PART 2 - X-RAY

X-RAY INSPECTION FOR CRACKS IN ELEVATOR TAB BRIDGE FITTINGS 3, 4, 5 AND 6

1. Purpose

A. Use this radiography procedure to examine the upper and lower flanges of the elevator tab bridge fittings for cracks. Figure 1 shows the inspection areas and bridge fittings. The X-ray beam will pass through the upper and lower flanges of the bridge fitting and the upper and lower composite skins.

B. This inspection procedure uses a side emission X-ray generator and Class 2, fine grained industrial X-ray film.

C. Sixteen exposures are necessary to completely examine the Number 3, 4, 5 and 6 bridge fittings on each elevator tab; eight exposures are for the left elevator tab and eight are for the right elevator tab. See Paragraph 4.

D. 737 Damage Tolerance Rating (D626A001-DTR):

(1) Item: 55-20-09-2

NOTE: This Item is applicable to 737 airplane line numbers 596 and 1175 and on, and line numbers 1-1174 that have incorporated Service Bulletin 737-55A1080 or 737-55-1081.

E. Service Bulletin Reference: 737-55A1080 or 737-55-1081

2. Equipment

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

A. X-ray generator – Use a generator that will transmit X-rays through the structure as specified in this procedure. An Eresco 160MPR3.1 constant potential generator was used to help prepare this procedure.

NOTE: We do not recommend the use of a 360 degree emission generator.

B. Film – Use a low speed, high contrast, fine grained film. This procedure was prepared with a double film load of Kodak MX125 (low speed) and T200 (medium speed) pre-packaged film with no lead screens. Use an approximate film dimension of 4 X 10 inches (101.6 X 254 mm).

C. Processor – A manual or automatic processor can be used.

D. Image Quality Indicator (IQI) – It is not necessary to use an IQI for this inspection.

3. Prepare for the Inspection

A. Put the stabilizer in the neutral position (2 units of stabilizer trim on the stabilizer gage) that is parallel with the ground or platform.

B. Obey standard Radiation Safety precautions.

4. Inspection Procedure

A. Identify the inspection areas to be examined. See Figure 1 for the inspection areas.

B. Prepare the X-ray equipment and do the inspection as follows:

(1) Put the X-ray (double loaded) film pack on the upper surface of the elevator tab as shown in Figure 2.

(2) Put the X-ray generator below the elevator tab with the emission window pointed at the bridge fitting flange. See Figure 3.

(3) Set the distance from the emission window of the generator to the upper surface of the elevator tab to 48 inches (1219 mm). See Figure 3.

CAUTION: EXPOSURE PARAMETERS MUST BE SET TO MAKE SURE THAT THE AREA TO BE EXAMINED IS WITHIN A 10 DEGREE CONE OF RADIATION (10 DEGREES TOTAL SOLID ANGLE, APEX AT THE RADIATION SOURCE, CENTRAL AXIS OF CONE EQUAL TO CENTRAL AXIS OF RADIATION BEAM). THIS WILL MAKE SURE THAT CRACKS CAN BE SEEN IN THE X-RAY IMAGE.

(4) Lower flange inspection - Make sure the X-ray generator is set as shown in Figure 3, flagnote 1. The generator must be aligned with the center of the bridge fitting in the inboard and outboard direction and also be 90 degrees (perpendicular) to the lower flange of the bridge fitting in the forward and aft direction.

NOTE: It is very helpful to use a laser pointer or small flashlight on the emission window of the generator to identify the position of the X-ray beam.

(5) Upper flange inspection - Make sure the X-ray generator is set as shown in Figure 3, flagnote 2. The generator must be aligned with the center of the bridge fitting in the inboard and outboard direction and also be 90 degrees (perpendicular) to the upper flange of the bridge fitting in the forward and aft direction.

NOTE: It is very helpful to use a laser pointer or small flashlight on the emission window of the generator to identify the position of the X-ray beam.

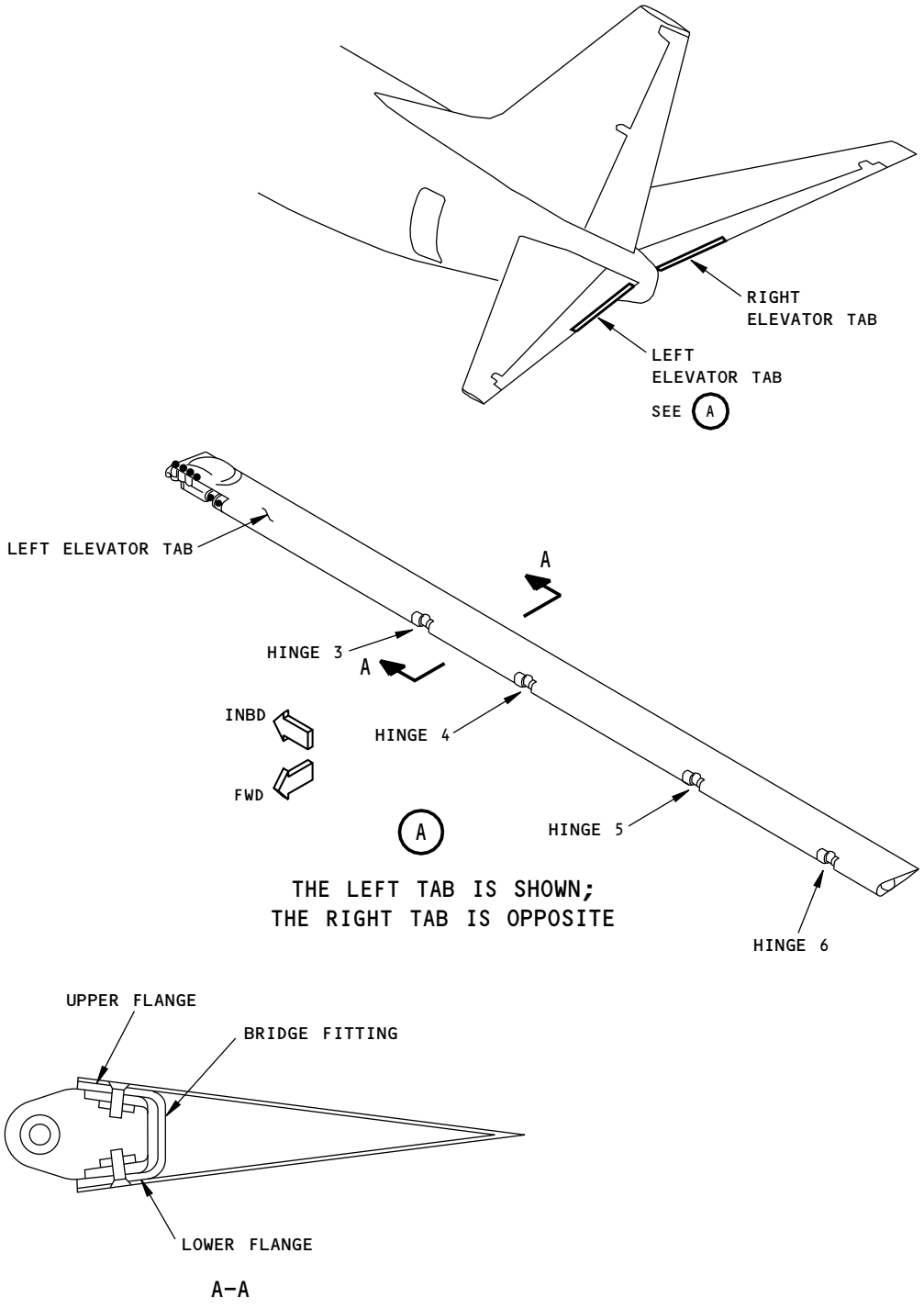
(6) For initial X-ray generator controls, set the kV to 110 and the milliamp seconds (MAS) to get a film density of 2.0 to 3.5 in the area of interest (areas of the flanges around the fastener nut plates and areas of the flanges covered by the nut plates) of each film. See Figure 2 for the MAS generator settings and Figure 4 for radiograph examples.

