

PART 1 - GENERAL  
ALI NO. 55-20-07

1. DESCRIPTION

- A. This procedure covers the inspection of the sandwich structure of the elevator panels using thermographic technique for trapped water inside the honeycomb core cells.
- B. This inspection is to be done from the outside after artificial thermal excitation of the elevator.
- C. Three alternative thermal excitation methods can be applied:
  - METHOD A: Heating the whole elevator inside an oven.
  - METHOD B: Heating the elevator with blankets.
  - METHOD C: Cooling the whole elevator inside a refrigerator.
- D. Inspection must be performed away from any type of hot or cold source and in ambient temperature within the range of 10 to 30° C (50 to 86° F).
- E. In order to perform this inspection two people are recommended, one NDT inspector and one assistant. The assistant will scan the inspection areas and the inspector will mark out the trapped water areas on the skin.

NOTE: AIRBUS gives a specific thermographic course for this inspection. AIRBUS recommends you do this training course before you do this inspection.

- F. For those thermographic trapped water indications partially hidden by lightning strips, a X-Ray inspection procedure is provided. This X-Ray inspection is an alternative procedure to remove the lightning strip and repeat the thermographic inspection.

2. PREFERRED INSPECTION

- A. 55-20-07, PART 10 - THERMOGRAPHIC, Page Block 1001

3. ALTERNATIVE INSPECTION

- A. 55-20-07, PART 2 - X-Ray, Page Block 201, (only for lightning strip areas)

PART 2 - X-RAY  
ALI NO. 55-20-07

1. COMPONENT OR AREA TO BE INSPECTED (Refer to Figure 201)

- A. This procedure can be applied In-Service, to determine the extent of trapped water behind a lightning strip, in cases where the full extent of a thermographic finding may be partially hidden by the strip.
- B. The X-ray procedure will be alternative to remove the lightning strip and repeat the thermographic inspection.

2. DESCRIPTION OF POSSIBLE DAMAGE

- A. Water in honeycomb cells located under lightning strips.

3. RELATED DOCUMENTS

- A. NTM, Chapter 51-10-10, X-Ray inspection to detect water in honeycomb sandwich parts
- B. NTM, Chapter 51-20-00, Page Block 201, X-Ray - General
- C. NTM, Chapter 51-21-01, Page Block 201, X-Ray Equipment

4. EQUIPMENT AND MATERIALS

- A. The equipment used in the development of this procedure was as follows:

- (1) X-Ray Unit : MG 161L from PHILIPS, tube being MCN166, kV range 15-160 kV, constant potential, Standard spot size 1.5 mm x 1.5 mm (0.059 in. x 0.059 in.)
- (2) X-Ray Film : Class 2, Type D7 from AGFA (GE INSPECTION TECHNOLOGIES)

NOTE: Select film size related to the area to be covered. In order to get well focused images it is recommended to use 10 in. x 12 in. films and overlap if needed.

NOTE: Any comparable X-Ray equipment may be used provided that it is capable of meeting the requirements of this procedure.

5. PREPARATION FOR INSPECTION

WARNING: OBSERVE STANDARD WARNINGS AND CAUTIONS BEFORE WORKING ON, OR NEAR HORIZONTAL STABILIZER

- A. Make sure that the surface of the inspection area is clean and smooth.
- B. Check the inspection area for any visible damage or discontinuities.

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C. Place the X-ray films to mark out their limits on the skin.

NOTE: Overlap films if needed.

D. Mark out the center point of each film location for further X-ray source positioning.

6. INSPECTION PROCEDURE

WARNING: NATIONAL SAFETY PRECAUTIONS RELATED TO RADIATION MUST BE FOLLOWED DURING THIS X-RAY INSPECTION PROCEDURE.

A. Place one X-ray film in its correct position.

B. Position the X-ray tube perpendicular to the upper panel and centered to the film to be shot. Refer to Figure 202 for typical examples of X-ray tube and film positioning.

