NACELLE UPPER LINK FORWARD LUGS

1. Purpose

A. Use this procedure to do an inspection for cracks in the forward lug of the upper links.

B. See Figure 1 for the inspection areas.

C. Service Bulletin reference: 767-54-0072.

2. Equipment

A. General

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

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

B. Instrument

(1) Use an ultrasonic instrument that:

(a) Operates in the pulse-echo mode.

(b) Operates in a frequency range of 4 to 6 MHz.

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

(a) USD 15; Krautkramer Branson

(b) Sonic 136; Staveley Instruments, Inc.

(c) Epoch 2002; Panametrics, Inc.

C. Transducer

(1) Two different low profile transducers are given in this procedure. Refer to Figure 2 or Figure 3, Table I to identify the transducer that is necessary to examine your airplane.

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

(a) Part Number SPO 6223 -- A low-profile 5 MHz transducer to cause a 38-degree refracted shear wave in steel thru a 1.830-inch (46.48 mm) radius convex surface. The maximum height is 0.400 inch (10.2 mm).

(b) Part Number SPO 6224 -- A low-profile 5 MHz transducer to cause a 38-degree refracted shear wave in steel thru a 1.880-inch (47.75 mm) radius convex surface. The maximum height is 0.400 inch (10.2 mm).

D. Reference Standards

(1) Two reference standards are specified in this procedure. Only one reference standard is necessary to examine an airplane and is given by the engine configuration. See Table I in Figure 2 or Figure 3 to identify the reference standard that is necessary for your engine configuration.

E. Couplant

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

3. Preparation for Inspection

A. Get access to the upper link on the left wing through wing/pylon access panels 511PT and 511ST (611PT and 611ST for the right wing).

B. Remove the fuse pin from the forward attach point of the upper link so that the forward end of the upper link can be lifted up.

C. Remove loose paint, primer, dirt and sealant from the surface of the inspection areas. See Figure 1 for the inspection locations.

4. Instrument Calibration

A. Get the necessary reference standard and transducer as given in Table I of Figure 2 or Figure 3.

B. Put couplant and then the transducer on the reference standard at transducer position 1 as shown in Figure 4 and get a maximum signal from EDM notch "A".

C. Adjust the instrument controls to put the initial pulse at 0 percent of full screen width (FSW) and the maximum signal from EDM notch "A" at 80 percent of full screen width as shown in Figure 4.

D. Adjust the gain controls to put the maximum signal from EDM notch "A" at 80 percent of full screen height (FSH) as shown in Figure 4.

E. Move the transducer to position 2 and get a signal from EDM notch "B". This signal will be at approximately 80% FSW. Permit the transducer to overhang the edge of the reference standard as much as necessary to get the EDM notch signal to 80% of FSH and hold the transducer positioner at this position.

F. Measure the quantity of overhang that is necessary to get an 80% FSH signal from EDM notch "B" (transducer position 2) as shown in Figure 4, Flagnote 3.

G. Move the transducer to position 3 and get a signal from EDM notch "B". This signal will be at approximately 80% FSW. Permit the transducer to overhang the edge of the reference standard up to a maximum of 0.09 inch (2.3 mm) to get the EDM notch signal to 80% of FSH and hold the transducer positioner at this position.

H. Measure the quantity of overhang that is necessary to get an 80% FSH signal from EDM notch "B" (transducer position 3) as shown in Figure 4, Flagnote 4.

I. Compare the two values measured in Paragraph 4.F. and Paragraph 4.H. Use the dimension with the greater value as the minimum overhang that must be used during the examination of the outer edges of the lug hole.

J. Add 6 dB more gain. Do not remove the 6 dB gain for the remainder of this inspection procedure.

5. Inspection Procedure

A. Put a sufficient quantity of couplant on the inspection surfaces of the forward lug.

B. Put the transducer on the inspection surface and fully scan the inspection area as shown in Figure 5. To make sure the lug is fully examined, it is necessary to make an overlap of approximately one-half of the transducer's width for each scan as shown in Figure 5, Flagnote 4.

C. Examine the outer edges of the lug. During the inspection, make sure to overhang the transducer positioner the necessary distance given in Paragraph 4.I. It is acceptable to use more than the minimum overhang distance. See Figure 5, Flagnote 5.

D. Turn the transducer positioner 180° and do Paragraph 5.A. thru Paragraph 5.C. in the opposite direction.

E. Do Paragraph 5.A. thru Paragraph 5.D. on the opposite upper link.

6. Inspection Results

A. An ultrasonic signal that is 40 percent of FSH or more and occurs between 75 and 90 percent of FSW is an indication of a possible crack and must be examined more fully.

B. To examine the forward lug of the upper link more fully, do the steps that follow:

(1) Remove all couplant from the surfaces of the forward lug.

(2) Put couplant only on the surface of the forward lug that the transducer will touch and do the inspection again.

(3) Again, get a maximum signal at the location where the signal occurred.

(4) If the transducer positioner overhangs an edge when the ultrasonic signal occurs, go to Paragraph 6.C. If the transducer positioner does not overhang an edge when the ultrasonic signal occurs, go to Paragraph 6.B.(5).

(5) If the maximum signal is 40 percent of FSH or more and occurs between 75 and 90 percent of FSW, go to Paragraph 6.D. If the maximum signal is less than 40 percent of FSH and occurs between 75 and 90 percent of FSW, the part is acceptable. Boeing suggests that you make a careful record of all data for reference during the next inspection. See the note in Paragraph 6.C.(7).

C. If the transducer positioner overhangs the edge of the lug when you get an ultrasonic signal, do the calibration procedure that follows to permit a more accurate evaluation of the ultrasonic signal.

(1) Remove 6 dB of gain.

(2) If the transducer positioner overhangs the right edge of the lug when the indication occurs, put the transducer positioner at position 2 on the reference standard as shown in Figure 4. If the transducer positioner overhangs the left edge of the lug when the indication occurs, put the transducer positioner at position 3 on the reference standard as shown in Figure 4.

(3) With the transducer positioner at the correct position, get a signal from EDM notch "B". The signal will occur at approximately 80% of FSW. Permit the transducer to overhang the edge of the reference standard as much as necessary to get the EDM notch signal to 80% of FSH and hold the transducer positioner at this position.

(4) Measure the quantity of overhang that was necessary to get an 80% of FSH signal from EDM notch "B". This is the new minimum overhang distance.

(5) Add 6 dB gain.

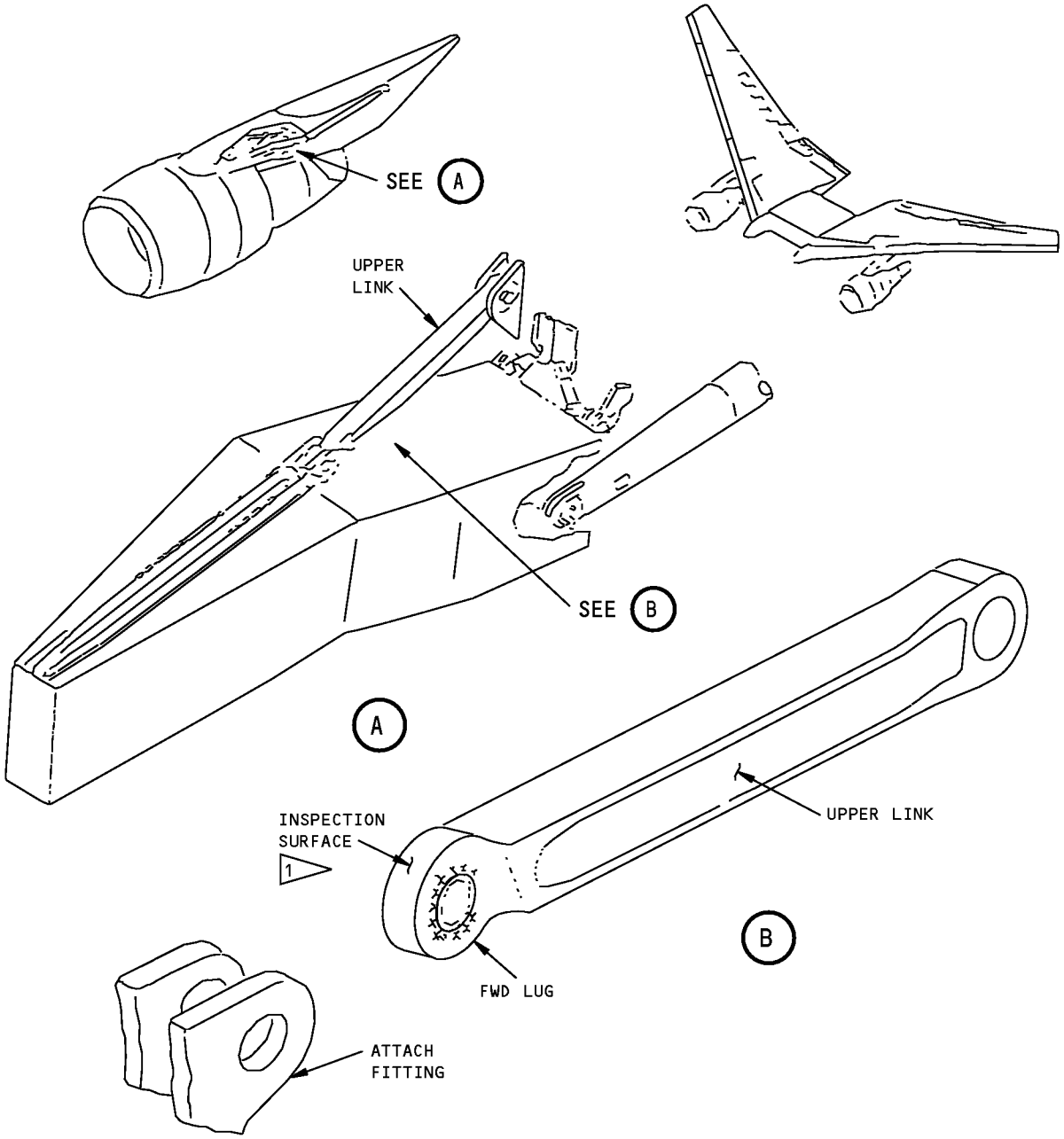
(6) Examine the outer edge of the lug again where the indication occurred. Make sure to overhang the transducer positioner at the new minimum overhang distance given in Paragraph 6.C.(4).

NOTE: It is satisfactory to overhang the transducer position more than the minimum overhang distance. It is not satisfactory to overhang the transducer positioner less than the minimum overhang distance.

(7) If the ultrasonic signal is 40 percent of FSH or more and occurs between 75 and 90 percent of FSW, go to Paragraph 6.D. If the signal is less than 40 percent of full screen height, the part is acceptable.

NOTE: Boeing does not make it necessary to do an analysis of signals that are less than 40 percent of full screen height because of the higher rate of false crack signals below this level. However, Boeing has no technical objection if the operator does an analysis of indications less than 40 percent of full screen height.

D. Remove the bushings from the forward lug and do a magnetic particle inspection of the lug to make sure the indication is from a crack.

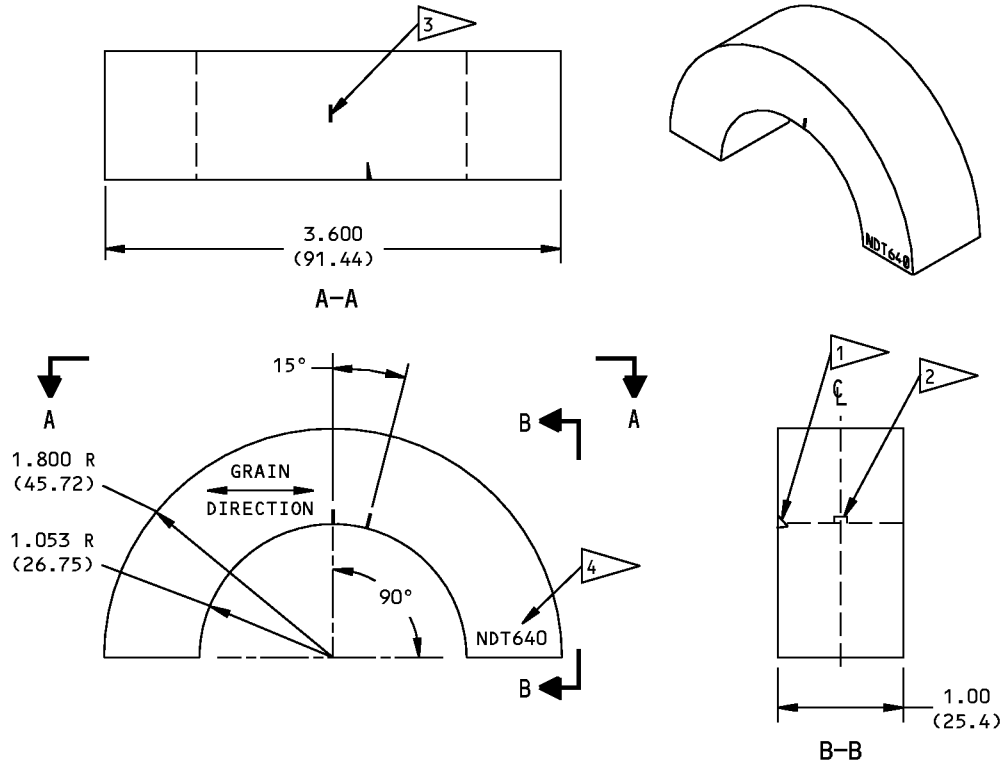


NOTES

XXXX = INSPECTION AREA (FULL WIDTH OF LUG)

- EXAMINE THE UPPER LINK IN STRUT NO. 1 AND NO. 2
- GET ACCESS TO THE UPPER LINK, REMOVE THE FORWARD FUSE PIN, LIFT THE FORWARD END OF THE UPPER LINK OUT OF THE ATTACH FITTING TO GAIN ACCESS FOR THE INSPECTION

Inspection Area
Figure 1



NOTES

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

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

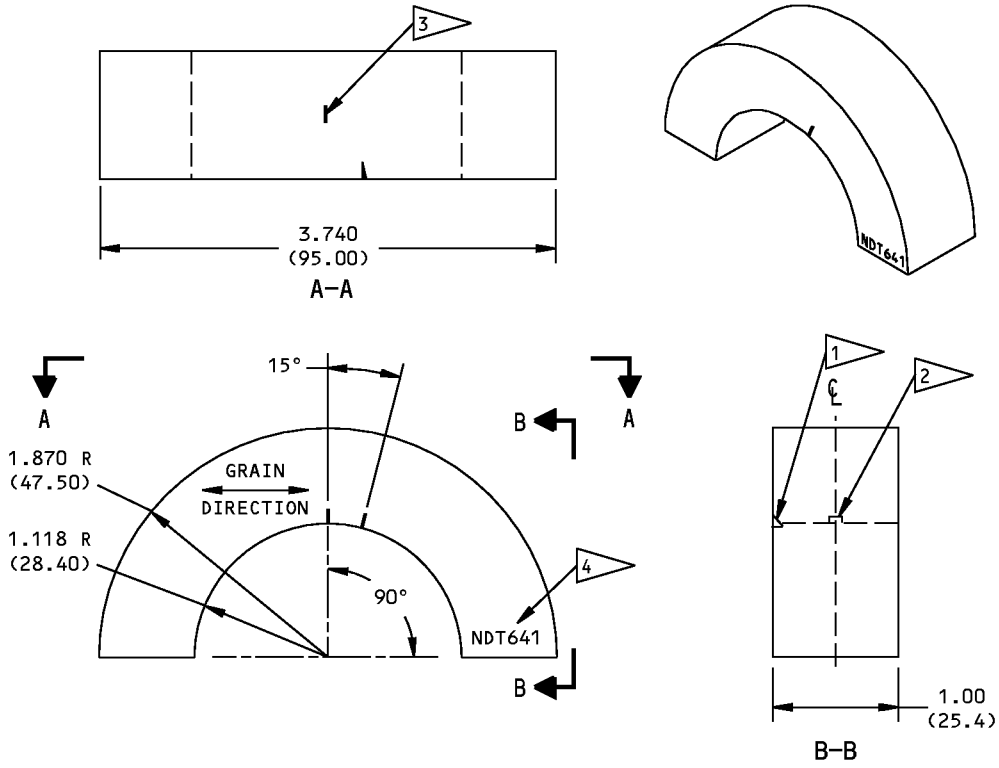
- MATERIAL: 4330M, 4340M, OR 15-5 PH
- SURFACE ROUGHNESS: 63 Ra OR BETTER

REF. STD. TRANSDUCER	CF6-80A	CF6-80C	PW4000	RB211
NDT640 SP06223	X	X	X	
NDT641 SP06224				X

TABLE I

1. EDM CORNER NOTCHES: 0.10 (2.54) X 0.10 (2.54) X 0.010 (0.25) WIDE
2. EDM MID-BORE NOTCH: 0.10 (2.54) LONG, 0.050 (1.27) DEEP, 0.010 (0.25) WIDE
3. CENTER THIS NOTCH IN THE HOLE (BORE) CENTERLINE
4. ETCH OR STEEL STAMP THE PART NUMBER (NDT640) AT APPROXIMATELY THIS LOCATION

Reference Standard NDT640
Figure 2



NOTES

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

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

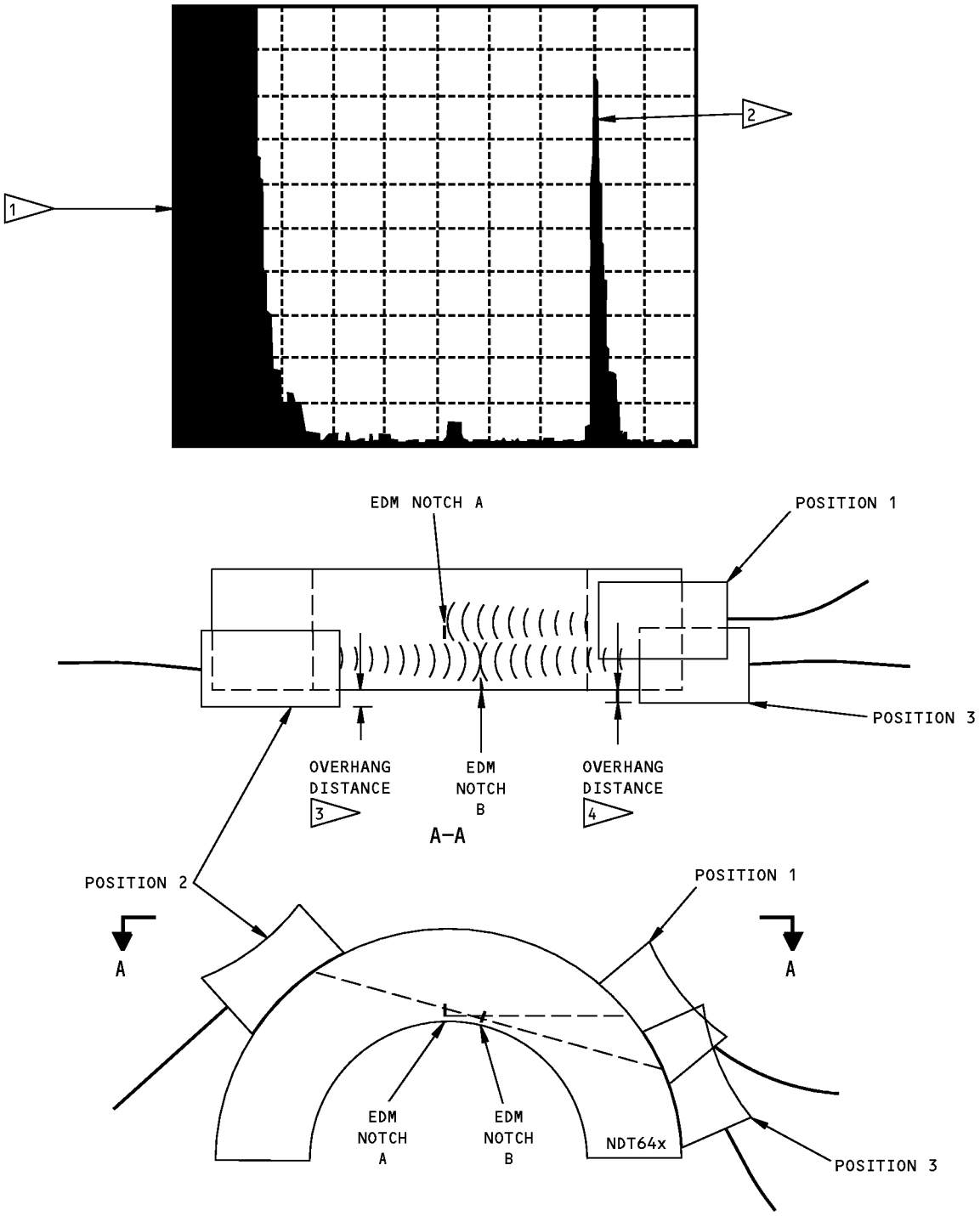
- MATERIAL: 4330M, 4340M, OR 15-5 PH
- SURFACE ROUGHNESS: 63 Ra OR BETTER

REF. STD. TRANSDUCER	CF6-80A	CF6-80C	PW4000	RB211
NDT640 SP06223	X	X	X	
NDT641 SP06224				X

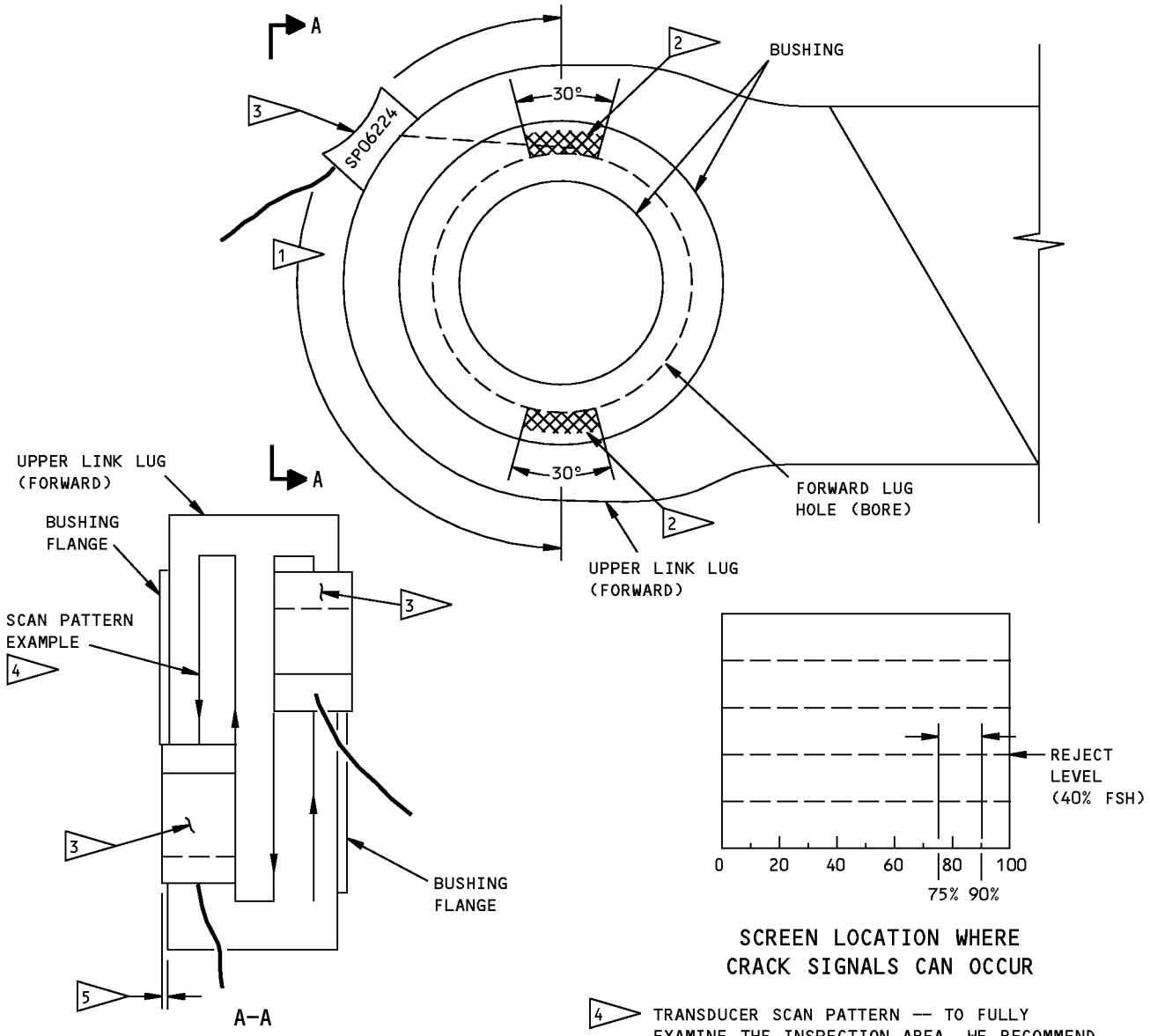
TABLE I

1. EDM CORNER NOTCHES: 0.10 (2.54) X 0.10 (2.54) X 0.010 (0.25) WIDE
2. EDM MID-BORE NOTCH: 0.10 (2.54) LONG, 0.050 (1.27) DEEP, 0.010 (0.25) WIDE
3. CENTER THIS NOTCH IN THE HOLE (BORE) CENTERLINE
4. ETCH OR STEEL STAMP THE PART NUMBER (NDT641) AT APPROXIMATELY THIS LOCATION

Reference Standard NDT641
Figure 3



Instrument Calibration
Figure 4



1. INSPECTION AREA: FULLY EXAMINE THE FORWARD LUG IN THIS RANGE
2. EXPECTED LOCATIONS FOR CRACKS TO OCCUR
3. SPECIAL LOW PROFILE TRANSDUCER SP06224 IS SHOWN. THE INSPECTION IS THE SAME WITH SP06223
4. TRANSDUCER SCAN PATTERN -- TO FULLY EXAMINE THE INSPECTION AREA, WE RECOMMEND THAT YOU DIVIDE THE INSPECTION AREA INTO SMALLER AREAS AND EXAMINE THE FULL WIDTH OF THE LUG IN EACH SMALL AREA. MAKE SURE TO OVERLAP EACH SCAN BY APPROXIMATELY ONE-HALF THE TRANSDUCERS WIDTH. WHEN THE LUG IS FULLY EXAMINED IN ONE DIRECTION, ROTATE THE TRANSDUCER 180° AND EXAMINE THE LUG IN THE OPPOSITE DIRECTION.
5. MAKE ONE SCAN ALONG EACH OF THE TWO EDGES WITH THE QUANTITY OF OVERHANG THAT WAS MEASURED DURING THE CALIBRATION PROCEDURE IN PARAGRAPH 4.I. THIS OVERHANG DISTANCE IS A MINIMUM DISTANCE -- IT IS ACCEPTABLE TO USE MORE OVERHANG.

Inspection Details
Figure 5

NACELLE UPPER LINK AFT LUGS

1. Purpose

A. Use this procedure to do an inspection for cracks in the aft lug of the upper links.

B. See Figure 1 for the inspection areas.

C. Service Bulletin reference: 767-54-0072.

2. Equipment

A. General

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

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

B. Instrument

(1) Use an ultrasonic instrument that:

(a) Operates in the pulse-echo mode.

(b) Operates in a frequency range of 4 to 6 MHz.

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

(a) USD 15; Krautkramer Branson

(b) Sonic 136; Staveley Instruments, Inc.

(c) Epoch 2002; Panametrics, Inc.

C. Transducers

(1) Use a transducer that:

(a) Operates in a frequency range of 4 to 6 MHz.

(b) Has a refracted shear wave of 60 (±2) degrees in steel.

(c) Has a side-mounted micro dot connector.

(d) Has a signal-to-noise ratio of 3-to-1 or better.

NOTE: Some transducers have a noise signal that comes into view in the area where crack signals can occur. This can cause a noise signal to be incorrectly identified as a crack signal.

(2) The transducer specified below is recommended for this procedure because it has a high signal-to-noise ratio. Other transducers can be used if they have an acceptable signal-to-noise ratio during calibration and inspection.

