



737
NON-DESTRUCTIVE TEST MANUAL

PART 6 - EDDY CURRENT

FIN REAR SPAR MAIN CHORD FORWARD ATTACHMENTS - BS 1088 BULKHEAD

1. Purpose

- A. To detect cracks in the webs and tee-chord at the fin rear spar main chord forward attachments at BS 1088 bulkhead using high frequency eddy current.

2. Equipment

- A. Instruments and Reference Standard - Refer to Part 6, 51-00-00, Procedure 1, Fastener Holes in Aluminum Parts.
- B. Probe - 0.375-inch diameter bolthole probe per Part 6, 51-00-00, Procedure 1.

3. Prepare for the Inspection

- A. Gain access to inspection area through rear access door P-25 and cutout in BS 1088 bulkhead.
- B. Remove four 0.375 inch (0.95 cm) diameter lockbolts. Two lockbolts are removed from the inboard sides of the forward attachment fittings for the fin rear spar. There are two forward attachment fittings; one is on the left side of the airplane and the other is on the right side of the airplane. See Fastener No. 1 and 2 in View A of Figure 1.
- C. Clean local inspection areas as necessary to permit good contact between part and probe.

4. Instrument Calibration

- A. Refer to Part 6, 51-00-00, Procedure 1.

5. Inspection Procedure

- A. Perform inspection per Part 6, 51-00-00, Procedure 1, Fastener Holes in Aluminum Parts.

6. Inspection Results

- A. A rapid meter movement occurring as probe is rotated over a short scan distance is a potential crack indication and further investigation is required.
- B. Refer to Part 6, 51-00-00, Procedure 1.

ALL

EFFECTIVITY

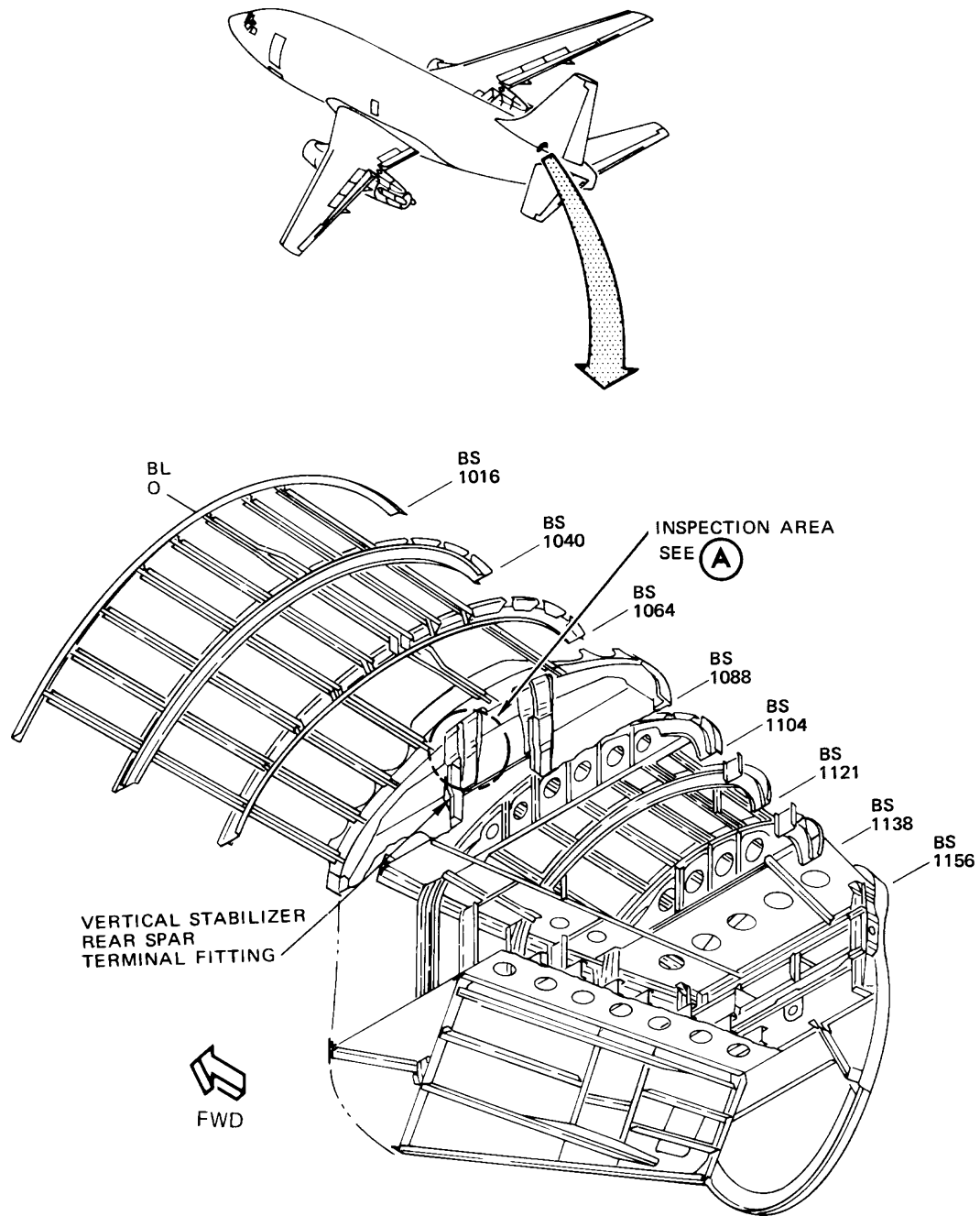
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Fin Rear Spar Main Chord Forward Attachments, BS 1088 Bulkhead
Figure 1 (Sheet 1 of 2)