C. When inspecting an area with two or more films, each film must be placed and shot in sequence.

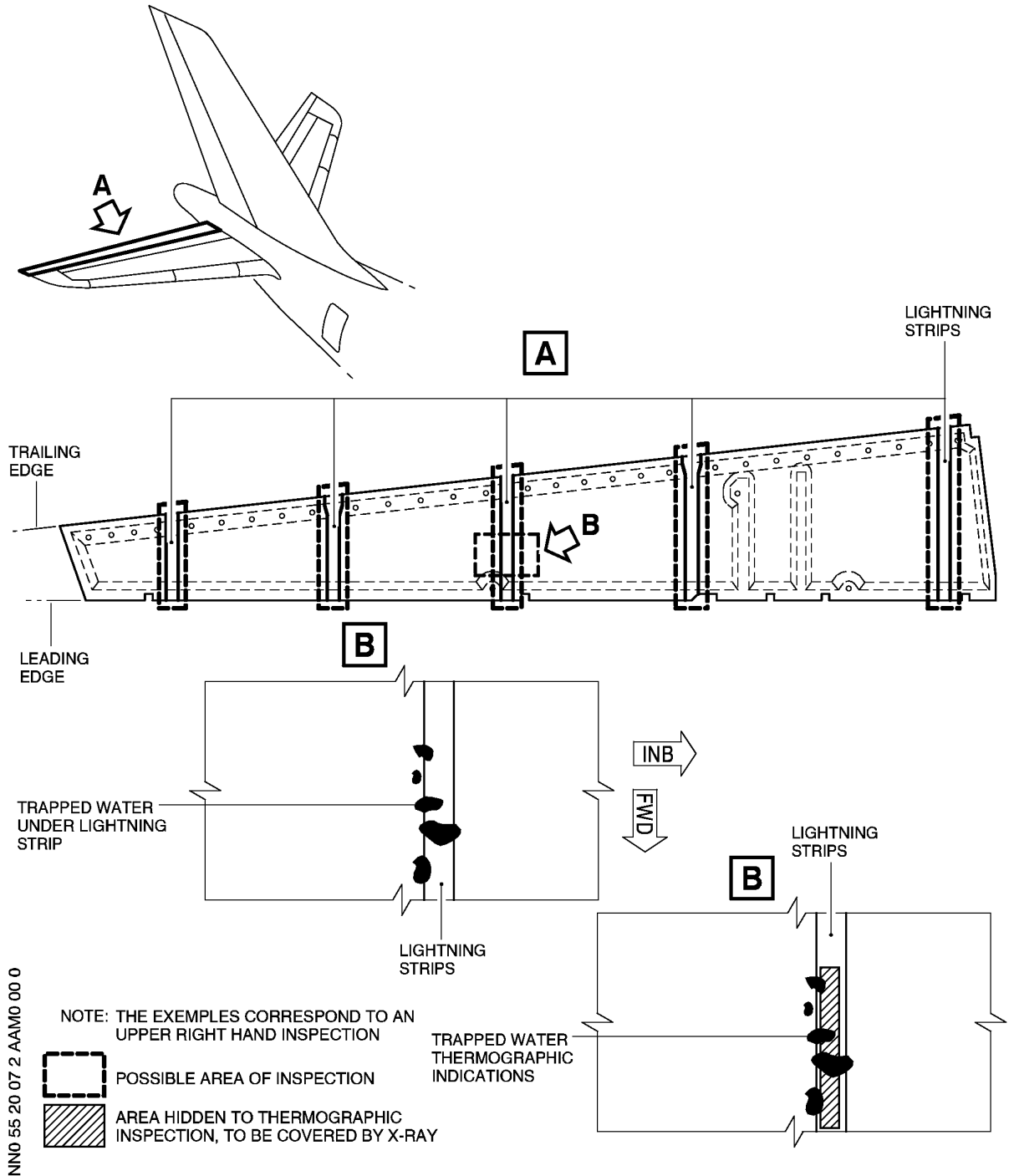
NOTE: Films shall overlap to ensure that the whole region of interest is radiographed. Use lead tapes or high density markers to help film evaluation.