(a) Krautkramer Branson Aerotech (KBA) Part Number 389-021-970. This is a 5 MHz transducer that produces a 60° refracted shear wave in steel. The crystal is 0.18 inch (4.75 mm) square.

D. Reference Standards

(1) Two reference standards are specified in this procedure. Only one reference standard is necessary to examine an airplane and is given by the engine configuration. See Table I in Figure 2 or Figure 3 to identify the reference standard that is necessary for your engine configuration.

E. Couplant

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

3. Preparation for Inspection

A. Get access to the upper link on the left wing through wing/pylon access panels 511PT and 511ST (611PT and 611ST for the right wing).

B. Remove loose paint, primer, dirt and sealant from the surface of the inspection areas. See Figure 1 for the inspection locations.

4. Instrument Calibration

NOTE: During calibration, do not permit the transducer to overhang the edge of the reference standard.

A. Get the necessary reference standard as specified in Table I of Figure 2 or Figure 3.

B. Put couplant on the reference standard at transducer positions 1 thru 4 as shown in Figure 4.

NOTE: An analysis is done during calibration of the signals from three different EDM notches. The EDM notch that gives the smallest ultrasonic signal (lowest signal) is used to set the sensitivity for the inspection.

C. Put the transducer at position 1 and get a maximum signal from the hole (bore) as shown in Figure 4.

D. Adjust the instrument controls to put the initial pulse at 0 percent of full screen width and the hole signal at 80 percent of full screen width. Make sure the signal is at a maximum when it is set to 80 percent full screen width.

E. Move the transducer to position 2 and get a maximum signal from EDM notch "A" as shown in Figure 4. This signal will come into view at approximately 40 percent of full screen width on reference standard NDT634 and at approximately 50 percent of full screen width on reference standard NDT639.

F. Adjust the gain control to put the maximum signal at 80 percent of full screen height. See Figure 4, Flagnote 3.

G. Move the transducer to position 3 and get a signal from EDM notch "B" as shown in Figure 4. This signal will come into view at approximtely 45 percent of full screen width on reference standard NDT634 and at approximately 55 percent of full screen width on reference standard NDT639. If the maximum signal from notch "B" is less than 80 percent of full screen height, then adjust the gain to put the signal at 80 percent of full screen height.

NOTE: Do not permit the transducer to overhang the edge of the reference standard during calibration.

H. Move the transducer to position 4 as shown in Figure 4 and get a maximum signal from EDM notch "C". This signal will come into view at approximtely 50 percent of full screen width on reference standard NDT634 and at approximately 55 percent of full screen width on reference standard NDT639. If the maximum signal from notch "C" is less than 80 percent of full screen height, then adjust the gain to put this signal at 80 percent of full screen height.

NOTE: Do not permit the transducer to overhang the edge of the reference standard during calibration.

I. Add 6 dB more gain. Do not remove the 6 dB gain for the remainder of this procedure.

5. Inspection Procedure

A. Put a sufficient quantity of couplant on the inspection surfaces of the aft lug.

B. Put the transducer on the upper surface of the lug with the sound beam pointed in the aft direction. Move the transducer forward or rearward until you get a signal from the hole (bore) in the lug. If you have calibrated correctly, this signal will occur at approximately 80 percent of full screen width.

NOTE: It is possible that the signal from the hole (bore) will not go away as you do the scan in the aft direction (to the hole). The signal will decrease in amplitude but can sometimes stay above the reject level (40% of full screen height) as the signal moves into the screen display area where crack signals can occur (see flagnote 1 of Figure 5). Do not reject the upper link because of this signal since you can see that the signal is caused by the hole (bore).

C. Begin at an outer edge and make a scan in the aft direction (in the direction of the lug hole) to approximately the hole centerline as shown in Figure 5. While you scan, continuously turn the transducer clockwise and counterclockwise approximately 10° in each direction. This scan procedure will help to find off-angle cracks. Look for crack signals to occur between 35 and 60 percent of full screen width. Ultrasonic signals that are 40 percent or more of full screen height are possible crack signals and make it necessary to examine the aft lug more fully as specified in Paragraph 6.

D. Fully scan the inspection area for the full width of the lug as shown in Figure 5. To make sure the lug is fully examined, it is necessary to make an overlap of approximately one-half of the transducer's width for each scan as shown in Figure 5, Flagnote 3.

E. Make one scan along each of the two outer edges with the transducer set at an angle of approximately 20 degrees as shown in Figure 5, Flagnote 5. Make a full scan in the forward and aft direction. Use EDM notches "B" and "C" in the necessary reference standard to find the correct angle to use for your transducer.

F. Do Paragraph 5.A. thru Paragraph 5.E. again but on the bottom of the lug as shown in Figure 5.

G. Do Paragraph 5.A. thru Paragraph 5.G. again on the aft lug of the other upper link.

6. Inspection Results

A. An ultrasonic signal that is 40 percent of full screen height or higher and occurs between 35 and 60 percent of full screen width is an indication of a possible crack and must be examined more fully. See Figure 5, Flagnote 1.

NOTE: See the note in Paragraph 5.B.

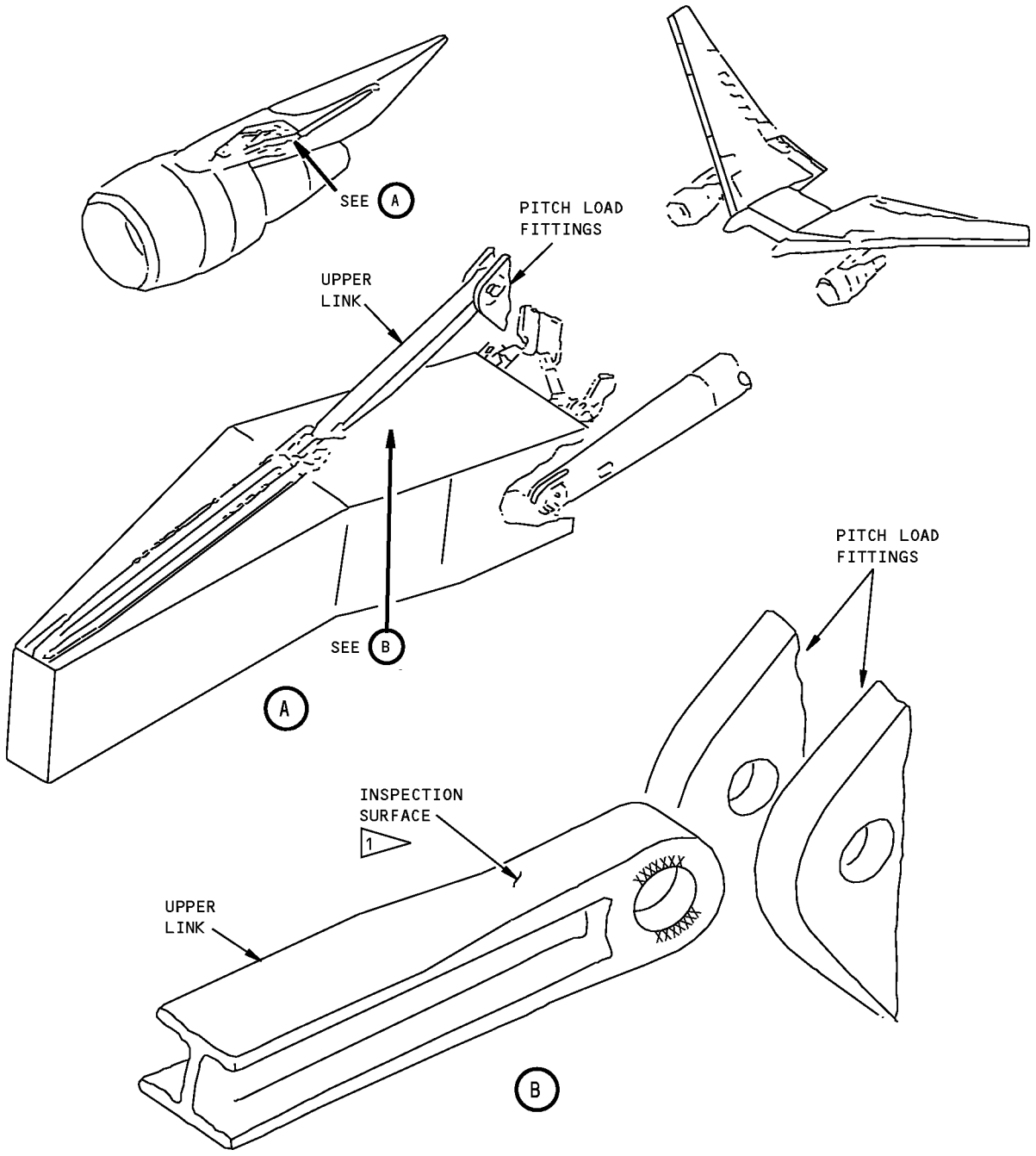
B. To examine the aft lug of the upper link more fully, do the steps that follow:

(1) Remove all couplant from the surfaces of the aft lug.

(2) Put couplant only on the surface of the aft lug that the transducer will touch and do the inspection again.

(3) If the indication is still above the reject level, go to Paragraph 6.C.

C. Remove the fuse pin, upper link, and bushings and do a magnetic particle inspection to make sure the indication is from a crack.

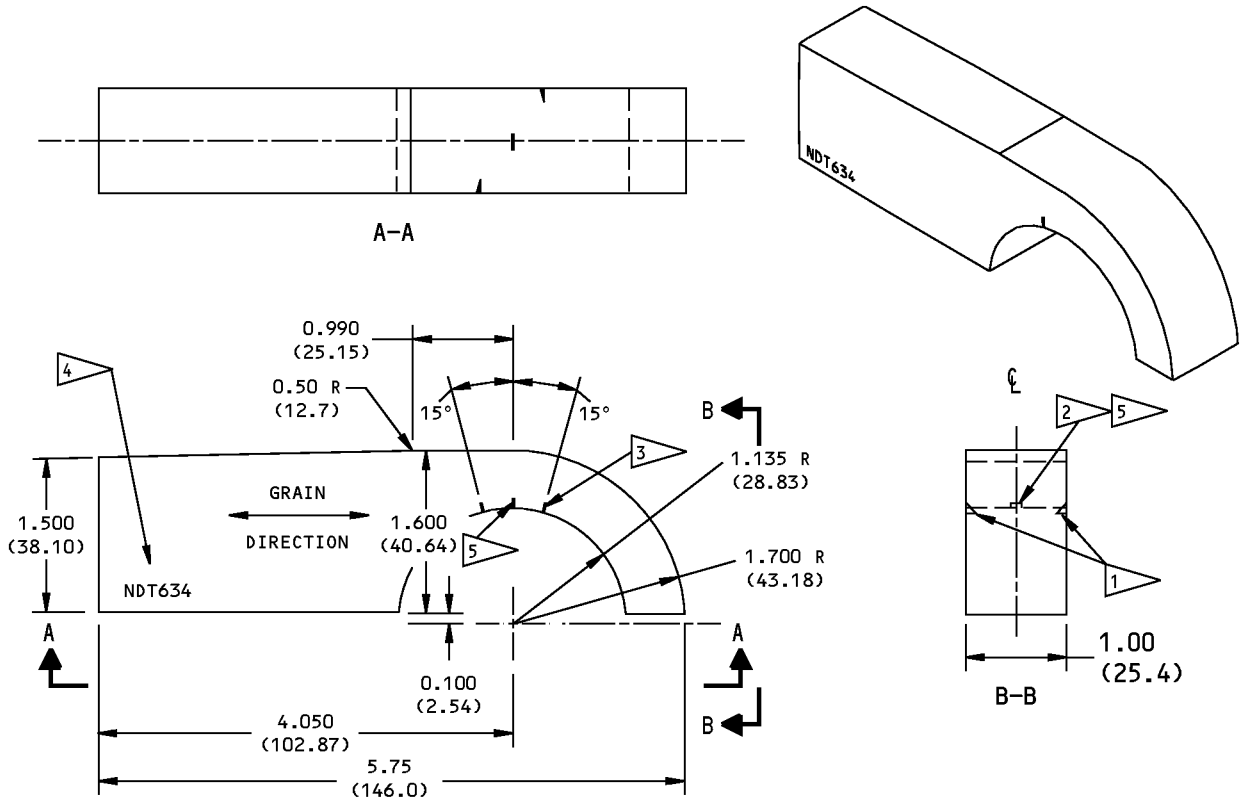


NOTES

XXXX = INSPECTION AREA (FULL WIDTH OF THE LUG)

1 IT IS NECESSARY TO EXAMINE THE INSPECTION AREA FROM THE UPPER SURFACE AND THE BOTTOM SURFACE OF THE UPPER LINK.

Inspection Locations
Figure 1



	NDT634	NDT639
CF6-80A		X
CF6-80C		X
PW4000		X
RB211	X	

TABLE I

NOTES

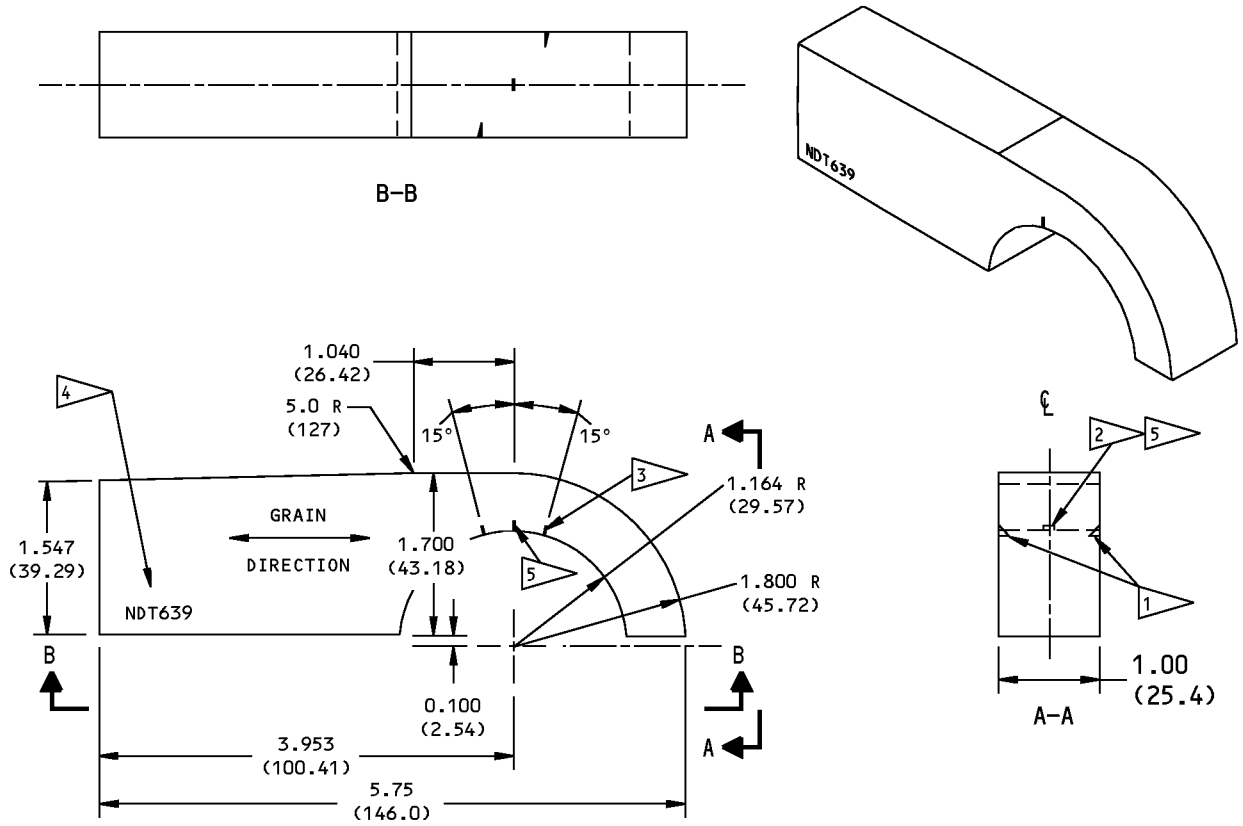
- ALL DIMENSIONS ARE IN INCHES (MILLIMETERS ARE IN PARENTHESES)
- TOLERANCE (UNLESS SPECIFIED DIFFERENTLY):

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

- MATERIAL: 4330M,4340M, OR 15-5 PH
- SURFACE ROUGHNESS: 63 Ra OR BETTER

1. EDM CORNER NOTCHES: 0.100 (2.54) X 0.100 (2.54) X 0.010 (0.25) WIDE
2. EDM MID-BORE NOTCH: 0.100 (2.54) LONG, 0.050 (1.27) DEEP, 0.010 (0.25) WIDE
3. THIS EDM NOTCH IS ON THE OPPOSITE SIDE OF THE PART
4. ETCH OR STEEL STAMP THE PART NUMBER (NDT634) AT APPROXIMATELY THIS LOCATION
5. CENTER THIS NOTCH ON THE HOLE (BORE) CENTERLINE

Reference Standard NDT634
Figure 2



	NDT634	NDT639
CF6-80A		X
CF6-80C		X
PW4000		X
RB211	X	

TABLE I

NOTES

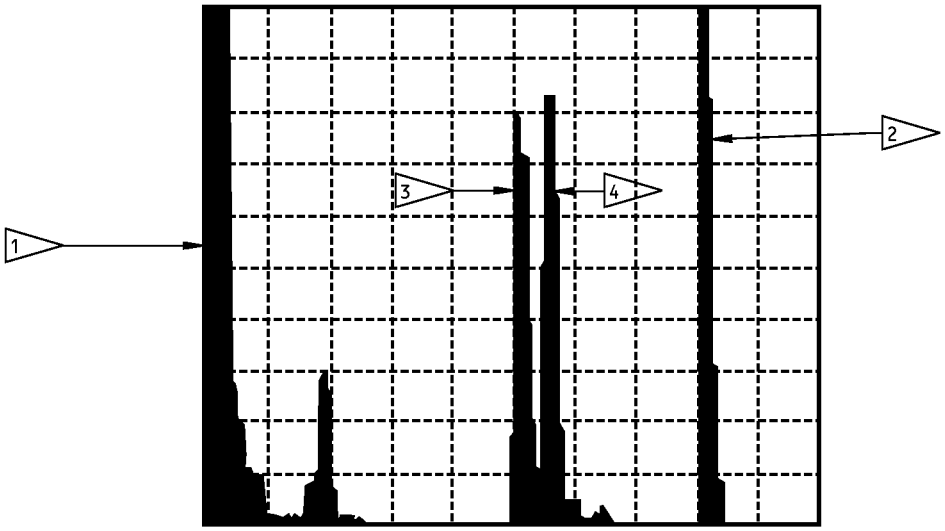
- ALL DIMENSIONS ARE IN INCHES (MILLIMETERS ARE IN PARENTHESES)
- TOLERANCE (UNLESS SPECIFIED DIFFERENTLY):

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

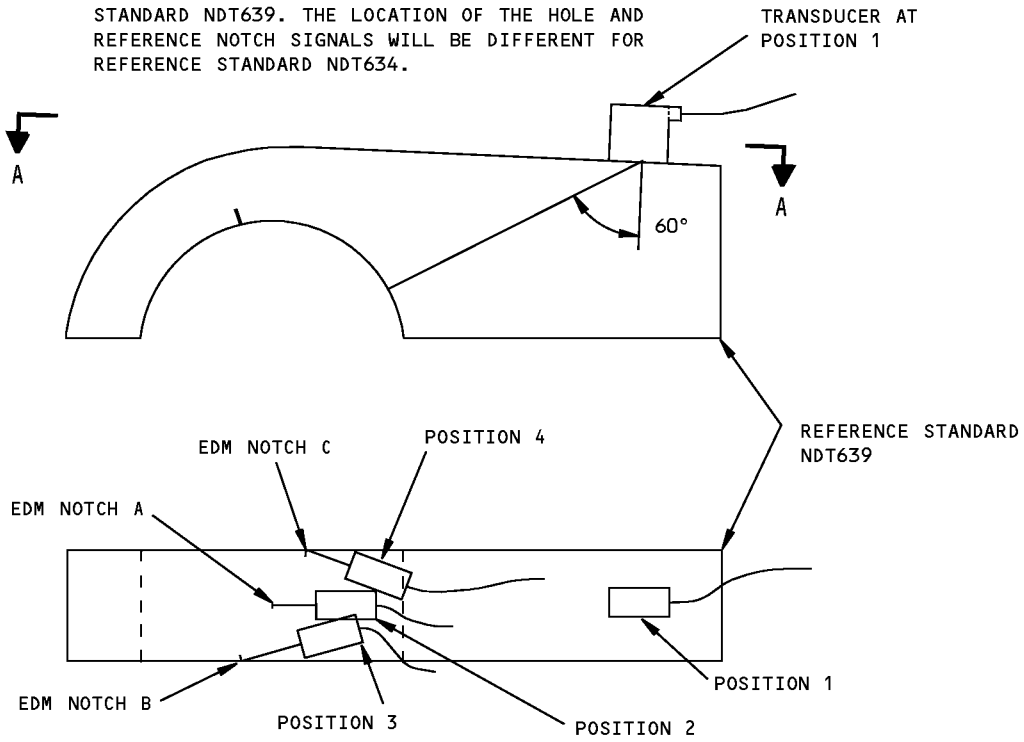
- MATERIAL: 4330M,4340M, OR 15-5 PH
- SURFACE ROUGHNESS: 63 Ra OR BETTER

1. EDM CORNER NOTCHES: 0.100 (2.54) X 0.100 (2.54) X 0.010 (0.25) WIDE
2. EDM MID-BORE NOTCH: 0.100 (2.54) LONG, 0.050 (1.27) DEEP, 0.010 (0.25) WIDE
3. THIS EDM NOTCH IS ON THE OPPOSITE SIDE OF THE PART
4. ETCH OR STEEL STAMP THE PART NUMBER (NDT639) AT APPROXIMATELY THIS LOCATION
5. CENTER THIS NOTCH ON THE HOLE (BORE) CENTERLINE

Reference Standard NDT639
Figure 3



HOLE AND REFERENCE NOTCH SIGNALS FROM REFERENCE STANDARD NDT639. THE LOCATION OF THE HOLE AND REFERENCE NOTCH SIGNALS WILL BE DIFFERENT FOR REFERENCE STANDARD NDT634.



A–A
(TOP VIEW)

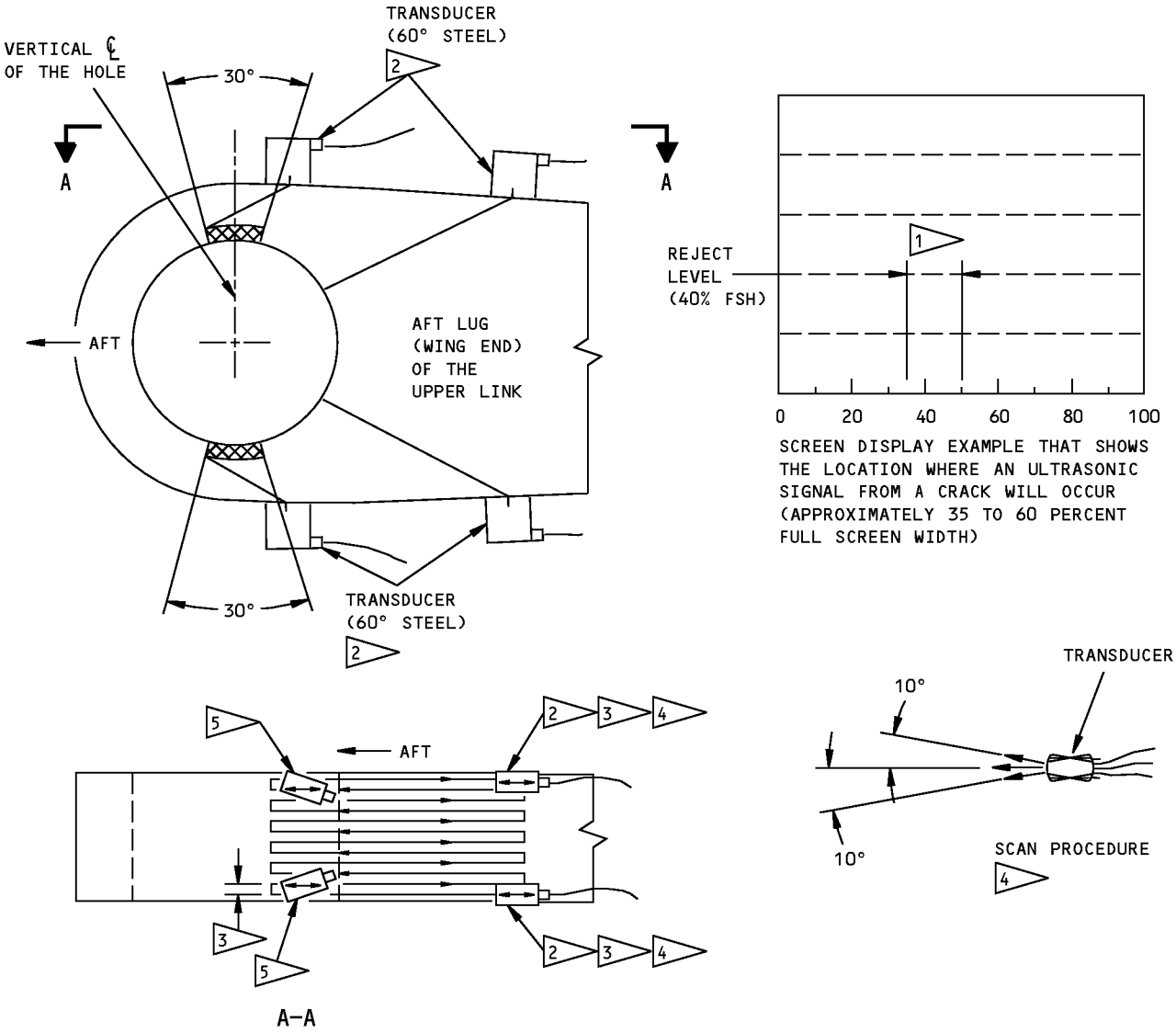
1 INITIAL PULSE SIGNAL

2 MAXIMUM SIGNAL FROM THE HOLE (BORE) WITH THE TRANSDUCER AT POSITION 1.

3 MAXIMUM SIGNAL FROM REFERENCE NOTCH A WITH THE TRANSDUCER AT POSITION 2.

4 MAXIMUM SIGNAL FROM REFERENCE NOTCH B WITH THE TRANSDUCER AT POSITION 3, AND ALSO FROM REFERENCE NOTCH C WITH THE TRANSDUCER AT POSITION 4.

Instrument Calibration
Figure 4



NOTES

- EXAMINE THE TOP AND BOTTOM SURFACES OF THE AFT LUG OF THE UPPER LINK IN STRUTS 1 AND 2

INSPECTION AREA

1. SIGNALS IN THIS RANGE THAT ARE 40 PERCENT OF FULL SCREEN HEIGHT OR MORE ARE POSSIBLE CRACK SIGNALS AND MAKE IT NECESSARY TO EXAMINE THE AFT LUG MORE FULLY
2. TO FULLY EXAMINE THE INSPECTION AREA, DO A SCAN IN THE AFT DIRECTION TO APPROXIMATELY THE VERTICAL CENTERLINE OF THE HOLE AND IN THE FORWARD DIRECTION UNTIL THE SIGNAL FROM THE HOLE STARTS TO COME INTO VIEW EXAMINE THE INSPECTION AREA FOR THE FULL WIDTH OF THE LUG
3. OVERLAP EACH SCAN BY ONE–HALF THE WIDTH OF THE TRANSDUCER
4. WHILE YOU MAKE A SCAN IN THE FORWARD AND AFT DIRECTIONS, CONTINUOUSLY TURN THE TRANSDUCER FROM SIDE–TO–SIDE APPROXIMATELY +10° AND –10°. THIS SCAN PROCEDURE IS USED WHEN IT IS NECESSARY TO EXAMINE LARGE AREAS
5. TO HELP FIND CRACKS AT THE OUTER EDGES OF THE PART, MAKE A SCAN ALONG EACH OF THE TWO OUTER EDGES WITH THE TRANSDUCER SET APPROXIMATELY 20° TO THE EDGE (USE EDM NOTCHES B AND C IN THE APPLICABLE REFERENCE STANDARD TO FIND THE TRANSDUCER POSITION NECESSARY FOR YOUR TRANSDUCER)

Inspection Details
Figure 5

DIAGONAL BRACE - FORWARD AND AFT CLEVIS LUG - INSPECTION FROM AROUND THE BUSHINGS

1. Purpose

A. Use this procedure to do an inspection for cracks in the forward and aft clevis lugs of the diagonal brace.

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

C. Service Bulletin 767-54A0094 identifies the airplane effectivity by the engine configuration and the diagonal brace that is installed. Paragraph 2.G. identifies the reference standards, transducers, and transducer guides that are necessary for you to do this inspection by the diagonal brace part number installed on your airplane.