(7) Operate the X-ray generator to take the exposure.

C. Do Paragraph 4.B.(1) thru Paragraph 4.B.(7) again as necessary to examine the upper and lower flanges of the bridge fittings for cracks at hinges 3, 4, 5 and 6 on the left and right elevator tabs. One exposure for the upper flange and one exposure for the lower flange will be necessary at each bridge fitting location.

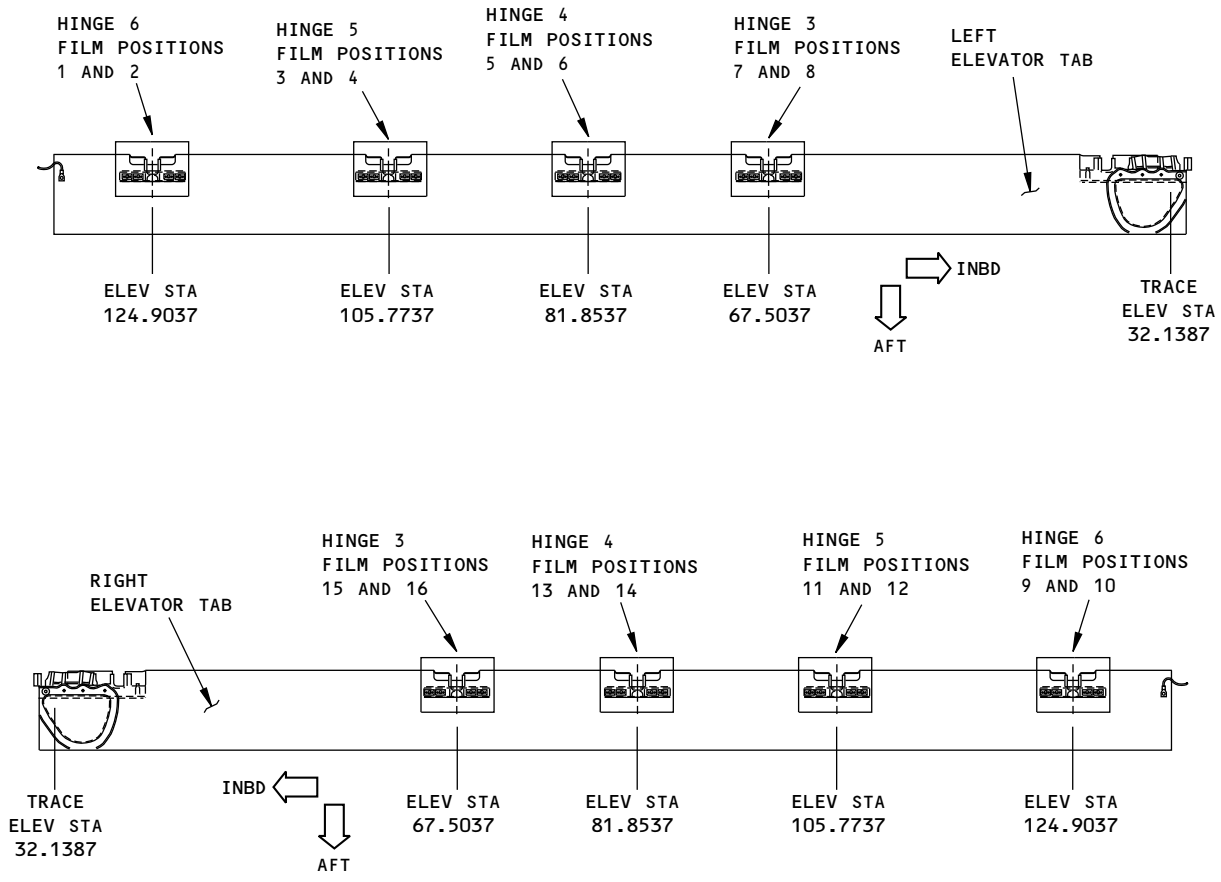
5. Inspection Results

A. Carefully examine the radiographs for crack indications around the fasteners in the bridge fitting upper and lower flanges.



2157368 S0000471002_V1

Inspection Areas
Figure 1



2157369 S0000471004_V1

Film Locations
Figure 2 (Sheet 1 of 2)