D. Radiographic pictures shall be taken following the parameters shown in Table 201.

E. Adjust the mAs to achieve a film density between 1.5 and 2.5.

F. Repeat procedure for all areas requiring inspection.

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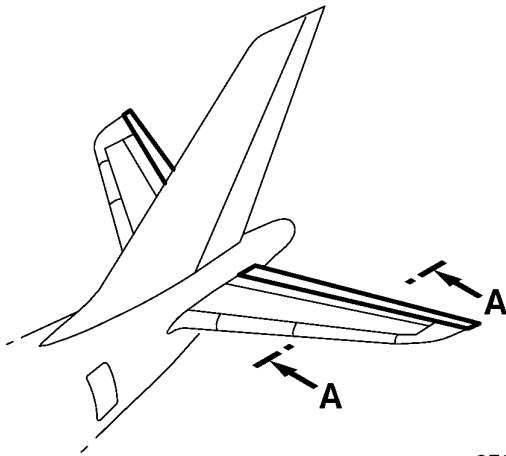
Area to be inspected  
Figure 201

EFFECTIVITY: A318, A319, A320, A321

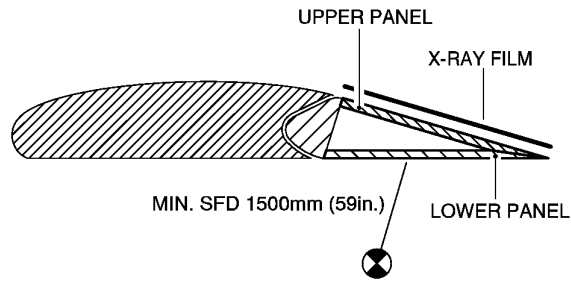
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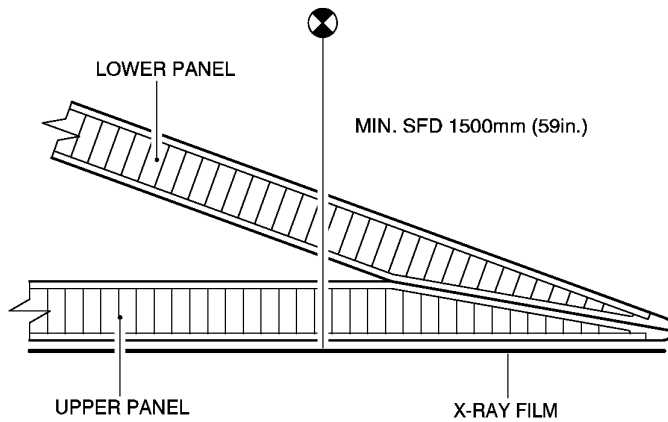
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SECTION  
**A-A**



TYPICAL ARRANGEMENT FOR INSPECTION ON AIRCRAFT



TYPICAL ARRANGEMENT FOR INSPECTION OF PART REMOVED FROM AIRCRAFT

NNO 55 20 07 2 ACM0 00 0

Preparation for inspection  
Figure 202

EFFECTIVITY: A318,A319,A320,A321

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7. EXPOSURE DATA

Exposure Number	SETTINGS			FILMS	
	kV	mAs	SFD	CLASS	SIZE
ALL	50	2800	1500 mm (59 in.)	2 Type D7	As required for area coverage

X-ray parameters for the inspection area  
Table 201

**CAUTION:** PARAMETERS ABOVE ARE FOR THE EQUIPMENT DESCRIBED IN PARAGRAPH 4 AND FOR A DEVELOPMENT TEMPERATURE OF 33° C (91.4° F). WHEN ADJUSTING OTHER UNIT OR CONDITIONS DO NOT EXCEED THE GIVEN KV.

**NOTE:** The mAs quoted is for a minimum SFD of 1500 mm (59 in.). Longer SFD may be used to inspect a larger area in one shot. In this case the mAs value must be adjusted in accordance with the inverse square law. (Refer to Chapter 51-20-00, Page Block 201).

8. ACCEPTANCE CRITERIA

**CAUTION:** WHITE OR LIGHT GREY INDICATIONS MAY ALSO BE CAUSED BY CORE FILLER OR ADHESIVE. THIS INDICATIONS MUST NOT BE CONFUSED WITH WATER TRAPPED INDICATIONS. (REFER TO FIGURE 204)

A. Water filled honeycomb cells will show as white or light grey areas on the film, conforming to the shape of the honeycomb cells. Refer to examples given on Figures 203 to 205.