D. Service Bulletin reference: 767-54A0094.

2. Equipment

A. General

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

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

B. Instrument

(1) Use an ultrasonic instrument that:

(a) Operates in the pulse-echo mode.

(b) Operates in a frequency range of 4 MHz to 6 MHz.

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

(a) USD 15; Krautkramer Branson

(b) Sonic 136; Staveley Instruments, Inc.

(c) USN 50; Krautkramer Branson

C. Transducer

(1) Six special transducers are necessary for this inspection. Three for the forward clevis lugs and three for the aft clevis lugs. See Paragraph 4., note 1, for more data about these transducers. Use these transducers for this inspection:

(a) XAB-6045-T1, -T2; Xactex, Inc.

NOTE: This transducer assembly contains two transducers in one fixture.

(b) XAB-6060-T3; Xactex, Inc.

(c) XAB-6058-T1, -T2; Xactex, Inc.

NOTE: This transducer assembly contains two transducers in one fixture.

(d) XAB-6059-T3; Xactex, Inc.

D. Reference Standards

(1) Use reference standards NDT655 and NDT656. See Figure 2 and Figure 3 for data about the reference standards.

E. Transducer Guides

(1) Use transducer guides NDT655G and NDT656G. See Figure 4 for data about the transducer guides.

F. Couplant

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

G. Equipment Necessary by Diagonal Brace Part Number

Table 1

DIAGONAL BRACE PART NUMBER	CLEVIS LUGS TO EXAMINE	NECESSARY REFERENCE STANDARD	NECESSARY TRANSDUCERS	NECESSARY TRANSDUCER GUIDE
311T1730-1,-3,-4,-7	Strut End (FWD)	NDT655	XAB-6058-T1, -T2	NDT655G
311T3730-1,-5				
311T1730-1,-3,-4,-7	Wing End (AFT)	NDT656	XAB-6045-T1, -T2 XAB-6060-T3	NDT656G
311T3730-1,-5				

3. Preparation for Inspection

A. Refer to Service Bulletin 767-54A0094 to prepare the airplane for inspection.

B. Gain access to the diagonal brace through doors 437BL, 437BR, 447BL, and 447BR. Also remove and keep access doors 437CL, 437CR, 447CL, and 447CR that are on the aft fairing. It can be necessary to remove more or less panels to do this inspection.

C. Clean the surface of the inspection areas identified in Figure 1. Remove all sealant from the edge of the bushings.

4. Instrument Calibration

NOTE: Three different transducers are necessary to fully examine the fuse pin hole area in each clevis lug. Each transducer examines approximately one-third of the clevis lug thickness. Transducers identified as XAB-6045-T1 (wing end) and XAB-6058-T1 (strut end) examine the outer one-third of the lug thickness. Transducers identified as XAB-6045-T2 (wing end) and XAB-6058-T2 (strut end) examine the inner one-third of the lug thickness. Transducers identified as XAB-6060-T3 (wing end) and XAB-6059-T3 (strut end) examine the middle one-third of the lug thickness.

NOTE: Because the diameters of the fuse pin holes are different for the strut and wing end lugs, different reference standards, transducers, and calibrations are necessary to examine these areas. Two calibrations are necessary, one calibration for the wing end and one calibration for the strut end. The calibration for the wing end is done with transducer XAB-6045-T1 and reference notch "B" in reference standard NDT656. The screen calibration for the strut end is done with transducer XAB-6058-T1 and reference notch "B" in reference standard NDT655. A sensitivity calibration is also necessary with each transducer that is used.

A. Calibration with Transducers XAB-6045-T1 and XAB-6058-T1.

(1) Refer to Paragraph 2.G. and get the reference standard, transducers, and transducer guide that are necessary for the diagonal brace and the clevis lug end to be examined.

(2) On narrow band instruments, set the frequency to 5 MHz or the nearest set frequency range to 5 MHz and make all necessary instrument adjustments.

(3) Put the transducer guide into the hole of the reference standard and on the side that is opposite reference notch "A". See Figure 5 for the location of the reference notches.

(4) Put a sufficient amount of couplant on the reference standard around the transducer guide.

(5) Put the transducer on the reference standard at the approximate location necessary to get a signal from reference notch "B" as shown in Figure 5, Detail II. Make sure the transducer is against the transducer guide at all times.

(6) Move the transducer to get a maximum signal from reference notch "B".

(7) Adjust the instrument controls to put the initial pulse at 0% of full screen width (FSW) and the signal from reference notch "B" at 80% of FSW. See Figure 6, Detail I.

(8) Adjust the gain to put the maximum signal from reference notch "B" at 80% of full screen height (FSH) as shown in Figure 6, Detail I.

(9) Now move the transducer to get a maximum signal from reference notch "C".

(a) This signal will come into view at approximately 80% of FSW for transducer XAB-6045-T1 (Figure 6, Detail II) and approximately 82% of FSW for transducer XAB-6058-T1 (Figure 7, Detail II).

(b) If the maximum signal is less than 80% of FSH, then set this signal at 80% of FSH. If the signal is more than 80% of FSH, no more calibration is necessary.

(10) Add 6 dB gain.

B. Calibration with Transducers XAB-6045-T2 and XAB-6058-T2.

(1) Refer to Paragraph 2.G. and get the reference standard, transducers, and transducer guide that are necessary for the diagonal brace and the clevis lug end to be examined.

(2) On narrow band instruments, set the frequency to 5 MHz or the nearest set frequency range to 5 MHz, and make all necessary instrument adjustments.

(3) Put the transducer guide into the hole of the reference standard and on the side that is opposite reference notch "A". See Figure 5, Detail I for the location of the reference notches.

(4) Put a sufficient amount of couplant on the reference standard in the area that the transducer will touch.

(5) Put the transducer on the reference standard and get a maximum signal from reference notch "A".

(a) This signal will come into view at approximately 52% of FSW for transducer XAB-6045-T2 (Figure 6, Detail III) and approximately 54% of FSW for transducer XAB-6058-T2 (Figure 7, Detail III).

(6) Adjust the gain to put the maximum signal from reference notch "A" at 80% of FSH (Figure 6, Detail III).

(7) Move the transducer to get a maximum signal from reference notch "E".

(a) This signal will come into view at approximately 48% of FSW for transducer XAB-6045-T2 (Figure 6, Detail IV) and approximately 54% of FSW for transducer XAB-6058-T2 (Figure 7, Detail IV).

(b) If the maximum signal is less than 80% of full screen height, then set this signal at 80% of full screen height. If the signal is more than 80% of full screen height, no more calibration is necessary.

(8) Add 6 dB gain.

C. Calibration with Transducers XAB-6059 and XAB-6060.

(1) Refer to Paragraph 2.G. and get the reference standard, transducers, and transducer guide that are necessary for the diagonal brace and the clevis lug end to be examined.

(2) On narrow band instruments, set the frequency to 5 MHz, or the nearest set frequency range to 5 MHz, and make all necessary instrument adjustments.

(3) Put the transducer guide into the hole of the reference standard and on the side that is opposite reference notch "A". See Figure 5, Detail I for the reference notch location.

(4) Put a sufficient amount of couplant on the reference standard in the area that the transducer will touch.

(5) Put the transducer on the reference standard at the approximate location necessary to get a signal from reference notch "D". Make sure the transducer is against the transducer guide at all times.

(6) Move the transducer to get a maximum signal from reference notch "D". This signal will come into view at approximately 36% of FSW for transducer XAB-6060-T3 (Figure 6, Detail V) and approximately 42% of FSW for transducer XAB-6059-T3 (Figure 7, Detail V).

(7) Adjust the gain to put the maximum signal from reference notch "D" at 80% of FSH.

(8) Add 6 dB gain.

5. Inspection Procedure

A. Examine the outer one-third of the lug thickness as follows. Use transducer XAB-6045-T1 for the wing end and XAB-6058-T1 for the strut end.

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

(2) Put a large quantity of couplant on the inspection surfaces of the clevis lugs to be examined. See Figure 8, flagnote 1.

(3) Put the transducer on the inspection surface and fully against the flange of the bushing.

(4) Move the transducer around the bushing as necessary to examine the inspection area (Figure 8, flagnote 2).

(a) As you make the scan, carefully monitor the baseline signal to be sure that the ultrasound goes into the lug.

(b) Be sure to keep the transducer against the flange of the bushing during the inspection.

(c) Make a minimum of two scans of the inspection area.

NOTE: If a sufficient amount of couplant is not used during the inspection, the sensitivity will be decreased. Make sure to use a sufficient amount of couplant.

(5) Do Paragraph 5.A.(1) thru Paragraph 5.A.(4) on all diagonal-brace clevis lugs that must be examined.

NOTE: It is permitted to fully examine one clevis lug with all three transducers and then continue to the subsequent clevis lug. The sensitivity must be set for each different transducer that is used during the inspection.

B. Examine the inner one-third of the lug thickness as follows. Use transducer XAB-6045-T2 for the wing end and XAB-6058-T2 for the strut end.

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

(2) Put a large quantity of couplant on the inspection surfaces of the clevis lugs to be examined. See Figure 8, flagnote 1.

(3) Put the transducer on the inspection surface and fully against the flange of the bushing.

(4) Move the transducer around the bushing as necessary to examine the inspection area (Figure 8, flagnote 2). As you make the scan, carefully monitor the baseline signal to be sure that the ultrasound goes into the lug. Be sure to keep the transducer against the flange of the bushing during the inspection. Make a minimum of two scans of the inspection area.

NOTE: If a sufficient amount of couplant is not used during the inspection, the sensitivity will be decreased. Make sure to use a sufficient amount of couplant.

(5) Do Paragraph 5.B.(1) thru Paragraph 5.B.(4) on all diagonal-brace clevis lugs that must be examined.

NOTE: See the note in Paragraph 5.A.(5).

C. Examine the middle one-third of the lug thickness as follows. Use transducer XAB-6060-T3 for the wing end and XAB-6059-T3 for the strut end.

(1) Calibrate the instrument as specified in Paragraph 4.C.

(2) Put a large quantity of couplant on the inspection surfaces of the clevis lugs to be examined. See Figure 8, flagnote 1.

(3) Put the transducer on the inspection surface and fully against the flange of the bushing.

(4) Move the transducer around the bushing as necessary to examine the inspection area (Figure 8, flagnote 2).

(a) As you make the scan, carefully monitor the baseline signal to be sure that the ultrasound goes into the lug.

(b) Be sure to keep the transducer against the flange of the bushing during the inspection.

(c) Make a minimum of two scans of the inspection area.

NOTE: If a sufficient amount of couplant is not used during the inspection, the sensitivity will be decreased. Make sure to use a sufficient amount of couplant.

(5) Do Paragraph 5.C.(1) thru Paragraph 5.C.(4) on all diagonal-brace clevis lugs that must be examined.

NOTE: See the note in Paragraph 5.A.(5).

6. Inspection Results

A. An ultrasonic signal that is equal to, or more than, 40% of FSH, and occurs at approximately the same screen location as the reference notch, is an indication of a possible crack and must be examined more fully.

B. To examine the clevis lugs more fully, do the steps that follow:

(1) Remove all couplant from the surfaces of the lug.

(2) Put couplant only on the surface of the lug where the transducer was when the signal occurred.

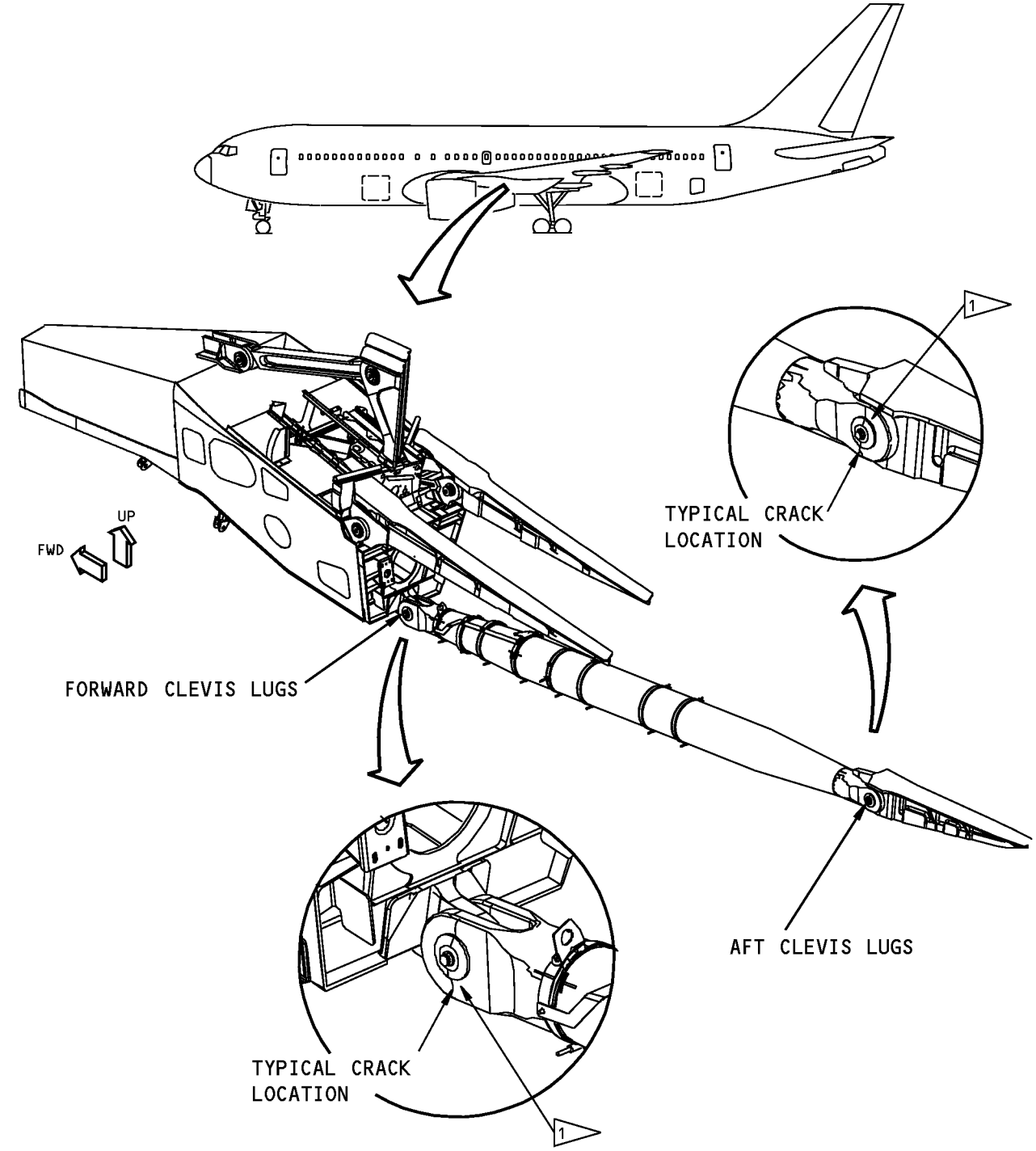
(3) Put the transducer on the lug at the location where the signal occurred.

(4) If you get a signal at this location again, move the transducer as necessary to get a maximum signal.

(5) If the maximum signal is 40% of FSH or more and it occurs in the screen location where cracks can occur (Figure 6 and Figure 7), then go to Paragraph 6.B.(6). If no signal occurs, or the signal is less than 40% of full screen height, the part is acceptable. Boeing suggests that you make a careful record of all data for reference during a subsequent inspection.

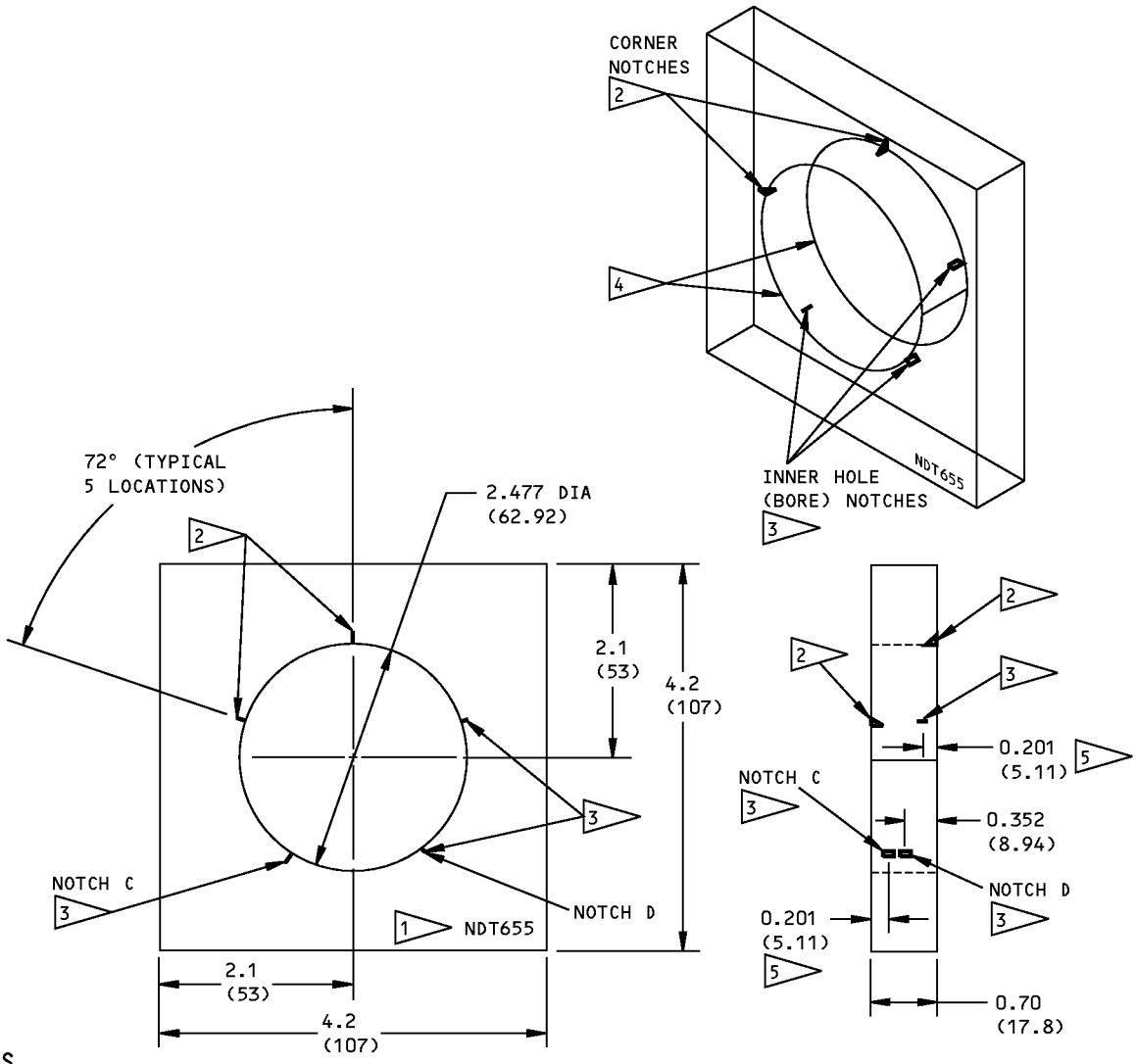
NOTE: Boeing does not make it mandatory to make an analysis of signals that are less than 40% of full screen height because of the higher rate of false crack signals below this level. However, Boeing has no technical objection if an operator makes an analysis of indications that are less than 40% of full screen height.

(6) Remove the diagonal brace, remove the bushings from the lug and do an eddy current or fluorescent penetrant inspection to make sure the indication is from a crack.



1 INSPECTION SURFACE (TYPICAL)--EXAMINE THE HOLE (BORE) OF THE CLEVIS LUGS FOR CRACKS FROM THIS SURFACE. EXAMINE THE WING END AND THE STRUT END LUGS.

Inspection Locations
Figure 1



NOTES

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

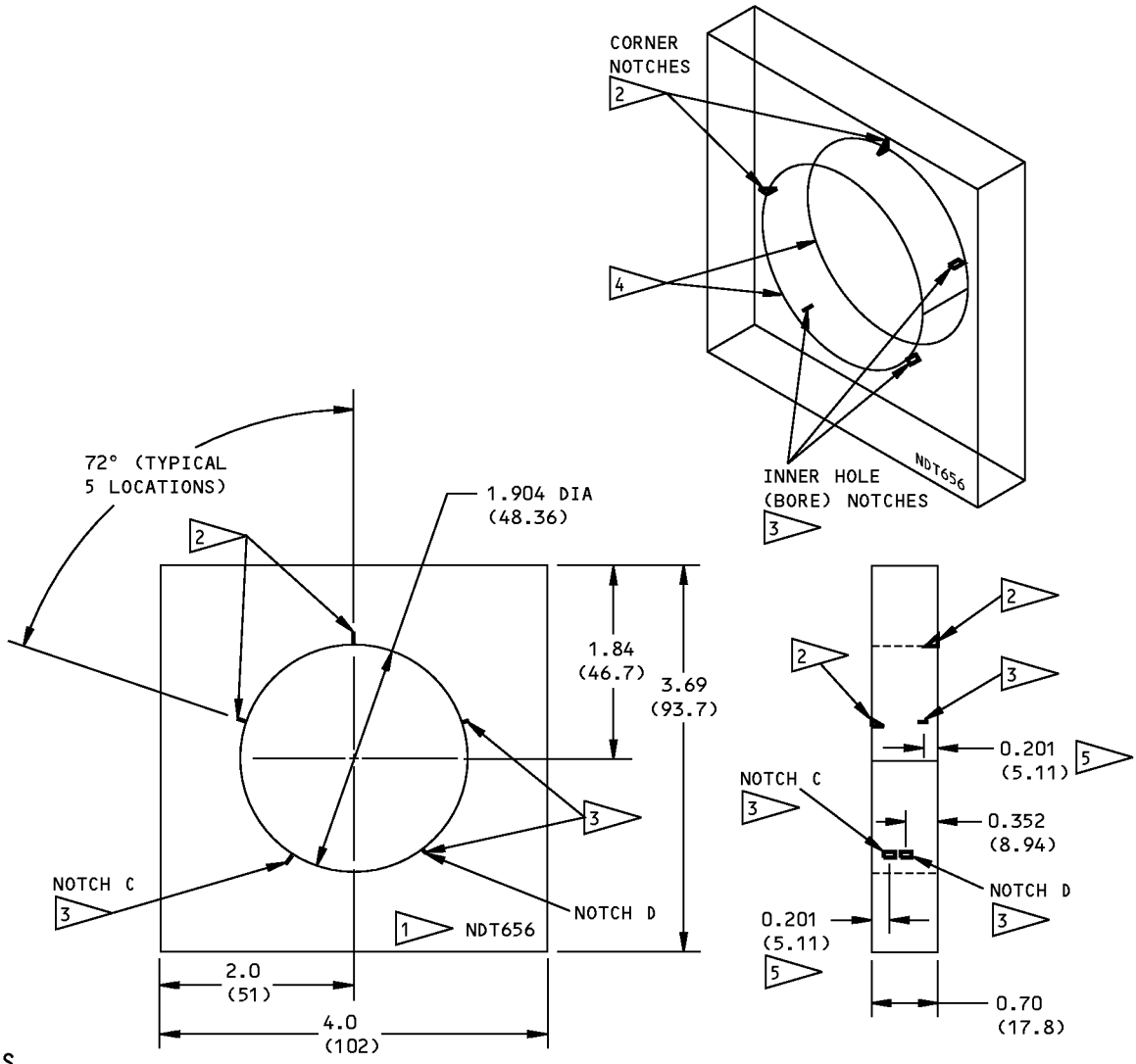
INCHES	MILLIMETERS
X.XXX = ±0.005	X.XX = ±0.10
X.XX = ±0.025	X.X = ±0.5
X.X = ±0.050	X = ±1

ANGULAR = ±1.0 DEGREE

- NOTCH TOLERANCES:
  WIDTH: ±0.002 (0.25 ±0.05)
  LENGTH: ±10% OF THE LENGTH
  DEPTH: ±10% OF THE DEPTH
- MATERIAL: 7075-T6 OR 2024-T3,-T4.
- SURFACE ROUGHNESS: 63 Ra OR BETTER

1. ETCH OR STEEL STAMP THE REFERENCE STANDARD NUMBER NDT655 AT APPROXIMATELY THIS LOCATION.
2. EDM CORNER NOTCHES:
   0.10 (2.54) X
   0.10 (2.54) X
   0.005 (0.13) WIDE
3. EDM INNER-BORE NOTCHES:
   0.10 (2.54) LONG
   0.050 (1.27) DEEP
   0.005 (0.13) WIDE
4. BREAK THE EDGES OF THE HOLE 0.02 (0.51) X 45°--2 LOCATIONS
5. DIMENSION IS TO THE CENTER OF THE NOTCH

Reference Standard NDT655
Figure 2



NOTES

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

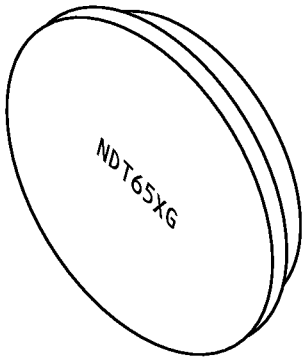
INCHES	MILLIMETERS
X.XXX = ±0.005	X.XX = ±0.10
X.XX = ±0.025	X.X = ±0.5
X.X = ±0.050	X = ±1

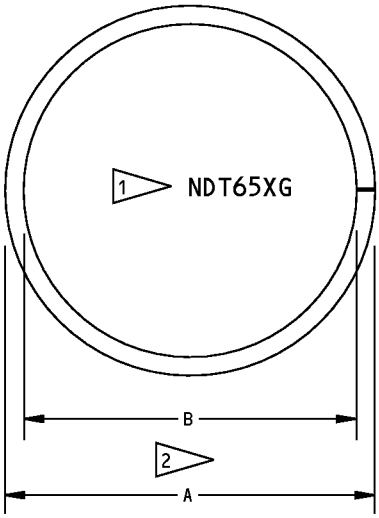
ANGULAR = ±1.0 DEGREE

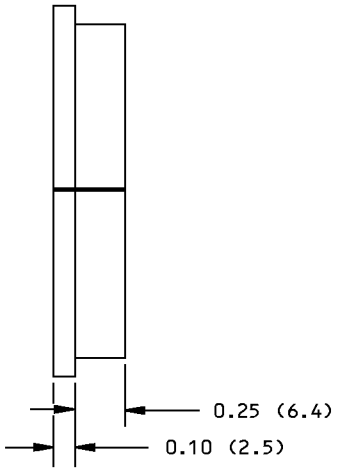
- NOTCH TOLERANCES:
  WIDTH: ±0.002 (0.25 ±0.05)
  LENGTH: ±10% OF THE LENGTH
  DEPTH: ±10% OF THE DEPTH
- MATERIAL: 7075-T6 OR 2024-T3,-T4.
- SURFACE ROUGHNESS: 63 Ra OR BETTER

1. ETCH OR STEEL STAMP THE REFERENCE STANDARD NUMBER NDT656 AT APPROXIMATELY THIS LOCATION.
2. EDM CORNER NOTCHES:
   0.10 (2.54) X
   0.10 (2.54) X
   0.005 (0.13) WIDE
3. EDM INNER-BORE NOTCHES:
   0.10 (2.54) LONG
   0.050 (1.27) DEEP
   0.005 (0.13) WIDE
4. BREAK THE EDGES OF THE HOLE 0.02 (0.51) X 45°--2 LOCATIONS
5. DIMENSION IS TO THE CENTER OF THE NOTCH

Reference Standard NDT656
Figure 3







NOTES

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

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

- MATERIAL: UVA II, PLEXIGLASS, LUCITE, OR EQUIVALENT MATERIAL

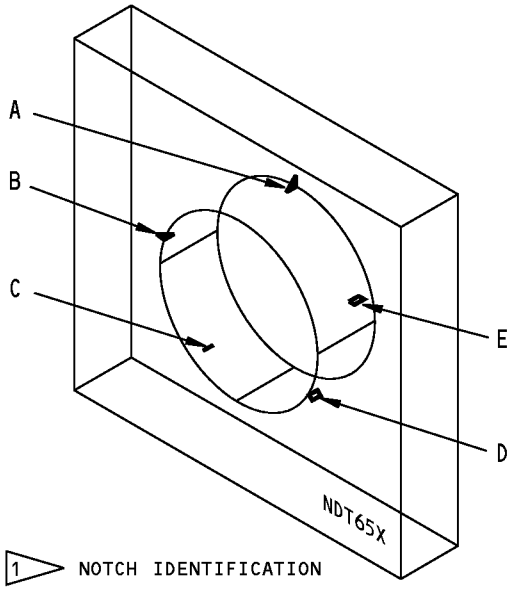
1 ETCH OR ENGRAVE THE TRANSDUCER GUIDE NUMBER AT APPROXIMATELY THIS LOCATION

2 SEE TABLE I FOR DIMENSIONS A AND B

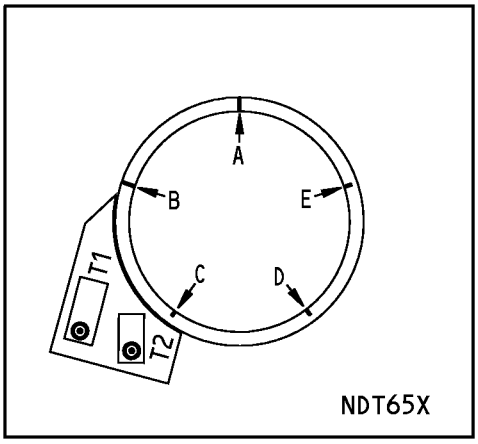
PART NUMBER	DIMENSION A	DIMENSION B
NDT655G	2.870 (72.90)	2.460 (62.48)
NDT656G	2.125 (53.98)	1.885 (47.88)

TABLE I

Transducer Guides NDT655G and NDT656G
Figure 4



DETAIL I



MOVE THE TRANSDUCER ASSEMBLY TO GET A MAXIMUM SIGNAL FROM THE NECESSARY EDM NOTCH. THE LOCATION OF THE TRANSDUCER ASSEMBLY WILL BE DIFFERENT FOR EACH EDM NOTCH.