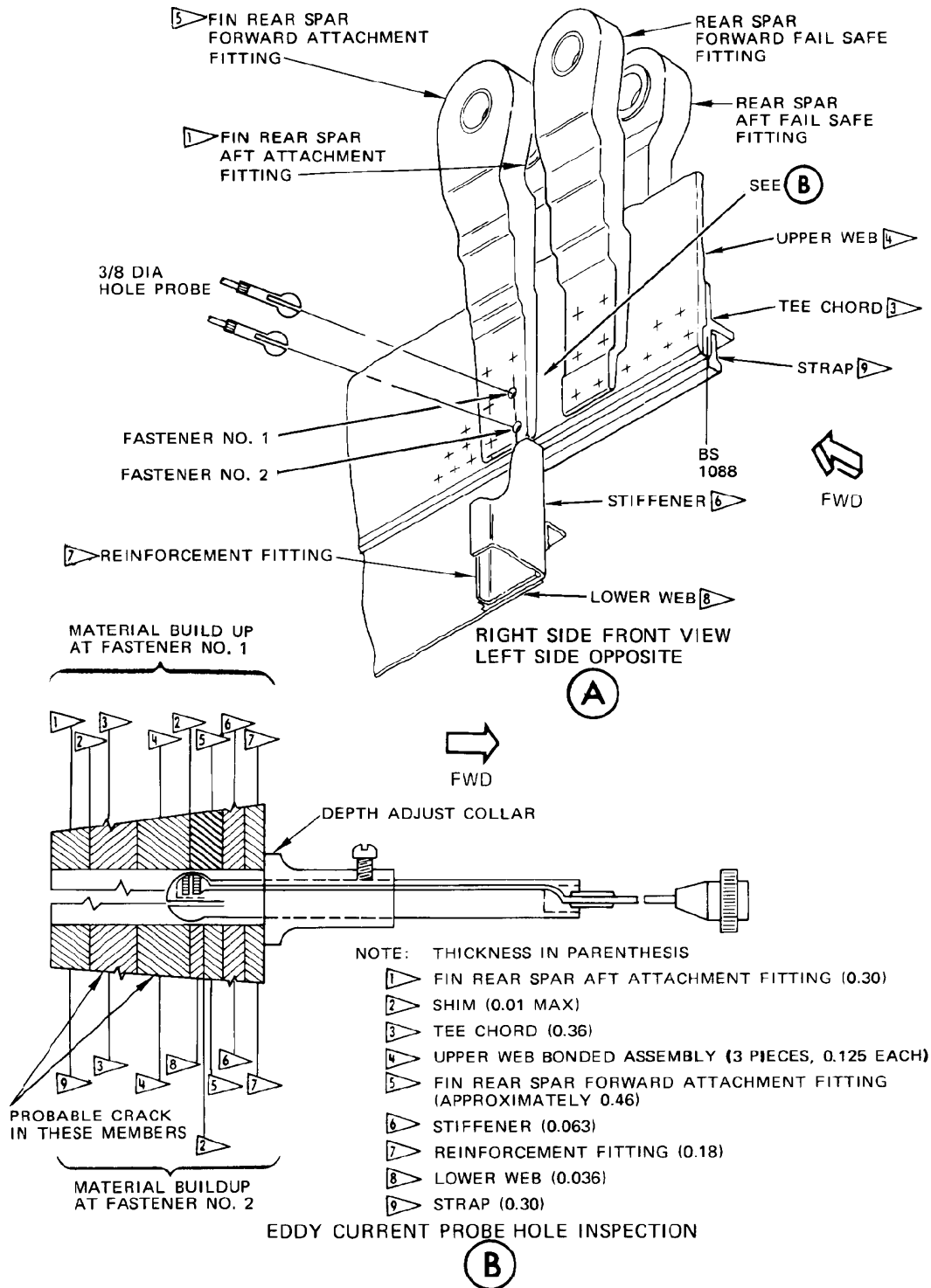
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Fin Rear Spar Main Chord Forward Attachments, BS 1088 Bulkhead
Figure 1 (Sheet 2 of 2)

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VERTICAL STABILIZER ATTACH FITTINGS AT BS 1088 (HFEC)

1. Purpose

- A. This procedure uses high frequency eddy current to find cracks in the attach fittings of the vertical stabilizer at BS 1088.
- B. This procedure uses an instrument with an impedance plane or a meter display.
- C. 737 Supplemental Structural Inspection Document (D6-37089) Reference:
 - (1) Item: F-31

2. Equipment

- A. General
 - (1) Use inspection equipment that can be calibrated on the reference standard as specified in Paragraph 4.
 - (2) Refer to Part 1, 51-01-00, for data about the equipment manufacturers.
- B. Instrument, Probes and Reference Standard
 - (1) Refer to Part 6, 51-00-00, Procedure 4, for the equipment to use to examine the attach fittings if a meter display instrument is used and Part 6, 51-00-00, Procedure 23, if an impedance plane display instrument is used.
 - (2) Use a shielded, right angle, pencil probe as specified in Part 6, 51-00-00, Procedure 4 or Part 6, 51-00-00, Procedure 23, that has the dimensions that follow:
 - (a) DIA = 0.125 inch (3.18 mm), A = 0.2 inch (5 mm), B = 0.33 inch (8.3 mm), C = 4.0 inch (101.6 mm) (the handle is made from a flexible copper tube).

3. Prepare for the Inspection

- A. Remove panels 9505 and 9506 to get access to the lug end (top) of the primary and failsafe fittings.
- B. Remove the rear access door P-25 to get access to the shank end (bottom) of the primary and failsafe fittings.
- C. Clean the surface at the inspection areas. Remove loose paint.

4. Instrument Calibration

- A. Refer to Part 6, 51-00-00, Procedure 4, for the calibration instructions if a meter instrument is used or Part 6, 51-00-00, Procedure 23, if an impedance plane display instrument is used.