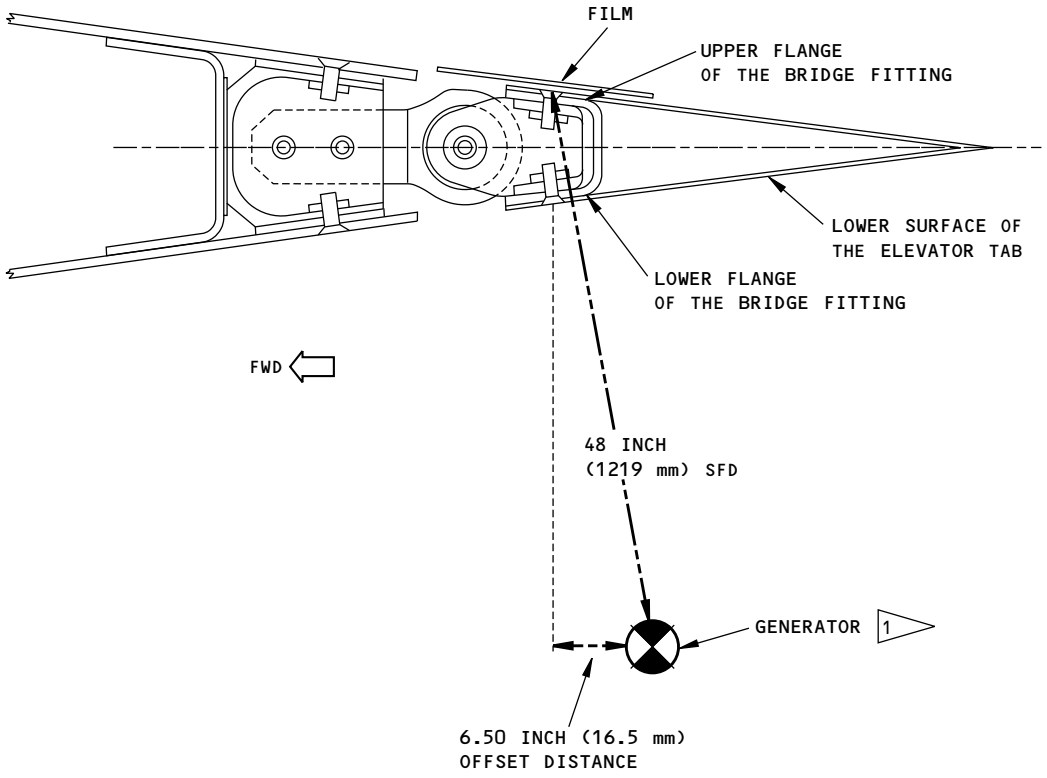
FILM					GENERATOR SETTINGS		TUBE LOCATION		
FILM POSITION	ASTM E1815-08 CLASS	LOW SPEED*	MEDIUM SPEED*	SIZE INCH (mm)	kV	MAS	ELEVATOR STATION	SFD INCH (mm)	OFFSET INCH (mm)
1	1	MX125	T200	4 X 10 (102.6 X 254)	110	210	124.9037	48 (1219)	6.5 (16.5)
2	1	MX125	T200	4 X 10 (102.6 X 254)	110	210	124.9037	48 (1219)	6.5 (16.5)
3	1	MX125	T200	4 X 10 (102.6 X 254)	110	210	105.7737	48 (1219)	6.5 (16.5)
4	1	MX125	T200	4 X 10 (102.6 X 254)	110	210	105.7737	48 (1219)	6.5 (16.5)
5	1	MX125	T200	4 X 10 (102.6 X 254)	110	210	81.8537	48 (1219)	6.5 (16.5)
6	1	MX125	T200	4 X 10 (102.6 X 254)	110	210	81.8537	48 (1219)	6.5 (16.5)
7	1	MX125	T200	4 X 10 (102.6 X 254)	110	210	67.5037	48 (1219)	6.5 (16.5)
8	1	MX125	T200	4 X 10 (102.6 X 254)	110	210	67.5037	48 (1219)	6.5 (16.5)
9	1	MX125	T200	4 X 10 (102.6 X 254)	110	210	124.9037	48 (1219)	6.5 (16.5)
10	1	MX125	T200	4 X 10 (102.6 X 254)	110	210	124.9037	48 (1219)	6.5 (16.5)
11	1	MX125	T200	4 X 10 (102.6 X 254)	110	210	105.7737	48 (1219)	6.5 (16.5)
12	1	MX125	T200	4 X 10 (102.6 X 254)	110	210	105.7737	48 (1219)	6.5 (16.5)
13	1	MX125	T200	4 X 10 (102.6 X 254)	110	210	81.8537	48 (1219)	6.5 (16.5)
14	1	MX125	T200	4 X 10 (102.6 X 254)	110	210	81.8537	48 (1219)	6.5 (16.5)
15	1	MX125	T200	4 X 10 (102.6 X 254)	110	210	67.5037	48 (1219)	6.5 (16.5)
16	1	MX125	T200	4 X 10 (102.6 X 254)	110	210	67.5037	48 (1219)	6.5 (16.5)

X-RAY EXPOSURE PARAMETERS AND POSITIONS

* OTHER FILM MANUFACTURERS AND FILM PART NUMBERS THAT SATISFY THE CONDITIONS SPECIFIED IN PARAGRAPH 2.B CAN BE USED.

2157370 S0000471006_V1

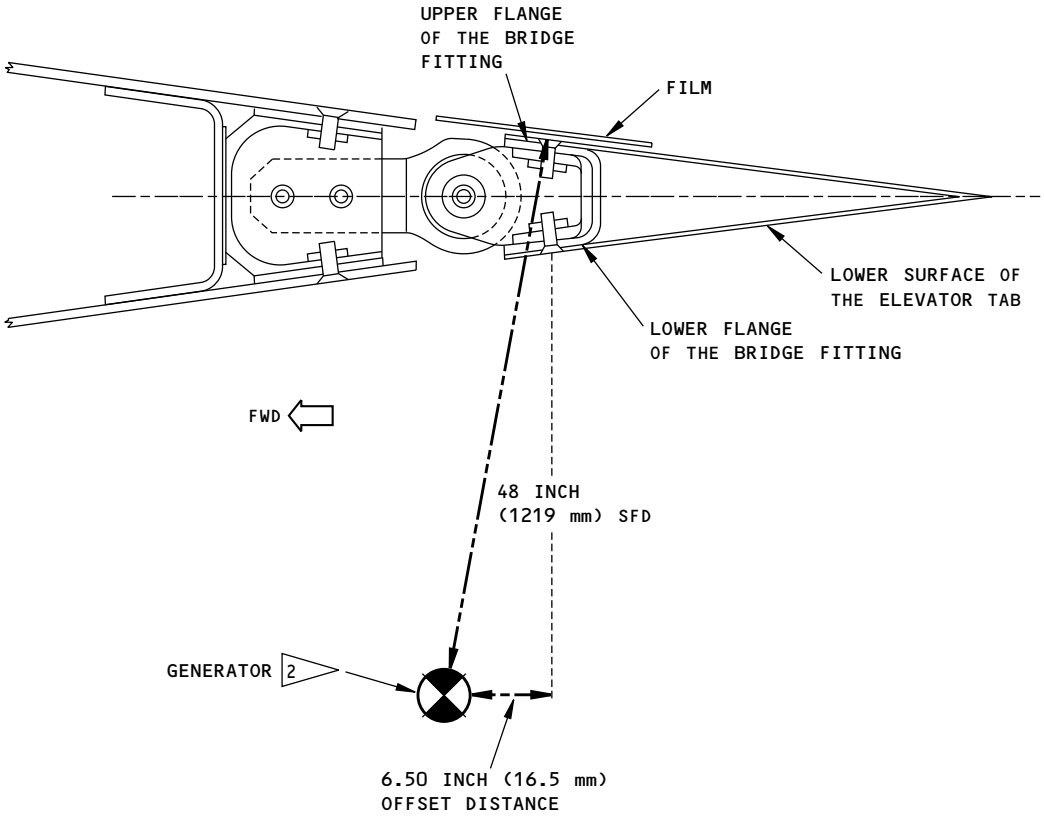
Film Locations
Figure 2 (Sheet 2 of 2)