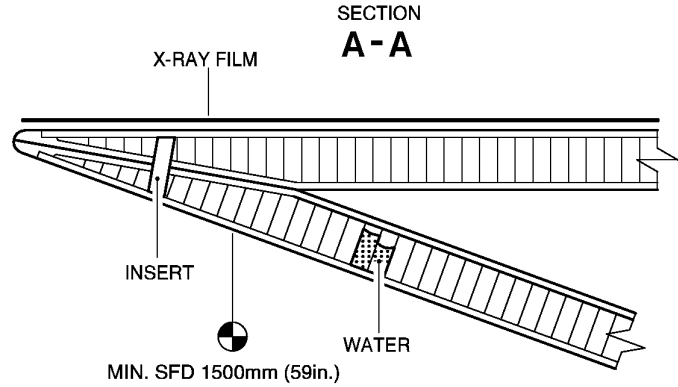
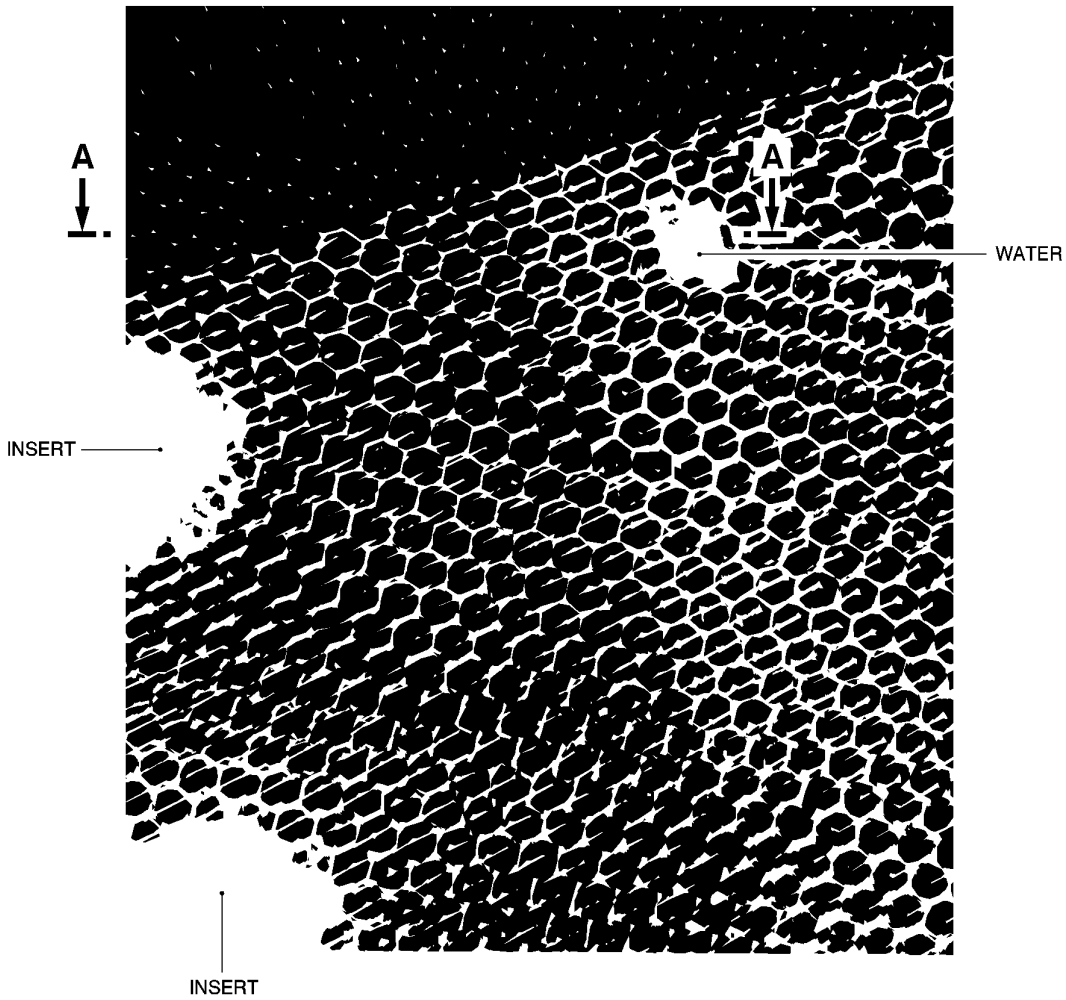
**NOTE:** To determine white or light grey indications as caused by water and core filler or adhesive, a cell by cell evaluation must be performed. Usually, cells containing water are all homogeneous, while cells containing core filler or adhesive have a small spot produced by the presence of bubbles.

