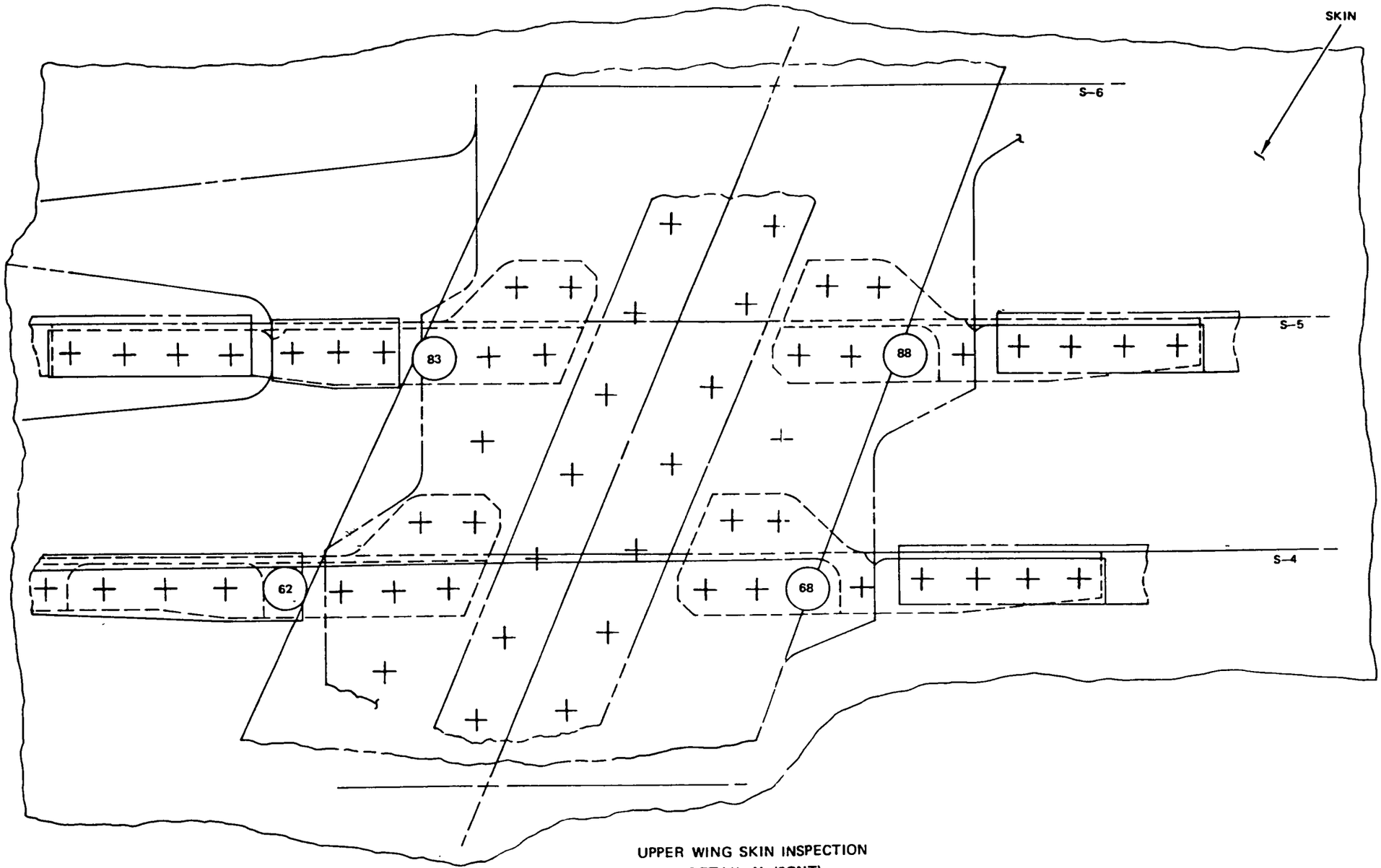
UPPER WING SKIN INSPECTION
DETAIL X

Upper Wing Skin At Beavertail
Figure 5 (Sheet 11)



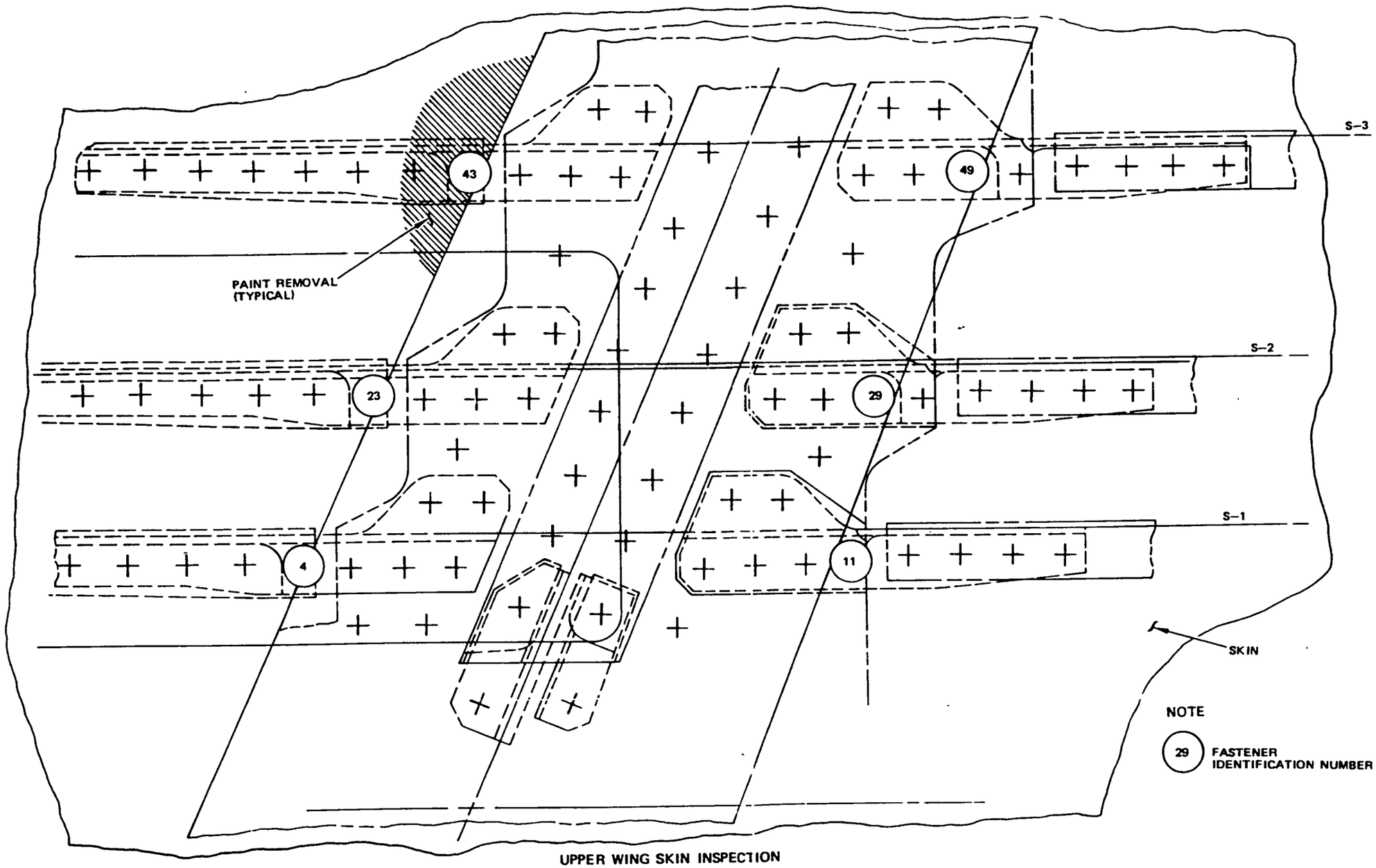
UPPER WING SKIN INSPECTION
DETAIL X (CONT)

Upper Wing Skin At Beavertail
Figure 5 (Sheet 12)



UPPER WING SKIN INSPECTION
DETAIL X (CONT)

Upper Wing Skin At Beavertail
Figure 5 (Sheet 13)



UPPER WING SKIN INSPECTION
DETAIL X (CONT)

Upper Wing Skin At Beavertail
Figure 5 (Sheet 14)

PART 4 - ULTRASONIC

WINGS - MAIN FRAME

1. Purpose

   A. Detect cracks emanating from selected fastener holes in the upper wing skin adjacent to and under the beavertail. Two types of fastener holes are included:

      (1) Holes common to beavertail, wing skin, and rib chord.

      (2) Holes common to wing skin and stringer end.

      Fastener hole locations are shown in Detail VIII.

2. Equipment

   A. Any ultrasonic instrument which satisfies the requirement of this procedure can be used. The following equipment was used during the development of this procedure and found acceptable.

      (1) Instrument

         (a) Nortec NDT-131
         Nortec Corporation
         421 N. Quay
         Kennewick, WA. 99336

      (2) Transducer

         (a) Automation Industries, Type SMZ,
         5 MHZ, 0.25" element, 70° A, 57A3066

   B. Reference Standard

      (1) Fabricate reference standard per Detail I.

   C. Couplant

      (1) Light oil or grease

Upper Wing Skin at Beavertail
Figure 6 (Sheet 1)

3. Preparation for Inspection

A. This inspection can be performed from outside the wing with the part in place on the airplane.

B. Remove the fairing which covers the aft end of beavertail.

C. Remove paint in the inspection area (Detail VIII). Smooth out any surface roughness by sanding lightly.

D. Apply a thin film of couplant to the inspection surface.

4. Instrument Calibration

A. Calibration for inspection of the upper wing skin at fastener holes common to beavertail skin and rib chord between stringer S-9 and stringer S-14 (Detail VIII).

(1) Coat the reference standard with a thin film of couplant.

(2) Place the transducer on the reference standard with the leading edge of the transducer against the edge of the upper plate. Aim the sound beam at the unnotched hole, hole "A" (Detail II).

(3) Adjust instrument controls and move the transducer laterally to search for a signal from the hole edge.

(4) Position the hole edge signal approximately 3/4 of the total screen width away from the initial pulse (Detail III).

(5) Adjust the sensitivity control so that the amplitude of the hole edge signal is about 90% of the maximum height.

(6) Move the transducer to notched hole "B" and manipulate to obtain a signal from the notch. Note the difference in response position between the notch signal and hole edge signal (Detail III).

B. Calibration for inspection of upper wing skin fastener holes common to beavertail and rib chord between stringers S-7 and S-9 (Detail VIII).

(1) Calibrate by repeating par. (3) to (6) in par. 4.A., except keep the transducer's leading edge behind the scribe line on the standard and use unnotched hole "C" and notched hole "D" for references.

Upper Wing Skin at Beavertail
Figure 6 (Sheet 2)

C. Calibration for inspection of upper wing skin fastener holes common to skin and stringer ends between stringers S-1 and S-8 (Detail VIII).

(1) Remove the top plate of the reference standard.

(2) Place the transducer on the reference standard and aim the sound beam at the notch located at the edge of the standard (Details I and IV). Note the distance between the leading edge of the transducer case and the plane of the notch (Details I and IV).

(3) Position this signal approximately 3/4 of the total screen width away from the initial pulse.

(4) Move the transducer to the unnotched hole (A or C depending on the fastener size to be inspected) and obtain a signal from the hole lower edge. The distance between the leading edge of the transducer case and the hole edge should be approximately the same as the distance noted in par. 4.C.(2).

(5) Move the transducer to the notched hole (B or D) and obtain a signal from the hole's lower edge. Move the transducer to detect the notch indication.

(6) Note the different in signal response position between the notch indication and hole edge indication.

5. Inspection Procedure

A. Inspection of fastener holes in the upper wing skin which are common to beavertail, skin and rib chord between stringers S-9 and S-14 (Detail VIII). Instrument calibrated according to par. 4.A.

(1) Inspection is accomplished by sliding the transducer along the edge of the beavertail while directing the sound beam toward and forward and aft of the designated fastener holes. See Detail V for a description of transducer positioning and scanning.

NOTE: Higher instrument sensitivity may be required on the airplane due to greater sound loss at the interface between skin and beavertail. Readjust sensitivity control, if necessary, so that the signal from the hole edge is approximately 90% of full scale.

Wing skin tapers linearly from 0.46-inch at rear spar to 0.26-inch at stringer S-17. No change in instrument setting is required as a result of the change in skin thickness.

Upper Wing Skin at Beavertail
Figure 6 (Sheet 3)

(2) Any ultrasonic indication which is 50% or more of full signal height and which occurs between fastener holes or approximately at the same location on the screen as the notch in the standard is a potential crack. Further investigation is needed.

B. Inspection of fastener holes in the upper wing skin common to beavertail, skin, and rib chord between stringers S-7 and S-8 (Detail VIII). Instrument calibrated according to par. 4.B.

(1) Repeat par. (1) and (2) in par. 5.A., except start at the outboard side of stringer S-6.

NOTE: The distance between hole edge and the edge of the beavertail varies from hole to hole. The fastener hole on the outboard side of stringer S-7 has the longest distance.

C. Inspection of upper wing skin fastener holes common to stringer end (Detail VIII). Instrument calibrated according to par. 4.C.

(1) Determine the location of the fastener holes to be inspected using Detail VIII. Select a hole and place the leading edge of the transducer the same distance from the fastener hole edge that was established in par. 4.C. (Detail VI, Position 1).

(2) Manipulate the transducer to obtain a signal from the hole lower edge. If another fastener blocks the sound beam, move the transducer to either side of the interfering fastener and manipulate to obtain a signal from the fastener hole being inspected (Detail VI, Position 2).

NOTE: Higher instrument sensitivity may be needed to compensate for the signal loss due to the tight interface between the skin and beavertail. Readjust the instrument sensitivity to obtain a 90% signal height from the hole being inspected.

(3) Move the transducer laterally and manipulate to inspect the vicinity of the fastener hole for cracks (Detail VII).

(4) Any signal from the inspection area which is 50% or more of screen height and which is not identified as a hole edge response should be considered a crack and investigated further.

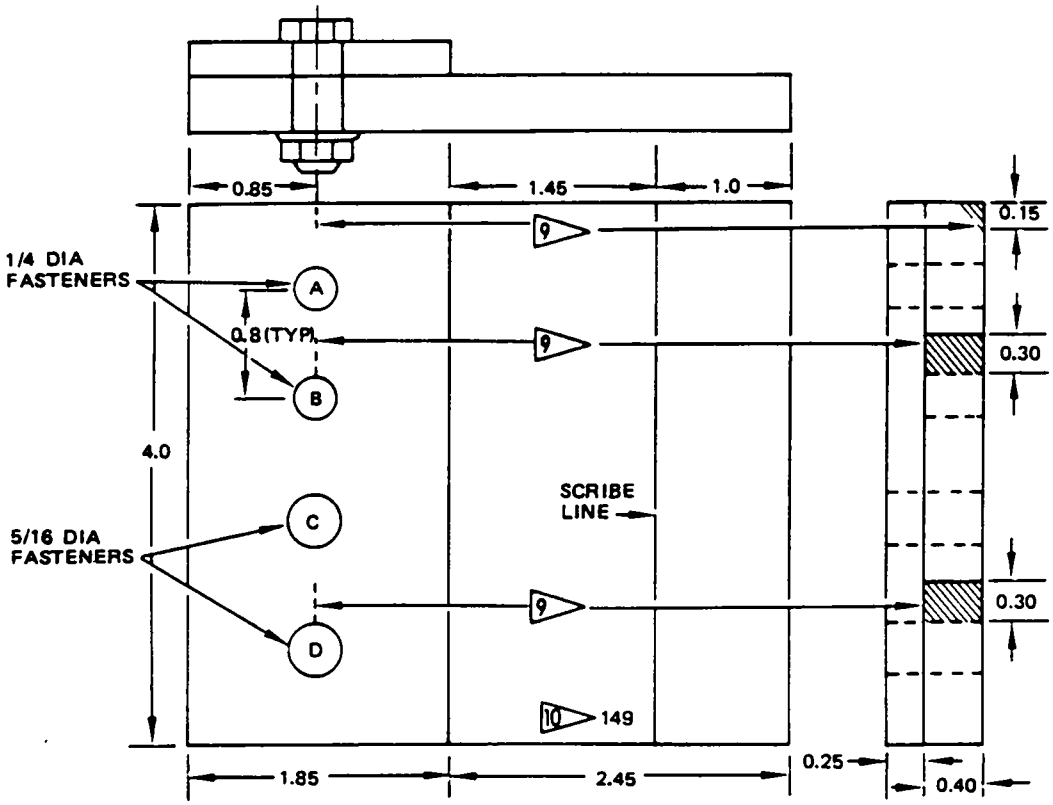
Upper Wing Skin at Beavertail
Figure 6 (Sheet 4)

D. The following responses are potential crack indications:

(1) A signal on the oscilloscope which occurs a short distance to the left of the response from the hole edge--compare with the oscilloscope response pattern obtained from the notched hole in the standard.

(2) A signal which occurs approximately at the same location but slightly to the side of the hole response, or, a response from a hole edge occurring over a wider range of transducer lateral movement than that experienced from the reference standard hole or known good hole in similar structure on the airplane.

Upper Wing Skin at Beavertail
Figure 6 (Sheet 5)



NOTES

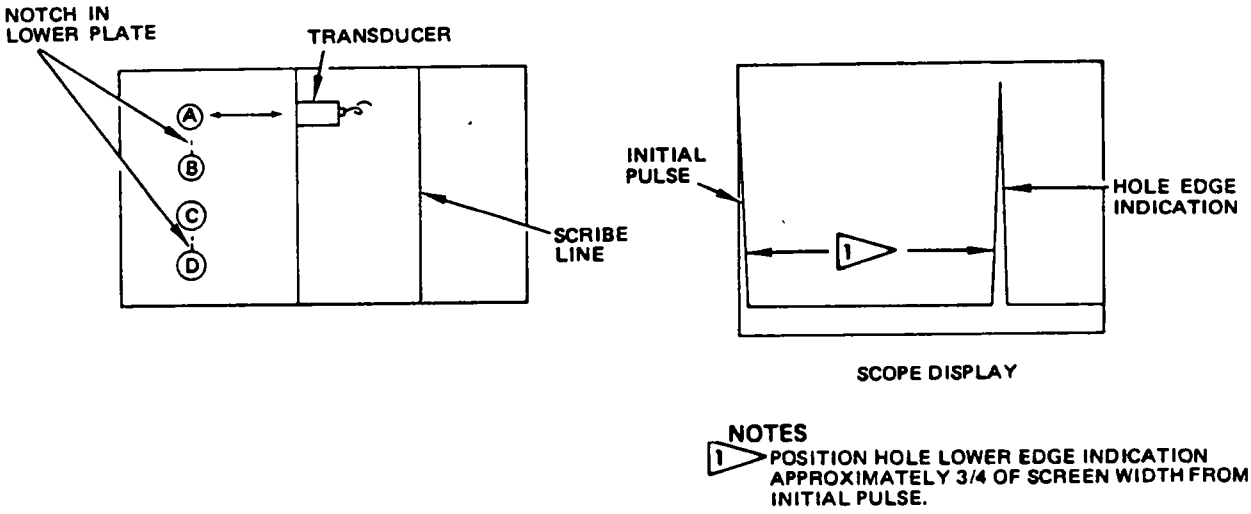
- ALL DIMENSIONS ARE IN INCHES
- MATERIAL: 2024–T4, 7075–T6, ALUMINUM
- TOLERANCE: X.X ± 0.05, X.XX ± 0.02
- P/N 6411–45 AVAILABLE FROM IDEAL SPECIALTY CO.

