

EFFECTIVITY
MODEL: ALL 707 AND 720
SERVICE BULLETIN
REFERENCE: 707-2330

NONDESTRUCTIVE TEST

PART 4 - ULTRASONIC

HORIZONTAL STABILIZER

1. Purpose

- A. To find cracks in the horizontal stabilizer top and bottom front spar clevis lugs. See Details I and II.

2. Equipment

- A. All ultrasonic equipment that can do this procedure are permitted for use.

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

- (1) Instrument - Use an ultrasonic instrument that can operate between 4 and 6 MHz. The instrument specified below was used to make this procedure.

(a) Krautkramer/Branson USL 38,
Krautkramer/Branson Corp.

- (2) Transducer - A 5 MHz longitudinal wave transducer with a 0.25 inch (6.35 millimeter) diameter element. The element is put in a 0.375 inch (9.52 millimeter) diameter by 0.75 inch (19.0 millimeter) long, cylindrical, smooth case. The case has a side connector. The transducer specified below was used to make this procedure.

(a) Krautkramer/Branson Aerotech,
part number 291724700.

B. Reference Standard

- (1) Make reference standard 140. See Detail III.

C. Transducer Position Fixture

- (1) Make transducer position fixture 140P1A. See Detail IV.
Transducer position fixture 140P1A replaces transducer position fixture 140P1.

- (2) Make transducer position fixture 140P2. See Detail V.

- D. Couplant - Use couplant that will not cause damage to the airplane structure.

Horizontal Stabilizer Front Spar Clevis Lugs
Figure 1 (Sheet 1)

NONDESTRUCTIVE TEST

3. Preparation for Inspection

- A. Get access to the center section of the horizontal stabilizer through the jackscrew access panel. See Figure 1, flagnote 4.
- B. Remove the access panels from the bulkhead at body station 1505 (at water line 272.5) for access to the horizontal stabilizer top and bottom front spar clevis lugs. See Figure 1, flagnote 3.

WARNING: DO THE NECESSARY PRECAUTIONS TO PREVENT ACCIDENTAL MOVEMENT OF THE HORIZONTAL STABILIZER. ACCIDENTAL MOVEMENT OF THE HORIZONTAL STABILIZER DURING THE INSPECTION CAN CAUSE INJURY TO PERSONNEL.

- C. Make sure the clevis lug inspection areas are clean and free from dirt and loose paint.

4. Instrument Calibration

- A. Instrument calibration for the inboard side of the clevis lug hole.
 - (1) Connect the transducer to the instrument and adjust the instrument controls.
 - (2) Put the transducer in transducer position fixture 140PlA. See Detail IV.
 - (3) Put the transducer position fixture on the reference standard so that the sound beam points at the inboard notch. See Detail VI, position A.
 - (4) Move the transducer to get a maximum response signal on the instrument screen display from the inboard notch. Adjust the instrument controls to position the inboard notch response signal at 70 percent of full screen height and 80 percent of full screen width. See Detail VI, position A, flagnotes 1 and 2.
 - (5) Move the transducer in the inspection area to and away from the inboard notch and monitor the notch response signal. The notch response signal will move laterally from 70 to 90 percent (approximately) of full screen width. See Detail VI, flagnote 3.

NOTES: (a) The response signal amplitude will change as the transducer moves to and away from the inboard notch.

Horizontal Stabilizer Front Spar Clevis Lugs
Figure 1 (Sheet 2)

NONDESTRUCTIVE TEST

- (b) If the transducer is moved too far around the reference standard radius a signal from the reference standard hole will be seen on the screen display at 65 to 70 percent (approximately) of full screen width. The signal will not move laterally on the instrument screen display as the transducer is moved around the reference standard radius above the hole. See Detail VI, position B, flagnote 4.

B. Instrument calibration for the outboard side of the clevis lug hole.

- (1) Do paragraphs 4.A.(1) and 4.A.(2) with position fixture 140P2. See Detail V.
- (2) Put the transducer position fixture on the reference standard so that the sound beam points at the outboard notch. See Detail VII, position C.
- (3) Move the transducer to get a maximum response signal on the instrument screen display from the outboard notch. Adjust the instrument controls to position the outboard notch response signal at 70 percent of full screen height and 80 percent of full screen width. See Detail VII, position C, flagnotes 1 and 2.
- (4) Move the transducer in the inspection area to and away from the outboard notch and monitor the notch response signal. The notch response signal will move laterally from 80 to 85 percent (approximately) of full screen width. See Detail VII, flagnote 3.

NOTE: If the transducer is moved too far to the center of the reference standard hole a response signal from the hole will be seen on the screen display at 55 percent (approximately) of full screen width. See Detail VII, position D, flagnote 4.

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5. Inspection Procedure

A. Inspection procedure for the inboard side of the clevis lug hole.

- (1) Calibrate the instrument as specified in paragraph 4.A.
- (2) Put the transducer position fixture on the inspection surface of the clevis lug. See Detail VIII, flagnotes 1 and 2. Make sure that the transducer position fixture fully touches the clevis lug radius. If the transducer position fixture does not fit the radius of the clevis lug:
 - (a) Put sandpaper on the radius of the clevis lug.
 - (b) Lightly move the transducer position fixture in the inspection area to get a transducer position fixture curvature that is the same as the clevis lug radius.
 - (c) Do the calibration specified in paragraph 4.A.
- (3) Put couplant on the clevis lug surface that the transducer position fixture will touch. See Detail VIII, inspection area surface.
- (4) Put the transducer position fixture on the inspection surface of the clevis lug so that the sound beam points to the inboard side of the clevis lug hole. Move the transducer in the inspection area. See Detail VIII, flagnotes 1 and 2.

NOTE: A lug hole response signal will be seen on the instrument screen display at 65 to 70 percent (approximately) of full screen width if the transducer is moved too far inboard. Compare this response signal with the calibration response signal (see note b of paragraph 4.A.(5) and Detail VI, flagnote 4, transducer position B).

- (5) If the response signal from the lug hole is not approximately the same full screen height as in Detail VI, flagnote 4, transducer position B, increase the instrument sensitivity a maximum of 6 dB.

NOTE: The response signal from the lug hole on the instrument screen display will make sure that sound is being transmitted into the lug satisfactorily.

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- (6) Move the transducer to do an inspection of the forward inboard side of the lug hole. See Detail VIII, flagnote 3.
 - (7) Make a list of all response signals on the screen display that are equal to or more than 40 percent of full screen height and between 70 to 90 percent of full screen width. Compare the response signal with the response signal of Detail VI, flagnote 3.
- B. Inspection procedure for the outboard side of the clevis lug hole.
- (1) Calibrate the instrument as specified in paragraph 4.B.
 - (2) Put couplant on the clevis lug surface that the transducer position fixture will touch. See Detail VIII, inspection area surface.
 - (3) Put the transducer position fixture on the inspection surface of the clevis lug so that the sound beam points to the outboard side of the clevis lug. Move the transducer in the inspection area. See Detail VIII, flagnotes 4 and 5.
- NOTE: If the transducer is moved too far to the center of the clevis lug hole, a lug hole response signal will be seen on the instrument screen display at 55 percent of full screen width. It is also possible to get bushing response signals at 65 and 70 percent (approximately) of full screen width. See the instrument screen response shown in Detail IX.
- (4) If the response signals from the lug hole are not the same (approximately) height as shown in Detail IX, increase the instrument sensitivity to a maximum of 6 dB.
 - (5) Move the transducer to do an inspection aft of the outboard side of the clevis lug hole. See Detail VIII, flagnote 6.
 - (a) A response signal from the lug hole that shows on the instrument screen display tells you that sound is transmitted into the lug satisfactorily.
 - (6) Make a list of all response signals on the screen display that are equal to or more than 40 percent of full screen height and between 80 to 85 percent of full screen width. Compare the response signals with the response signals of Detail VII, flagnote 3.

Horizontal Stabilizer Front Spar Clevis Lugs
Figure 1 (Sheet 5)

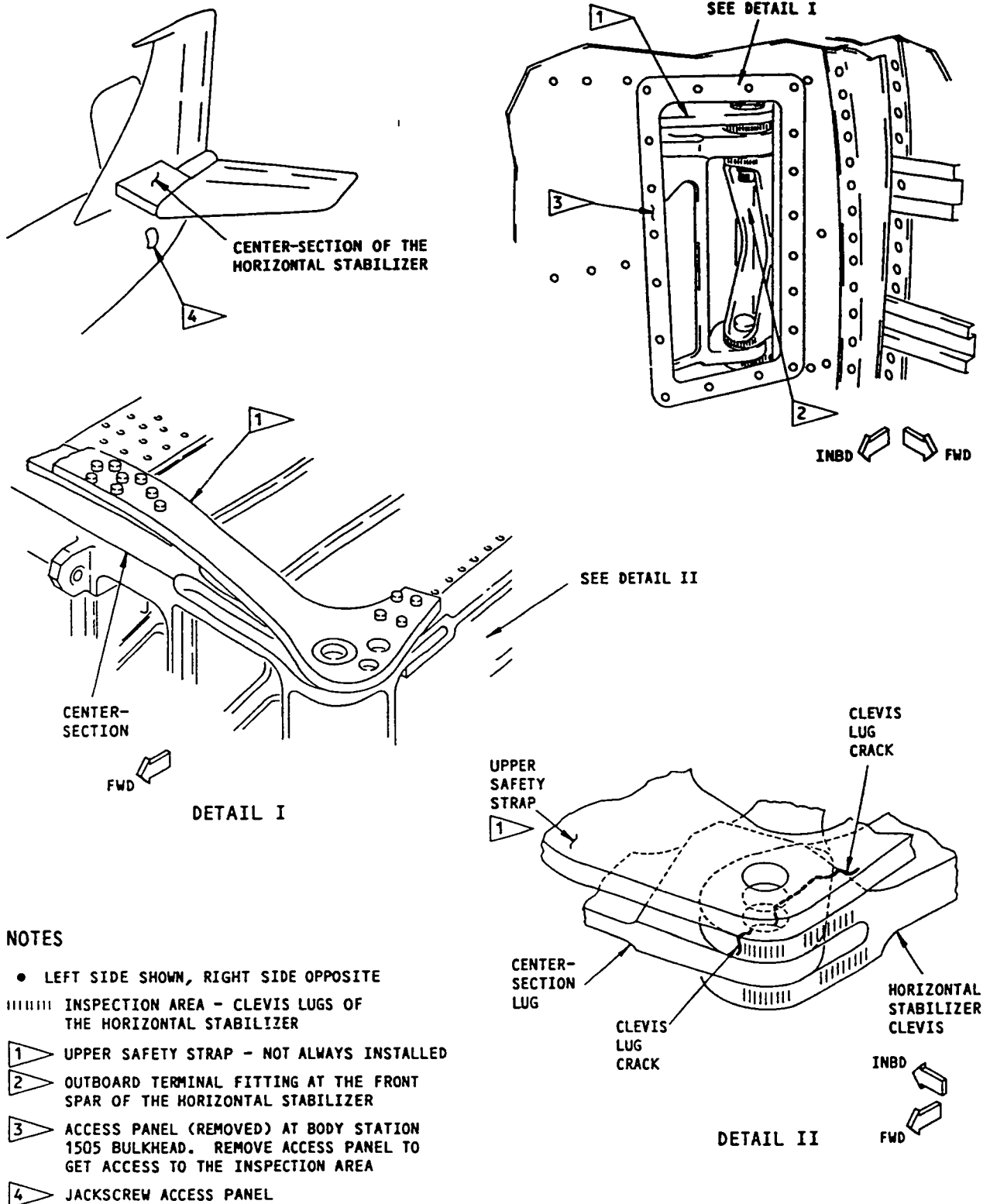
NONDESTRUCTIVE TEST

6. Inspection Results

- A. For the inspection of the inboard side of the clevis lug hole, an indication of a possible crack is:
 - A response signal that is 40 percent or more of the full screen height and from 75 to 90 percent of the full screen width.
- B. For the inspection of the outboard side of the clevis lug hole, an indication of a possible crack is:
 - A response signal that is 40 percent or more of the full screen height and from 80 to 85 percent of the full screen width.
- C. A possible crack can be examined with a surface eddy current inspection, after removal of the terminal bolt and bushing. See Section 51-00-00, Figure 1 or Figure 4.

NOTE: Removal of the horizontal stabilizer from the airplane will be necessary to do this eddy current inspection.

NONDESTRUCTIVE TEST

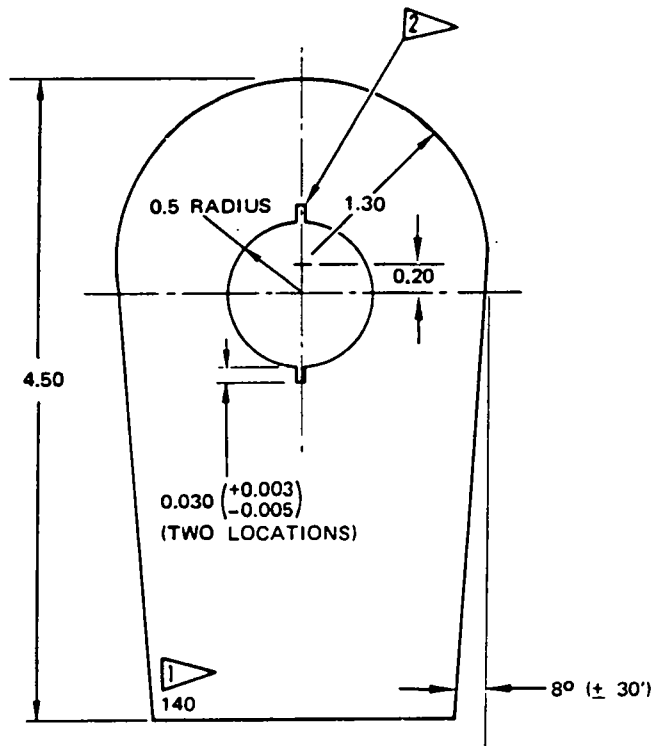
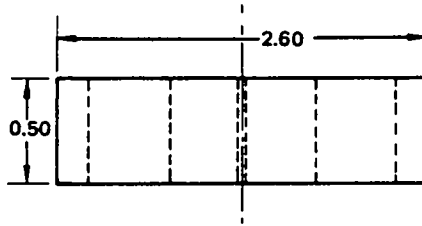


NOTES

- LEFT SIDE SHOWN, RIGHT SIDE OPPOSITE
- ||||| INSPECTION AREA - CLEVIS LUGS OF THE HORIZONTAL STABILIZER
- 1 UPPER SAFETY STRAP - NOT ALWAYS INSTALLED
- 2 OUTBOARD TERMINAL FITTING AT THE FRONT SPAR OF THE HORIZONTAL STABILIZER
- 3 ACCESS PANEL (REMOVED) AT BODY STATION 1505 BULKHEAD. REMOVE ACCESS PANEL TO GET ACCESS TO THE INSPECTION AREA
- 4 JACKSCREW ACCESS PANEL