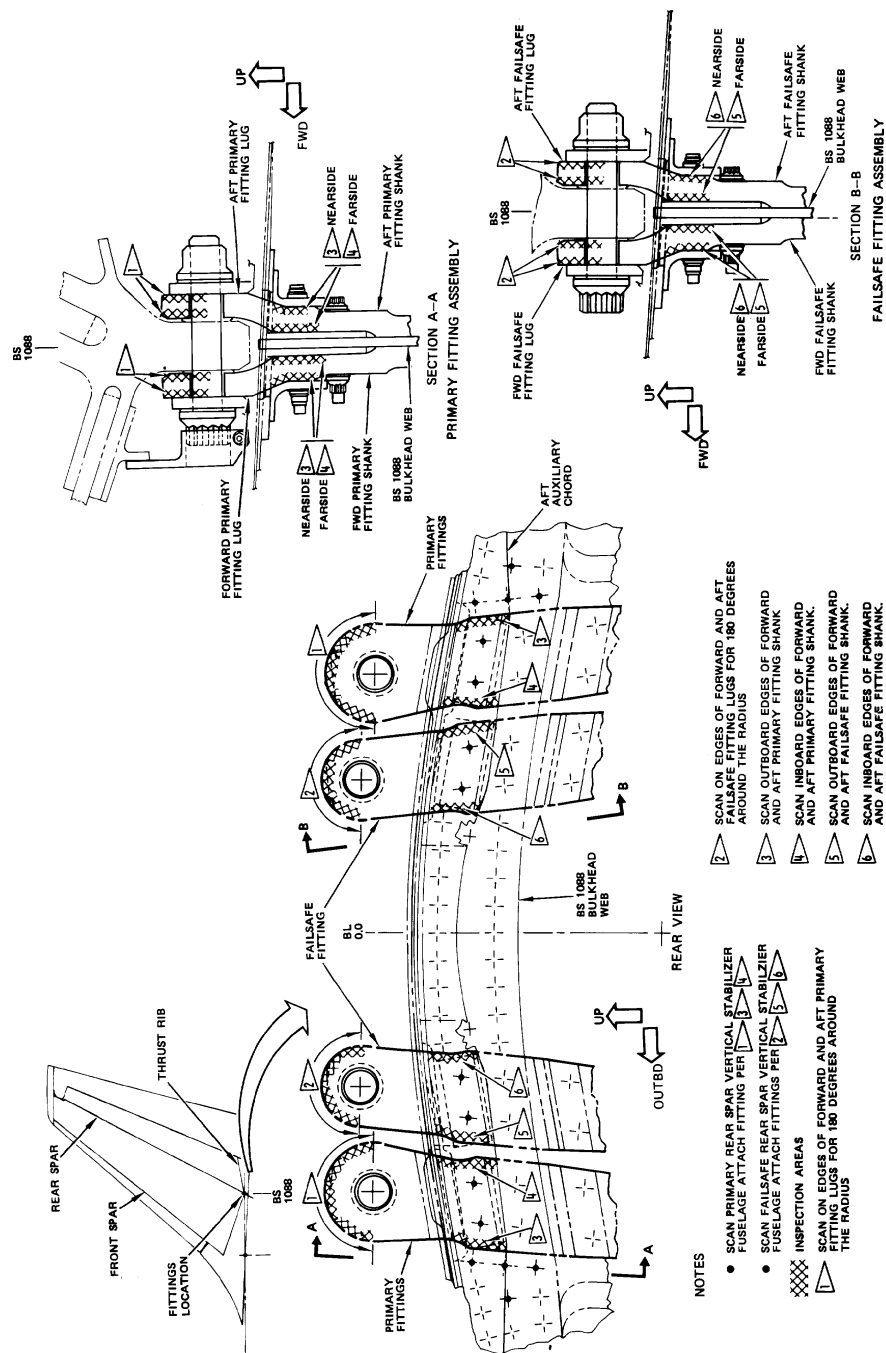
5. Inspection Procedure

- A. Examine the attach fittings for cracks at BS 1088 of the vertical stabilizer as specified in Figure 1.
- B. Do the inspection scans as specified in Part 6, 51-00-00, Procedure 4 or Part 6, 51-00-00, Procedure 23.

6. Inspection Results

- A. Refer to the applicable inspection procedure for data to help make an analysis of the inspection results.

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Vertical Stabilizer Rear Spar Fuselage Attach Fittings at BS 1088
Figure 1

EFFECTIVITY
ALL; 737-100/-200/-200C/-300/-400/-500 AIRPLANES

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PART 6 - EDDY CURRENT

LOWER FITTING OF FRAME AT BODY STATION 695

1. Purpose

- A. To find cracks that come out of the fastener holes in the vertical inboard and outboard flanges of the forward and aft frame lower fitting at body station 695 (see Figure 1).
- B. Service Bulletin Reference: 737-53-1080

2. Equipment

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

- A. Instrument - All eddy current equipment that will satisfactorily do this procedure is applicable for this inspection. These instruments were used to make this procedure:
 - (1) MIZ-10B; Zetec, Inc.
 - (2) NDT-19; Nortec/Staveley, Inc.
 - (3) AV100; Hocking Instruments
- B. Probe - A ferrite shielded, right angle, spot probe that can operate at 3 kHz and has a minimum tip diameter of 0.31 inches (7.9 mm). The probes listed below were used to make this procedure.
 - (1) RS203-70FX/BC; NDT Engineering Corp.
 - (2) SPO-4797; Nortec/Staveley, Inc.
- C. Reference Standard - Make reference standard 384 as specified in Figure 3.

3. Prepare for the Inspection

- A. Get access to the inspection area through the main landing gear wheel well area. Refer to Figure 2 for the inspection areas.
- B. Remove or move the tubing that limits the access to the inspection area(s).
- C. Clean the inspection area of sealant, grease, or loose paint.

4. Instrument Calibration

- A. Calibration for the outboard flange inspection.
 - (1) Set the instrument frequency at 3 kHz.
 - (2) Put the probe adjacent to the fastener (in the area without a notch) of reference standard 384A as shown in position A1 of Figure 4.
 - (3) Balance the instrument as specified in the manufacturers' instructions.
 - (4) Adjust the instrument lift-off. If a meter display instrument is used: adjust the phase control so that the meter needle moves no more than 5 percent of full scale for probe to part distance of 0.006 inches (0.15 mm). If an impedance plane instrument is used: adjust the phase control so that the signal moves horizontally from right to left when the probe is lifted off of the part surface.

NOTE: Put the probe at position A1 (see Figure 4) during the lift-off calibration.

- (5) If a meter display instrument is used, set the needle at 20 percent of full scale. If an impedance plane instrument is used, set the balance point in the lower right area of the screen.