9 JEWELER'S SAWCUT 0.030 MAX WIDTH IN LOWER PLATE

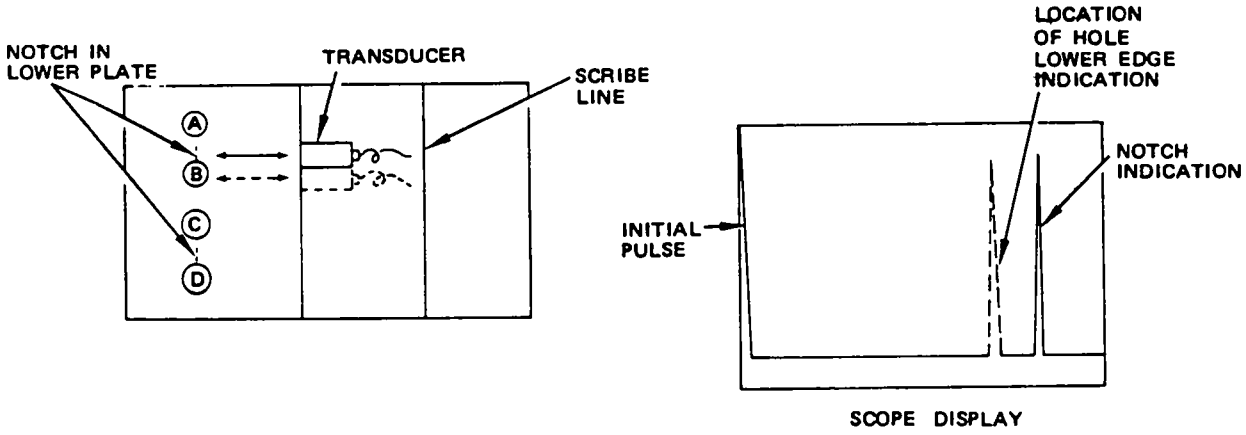
10 ETCH OR STEEL STAMP WITH 149

REFERENCE STANDARD
DETAIL I

Upper Wing Skin at Beavertail
Figure 6 (Sheet 6)

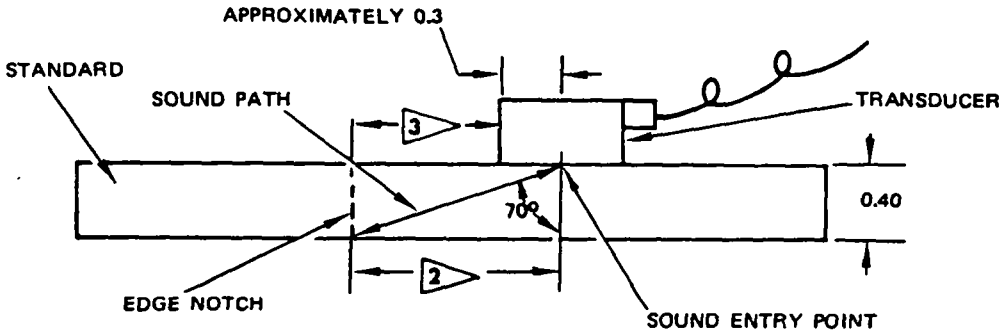


OSCILLOSCOPE DISPLAY, UNNOTCHED HOLE
DETAIL II



OSCILLOSCOPE DISPLAY, NOTCHED HOLD
DETAIL III

Upper Wing Skin at Beavertail
Figure 6 (Sheet 7)



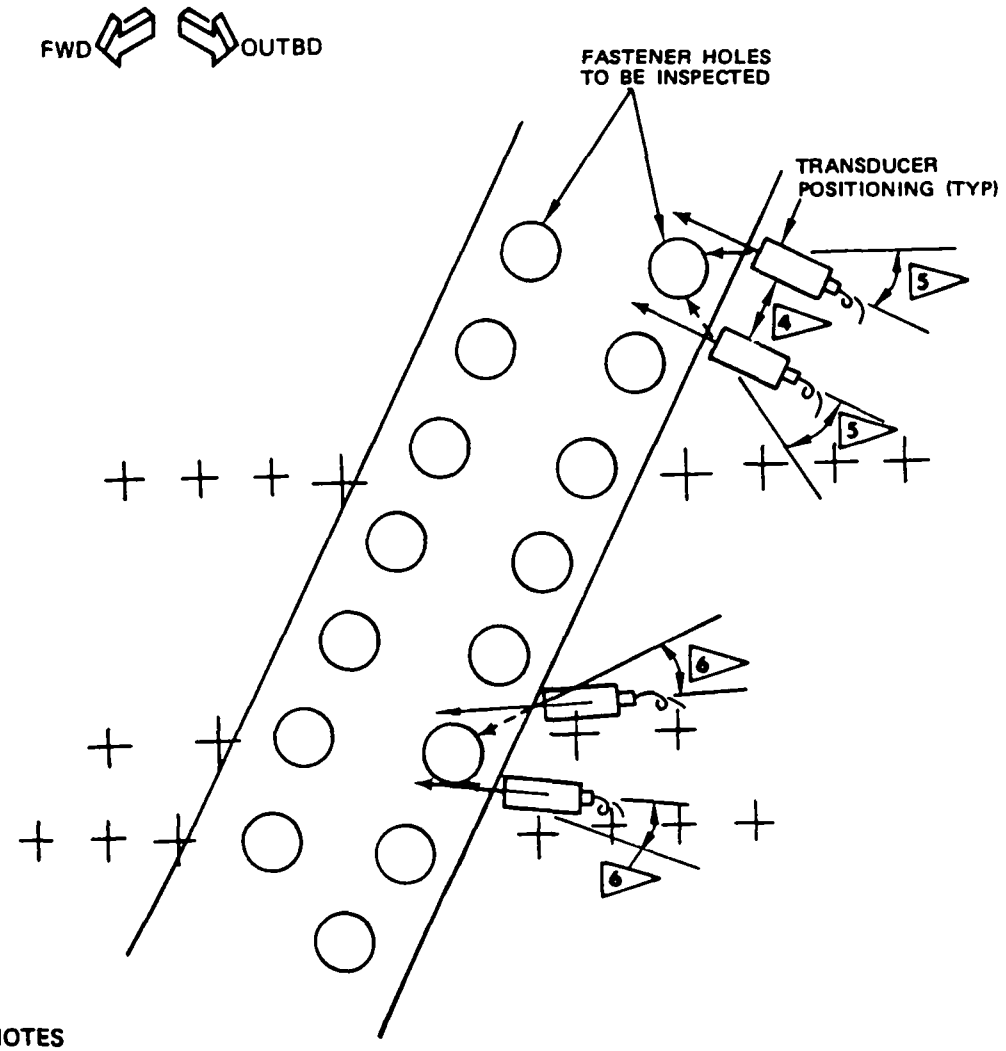
NOTES

2 APPROXIMATE SURFACE DISTANCE BETWEEN EDGE NOTCH AND SOUND ENTRY POINT FOR A 70° SHEAR WAVE.

3 DETERMINE REFERENCE DISTANCE BETWEEN LEADING EDGE OF TRANSDUCER CASE AND PLANE OF NOTCH

TRANSDUCER TO NOTCH DISTANCE
DETAIL IV

Upper Wing Skin at Beavertail
Figure 6 (Sheet 8)



NOTES

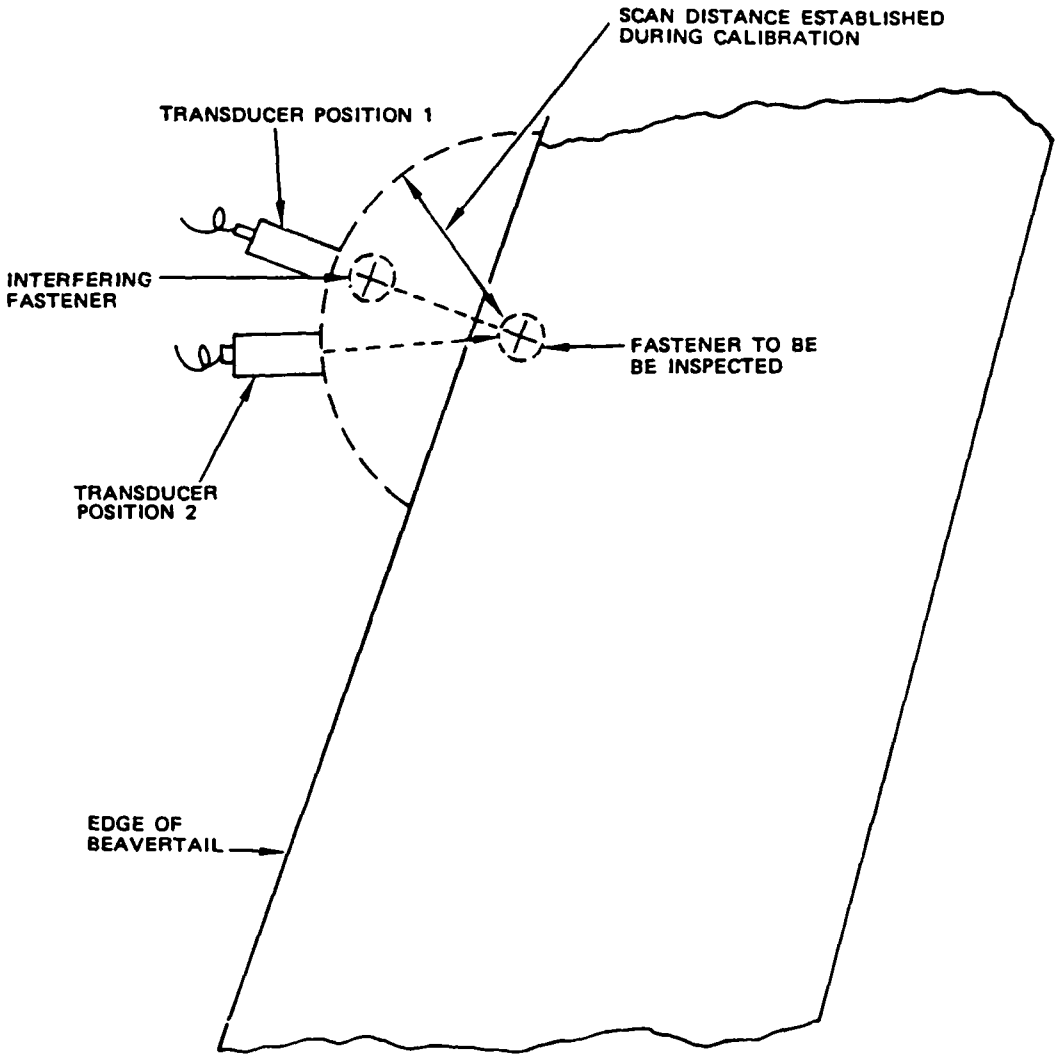
4 SCAN TRANSDUCER ALONG EDGE OF BEAVERTAIL PAST THE FASTENER BEING INSPECTED

5 AT THE FWD AND AFT SIDE OF THE FASTENER HOLE ROTATE TRANSDUCER TO DIRECT THE SOUND BEAM TOWARD AND PAST THE SIDE OF THE FASTENER HOLE

6 WHEN INTERFERING FASTENER IS PRESENT, POSITION TRANSDUCER TO DIRECT SOUND TO THE FWD AND AFT SIDE OF THE FASTENER HOLE. ROTATE TRANSDUCER TO DIRECT SOUND TOWARD AND PAST THE SIDE OF THE FASTENER HOLE

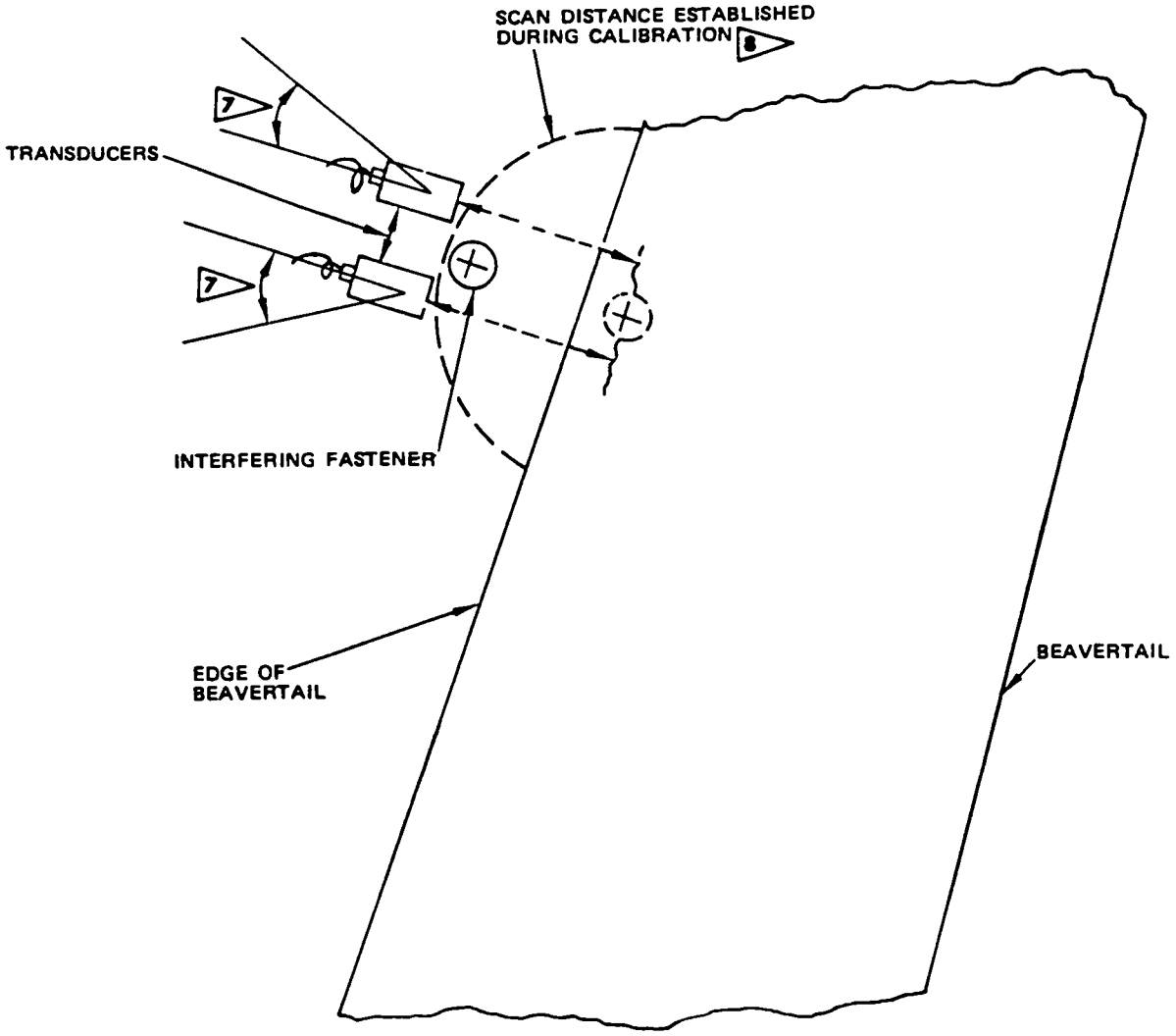
TRANSDUCER POSITIONING AND SCANNING
DETAIL V

Upper Wing Skin at Beavertail
Figure 6 (Sheet 9)



INSPECTION PROCESS
DETAIL VI

Upper Wing Skin at Beavertail
Figure 6 (Sheet 10)



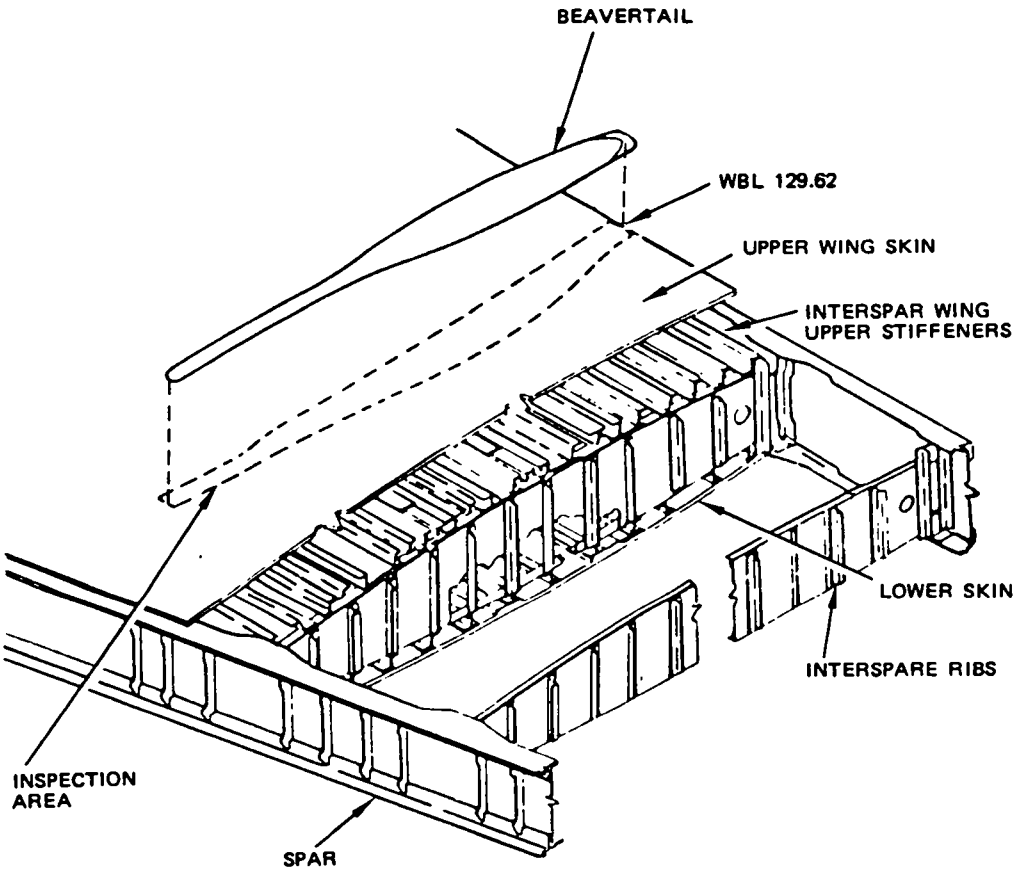
NOTES

7 ROTATE TRANSDUCER TO OBTAIN SIGNALS FROM THE FASTENER HOLE AND POTENTIAL CRACKS

8 FASTENER HOLE RESPONSE MAY BE IMPROVED BY MOVING THE TRANSDUCER CLOSER TO OR FARTHER FROM THE FASTENER THAN THE ESTABLISHED SCAN DISTANCE.

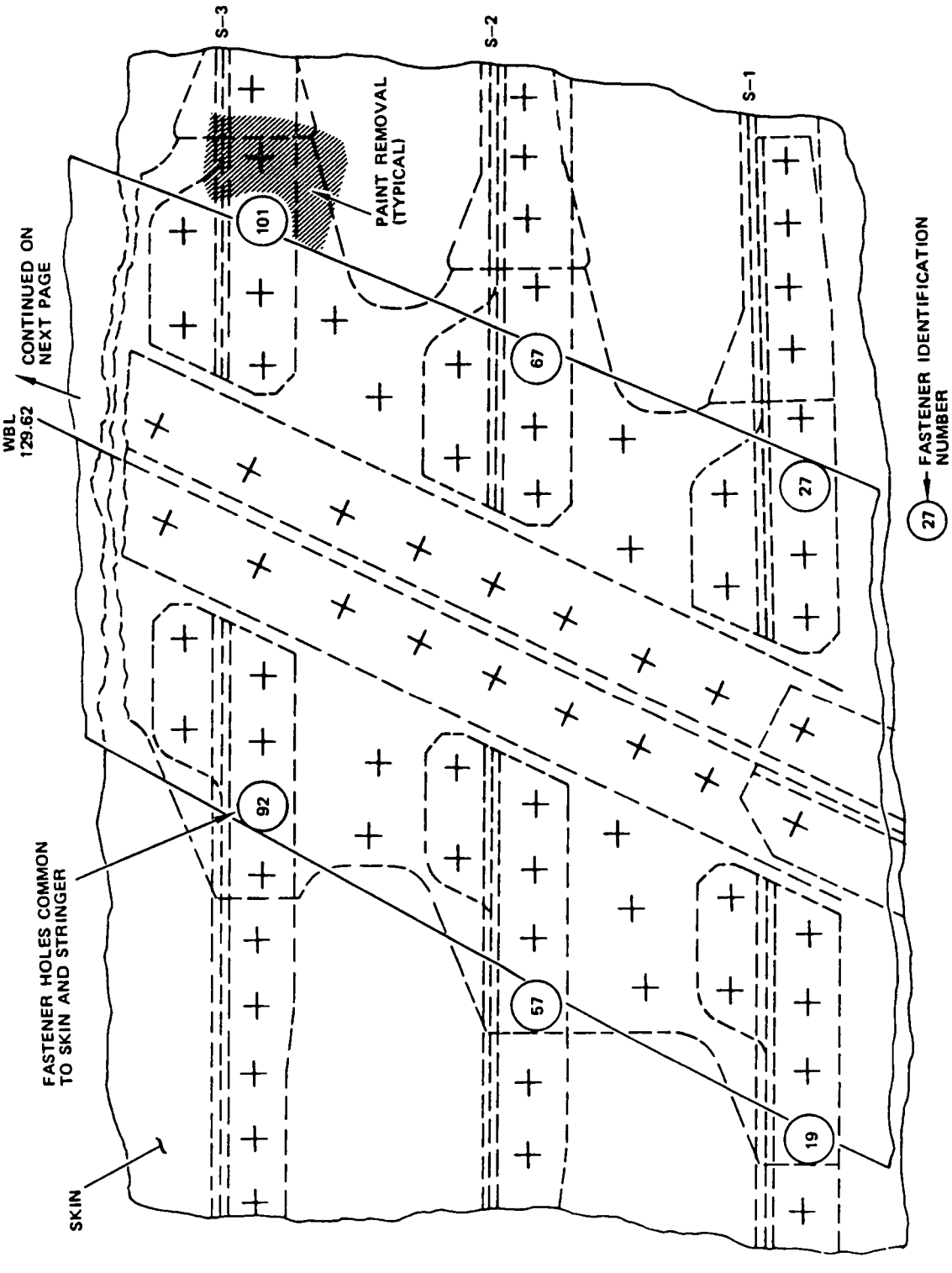
INSPECTION PROCESS
DETAIL VII

Upper Wing Skin at Beavertail
Figure 6 (Sheet 11)