Horizontal Stabilizer Front Spar Clevis Lugs
Figure 1 (Sheet 7)

NONDESTRUCTIVE TEST



NOTES

- ALL DIMENSIONS ARE IN INCHES
- MAKE FROM ALUMINUM
- TOLERANCE (UNLESS SHOWN DIFFERENTLY):
X X = ± 0 050
X .XX = ± 0 025
X XXX = ± 0 005

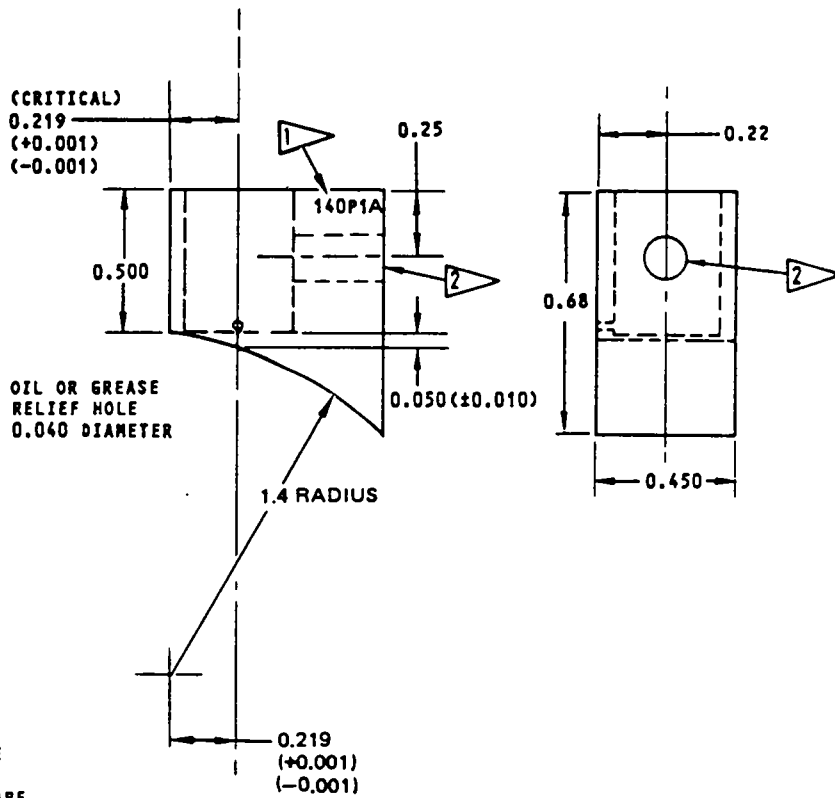
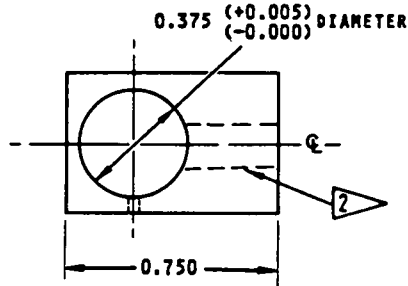
 ETCH OR STEEL STAMP NUMBER 140 HERE

 EDM NOTCH OR SAWCUT 0.030 MAXIMUM WIDTH

REFERENCE STANDARD 140
DETAIL III

Horizontal Stabilizer Front Spar Clevis Lugs
Figure 1 (Sheet 8)



BOEING 
COMMERCIAL JET
 NONDESTRUCTIVE TEST



NOTES

- MAKE FROM LUCITE
- ALL DIMENSIONS ARE IN INCHES
- TOLERANCE (UNLESS SHOWN DIFFERENTLY):

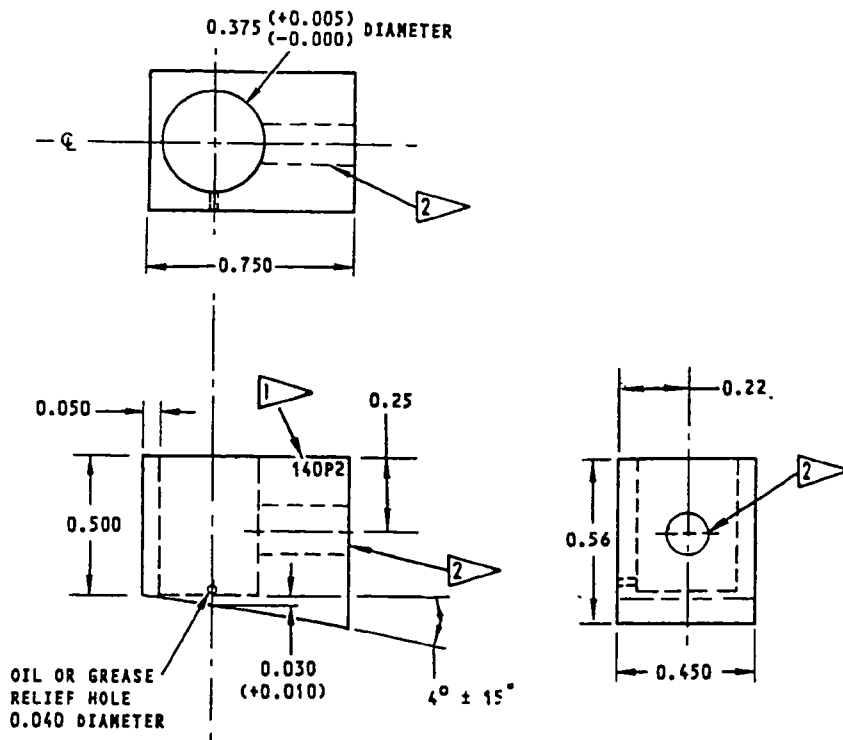
X.X = ±0.050
 X.XX = ±0.010
 X.XXX = ±0.005

-  1 ETCH WITH 140P1A
-  2 DRILL AND TAP FOR 10-32 SET SCREW

TRANSDUCER POSITION FIXTURE 140P1A
 DETAIL IV

Horizontal Stabilizer Front Spar Clevis Lugs
 Figure 1 (Sheet 9)


NONDESTRUCTIVE TEST




TRANSDUCER POSITION FIXTURE 140P2
 DETAIL V

NOTES

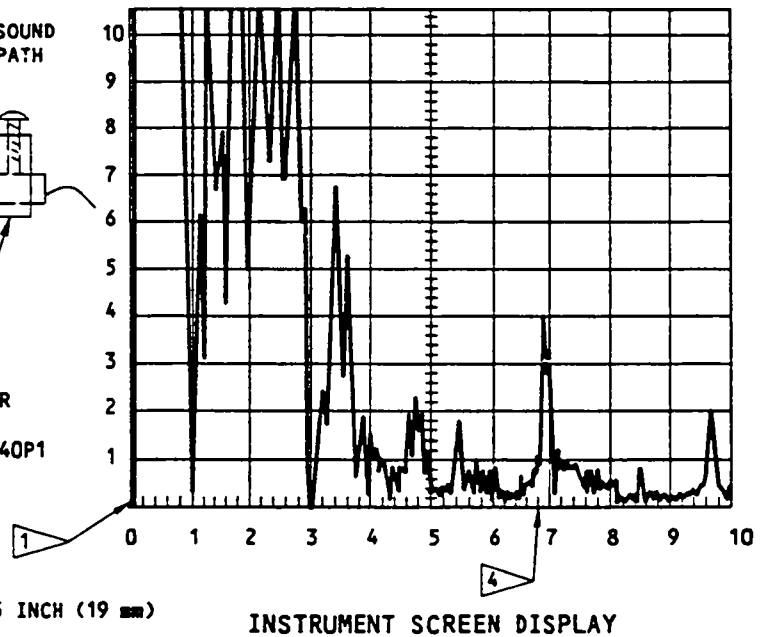
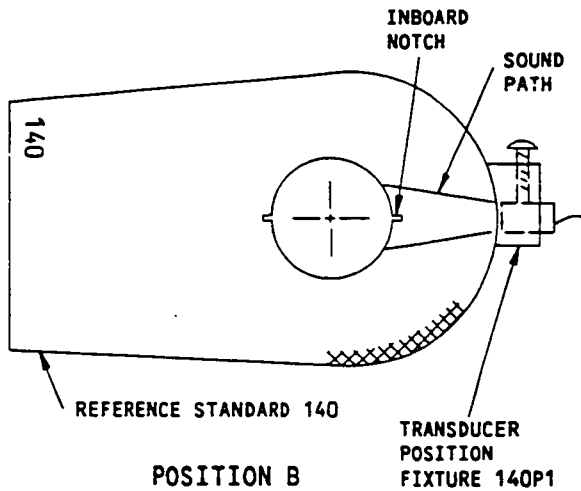
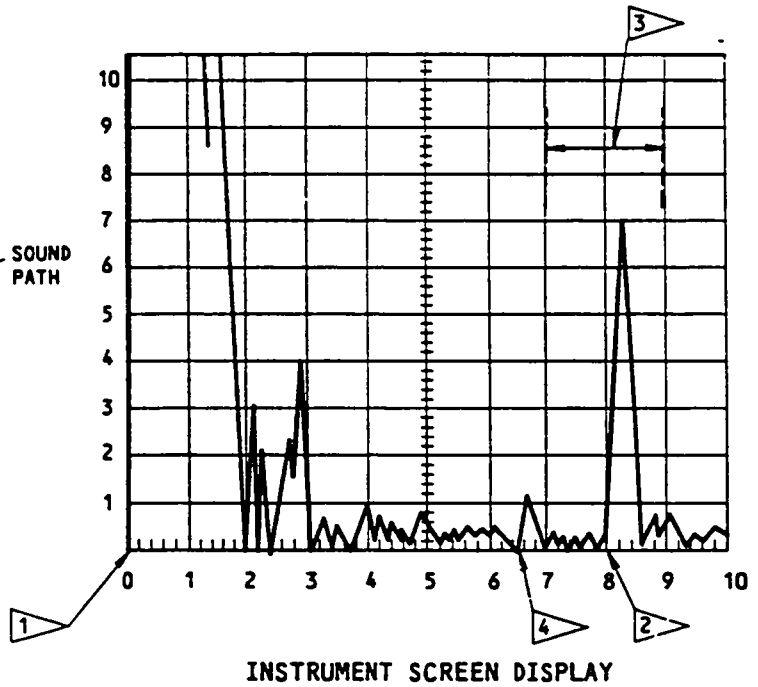
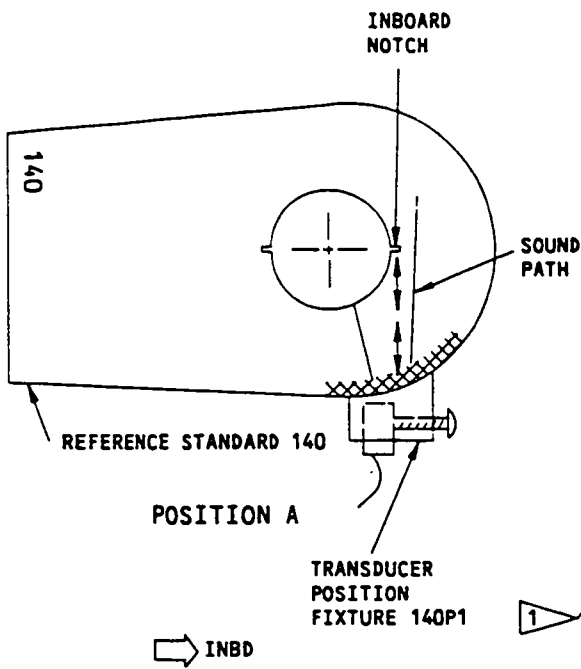
- MAKE FROM LUCITE
- ALL DIMENSIONS ARE IN INCHES
- TOLERANCE (UNLESS SHOWN DIFFERENTLY):
 X.X = ±0.050
 X.XX = ±0.010
 X.XXX = ±0.005

 ETCH WITH NUMBER
 140P2 HERE

 DRILL AND TAP FOR
 10-32 SET SCREW

Horizontal Stabilizer Front Spar Clevis Lugs
 Figure 1 (Sheet 10)

NONDESTRUCTIVE TEST



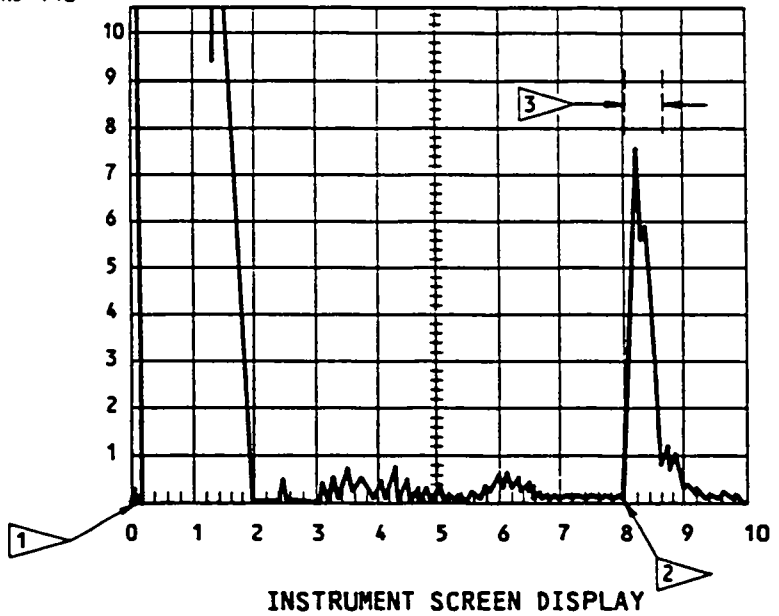
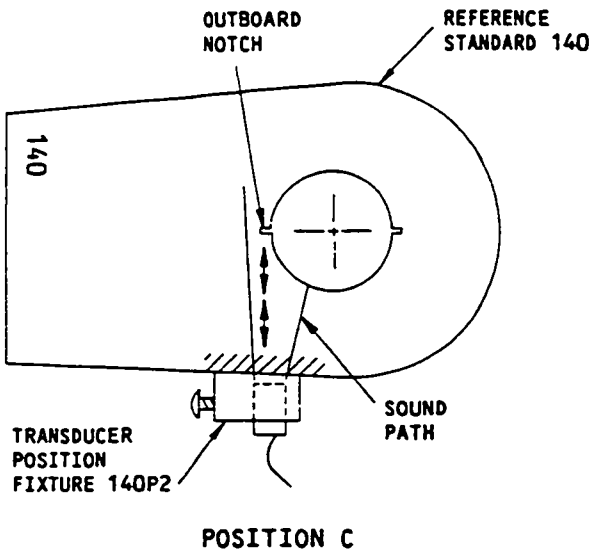
NOTES