DETAIL II

	TRANSDUCER	EDM CALIBRATION NOTCH
* FOR THE AFT CLEVIS LUGS OF 311T1730-2 AND 311T3730-4	XAB-6045-T1	B & C
	XAB-6045-T2	A & E
	XAB-6060	D
** FOR THE FWD CLEVIS LUGS OF 311T1730-2 AND 311T3730-4	XAB-6058-T1	B & C
	XAB-6058-T2	A & E
	XAB-6059	D

* USE REFERENCE STANDARD NDT656 - SEE FIGURE 6 FOR THE SIGNAL LOCATIONS
** USE REFERENCE STANDARD NDT655 - SEE FIGURE 7 FOR THE SIGNAL LOCATIONS

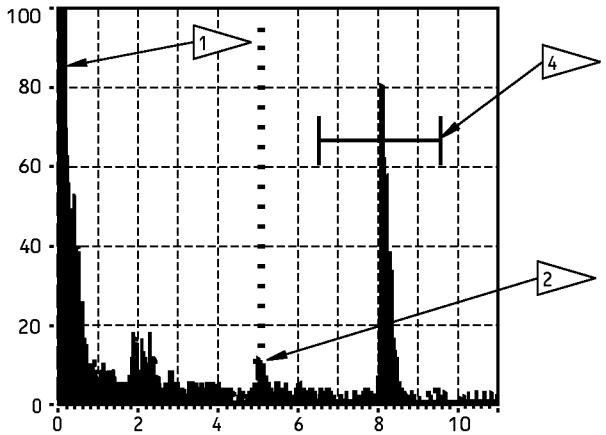
TABLE I

NOTES

1. REFER TO PARAGRAPH 2.G TO SEE WHAT TRANSDUCERS, TRANSDUCER GUIDES, AND REFERENCE STANDARDS ARE NECESSARY FOR THE CLEVIS LUG TO BE EXAMINED.
2. REFER TO TABLE I TO IDENTIFY WHICH EDM NOTCHES TO USE DURING CALIBRATION WITH THE SPECIFIED TRANSDUCER.
3. PUT THE TRANSDUCER ON THE REFERENCE STANDARD AT THE APPROXIMATE LOCATION NECESSARY TO GET A SIGNAL FROM THE REFERENCE NOTCH.
4. SET THE MAXIMUM SIGNAL FROM THE EDM NOTCH AT 80% OF FULL SCREEN HEIGHT.

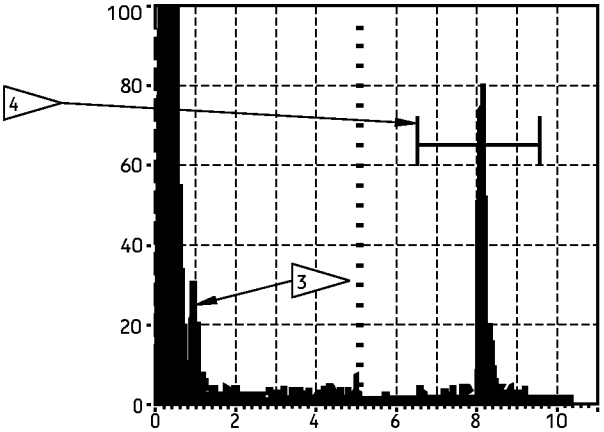
1 NOTCH A - BOTTOM CORNER NOTCH
NOTCH B - TOP CORNER NOTCH
NOTCH C - UPPER BORE NOTCH
NOTCH D - MID BORE NOTCH
NOTCH E - LOWER BORE NOTCH

Calibration Details
Figure 5



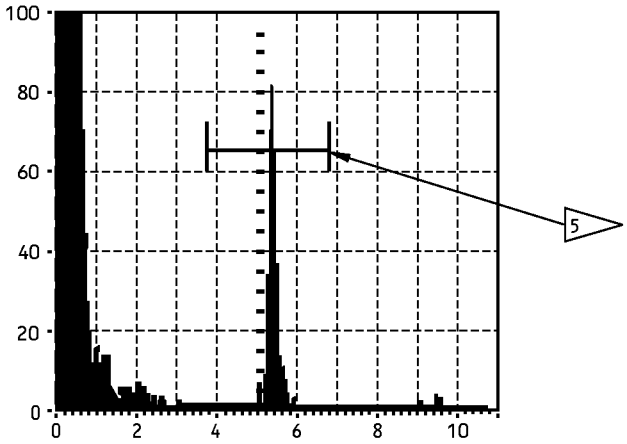
SCREEN DISPLAY CALIBRATION: SET THE SIGNAL FROM REFERENCE NOTCH "B" TO 80% OF FSW AND 80% OF FSH (TRANSDUCER XAB-6045-T1)

DETAIL I



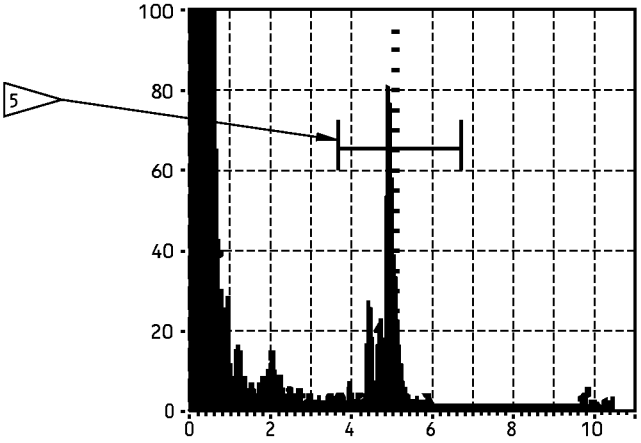
SIGNAL FROM REFERENCE NOTCH "C" WITH TRANSDUCER XAB-6045-T1

DETAIL II



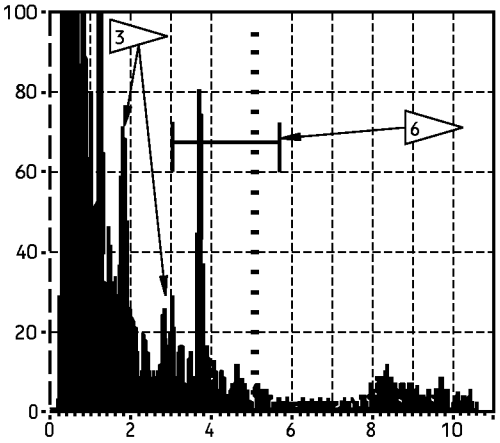
SIGNAL FROM REFERENCE NOTCH "A" WITH TRANSDUCER XAB-6045-T2

DETAIL III



SIGNAL FROM REFERENCE NOTCH "E" WITH TRANSDUCER XAB-6045-T2

DETAIL IV



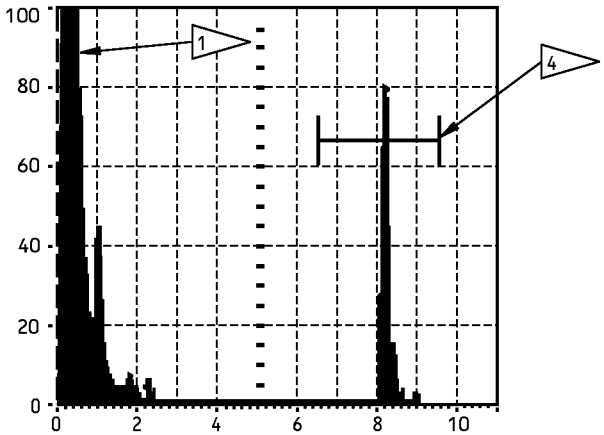
SIGNAL FROM REFERENCE NOTCH "D" WITH TRANSDUCER XAB-6060-T3

DETAIL V

NOTES

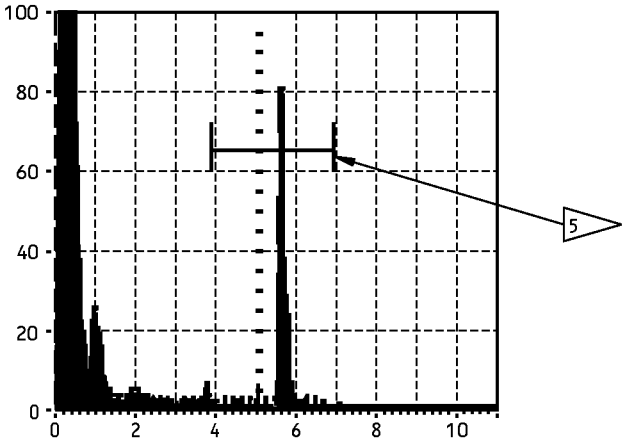
1. INITIAL PULSE SIGNAL (TYPICAL)
2. NOISE SIGNALS (TYPICAL)
3. NOISE SIGNALS FROM THE TRANSDUCER WEDGE (TYPICAL)
4. SCREEN LOCATION WHERE CRACK SIGNALS CAN OCCUR FOR TRANSDUCER XAB-6045-T1
5. SCREEN LOCATION WHERE CRACK SIGNALS CAN OCCUR FOR TRANSDUCER XAB-6045-T2
6. SCREEN LOCATION WHERE CRACK SIGNALS CAN OCCUR FOR TRANSDUCER XAB-6060-T3

Reference Notch Signal Displays From Reference Standard NDT656 and Transducers XAB-6045-T1,-T2, and XAB-6060-T3
Figure 6



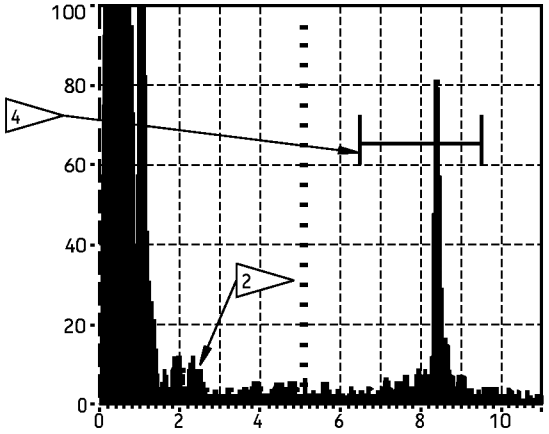
SCREEN DISPLAY CALIBRATION: SET THE SIGNAL FROM REFERENCE NOTCH "B" TO 80% OF FSW AND 80% OF FSH (TRANSDUCER XAB-6058-T1)

DETAIL I



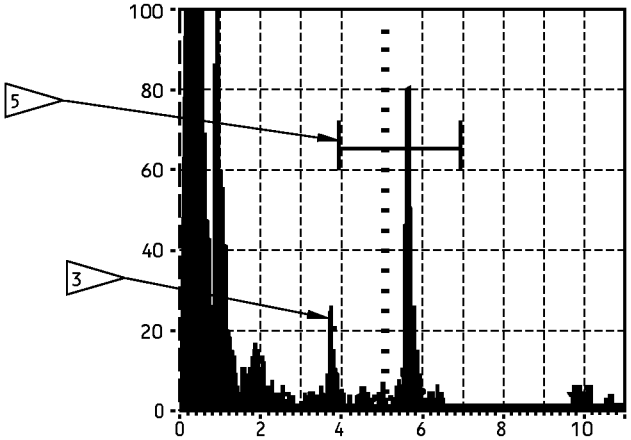
SIGNAL FROM REFERENCE NOTCH "A" WITH TRANSDUCER XAB-6058-T2

DETAIL III



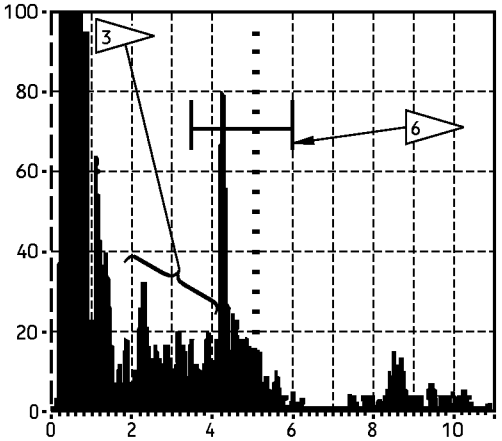
SIGNAL FROM REFERENCE NOTCH "C" WITH TRANSDUCER XAB-6058-T1

DETAIL II



SIGNAL FROM REFERENCE NOTCH "E" WITH TRANSDUCER XAB-6058-T2

DETAIL IV



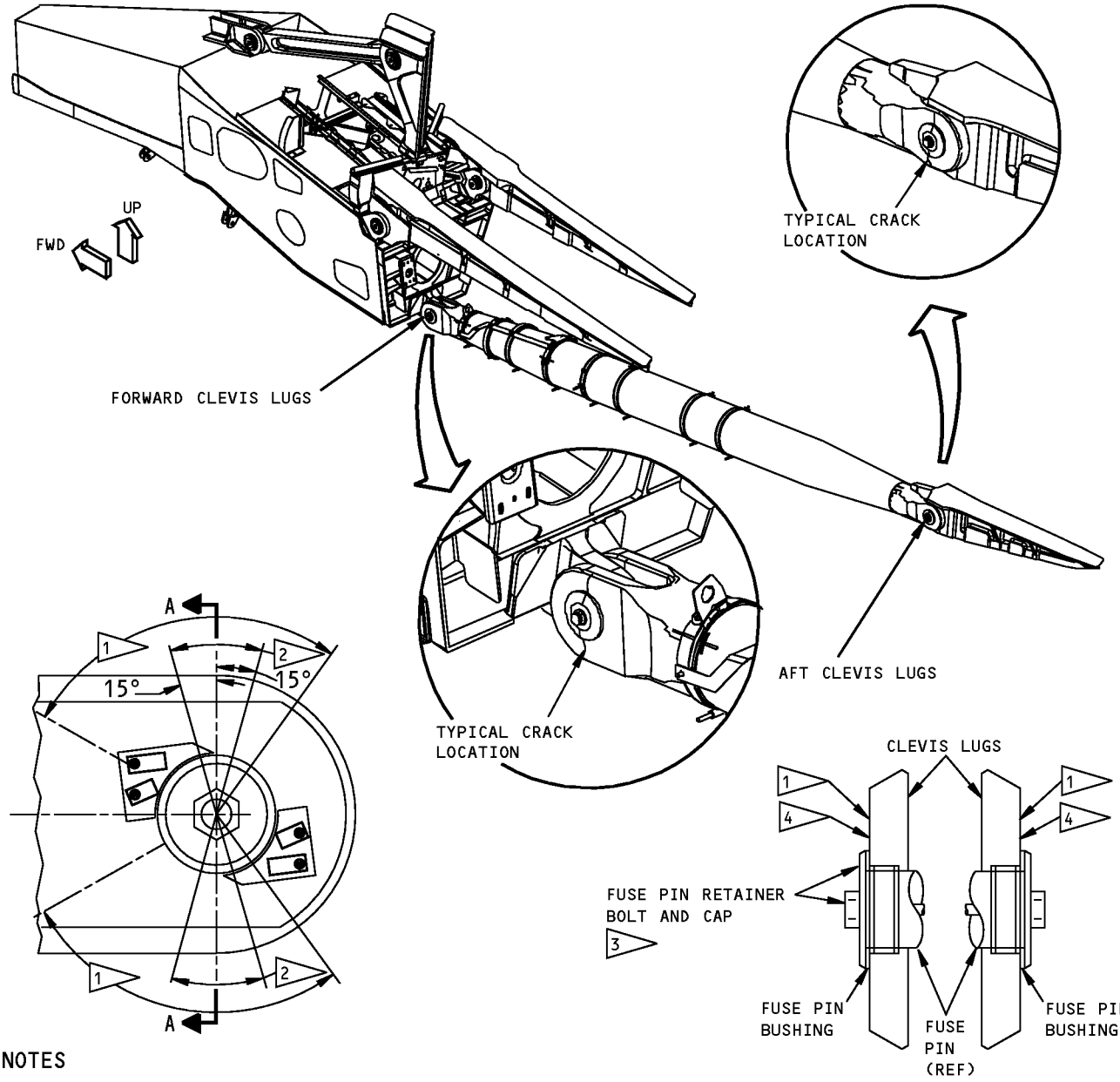
SIGNAL FROM REFERENCE NOTCH "D" WITH TRANSDUCER XAB-6059-T3

DETAIL V

NOTES

1. INITIAL PULSE SIGNAL (TYPICAL)
2. NOISE SIGNALS (TYPICAL)
3. NOISE SIGNALS FROM THE TRANSDUCER WEDGE (TYPICAL)
4. SCREEN LOCATION WHERE CRACK SIGNALS CAN OCCUR FOR TRANSDUCER XAB-6058-T1
5. SCREEN LOCATION WHERE CRACK SIGNALS CAN OCCUR FOR TRANSDUCER XAB-6058-T2
6. SCREEN LOCATION WHERE CRACK SIGNALS CAN OCCUR FOR TRANSDUCER XAB-6059-T3

Reference Notch Signal Displays From Reference Standard NDT655 and Transducers XAB-6058-T1,-T2, and XAB-6059-T3
Figure 7



NOTES

- THE LEFT SIDE IS SHOWN; THE RIGHT SIDE IS OPPOSITE
- THE TRANSDUCER SHAPE CAN BE DIFFERENT FROM THE TRANSDUCER SHAPE SHOWN HERE
- THE WING ATTACH CLEVIS LUG IS SHOWN, THE STRUT ATTACH CLEVIS LUG IS THE SAME BUT THE FUSE PIN HOLE IS LARGER
- MAKE A MINIMUM OF TWO SCANS OF THE INSPECTION AREA WITH EACH TRANSDUCER THAT IS NECESSARY

1 INSPECTION SURFACE

2 INSPECTION AREA

3 REMOVE THE PIN AND THE RETAINER CAP IF THE CAP DOES NOT PERMIT THE TRANSDUCER POSITIONER TO FULLY TOUCH THE LUG BUSHING

4 REMOVE ALL SEALANT FROM THE EDGE OF THE BUSHING

M23761 S00041154429_V3

Inspection Details
Figure 8

THRUST TANG OF THE FORWARD ENGINE MOUNT

1. Purpose

A. Use this ultrasonic procedure to examine the thrust tang of the forward engine mount of CF6-80A, CF6-80C2, JT9D-7R4 and PW 4000 struts for cracks.

B. The inspection area is the six fastener holes in the thrust tang of the forward engine mount on each strut. See Figure 1 for the location of the inspection area.

C. MPD Appendix B DTR Check Form Reference:

(1) ITEM 54-50-l05

2. Equipment

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

A. General

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

B. Instrument

(1) Use an ultrasonic instrument that can do pulse echo inspection.

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

(a) Masterscan 340; Sonatest, Inc.

(b) USN 52L; Krautkramer Branson, Inc.

C. Transducer

(1) Identify the correct transducer to use to examine the thrust tang of your engine strut. The transducers that follow were used to help prepare this procedure.

(a) For CF6-80A and CF6-80C2 engine struts, use the transducer that follows:

1) Use a SMZ miniature ceramic transducer with an end mounted microdot connector that operates at 5 MHz and puts a 45 degree refracted shear wave in steel. The element dimensions are 0.25 inch x 0.25 inch (6.4 x 6.4 mm). The part number is 57A3052 and it is made by Staveley Technologies, Inc.

NOTE: This is a standard miniature transducer.

(b) For JT9D and PW 4000 engine struts, use the transducer and handle extension that follows:

1) Use a transducer that operates at 10 MHz and puts a 45 degree refracted shear wave in steel. The transducer case dimensions are approximately 0.67 inch (17.0 mm) long by 0.26 inch (6.6 mm) wide by 0.33 inch (8.3 mm) high. The part number is SUS 936 and it is made by NDT Engineering. A separate switch box cable assembly, part number MSE-SWBN-6, must be used with this transducer and it is made by NDT Engineering. You must make a separate order for the switch box cable assembly.

NOTE: This special transducer with an extension handle permanently attached to the transducer is necessary to get access to the inspection area on the JT9D and PW 4000 engine struts.

D. Reference Standard

(1) Use reference standard NDT667. See Figure 2 for data about the reference standard.

NOTE: You can also use 747 reference standard NDT4224 to calibrate your instrument.

E. Couplant

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

3. Preparation for Inspection

A. Find the inspection areas. See Figure 1.

(1) Open the thrust reverser cowl.

(2) For CF6-80A and CF6-80C2 engine struts, remove six screws and fold the insulation blanket back. See Figure 1, Sheet 1 and Figure 1, Sheet 2, Detail A.

(3) For JT9D engine struts, remove two screws and fold the insulation blanket back. Remove five rivets to let the transducer get access to the inspection surface of the thrust tang. See Figure 1, Sheet 1 and Figure 1, Sheet 2, Detail B.

(4) For PW 4000 engine struts, remove three rivets, two Hi-Lok fasteners and a clip that attaches the insulation blanket to the seal depressor to let the transducer get access to the inspection surface of the thrust tang. See Figure 1, Sheet 1 and Figure 1, Sheet 2, Detail C.

(5) Remove the sealant from the thrust tang inspection area that the transducer will touch on the left and right engine struts. See Figure 1, Sheet 2, Details A and C.

NOTE: The inspection area for the JT9D and PW 4000 struts is the same as shown in Figure 1, Sheet 2, Detail A for the CF6-80A and CF6-80C2 struts.

(6) Fully clean the inspection area. See Figure 1, Sheet 2.

4. Instrument Calibration

NOTE: All six inspection holes on the thrust tang of each strut can be examined with one instrument calibration.

A. Calibration for thrust tangs on the CF6-80A and CF6-80C2 struts.

(1) Connect the transducer to the instrument. Use the transducer identified in Paragraph 2.C.(1)(a).

(2) On narrow band instruments, set the frequency to approximately 5 MHz.

(3) Put couplant on the reference standard at Transducer Positions 1 thru 4. See Figure 3.

(4) Put the transducer at transducer position 1 and move the transducer to and from the hole to get a maximum signal from the hole. See Figure 3, Transducer Position 1, flagnotes 1 and 2.

(5) Adjust the instrument controls to put the initial pulse at 0% of full screen width (FSW) and the signal from the reference hole at 80% of FSW. See Figure 4, Screen Display 1.

(6) Adjust the gain to put the maximum signal from the reference standard hole at 80% of full screen height (FSH). See Figure 4, Screen Display 1.

(7) Move the transducer to and away from the hole while you monitor the screen display. The hole signal will go out of view. This is the screen display from a fastener hole without a crack. See Figure 3, flagnotes 1 and 2 and Figure 4, Screen Display 1.

(8) Put the transducer at Transducer Position 2 and get an 80% of FSH signal from the reference standard hole. Move the transducer to and away from the hole and notch while you monitor the screen display. The notch signal will immediately follow the hole signal. Do not let the transducer extend out from the edge of the reference standard during calibration. See Figure 3, flagnotes 2, 3 and 4 and Figure 4, Screen Display 2.

NOTE: A flat shim held against the side of the reference standard will help to make sure the transducer does not extend out from the edge of the reference standard.

(9) Make all the necessary instrument adjustments to get the best signal from the reference standard notch. Keep the reject set to a minimum and the damping set to off or set to the value that has the minimum effect on the signal.

(10) Monitor the screen display to make sure the reference notch signal is at approximately 78% of FSW and 50% of FSH. See Figure 4, Screen Display 3.

(11) Do Paragraph 4.A.(4) thru Paragraph 4.A.(10) again at a higher gain level if you do not get a minimum 50% of FSH signal from the reference standard notch.

(12) Put the transducer at Transducer Position 3 and do Paragraph 4.A.(4), Paragraph 4.A.(8) and Paragraph 4.A.(10) again at Transducer Position 3. This step is to make sure that your transducer can find the notch in the opposite direction. If your transducer does not get a 50% of FSH signal from the notch in this direction, try a different transducer. See Figure 3, Transducer Position 3, and Figure 4, Screen Display 3.

(13) Put the transducer at Transducer Position 4 at approximately 1.12 inch (28.4 mm) from the hole nearest to the edge of the reference standard. See Figure 3, Transducer Position 4.

(14) Move the transducer to and from the hole to get the highest signal from the hole. The hole signal will be at approximately 65% of FSW and 100% of FSH. See Figure 3, Transducer Position 4, and Figure 4, Screen Display 4.

NOTE: This is the screen display for the fastener hole nearest to the edge of the thrust tang.

(15) Monitor the screen display as you move the transducer to the hole and notch. The notch signal will immediately follow the hole signal. The hole signal will be at approximately 60% of FSW and 50% of FSH and the notch signal will be at 65% of FSW and 45% of FSH. See Figure 4, Screen Display 5.

(16) Continue to move the transducer to the notch and monitor the screen display. The highest notch signal will be at 60% of FSW and 50% of FSH. See Figure 4, Screen Display 6.

B. Calibration for the thrust tangs on the JT9D and PW 4000 struts.

(1) Connect the transducer to the instrument. Use the special transducer and handle extension identified in Paragraph 2.C.(1)(b).

(2) Do Paragraph 4.A.(1) thru Paragraph 4.A.(16). Make sure you set the switching selector to energize the correct transducer to point at the correct calibration hole and notch in the reference standard.

NOTE: There are two elements that point in opposite directions in the transducer housing.