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- (6) Put the probe on the reference standard above the notched area (see position A2 in Figure 4) and do a scan around the fastener. There must be an upscale response on the meter display instrument and a higher vertical response on the impedance plane instrument.
- (7) Move the probe on the reference standard to a position above the notch to get the maximum response.
- (8) Adjust the sensitivity to get a meter response difference of 50 percent (full scale) between position A1 (no notch) and position A2 (notch) if a meter display instrument is used. If an impedance plane instrument is used, adjust the sensitivity to get a response of 50 percent full screen height when the probe is at position A2.

B. Calibration for the inboard flange inspection.

- (1) Do Paragraph 4.A.(1) thru Paragraph 4.A.(8) but use probe positions B1 and B2 of reference standard 384B instead of positions A1 and A2.

5. Inspection Procedure

A. Inspection of the outboard flange.

- (1) Calibrate the instrument as specified in Paragraph 4.A.
- (2) Put the probe on the surface of the outboard flange that is adjacent to the fastener collar. Balance the instrument and do a scan around the collar as shown in Figure 2.

NOTE: (1) It is important to keep the probe flat on the part surface to keep probe lift-off to a minimum.

NOTE: (2) Do not do a scan out of the inspection area, to prevent possible edge effect responses.

- (3) Monitor the baseline response on the impedance plane instrument or the meter needle position on the meter display instrument.
- (4) Do an inspection around each outboard flange fastener shown in Figure 2 as specified in Paragraph 5.A.(1) thru Paragraph 5.A.(3).

B. Inspection of the inboard flange.

- (1) Calibrate the instrument as specified in Paragraph 4.B.
- (2) Put the probe on the surface of the inboard flange that is adjacent to the fastener head. Do a scan around the head as shown in Figure 2.

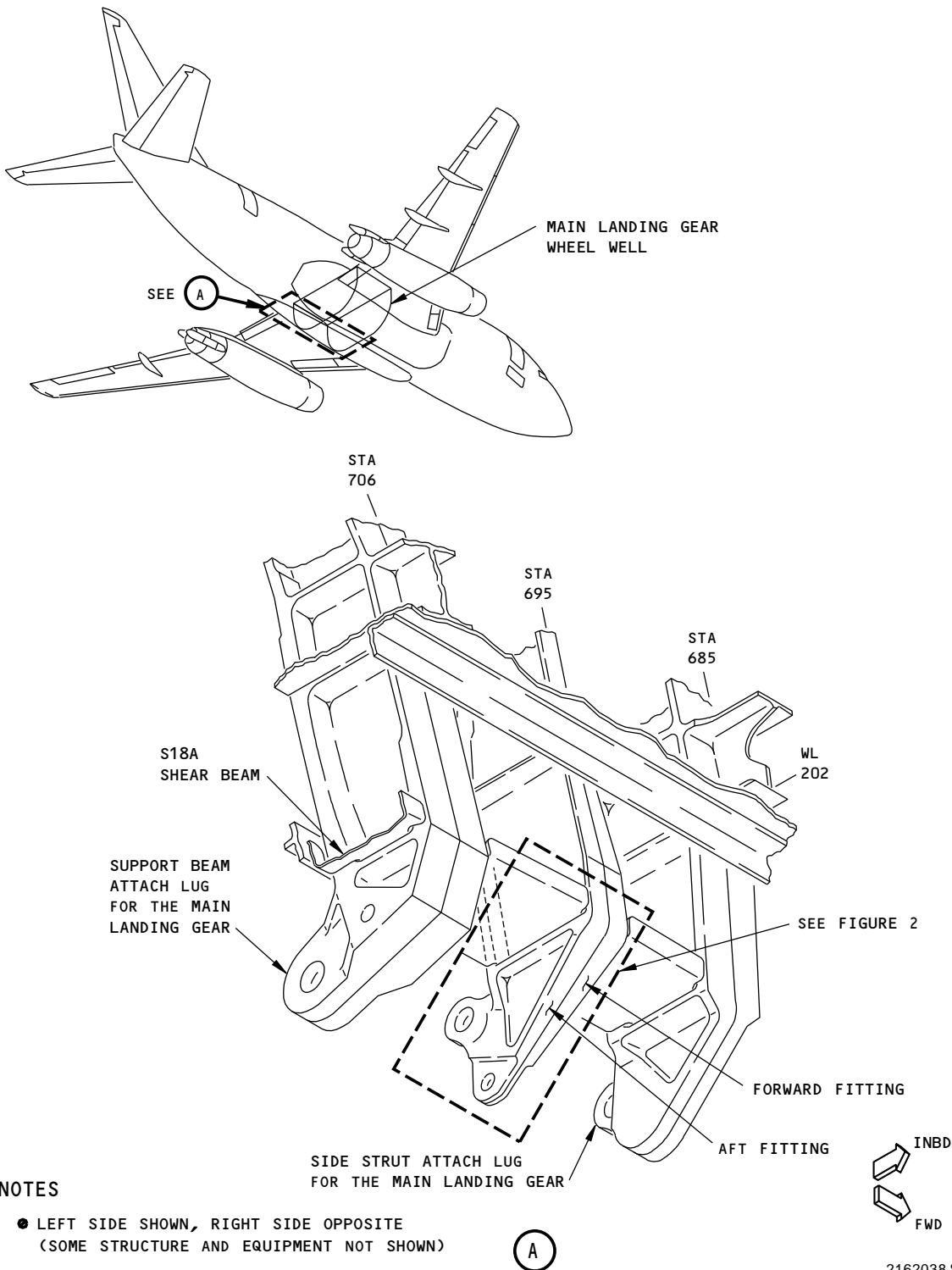
NOTE: Use a mirror to see the fastener head during the inspection, if necessary.

6. Inspection Results

- A. An upscale needle response that is 20 percent (or more) of the balance position on the meter display instrument is a sign of a possible crack. An indication on the impedance plane instrument that is 20 percent (or more) of full screen height higher than the balance point is a sign of a possible crack.

NOTE: An upscale indication, which moves slowly, can occur when a scan is done out of the inspection area. This is due to subsurface edge effect.