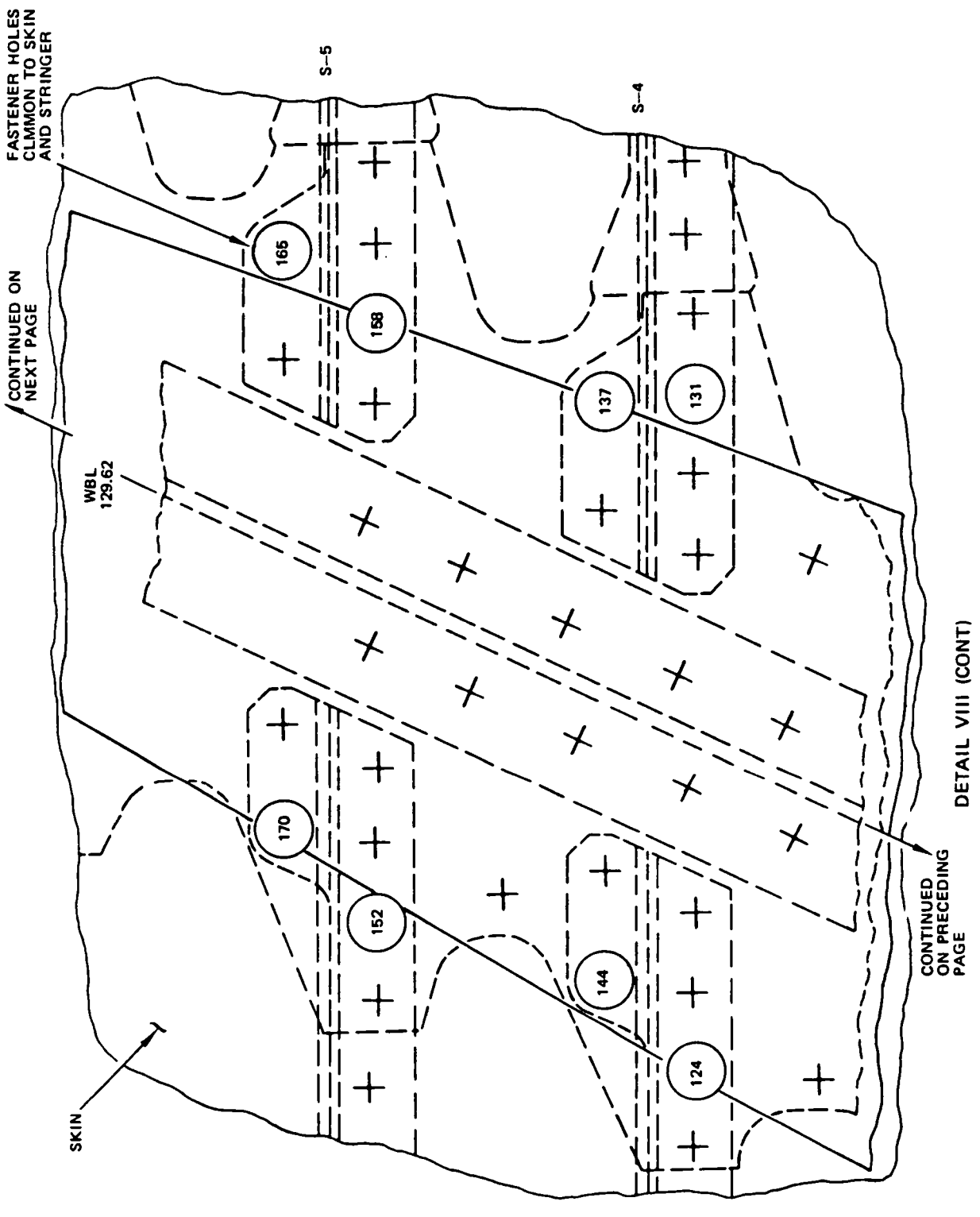


DETAIL VIII

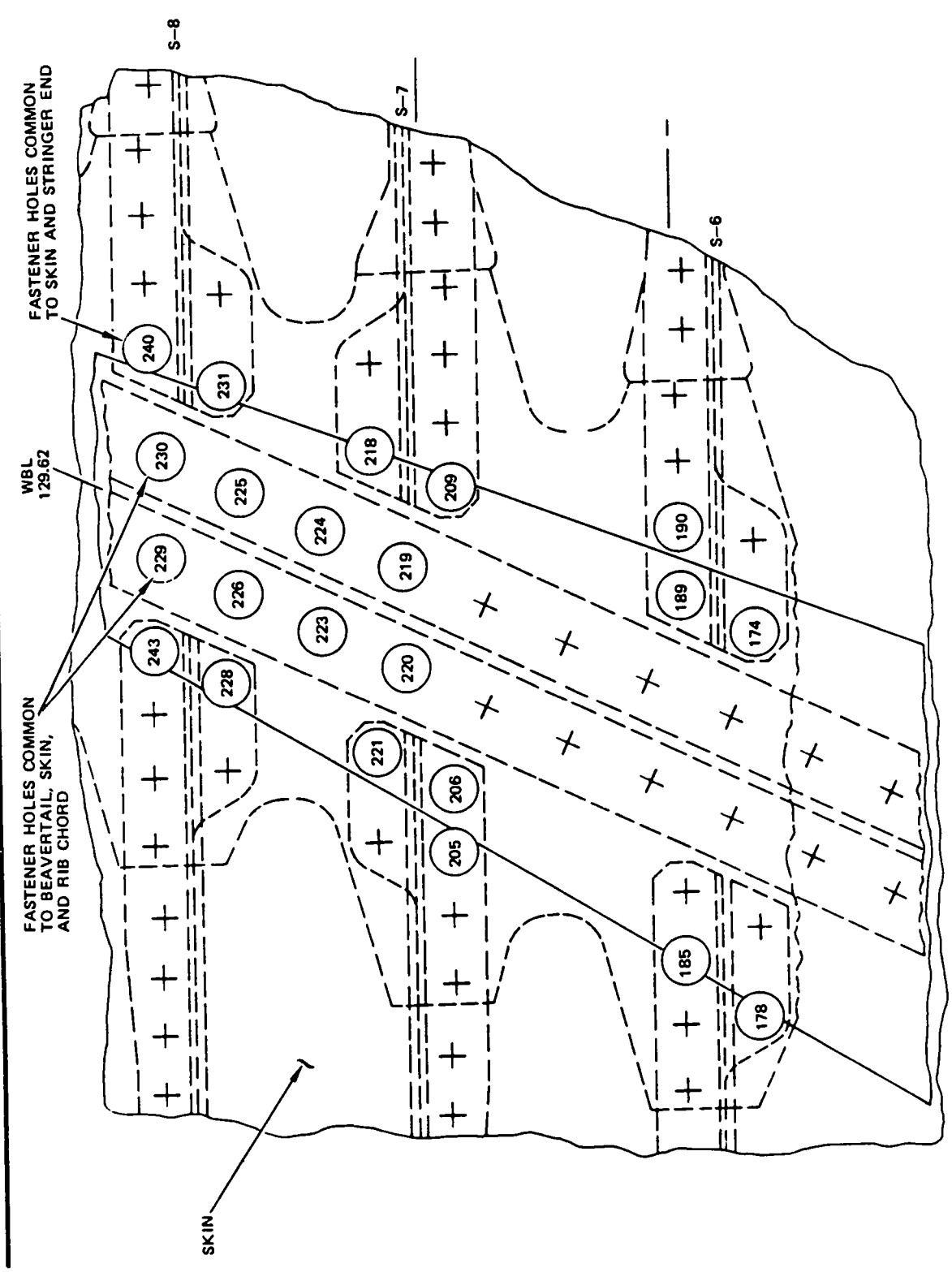
Upper Wing Skin at Beavertail
Figure 6 (Sheet 12)



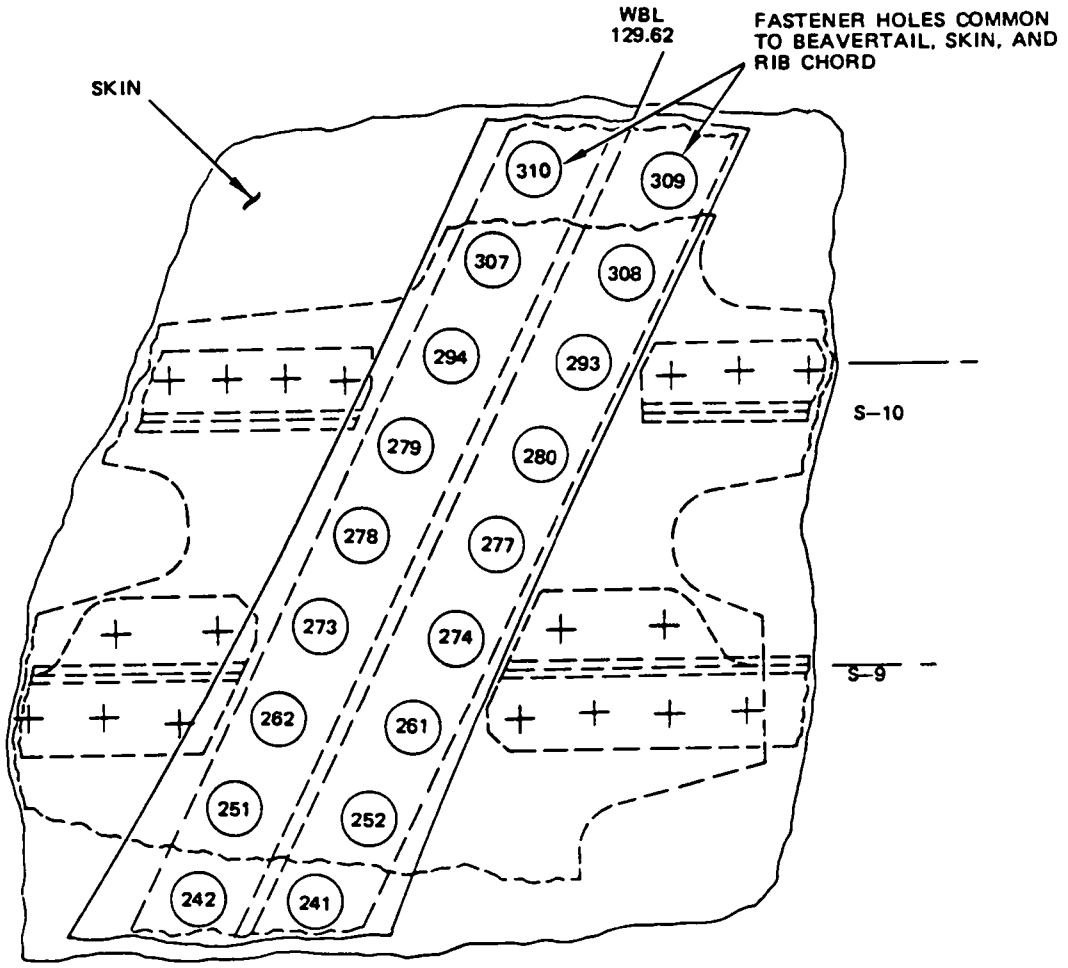
Upper Wing Skin at Beavertail
Figure 6 (Sheet 13)



Upper Wing Skin at Beavertail
Figure 6 (Sheet 14)

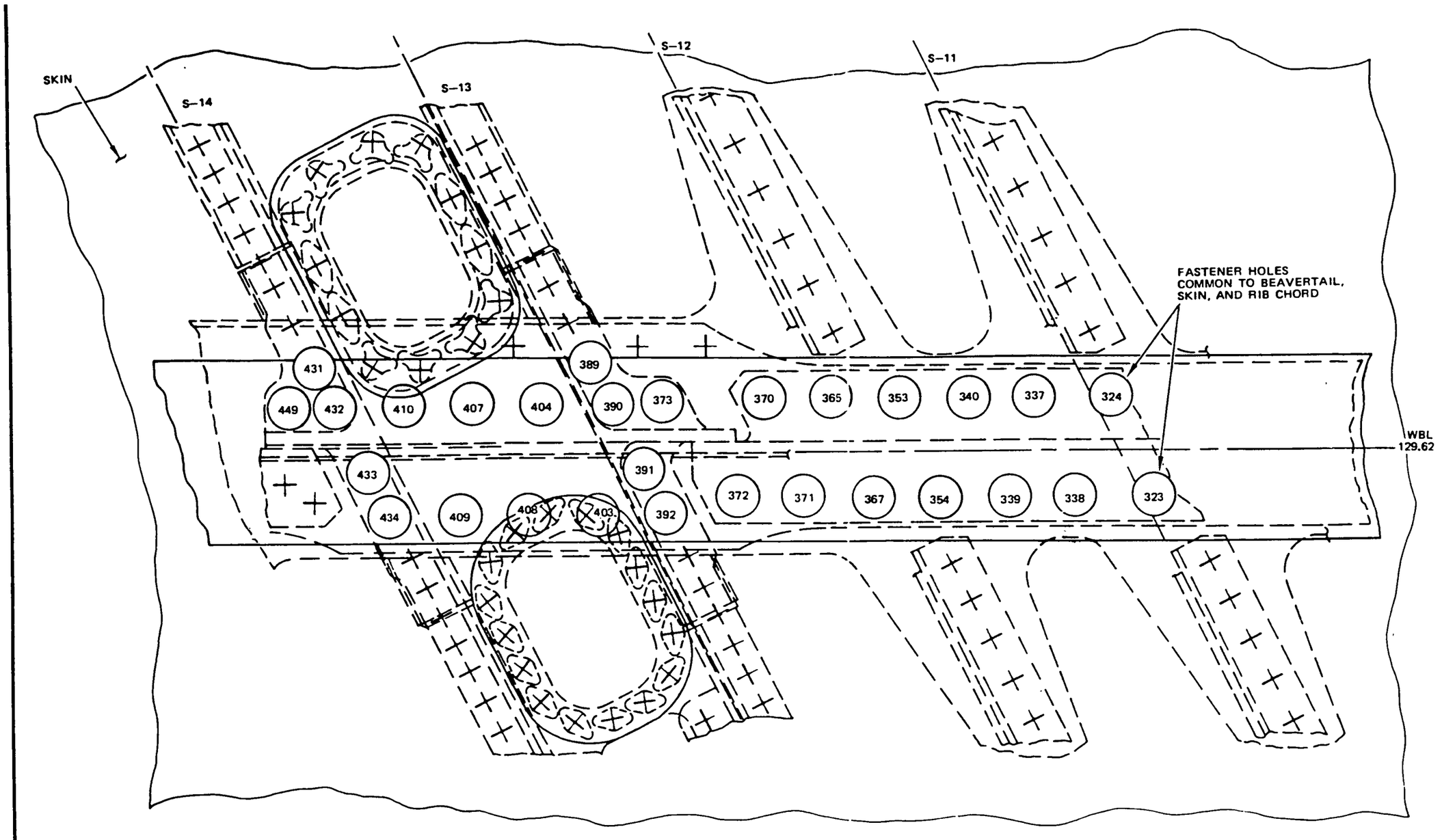


Upper Wing Skin at Beavertail
Figure 6 (Sheet 15)



DETAIL VIII (CONT)

Upper Wing Skin at Beavertail
Figure 6 (Sheet 16)



DETAIL VIII (CONT)

Upper Wing Skin at Beavertail
Figure 6 (Sheet 17)

PART 4 - ULTRASONIC

WINGS - SKIN

1. Purpose

   A. Detect cracks emanating from selected fastener holes in lower wing skin wholly or partially covered by beavertail (WBL 129.62). These fasteners are located near the periphery of the beavertail and are common to the lower wing skin and stringer end (See Detail IV).

2. Equipment

   A. Any ultrasonic instrument and shear wave transducer which satisfies the requirements of this procedure may be used. The following equipment was used during the development of this procedure and found acceptable.

      (1) Instrument - Nortec NDT-131, Nortec Corporation, 421 N. Quay, Kennewick, WA. 99336.

      (2) Transducer - Automation Industries, Type SMZ, 5 MHZ, 0.25 element, 70° A, 57A3066.

   B. Reference Standard

      (1) Fabricate three reference standards per Detail I.

   C. Couplant

      (1) Oil or light grease.

3. Preparation for Inspection

   A. This inspection can be performed from outside the wing and with the part in place on the airplane.

   B. Remove loose paint and smooth out surface roughness by sanding. Total paint removal may be necessary to improve sound transmission. See Detail IV for inspection locations.

   C. Wipe surface clean.

   D. Apply a thin film of couplant to the inspection area.

Lower Wing Skin at Beavertail
707-100/200 Airplanes
Figure 7 (Sheet 1)

4. Instrument Calibration

A. General

(1) Instrument calibrations for inspection codes A, B and C, are required to adjust for variations in structure geometry.

(2) Detail IV identifies the coverage for each of the three inspection codes.

B. Calibration for fasteners with inspection codes A, B, or C.

(1) Select the reference standard which has the same inspection code as the fasteners to be inspected and apply couplant. (See Detail II).

(2) Place the transducer on the surface to detect a signal from the unnotched hole, Detail II.

(3) Move the transducer toward and away from the hole and note the transducer-to-hole distances for maximum side-of-hole signal amplitude. Position this signal at approximately midscale on the oscilloscope.

(4) Set initial instrument sensitivity to obtain a full scale signal from the side of the hole.

(5) Move the transducer laterally and note the extent of lateral movement through which the hole signal is present on the oscilloscope, Detail II.

(6) Repeat (2), (3) and (5) on the notched hole and note the following differences in response between a notched hole indication and an unnotched hole indication. These differences are a part of crack identification.

(a) As the transducer is moved laterally on the notch side of the hole, the notch signal will appear on the oscilloscope just to the right of the hole signal as in Detail II.

NOTE: The displacement of the signal between hole edge and notch is smallest and most difficult to observe on small diameter holes, becoming more apparent as the hole diameters increase.

(b) When compared with the unnotched hole, the signal from the combined hole and notch occurs over a wider lateral movement of the transducer.

Lower Wing Skin at Beavertail
707-100/200 Airplanes
Figure 7 (Sheet 2)

5. Inspection Procedure

A. Place the transducer on the inspection area and obtain a side-of-hole signal from the hole being inspected.

B. Approximate the transducer-to-hole distance established in par. 4.B.(3).

NOTE: Where other fasteners block the sound beam, vary the distance and manipulate per Detail III.

Increased instrument sensitivity may be needed to compensate for signal loss due to sealant or a tight interface between the skin and beavertail. Readjust the instrument sensitivity to obtain a 90% signal height from the hole being inspected. Paint removal may help to gain higher sensitivity.

C. Move the transducer laterally and manipulate to inspect the vicinity of the fastener hole for cracks.

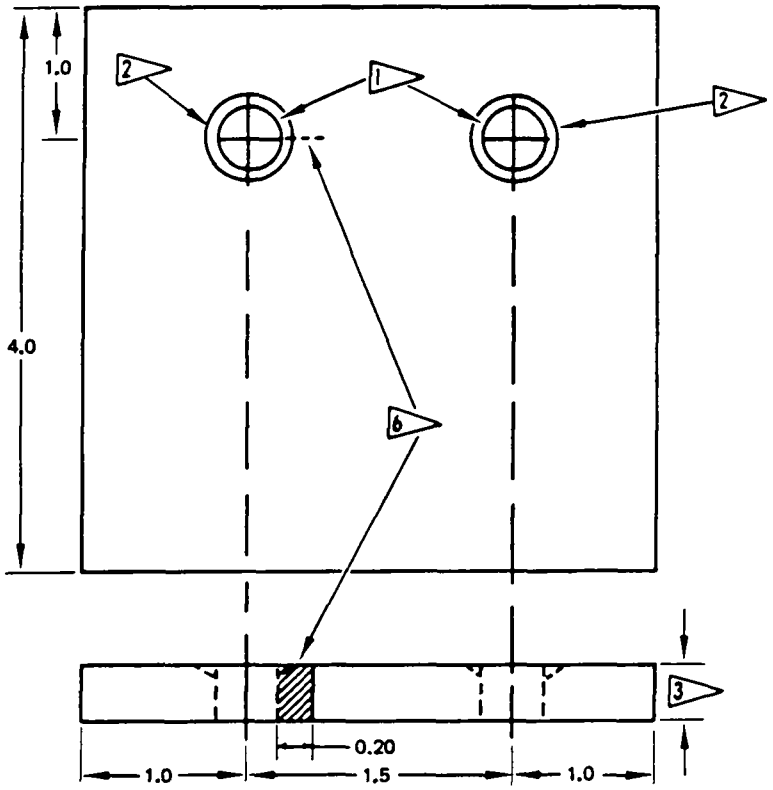
D. Any signal from the inspection area which is 50% or more of screen height and which is not identified as a side-of-hole response should be considered a crack and investigated further.

E. The following responses are potential crack indications:

(1) A signal on the oscilloscope which occurs a short distance to the right of the response from the side-of-hole. Compare with the oscilloscope response pattern obtained from the notched hole in the standard.

(2) A signal which occurs approximately at the same location but slightly to the side of the hole response, or, a response from a hole edge occurring over a wider range of transducer lateral movement than that experienced from the reference standard hole or known good hole in similar structure on the airplane.

Lower Wing Skin at Beavertail
707-100/200 Airplanes
Figure 7 (Sheet 3)



INSPECTION CODE	REFERENCE STANDARD NUMBER	HOLE DIA. (1)	COUNTERSINK	THICKNESS (3)	PART NUMBER [A]
A	044	3/16	(2)	0.31	6411-22
B	045	1/4	(2)	0.39	6411-23
C	046	1/4	NONE	0.45	6411-24

NOTES

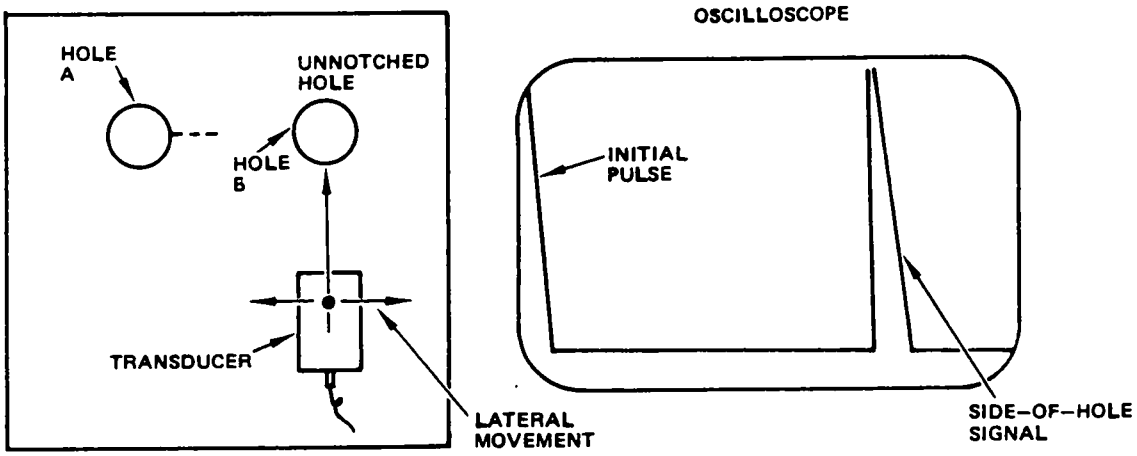
- ALL DIMENSIONS ARE IN INCHES
- TOLERANCE: X.X ± 0.05, X.XX ± 0.02
- MATERIAL: 2024-T4, 7075-T6 ALUMINUM
- ETCH OR STEEL STAMP BOEING REFERENCE STANDARD NUMBER

[A] AVAILABLE FROM IDEAL SPECIALTY CO.