5. Inspection Procedure

NOTE: The inboard and outboard edges of the thrust tang are examined with this procedure at each engine strut.

A. Inspection for thrust tangs of the CF6-80A and CF6-80C2 struts.

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

(2) Put a sufficient quantity of couplant on the inspection area. See Figure 5.

(3) Put the transducer on the right side of the thrust tang at approximately 1.5 inches (38.5 mm) from the forward fastener hole in the inspection area. See Figure 5, Sheet 1, Detail A. Make sure the transducer is pointed at the fastener hole.

NOTE: This step puts the transducer in the thickest area of the thrust tang.

(4) Move the transducer in the forward and aft direction to and from the hole to get a maximum signal from the hole. Adjust the instrument gain to get an 80% of FSH signal from the hole.

(5) Examine the upper area of the hole in the thrust tang. Move the transducer in the forward and aft direction to and from the inspection hole while you point the transducer at the edge of the hole.

NOTE: Use the same angular position that was used during calibration.

(6) Do Paragraph 5.A.(3) and Paragraph 5.A.(5) to examine the lower area of the forward inspection hole at the splice plate and thrust tang interface. See Figure 5, Sheet 1, Detail A.

(7) Do Paragraph 5.A.(3) thru Paragraph 5.A.(6) to examine the middle inspection hole. See Figure 5, Sheet 1, Detail A.

(8) Do Paragraph 5.A.(3) thru Paragraph 5.A.(6) to examine the aft inspection hole. Make sure the transducer points at the aft inspection hole. See Figure 5, Sheet 1, Detail B.

(9) Do Paragraph 5.A.(2) thru Paragraph 5.A.(8) again on the left side of the thrust tang to examine the three fastener holes on the left side. See Figure 5, Sheet 1.

(10) Do Paragraph 5.A.(1) thru Paragraph 5.A.(9) again to examine the thrust tang on the opposite wing.

(11) Make a record of all the fastener hole locations that cause signals that are almost the same as the signal you got from the notched fastener hole in the reference standard. Refer to Figure 4, Screen Displays 2 and 3 for the two most forward inspection holes. For the aft inspection hole, see Figure 4, Screen Displays 5 and 6.

B. Inspection for thrust tangs of JT9D and PW 4000 struts.

(1) Calibrate the instrument as specified in Paragraph 4.B. Make sure you use the special transducer and the extended handle identified in Paragraph 2.C.(1)(b).

(2) Do Paragraph 5.A.(2) thru Paragraph 5.A.(11). See Figure 5. Make sure that the correct transducer element is energized for each inspection fastener hole.

(3) Make sure you examine all the fastener holes shown in Figure 5.

6. Inspection Results

A. Inspection results for the two most forward inspection fastener holes.

(1) Ultrasonic signals that are equal to or more than 25% of FSH that occur at approximately 78% of FSW (refer to Figure 4, Screen Display 3) are indications of possible cracks and must be examined more fully.

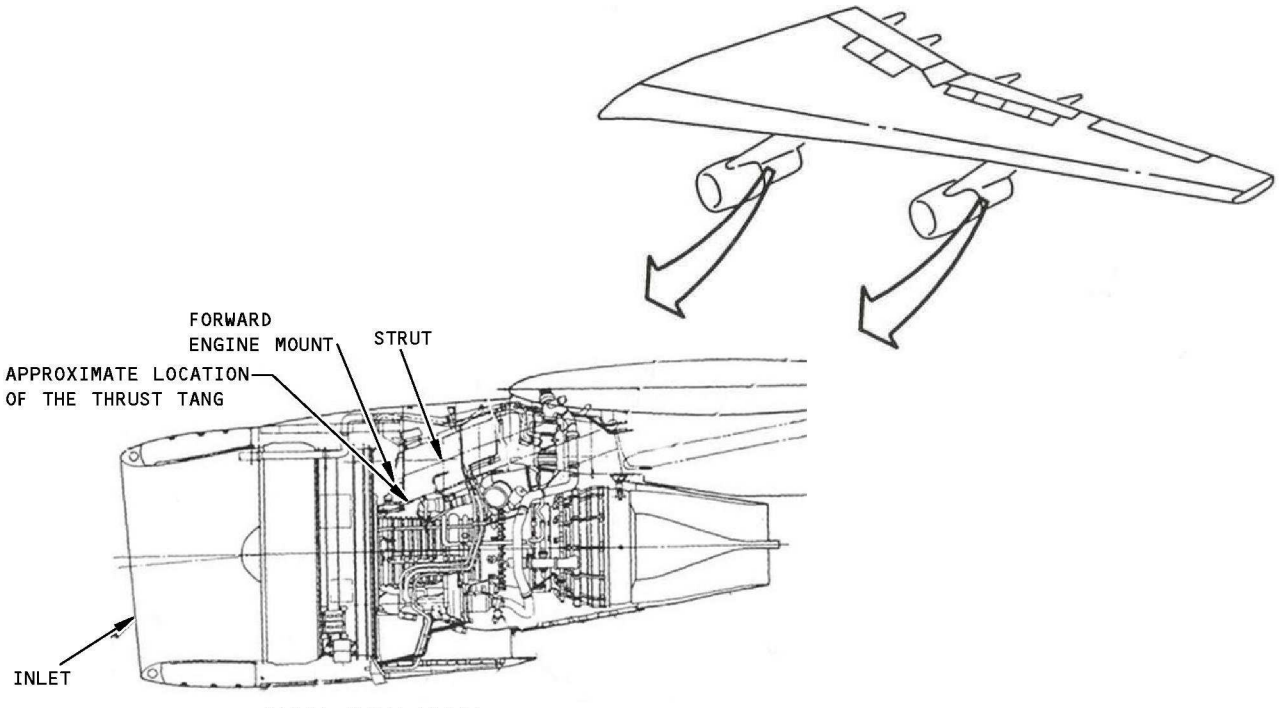
(2) To examine the fastener hole more fully, do the steps that follow:

(a) Do the inspection again and carefully monitor the screen display. Look for the two signals as the transducer is slowly moved to the inspection hole. One signal is from the hole and the other signal is from the crack. See Figure 4, Screen Display 2. Continue to slowly move the transducer to the hole. If there is still a signal at approximately 78% of FSW that is 25% of FSH (or more), remove the fastener and do an eddy current inspection of the open fastener hole.

B. Inspection results for the aft inspection hole.

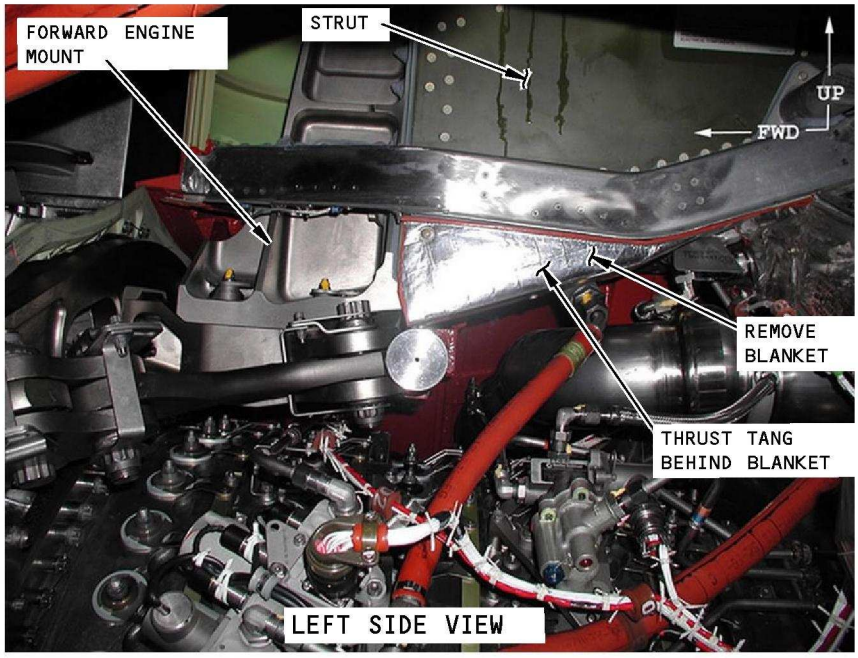
(1) Ultrasonic signals that are equal to or more than 25% of FSH and occur at approximately 60% of FSW (refer to Figure 4, Screen Display 6) are indications of possible cracks and must be examined more fully.

(2) Do Paragraph 6.A.(2) but look for the hole signal at approximately 60% of FSW and the crack signal at 65% of FSW. See Figure 4, Screen Display 5.

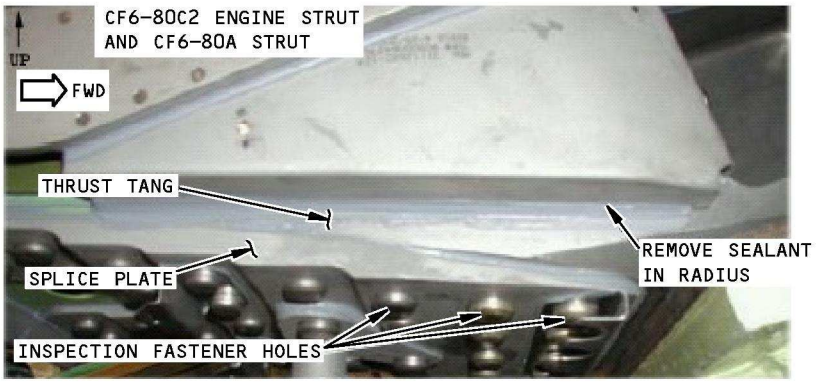


CF6-80C2 ENGINE
(TYPICAL INBOARD AND OUTBOARD STRUT)

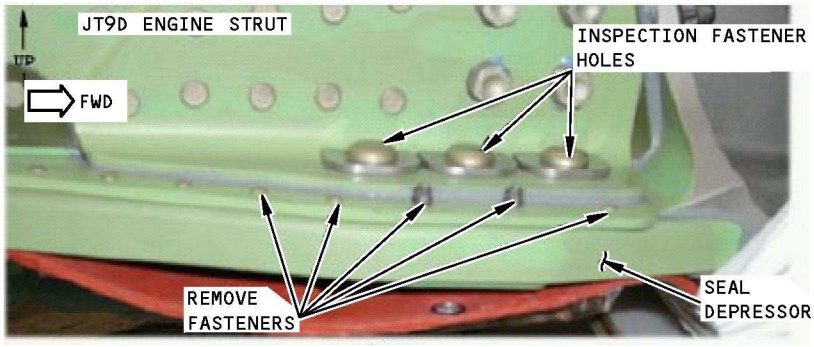
CF6-80C2 ENGINE



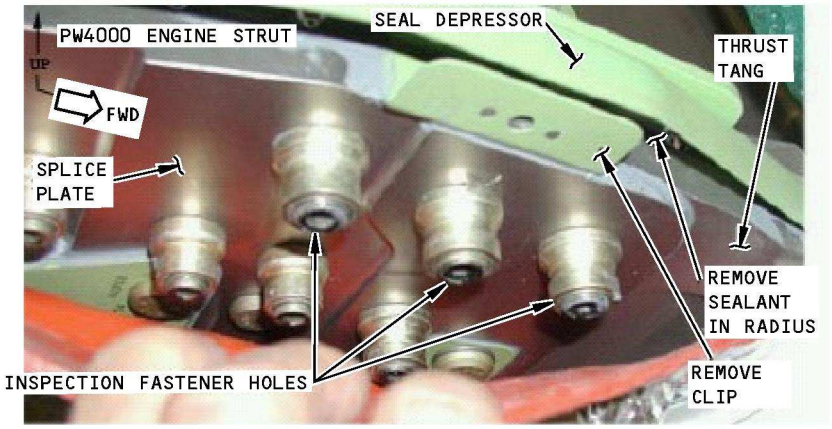
Inspection Location
Figure 1 (Sheet 1 of 2)



DETAIL A



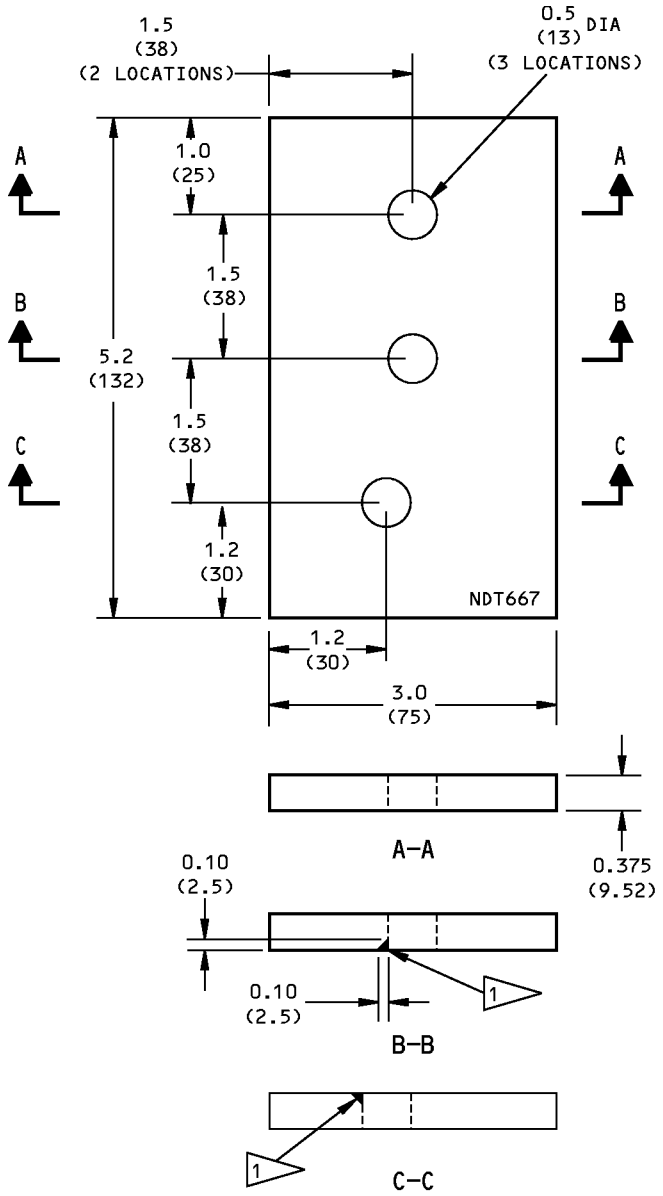
DETAIL B



DETAIL C

NOTES: THE RIGHT SIDE IS SHOWN; THE LEFT SIDE IS OPPOSITE

Inspection Location
Figure 1 (Sheet 2 of 2)



NOTES:

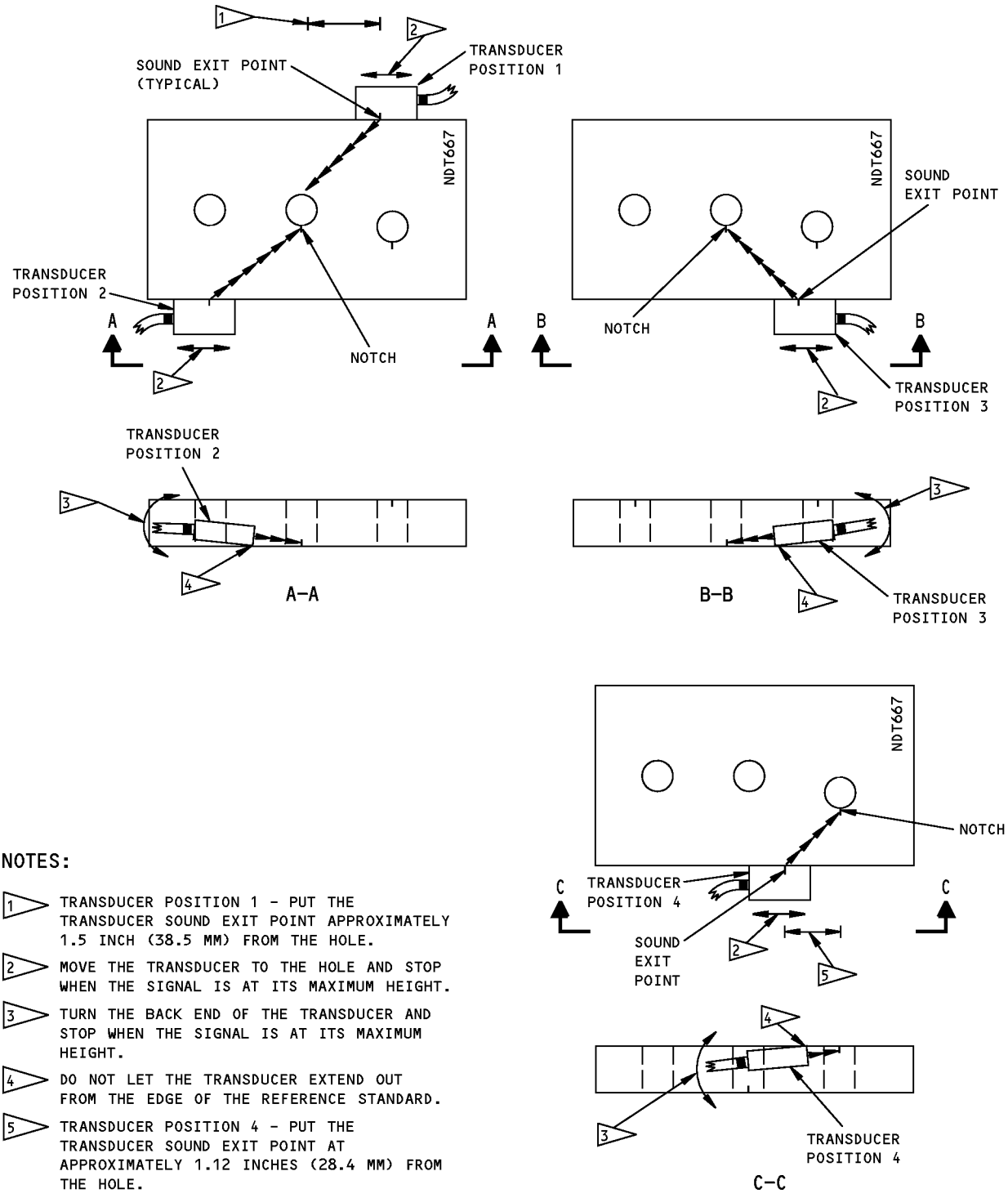
- ALL DIMENSIONS ARE IN INCHES (MILLIMETERS ARE IN PARENTHESES).
- TOLERANCES (UNLESS SPECIFIED DIFFERENTLY):

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

- MATERIAL: 15-5 PH OR 4130 STEEL
- ETCH OR STAMP NDT4224 WHERE SHOWN

1 EDM NOTCH; 0.10 (2.5) X 0.10 (2.5) CORNER NOTCH, 0.015 (0.38) MAXIMUM WIDTH, (2 LOCATIONS)

Reference Standard NDT667
Figure 2

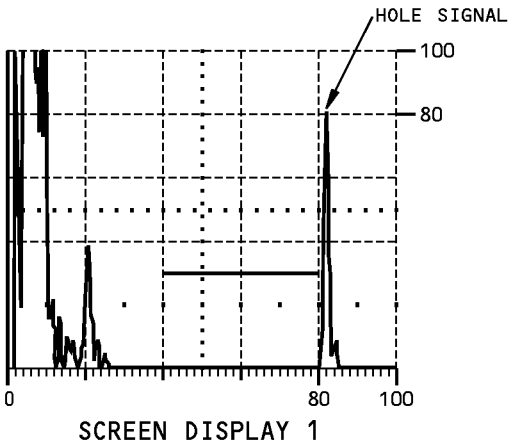


NOTES:

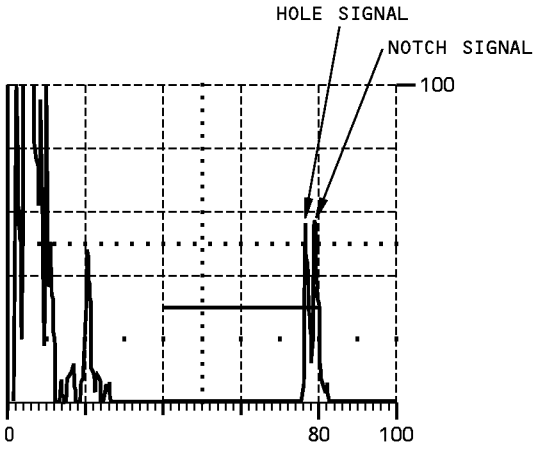
1. TRANSDUCER POSITION 1 - PUT THE TRANSDUCER SOUND EXIT POINT APPROXIMATELY 1.5 INCH (38.5 MM) FROM THE HOLE.
2. MOVE THE TRANSDUCER TO THE HOLE AND STOP WHEN THE SIGNAL IS AT ITS MAXIMUM HEIGHT.
3. TURN THE BACK END OF THE TRANSDUCER AND STOP WHEN THE SIGNAL IS AT ITS MAXIMUM HEIGHT.
4. DO NOT LET THE TRANSDUCER EXTEND OUT FROM THE EDGE OF THE REFERENCE STANDARD.
5. TRANSDUCER POSITION 4 - PUT THE TRANSDUCER SOUND EXIT POINT AT APPROXIMATELY 1.12 INCHES (28.4 MM) FROM THE HOLE.

Instrument Calibration
Figure 3

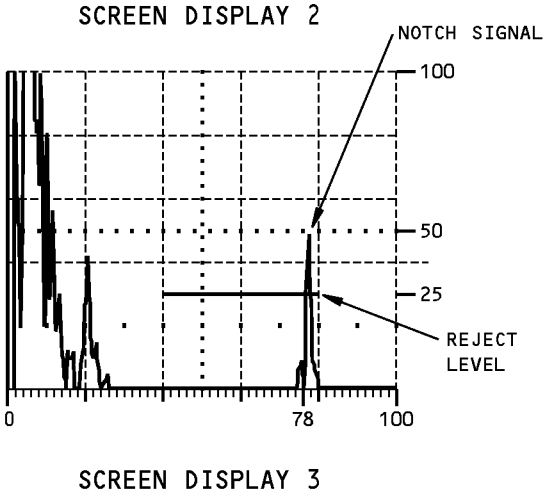
SCREEN DISPLAYS FOR FASTENER HOLES FARTHEST FROM THE TANG EDGE



SCREEN DISPLAY 1

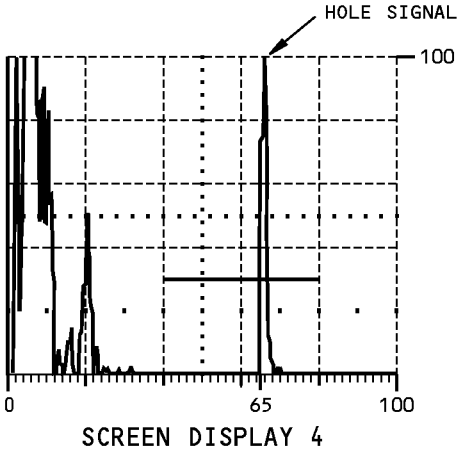


SCREEN DISPLAY 2

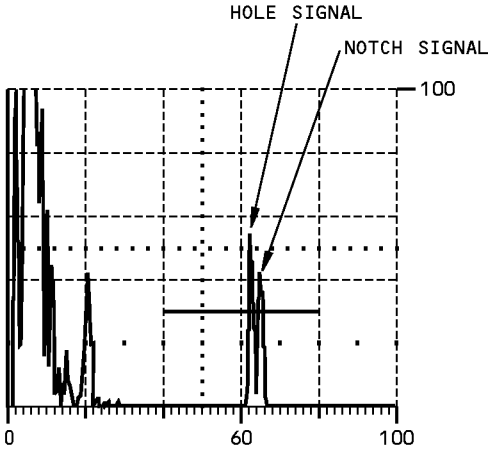


SCREEN DISPLAY 3

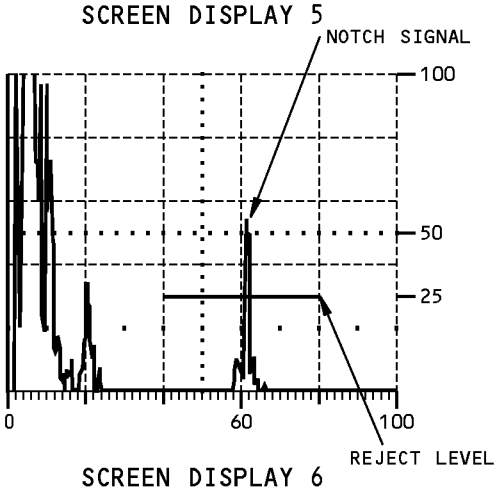
SCREEN DISPLAYS FOR FASTENER HOLES NEAREST TO THE TANG EDGE



SCREEN DISPLAY 4

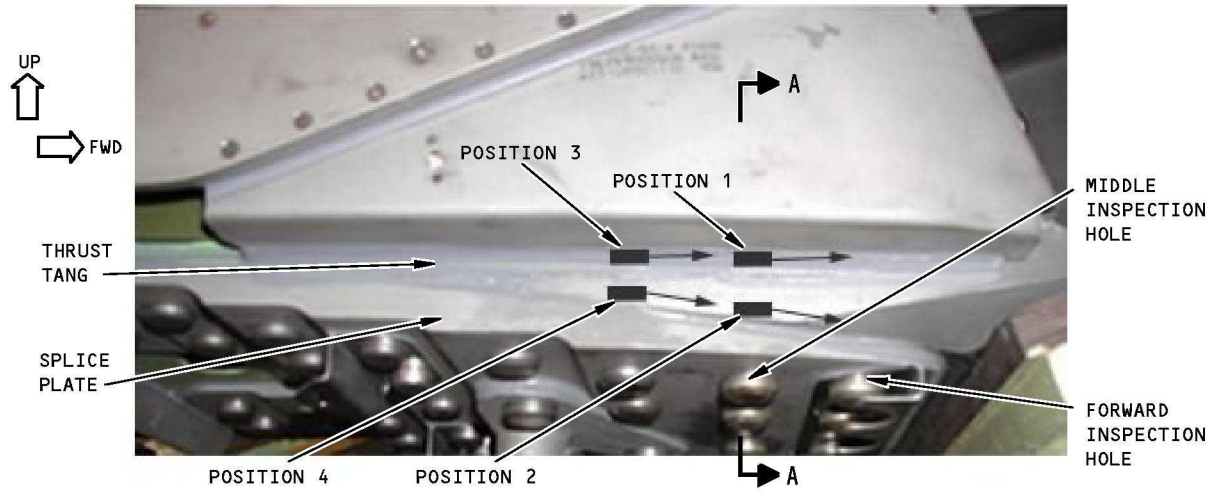


SCREEN DISPLAY 5

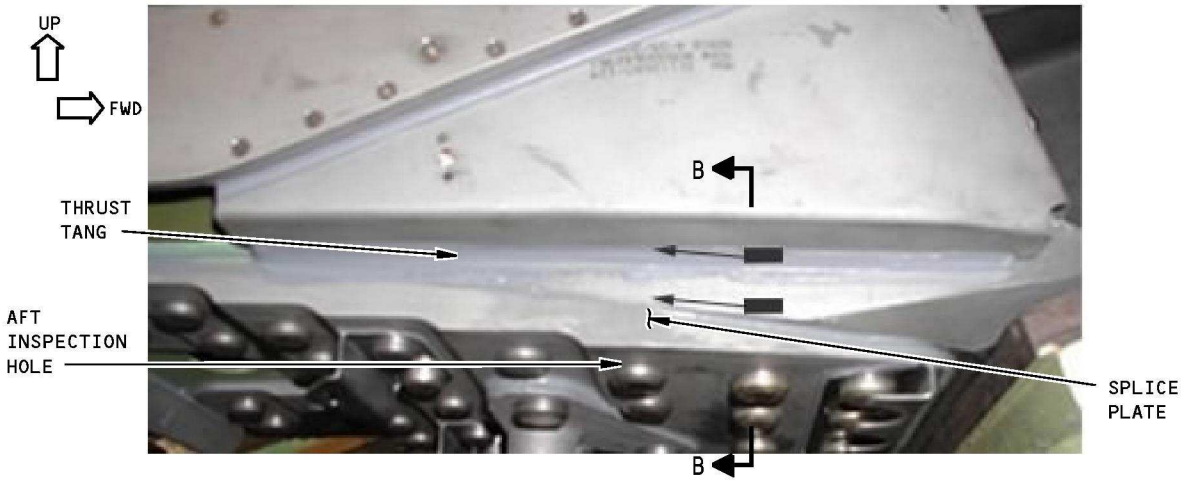


SCREEN DISPLAY 6

Instrument Screen Displays
Figure 4



DETAIL A



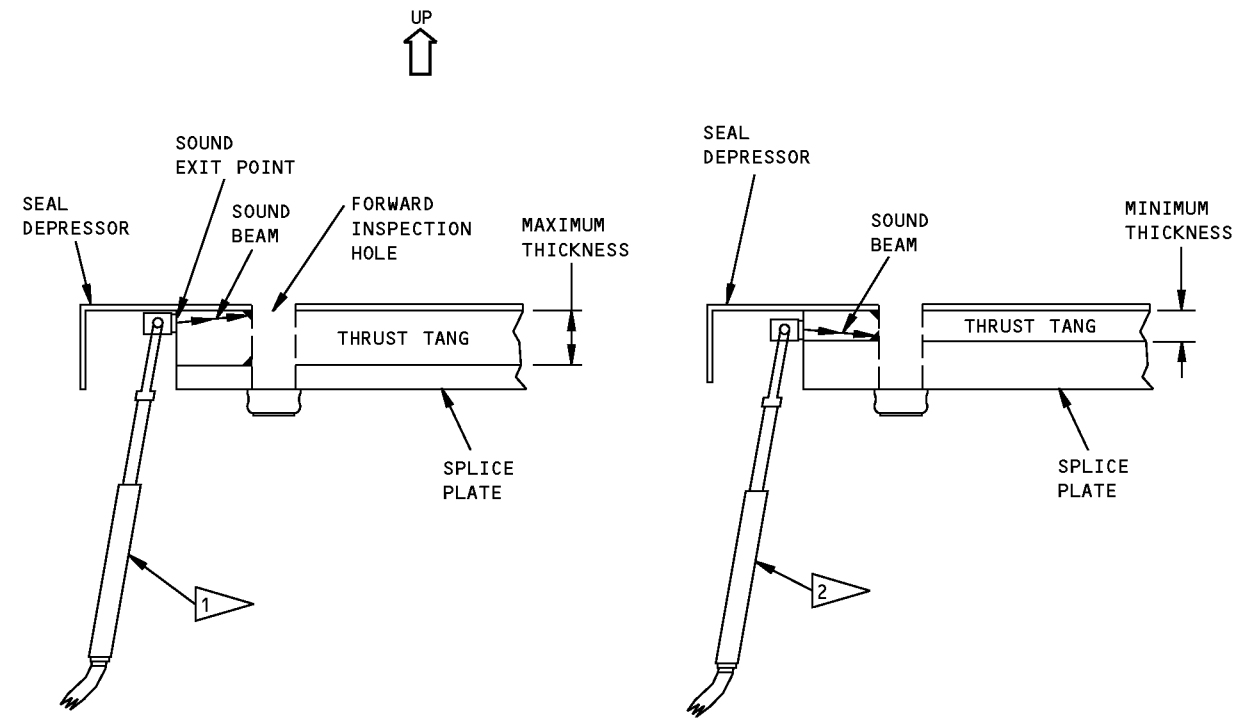
TYPICAL TRANSDUCER POSITIONS FOR CF6-80A AND CF6-80C2 ENGINE STRUTS
DETAIL B

NOTES:

TRANSDUCER

- THE RIGHT SIDE OF THE ENGINE STRUT IS SHOWN; THE LEFT SIDE IS OPPOSITE.
- MOVE AND POINT ALL OF THE UPPER TRANSDUCER POSITIONS AT THE UPPER AREA OF THE INSPECTION HOLE.
- MOVE AND POINT ALL OF THE LOWER TRANSDUCER POSITIONS AT THE LOWER AREA OF THE INSPECTION HOLE.
- THE THRUST TANG CONFIGURATION OF THE JT9D AND PW 4000 ENGINE STRUTS ARE ALMOST THE SAME AS SHOWN. A SEAL DEPRESSOR IN THE AREA OF THE THRUST TANG FOR THE JT9D AND PW 4000 ENGINE STRUT IS SHOWN IN SECTION VIEWS A-A AND B-B.

Typical Transducer Positions
Figure 5 (Sheet 1 of 2)



(SEAL DEPRESSOR NOT SHOWN IN DETAIL A)
A–A

(SEAL DEPRESSOR NOT SHOWN IN DETAIL B)
B–B

TYPICAL TRANSDUCER POSITIONS FOR JT9D AND PW 4000 ENGINE STRUTS

NOTES:

1. SLOWLY MOVE AND POINT THE TRANSDUCER AT THE UPPER AREA OF THE HOLE WHEN YOU EXAMINE THE UPPER AREA OF THE HOLE.

2. SLOWLY MOVE AND POINT THE TRANSDUCER AT THE LOWER AREA OF THE HOLE WHEN YOU EXAMINE THE LOWER AREA OF THE HOLE.

Typical Transducer Positions
Figure 5 (Sheet 2 of 2)

BARREL NUT BORES OF THE AFT ENGINE MOUNT BULKHEAD (GE ENGINE STRUTS)

1. Purpose

A. Use this ultrasonic procedure to examine the barrel nut bores of the aft engine mount bulkhead on the CF6-80C2 and CF6-80A/A2 struts for cracks. See Figure 1 and Figure 2 for the inspection areas for your engine strut.

B. MPD DTR Check Form Reference:

(1) ITEM 54-50-I06

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

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

(2) The ultrasonic instrument that follows was used to help prepare this procedure.

(a) Sonic 1200; Staveley Technologies Inc.

C. Transducer - The transducers used to examine the barrel nut bores will be different for each type of engine strut. The specially made transducers that follow were used to help prepare this procedure.

(1) For CF6-80C2 engine struts, use the transducers that follow:

NOTE: All the transducers have a top connector and are specially made to get access to the inspection area.

(a) Use a transducer that operates at 5 MHz and puts a backward 30 degree refracted shear wave in aluminum. The element dimensions are 0.187 x 0.187 inch (4.74 x 4.74 mm). The transducer case dimensions are approximately 1.0 inch (25 mm) long by 0.4 inch (10 mm) wide by 1.1 inch (27 mm) high with a 0.5 inch (12 mm) convex radius at the sound exit point. The part number is SUS674-T1 and it is made by NDT Engineering.

(b) Use a transducer that operates at 5 MHz and puts a backward 25 degree refracted shear wave in aluminum. The element dimensions are 0.187 x 0.187 inch (4.74 x 4.74 mm). The transducer case dimensions are approximately 1.0 inch (25 mm) long by 0.4 inch (10 mm) wide by 1.1 inch (27 mm) high with a 0.5 inch (12 mm) convex radius at the sound exit point. The part number is SUS674-T2 and it is made by NDT Engineering.

(c) Use a transducer that operates at 5 MHz and puts a 45 degree refracted shear wave in aluminum. The element dimensions are 0.25 x 0.25 inch (6.4 x 6.4 mm). The transducer case dimensions are approximately 0.75 inch (19 mm) long by 0.37 inch (9.3 mm) wide by 0.5 inch (12.0 mm) high. The part number is SUM 545AT and it is made by NDT Engineering.

NOTE: This is a standard 45 degree miniature transducer with a top connector.

(2) For CF6-80A/A2 engine struts, use the transducers that follow:

NOTE: All the transducers have a top connector and are specially made to get access to the inspection area.

(a) Use a transducer that operates at 5 MHz and puts a 15 degree refracted shear wave in aluminum. The element dimensions are 0.187 x 0.187 inch (4.74 x 4.74 mm). The transducer case dimensions are approximately 0.9 inch (22 mm) long by 0.4 inch (10 mm) wide by 0.9 inch (25 mm) high with a 34.5 degree angle at the sound exit surface. The part number is SUS675-T1 and it is made by NDT Engineering.

(b) Use a transducer that operates at 5 MHz and puts a 30 degree backward refracted shear wave in aluminum. The element dimensions are 0.187 x 0.187 inch (4.74 x 4.74 mm). The transducer case dimensions are approximately 1.1 inch (28 mm) long by 0.4 inch (10 mm) wide by 1.2 inch (30 mm) high with a 0.5 inch (12 mm) convex radius at the sound exit surface. The part number is SUS675-T2 and it is made by NDT Engineering.

(c) Use a transducer as specified in Paragraph 2.C.(1)(c).

D. Reference Standard

(1) Use reference standard NDT674 for CF6-80C2 engine struts. See Figure 3.

(2) Use reference standard NDT675 for CF6-80A/A2 engine struts. See Figure 4.

E. Couplant

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

3. Preparation for Inspection

A. The inspection is done from the inside of the strut. Find the inspection areas for your airplane.

(1) To examine the CF6-80C2 engine struts, see Figure 1 and Figure 8.

(2) To examine the CF6-80A/A2 engine struts, see Figure 1 and Figure 9.

B. Remove the engine from the strut.

C. Open the FWD and AFT access doors on each side of the strut.

D. Remove all components that prevent access to the inspection area.

E. Remove dirt, grease and sealant from the inspection areas that the transducer will touch.

F. Visually examine the inspection area for paint chips or unusual marks. Sand the paint chipped areas with fine grit sandpaper.

4. Instrument Calibration

A. Three instrument calibrations are necessary for each engine strut. Refer to Table 1 for the reference standard, transducers, calibration and inspection figures necessary to do the inspection for your strut.

(1) To examine the CF6-80C2 engine struts - Calibrate your instrument as specified in Paragraph 4.B. thru Paragraph 4.D. Use reference standard NDT674.

(2) To examine the CF6-80A/A2 engine struts - Calibrate your instrument as specified in Paragraph 4.E. thru Paragraph 4.G. Use reference standard NDT675.

B. Calibrate the instrument to be used on the concave radius of CF6-80C2 struts to examine the barrel nut bore for cracks at the horizontal centerline and 15 degrees above the horizontal centerline of the bore. See Figure 5, Detail 1.

(1) Connect the SUS674-T1 transducer to the instrument and set the instrument frequency to 5 MHz.

(2) Put couplant on the concave radius of the reference standard. See Figure 5, Detail 1.

(3) Put the transducer on the concave radius of the reference standard at transducer position 1 (TP 1). Get a maximum signal from the center notch at the 9 o'clock position. See Figure 5, Detail 1, flag note 1.

(4) Adjust the instrument controls to put the initial pulse at 0% of full screen width (FSW) and the notch signal at 80% of FSW. See Figure 7, Screen Display 1.

(5) Adjust the gain to put the maximum signal from the reference standard hole at 80% of full screen height (FSH). See Figure 7, Screen Display 1.

(6) Move the transducer horizontally to transducer position 2 (TP 2) to find the upper notch. See Figure 5, Detail 1, flag note 2. The upper notch signal will be at approximately 55% of FSW. See Figure 7, Screen Display 2.

(7) Move the transducer horizontally to transducer position 3 (TP 3). See Figure 5, flag note 3. No signal will be on the screen at approximately 50 to 80% of FSW. This is a screen display for a barrel nut bore without a crack.

C. Calibrate the instrument to be used on the concave radius of CF6-80C2 struts to examine the barrel nut bore for cracks that are approximately 30 degrees below the horizontal centerline of the bore. See Figure 5, Details 2 and 3.

(1) Connect the SUS674-T2 transducer to the instrument and set the instrument frequency to 5 MHz.

(2) Put couplant on the concave radius of the reference standard. See Figure 5, Detail 2.

(3) Put the transducer on the reference standard at transducer position 4 (TP 4). Get a maximum signal from the lower notch at the 8 o'clock position. A signal will show on the screen at approximately 55% of FSW. See Figure 5, Detail 2, flag note 4 and Figure 7, Screen Display 3.

(4) Adjust the gain to put the maximum signal from the reference standard hole at 80% of FSH. See Figure 7, Screen Display 3.

(5) Move the transducer to transducer position 5 (TP 5). No signal will be shown on the screen at approximately 55% of FSW. This is a screen display for a barrel nut bore without a crack. See Figure 5, Detail 3, flag note 5.

D. Calibrate the instrument to be used on the flat, vertical surface of CF6-80C2 struts to examine the barrel nut bore for cracks. See Figure 5, Detail 4.

(1) Connect the SUM545AT transducer to the instrument and set the instrument frequency to 5 MHz.

(2) Put couplant on the flat, vertical inspection surface of the reference standard. See Figure 5, Detail 4.

(3) Put the transducer on the reference standard at transducer position 6 (TP 6). Move the transducer to and away from the lower notch that is at the 4 o'clock position to get a maximum signal from the notch. See Figure 5, Detail 4, flag note 6 and Figure 7, Screen Display 4.

(4) Adjust the instrument controls to put the initial pulse at 0% of FSW and the notch signal at 80% of FSW. See Figure 7, Screen Display 4.

(5) Adjust the gain to put the maximum signal from the reference standard hole at 80% of FSH. See Figure 7, Screen Display 4.

(6) Move the transducer to transducer position 7 (TP 7) to find the center notch. A signal will show on the screen at approximately 70% of FSW. See Figure 5, Detail 4, flag note 7 and Figure 7, Screen Display 5.

(7) Put the transducer on the reference standard at transducer position 8 (TP 8). Move the transducer up past the hole. See Figure 5, Detail 4, flag note 8. No signal will be shown on the screen at approximately 70 to 80% of FSW. This is a screen display for a barrel nut bore without a crack. Make sure the transducer sound beam points at the bore.

NOTE: If you move the transducer so the sound exit point is approximately 0.9 inch (23 mm) above or below the horizontal centerline of the bore, you can get a signal from the bore. See Figure 5, Detail 5.

NOTE: If you move the transducer so the sound exit point is approximately 0.4 inch (10 mm) or more above the horizontal centerline of the bore, you can get a signal from the top radius of the barrel nut. See Figure 5, Detail 6.

E. Calibrate the instrument to be used on the 34.5 degree angled but flat surface of CF6-80A/A2 struts to examine the barrel nut bore for cracks. See Figure 6, Detail 1.

(1) Connect the SUS675-T1 transducer to the instrument and set the instrument frequency to 5 MHz.

(2) Put couplant on the angled, flat inspection surface of the reference standard. See Figure 6, Detail 1.

(3) Put the transducer on the reference standard at transducer position 1 (TP 1). Get a maximum signal from the center notch at the 9 o'clock position. See Figure 6, Detail 1, flag note 1.

(4) Adjust the instrument controls to put the initial pulse at 0% of full screen width (FSW) and the notch signal at 80% of FSW. See Figure 7, Screen Display 1.

(5) Adjust the gain to put the maximum signal from the reference standard hole at 80% of full screen height (FSH). See Figure 7, Screen Display 1.

(6) Move the transducer horizontally to transducer position 2 (TP 2) to find the upper notch and get a maximum signal from the notch. See Figure 6, flag note 2. The notch signal will be at approximately 55% of FSW. See Figure 7, Screen Display 2.

(7) Move the transducer horizontally to transducer position 3 (TP 3). No signal will be shown on the screen at approximately 55 to 80% of FSW. This is a screen display for a barrel nut bore without a crack. See Figure 6, Detail 1, flag note 3.

F. Calibrate the instrument to be used on the concave radius of CF6–80A/A2 struts to examine the barrel nut bore for cracks. See Figure 6, Details 2 and 3.

(1) Connect the SUS675-T2 transducer to the instrument and set the instrument frequency to 5 MHz.

(2) Put couplant on the concave radius of the reference standard. See Figure 6, Detail 2.

(3) Put the transducer on the reference standard at transducer position 4 (TP 4). Get a maximum signal from the lower notch at the 8 o'clock position. A signal will occur on the screen at approximately 55% of FSW. See Figure 6, Detail 2, flag note 4 and Figure 7, Screen Display 3.

(4) Adjust the gain to put the maximum signal from the reference standard hole at 80% of full screen height (FSH). See Figure 7, Screen Display 3.

(5) Move the transducer sound beam away from the hole. No signal will be on the screen at approximately 50 to 80% of FSW. See Figure 6, Detail 3, flag note 5.

G. Calibrate the instrument to be used on the flat, vertical surface of CF6-80A/A2 struts to examine the barrel nut bore for cracks. See Figure 6, Detail 4.

(1) Connect the SUM545AT transducer to the instrument and set the instrument frequency to 5 MHz.

(2) Put couplant on the vertical, flat inspection surface of the reference standard. See Figure 6, Detail 4.

(3) Put the transducer on the reference standard at transducer position 6 (TP 6). Move the transducer to and away from the lower notch that is at the 4 o'clock position to get a maximum signal from the notch. See Figure 6, Detail 4, flag note 6.

(4) Adjust the instrument controls to put the initial pulse at 0% of FSW and the notch signal at 80% of FSW. See Figure 7, Screen Display 4.

(5) Adjust the gain to put the maximum signal from the reference standard hole at 80% of FSH. See Figure 7, Screen Display 4.

(6) Move the transducer to transducer position 7 (TP 7) to find the center notch. A signal will occur on the screen at approximately 70% of FSW. See Figure 6, Detail 4, flag note 7 and Figure 7, Screen Display 5.

(7) Put the transducer on the reference standard at transducer position 8 (TP 8). Move the transducer up past the hole. See Figure 6, Detail 4, flag note 8. No signal will be shown on the screen at approximately 70 to 80% of FSW. This is a screen display for a barrel nut bore without a crack. Make sure the transducer sound beam points at the hole.

NOTE: If you move the transducer so the sound exit point is approximately 0.9 inch (23 mm) above or below the horizontal centerline of the hole, you can get a signal from the hole. See Figure 6, Detail 5.

5. Inspection Procedure

A. Three inspections are necessary for each type of engine strut. Refer to Figure 1, Figure 2, Figure 8 and Figure 9 (as applicable) to identify the inspection area to be examined on your airplane.

NOTE: The inboard and outboard barrel nut bores are examined with this procedure on each engine strut. Each barrel nut bore is examined from the forward and aft sides of the bulkhead web.

(1) Examine the CF6-80C2 engine struts as specified in Paragraph 5.B. thru Paragraph 5.D.

(2) Examine the CF6-80A/A2 engine struts as specified in Paragraph 5.E. thru Paragraph 5.G.

B. Examine the barrel nut bore from the concave radius of CF6-80C2 struts to look for cracks that can occur between the horizontal centerline and approximately 15 degrees above the horizontal centerline on the outboard side of the bore. See Figure 8, Detail 1.

(1) Calibrate the instrument as specified in Paragraph 4.B. See Table 1, Item 1.

NOTE: Make sure you use the SUS674-T1 transducer.

(2) Put a sufficient quantity of couplant on the concave radius at the aft end of the barrel nut bore. See Figure 8, Detail 1.

NOTE: The aft end of the barrel nut bore is on the aft side of the bulkhead web.

(3) Put the transducer on the concave radius at the aft end of the barrel nut bore. Slowly move the transducer forward approximately 2.5 inches (63 mm) in the direction of the bulkhead web and monitor the screen display for crack signals. See Figure 1, Detail 2, flag note 4 and Figure 8, Detail 1, flag note 1. During the inspection:

(a) Do not move the transducer in an inboard and outboard direction when you move the transducer in the forward and aft directions.

(b) Make a record of all signals that occur between 55 and 80% of FSW.

(4) Do Paragraph 5.B.(2) and Paragraph 5.B.(3) on the forward end of the barrel nut bore but start the inspection with the transducer at the forward end of the barrel nut bore and slowly move the transducer approximately 2.5 inches (63 mm) in the aft direction.

NOTE: The forward end of the barrel nut bore is on the forward side of the bulkhead web. You will have to get access to the inspection area through the side access holes of the strut. See Figure 1, Detail 3.

(5) Do Paragraph 5.B.(2) thru Paragraph 5.B.(4) for the barrel nut bore on the opposite side of the strut. See Figure 1, Detail 1.

(6) Do Paragraph 5.B.(2) thru Paragraph 5.B.(5) on the opposite strut.

C. Examine the barrel nut bore from the concave radius of CF6-80C2 struts to look for cracks that can occur between the horizontal centerline to approximately 30 degrees below the horizontal centerline on the outboard side of the bore. See Figure 8, Detail 2.

(1) Calibrate the instrument as specified in Paragraph 4.C. See Table 1, Item 2.

NOTE: Make sure you use the SUS674-T2 transducer.

(2) Put a sufficient quantity of couplant on the concave radius at the aft end of the barrel nut bore. See Figure 8, Detail 2.

NOTE: The aft end of the barrel nut bore is on the aft side of the bulkhead web.

(3) Put the transducer on the concave radius at the aft end of the barrel nut bore. Examine the barrel nut bore for cracks as follows:

(a) Move the transducer slowly in an inboard and outboard direction and monitor the screen display for crack signals.

1) Make a record of all signals that occur on the screen display that are between 55 and 60% of FSW.

(b) Index the transducer forward (in the direction of the bulkhead web) approximately 0.1 inch (2.5 mm) and do Paragraph 5.C.(3)(a) again.

(c) Continue to do Paragraph 5.C.(3)(a) and Paragraph 5.C.(3)(b) to examine the barrel nut bore for cracks until you have examined the area from the end of the barrel nut bore to approximately 2.5 inches (63 mm) in the direction of the bulkhead web. See Figure 1, Detail 2, flag note 4 and Figure 8, Detail 2, flag note 2.

(4) Do Paragraph 5.C.(2) and Paragraph 5.C.(3) on the forward end of the barrel nut bore but start the inspection with the transducer at the forward end of the barrel nut bore and slowly move the transducer in the aft direction. See Figure 1, Detail 3.

NOTE: The forward end of the barrel nut bore is on the forward side of the bulkhead web. You will have to get access to the inspection area through the side access holes of the strut. See Figure 1, Detail 3.

(5) Do Paragraph 5.C.(2) thru Paragraph 5.C.(4) for the barrel nut bore on the opposite side of the strut. See Figure 1, Detail 1.

(6) Do Paragraph 5.C.(2) thru Paragraph 5.C.(5) on the opposite strut.

D. Examine the barrel nut bore from the vertical inspection surface of the CF6-80C2 strut to look for cracks that are 30 degrees above and below the horizontal centerline of the bore. See Figure 8, Detail 3.

(1) Calibrate the instrument as specified in Paragraph 4.D. See Table 1, Item 3.

(2) Put a sufficient quantity of couplant on the vertical inspection surface at the aft end of the barrel nut bore. See Figure 8, Detail 3.

NOTE: The aft end of the barrel nut bore is on the aft side of the bulkhead web.

(3) Put the transducer on the vertical inspection surface at the aft end of the barrel nut bore so that the sound exit point is approximately 0.6 inches (15 mm) above the horizontal centerline of the bore. Examine the barrel nut bore for cracks as follows:

(a) As you monitor the screen display for crack signals, slowly move the transducer down to examine the area around the horizontal centerline of the bore and then below the horizontal centerline to examine the lower inspection area.

NOTE: The lower inspection area is from the horizontal centerline to approximately 30 degrees below the horizontal centerline of the barrel nut bore.

1) Make a record of all signals that occur on the screen display that are between 70 and 80% of FSW.

(b) Index the transducer forward (in the direction of the bulkhead web) approximately 0.1 inch (2.5 mm) and do Paragraph 5.D.(3)(a) again.

(c) Continue to do Paragraph 5.D.(3)(a) and Paragraph 5.D.(3)(b) to examine the barrel nut bore for cracks until you have examined the area from the end of the barrel nut bore to approximately 2.5 inches (63 mm) in the direction of the bulkhead web. See Figure 8, Detail 3, flag notes 3 and 5.

(4) Put the transducer on the vertical inspection surface at the aft end of the barrel nut bore so that the sound exit point is approximately 0.6 inches (15 mm) below the horizontal centerline of the bore. Examine the barrel nut bore for cracks as follows:

NOTE: The aft end of the barrel nut bore is on the aft side of the bulkhead web.

(a) As you monitor the screen display for crack signals, slowly move the transducer up to examine the area above the horizontal centerline of the bore.

1) Make a record of all signals that occur on the screen display that are between 70 and 80% of FSW.

(b) Index the transducer forward (in the direction of the bulkhead web) approximately 0.1 inch (2.5 mm) and do Paragraph 5.D.(4)(a) again.

(c) Continue to do Paragraph 5.D.(4)(a) and Paragraph 5.D.(4)(b) to examine the barrel nut bore for cracks until you have examined the area from the end of the barrel nut bore to approximately 2.5 inches (63 mm) in the direction of the bulkhead web. See Figure 8, Detail 3, flag notes 4 and 5.

NOTE: If you move the transducer so the sound exit point is approximately 0.9 inch (23 mm) above or below the horizontal centerline of the bore, you can get a signal from the bore. See Figure 5, Detail 5.

NOTE: If you move the transducer so the sound exit point is approximately 0.4 inch (10 mm) or more above the horizontal centerline of the bore, you can get a signal from the top radius of the barrel nut bore. See Figure 5, Detail 6.

(5) Do Paragraph 5.D.(2) thru Paragraph 5.D.(4) on the forward end of the barrel nut bore but start with the transducer at the most forward end and index the transducer in the aft direction.

NOTE: The forward end of the barrel nut bore is on the forward side of the bulkhead web. You will have to get access to the inspection area through the side access holes of the strut. See Figure 8, Detail 3.

(6) Do Paragraph 5.D.(2) thru Paragraph 5.D.(5) again for the barrel nut bore on the opposite side of the strut. See Figure 1, Detail 1 and Figure 8, Detail 3.

(7) Do Paragraph 5.D.(2) thru Paragraph 5.D.(6) again on the opposite strut.

E. Examine the barrel nut bore from the 34.5 degree angled, flat inspection surface of CF6-80A/A2 struts to look for cracks at the horizontal centerline and approximately 15 degrees above the horizontal centerline on the outboard side of the bore. See Figure 9, Detail 1.

(1) Calibrate the instrument as specified in Paragraph 4.E. See Table 1, Item 4.

NOTE: Make sure you use the SUS675-T1 transducer.

(2) Put a sufficient quantity of couplant on the angled, flat inspection surface at the aft end of the barrel nut bore. See Figure 9, Detail 1.

NOTE: The aft end of the barrel nut bore is on the aft side of the bulkhead web.

(3) Put the transducer on the angled inspection surface so that the sound points at the outboard side of the barrel nut bore. See Figure 9, Detail 1, flag note 1. Examine the barrel nut bore for cracks as follows:

(a) As you monitor the screen display for crack signals, slowly move the transducer approximately 0.2 inch (0.5 mm) to the outboard side of the bore.

1) Make a record of all signals that occur on the screen display that are between approximately 50 and 80% of FSW.

(b) Index the transducer forward (in the direction of the bulkhead web) approximately 0.1 inch (2.5 mm) and do Paragraph 5.E.(3)(a) again.

(c) Continue to do Paragraph 5.E.(3)(a) and Paragraph 5.E.(3)(b) to examine the barrel nut bore for cracks until you have examined the area from the end of the barrel nut bore to approximately 2.5 inches (63 mm) in the direction of the bulkhead web. See Figure 9, Detail 1, and Detail 3, flag note 5.

(4) Do Paragraph 5.E.(2) and Paragraph 5.E.(3) on the forward end of the barrel nut bore but start the inspection with the transducer at the most forward end and index the transducer in the aft direction.

NOTE: The forward end of the barrel nut bore is on the forward side of the bulkhead web. You will have to get access to the inspection area through the side access holes of the strut.

(5) Do Paragraph 5.E.(2) thru Paragraph 5.E.(4) again for the barrel nut bore on the opposite side of the strut.

(6) Do Paragraph 5.E.(2) thru Paragraph 5.E.(5) again on the opposite strut.

F. Examine the barrel nut bore from the concave radius of CF6-80A/A2 struts to look for cracks between the horizontal centerline and approximately 30 degrees below the horizontal centerline on the outboard side of the bore. See Figure 9, Detail 2.

(1) Calibrate the instrument as specified in Paragraph 4.F. See Table 1, Item 5.