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Lower Fitting of Frame at Body Station 695
Figure 1

EFFECTIVITY
ALL; 737-100 AND -200 AIRPLANE LINE NUMBERS
1 THRU 1000

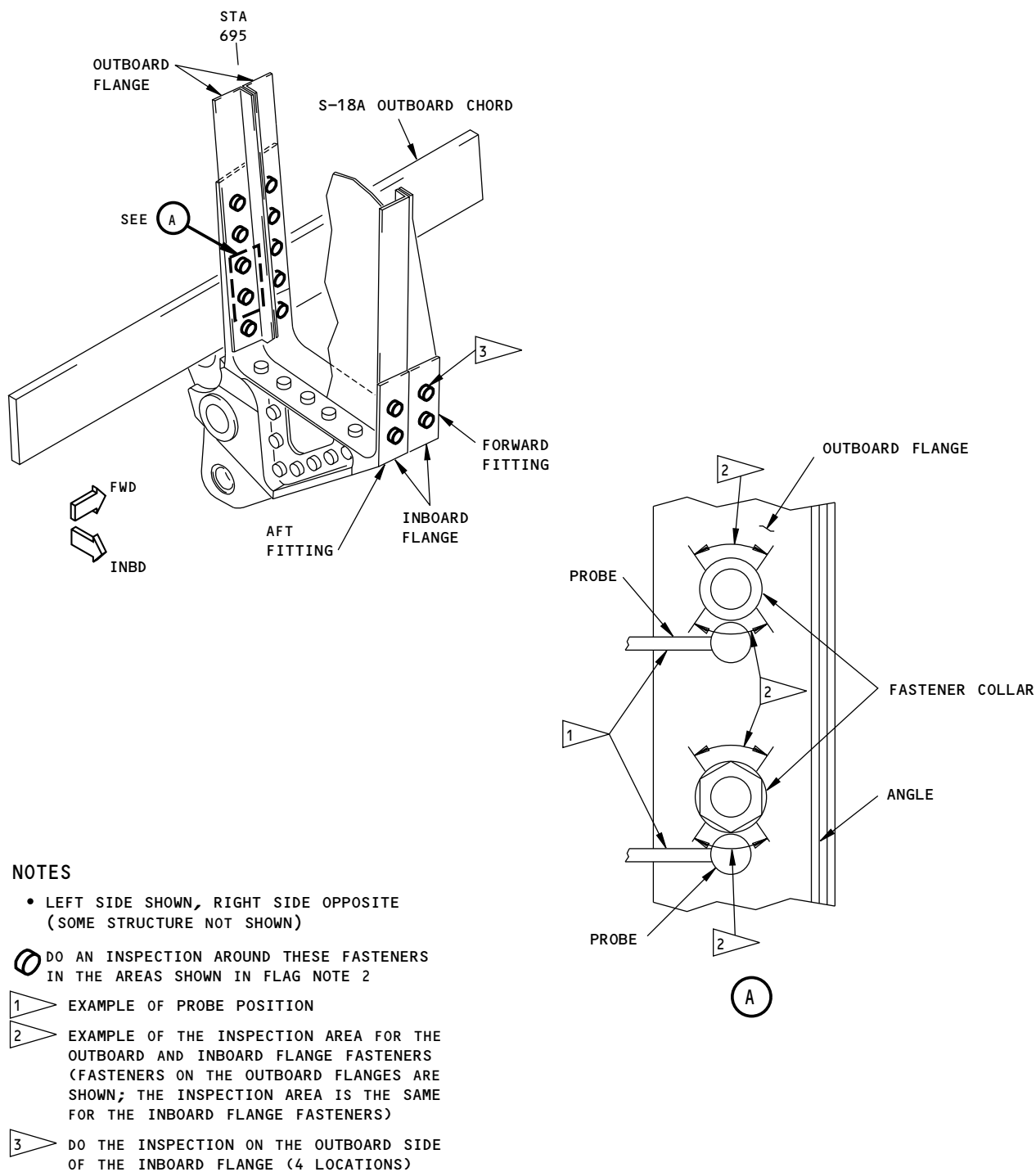
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**Inspection Areas
Figure 2**

EFFECTIVITY
ALL; 737-100 AND -200 AIRPLANE LINE NUMBERS
1 THRU 1000

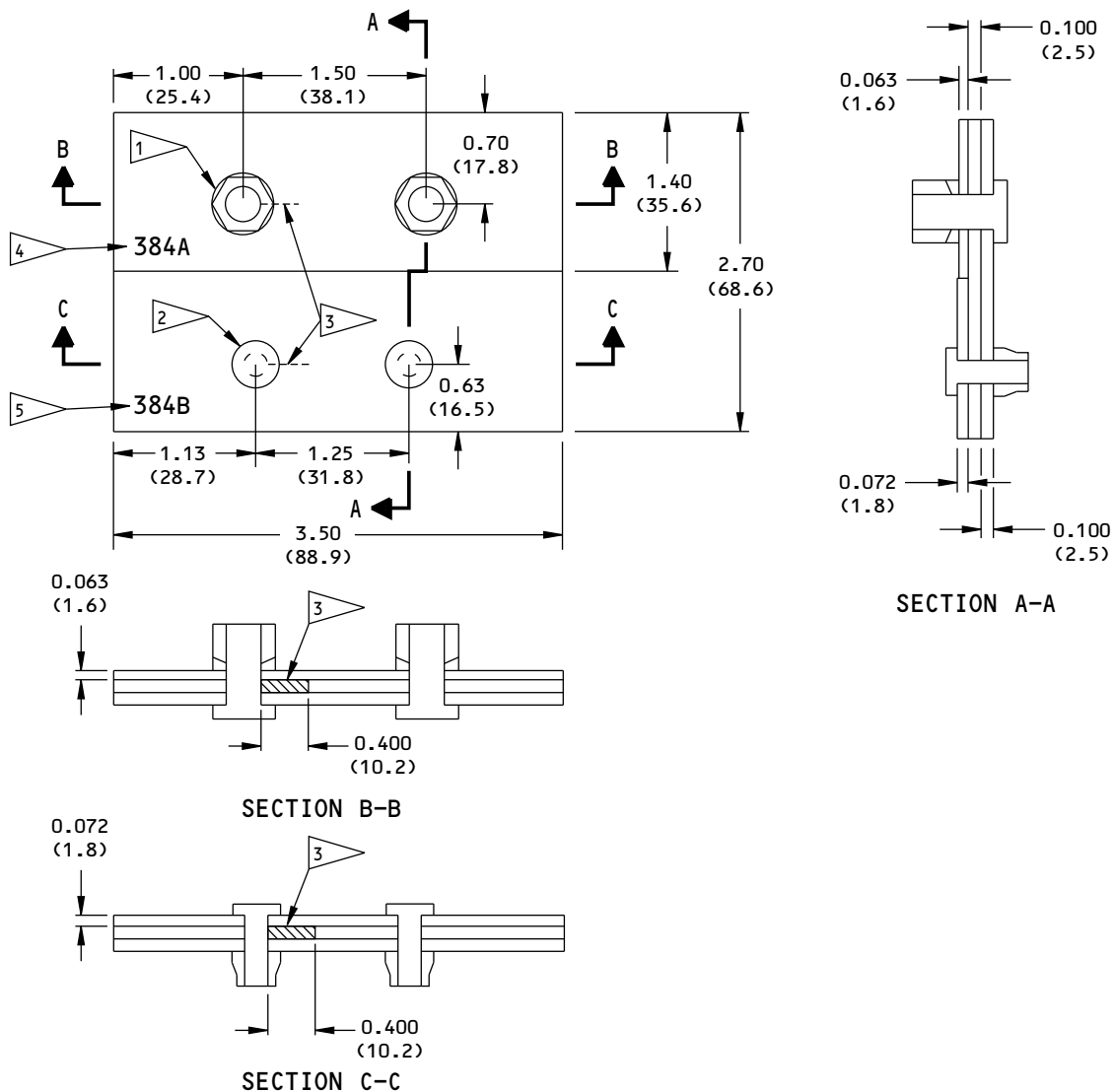
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NOTES