- ☒ INSPECTION AREA - APPROXIMATELY 0.75 INCH (19 mm)
- 1 SOUND INITIAL PULSE
- 2 NOTCH RESPONSE SIGNAL AT 80 PERCENT OF FULL SCREEN WIDTH
- 3 LATERAL MOVEMENT OF THE NOTCH RESPONSE SIGNAL WHEN THE TRANSDUCER IS MOVED TO OR AWAY FROM THE NOTCH
- 4 HOLE RESPONSE SIGNAL AT APPROXIMATELY 65 TO 70 PERCENT OF FULL SCREEN WIDTH

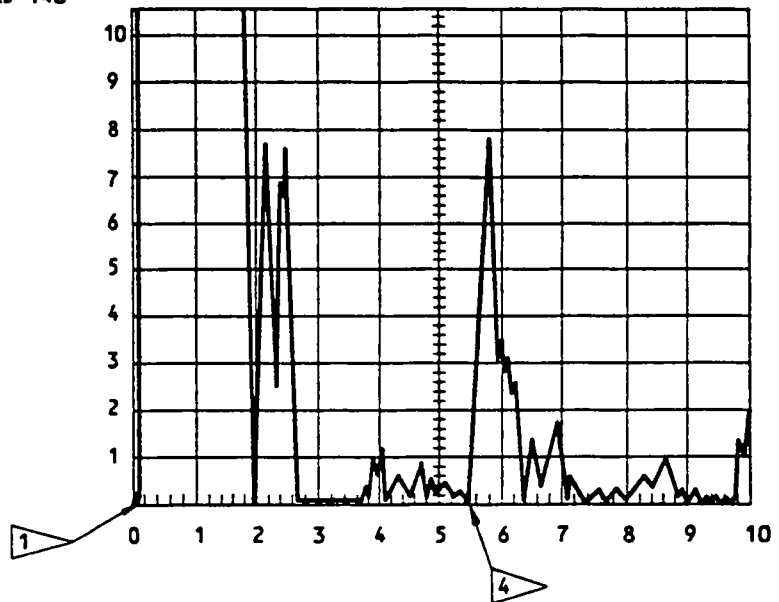
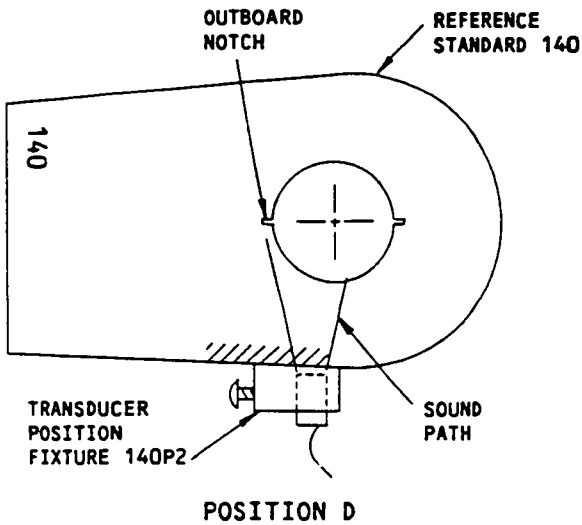
**CALIBRATION FOR THE INBOARD SIDE OF THE CLEVIS LUG HOLE
 DETAIL VI**

Horizontal Stabilizer Front Spar Clevis Lugs
 Figure 1 (Sheet 11)

NONDESTRUCTIVE TEST



INBD



NOTES

//// INSPECTION AREA - APPROXIMATELY 0.5 INCH (12.7 mm)

1 SOUND INITIAL PULSE

2 NOTCH RESPONSE SIGNAL AT 80 PERCENT OF FULL SCREEN WIDTH

3 LATERAL MOVEMENT OF THE NOTCH RESPONSE SIGNAL WHEN THE TRANSDUCER IS MOVED TO OR AWAY FROM THE NOTCH

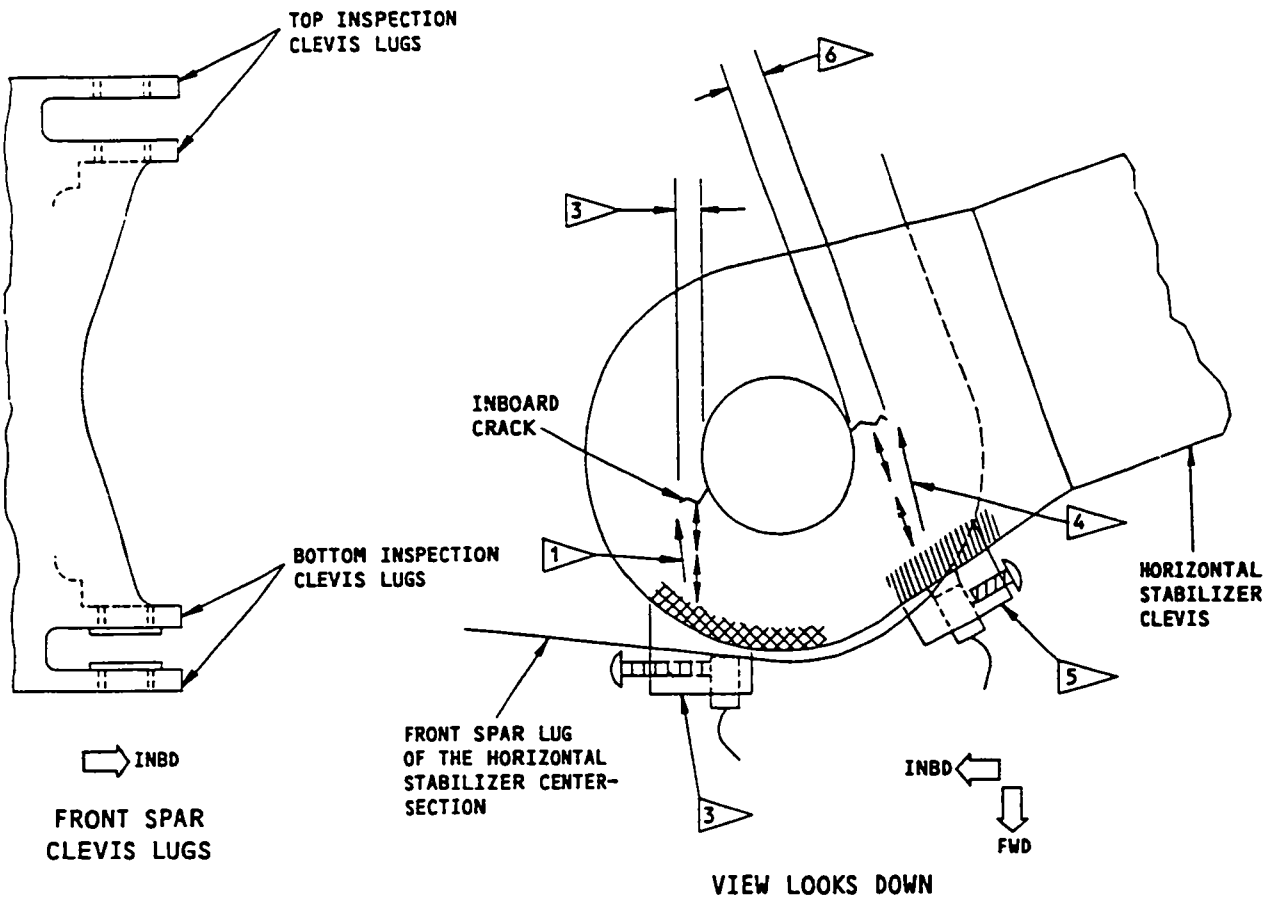
4 HOLE RESPONSE SIGNAL AT 55 PERCENT OF FULL SCREEN WIDTH

INSTRUMENT SCREEN DISPLAY

**CALIBRATION FOR THE OUTBOARD SIDE OF THE CLEVIS LUG HOLE
DETAIL VII**

Horizontal Stabilizer Front Spar Clevis Lugs
Figure 1 (Sheet 12)

NONDESTRUCTIVE TEST



NOTES

INSPECTION OF THE FORWARD/INBOARD SIDE OF THE CLEVIS LUG HOLE

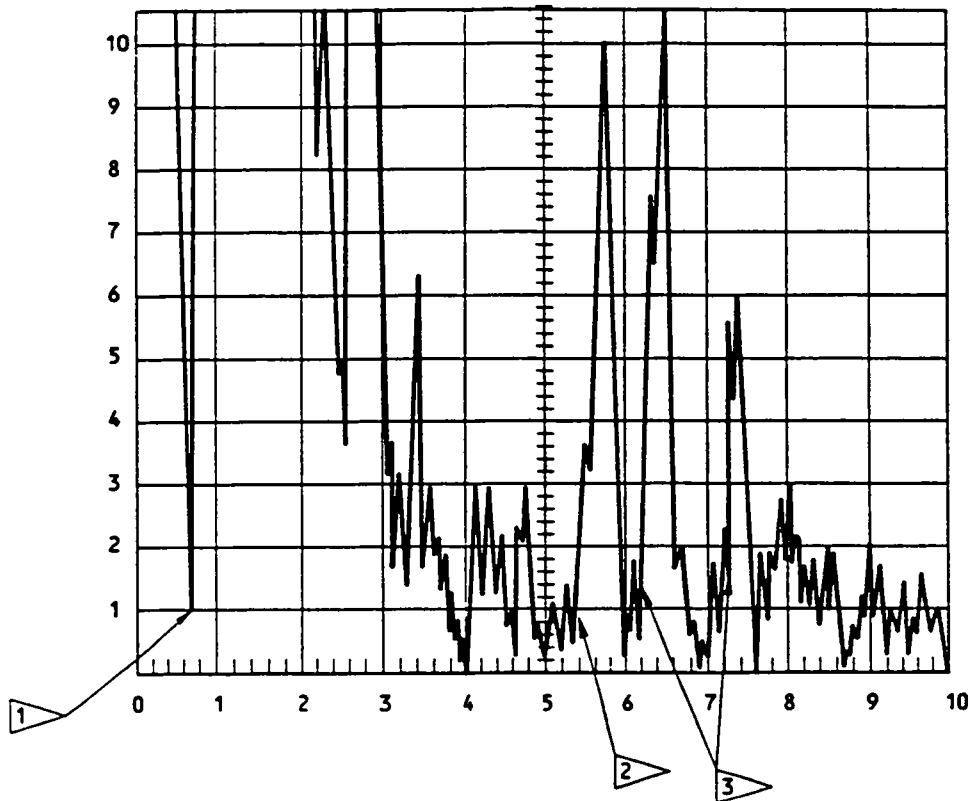
- ▨▨▨▨ INSPECTION AREA - FORWARD/INBOARD SIDE OF THE CLEVIS LUG HOLE
- 1 SOUND BEAM DIRECTION
- 2 PUT THE TRANSDUCER POSITION FIXTURE ON THE INBOARD SIDE OF THE CLEVIS LUG HOLE. MOVE THE TRANSDUCER OUTBOARD TO THE CLEVIS LUG HOLE AND STOP WHEN A RESPONSE SIGNAL IS GOTTEN FROM THE CLEVIS LUG HOLE
- 3 MOVE THE TRANSDUCER INBOARD AWAY FROM THE CLEVIS LUG HOLE 0.30 (7.6 mm) (APPROXIMATELY) AND LOOK FOR A RESPONSE SIGNAL ON THE INSTRUMENT SCREEN DISPLAY THAT IS AT 75 TO 90 PERCENT OF FULL SCREEN WIDTH

INSPECTION OF THE AFT/OUTBOARD SIDE OF THE CLEVIS LUG HOLE

- ▨▨▨▨ INSPECTION AREA - AFT/OUTBOARD SIDE OF THE CLEVIS LUG HOLE
- 4 SOUND BEAM DIRECTION
- 5 PUT THE TRANSDUCER POSITION FIXTURE ON THE OUTBOARD SIDE OF THE CLEVIS LUG HOLE. MOVE THE TRANSDUCER INBOARD TO THE CLEVIS LUG HOLE AND STOP WHEN A RESPONSE SIGNAL IS GOTTEN FROM THE CLEVIS LUG HOLE
- 6 MOVE THE TRANSDUCER OUTBOARD AWAY FROM THE CLEVIS LUG HOLE 0.30 (7.6 mm) (APPROXIMATELY) AND LOOK FOR A RESPONSE SIGNAL ON THE INSTRUMENT SCREEN DISPLAY THAT IS AT 80 TO 85 PERCENT OF FULL SCREEN WIDTH

LEFT SIDE SHOWN, RIGHT SIDE OPPOSITE
 DETAIL VIII
 Horizontal Stabilizer Front Spar Clevis Lugs
 Figure 1 (Sheet 13)

NONDESTRUCTIVE TEST



INSTRUMENT SCREEN DISPLAY

NOTES

- OUTBOARD SIDE OF THE CLEVIS LUG
- INSTRUMENT SCREEN DISPLAY WHEN TRANSDUCER IS MOVED TOO FAR TO THE CENTER OF THE LUG HOLE

- 1 SOUND INITIAL PULSE
- 2 LUG HOLE RESPONSE SIGNAL AT 55 PERCENT OF FULL SCREEN WIDTH
- 3 BUSHING RESPONSE SIGNALS AT 65 AND 70 PERCENT OF FULL SCREEN WIDTH

**LUG HOLE AND BUSHING RESPONSE SIGNALS
DETAIL IX**

**Horizontal Stabilizer Front Spar Clevis Lugs
Figure 1 (Sheet 14)**

EFFECTIVITY
MODEL: ALL 707 AND 720
MAINTENANCE PLANNING
DOCUMENT REFERENCE: NONE
SERVICE BULLETIN
REFERENCE: 707-2959

NONDESTRUCTIVE TEST

PART 4 - ULTRASONIC

HORIZONTAL STABILIZER

1. Purpose

- A. To find cracks in the upper and lower front spar lugs of the horizontal stabilizer center-section. See Detail I.

2. Equipment

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

- A. Ultrasonic equipment that can do this procedure are satisfactory for use.

- (1) Instrument - Use an ultrasonic instrument that can operate between 4 and 6 MHz. The instrument specified below was used to make this procedure.

- (a) Krautkramer/Branson USL 38,
Krautkramer/Branson Corp.

- (2) Transducer - A 5 MHz longitudinal wave transducer with a 0.25 inch (6.35 mm) diameter element. The element is put in a 0.375 inch (9.52 mm) diameter by 0.75 inch (19.0 mm) long, cylindrical, smooth case. The case has a side connector. The transducer specified below was used to make this procedure.