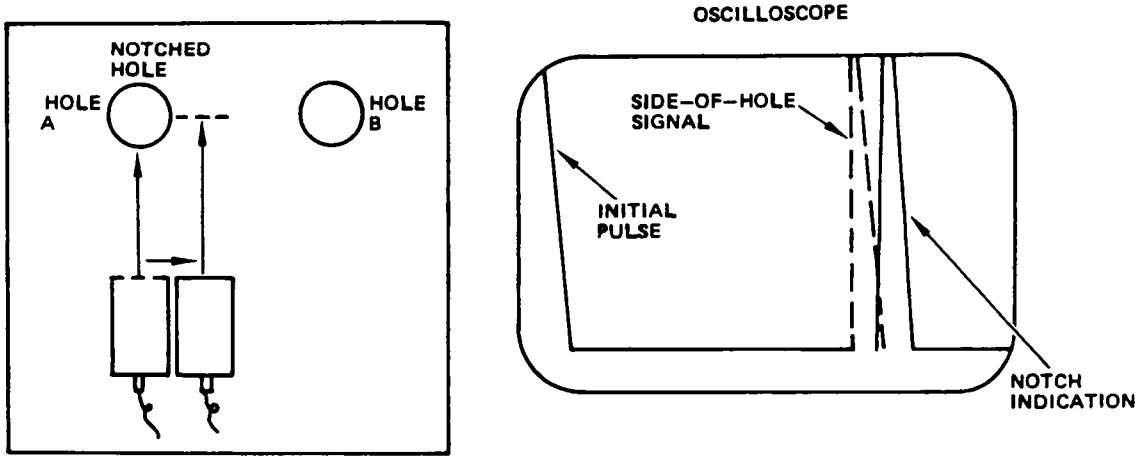
(2) COUNTERSINK 100° TO DEPTH OF STANDARD HEAD CONFIGURATION

(6) JEWELER'S SAWCUT 0.030 MAX WIDTH

Lower Wing Skin at Beavertail 707-300/400 Airplanes
Figure 7 (Sheet 4)



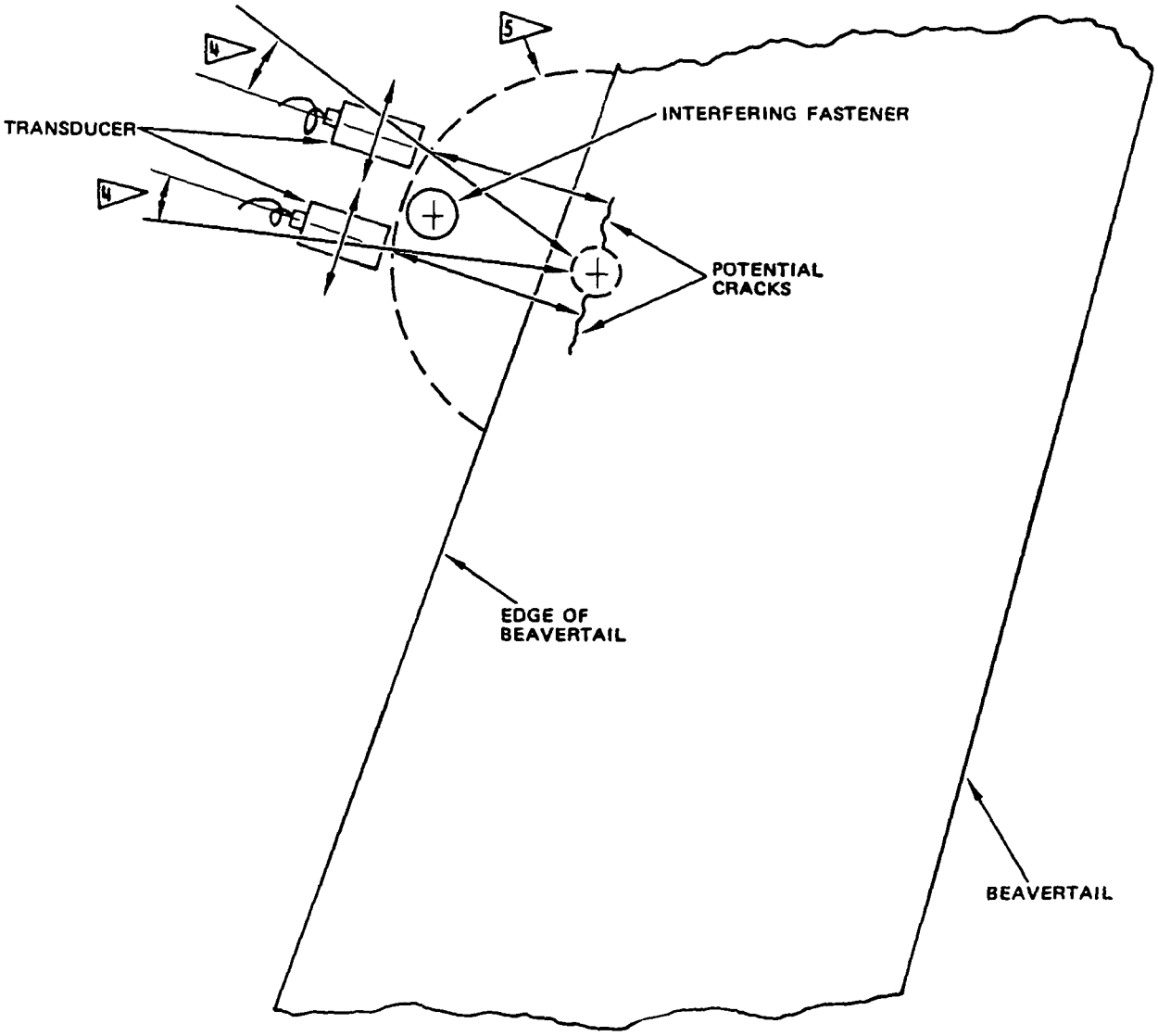
OSCILLOSCOPE DISPLAY
SIDE-OF-HOLE RESPONSE



OSCILLOSCOPE DISPLAY–NOTCH RESPONSE

RESPONSE PATTERN FROM REFERENCE STANDARD
DETAIL II

NONDESTRUCTIVE TEST

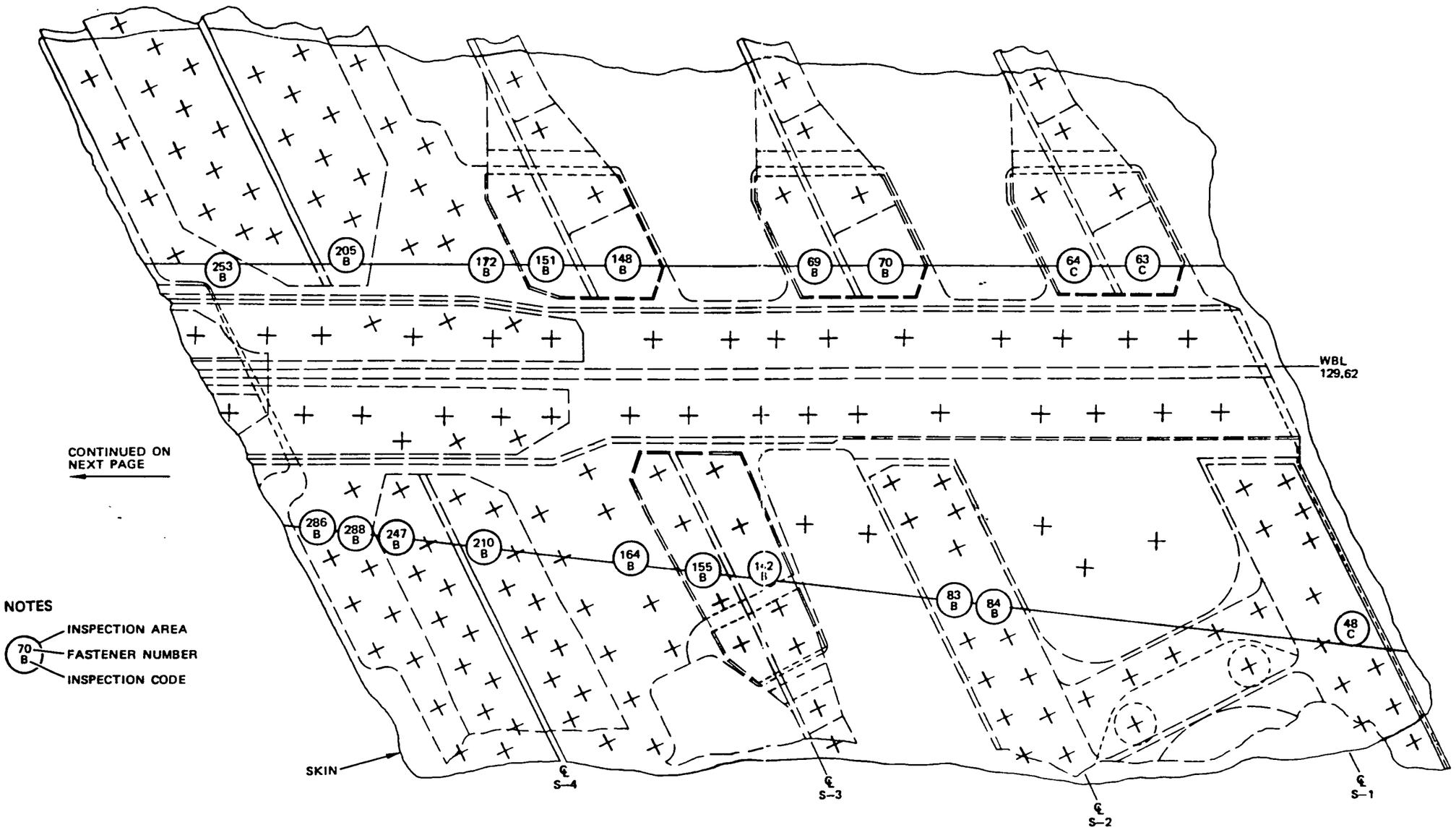


NOTES

4 ROTATE TRANSDUCER TO OBTAIN SIGNALS FROM TNE FASTENER HOLE AND POTENTIAL CRACKS

5 FASTENER HOLE RESPONSE MAY BE IMPROVED BY MOVING THE TRANS-DUCER CLOSER TO OR FARTHER FROM THE FASTENER THAN THE ESTABLISHED SCAN DISTANCE

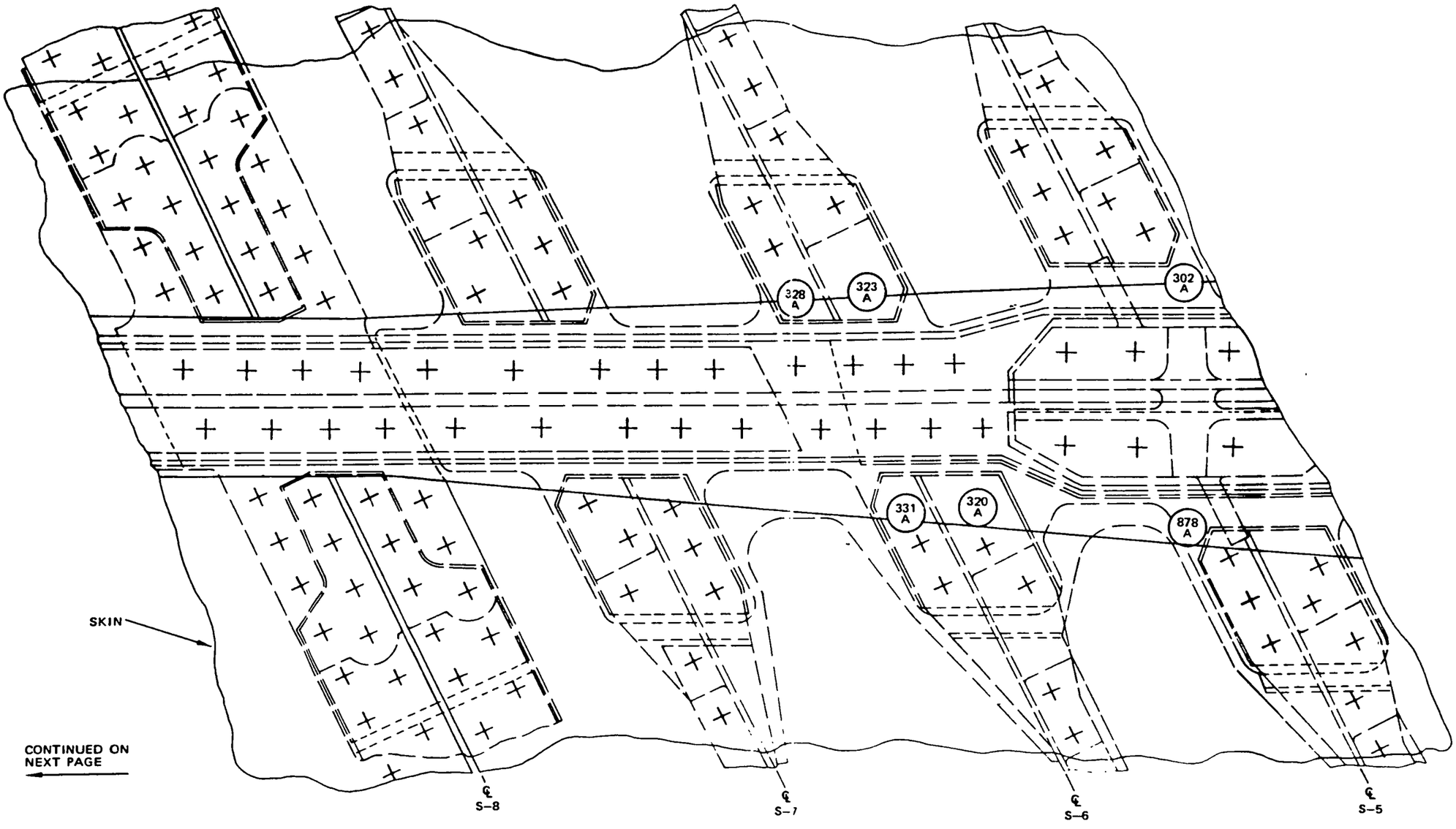
INSPECTION PROCESS
DETAIL III



FASTENER LOCATIONS TO BE INSPECTED
LOWER WING SKIN–BEAVERTAIL
(RIGHT SIDE SHOWN, LEFT SIDE SIMILAR)

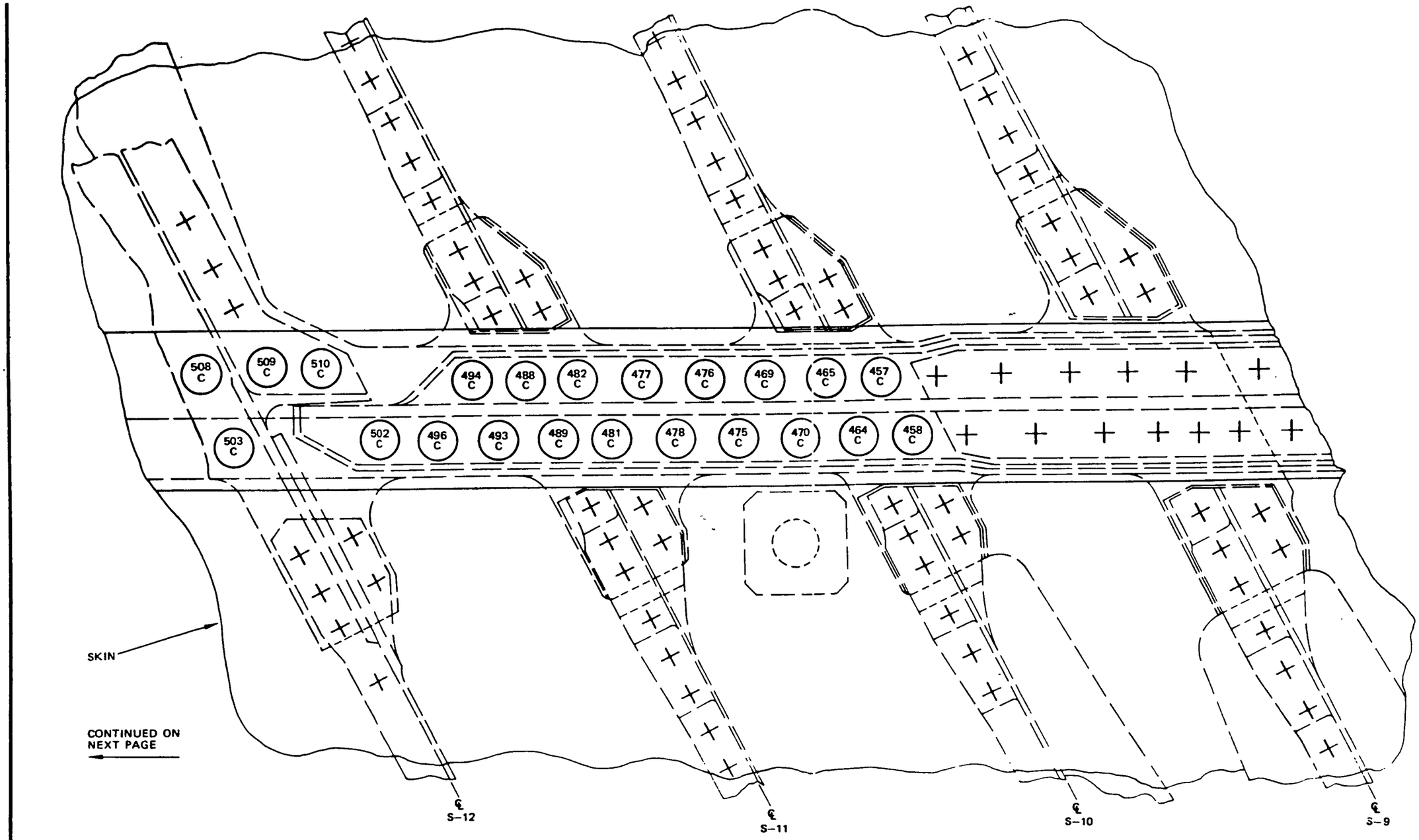
DETAIL IV

Lower Wing Skin at Beavertail
707-100/200 Airplanes
Figure 7 (Sheet 7)



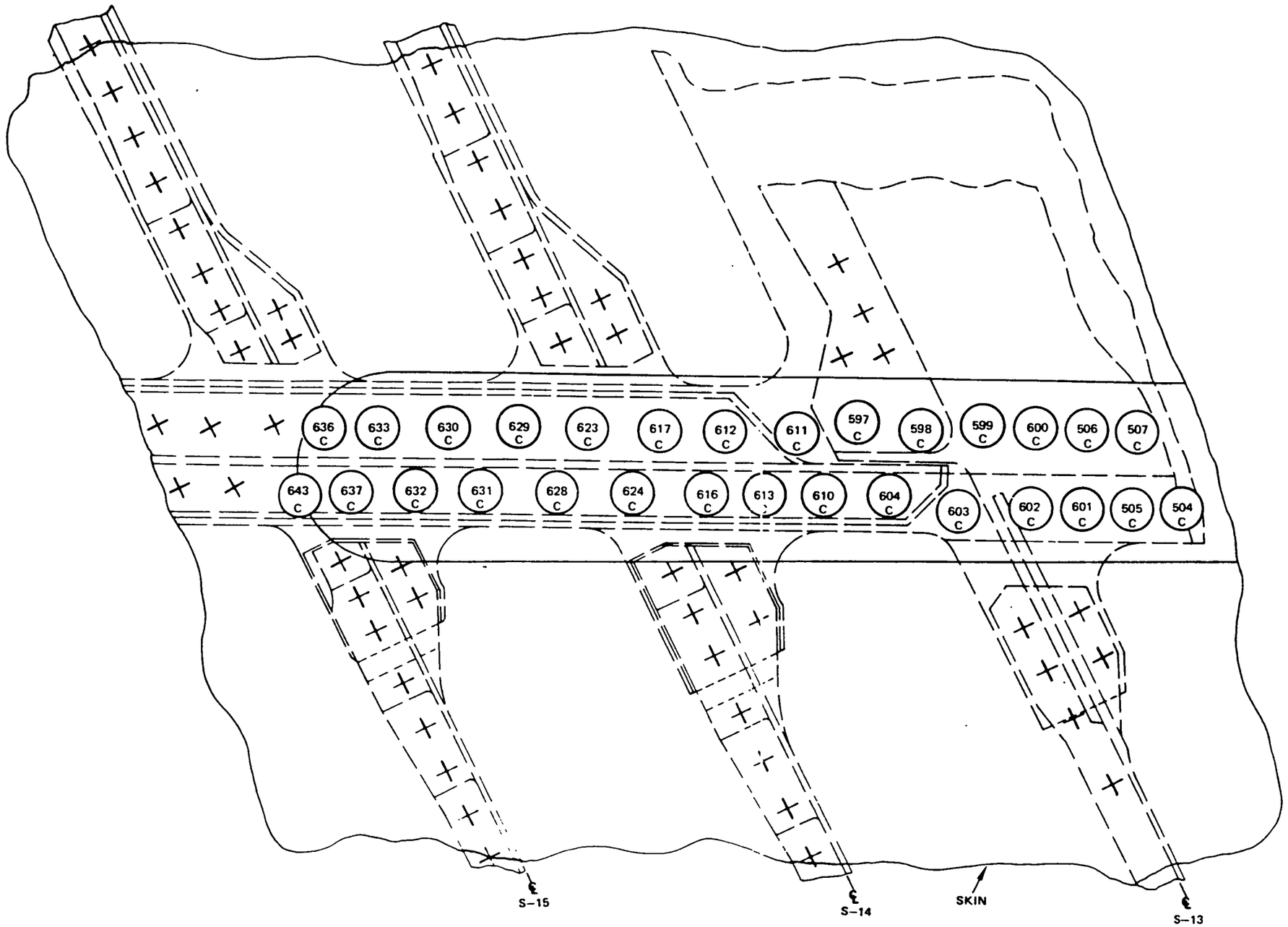
DETAIL IV (CONT)

Lower Wing Skin at Beavertail
707-100/200 Airplanes
Figure 7 (Sheet 8)



DETAIL IV (CONT)

Lower Wing Skin at Beavertail
707-100/200 Airplanes
Figure 7 (Sheet 9)



DETAIL IV (CONT)

Lower Wing Skin at Beavertail
707-100/200 Airplanes
Figure 7 (Sheet 10)

PART 4 - ULTRASONIC

WINGS - SKIN

1. Purpose

   A. Detect cracks emanating from selected fastener holes on lower wing skin wholly or partially covered by beavertail (WBL 129.62). These fasteners are located near the periphery of the beavertail and they are common to the lower wing skin and stringer end (Detail V).

2. Equipment

   A. Any ultrasonic instrument which satisfies the requirements of this procedure may be used. The following equipment was used during the development of this procedure and found acceptable.

      (1) Instrument - Nortec NDT-131, Nortec Corporation, 421 N. Quay, Kennewick, WA. 99336

      (2) Transducer - Automation Industries, Type SMZ, 5 MHZ, 0.25-inch element, 60° A, 57A3065.

   B. Reference Standard

      (1) Fabricate three reference standards per Detail I.

   C. Couplant

      (1) Light oil or grease.

3. Preparation for Inspection

   A. This inspection can be performed from outside the wing and with the part in place on the airplane.

   B. Paint removal in the inspection area may be necessary to improve sound transmission (Detail V). Smooth out any surface roughness by sanding lightly.

   C. Wipe surface clean.

   D. Apply a thin film of couplant to the inspection area.

Lower Wing Skin at Beavertail
720 Airplanes
Figure 8 (Sheet 1)

4. Instrument Calibration

A. General

(1) Instrument calibrations for inspection codes A, B and C, were required to adjust for variations in structure geometry.

(2) Detail V identifies the coverage for each of the three inspection codes.

B. Calibration for fasteners with inspection code A, B, or C.

(1) Select the reference standard which has the same inspection code as the holes to be inspected and apply couplant (Detail I).

(2) Place the transducer on the surface and aim the sound beam at the sound beam at the notch located at the edge of the standard (Details I and II). Note the distance between the leading edge of the notch (Detail II).