- ALL DIMENSIONS ARE IN INCHES (MILLIMETERS IN PARENTHESES)
- TOLERANCE: X.XX = ± 0.05 (1.3)
X.XXX = ± 0.005 (0.13)
- MATERIAL: 7075-T6 ALUMINUM
- 1 BACB30NF5-4 - ALLOY STEEL, EXTERNAL WRENCHING HEX BOLT,
BACW10AN5 - ALLOY STEEL, NUT BASE SELF-ALIGNING WASHER,
BACN10FD55 - ALLOY STEEL, SELF-ALIGNING HEX NUT; (2 LOCATIONS)
- 2 BACB30FM8-4 - ALLOY STEEL, PROTRUDING HEAD BOLT,
BACC30M - 2024-T6 ALUMINUM, COLLAR; (2 LOCATIONS)
- 3 JEWELERS SAWCUT OR EDM NOTCH; 0.030 (0.80) MAXIMUM WIDTH
- 4 ETCH OR STEEL STAMP WITH 384A
- 5 ETCH OR STEEL STAMP WITH 384B

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Reference Standard 384
Figure 3

EFFECTIVITY
ALL; 737-100 AND -200 AIRPLANE LINE NUMBERS
1 THRU 1000

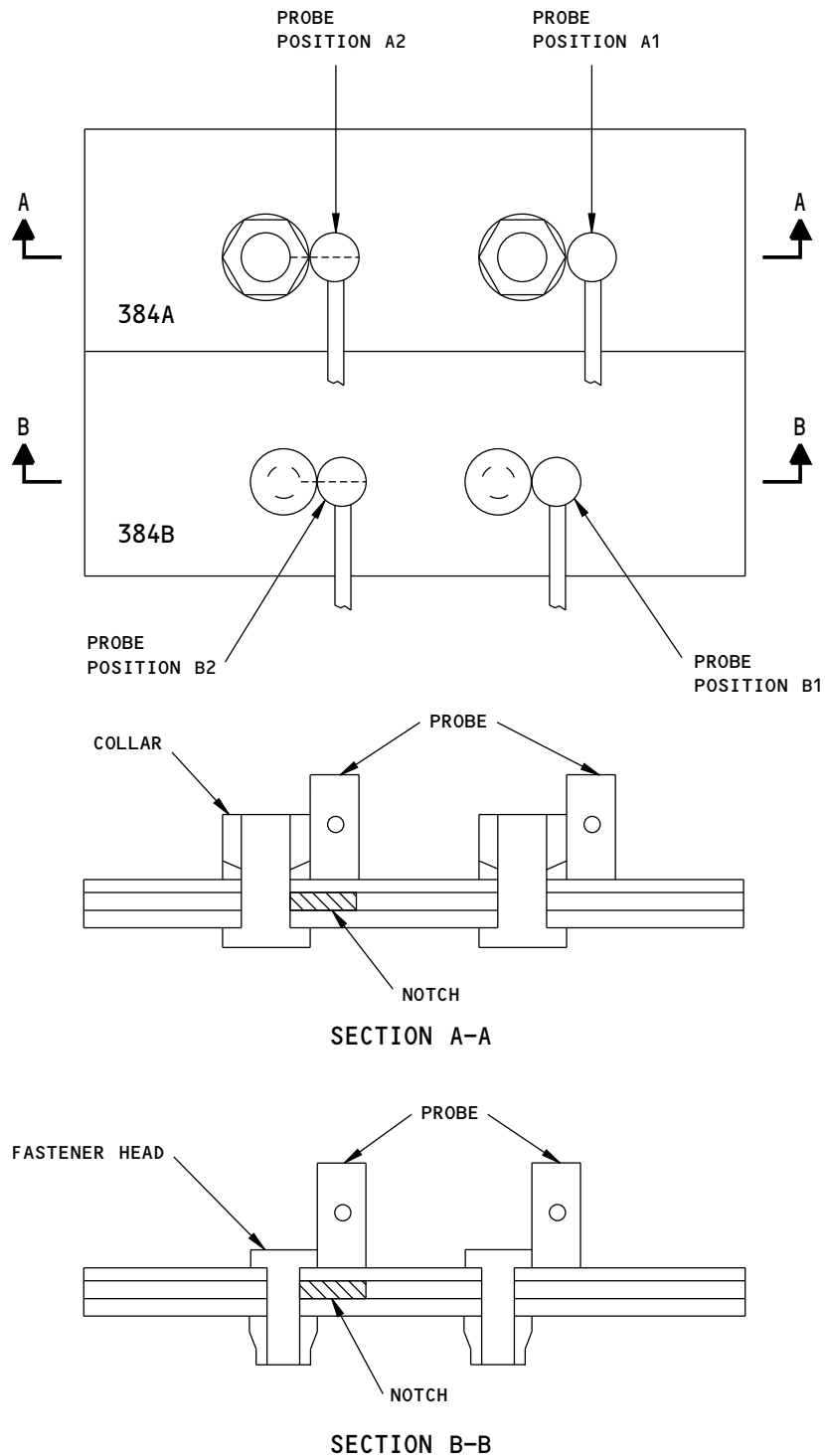
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Probe Positions for Instrument Calibration
Figure 4