- (a) Krautkramer/Branson Aerotech,
part number 291724700.

- B. Reference Standard

- (1) Make reference standard 141. See Detail III.

- C. Transducer Position Fixture

- (1) Make transducer position fixture 141P1. See Detail IV.

- (2) Make transducer position fixture 141P2. See Detail V.

- D. Couplant - Use couplant that will not cause damage to the airplane structure.

Horizontal Stabilizer Center-Section Front Spar Lugs
Figure 2 (Sheet 1)

NONDESTRUCTIVE TEST

3. Preparation for Inspection

- A. Get access to the horizontal stabilizer center-section through the jackscrew access panel 1185. See Detail I, flagnote 3.
- B. Remove the access panels from the bulkhead at body station 1505 (at water line 272.5 [approximately]) for access to the front lugs of the horizontal stabilizer center-section. See Detail I, flagnote 2 and Part 1, 51-01-07, Figure 1.

WARNING: DO THE NECESSARY PRECAUTIONS TO PREVENT ACCIDENTAL MOVEMENT OF THE HORIZONTAL STABILIZER. ACCIDENTAL MOVEMENT OF THE HORIZONTAL STABILIZER DURING THE INSPECTION CAN CAUSE INJURY TO PERSONNEL.

- C. Make sure the lug inspection areas are clean and free from dirt and loose paint.

4. Instrument Calibration

- A. Instrument calibration with transducer position fixture 141P1 for the inboard and outboard sides of the center-section lug holes.
 - (1) Connect the transducer to the instrument and make the initial adjustments to the instrument controls.
 - (2) Put the transducer in transducer position fixture 141P1. See Detail IV.
 - (3) Put the transducer position fixture (141P1) on the reference standard so that the sound beam points at the outboard notch. See Detail VI, flagnote 1.
 - (4) Move the transducer to get a maximum response from the outboard notch on the instrument screen display. Adjust the instrument controls to put the outboard notch response at 80 percent of full screen height and 80 percent of full screen width. See Detail VI, flagnote 2.
 - (5) Move the transducer to and away from the outboard notch and monitor the notch response. The notch response will move laterally from 70 to 90 percent (approximately) of full screen width. See Detail VI, flagnote 3.

NOTES: (a) The notch response amplitude will change on the instrument screen display as the transducer is moved to and away from the outboard notch.

Horizontal Stabilizer Center-Section Front Spar Lugs
Figure 2 (Sheet 2)

NONDESTRUCTIVE TEST

- (b) A response signal from the reference standard hole will be seen at 15 percent of full screen height and 65 percent (approximately) of full screen width. The signal will not move laterally on the instrument screen display as the transducer is moved around the reference standard radius above the hole. See Detail VI, flagnote 4.
- (6) Put the transducer position fixture (141P1) on the reference standard so that the sound beam points away from the outboard notch to the inboard notch. Monitor the instrument screen display. No response signal will be seen other than the reference standard hole response. See paragraph 4.A.(5), Note (b).
- B. Instrument calibration with the (flat) transducer position fixture (141P2) for the inboard side of the center-section lug holes.
 - (1) Connect the transducer to the instrument and make the initial adjustment to the instrument controls.
 - (2) Put the transducer in the (flat) transducer position fixture 141P2. See Detail V.
 - (3) Put the (flat) transducer position fixture (141P2) on the reference standard so that the sound beam points at the inboard notch. See Detail VII, flagnote 1.
 - (4) Move the transducer to get a maximum response on the instrument screen display from the inboard notch. Adjust the instrument controls to put the inboard notch response at 80 percent of full screen height and 80 percent of full screen width. See Detail VII, flagnote 2.
 - (5) Move the transducer to and away from the outboard notch and monitor the notch response. The notch response will move laterally from 80 to 85 percent (approximately) of full screen width. See Detail VII, flagnote 3.

NOTES: (a) The notch response amplitude will change on the instrument screen display as the transducer is moved to and away from the inboard notch.

- (b) A response signal from the reference standard hole will be seen on the instrument screen display at 60 percent (approximately) when the transducer is moved to the radius of the reference standard. See Detail VII, flagnotes 4 and 5.
- (6) Put the transducer position fixture on the reference standard so that the sound beam points away from the inboard notch to the outboard notch. Monitor the instrument screen display; no response signal will be seen other than the reference standard hole response, see paragraph 4.B.(5), Note (b).

Horizontal Stabilizer Center-Section Front Spar Lugs
Figure 2 (Sheet 3)

NONDESTRUCTIVE TEST

5. Inspection Procedure

- A. Inspection with transducer position fixture 141P1. Inspection of the inboard and outboard sides of the center-section lug hole is necessary with transducer position fixture 141P1.
- (1) Calibrate the instrument as specified in paragraph 4.A.
 - (2) Put the transducer position fixture (141P1) on the lug inspection surface of the horizontal stabilizer center-section. See Detail VIII, flagnotes 1 and 2. Make sure that the transducer position fixture fully touches the lug radius. If the transducer position fixture does not fit the radius of the lug:
 - (a) Put sandpaper on the radius of the lug.
 - (b) Lightly move the transducer position fixture in the inspection area to get a transducer position fixture curvature that is the same as the lug radius.
 - (c) Do the calibration specified in paragraph 4.A.
 - (3) Put couplant on the lug surface that the transducer position fixture will touch. See Detail VIII inspection surface area.
 - (4) Put the transducer position fixture (141P1) on the inspection surface of the center-section lug. Make sure the sound beam points at the forward/inboard side of the center-section lug hole. See Detail VIII, flagnote 1.
 - (5) Move the transducer in the inspection area as specified in Detail VIII, flagnote 2.

NOTE: A lug hole response signal will be seen on the instrument screen display at 15 percent of full screen height and 65 percent (approximately) of full screen width. It is possible to get a response signal from the bushing at 70 percent of full screen width. Compare the response signal with the response signal of Detail VI, flagnote 4.

- (6) Increase the instrument sensitivity a maximum of 6 dB, if necessary, to get a response signal from the lug hole that is the same height as shown in Detail VI, flagnote 4.
- (7) Move the transducer to do an inspection of the forward/inboard side of the lug hole as specified in Detail VIII, flagnote 3.
- (8) Make a list of all response signals on the instrument screen display that are equal to or more than 40 percent of full screen height and between 75 to 90 percent of full screen width. Compare the response signals with the response signals of Detail VI, flagnote 3.

Horizontal Stabilizer Center-Section Front Spar Lugs
Figure 2 (Sheet 4)

NONDESTRUCTIVE TEST

- (9) Turn the transducer position fixture (141P1) in the opposite direction to do an inspection of the outboard side of the center-section lug hole. See Detail VIII, flagnotes 4 and 5.
- (10) Check the instrument calibration as specified in paragraph 4.A.
- (11) Put the transducer position fixture (141P1) on the inspection surface of the center-section lug. Make sure the sound beam points at the aft/outboard side of the center-section lug hole. See Detail VIII, flagnote 4.
- (12) Move the transducer in the inspection area as specified in Detail VIII, flagnote 5.

NOTE: A lug hole response signal will be seen on the instrument screen display at 15 percent of full screen height and 65 percent (approximately) of full screen width. It is possible to get a response signal from the bushing at 70 percent of full screen width. Compare the lug hole response signal with the response signal of Detail VI, flagnote 4.

- (13) Move the transducer to do an inspection of the aft/outboard side of the lug hole as specified in Detail VIII, flagnote 6.
- (14) Make a list of all response signals on the instrument screen display that are equal to or more than 40 percent of full screen height and between 75 to 90 percent of full screen width. Compare the response signals with the response signals of Detail VI, flagnote 3.

B. Inspection with the (flat) transducer position fixture 141P2. Do an inspection of the inboard side of the center-section lug hole only.

- (1) Calibrate the instrument as specified in paragraph 4.B.
- (2) Put couplant on the lug surface that the transducer position fixture will touch. See Detail IX inspection surface area.
- (3) Put the transducer position fixture (141P2) on the inspection surface of the center-section lug so that the sound beam points at the inboard side of the center-section lug hole. Move the transducer in the inspection area as specified in Detail IX, flagnotes 1 and 2.

NOTE: A response signal from the lug hole will be seen on the instrument screen display at 60 percent (approximately) of full screen width when the transducer is moved too far outboard to the radius of the lug. Compare the response signal with the response signal shown in Detail VII, flagnote 4.

Horizontal Stabilizer Center-Section Front Spar Lugs
Figure 2 (Sheet 5)

NONDESTRUCTIVE TEST

- (4) Increase the instrument sensitivity a maximum of 6 dB, if necessary, to get a response signal from the lug hole that is the same height as shown in Detail VII, flagnote 4.
- (5) Move the transducer to do an inspection of the inboard side of the lug hole. See Detail IX, flagnote 3.
- (6) Make a list of response signals on the instrument screen display that are equal to or more than 40 percent of full screen height and between 75 to 90 percent of full screen width. Compare the response signals with the response signal of Detail VII, flagnotes 2 and 3.

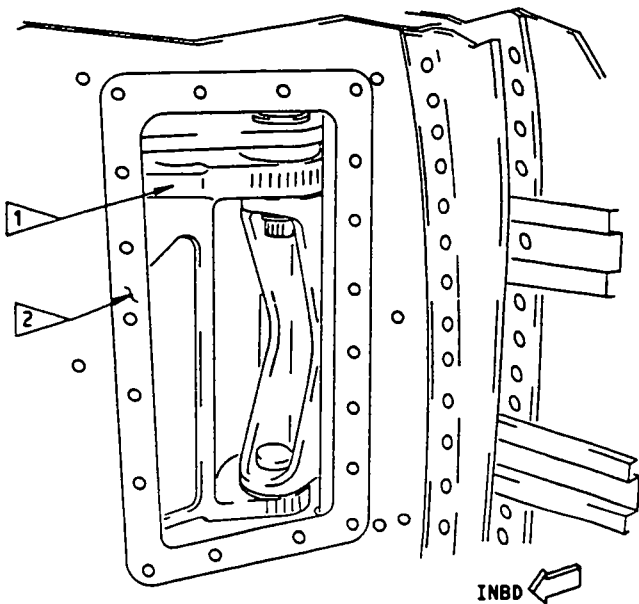
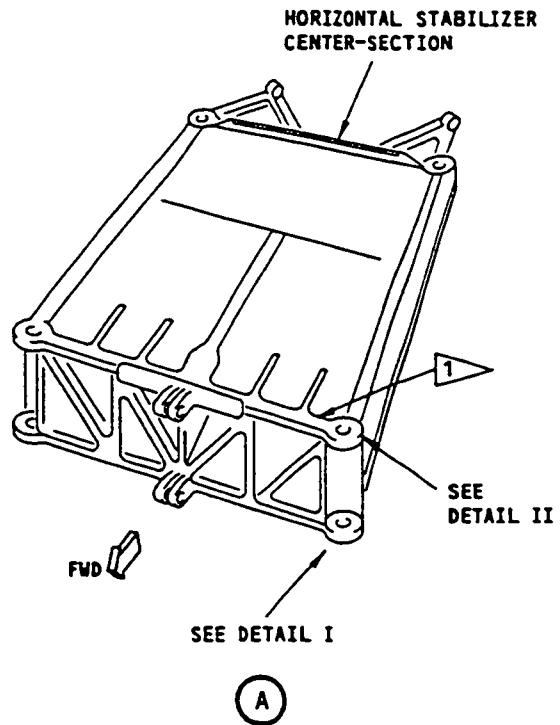
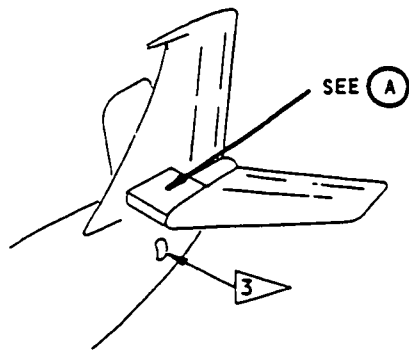
6. Inspection Results

- A. For the inspection of the inboard or outboard sides of the center-section lug areas, an indication of a possible crack is:
 - A response signal that is 40 percent or more of full screen height and from 75 to 90 percent of full screen width.
- B. A possible crack can be examined with a surface eddy current inspection, after removal of the terminal bolt and bushing. See Section 51-00-00, Figure 1 or Figure 4.

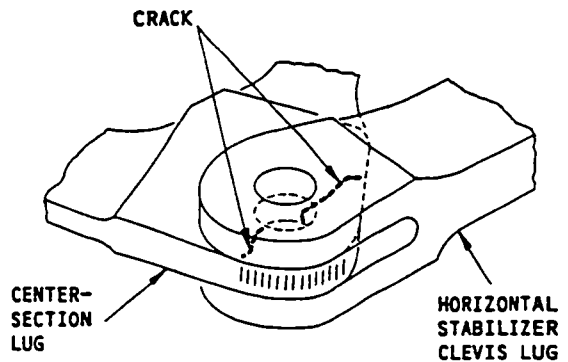
NOTE: Removal of the horizontal stabilizer from the airplane will be necessary to do this eddy current inspection.