(3) Move the transducer to the unnotched hole and obtain a signal from the hole lower edge. The distance between leading edge of transducer case and the hole edge should be approximately the same as the distance noted in Section 4.B.(2).

(4) Position this signal at approximately 3/4 of the total screen width away from the initial pulse (Detail III).

(5) Adjust instrument sensitivity so that the hole lower edge signal is 90% of maximum signal height.

(6) Move the transducer to the notched hole, and obtain a signal from the hole's lower edge. Move the transducer to detect the notch indication (Detail III).

(7) Note the following differences in response between a noticed hole indication and an unnotched hole indication.

(a) As the transducer is moved laterally on the notch side of the hole, the notch signal will appear on the oscilloscope just to the right of the hole signal as in Detail III.

NOTE: The displacement of the signal between hole edge and notch is smallest and most difficult to observe on small diameter holes, becoming more apparent as the hole diameter increases.

(b) When compared with the unnotched hole, the signal from the combined hole and notch occurs over a wider lateral movement of the transducer.

Lower Wing Skin at Beavertail
720 Airplanes
Figure 8 (Sheet 2)

5. Inspection Procedure

A. Determine the location of the fastener holes to be inspected using Detail V.

B. Calibrate the instrument for inspecting these fasteners using par. 4.B.

C. Select a fastener hole on the airplane for which the instrument has been calibrated and place the leading edge of the transducer the same distance away from the hole edge as was established during calibration (Detail IV).

D. Manipulate the transducer to obtain a signal from the hole lower edge. If another fastener blocks the sound beam, move the transducer to either side of this fastener and manipulate to obtain a signal from fastener hole being inspected.

NOTE: Increased instrument sensitivity may be needed to compensate for signal loss due to sealant or a tight interface between the skin and beavertail. Readjust the instrument sensitivity to obtain a 90% signal height from the hole being inspected. Paint removal may help to gain higher sensitivity.

E. Move the transducer laterally and manipulate to inspect the vicinity of the fastener hole for cracks (Detail IV).

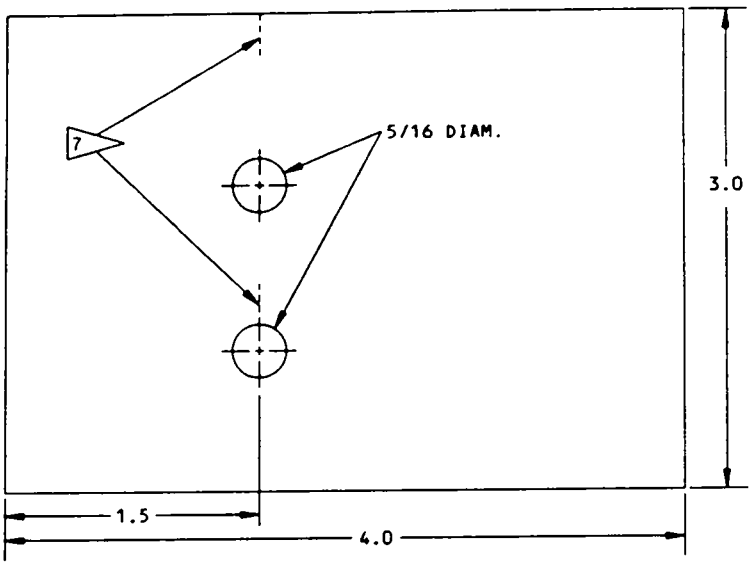
F. Move signal from the inspection area which is 50% or more of screen height and which is not identified as a hole edge response should be considered a crack and investigated further.

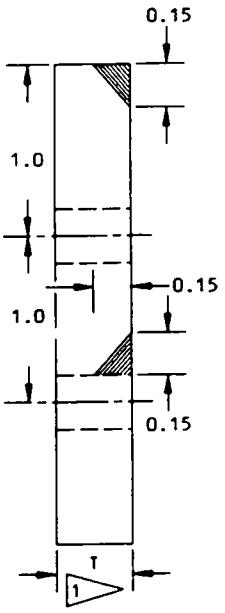
G. The following responses are potential crack indications:

(1) A signal on the oscilloscope which occurs a short distance to the right of the response from the hole edge - compare with the oscilloscope response pattern obtained from the notched hole in the standard.

(2) A signal which occurs approximately at the same location but slightly to the side of the hole response, or, a response from a hole edge occurring over a wider range of transducer lateral movement than that experienced from the reference standard hole or known good hole in similar structure on the airplane.

Lower Wing Skin at Beavertail
720 Airplanes
Figure 8 (Sheet 3)





INSPECTION CODE	REFERENCE STANDARD NUMBER	1 THICKNESS	PART NUMBER [A]
A	047	0.45	6411-25
B	048	0.33	6411-26
C	049	0.21	6411-27

NOTES

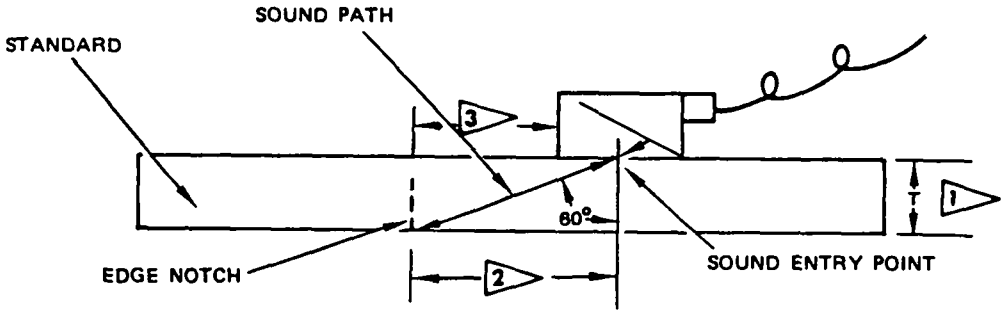
- ALL DIMENSIONS ARE IN INCHES
- MATERIAL: 2024-T4, 7075-T6 ALUMINUM
- TOLERANCE: X.X ± 0.05, X.XX ± 0.02
- ETCH OR STEEL STAMP REFERENCE STANDARD NUMBER

[A] AVAILABLE FROM IDEAL SPECIALTY CO.
2531 E. INDEPENDENCE ST.
TULSA, OKLAHOMA 74110

7 JEWELER'S SAWCUT
0.030 MAX WIDTH
(2 PLACES)

REFERENCE STANDARDS
DETAIL I

Lower Wing Skin at Beavertail
720 Airplanes
Figure 8 (Sheet 4)

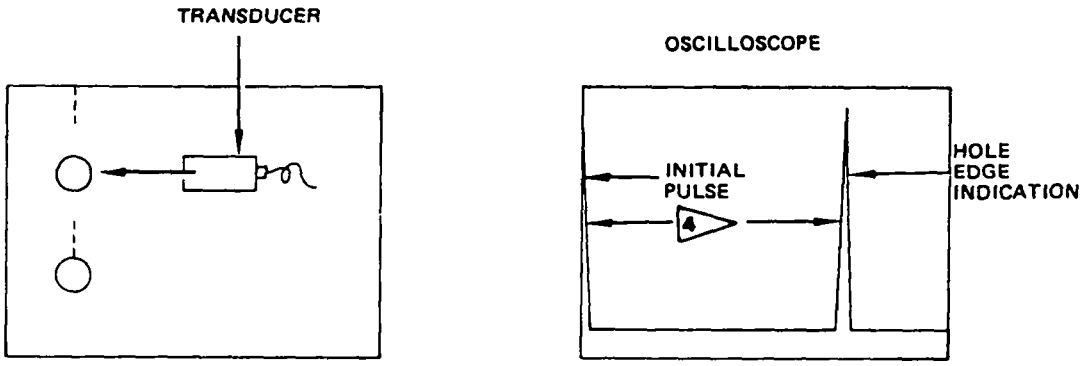


NOTES

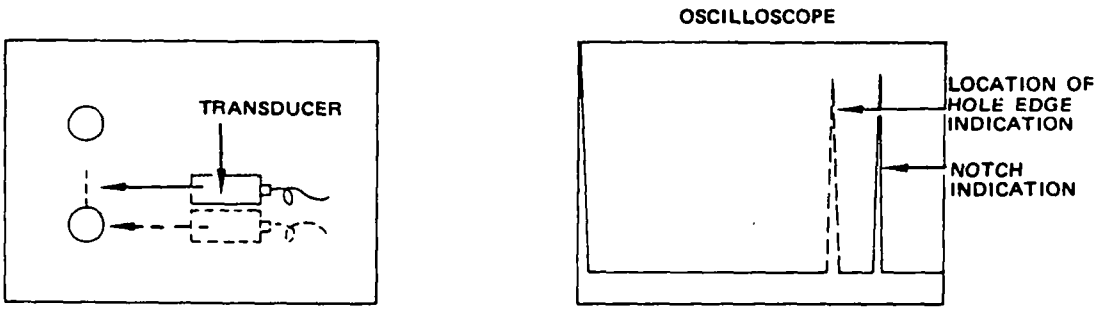
1. SEE DETAIL I FOR T
2. APPROXIMATE SURFACE DISTANCE BETWEEN EDGE NOTCH AND SOUND ENTRY POINT FOR A 60° SHEAR WAVE: 0.78 IN. FOR T=0.45, 0.59 INCH FOR T=0.33, AND 0.36 IN. FOR T=0.21
3. DETERMINE REFERENCE DISTANCE BETWEEN LEADING EDGE OF TRANSDUCER CASE AND PLANE OF THE NOTCH

TRANSDUCER TO NOTCH DISTANCE
DETAIL II

Lower Wing Skin at Beavertail
720 Airplanes
Figure 8 (Sheet 5)



OSCILLOSCOPE DISPLAY, UNNOTCHED HOLE



NOTES

4 POSITION HOLE LOWER EDGE INDICATION APPROXIMATELY 3/4 OF SCREEN WIDTH FROM INITIAL PULSE

OSCILLOSCOPE DISPLAY, HOLE NOTCH

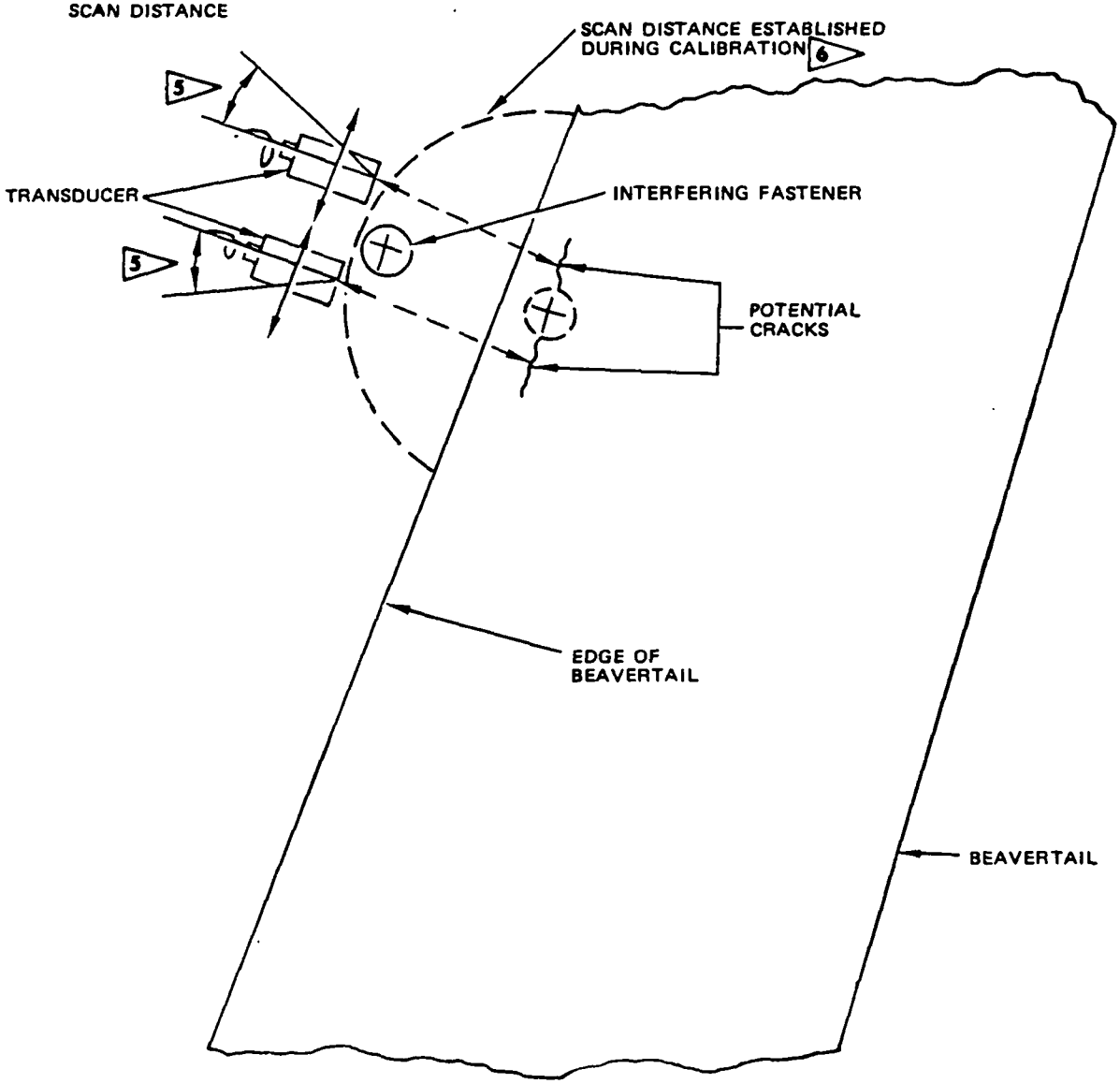
RESPONSE PATTERN FROM REFERENCE STANDARD
DETAIL III

Lower Wing Skin at Beavertail
720 Airplanes
Figure 8 (Sheet 6)

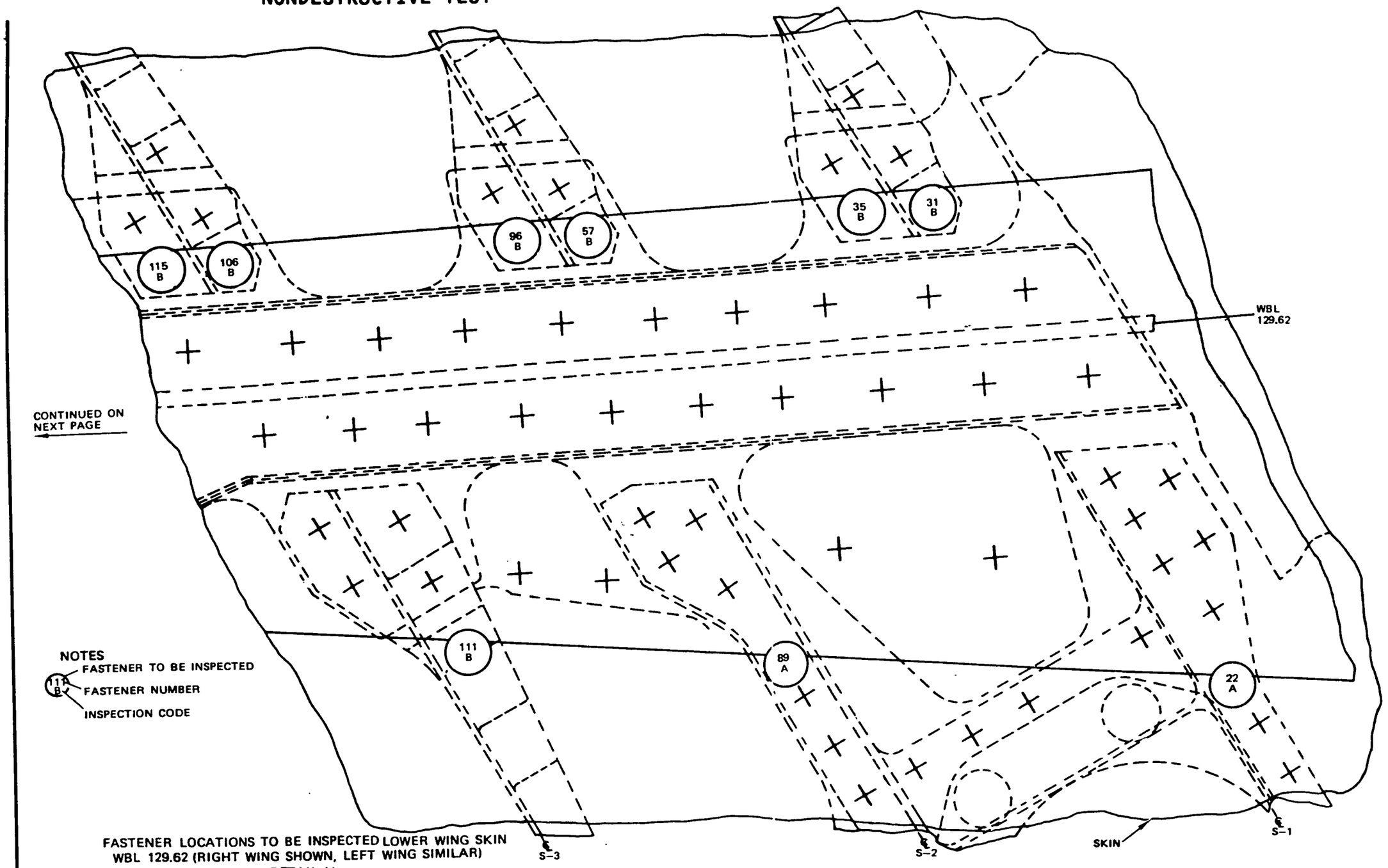
NOTES

5 ROTATE TRANSDUCER TO OBTAIN SIGNALS FROM THE FASTENER HOLE AND POTENTIAL CRACKS

6 FASTENER HOLE RESPONSE MAY BE IMPROVED BY MOVING THE TRANSDUCER CLOSER TO OR FARTHER FROM THE FASTENER THAN THE ESTABLISHED SCAN DISTANCE

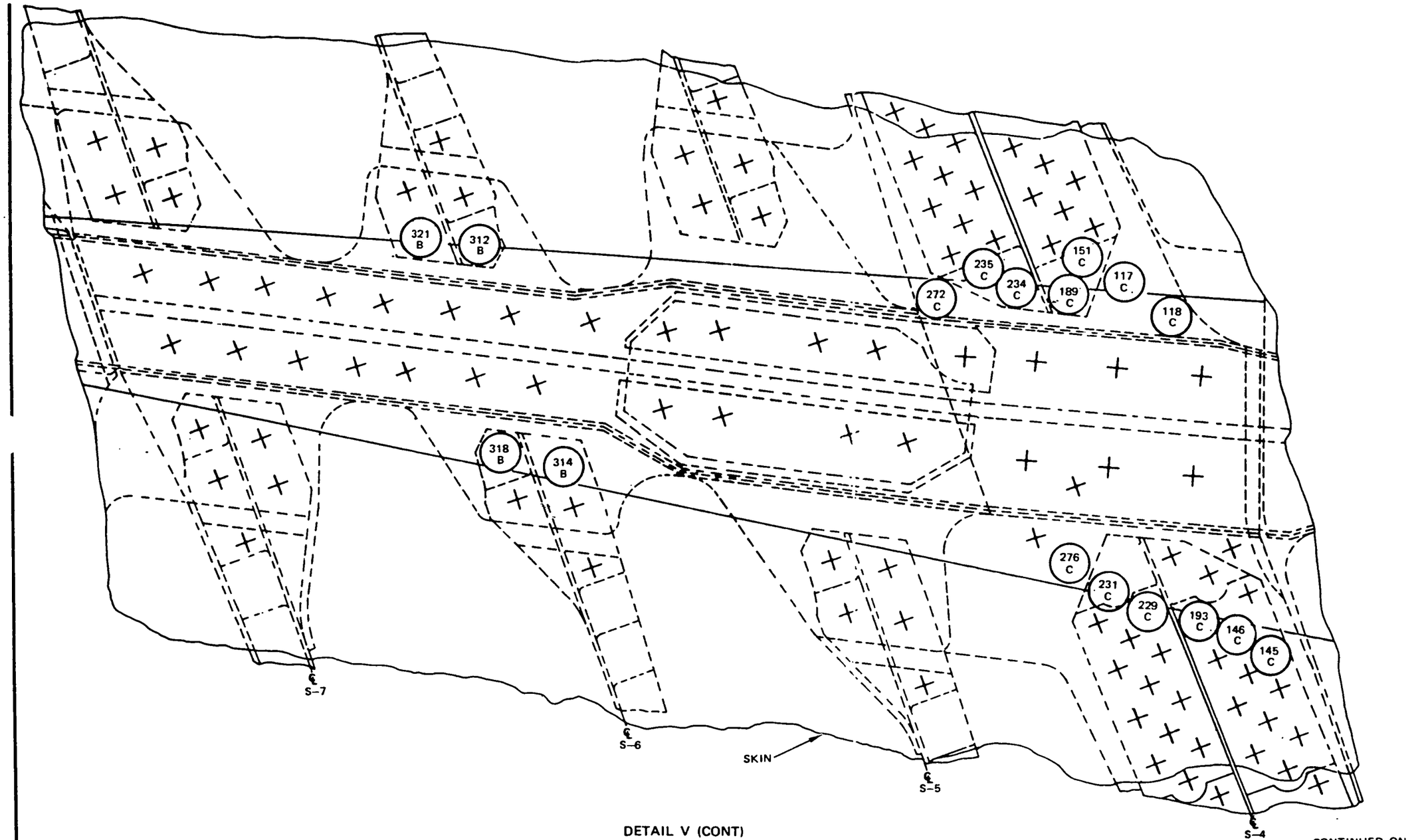


INSPECTION PROCESS
DETAIL IV



FASTENER LOCATIONS TO BE INSPECTED LOWER WING SKIN
WBL 129.62 (RIGHT WING SHOWN, LEFT WING SIMILAR)
DETAIL V

Lower Wing Skin at Beavertail
720 Airplanes
Figure 8 (Sheet 8)



DETAIL V (CONT)

CONTINUED ON PRECEDING PAGE

Lower Wing Skin at Beavertail
720 Airplanes
Figure 8 (Sheet 9)

PART 4 - ULTRASONIC

WINGS - SKIN

1. Purpose

A. To detect cracks emanating from selected fastener holes on lower wing skin wholly or partially covered by beavertail (WBL 59.24). These fasteners are located near the periphery of the beavertail and they are common to the lower wing skin and stringer end (Detail V).