EFFECTIVITY
ALL; 737-100 AND -200 AIRPLANE LINE NUMBERS
1 THRU 1000

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PART 6 - EDDY CURRENT

MAIN LANDING GEAR SUPPORT FRAME AT BS 716 - FRAME INNER CHORD AND WEB AT S-16 (HFEC)

1. Purpose

- A. Use this high frequency eddy current (HFEC) procedure to examine the frame inner chord and web at S-16 for cracks at the main landing gear support frame at BS 716. See Figure 1 for the inspection areas.
- B. This procedure uses an impedance plane display instrument.
- C. The frame inner chord and web are aluminum.
- D. 737-600/700/800/900 Damage Tolerance Rating (D626A001-DTR):
 - (1) Item: 53-40-19-1

2. Equipment

- A. General
 - (1) Use inspection equipment that can be calibrated on the reference standard as specified in Part 6, 51-00-00, Procedure 23, paragraph 5.
 - (2) Refer to Part 1, 51-01-00, for data about the equipment manufacturers.
- B. Instrument
 - (1) Use an eddy current instrument that:
 - (a) Has an impedance plane display.
 - (b) Operates from 50 to 500 kHz.
 - (2) The instrument that follows was used to help prepare this procedure.
 - (a) Phasec 2D/3D; GE Inspection Technologies
- C. Probes
 - (1) Use a probe that operates in a frequency range from 50 to 500 kHz.
NOTE: Shielded probes are recommended.
 - (2) The probe that follows was used to help prepare this procedure.
 - (a) TPEN92-5B; Techna NDT
- D. Reference Standard
 - (1) To examine the frame inner chord from six inches above S-16 to six inches below S-16 along the forward and aft edges of the flange, use reference standard 126, or an equivalent, as shown in Part 6, 51-00-00, Procedure 23.
 - (2) To examine the frame web at the three fastener locations for the stringer clip at S-16, use reference standard 188A, or an equivalent, as shown in Part 6, 51-00-00, Procedure 23.
- E. Special Tools
 - (1) Use a nonconductive straightedge to help make a scan of the frame inner chord at S-16.

3. Prepare for the Inspection

- A. Identify and get access to all of the inspection areas. See Figure 1.

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ALL; 737-600/700/800/900 AIRPLANES

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- B. Clean the inspection surfaces.
 - (1) Remove dirt, grease, or sealant from the inspection surfaces.
 - (2) Remove paint only if it is loose.

4. Instrument Calibration

- A. Calibrate the instrument to examine the frame inner chord from six inches above S-16 to six inches below S-16 along the forward and aft edges of the flange (see Figure 1) as specified in Part 6, 51-00-00, Procedure 23, paragraph 5.
 - (1) Use reference standard 126, or an equivalent, to help calibrate the instrument.
- B. Calibrate the instrument to examine the frame web at the three fastener locations for the stringer clip at S-16 (see Figure 1) as specified in Part 6, 51-00-00, Procedure 23, paragraph 5.
 - (1) Use reference standard 188A, or an equivalent, to help calibrate the instrument.