NOTE: Make sure you use the SUS675-T2 transducer.

(2) Put a sufficient quantity of couplant on the concave surface at the aft end of the barrel nut bore. See Figure 9, Detail 2.

NOTE: The aft end of the barrel nut bore is on the aft side of the bulkhead web.

(3) Put the transducer on the concave surface at the aft end of the barrel nut bore. Examine the barrel nut bore for cracks as follows:

(a) As you monitor the screen display for crack signals, slowly move the transducer in an inboard and outboard direction.

1) Make a record of all signals that occur on the screen display that are between approximately 55 and 60% of FSW.

(b) Index the transducer forward (in the direction of the bulkhead web) approximately 0.1 inch (2.5 mm) and do Paragraph 5.F.(3)(a) again.

(c) Continue to do Paragraph 5.F.(3)(a) and Paragraph 5.F.(3)(b) to examine the barrel nut bore for cracks until you have examined the area from the end of the barrel nut bore to approximately 2.5 inches (63 mm) in the direction of the bulkhead web. See Figure 9, Detail 2, flag note 2.

(4) Do Paragraph 5.F.(2) and Paragraph 5.F.(3) on the forward end of the barrel nut bore but start the inspection with the transducer at the forward end and index the transducer in the aft direction.

NOTE: The forward end of the barrel nut bore is on the forward side of the bulkhead web. You will have to get access to the inspection area through the side access holes of the strut.

(5) Do Paragraph 5.F.(2) thru Paragraph 5.F.(4) again for the barrel nut bore on the opposite side of the strut.

(6) Do Paragraph 5.F.(2) thru Paragraph 5.F.(5) again on the opposite strut.

G. Examine the barrel nut bore from the vertical inspection area of the CF6-80A/A2 strut for cracks that are 30 degrees above and below the horizontal centerline of the bore. See Figure 9, Detail 3.

(1) Calibrate the instrument as specified in Paragraph 4.G. See Table 1, Item 6.

(2) Put a sufficient quantity of couplant on the vertical inspection surface at the aft end of the barrel nut bore. See Figure 9, Detail 3.

NOTE: The aft end of the barrel nut bore is on the aft side of the bulkhead web.

(3) Put the transducer on the vertical inspection surface at the aft end of the barrel nut bore so that the sound exit point is approximately 0.6 inches (15 mm) above the horizontal centerline of the bore. Examine the barrel nut bore for cracks as follows:

(a) As you monitor the screen display for crack signals, slowly move the transducer down to examine the area around the horizontal centerline of the bore and then below the horizontal centerline to examine the lower inspection area.

NOTE: The lower inspection area is from the horizontal centerline to approximately 30 degrees below the horizontal centerline of the barrel nut bore.

1) Make a record of all signals that occur on the screen display that are between 70 and 80% of FSW.

(b) Index the transducer forward (in the direction of the bulkhead web) approximately 0.1 inch (2.5 mm) and do Paragraph 5.G.(3)(a) again.

(c) Continue to do Paragraph 5.G.(3)(a) and Paragraph 5.G.(3)(b) to examine the barrel nut bore for cracks until you have examined the area from the end of the barrel nut bore to approximately 2.5 inches (63 mm) in the direction of the bulkhead web. See Figure 9, Detail 3, flag notes 3 and 5.

(4) Put the transducer on the vertical inspection surface at the aft end of the barrel nut bore so that the sound exit point is approximately 0.6 inches (15 mm) below the horizontal centerline of the bore. Examine the barrel nut bore for cracks as follows:

NOTE: The aft end of the barrel nut bore is on the aft side of the bulkhead web.

(a) As you monitor the screen display for crack signals, slowly move the transducer up to examine the area above the horizontal centerline of the bore.

1) Make a record of all signals that occur on the screen display that are between 70 and 80% of FSW.

(b) Index the transducer forward (in the direction of the bulkhead web) approximately 0.1 inch (2.5 mm) and do Paragraph 5.G.(4)(a) again.

(c) Continue to do Paragraph 5.G.(4)(a) and Paragraph 5.G.(4)(b) to examine the barrel nut bore for cracks until you have examined the area from the end of the barrel nut bore to approximately 2.5 inches (63 mm) in the direction of the bulkhead web. See Figure 9, Detail 3, flag notes 4 and 5.

NOTE: If you move the transducer so the sound exit point is approximately 0.9 inch (23 mm) above or below the horizontal centerline of the bore, you can get a signal from the bore. See Figure 6, Detail 5, flag note 9.

(5) Do Paragraph 5.G.(2) thru Paragraph 5.G.(4) on the forward end of the barrel nut bore but start the inspection with the transducer at the most forward end and index the transducer in the aft direction.

NOTE: The forward end of the barrel nut bore is on the forward side of the bulkhead web. You will have to get access to the inspection area through the side access holes of the strut.

(6) Do Paragraph 5.G.(2) thru Paragraph 5.G.(5) again for the barrel nut bore on the opposite side of the strut.

(7) Do Paragraph 5.G.(2) thru Paragraph 5.G.(6) again on the opposite strut.

6. Inspection Results

NOTE: The inspection results can change for each type of strut and inspection area.

A. Ultrasonic signals that are equal to or more than 25% of FSH and that occur at the approximate FSW range for the inspection area identified in Table 1, are indications of possible cracks and must be examined more fully. See the inspection results column in Table 1.

(1) Compare the signals that occurred during the inspection to the signals you got during calibration from the reference standard notch. The crack signals will occur in approximately the same FSW range.

(2) To examine the bore more fully, do the steps that follow:

(a) Do the inspection again and carefully monitor the screen display.

(b) Make sure you used the correct transducer to examine the correct inspection area.

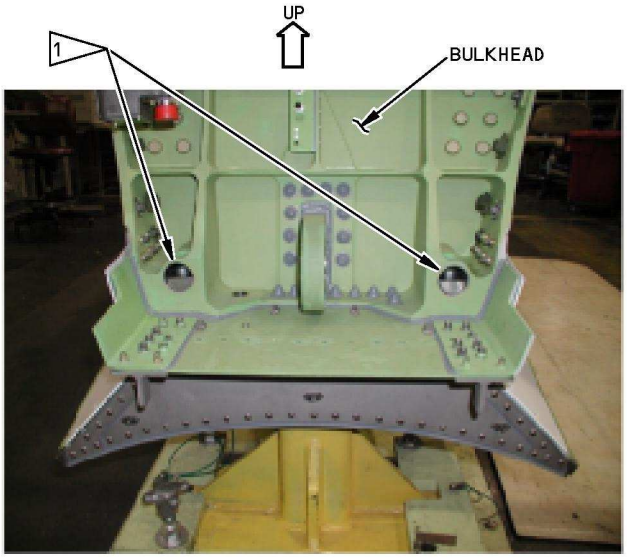
(c) If there is still a signal that is 25% of FSH (or more) at the approximate FSW range for a crack signal, remove the bushing from the barrel nut bore and do a surface eddy current inspection in the bore.

1) Use a pencil probe with a 90 degree angle. See Part 6, 51-00-19.

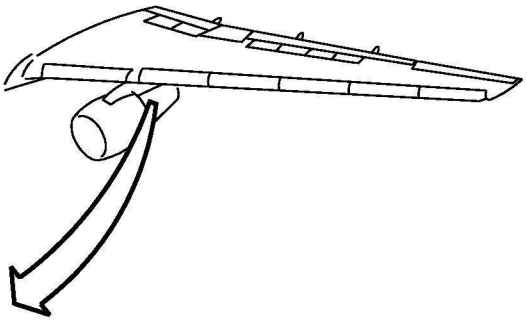
Table 1 Calibration and Inspection Table

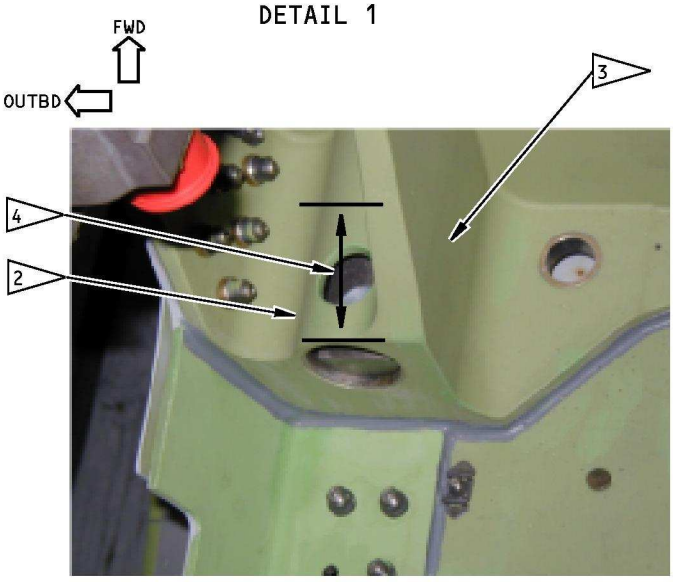
ITEM	ENGINE TYPE	REFERENCE STANDARD/~ FIGURE NUMBER	CALIBRATION FIGURE NUMBER	TRANSDU~ CER	INSPECTION FIGURE NUMBER	INSPECTION RESULTS See NOTE
1	CF6-80C2	NDT674 / Figure 3	Figure 5, SHEET 1, DETAIL 1.	SUS674-T1	Figure 8, DETAIL 1	55 TO 80% of FSW
2	CF6-80C2	NDT674 / Figure 3	Figure 5, DETAIL 2 and 3.	SUS674-T2	Figure 8, DETAIL 2	55 TO 60% of FSW
3	CF6-80C2	NDT674 / Figure 3	Figure 5, DETAIL 4.	SUM545AT	Figure 8, DETAIL 3	70 TO 80% of FSW
4	CF6-80A/A2	NDT675 / Figure 4	Figure 6, DETAIL 1.	SUS675-T1	Figure 9, DETAIL 1	55 TO 80% of FSW
5	CF6-80A/A2	NDT675 / Figure 4	Figure 6, DETAIL 2 and 3.	SUS675-T2	Figure 9, DETAIL 2	55 TO 60% of FSW
6	CF6-80A/A2	NDT675 / Figure 4	Figure 6, DETAIL 4.	SUM545AT	Figure 9, DETAIL 3	70 TO 80% of FSW

NOTE: Ultrasonic signals that are equal to or more than 25% of FSH that occur at the approximate FSW range identified in the Inspection Results column are indications of possible cracks and must be examined more fully.

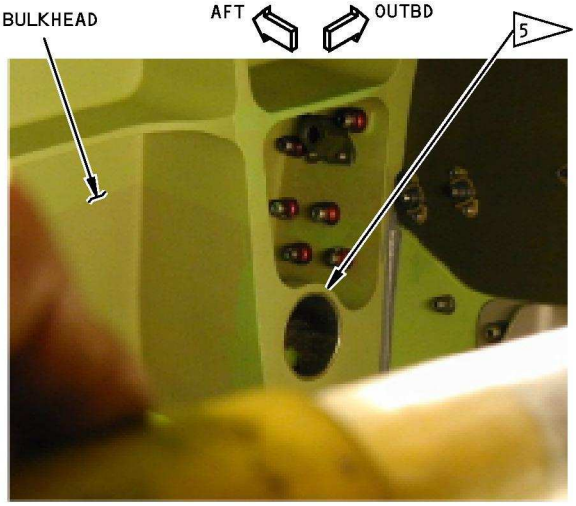


AFT VIEW
DETAIL 1





TOP VIEW
DETAIL 2



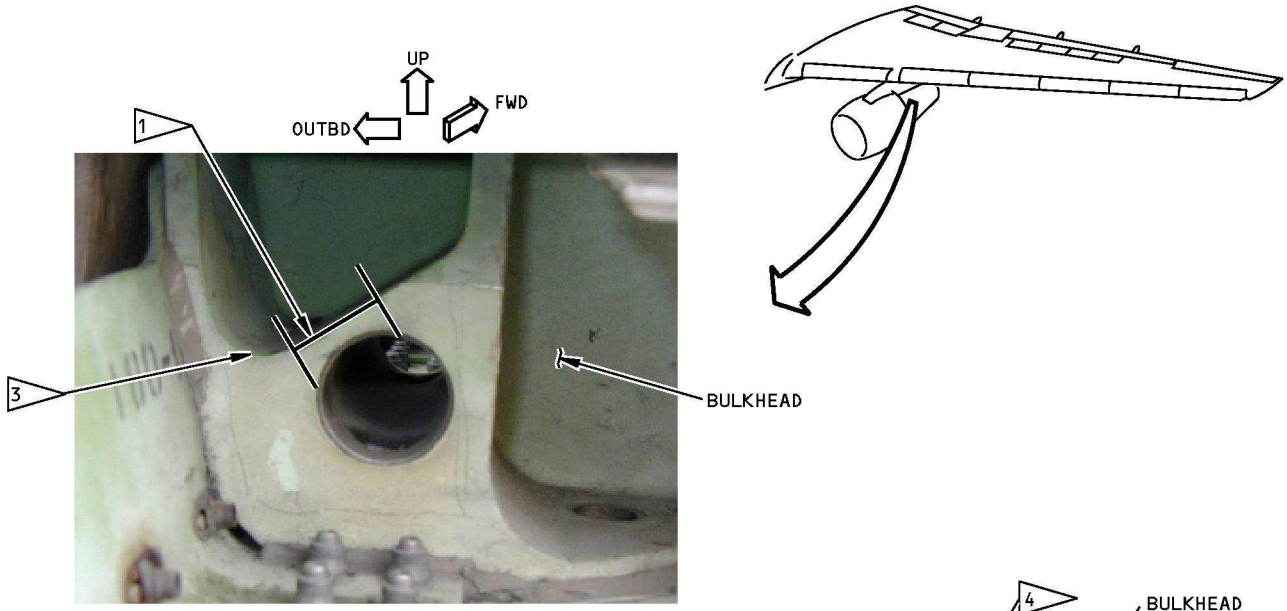
VIEW OF THE FORWARD END FROM
INSIDE THE STRUT
DETAIL 3

NOTES:

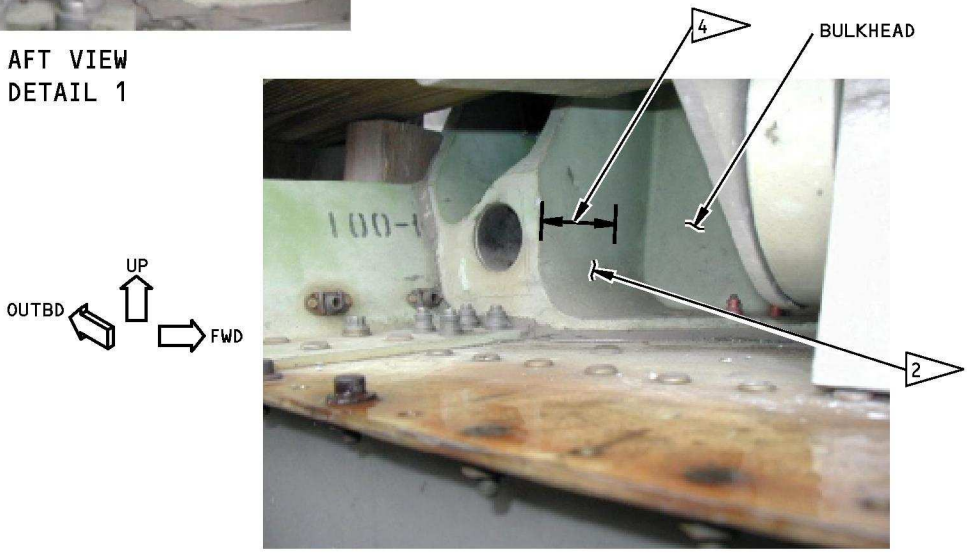
- THE CF6-80C2 STRUT BARREL NUT BORES ARE SHOWN.

1. EXAMINE THE FORWARD AND AFT ENDS OF THE TWO BARREL NUT BORES ON EACH STRUT. THE BORES EXTEND TO EACH SIDE OF THE BULKHEAD.
2. CONCAVE AFT INSPECTION SURFACE
3. FLAT VERTICAL INSPECTION SURFACE
4. INSPECTION DISTANCE - 2.5 INCHES (63 mm) FOR THE CONCAVE AND VERTICAL (FLAT) INSPECTION AREAS
5. CONCAVE FORWARD INSPECTION AREA

CF6-80C2 Strut Inspection Area
Figure 1



AFT VIEW
DETAIL 1



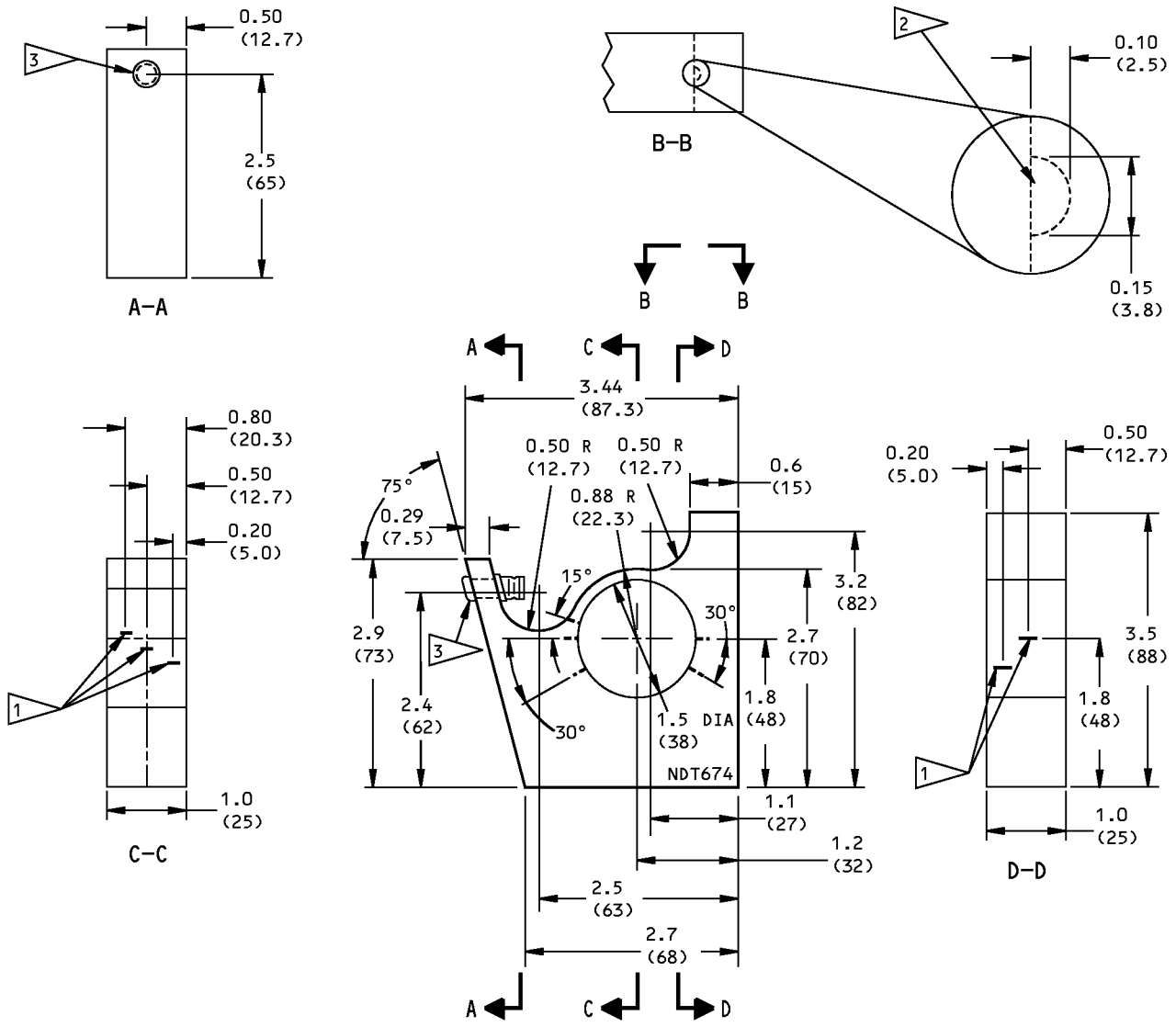
INBOARD VIEW
DETAIL 2

NOTES:

- THE CF6-80A/A2 STRUT BARREL NUT BORE ON THE LEFT SIDE OF THE BULKHEAD IS SHOWN; THE BARREL NUT BORE ON THE RIGHT SIDE OF THE BULKHEAD IS ALMOST THE SAME.
- EXAMINE THE FORWARD AND AFT ENDS OF THE TWO BARREL NUT BORES FOR CRACKS ON EACH STRUT. THE BORES EXTEND TO EACH SIDE OF THE BULKHEAD.

1. FLAT 34.5 DEGREE INSPECTION SURFACE
2. FLAT VERTICAL INSPECTION SURFACE
3. CONCAVE INSPECTION SURFACE
4. INSPECTION DISTANCE - 2.5 INCHES (63 mm) FOR THE 34.5 DEGREE AND VERTICAL FLAT SURFACES.

CF6-80A/A2 Strut Inspection Areas
Figure 2



NOTES:

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

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

ANGULAR: ±1 DEGREE

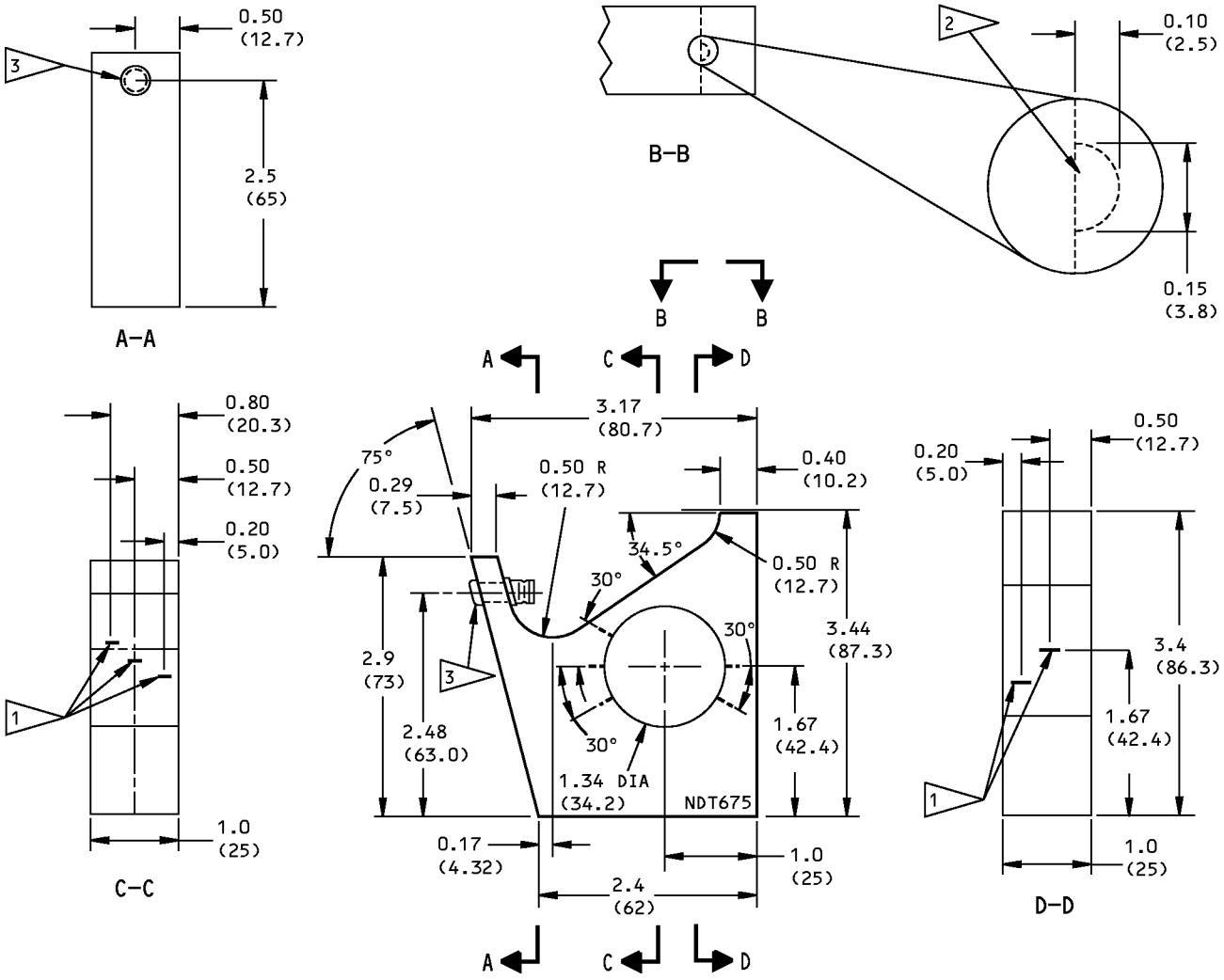
- MATERIAL: ALUMINUM 2024–T3 OR T4
- ETCH OR STAMP NDT674 WHERE SHOWN

1 EDM NOTCH: 0.10 X 1.5 (2.5 X 3.6); THE MAXIMUM WIDTH IS 0.010 ±0.002 (0.025 ±0.05). TYPICAL 5 LOCATIONS.

2 TYPICAL EDM NOTCH SHAPE

3 FASTENER: BACB30YT8K5; COLLAR: BACC30BQ8

Reference Standard NDT674 For CF6-80C2 Struts
Figure 3



NOTES:

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

INCHES	MILLIMETERS
X.XXX = ± 0.005	X.XX = ± 0.10
X.XX = ± 0.025	X.X = ± 0.5
X.X = ± 0.05	X = ± 1

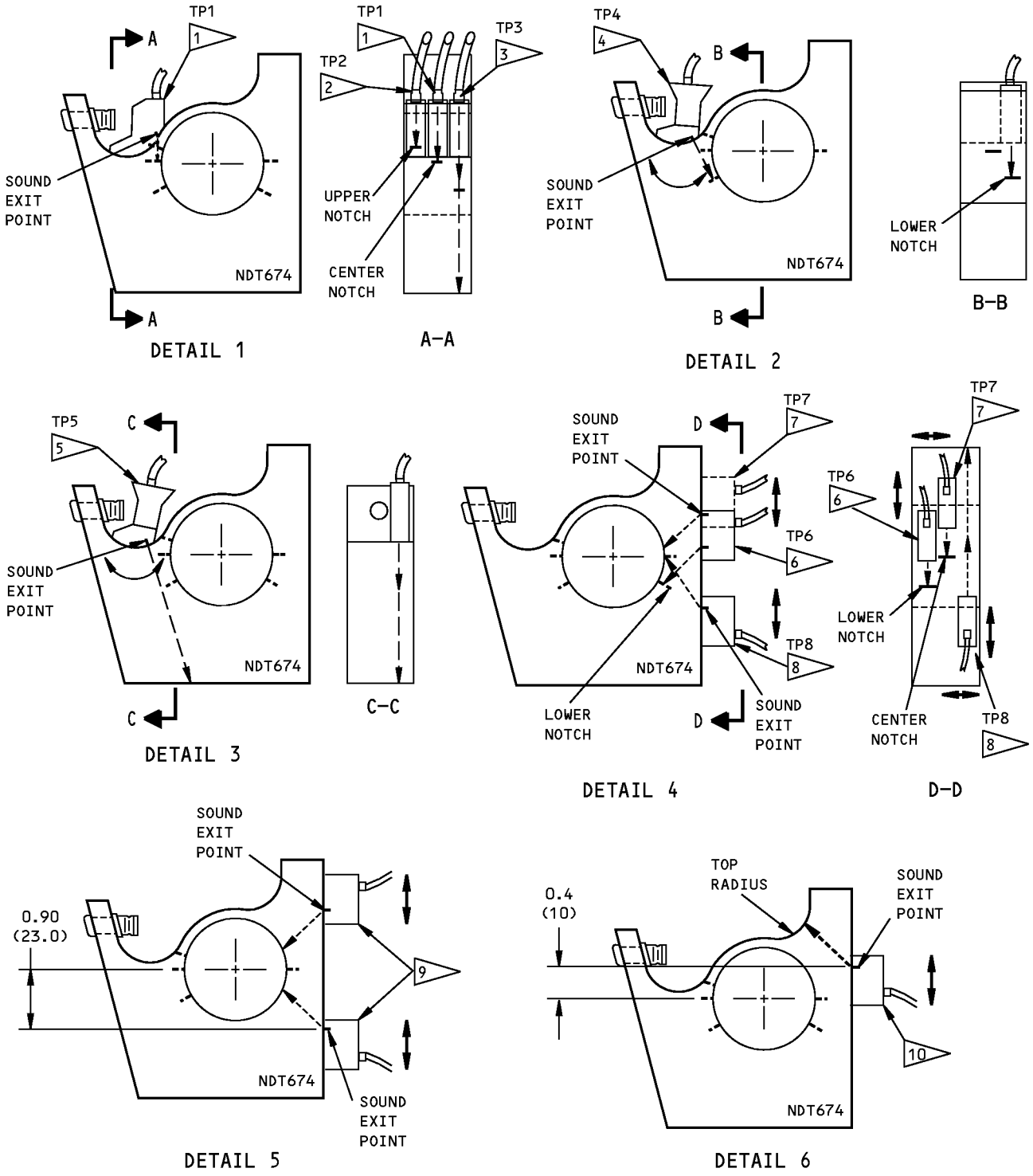
- MATERIAL: ALUMINUM 2024–T3 OR –T4
- ETCH OR STAMP NDT675 WHERE SHOWN