2. Equipment

A. Any ultrasonic instrument which satisfies the requirements of this procedure may be used. The following equipment was used during the development of this procedure and found acceptable.

(1) Instrument - Nortec NDT-131, Nortec Corporation, 421 N. Quay, Kennewick, WA. 99336

(2) Transducer - Automation Industries, Type SMZ, 5 MHz, 0.25-inch element, 60° A, 57A3065.

(3) Transducer - Automation Industries, Type SMZ, 5 MHz, 0.25-inch element, 45° A, 57A3064.

B. Reference Standard - Fabricate two reference standards per Detail I.

C. Couplant - Light oil or grease.

3. Preparation for Inspection

A. This inspection can be performed from outside the wing and with the part in place on the airplane.

B. Paint removal in the inspection area may be necessary to improve sound transmission (Detail V). Smooth out any surface roughness by sanding lightly.

C. Wipe surface clean.

D. Apply a thin film of couplant to the inspection area.

Lower Wing Skin at Beavetail
707-300/400 Airplanes
Figure 9 (Sheet 1)

4. Instrument Calibration

A. General

(1) Instrument calibrations for inspection codes A, B and C, are required to adjust for variations in structure geometry.

(2) Detail V identifies the coverage for each of the three inspection codes.

B. Calibration for fasteners with inspection code A, B, or C.

(1) Select the reference standard and transducer which has the same inspection code as the holes to be inspected and apply couplant (Detail I).

(2) Place the transducer on the surface and aim the sound beam at the notch located at the edge of the standard (Details II and III). Note the distance between the leading edge of the transducer case and the plane of the notch (Detail III).

(3) Move the transducer to the unnotched hole and obtain a signal from the hole lower edge. The distance between leading edge of transducer case and the hole edge should be approximately the same as the distance noted in par. 4.B.(2).

(4) Position this signal at approximately 3/4 of the total screen width away from the initial pulse (Detail III).

(5) Adjust instrument sensitivity so that the hole lower edge signal is 90% of maximum signal height.

(6) Move the transducer to the notched hole, and obtain a signal from the hole's lower edge. Move the transducer to detect the notch indication (Detail III).

(7) Note the following differences in response between a notched hole indication and an unnotched hole indication.

(a) As the transducer is moved laterally on the notch side of the hole, the notch signal will appear on the oscilloscope just to the right of the hole signal as in Detail III.

NOTE: The displacement of the signal between hole edge and notch is smallest and most difficult to observe on small diameter holes, becoming more apparent as the hole diameter increases.

(b) When compared with the unnotched hole, the signal from the combined hole and notch occurs over a wider lateral movement of the transducer.

Lower Wing Skin at Beavetail
707-300/400 Airplanes
Figure 9 (Sheet 2)

5. Inspection Procedure

A. Determine the location of the fastener holes to be inspected using Detail V.

B. Calibrate the instrument for inspecting these fasteners using par. 4.B.

C. Select a fastener hole on the airplane for which the instrument as been calibrated and place the leading edge of the transducer the same distance away from the hole edge as was established during calibration (Detail V).

D. Manipulate the transducer to obtain a signal from the hole lower edge. If another fastener blocks the sound beam, move the transducer to either side of this fastener and manipulate to obtain a signal from fastener hole being inspected.

NOTE: Increased instrument sensitivity may be needed to compensate for signal loss due to sealant or a tight interface between the skin and beavertail. Readjust the instrument sensitivity to obtain a 90% signal height from the hole being inspected. Paint removal may help to gain higher sensitivity.

E. Move the transducer laterally and manipulate to inspect the vicinity of the fastener hole for cracks (Detail V).

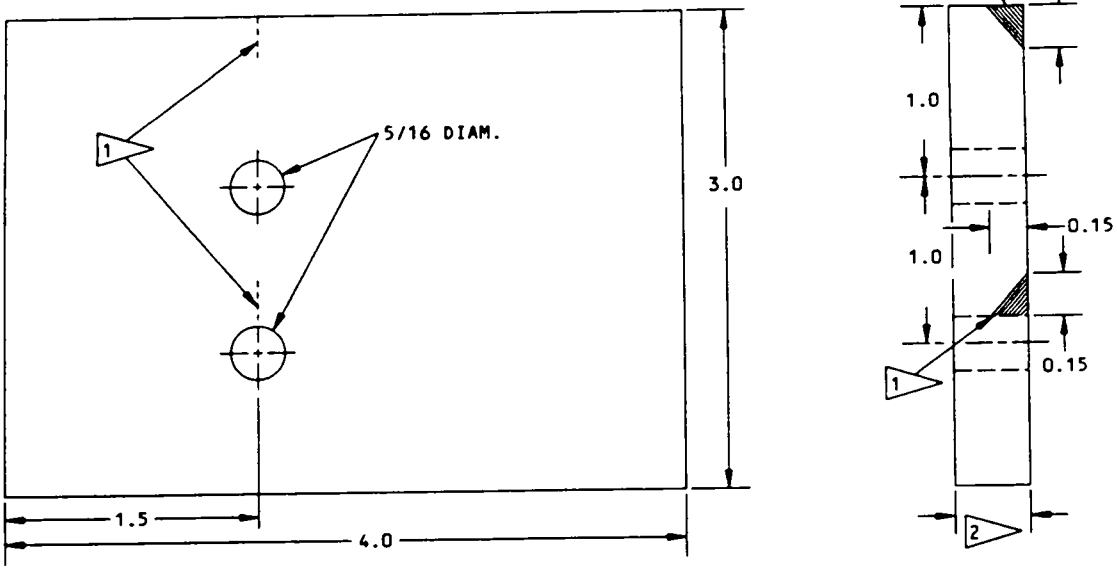
F. Any signal from the inspection area which is 50% or more of screen height and which is not identified as a hole edge response should be considered a crack and investigated further.

G. The following responses are potential crack indications:

(1) A signal on the oscilloscope which occurs a short distance to the right of the response from the hole edge - compare wih the oscilloscope response pattern obtained from the notched hole in the standard.

(2) A signal which occurs approximately at the same location but slightly to the side of the hole response, or, a response from a hole edge occurrring over a wider range of transducer lateral movement than that experienced from the reference standard hole or known good hole in similar structure on the airplane.

Lower Wing Skin at Beavertail
707-300/400 Airplanes
Figure 9 (Sheet 3)



INSPECTION CODE	TRANSDUCER ANGLE	REFERENCE STANDARD NUMBER	2 THICKNESS	PART NUMBER [A]
A	45°	050	0.60	6411-28
B	60°	050	0.60	6411-28
C	60°	048	0.33	6411-26

NOTES

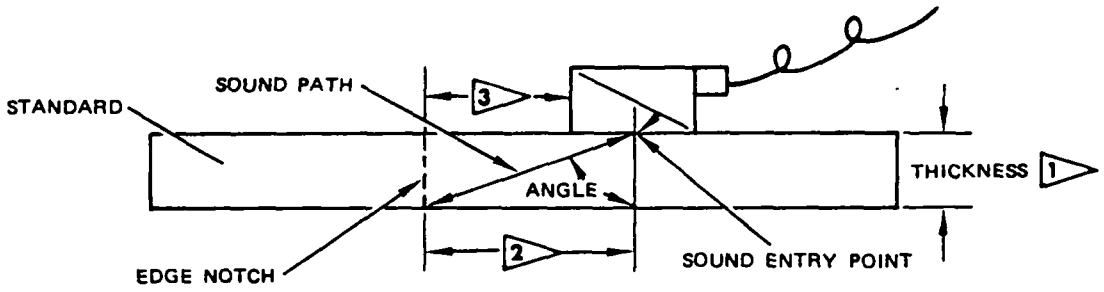
- ALL DIMENSIONS ARE IN INCHES
- ETCH OR STEEL STAMP WITH REFERENCE STANDARD NUMBER
- MATERIAL: 2024-T4, 7075-T6 ALUMINUM
- TOLERANCE: X.X ± 0.05, X.XX ± 0.02

[A] AVAILABLE FROM IDEAL SPECIALTY CO.
2531 E. INDEPENDENCE ST.
TULSA, OKLAHOMA 74110

1 JEWELER'S SAWCUT 0.030 MAX WIDTH (2 PLACES)

REFERENCE STANDARDS
DETAIL I

Lower Wing Skin at Beavertail
707-300/400 Airplanes
Figure 9 (Sheet 4)



STANDARD THICKNESS 1	0.33 INCH	0.60	0.60
SHEAR WAVE TRANSDUCER	60°ANGLE	45°ANGLE	60°ANGLE
MINIMUM DISTANCE 2	0.55	0.6	1.1

NOTES

- ALL DIMENSIONS IN INCHES

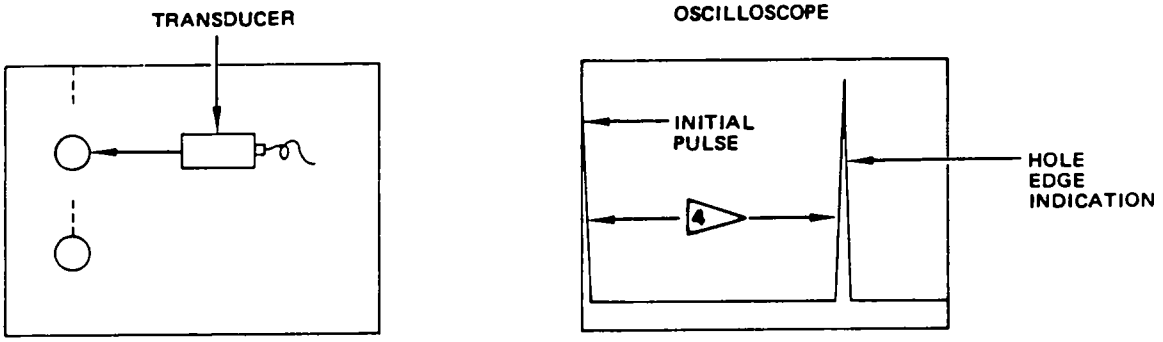
2 APPROXIMATE SURFACE DISTANCE BETWEEN EDGE NOTCH AND SOUND ENTRY POINT FOR A 45° OR 60° SHEAR WAVE

3 DETERMINE REFERENCE DISTANCE BETWEEN LEADING EDGE OF TRANSDUCER CASE AND PLANE OF THE NOTCH

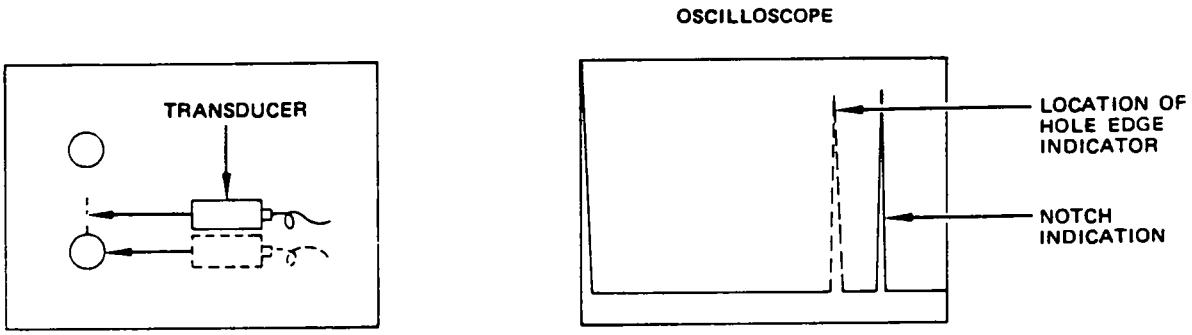
TRANSDUCER TO NOTCH DISTANCE

DETAIL II

Lower Wing Skin at Beavertail
707-300/400 Airplanes
Figure 9 (Sheet 5)



OSCILLOSCOPE DISPLAY, UNNOTCHED HOLE



OSCILLOSCOPE DISPLAY, HOLE NOTCH

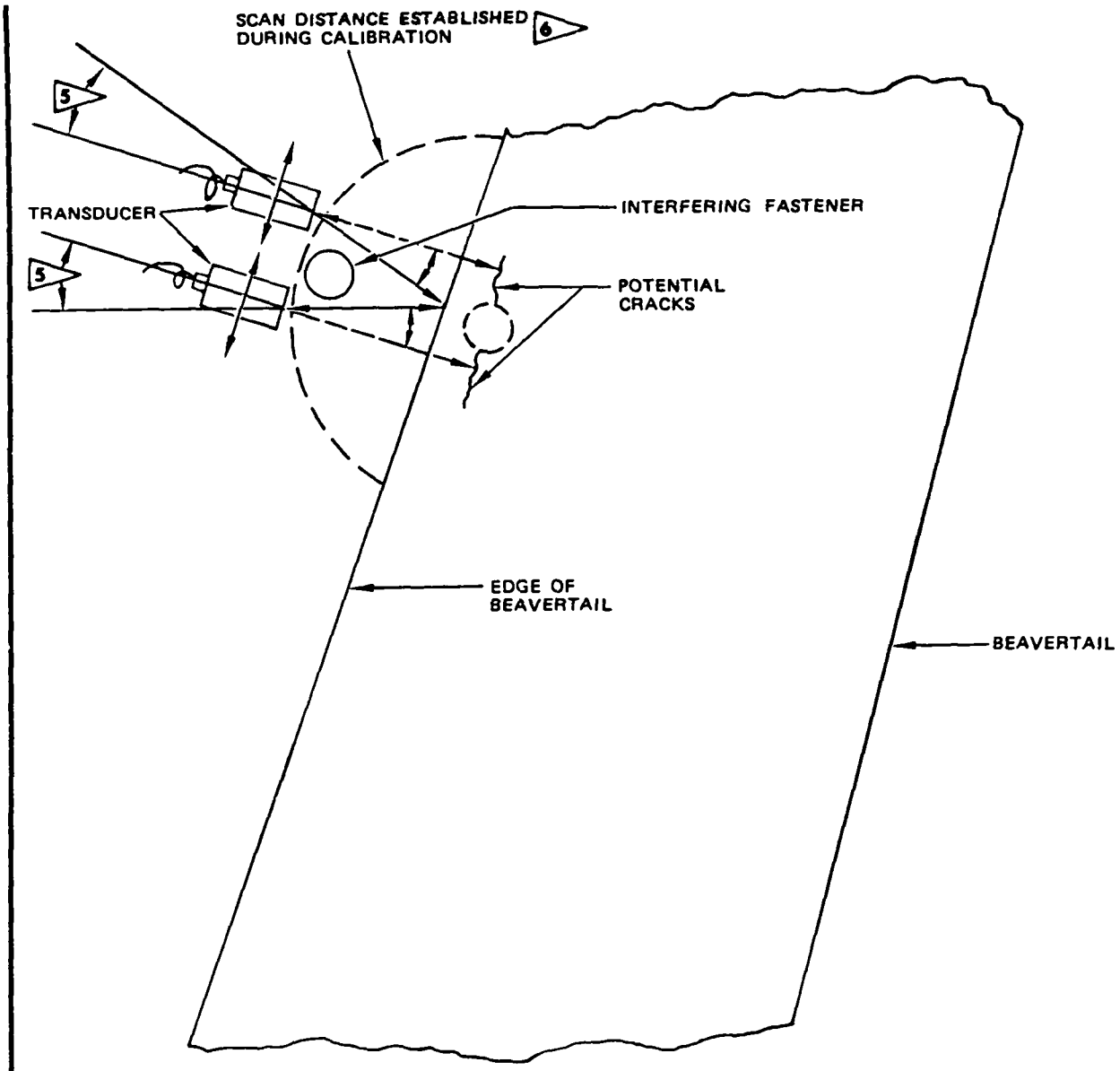
NOTES

4 POSITION HOLE LOWER EDGE INDICATION APPROXIMATELY 3/4 OF SCREEN WIDTH FROM INITIAL PULSE

RESPONSE PATTERN FROM REFERENCE STANDARD
DETAIL III

Lower Wing Skin at Beavertail
707-300/400 Airplanes
Figure 9 (Sheet 6)

NONDESTRUCTIVE TEST



NOTES

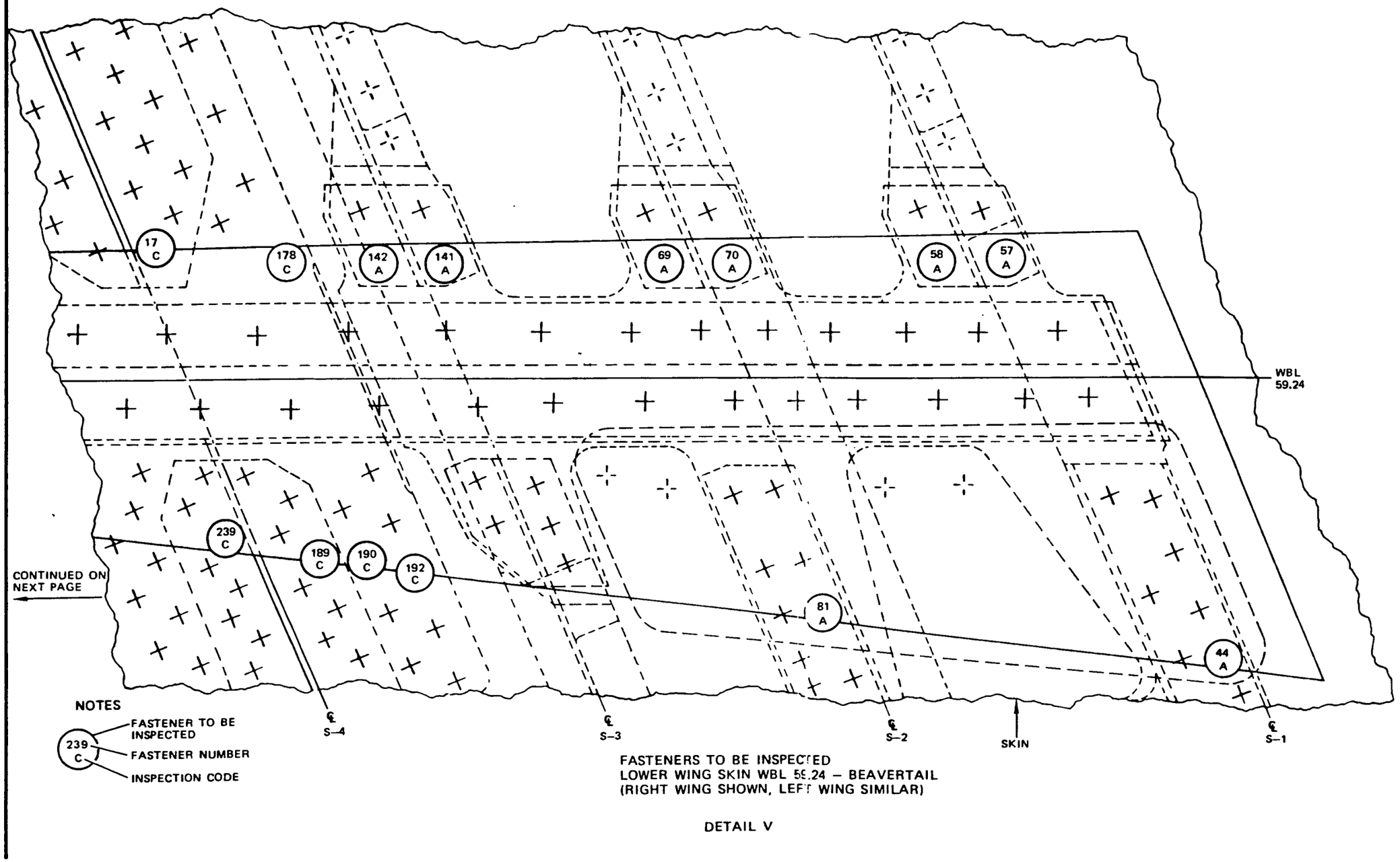
5 ROTATE TRANSDUCER TO OBTAIN SIGNALS FROM THE FASTENER HOLE AND POTENTIAL CRACKS

6 FASTENER HOLE RESPONSE MAY BE IMPROVED BY MOVING THE TRANSDUCER CLOSER TO OR FARTHER FROM THE FASTENER THAN THE ESTABLISHED SCAN DISTANCE

INSPECTION PROCESS

DETAIL IV

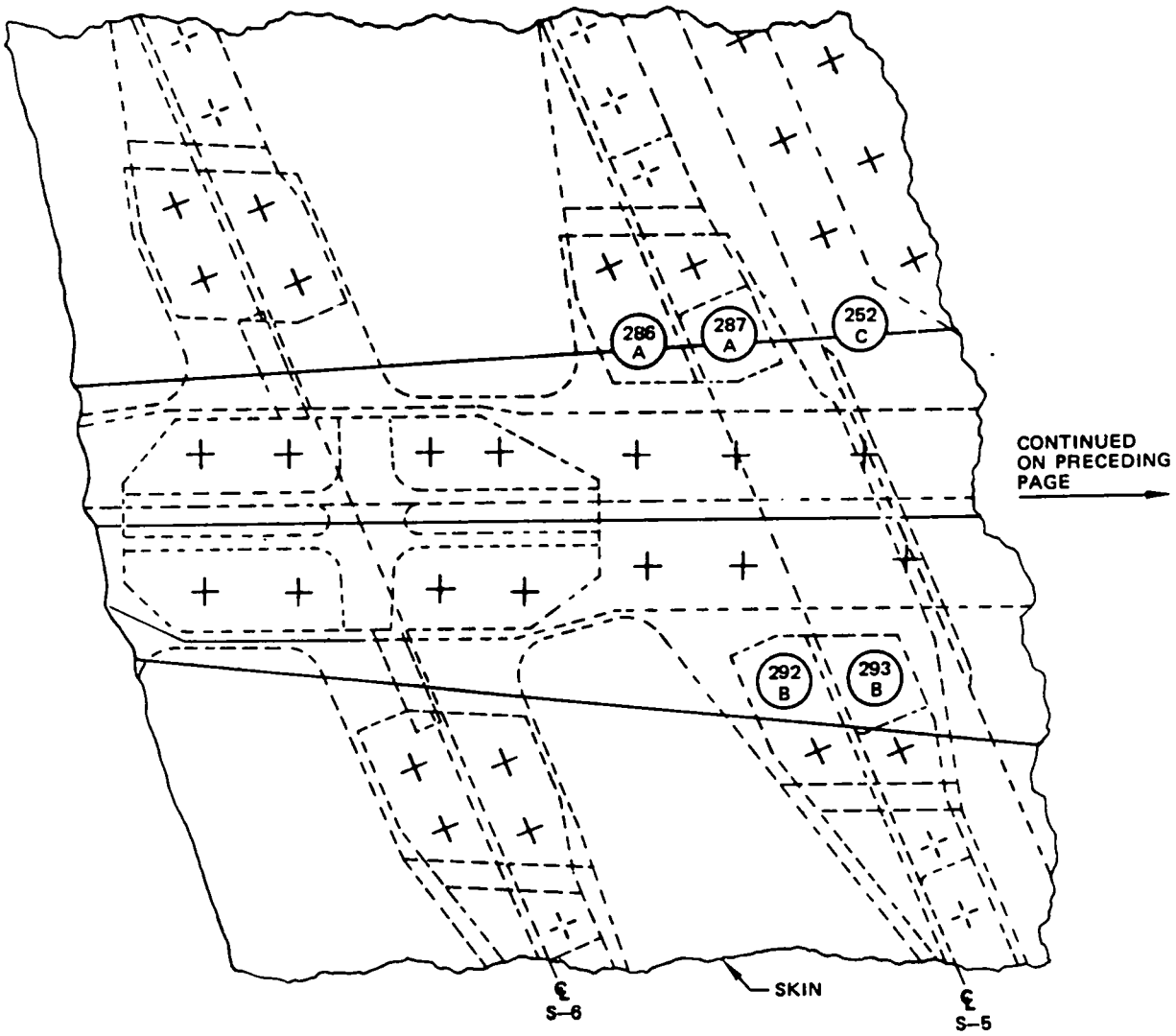
Lower Wing Skin at Beavertail
707-300/400 Airplanes
Figure 9 (Sheet 7)



FASTENERS TO BE INSPECTED
LOWER WING SKIN WBL 59.24 – BEAVERTAIL
(RIGHT WING SHOWN, LEFT WING SIMILAR)

DETAIL V

Lower Wing Skin at Beavertail
707-300/400 Airplanes
Figure 9 (Sheet 8)



DETAIL V (CONT)

Lower Wing Skin at Beavertail
707-300/400 Airplanes
Figure 9 (Sheet 9)

EFFECTIVITY
MODEL: 707-100/200
SERVICE BULLETIN
REFERENCE: 2177
SSI DOCUMENT (D6-44860)
REFERENCE:
SSD: 57-A15-15

PART 4 - ULTRASONIC

WING - MAIN FRAME

1. Purpose

   A. To detect skin cracks emanating from the seal stop fastener at W.S. 304.93 rear spar upper chord splice. See Detail I.