5. Inspection Procedure

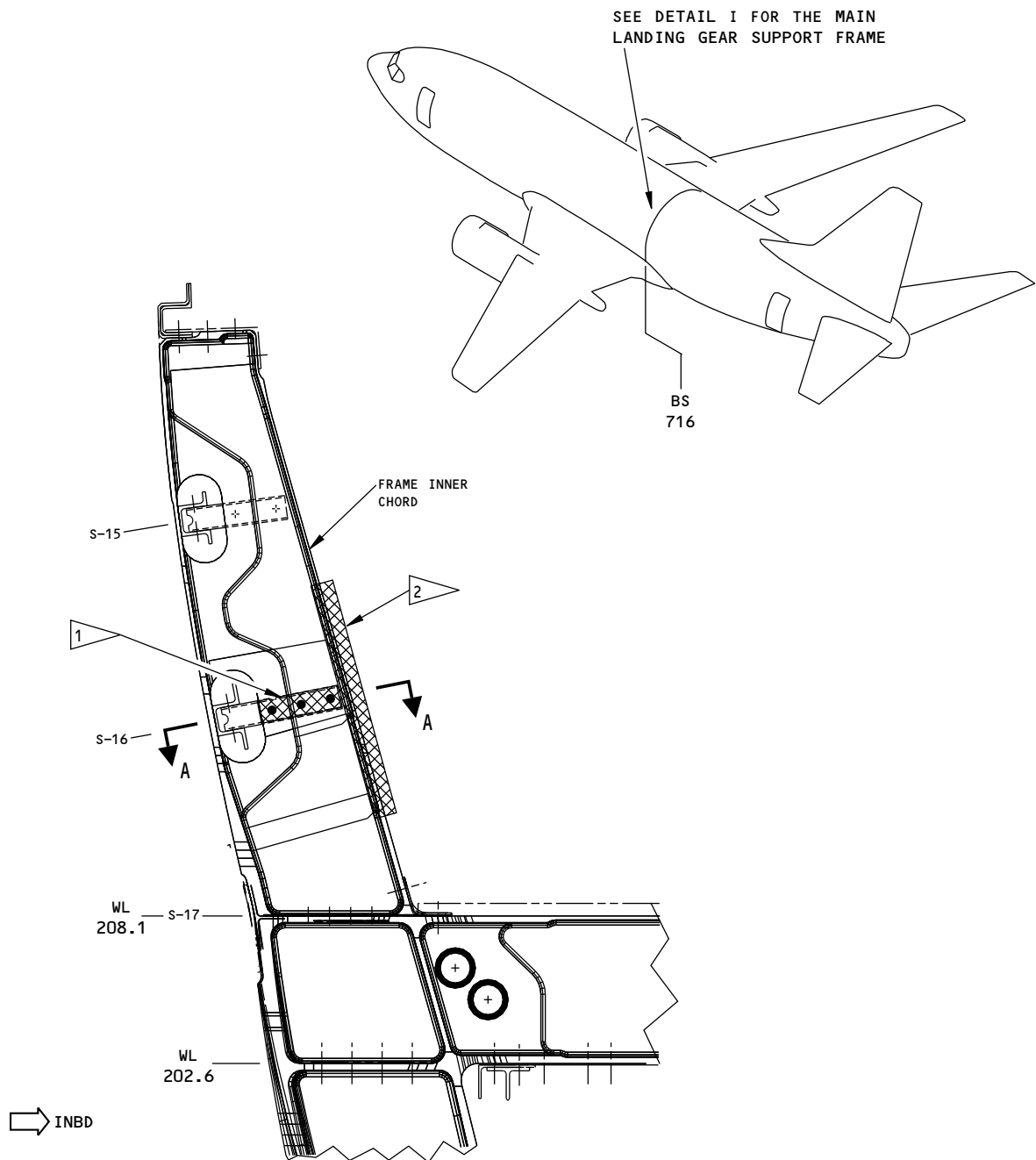
- A. Get access to the inspection area shown in Figure 1.
- B. Examine the frame inner chord and web at S-16 for cracks as specified in Part 6, 51-00-00, Procedure 23, paragraph 6, at the locations that follow:
 - (1) Examine the frame inner chord from six inches above S-16 to six inches below S-16 along the forward and aft edges of the flange. Keep the probe coil a constant distance from the edges of the flange. See Figure 1, flagnote 2.
 - (2) Examine the frame web at the three fastener locations for the stringer clip at S-16. Use the head of the fastener as a probe guide. See Figure 1, flagnote 1.
- C. Do a check of the instrument calibration as specified in Part 6, 51-00-00, Procedure 23, paragraph 6.E.(5).
- D. Do Paragraph 5.A. thru Paragraph 5.C. again to examine the frame inner chord and webs for cracks on the other side of the airplane.

6. Inspection Results

- A. Refer to Part 6, 51-00-00, Procedure 23, paragraph 7, for instructions to help make an analysis of the indications that occur during the inspection.



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DETAIL I
MAIN LANDING GEAR SUPPORT FRAME AT BS 716

NOTES

☒ INSPECTION AREA

- THE LEFT SIDE IS SHOWN; THE RIGHT SIDE IS OPPOSITE
- FASTENER LOCATIONS TO BE EXAMINED

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Inspection Area
Figure 1 (Sheet 1 of 2)

EFFECTIVITY
ALL; 737-600/700/800/900 AIRPLANES

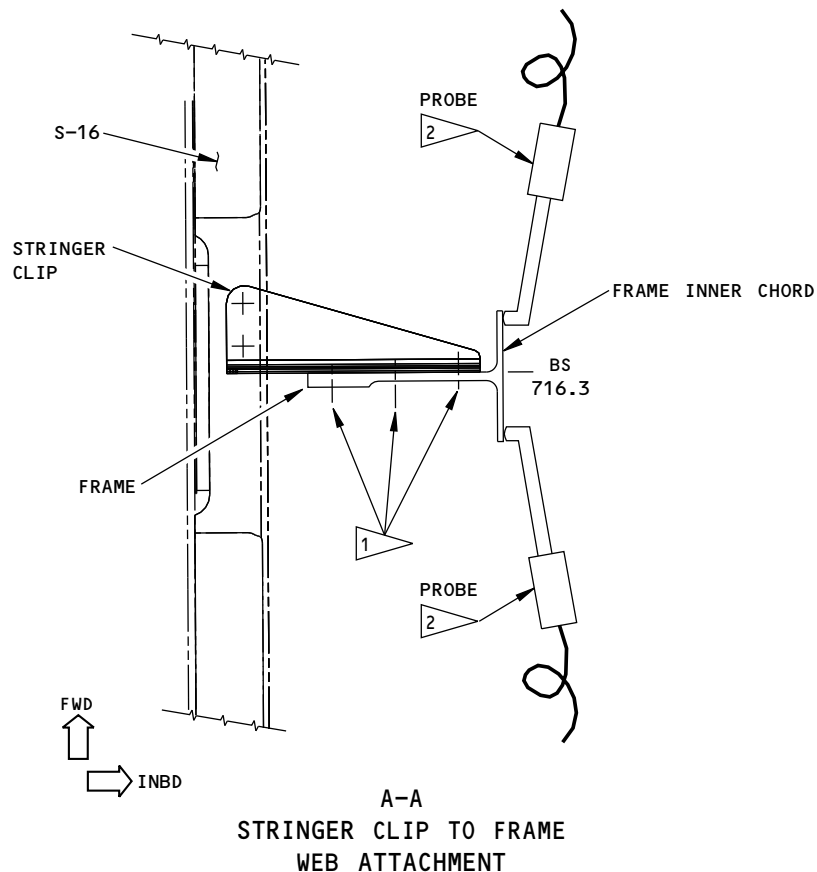
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NOTES

- 1 EXAMINE THE FRAME WEB AT THE THREE FASTENERS THAT ATTACH THE FRAME TO THE STRINGER CLIP AT S-16. USE THE HEAD OF THE FASTENER AS A PROBE GUIDE.
- 2 EXAMINE THE FRAME INNER CHORD FROM SIX INCHES ABOVE S-16 TO SIX INCHES BELOW S-16 ALONG THE FORWARD AND AFT EDGES. KEEP THE PROBE COIL A CONSTANT DISTANCE FROM THE EDGES OF THE FLANGE.

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Inspection Area
Figure 1 (Sheet 2 of 2)

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