Horizontal Stabilizer Center-Section Front Spar Lugs
Figure 2 (Sheet 6)

NONDESTRUCTIVE TEST



**BULKHEAD AT BODY STATION 1505
 (AS SEEN WHEN YOU LOOK AFT)
 DETAIL I**



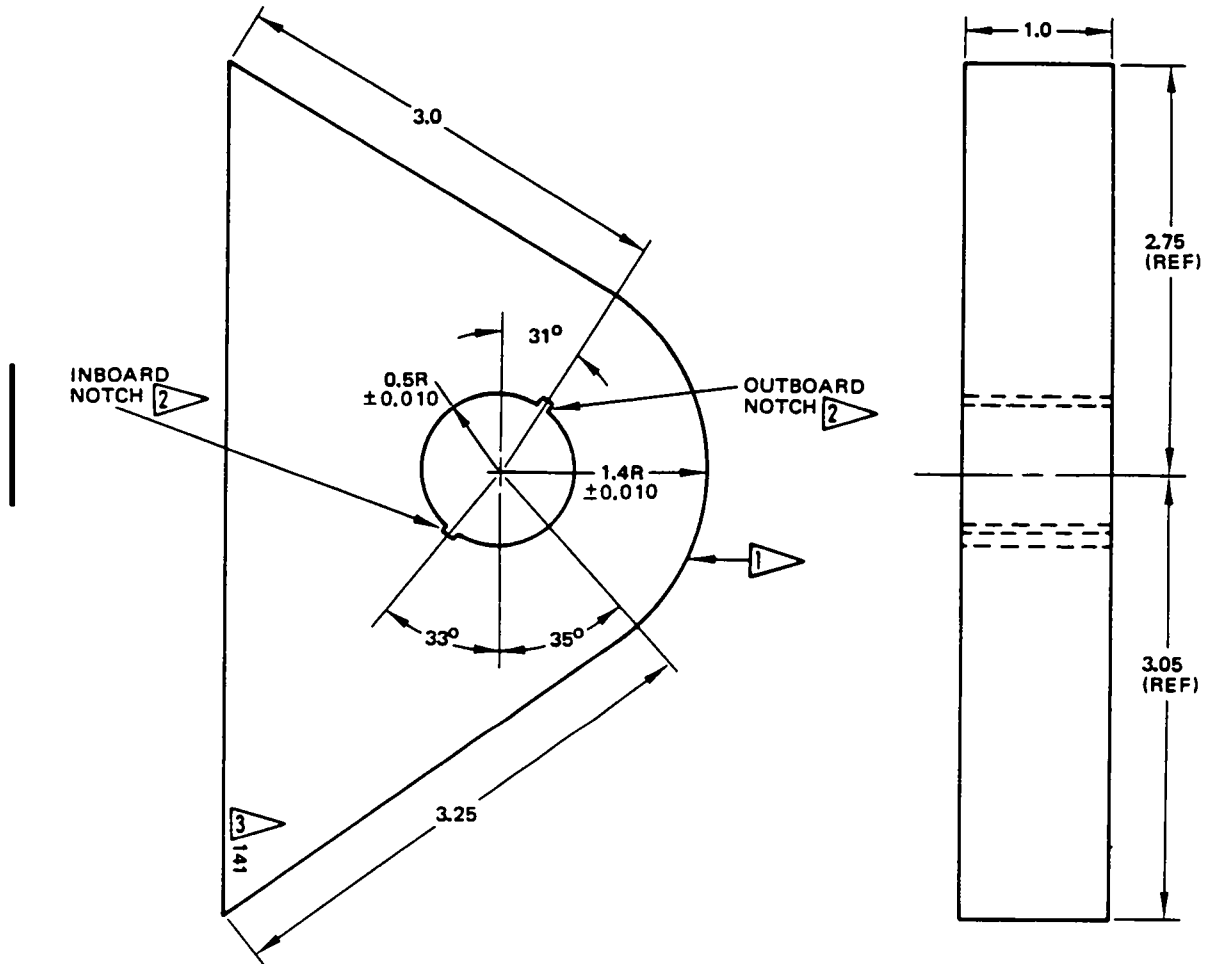
DETAIL II

NOTES

- LEFT SIDE SHOWN, RIGHT SIDE OPPOSITE
- ||||| INSPECTION AREA - FRONT SPAR LUGS OF THE HORIZONTAL STABILIZER CENTER-SECTION
- 1 UPPER FRONT SPAR OF THE HORIZONTAL STABILIZER CENTER-SECTION
- 2 ACCESS PANEL (REMOVED) TO INSPECTION AREA (BODY STATION 1505)
- 3 JACKSCREW ACCESS PANEL 1185




**Horizontal Stabilizer Center-Section Front Spar Lugs
 Figure 2 (Sheet 7)**

NONDESTRUCTIVE TEST



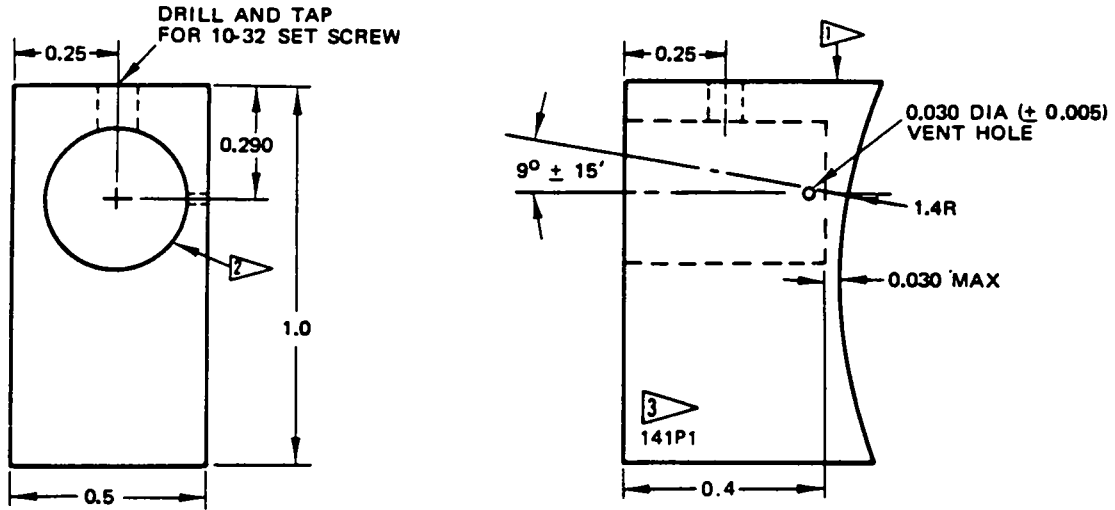
**ULTRASONIC REFERENCE STANDARD
 DETAIL III**

- ALL DIMENSIONS ARE IN INCHES
- TOLERANCE (UNLESS SHOWN DIFFERENTLY).
 X X = ± 0.050
 X.XX = ± 0.025
 X.XXX = ± 0.005

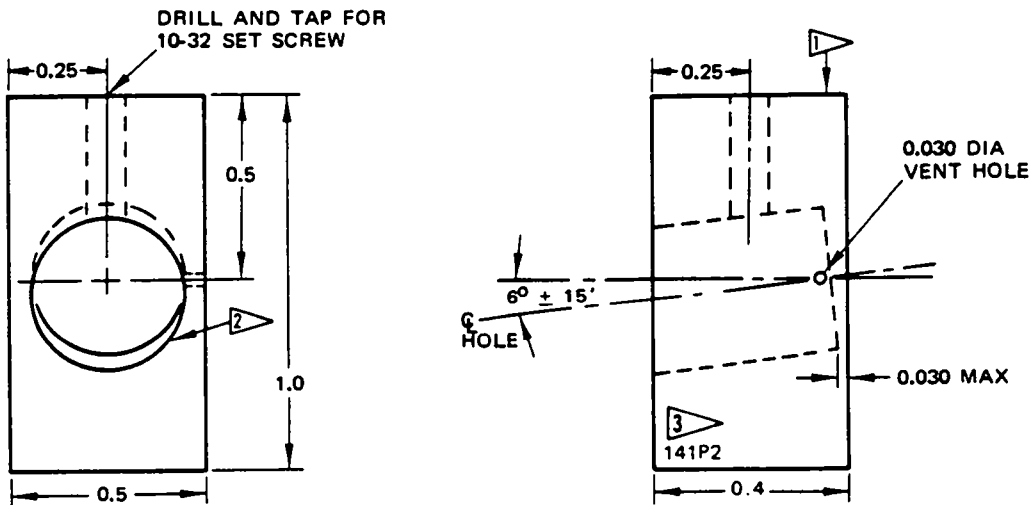
-  MATERIAL: 7075 OR 7079 ALUMINUM ALLOY
-  ELECTRIC DISCHARGE MACHINE (EDM) - 0.050 ± 0.005 DEEP
-  ETCH OR STEEL STAMP WITH 141

Horizontal Stabilizer Center-Section Front Spar Lugs
 Figure 2 (Sheet 8)

NONDESTRUCTIVE TEST






**TRANSDUCER POSITION FIXTURE 141P1
 DETAIL IV**



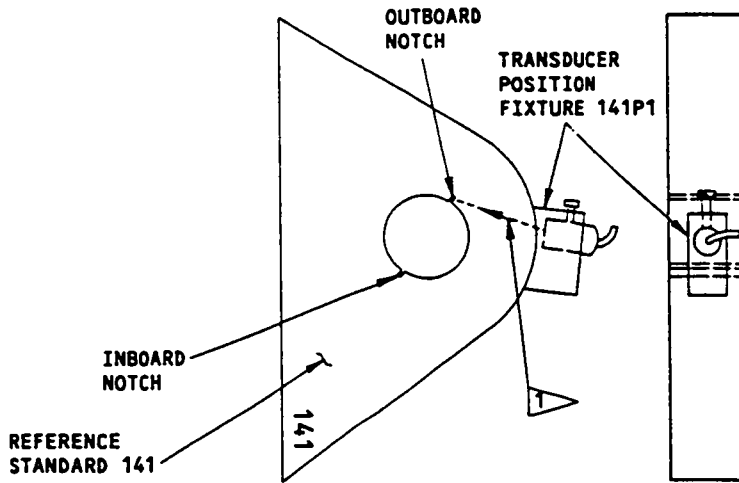
**TRANSDUCER POSITION FIXTURE 141P2 (FLAT)
 DETAIL V**

- ALL DIMENSIONS ARE IN INCHES
- TOLERANCE (UNLESS SHOWN DIFFERENTLY)
 - X.X = ± 0.050
 - X XX = ± 0.010
 - X.XXX = ± 0.005
 - ANGULAR = ± 0.5 DEGREES

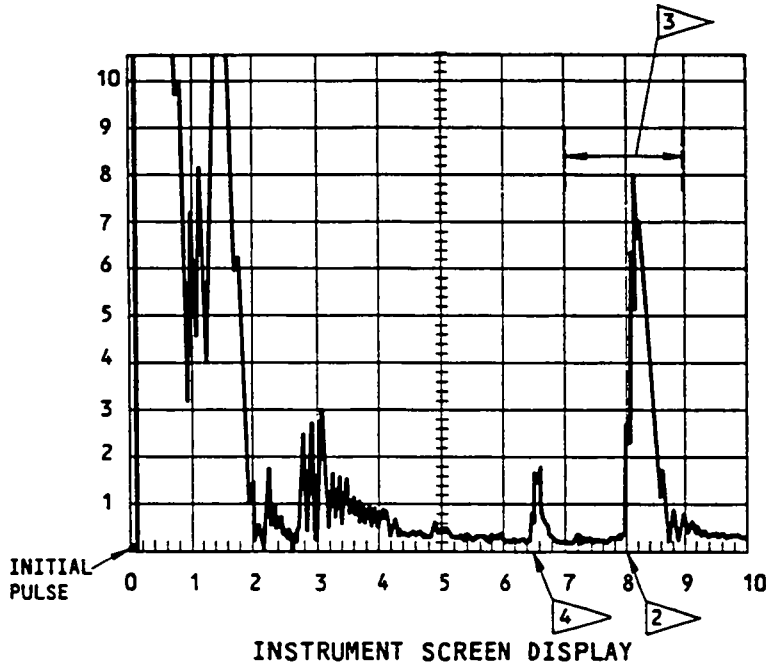
-  MATERIAL: LUCITE
-  HOLE DIAMETER: 0.375-0.380 INCH
-  ETCH WITH BOEING PART NUMBER

Horizontal Stabilizer Center-Section Front Spar Lugs
 Figure 2 (Sheet 9)

NONDESTRUCTIVE TEST







LOCATION OF TRANSDUCER POSITION FIXTURE ON REFERENCE STANDARD 141 FOR CALIBRATION



NOTES

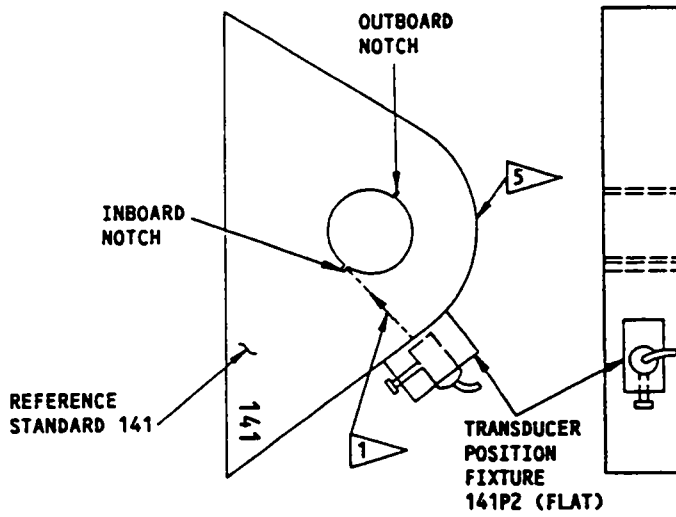
- INSTRUMENT CALIBRATION WITH THE TRANSDUCER POSITION FIXTURE (141P1)

- 1  SOUND BEAM DIRECTION
- 2  NOTCH RESPONSE SIGNAL AT 80 PERCENT OF FULL SCREEN HEIGHT AND 80 PERCENT OF FULL SCREEN WIDTH
- 3  LATERAL MOVEMENT OF NOTCH RESPONSE SIGNAL FROM 70 TO 90 PERCENT OF FULL SCREEN WIDTH WHEN THE TRANSDUCER IS MOVED TO AND AWAY FROM THE HOLE
- 4  REFERENCE STANDARD HOLE RESPONSE SIGNAL AT 65 PERCENT OF FULL SCREEN WIDTH

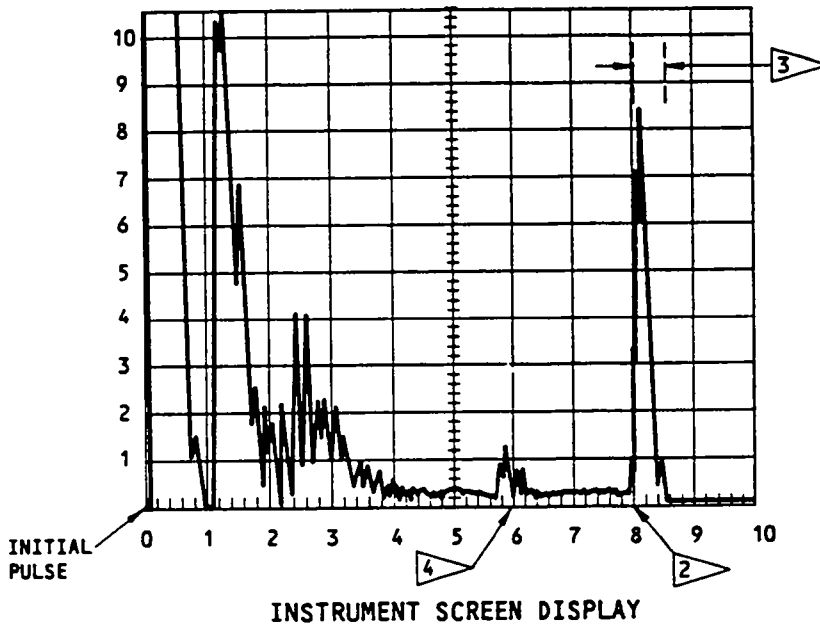
DETAIL VI

Horizontal Stabilizer Center-Section Front Spar Lugs
 Figure 2 (Sheet 10)