1 GENERATOR POSITIONS 1, 3, 5, 7, 9, 11, 13, AND 15 TO EXAMINE THE LOWER FLANGE FOR CRACKS

2157372 S0000471007_V1

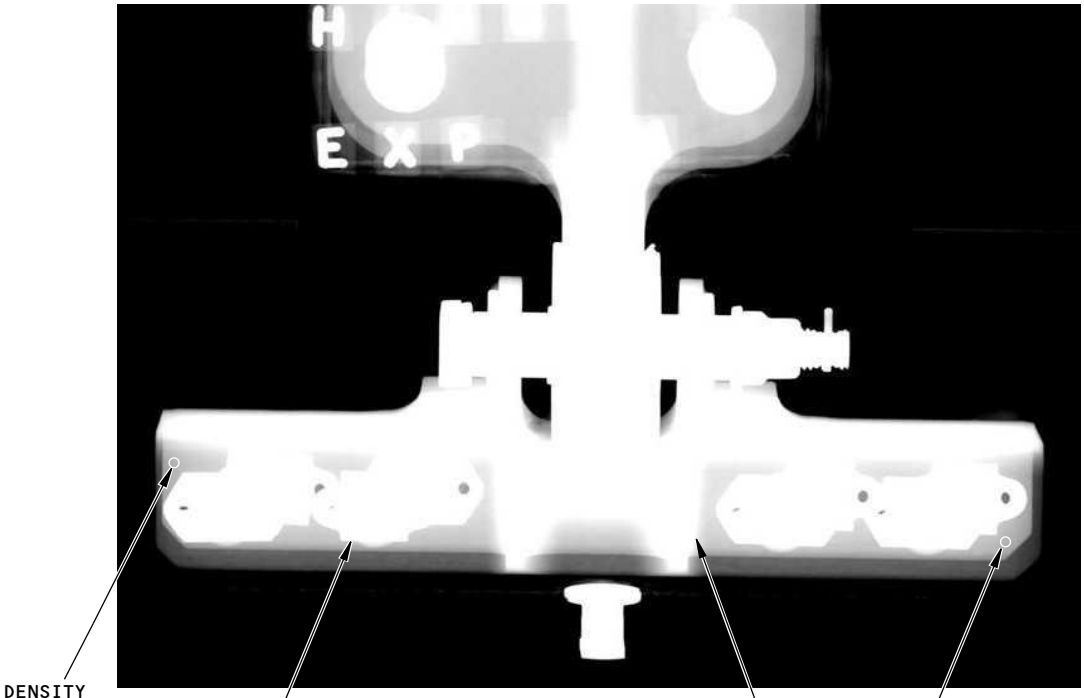
Generator Positions
Figure 3 (Sheet 1 of 2)



2 GENERATOR POSITIONS 2, 4, 6, 8, 10, 12, 14, AND 16
TO EXAMINE THE UPPER FLANGE FOR CRACKS

2157373 S0000471008_V1

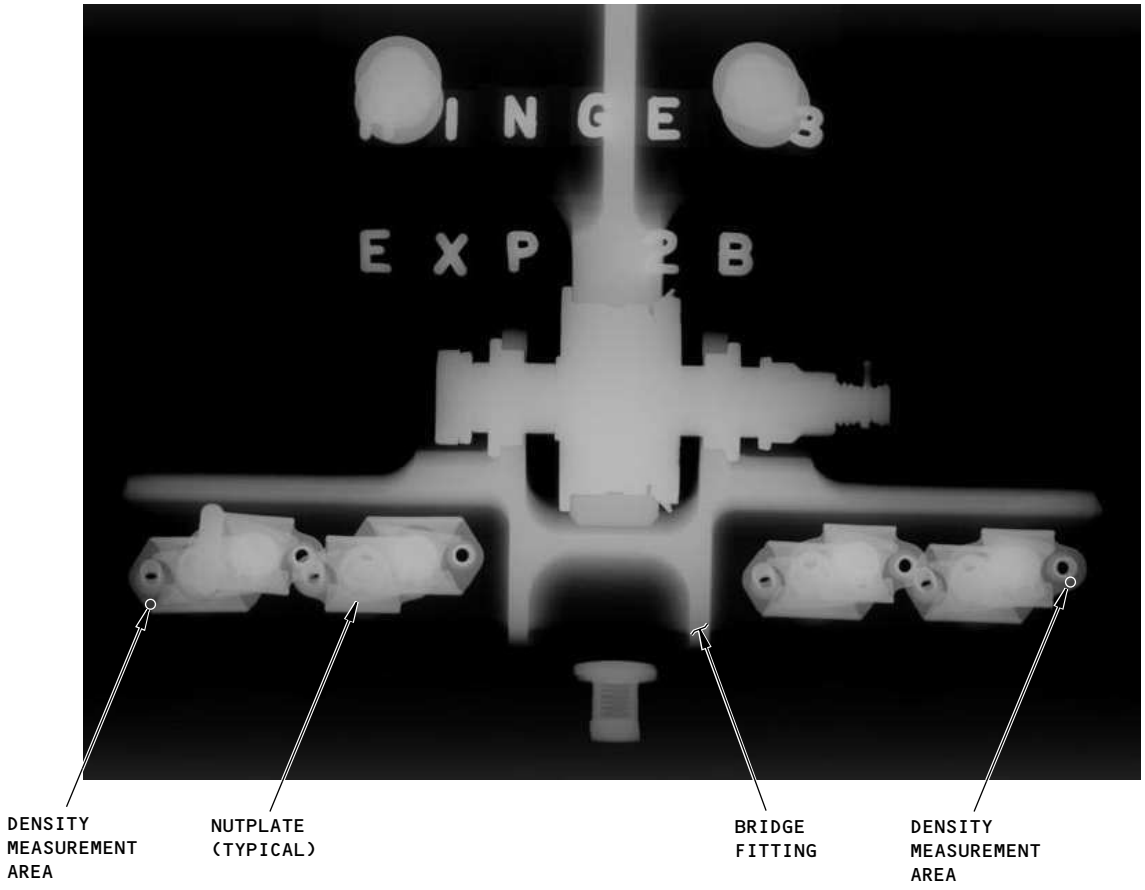
Generator Positions
Figure 3 (Sheet 2 of 2)