2. Equipment

   A. Any ultrasonic instrument which satisfies the requirements of this procedure may be used. The following equipment was used during the development of this procedure and found acceptable.

      (1) Instruments

         (a) Sperry Products model UM 700 Reflectoscope.

         (b) Nortec model NDT-131, Nortex Corporation, Richland, WA.

      (2) Transducer

         (a) Automation Industries, 5mc, Lithium Sulphate, Style C, special purpose 0.25-inch diameter transducer mounted in a metal case 0.375-inch diameter.

         (b) Branson, 5mc transducer, 0.25-inch diameter crystal, type Z1, 0.375-inch diameter metal case.

   B. Fabricate positioning fixture per Detail II.

   C. Fabricate Reference Standard per Detail III.

   D. Couplant is a non-homogenized grease or other suitable coupling media.

3. Preparation for Inspection

   A. Paint removal is recommended for placement of positioning fixture.

   B. Clean surface throughly.

Wing Upper Rear Spar Seal Stop Fastener
at WS 304.93
Figure 10 (Sheet 1)

4. Instrument Calibration

A. Couple transducer to positioning fixture using couplant.

B. Couple positioning fixture to reference standard using couplant.

C. To locate the position of the ultrasonic response on the oscilloscope, and to ensure proper operation of system, place positioning fixture centering pin at the lip edge of the comparison standard as indicated in Detail IV. A vertical response will appear on the oscilloscope. If properly located, the vertical amplitude of the response can be reduced by placing a finger on the lower edge of the skin portion of the comparison standard.

D. To adjust instrument sensitivity, place the transducer positioning fixture centering pin in the recess of the steel fastener of the standard.

NOTE: The positioning fixture must be directed in the inboard direction of the standard as shown in Detail V. Rotate the positioning fixture around the fastener until a maximum ultrasonic response is obtained from the simulated 0.050 x 0.10-inch crack in the standard. See Detail VI.

E. Adjust the sensitivity of the ultrasonic instrument until the vertical response indication of the oscilloscope is approximately 70 percent of saturation. See Detail V. Note that as the transducer positioner is rotated around the fastener the vertical response from the simulated crack will increase to a maximum, then decrease while simultaneously moving in a lateral direction. This movement is also a characteristic of the ultrasonic indication from a natural crack.

F. Note the position and lateral travel of the standard response on the oscilloscope screen.

5. Inspection Procedure

A. After calibration of instrument per par. 4, proceed as follows:

NOTE: A peculiarity of the affected fastener hole is that the ultrasonic inspection can be performed satisfactorily only when the ultrasound is propagated in an inboard direction.

Prepare area to be inspected around the fastener hole with couplant.

Wing Upper Rear Spar Seal Stop Fastener
at WS 304.93
Figure 10 (Sheet 2)

B. Place the transducer positioning fixture on the upper wing surface so that the centering pin of the fixture is seated in the recessed hole in the center of the fastener. See Detail V.

NOTE: This inspection can only be performed satisfactorily if the transducer face is directed inboard as shown in details V and VI.

C. Rotate the transducer positioning fixture around the fastener as indicated in Detail VI.

D. Observe the oscilloscope as the transducer positioning fixture is rotated around the fastener. If a possible crack indication is detected, a similar response, with lateral movement, will appear on the oscilloscope when the transducer is in the same attitude to the crack as it was to the saw cut in the reference standard. For example, maximum response will be obtained when the transducer is at 90° (in the horizontal plane) to either the saw cut or the crack. If this occurs proceed to step E.

E. Relocate the centering pin in the opposite pin hole in the fixture and repeat steps C. and D. By means of the two centering pin holes, the transducer is offset so that both sides of the fastener hole can be inspected for cracks.

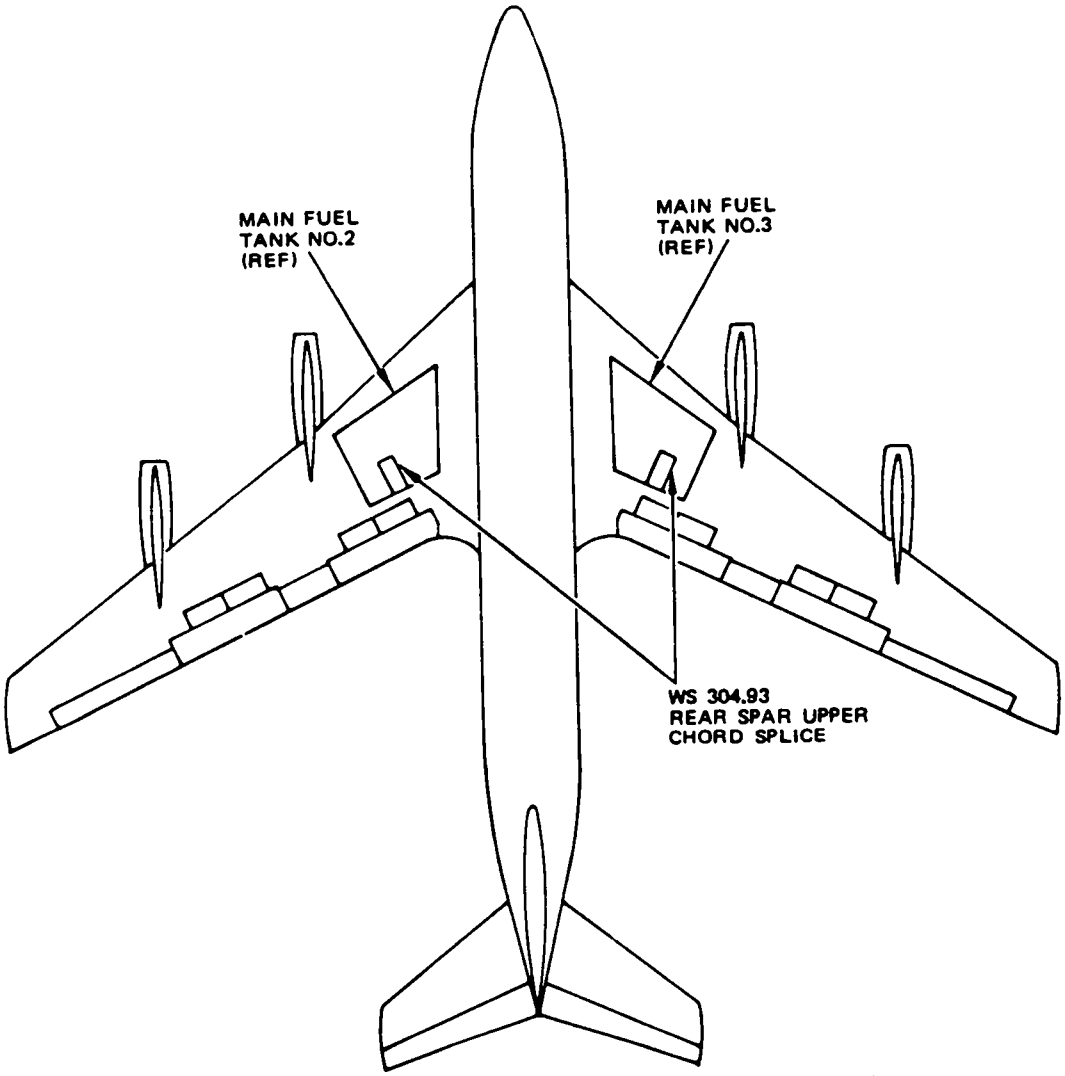
F. Check standard response. The crack response in the wing skin may be smaller (less than 70 percent) or larger (70 percent to saturation) than the response calibrated from the reference standard. The sensitivity level for the test has been set so that responses in excess of standard settings are indicative of cracks; while responses less than standard settings may be crack indications or interference responses.

G. If a crack is detected, the fastener should be removed and presence of the crack confirmed by another nondestructive method (visual, dye penetrant, or eddy current).

H. If a questionable response is obtained, an ultrasonic monitoring program is recommended to prove crack presence through response growth.

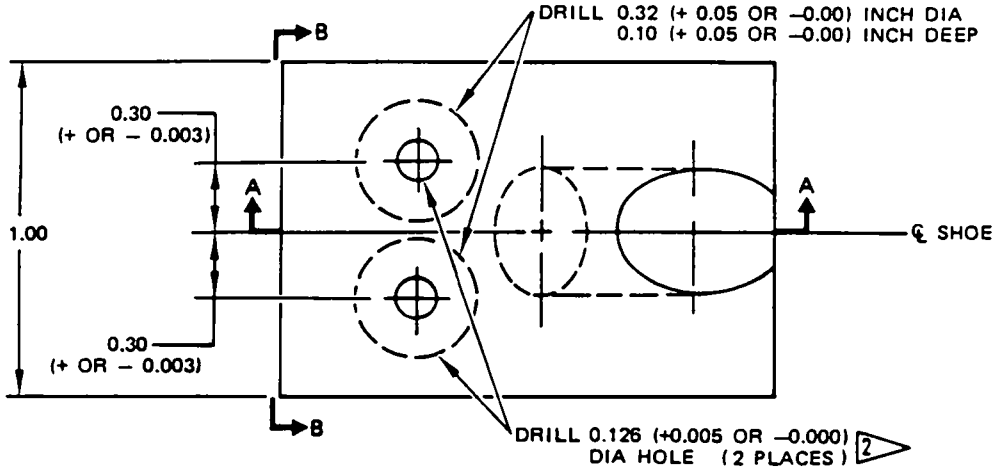
NOTE: A response from sound transfer into the rear spar chord splice may sometimes be shown on the oscilloscope. This response will have lateral movement but will not be in the exact location at the response received from the saw cut.

Wing Upper Rear Spar Seal Stop Fastener
at WS 304.93
Figure 10 (Sheet 3)

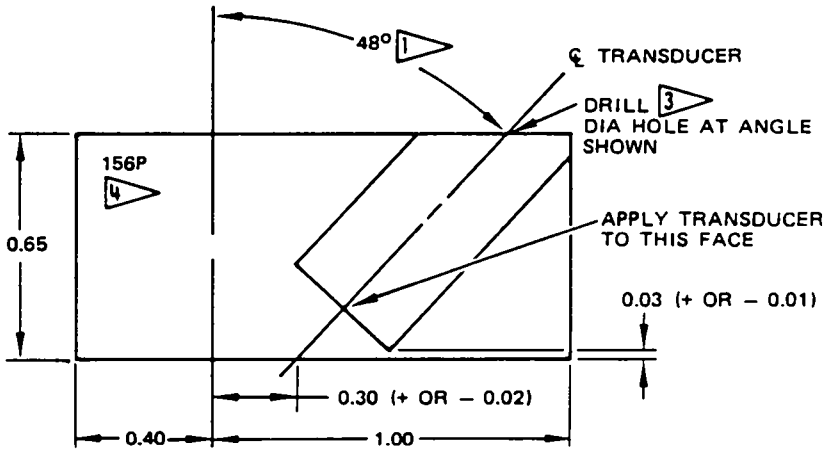


REAR SPAR UPPER CHORD SPLICE ANGLE
MODIFICATION
DETAIL I

Wing Upper Rear Spar Seal Stop Fastener
at WS 304.93
Figure 10 (Sheet 4)



PLAN VIEW

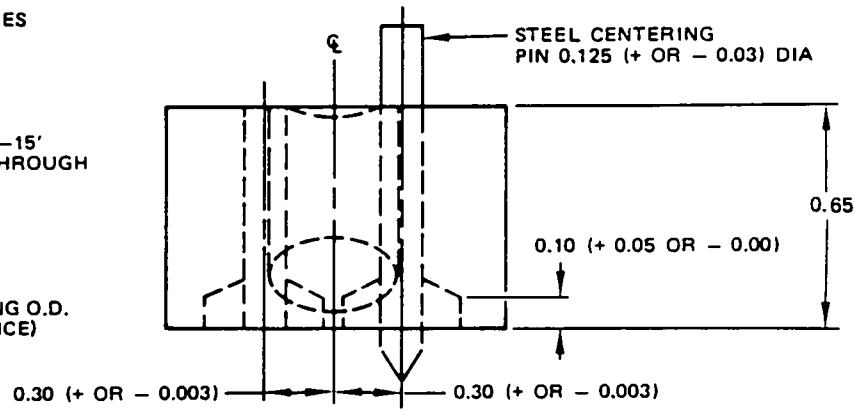


SECTION A–A

NOTES

- ALL DIMENSIONS ARE IN INCHES
- P/N: 6410–23
  AVAILABLE FROM
  IDEAL SPECIALTY CO.

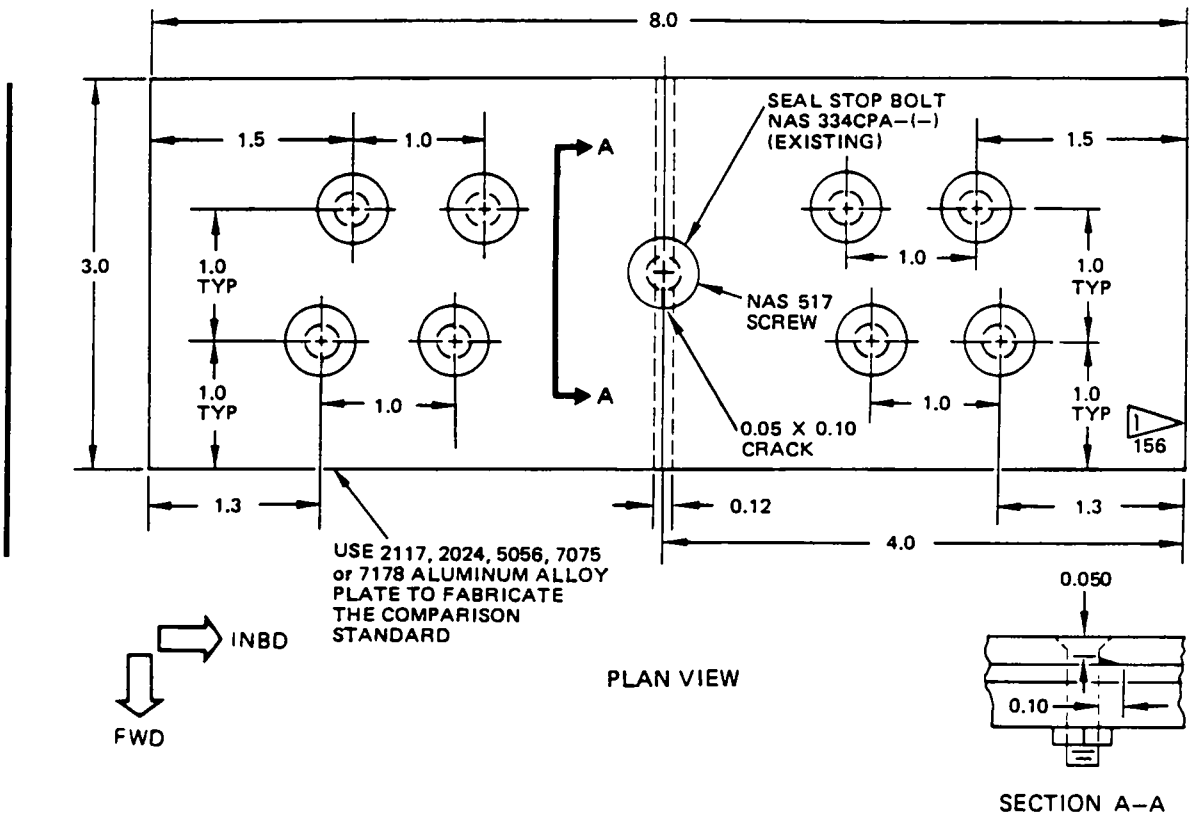
1. CRITICAL TOLERANCE + OR –15'
   ℄ OF SHOE SHOULD PASS THROUGH
   ℄ OF TRANSDUCER.
2. FABRICATE FROM LUCITE
   OR PLEXIGLAS BLOCK
3. DRILL FLAT BOTTOMED HOLE
   TO SUIT TRANSDUCER HOUSING O.D.
   (0.001 TO 0.003 INCH CLEARANCE)
4. ETCH WITH 156P

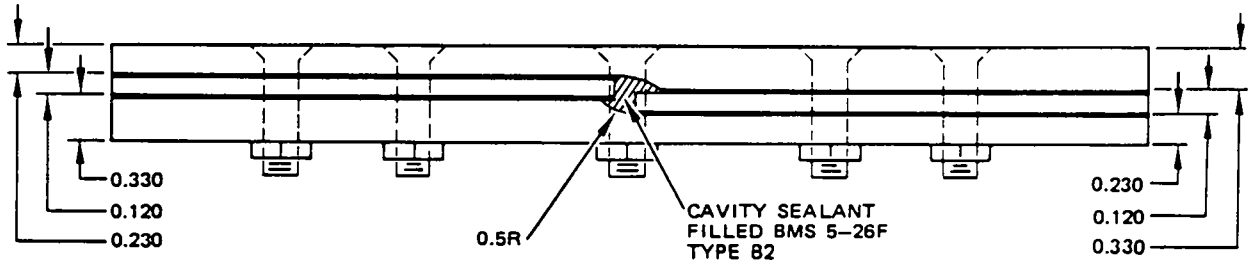


SECTION B–B

FABRICATION OF SPECIAL SHEAR WAVE SHOE
DETAIL II

Wing Upper Rear Spar Seal Stop Fastener at WS 304.93
Figure 10 (Sheet 5)



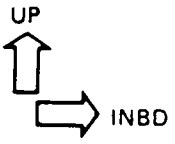


FRONT VIEW

NOTES :

- ALL DIMENSIONS ARE IN INCHES
- P/N: 6411-53
  AVAILABLE FROM
  IDEAL SPECIALTY CO.