NONDESTRUCTIVE TEST



LOCATION OF TRANSDUCER POSITION FIXTURE ON REFERENCE STANDARD 141 FOR CALIBRATION



NOTES

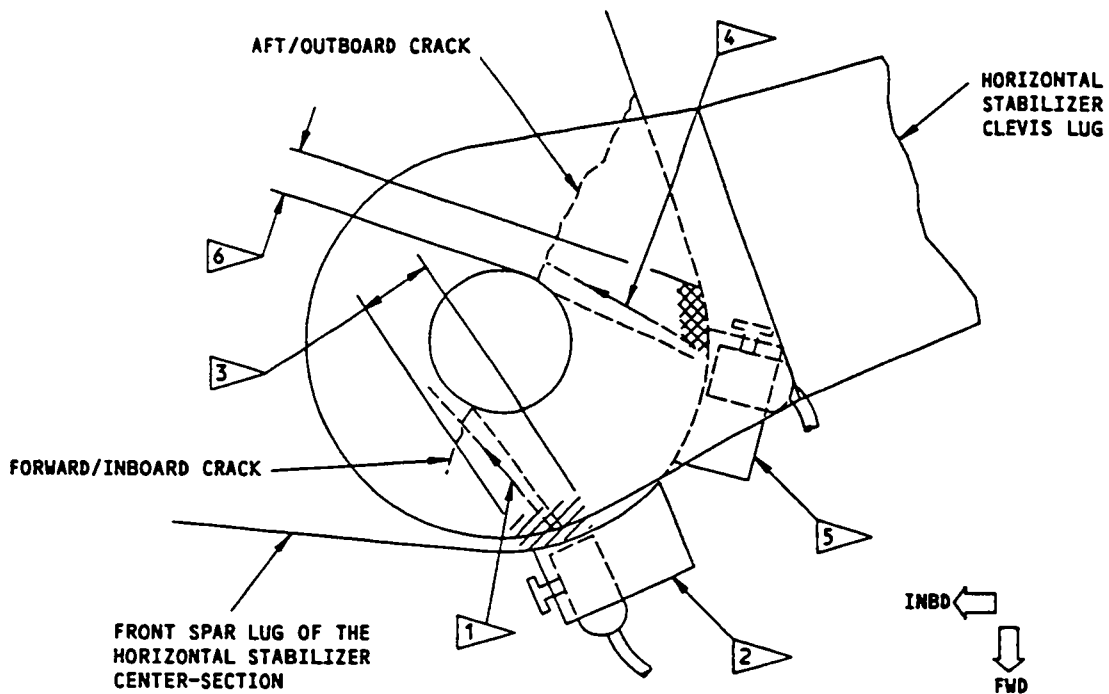
- INSTRUMENT CALIBRATION WITH (FLAT) TRANSDUCER POSITION FIXTURE (141P2)

- 1 SOUND BEAM DIRECTION
- 2 NOTCH RESPONSE SIGNAL AT 80 PERCENT OF FULL SCREEN HEIGHT AND 80 PERCENT OF FULL SCREEN WIDTH
- 3 LATERAL MOVEMENT OF NOTCH RESPONSE SIGNAL FROM 80 TO 85 PERCENT OF FULL SCREEN WIDTH WHEN THE TRANSDUCER IS MOVED TO OR AWAY FROM THE NOTCH
- 4 REFERENCE STANDARD HOLE RESPONSE SIGNAL AT 60 PERCENT OF FULL SCREEN WIDTH
- 5 RADIUS OF REFERENCE STANDARD 141

DETAIL VII

**Horizontal Stabilizer Center-Section Front Spar Lugs
 Figure 2 (Sheet 11)**

NONDESTRUCTIVE TEST



INSPECTION WITH TRANSDUCER POSITION FIXTURE 141P1

NOTES

- LEFT SIDE SHOWN, RIGHT SIDE OPPOSITE

INSPECTION OF THE FORWARD/INBOARD SIDE OF THE CENTER-SECTION LUG HOLE:

////// INSPECTION AREA - FORWARD/INBOARD AREA OF THE CENTER-SECTION LUG HOLE

- 1 SOUND BEAM DIRECTION
- 2 PUT THE TRANSDUCER POSITION FIXTURE (141P1) ON THE INBOARD SIDE OF THE LUG HOLE. MOVE THE TRANSDUCER OUTBOARD TO THE LUG HOLE AND STOP WHEN A RESPONSE SIGNAL IS GOTTEN FROM THE LUG HOLE
- 3 MOVE THE TRANSDUCER INBOARD AWAY FROM THE LUG HOLE 0.250 INCH (6.3 mm) (APPROXIMATELY) AND LOOK FOR A RESPONSE SIGNAL ON THE INSTRUMENT SCREEN DISPLAY AT 75 TO 90 PERCENT OF FULL SCREEN WIDTH

INSPECTION OF THE AFT/OUTBOARD SIDE OF THE CENTER-SECTION LUG HOLE:

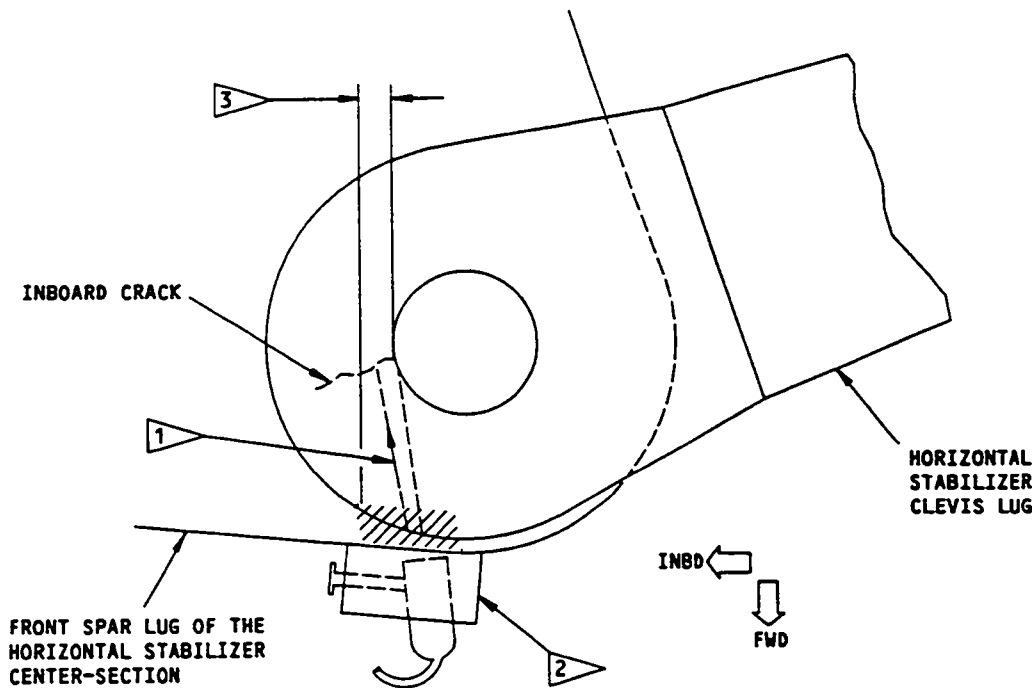
XXXX INSPECTION AREA - AFT/OUTBOARD AREA OF THE CENTER-SECTION LUG HOLE

- 4 SOUND BEAM DIRECTION
- 5 PUT THE TRANSDUCER POSITION FIXTURE (141P1) ON THE OUTBOARD SIDE OF THE LUG HOLE. MOVE THE TRANSDUCER INBOARD TO THE LUG HOLE AND STOP WHEN A RESPONSE SIGNAL FROM THE LUG HOLE IS GOTTEN
- 6 MOVE THE TRANSDUCER OUTBOARD AWAY FROM THE LUG HOLE 0.250 INCH (6.3 mm) (APPROXIMATELY) AND LOOK FOR A RESPONSE SIGNAL ON THE INSTRUMENT SCREEN DISPLAY AT 75 TO 90 PERCENT OF FULL SCREEN WIDTH

DETAIL VIII

**Horizontal Stabilizer Center-Section Front Spar Lugs
 Figure 2 (Sheet 12)**

NONDESTRUCTIVE TEST



INSPECTION WITH TRANSDUCER POSITION FIXTURE 141P2 (FLAT)

NOTES

- LEFT SIDE SHOWN, RIGHT SIDE OPPOSITE

//// INSPECTION AREA - INBOARD AREA OF THE CENTER-SECTION LUG HOLE

1 SOUND BEAM DIRECTION

2 PUT THE TRANSDUCER POSITION FIXTURE (141P2) ON THE INBOARD SIDE OF THE LUG HOLE. MOVE THE TRANSDUCER OUTBOARD TO THE HOLE AND STOP WHEN A RESPONSE SIGNAL FROM THE LUG HOLE IS GOTTEN

3 MOVE THE TRANSDUCER INBOARD AWAY FROM THE LUG HOLE 0.250 INCH (6.3 mm) (APPROXIMATELY) AND LOOK FOR A RESPONSE SIGNAL ON THE INSTRUMENT SCREEN DISPLAY AT 75 TO 90 PERCENT FULL SCREEN WIDTH

**INSPECTION OF THE INBOARD SIDE OF THE CENTER-SECTION LUG HOLE
DETAIL IX**

**Horizontal Stabilizer Center-Section Front Spar Lugs
Figure 2 (Sheet 13)**

BOEING →
COMMERCIAL JET
NONDESTRUCTIVE TEST

EFFECTIVITY
MODEL: 707-300/400
SERVICE BULLETIN
REFERENCE: 3145

PART 4 - ULTRASONIC

HORIZONTAL STABILIZER

1. Purpose

To detect laminar cracks in the raised land of the upper front spar chord of the 707-300/400 horizontal stabilizer between the side of body and FSS 11.55.

2. Equipment

A. Any ultrasonic instrument and probe combination which will satisfy the requirements of this procedure may be used. The following were used and found acceptable.

(1) Instrument

(a) Method A - Ultrasonic digital thickness gage, Nova 201-A, NDT Instrument Inc.

(b) Method B - Ultrasonic pulse-echo, Ultrascope NDT - 131, Nortec.

(2) Transducer

(a) Method A - D1 Nova, NDT Instrument Inc.

(b) Method B - Nortec SPO 562, 5 MHz, 0.25 inch diameter element.

NOTE: Any 5 MHz, 0.25 inch diameter element transducer having good surface resolution may be used.

B. Reference Standard

Both Methods - A 0.20 inch thick aluminum plate of any common high strength aluminum alloy.

C. Couplant

Both Methods - Grease, oil or any commercial couplant compatible with the airplane structure being inspected.

3. Prepare for Inspection

Remove loose paint and wipe surface clean.

NOTE: Remove heavy paint if excessive sound attenuation occurs.

Horizontal Stabilizer Upper Front Spar Chord Inboard of FSS 11.55
Figure 3 (Sheet 1)

BOEING 
COMMERCIAL JET
NONDESTRUCTIVE TEST

4. Inspection Calibration

A. Method A, Ultrasonic digital thickness measurement.

- (1) Place couplant and transducer on reference standard.
- (2) Adjust instrument to measure 0.02 inch aluminum thickness.

B. Method B, Ultrasonic pulse-echo measurement.

- (1) Place couplant and transducer on reference standard.
- (2) Adjust gain to obtain 1st back reflection at 80% full scale height.
- (3) Adjust sweep to obtain 1st back reflection at 20% full screen width.

NOTE: Multiple back reflection should occur.

5. Inspection Procedure

A. Calibrate instrument for respective method.

B. Apply couplant to edges of raised land. See Detail I.

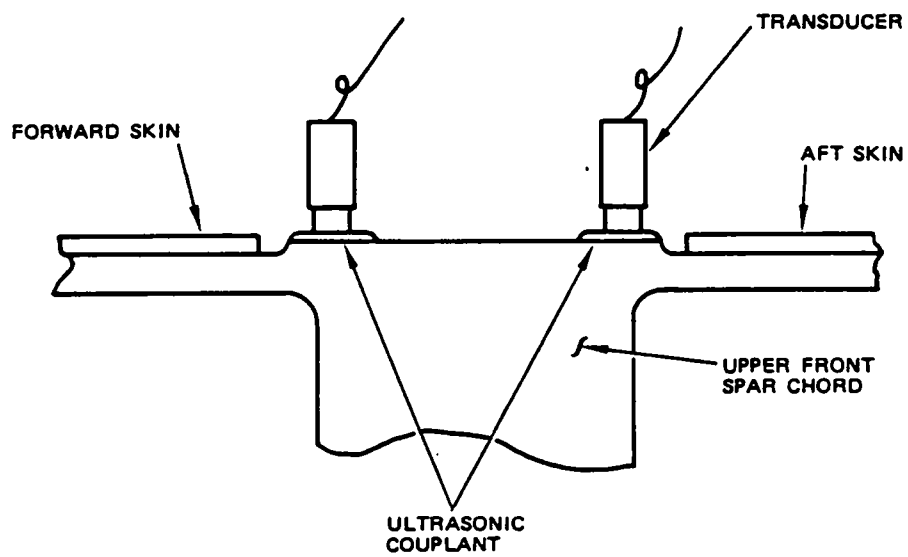
C. Compare response to that of standard.

D. Laminar crack indication.

- (1) Method A - If the thickness indicated is less than 0.170 inch, a laminar crack may be present.
- (2) Method B - If a significant loss in back reflection from that of the standard occurs, a laminar crack may be present.
- (3) Verify crack indication by using alternate method.

Horizontal Stabilizer Upper Front Spar Chord Inboard of FSS 11.55
Figure 3 (Sheet 2)

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NONDESTRUCTIVE TEST



TRANSDUCER POSITION
DETAIL I

Horizontal Stabilizer Upper Front Spar Chord Inboard of FSS 11.55
Figure 3 (Sheet 3)

EFFECTIVITY
MODEL: 707-300/-400/ -300B/-300C
SSI DOCUMENT (D6-44860)
REFERENCE:
SSD 55-A25-01A
55-A35-01A
55-A45-01A
55-A20-05
55-A30-05
55-A40-05
SERVICE BULLETIN
REFERENCE: 3313, 3331

BOEING 
COMMERCIAL JET
NONDESTRUCTIVE TEST

PART 4 - ULTRASONIC

HORIZONTAL STABILIZER

1. Purpose

To perform an ultrasonic inspection to detect cracks in the horizontal stabilizer rear spar beneath the failsafe fitting as follows:

- A. Horizontal stabilizer rear spar upper terminal clevis upper lug.
- B. Horizontal stabilizer center section rear spar upper lug.