AREA OF INTEREST FOR LOW SPEED FILM - FLANGE
AREAS AROUND THE NUT PLATES

2157374 S0000471009_V1

Radiograph Example
Figure 4 (Sheet 1 of 2)



AREA OF INTEREST FOR HIGH SPEED FILM - FLANGE AREAS AROUND THE FASTENERS AND BEHIND THE NUT PLATES

2157378 S0000471010_V1

Radiograph Example
Figure 4 (Sheet 2 of 2)

PART 2 - X-RAY

X-RAY INSPECTION FOR CRACKS IN ELEVATOR TAB BRIDGE FITTINGS 2 AND 2.5

1. Purpose

A. Use this radiography procedure to examine the upper and lower flanges of the elevator tab bridge fittings for cracks. Figure 1 shows the inspection areas and bridge fittings. The X-ray beam will pass through the upper and lower flanges of the bridge fitting and the upper and lower composite skins.

B. This inspection procedure uses a side emission X-ray generator and Class 2, fine grained industrial X-ray film.

C. Eight exposures are necessary to completely examine the Number 2 and 2.5 bridge fittings on each elevator tab; four exposures are for the left elevator tab and four are for the right elevator tab. See Paragraph 4.

D. 737 Damage Tolerance Rating (DTR):

(1) Item 55-20-09-1

NOTE: This Item is applicable to 737-900 airplane line numbers 683 to 1174.

2. Equipment

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

A. X-ray generator – Use a generator that will transmit X-rays through the structure as specified in this procedure. An Eresco 160MPR3.1 constant potential generator was used to help prepare this procedure.

NOTE: We do not recommend the use of a 360 degree emission generator.

B. Film – Use a low speed, high contrast, fine grained film. This procedure was prepared with a double film load of Kodak MX125 (low speed) and T200 (medium speed) pre-packaged film with no lead screens. Use an approximate film dimension of 4 X 10 inches (101.6 X 254 mm).

C. Processor – A manual or automatic processor can be used.

D. Image Quality Indicator (IQI) – It is not necessary to use an IQI for this inspection.

3. Prepare for the Inspection

A. Put the stabilizer in the neutral position (2 units of stabilizer trim on the stabilizer gage) that is parallel with the ground or platform.

B. Obey standard Radiation Safety precautions.

4. Inspection Procedure

A. Identify the inspection areas to be examined. See Figure 1 for the inspection areas.

B. Prepare the X-ray equipment and do the inspection as follows:

(1) Put the X-ray (double loaded) film pack on the upper surface of the elevator tab as shown in Figure 2.

(2) Put the X-ray generator below the elevator tab with the emission window pointed at the bridge fitting flange. See Figure 3.

(3) Set the distance from the emission window of the generator to the upper surface of the elevator tab to 48 inches (1219 mm). See Figure 3.

CAUTION: EXPOSURE PARAMETERS MUST BE SET TO MAKE SURE THAT THE AREA TO BE EXAMINED IS WITHIN A 10 DEGREE CONE OF RADIATION (10 DEGREES TOTAL SOLID ANGLE, APEX AT THE RADIATION SOURCE, CENTRAL AXIS OF CONE EQUAL TO CENTRAL AXIS OF RADIATION BEAM). THIS WILL MAKE SURE THAT CRACKS CAN BE SEEN IN THE X-RAY IMAGE.

(4) Lower flange inspection - Make sure the X-ray generator is set as shown in Figure 3, flagnote 1. The generator must be aligned with the center of the bridge fitting in the inboard and outboard direction and also be 90 degrees (perpendicular) to the lower flange of the bridge fitting in the forward and aft direction.

NOTE: It is very helpful to use a laser pointer or small flashlight on the emission window of the generator to identify the position of the X-ray beam.

(5) Upper flange inspection - Make sure the X-ray generator is set as shown in Figure 3, flagnote 2. The generator must be aligned with the center of the bridge fitting in the inboard and outboard direction and also be 90 degrees (perpendicular) to the upper flange of the bridge fitting in the forward and aft direction.

NOTE: It is very helpful to use a laser pointer or small flashlight on the emission window of the tube to identify the position of the X-ray beam.