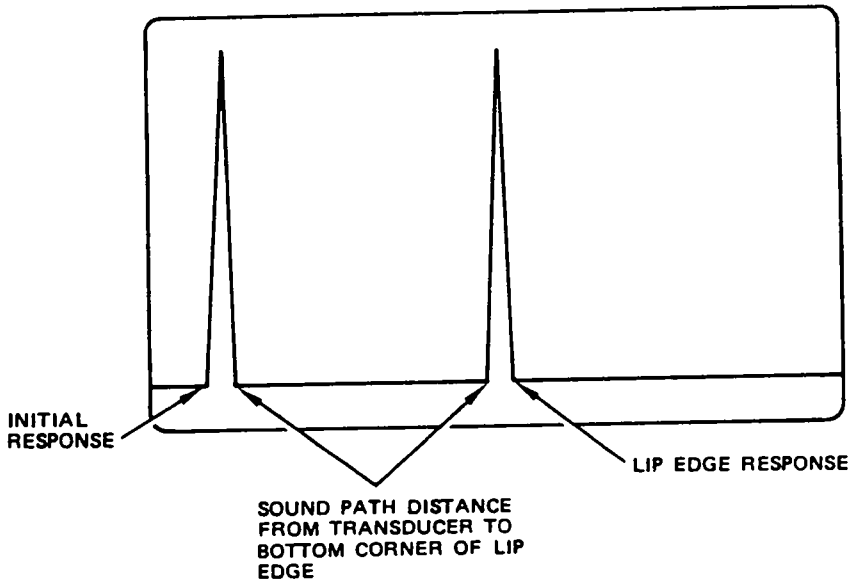
1 ETCH OR STEEL
STAMP WITH 156

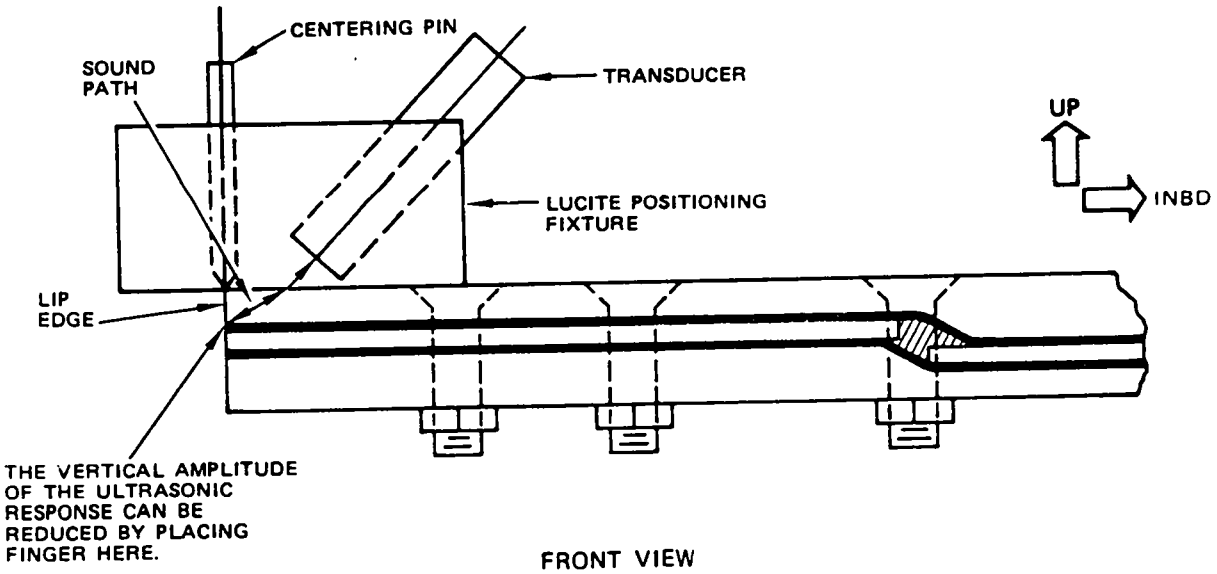


REFERENCE STANDARD

DETAIL III

Wing Upper Rear Spar Seal Stop Fastener at WS 304.93
Figure 10 (Sheet 6)

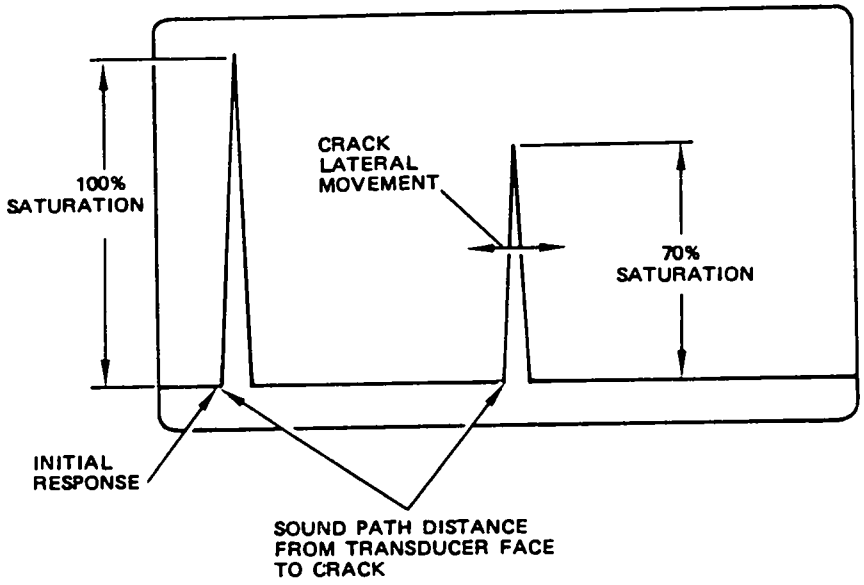


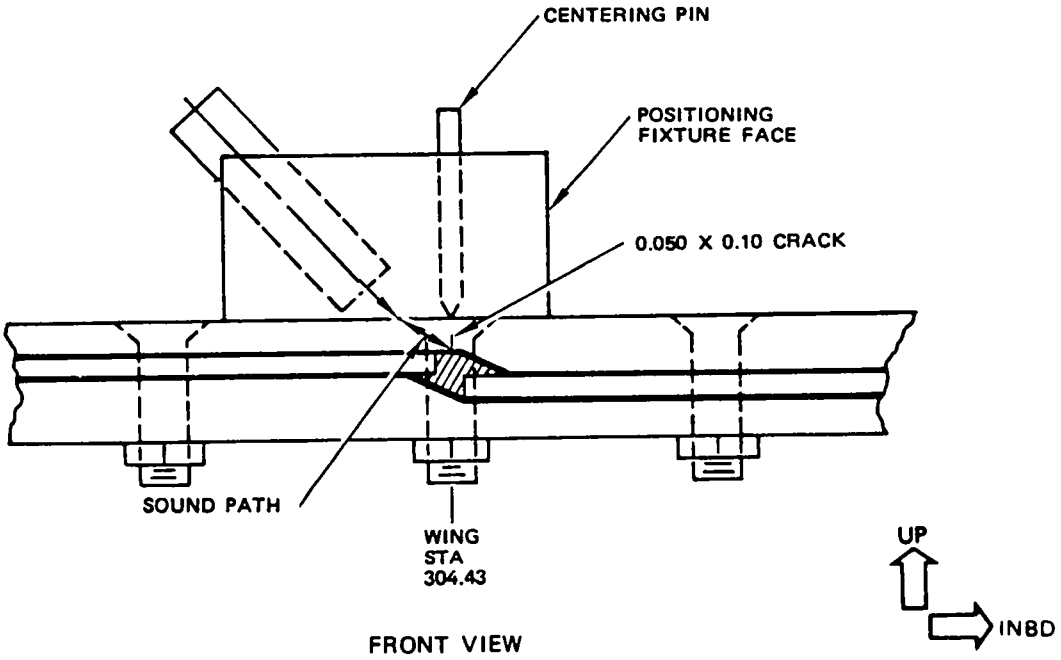


TRANSDUCER ASSEMBLY POSITIONED ON STANDARD TO DETERMINE SOUND PATH RESPONSE LOCATION ON OSCILLOSCOPE SCREEN

DETAIL IV

Wing Upper Rear Spar Seal Stop Fastener
at WS 304.93
Figure 10 (Sheet 7)

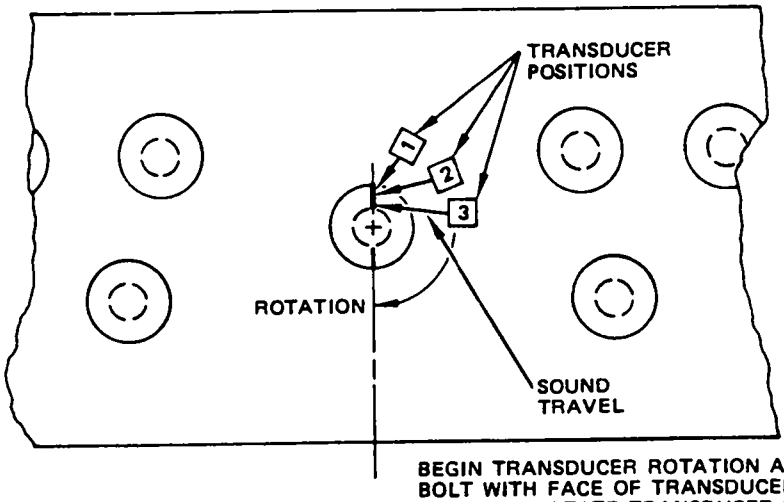




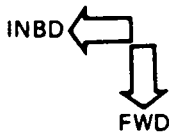
FRONT VIEW

TRANSDUCER ASSEMBLY POSITIONED ON STANDARD
TO ESTABLISH ULTRASONIC CRACK RESPONSE SENSITIVITY
DETAIL V

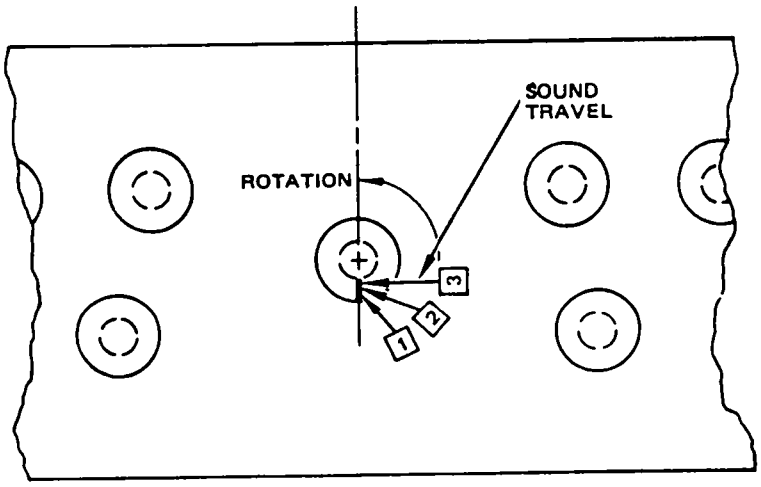
Wing Upper Rear Spar Seal Stop Fastener
at WS 304.93
Figure 10 (Sheet 8)



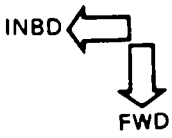
BEGIN TRANSDUCER ROTATION AT AFT SIDE OF BOLT WITH FACE OF TRANSDUCER FACING INBOARD, ROTATE TRANSDUCER 90 DEGREES IN DIRECTION SHOWN ABOVE.



PLAN VIEW



AT FORWARD SIDE OF BOLT WITH TRANSDUCER ALSO FACING INBOARD, CHANGE CENTERING PIN TO OPPOSITE PIN HOLE FROM ABOVE. ROTATE TRANSDUCER 90 DEGREES.



PLAN VIEW

NOTE

[1] [2] [3] ARE FIRST, SECOND AND THIRD TRANSDUCER POSITIONS

ROTATION OF TRANSDUCER POSITION
DETAIL VI

Wing Upper Rear Spar Seal Stop Fastener
at WS 304.93
Figure 10 (Sheet 9)

PART 4 - ULTRASONIC

WINGS - OVERWING ATTACH FITTING AND SKIN

1. Purpose

   A. To detect cracks in the aluminum skins hidden fastener holes common to stringers S-20 and S-21 and nacelle strut overwing attach fitting at upper WBL 315. See Detail I.

2. Equipment

   A. Any ultrasonic equipment satisfying the requirements of this procedure may be used. The following equipment was used during the development of this procedure and found to be acceptable.

      (1) Instrument - Nortec NDT 131, Nortec Corporation.

      (2) Transducers - Two 2.25 MHz, 60 degree, 0.5 x 0.5-inch element, shear wave trandsucers.

      (3) Reference Standard - Fabricate reference standard as shown in Detail II.

      (4) Couplant - Grease, oil or any couplant compatible with airplane structure.

3. Preparation for Inspection

   A. Remove fairings as necessary to gain access to the overwing fitting aft of stringers S-20 and S-21.

   B. Remove loose paint from the skin adjacent to the fastener common to stringers S-20 and S-21 and fairing attach angles.

   C. Sand lightly to remove any surface roughness which would interfere with transducer shoe contact.

   D. Wipe surface clean.

4. Instrument Calibration

   A. Connect the two shear wave transducers to the instrument for sound transmit-receive operation.

   B. Apply couplant to standard and locate transducers (approximately 7 inches apart) so that sound is transmitted tangentially past the unnotched fastener. See Detail III for Transducer Position 1.

Overwing Attach Fitting and Skin
Figure 11 (Sheet 1)

C. Align transmit-receive transducers to detect maximum transmitted ultrasonic signal. Using the instrument's delay circuit, position the received signal at approximately 50% of full screen width.

D. Adjust instruments gain to obtain a received signal that is 90% of maximum amplitude.

E. Move transmit-receive transducers to Position 2, Detail III, and align them so that sound is transmitted tangentially past the row of fasteners with the notched hole. No significant transmitted signal should be obtained. This represents a condition in which a fastener hole crack interrupts the sound path between transmit and receive transducers.

NOTE: If a fastener hole lies in the sound path between transmitting and receiving transducers, a significant loss in transmitted sound signal will occur.

5. Inspection Procedure

A. Apply couplant to skin surface inboard and outboard of the fairing attach clip aft of stringer S-20. See Detail I.

B. Align transmit-receive transducers so that sound is transmitted through the skin and parallel to the stringer-skin fastener line hidden by the overwing fitting. Adjust instrument gain to obtain a 100% of full screen height transmitted signal.

NOTE: If excessive gain is required:

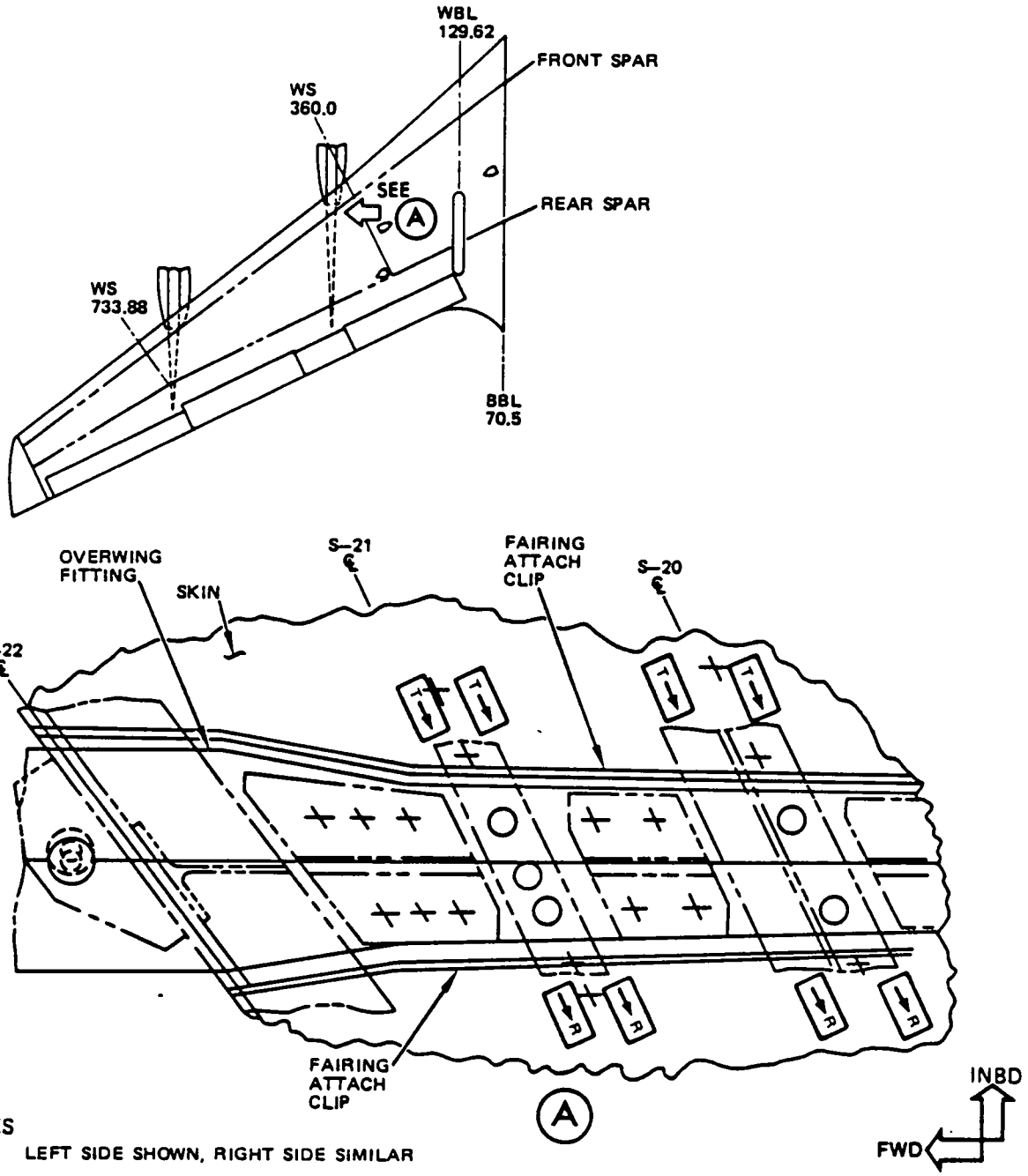
(1) Make sure the transmitted sound is not interrupted by a fastener hole common to skin and fairing clip, external doubler or overwing attach fitting.

(2) Check additional transducer positions to ensure that a crack indication is not the cause of weak or no signal transmission.

(3) Remove paint to ensure satisfactory sound transmission through wing skin surface.

C. Repeat par. 5.B. for forward side of stringer S-20 and the forward and aft side of stringer S-21.

Overwing Attach Fitting and Skin
Figure 11 (Sheet 2)

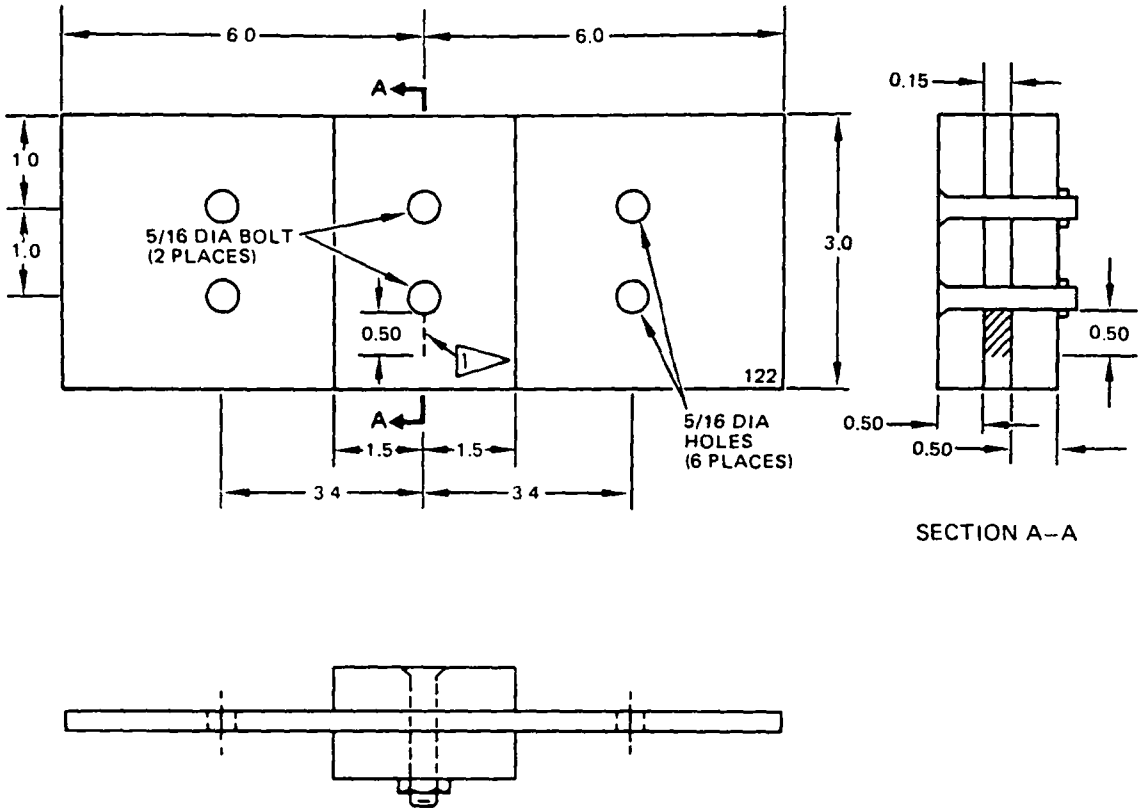


NOTES

- ● LEFT SIDE SHOWN, RIGHT SIDE SIMILAR
- ○ FASTENERS TO BE INSPECTED
- T→ TRANSMITTING TRANSDUCER – PLACE TRANSDUCER ON SKIN TO TRANSMIT SOUND PARALLEL TO STRINGER CENTERLINE. ALIGN WITH RECEIVING TRANSDUCER
- →R RECEIVING TRANSDUCER – PLACE TRANSDUCER ON SKIN. ALIGN WITH TRANSMITTING TRANSDUCER

OVERWING SUPPORT FITTINGS
DETAIL I

Overwing Attach Fitting and Skin
Figure 11 (Sheet 3)



SECTION A–A

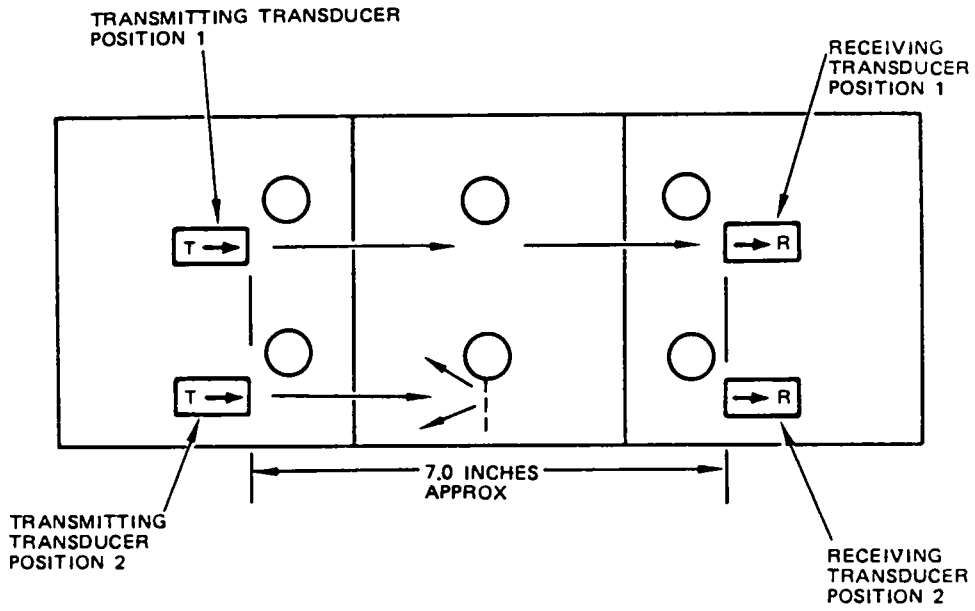
NOTES

- ALL DIMENSIONS ARE IN INCHES
- MATERIAL 2024–T4, 7075–T6 ALUMINUM
- TOLERANCES. X X ± 0 05, X.XX ±0.02
- ETCH OR STEEL STAMP WITH 122
- P/N 6411–127 AVAILABLE FROM IDEAL SPECIALTY CO

1 JEWELER'S SAWCUT 0 030 MAX WIDTH

REFERENCE STANDARD
DETAIL II

Overwing Attach Fitting and Skin
Figure 11 (Sheet 4)



ULTRASONIC INSTRUMENT CALIBRATION
DETAIL III

Overwing Attach Fitting and Skin
Figure 11 (Sheet 5)