NOTE: Only airplanes that are modified to incorporate the failsafe fitting per Service Bulletins 3313 and 3331 are affected by this procedure.

2. Equipment

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

- A. Instrument - Pulse/echo ultrasonic instrument capable of operating between 4 and 6 MHz.

NDT 131, Nortec Corporation

- B. Transducer - 5 MHz, 0.25-inch (0.64 cm) diameter element in 0.36-inch (0.95 cm) diameter by 0.75-inch (1.9 cm) long cylindrical case.

P/N 57A4268, Automation Industries, Inc.

NOTE: Coordinate transducer diameter with positioning fixture transducer diameter hole if transducer diameter is different than above. See Detail II.

Use a transducer cable with a right angle micro dot connector (P/N CBMR, NDT Products Engineering) or alternate low profile transducer (P/N SP0-3904, Automation Industries, Inc., or P/N 57K1106, Qual Corp., Stavely Industries, Inc.) if adjacent structure interferes with transducer movement.

Horizontal Stabilizer Rear Spar Upper Terminal Attachment Lugs
Figure 4 (Sheet 1)

NONDESTRUCTIVE TEST

C. Reference Standard

Fabricate reference standard as shown in Detail I.

D. Transducer Positioning Fixture

Fabricate transducer positioning fixture as shown in Detail II.

E. Couplant - Light oil or grease compatible with structure being inspected.

3. Preparation for Inspection

A. Position horizontal stabilizer leading edge in the down position.

B. Gain access thru jackscrew access door and over top of stabilizer center section. See Detail III.

C. Identify the inspection area and wipe surface clean.

4. Instrument Calibration

One instrument calibration is required for each inspection, the horizontal stabilizer rear spar upper terminal clevis upper lug and center section rear spar upper lug inspection.

A. Connect transducer and make preliminary instrument adjustments.

B. Place transducer in positioning fixture. Place positioning fixture on reference standard as shown in Detail IV, Flagnote 1. Set response signal at 70 percent of scope width. See Detail IV, Flagnote 2.

NOTE: Rotate transducer in the positioning fixture to obtain maximum response from the notch.

C. Adjust sensitivity to obtain a received signal of 70 percent of full scale height.

5. Inspection Procedure

A. Inspection of horizontal stabilizer rear spar upper terminal clevis upper lug.

(1) Calibrate instrument according to Section 4.

Horizontal Stabilizer Rear Spar Upper Terminal Attachment Lugs
Figure 4 (Sheet 2)

NONDESTRUCTIVE TEST

- (2) Place transducer on inboard forward end of terminal clevis lug.
See Detail V.

NOTE: If transducer positioning fixture radius does not make good contact with lug radius, place sandpaper on lug radius and lightly work fixture back and forth until proper curvature of fixture is obtained.

- (3) Scan the transducer in a forward and aft direction with the transducer beam inspection lug area beneath the forward end of the failsafe fitting. See Detail V.

B. Inspection of horizontal stabilizer center section rear spar upper lug.

- (1) Calibrate instrument according to par. 4.

- (2) Place transducer on outboard forward end of center section rear spar upper lug. See Detail VI.

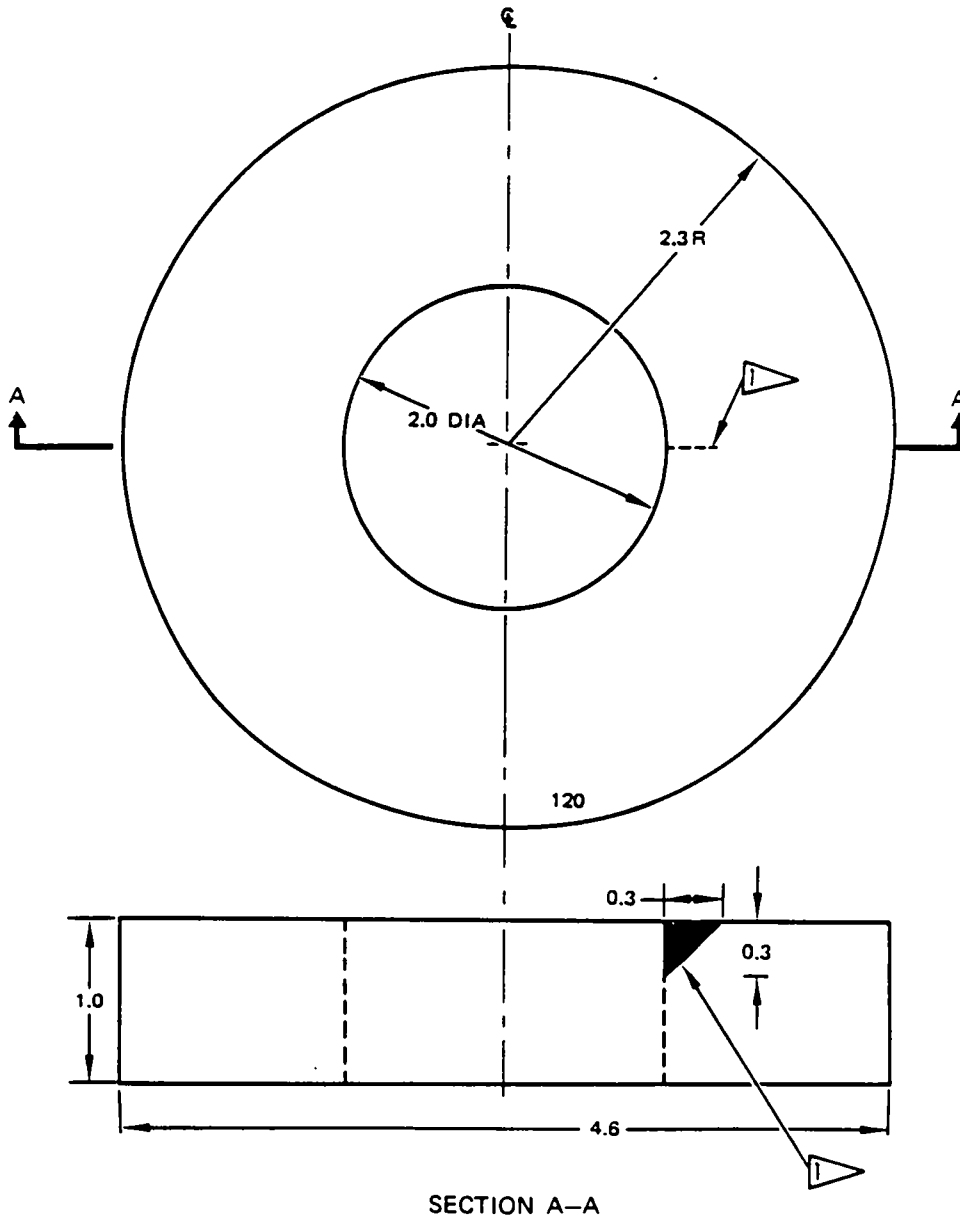
- (3) Scan the transducer per step 5.A.(3).

6. Inspection Results

- A. Ultrasonic indications in the inspection area equal to or greater than 40 percent of full signal height at 70 to 90 percent of full screen width are potential cracks and should be further investigated.
- B. Any ultrasonic indication outside the 70 to 90 percent of full screen width inspection range is not considered a crack indication from the lug bore. An indication that occurs before 70 percent of full screen width may result from a surface discontinuity on the lug outer surface.

Horizontal Stabilizer Rear Spar Upper Terminal Attachment Lugs
Figure 4 (Sheet 3)

NONDESTRUCTIVE TEST



NOTES

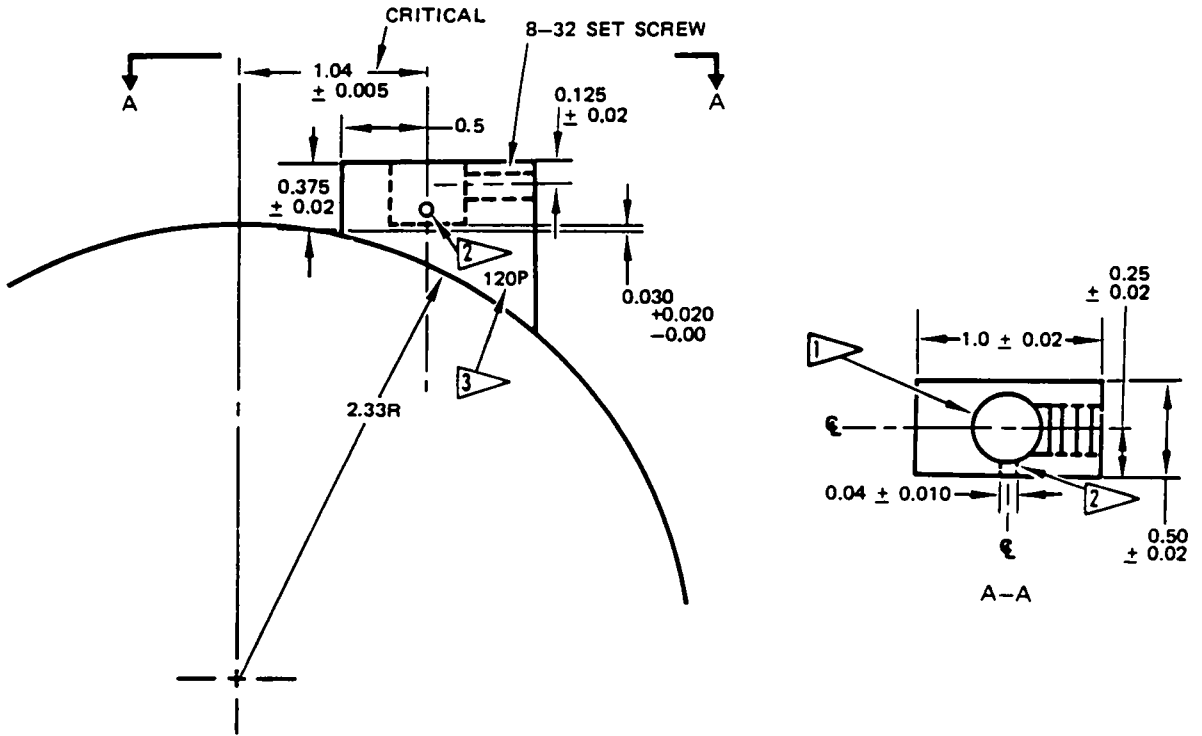
- ALL DIMENSIONS ARE IN INCHES
- MATERIAL: 2024-T3 OR -T4 ALUMINUM
- TOLERANCE: X.X ± 0.05 INCH, X.XX ± 0.010 INCH,
X.XXX ± 0.005 INCH
- ETCH OR STEEL STAMP WITH 120
- P/N 6411-100 AVAILABLE FROM IDEAL SPECIALTY CO.

 JEWELER'S SAWCUT 0.030 INCH MAX WIDTH

REFERENCE STANDARD
DETAIL I

Horizontal Stabilizer Rear Spar Upper
Terminal Attachment Lugs
Figure 4 (Sheet 4)

NONDESTRUCTIVE TEST



NOTES

- ALL DIMENSIONS ARE IN INCHES
- MATERIAL: LUCITE
- P/N 6410-27 AVAILABLE FROM IDEAL SPECIALTY CO.

1 ▸ FLAT BOTTOM HOLE 0.375
 ± 0.001 INCH IN DIAMETER

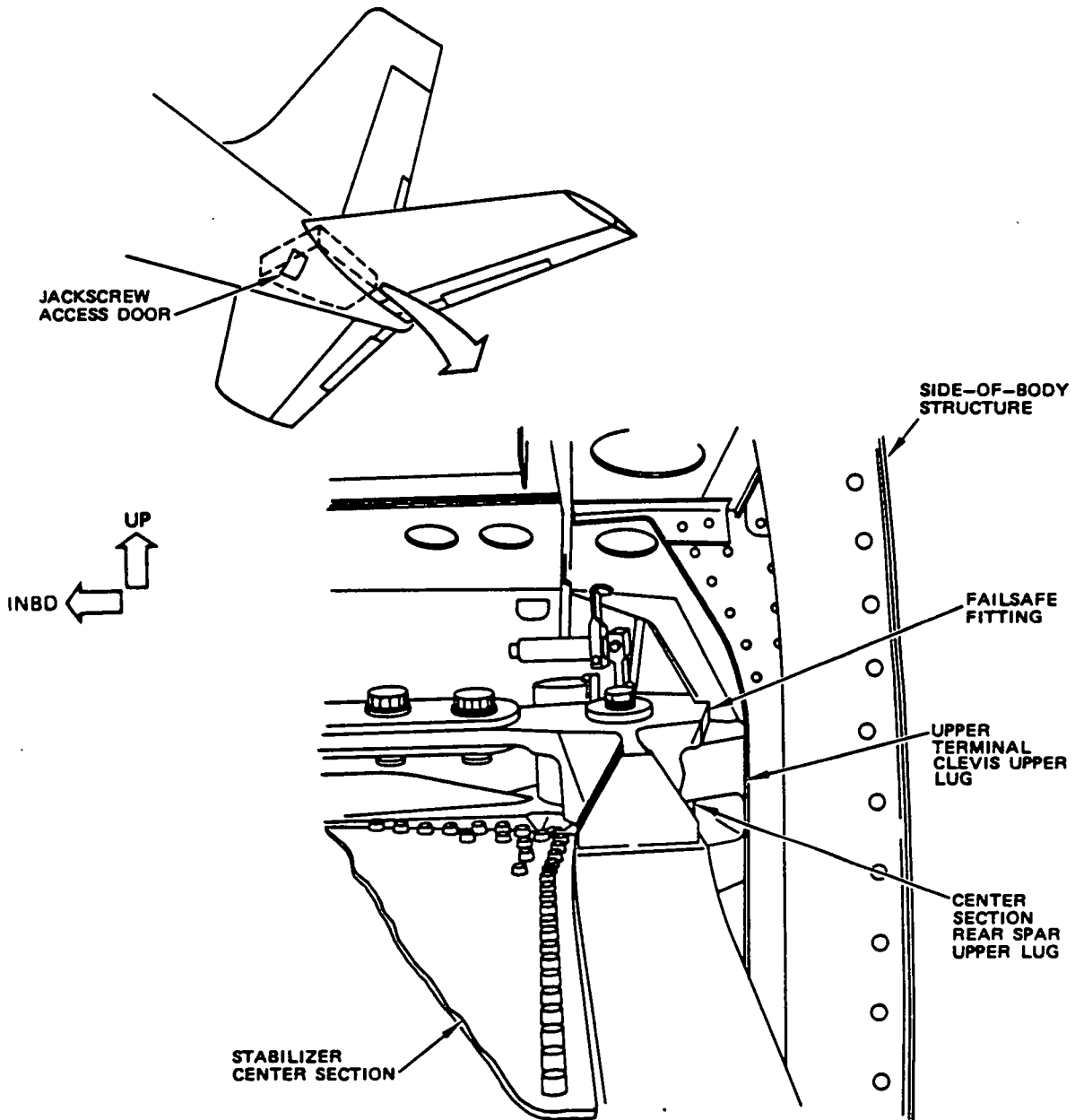
2 ▸ RELIEF HOLE DRILL FLUSH
 WITH BOTTOM OF
 FLAT BOTTOM HOLE

3 ▸ ETCH WITH 120P

**. TRANSDUCER POSITIONING FIXTURE
 DETAIL II**

Horizontal Stabilizer Rear Spar Upper Terminal Attachment Lugs
 Figure 4 (Sheet 5)