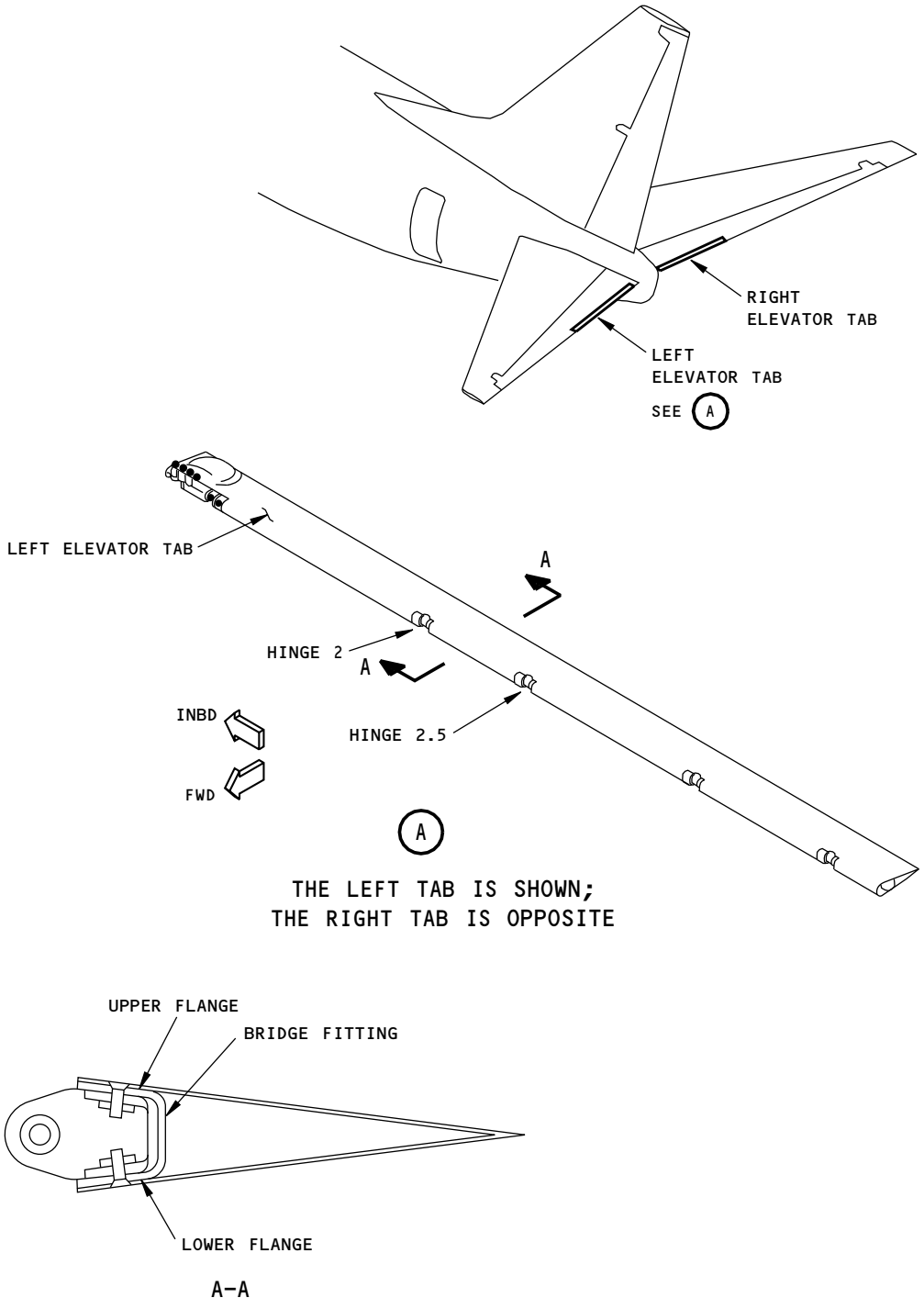
(6) For initial X-ray generator controls, set the kV to 110 and the milliamp seconds (MAS) to get a film density of 2.0 to 3.5 in the area of interest (areas of the flanges around the fastener nut plates and areas of the flanges covered by the nut plates) of each film. See Figure 2 for the MAS generator settings and Figure 4 for radiograph examples.

(7) Operate the X-ray generator to take the exposure.

C. Do Paragraph 4.B.(1) thru Paragraph 4.B.(7) again as necessary to examine the upper and lower flanges of the bridge fittings for cracks at hinges 2 and 2.5 on the left and right elevator tabs. One exposure for the upper flange and one exposure for the lower flange will be necessary at each bridge fitting location.

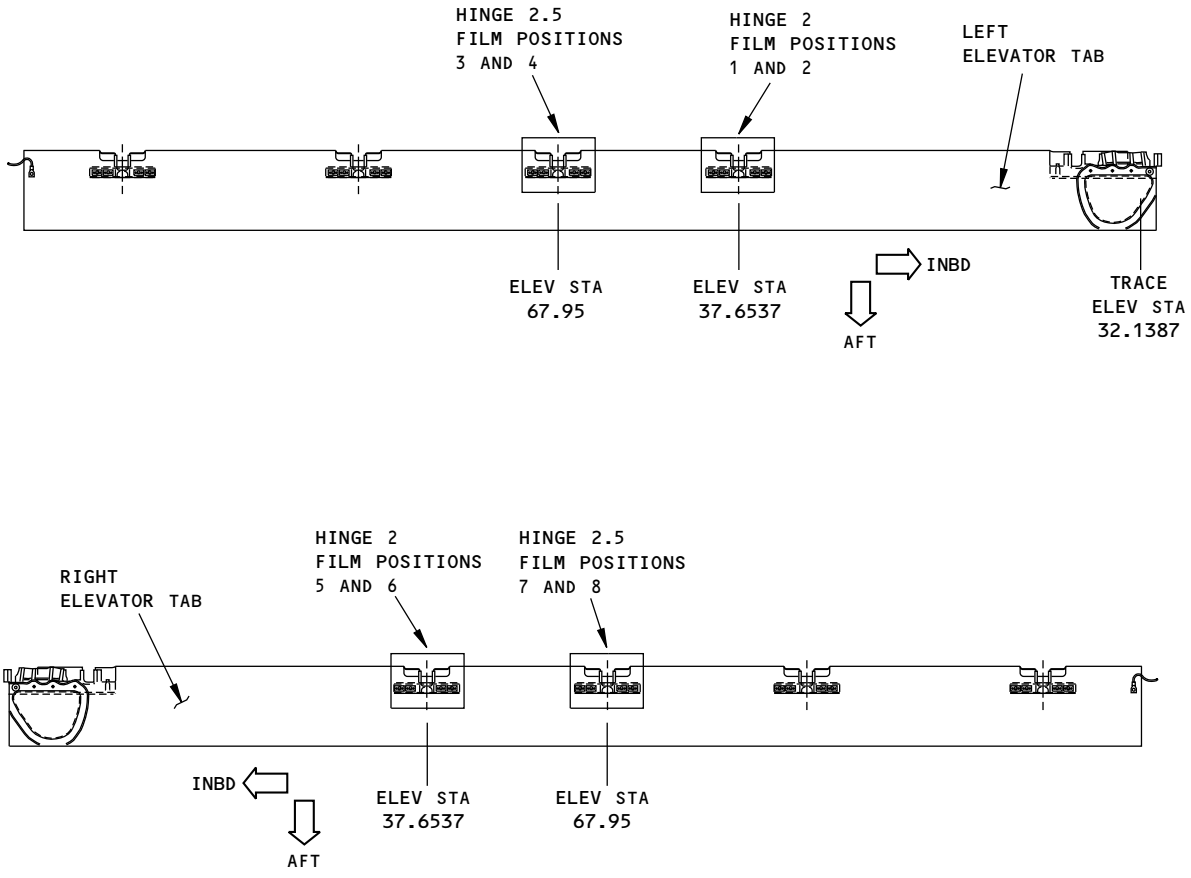
5. Inspection Results

A. Carefully examine the radiographs for crack indications around the fasteners in the bridge fitting upper and lower flanges.