1 EDM NOTCH: 0.10 X 1.5 (2.5 X 3.6); THE MAXIMUM WIDTH IS 0.010 (0.025). TYPICAL 5 LOCATIONS.

2 TYPICAL EDM NOTCH SHAPE

3 FASTENER: BACB30YT8K5; COLLAR: BACC30BQ8

Reference Standard NDT675 For CF6-80A/A2 Struts
Figure 4



Instrument Calibration for the CF6-80C2 Engine Strut
Figure 5 (Sheet 1 of 2)

NOTES:

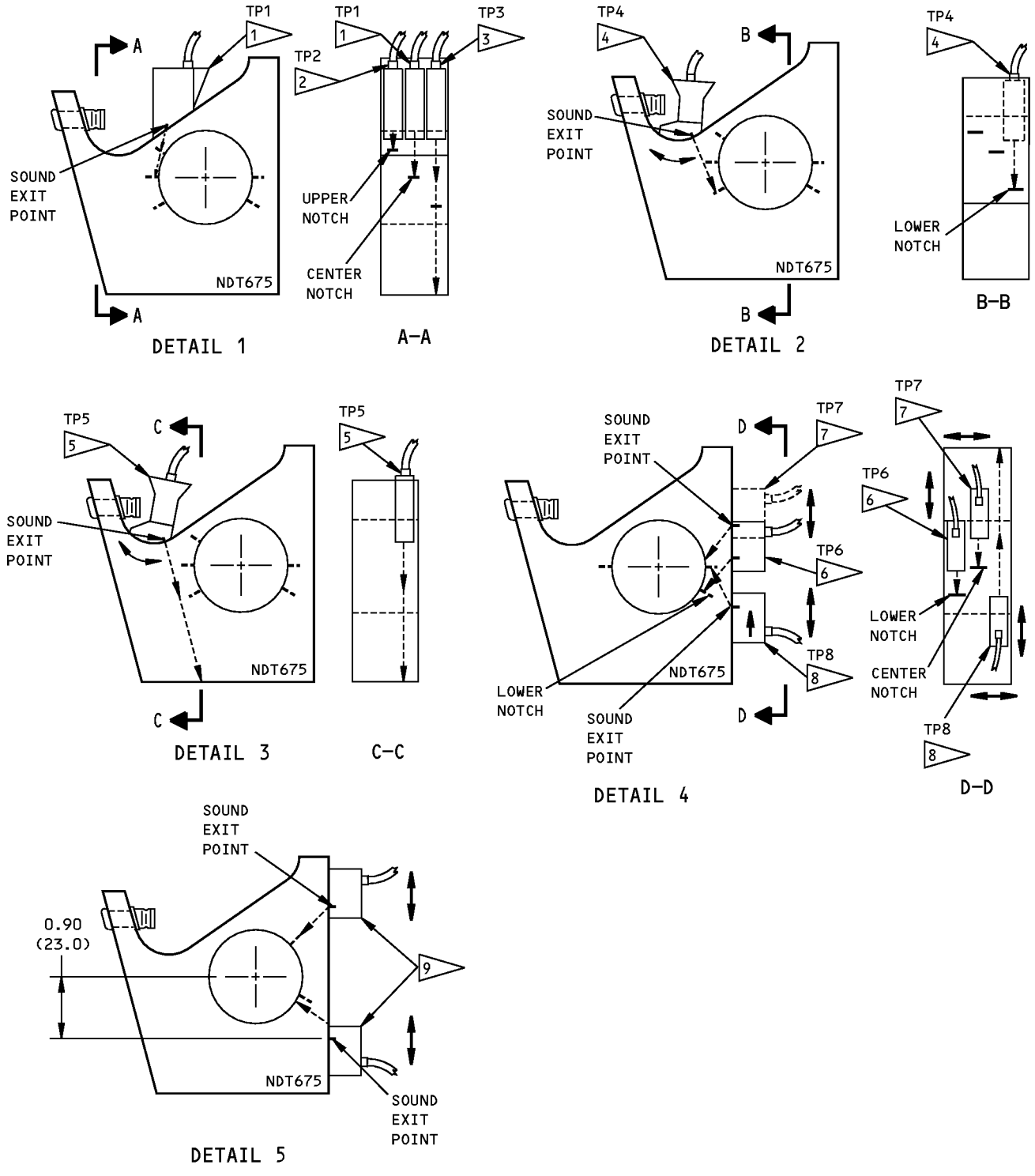
- ALL DIMENSIONS ARE IN INCHES
  (MILLIMETERS ARE IN PARENTHESES)

1. TRANSDUCER POSITION 1 - PUT THE SOUND EXIT POINT OF THE TRANSDUCER AT THE CENTER (APPROXIMATELY) OF THE CONCAVE SURFACE OF THE REFERENCE STANDARD. MOVE THE TRANSDUCER ABOVE THE CENTER NOTCH ON THE REFERENCE STANDARD.
2. TRANSDUCER POSITION 2 - MOVE THE SOUND EXIT POINT OF THE TRANSDUCER SO IT IS ABOVE THE UPPER NOTCH ON THE REFERENCE STANDARD.
3. TRANSDUCER POSITION 3 - MOVE THE TRANSDUCER TO THE OPPOSITE END OF THE CONCAVE SURFACE OF THE REFERENCE STANDARD SO IT IS APPROXIMATELY 0.2 INCH (5 MM) FROM THE END OF THE REFERENCE STANDARD.
4. TRANSDUCER POSITION 4 - PUT THE SOUND EXIT POINT OF THE TRANSDUCER AT APPROXIMATELY THE POSITION SHOWN ON THE CONCAVE SURFACE OF THE REFERENCE STANDARD ABOVE THE LOWER NOTCH.
5. TRANSDUCER POSITION 5 - MOVE THE SOUND EXIT POINT OF THE TRANSDUCER TO AND AWAY FROM THE LOWER NOTCH OF THE REFERENCE STANDARD.
6. TRANSDUCER POSITION 6 - PUT THE SOUND EXIT POINT OF THE TRANSDUCER ON THE SIDE OF THE REFERENCE STANDARD AT APPROXIMATELY THE CENTERLINE OF THE HOLE. MOVE THE TRANSDUCER TO THE LOWER NOTCH.
7. TRANSDUCER POSITION 7 - PUT THE TRANSDUCER AT APPROXIMATELY 0.4 INCH (10 MM) ABOVE THE CENTER NOTCH. MOVE THE TRANSDUCER TO THE CENTER NOTCH.
8. TRANSDUCER POSITION 8 - PUT THE SOUND EXIT POINT OF THE TRANSDUCER APPROXIMATELY 0.4 INCH (10 MM) BELOW THE CENTERLINE OF THE HOLE AND APPROXIMATELY 0.2 INCH (5 MM) FROM THE EDGE OF THE REFERENCE STANDARD. MOVE THE TRANSDUCER TO THE HOLE.
9. WHEN THE SOUND EXIT POINT OF THE TRANSDUCER IS 0.9 INCH (23 MM) OR MORE FROM THE HORIZONTAL CENTERLINE OF THE HOLE, A SIGNAL FROM THE HOLE CAN OCCUR.
10. WHEN THE SOUND EXIT POINT OF THE TRANSDUCER IS 0.4 INCH (10 MM) OR MORE FROM THE HORIZONTAL CENTERLINE OF THE HOLE, A SIGNAL FROM THE TOP RADIUS OF THE BARREL NUT CAN OCCUR.

SOUND BEAM: — — — — — — →

TRANSDUCER SCAN DIRECTION - FOR TRANSDUCER POSITIONS 1 AND 3: ←→ ; FOR TRANSDUCER POSITIONS 4 AND 5: ⟲ ; FOR TRANSDUCER POSITIONS 6,7 AND 8: ↕ ←→

Instrument Calibration for the CF6-80C2 Engine Strut
Figure 5 (Sheet 2 of 2)



Instrument Calibration for the CF6-80A/A2 Engine Strut
Figure 6 (Sheet 1 of 2)

NOTES:

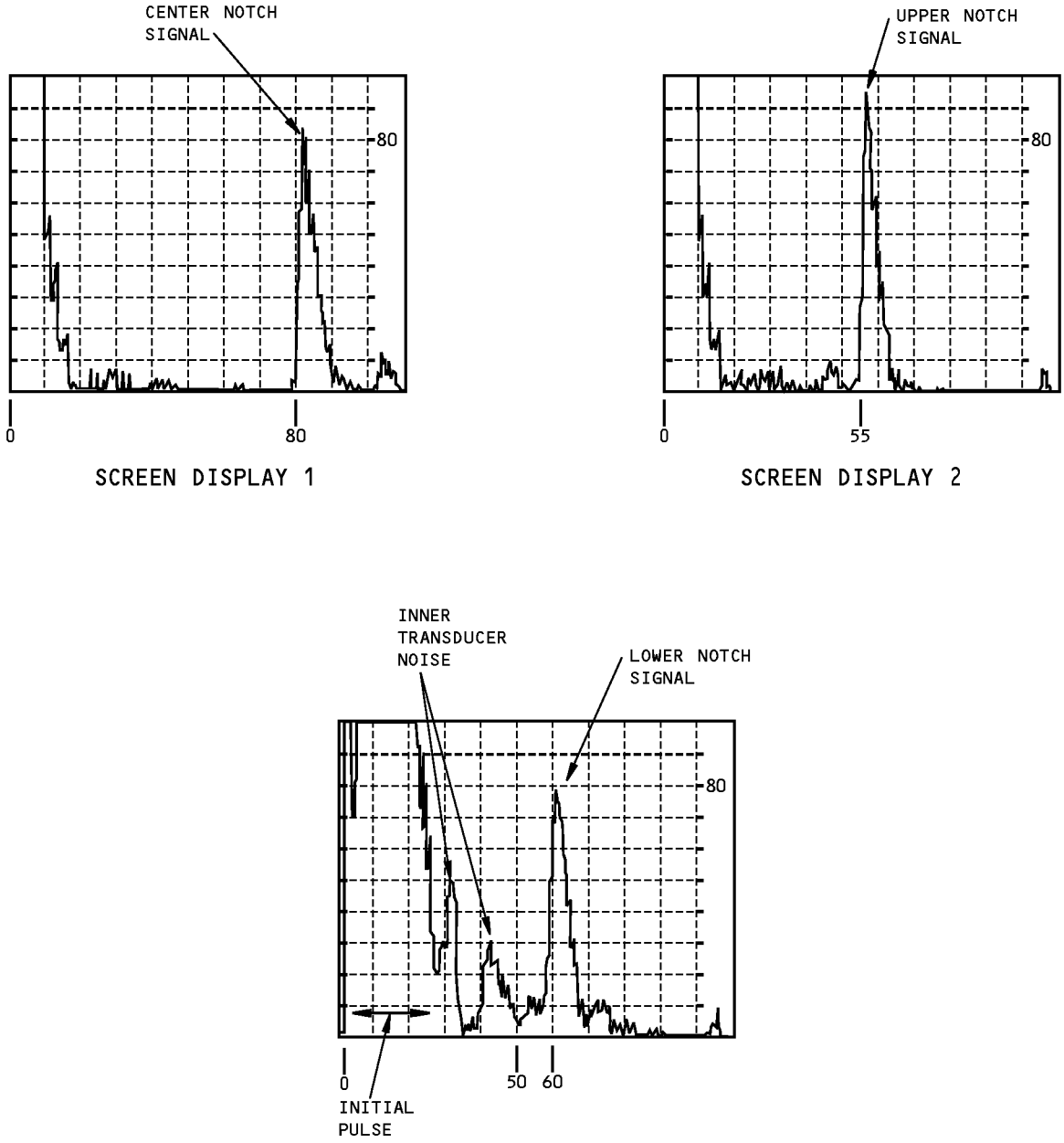
- ALL DIMENSIONS ARE IN INCHES
  (MILLIMETERS ARE IN PARENTHESES)

1. TRANSDUCER POSITION 1 - PUT THE SOUND EXIT POINT OF THE TRANSDUCER AT THE CENTER (APPROXIMATELY) OF THE REFERENCE STANDARD TO FIND THE CENTER NOTCH AT THE 9 O'CLOCK POSITION.
2. TRANSDUCER POSITION 2 - MOVE THE TRANSDUCER ABOVE THE UPPER NOTCH ON THE REFERENCE STANDARD TO FIND THE UPPER NOTCH AT THE 11 O'CLOCK POSITION.
3. TRANSDUCER POSITION 3 - MOVE THE SOUND EXIT POINT OF THE TRANSDUCER TO THE OPPOSITE END OF THE REFERENCE STANDARD SO IT IS APPROXIMATELY 0.2 INCH (5 MM) FROM THE END OF THE REFERENCE STANDARD.
4. TRANSDUCER POSITION 4 - PUT THE SOUND EXIT POINT OF THE TRANSDUCER AT APPROXIMATELY THE POSITION SHOWN ON THE CONCAVE SURFACE OF THE REFERENCE STANDARD.
5. TRANSDUCER POSITION 5 - TURN THE TRANSDUCER SO THAT THE SOUND EXIT POINT MOVES AWAY FROM THE HOLE.
6. TRANSDUCER POSITION 6 - PUT THE SOUND EXIT POINT OF THE TRANSDUCER ON THE SIDE OF THE REFERENCE STANDARD AT APPROXIMATELY THE CENTERLINE OF THE HOLE. MOVE THE TRANSDUCER TO THE LOWER NOTCH.
7. TRANSDUCER POSITION 7 - PUT THE TRANSDUCER APPROXIMATELY 0.4 INCH (10 MM) ABOVE THE CENTER NOTCH. MOVE THE TRANSDUCER TO THE CENTER NOTCH.
8. TRANSDUCER POSITION 8 - PUT THE SOUND EXIT POINT OF THE TRANSDUCER APPROXIMATELY 0.4 INCH (10 MM) BELOW THE CENTERLINE OF THE HOLE AND APPROXIMATELY 0.2 INCH (5 MM) FROM THE EDGE OF THE REFERENCE STANDARD. MOVE THE TRANSDUCER TO THE HOLE.
9. WHEN THE SOUND EXIT POINT OF THE TRANSDUCER IS 0.9 INCH (23 MM) OR MORE FROM THE HORIZONTAL CENTERLINE OF THE HOLE, A SIGNAL FROM THE HOLE CAN OCCUR.

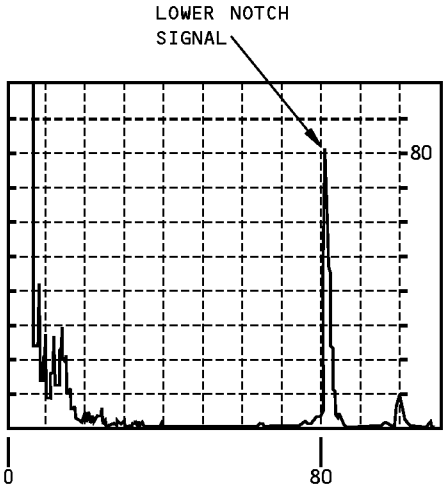
SOUND BEAM: — — — — — — →

TRANSDUCER SCAN DIRECTION - FOR TRANSDUCER POSITIONS 1,2 AND 3: ↔ ; FOR TRANSDUCER POSITIONS 4 AND 5: ⟲ ; FOR TRANSDUCER POSITIONS 6,7 AND 8: ↕ ↔ .

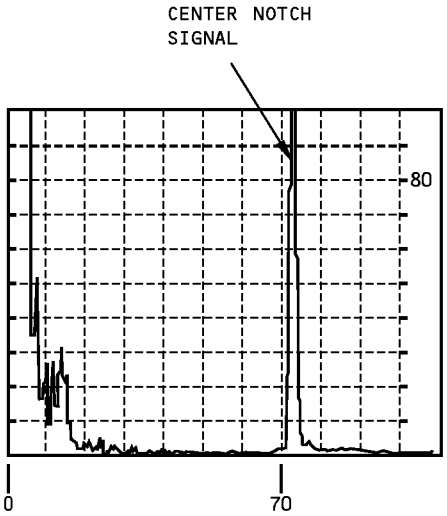
Instrument Calibration for the CF6-80A/A2 Engine Strut
Figure 6 (Sheet 2 of 2)



Instrument Screen Displays
Figure 7 (Sheet 1 of 2)

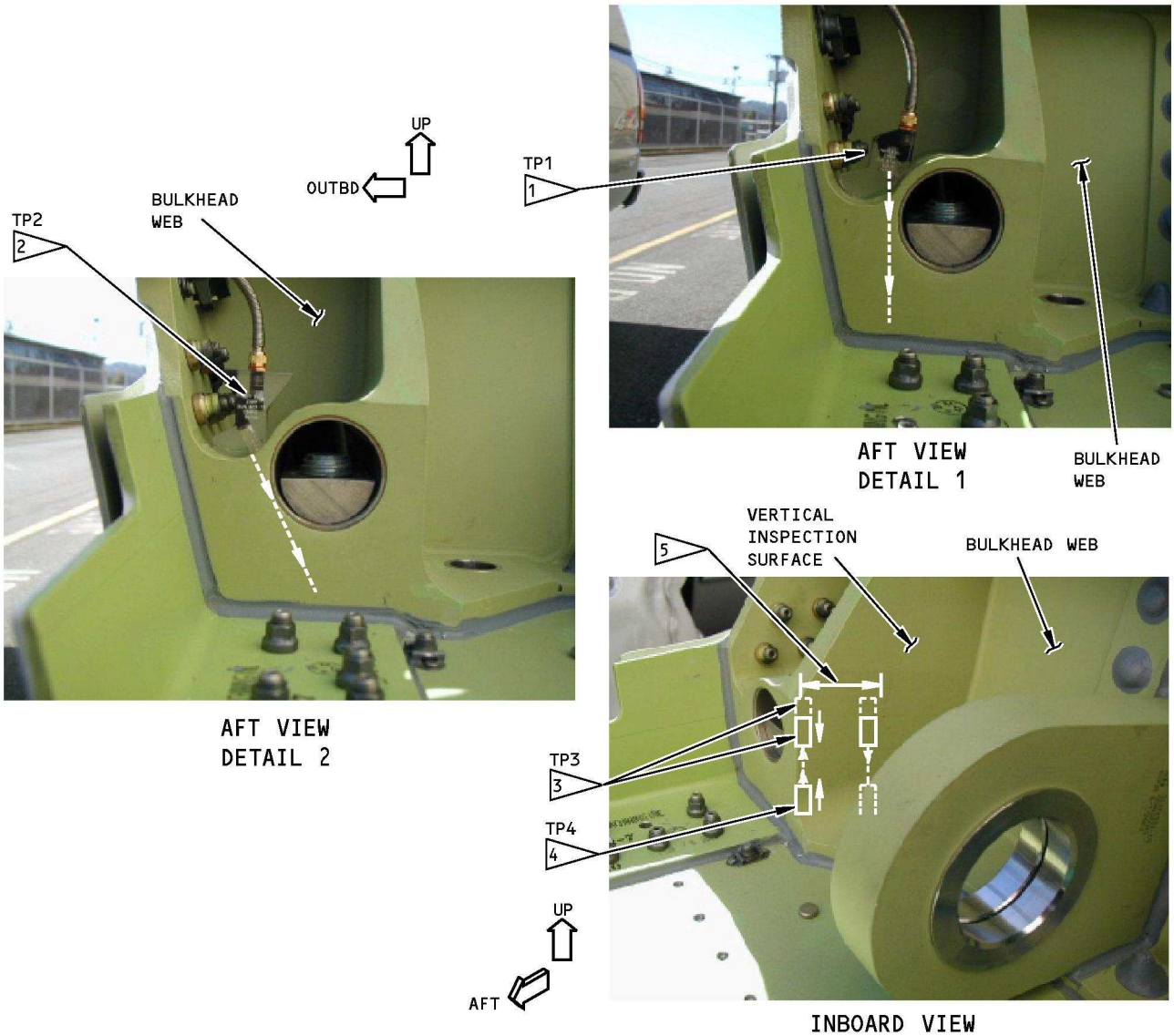


SCREEN DISPLAY 4



SCREEN DISPLAY 5

Instrument Screen Displays
Figure 7 (Sheet 2 of 2)



NOTES:

- THE CF6-80C2 STRUT BARREL NUT BORE ON THE LEFT SIDE OF THE BULKHEAD IS SHOWN; THE BARREL NUT BORE ON THE RIGHT SIDE OF THE BULKHEAD IS ALMOST THE SAME.

1 TRANSDUCER POSITION 1 - PUT THE TRANSDUCER IN THE UPPER AREA OF THE CONCAVE RADIUS TO EXAMINE THE UPPER OUTBOARD AREA OF THE BORE.

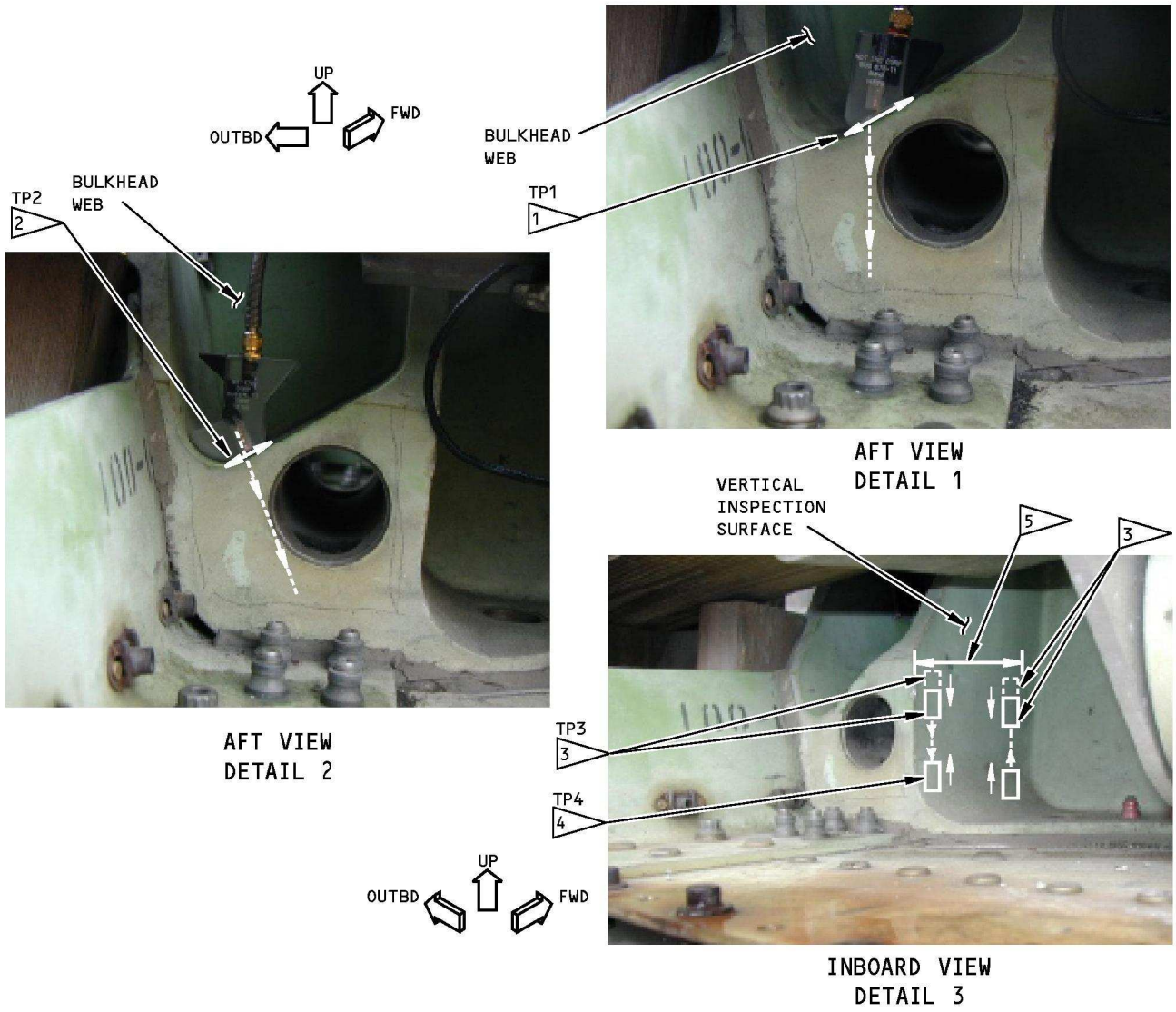
2 TRANSDUCER POSITION 2 - PUT THE TRANSDUCER IN THE MIDDLE AREA OF THE CONCAVE RADIUS TO EXAMINE THE LOWER OUTBOARD AREA OF THE BORE.

3 TRANSDUCER POSITION 3 - PUT THE TRANSDUCER ON THE UPPER PART OF THE VERTICAL INSPECTION SURFACE TO EXAMINE THE CENTER AND INBOARD AREA OF THE BORE.

4 TRANSDUCER POSITION 4 - PUT THE TRANSDUCER ON THE LOWER PART OF THE VERTICAL INSPECTION SURFACE TO EXAMINE THE INBOARD UPPER AREA OF THE BORE.

5 INSPECTION DISTANCE - 2.5 INCHES (63 mm)
SOUND BEAM ---►------►--- SCAN DIRECTION ——► , ◄——►

CF6-80C2 Strut Inspection Details
Figure 8



NOTES:

- THE CF6-80A/A2 STRUT BARREL NUT BORE ON THE LEFT SIDE OF THE BULKHEAD IS SHOWN; THE BARREL NUT BORE ON THE RIGHT SIDE OF THE BULKHEAD IS ALMOST THE SAME.

1. TRANSDUCER POSITION 1 - PUT THE TRANSDUCER ON THE UPPER PART OF THE 34.5 DEGREE ANGLED FLAT INSPECTION SURFACE TO EXAMINE THE UPPER AND CENTER PART OF THE BORE.
2. TRANSDUCER POSITION 2 - PUT THE TRANSDUCER ON THE CONCAVE PART OF THE INSPECTION SURFACE TO EXAMINE THE LOWER PART OF THE BORE.
3. TRANSDUCER POSITION 3 - PUT THE TRANSDUCER ON THE UPPER PART OF THE VERTICAL INSPECTION SURFACE TO EXAMINE THE CENTER AND LOWER PART OF THE BORE.
4. TRANSDUCER POSITION 4 - PUT THE TRANSDUCER ON THE LOWER PART OF THE VERTICAL INSPECTION SURFACE TO EXAMINE THE UPPER PART OF THE BORE.
5. INSPECTION DISTANCE - 2.5 INCHES (63 mm)
   SOUND BEAM ---►------►--- SCAN DIRECTION ⟶ , ⟷

CF6-80A/A2 Strut Inspection Details
Figure 9