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NONDESTRUCTIVE TEST



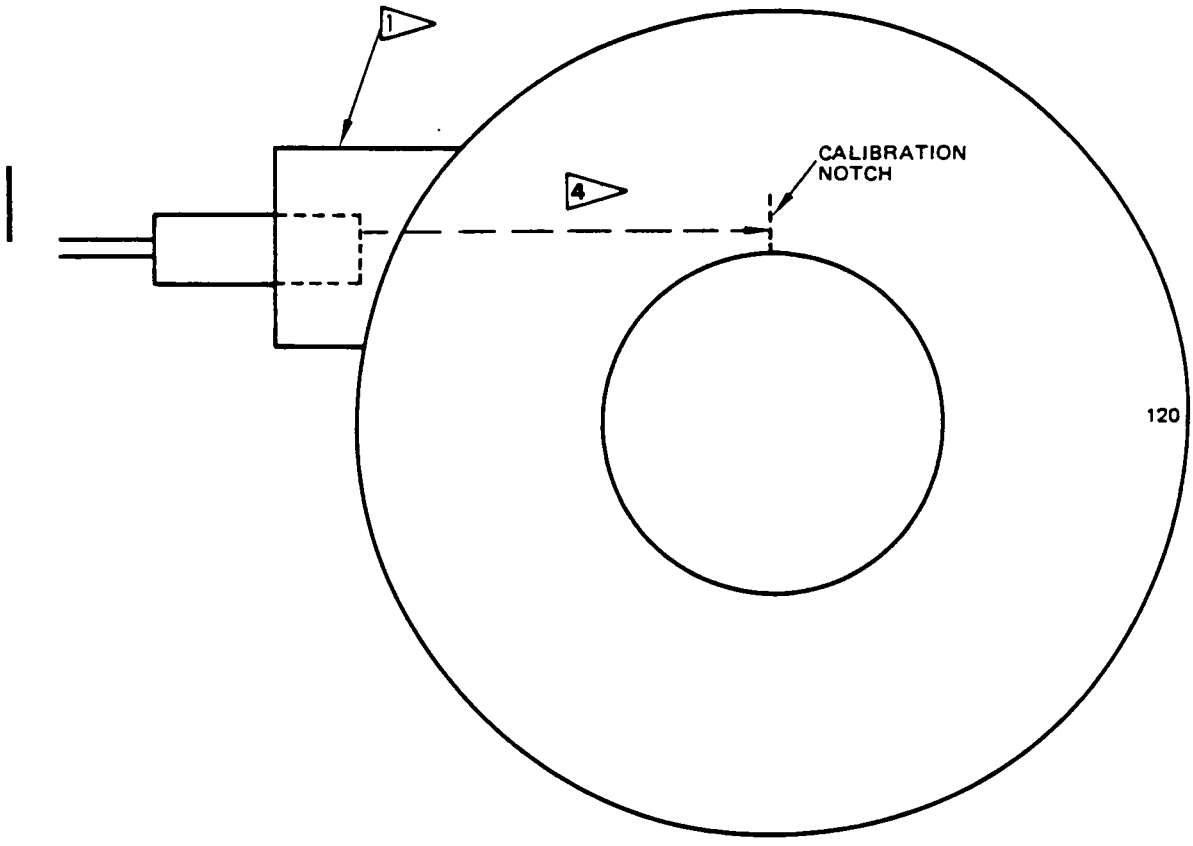
NOTES

- LEFT SIDE SHOWN,
RIGHT SIDE SIMILAR
- VIEW LOOKING AFT

**ACCESS OVER STABILIZER CENTER SECTION
DETAIL III**

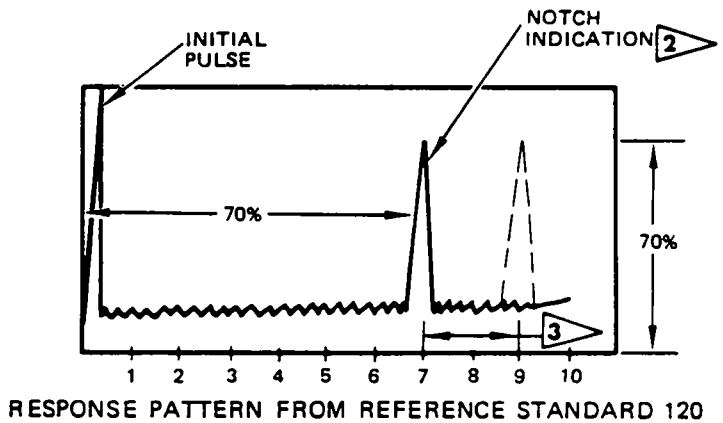
Horizontal Stabilizer Rear Spar Upper
Terminal Attachment Lugs
Figure 4 (Sheet 6)

BOEING 
COMMERCIAL JET
 NONDESTRUCTIVE TEST



NOTES

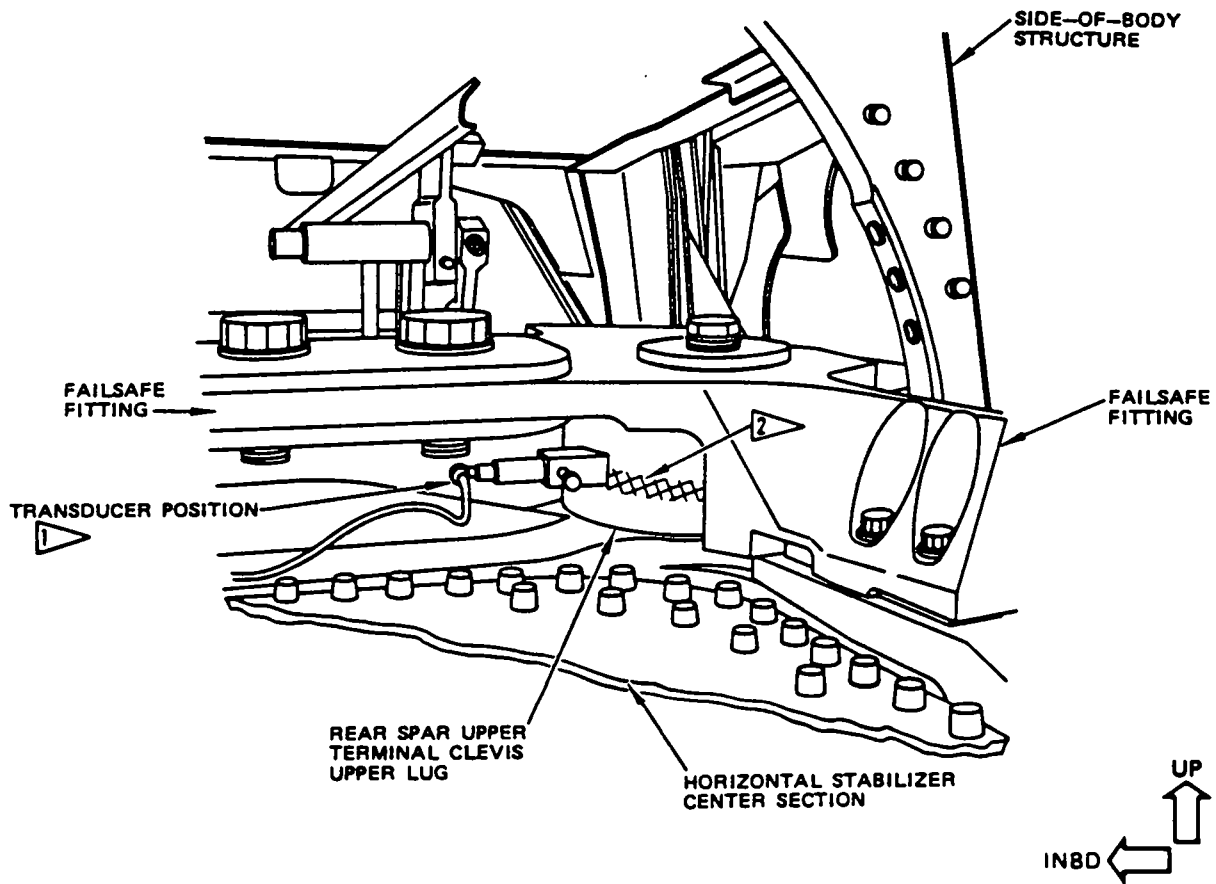
- 1** PLACE PROBE POSITIONING FIXTURE SO THAT SIGNAL PULSE TRAVELS PERPENDICULAR TO CALIBRATION NOTCH AS SHOWN.
- 2** NOTCH INDICATION FROM REFERENCE STANDARD.
- 3** CRACK INDICATION RANGE FROM ATTACHMENT LUG
- 4** REFRACTED 28 DEGREE SHEAR ANGLE BEAM



**INSTRUMENT CALIBRATION
 DETAIL IV**


Horizontal Stabilizer Rear Spar Upper
 Terminal Attachment Lugs
 Figure 4 (Sheet 7)

BOEING 
COMMERCIAL JET
 NONDESTRUCTIVE TEST



NOTES

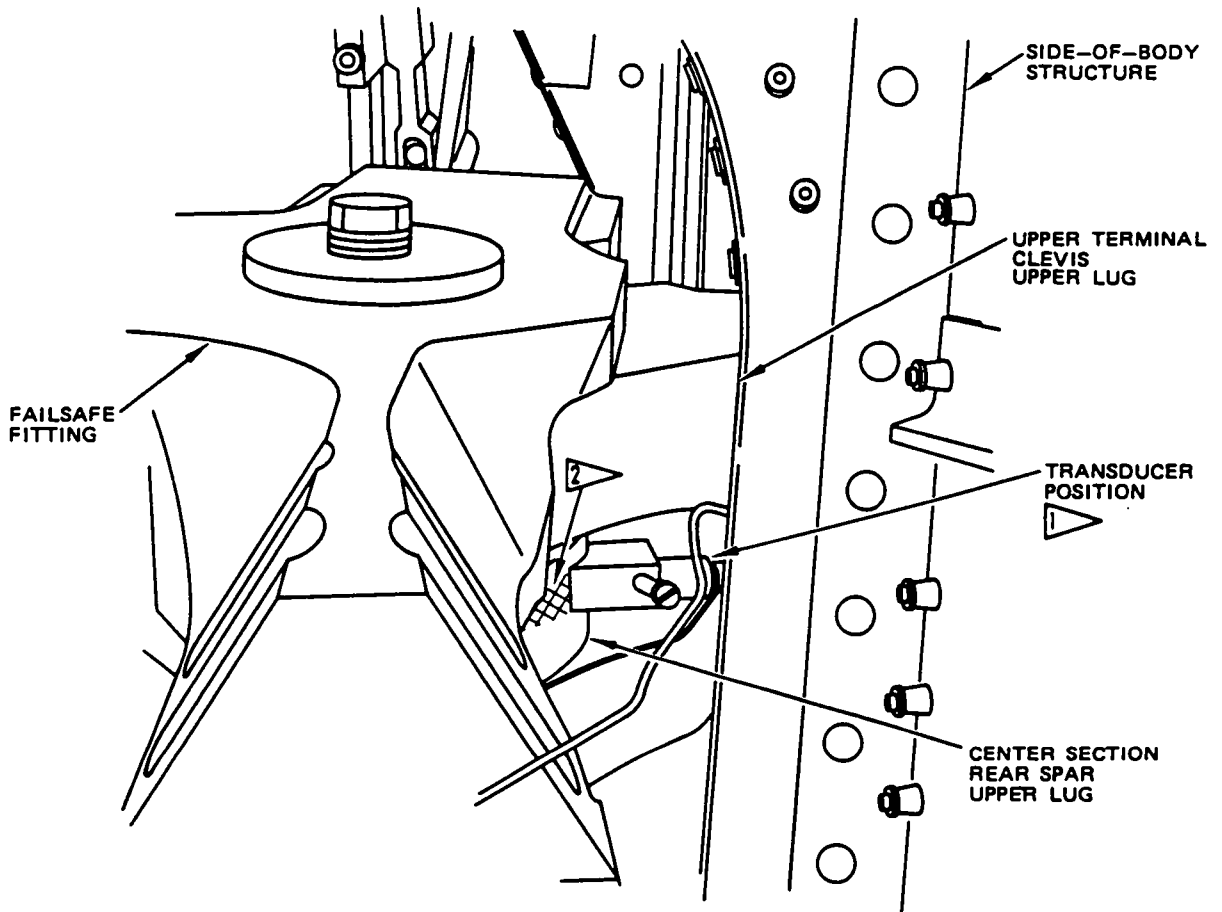
- VIEW LOOKING AFT
- LEFT SIDE SHOWN, RIGHT SIDE SIMILAR

- 1 POSITION TRANSDUCER AND DIRECT BEAM PERPENDICULAR TO REAR SPAR UPPER LUG
- 2 INSPECT FORWARD SECTION OF LUG UNDER FAILSAFE FITTING. MANIPULATE TRANSDUCER TO INSPECT FULL LENGTH OF FORWARD SIDE OF LUG BORE PER .

**UPPER TERMINAL CLEVIS UPPER LUG INSPECTION
 DETAIL V**

Horizontal Stabilizer Rear Spar Upper
 Terminal Attachment Lugs
 Figure 4 (Sheet 8)

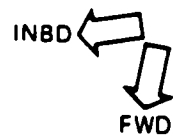
NONDESTRUCTIVE TEST



NOTES

- VIEW LOOKING AFT
- LEFT SIDE SHOWN, RIGHT SIDE SIMILAR

- 1 POSITION TRANSDUCER AND DIRECT BEAM PERPENDICULAR TO REAR SPAR UPPER LUG.
- 2 INSPECT FORWARD SECTION OF REAR SPAR UPPER LUG. MANIPULATE TRANSDUCER TO INSPECT FULL LENGTH OF FORWARD SIDE OF LUG BORE PER XXX.



**CENTER SECTION REAR SPAR UPPER LUG INSPECTION
DETAIL VI**

Horizontal Stabilizer Rear Spar Upper
Terminal Attachment Lugs
Figure 4 (Sheet 9)