2157391 S0000471033_V1

Inspection Areas
Figure 1



2157392 S0000471034_V1

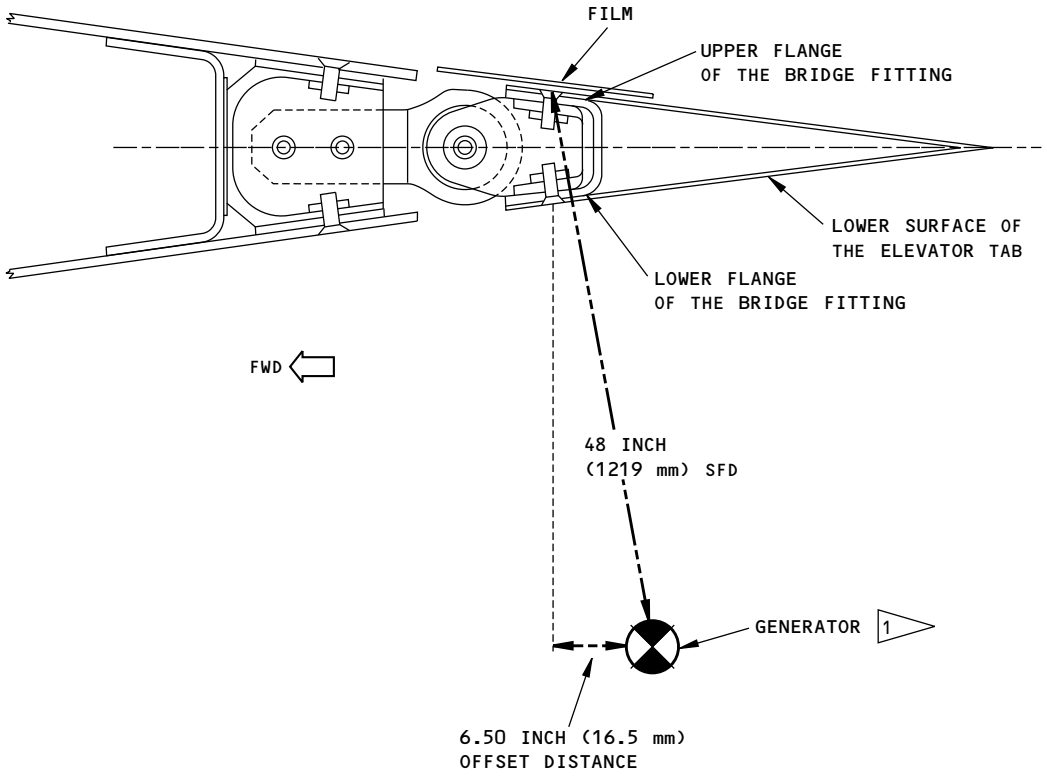
Film Locations
Figure 2 (Sheet 1 of 2)

FILM					GENERATOR SETTINGS		TUBE LOCATION		
FILM POSITION	ASTM E1815-08 CLASS	LOW SPEED	MEDIUM SPEED	SIZE INCHES (MILLI-METERS)	kV	MAS	ELEVATOR STATION	SFD INCHES (MILLI-METERS)	OFFSET INCHES (MILLI-METERS)
1	1	MX125	T200	4 X 10 (102.6 X 254)	110	210	37.6537	48 (1219)	6.5 (16.5)
2	1	MX125	T200	4 X 10 (102.6 X 254)	110	210	37.6537	48 (1219)	6.5 (16.5)
3	1	MX125	T200	4 X 10 (102.6 X 254)	110	210	67.95	48 (1219)	6.5 (16.5)
4	1	MX125	T200	4 X 10 (102.6 X 254)	110	210	67.95	48 (1219)	6.5 (16.5)
5	1	MX125	T200	4 X 10 (102.6 X 254)	110	210	37.6537	48 (1219)	6.5 (16.5)
6	1	MX125	T200	4 X 10 (102.6 X 254)	110	210	37.6537	48 (1219)	6.5 (16.5)
7	1	MX125	T200	4 X 10 (102.6 X 254)	110	210	67.95	48 (1219)	6.5 (16.5)
8	1	MX125	T200	4 X 10 (102.6 X 254)	110	210	67.95	48 (1219)	6.5 (16.5)

X-RAY EXPOSURE PARAMETERS AND POSITIONS

2157394 S0000471035_V1

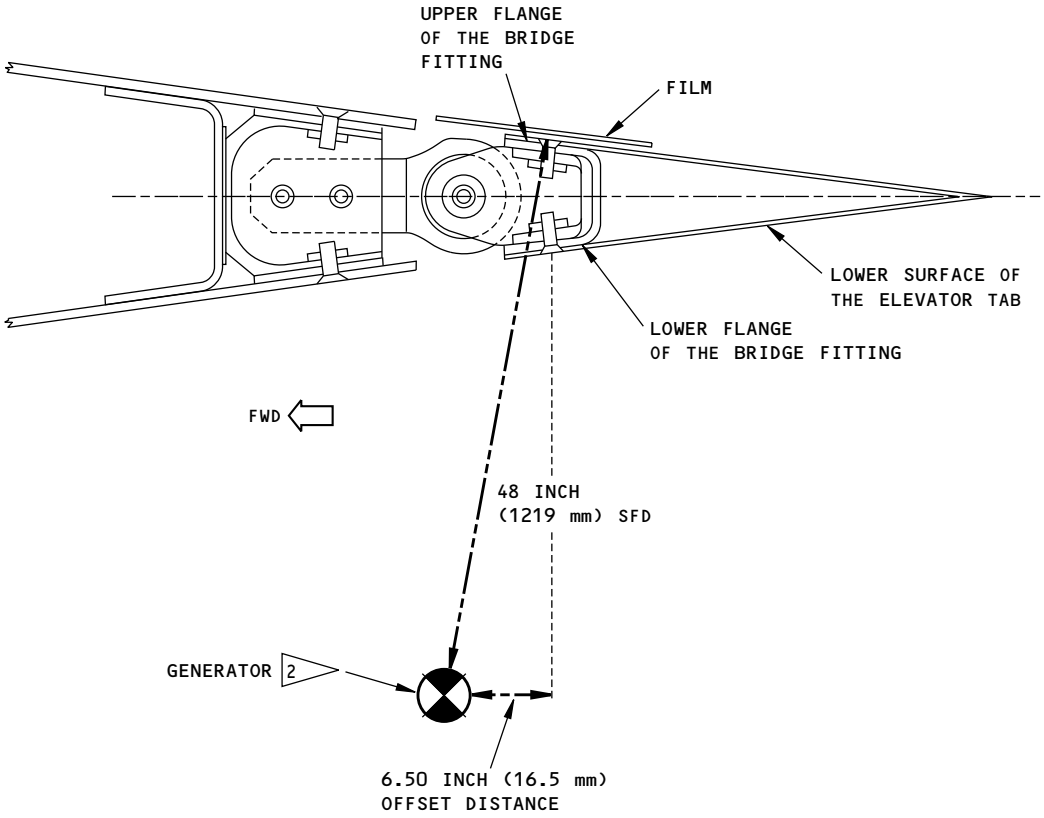
Film Locations
Figure 2 (Sheet 2 of 2)



1 GENERATOR POSITIONS 1, 3, 5 AND 7 TO EXAMINE THE LOWER FLANGE FOR CRACKS

2157395 S0000471037_V1

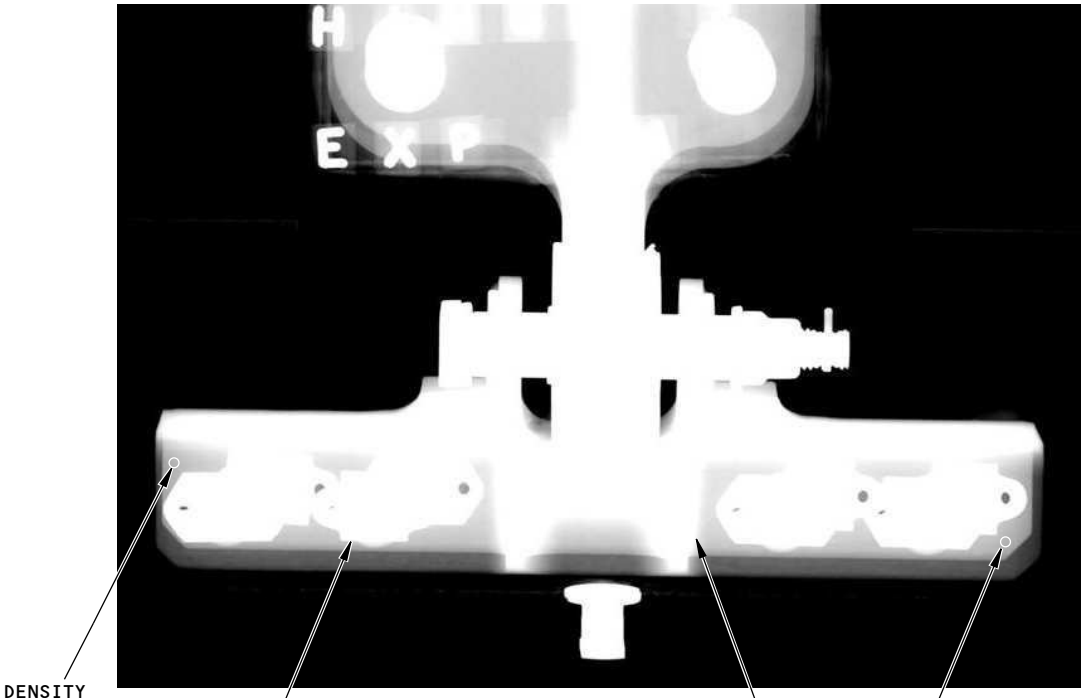
Generator Positions
Figure 3 (Sheet 1 of 2)



2 GENERATOR POSITIONS 2, 4, 6 AND 8 TO EXAMINE THE UPPER FLANGE FOR CRACKS

2157396 S0000471038_V1

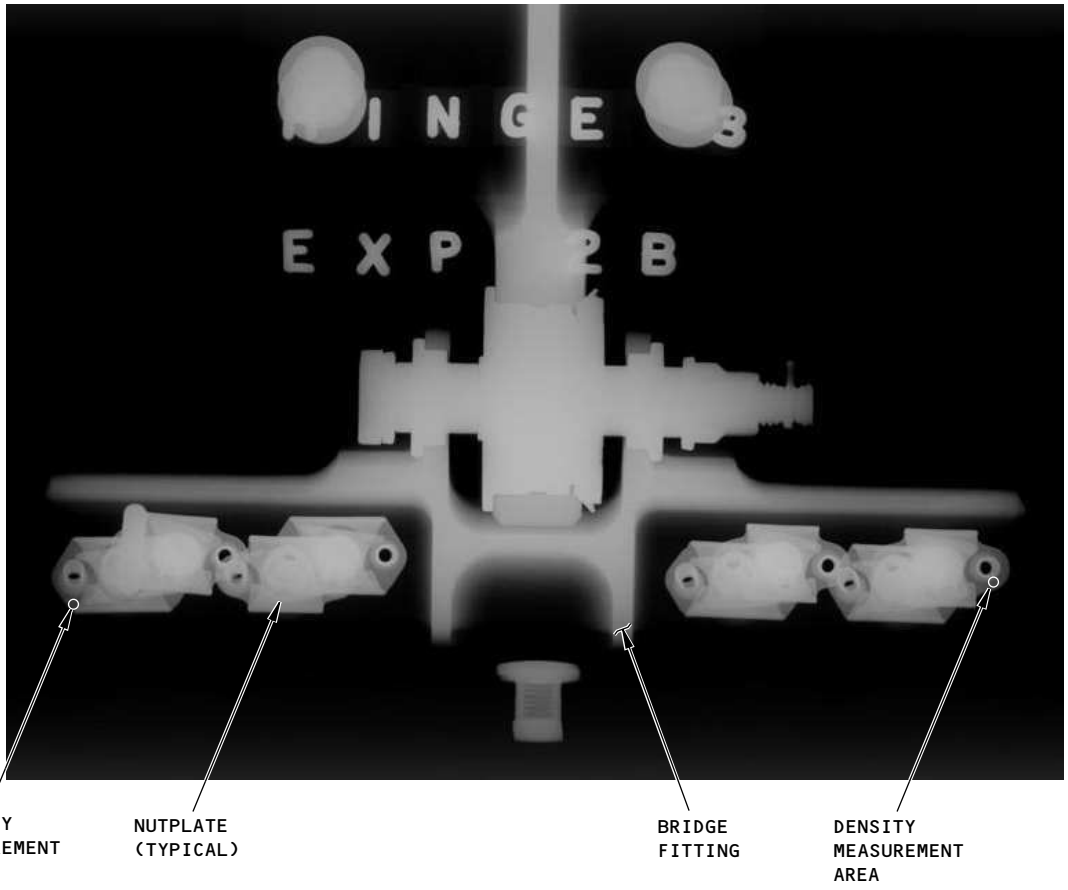
Generator Positions
Figure 3 (Sheet 2 of 2)



AREA OF INTEREST FOR LOW SPEED FILM - FLANGE
AREAS AROUND THE NUT PLATES

2157397 S0000471040_V1

Radiograph Example
Figure 4 (Sheet 1 of 2)



AREA OF INTEREST FOR HIGH SPEED FILM - FLANGE AREAS AROUND THE FASTENERS AND BEHIND THE NUT PLATES

2157398 S0000471041_V1

Radiograph Example
Figure 4 (Sheet 2 of 2)