B. Mark the position and size of any water indication located under the lightning strip.

C. Complete the shape and size of the thermographic indications with the ones obtained by X-ray. (Refer to Figure 205)

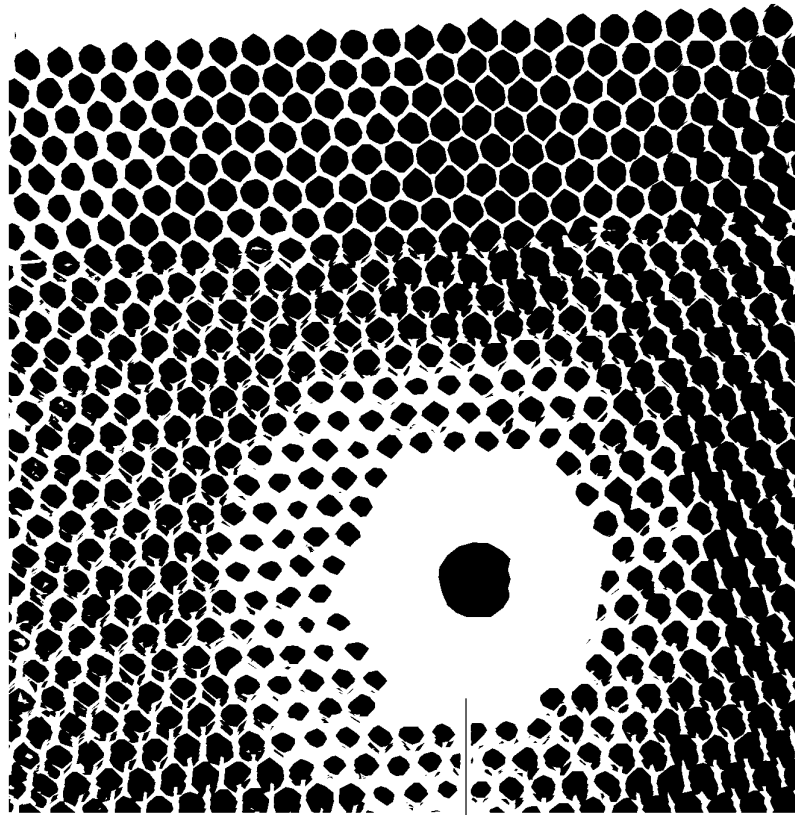
9. FINAL NDT REQUIREMENTS

- A. Remove all test equipment.



NNO 55 20 07 2 AEMO 00 0

Example of radiograph image where the beam of radiation is not perpendicular to the honeycomb cell orientation  
Figure 203



INSERT (CORE FILLER)

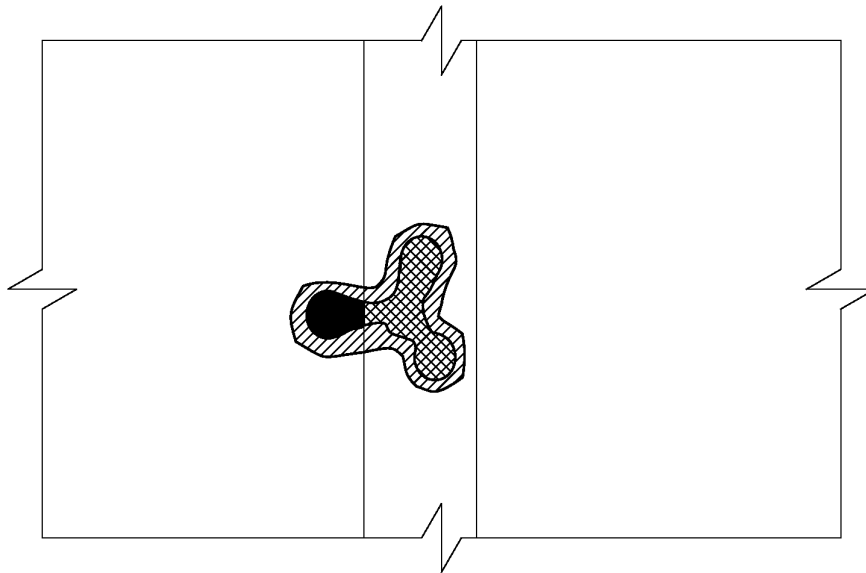
NNO 55 20 07 2 AGMO 00 0

Example of radiograph image of an area with core filler  
Figure 204




EFFECTIVITY: A318,A319,A320,A321

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NON 55 20 07 2 A J M 0 0 0 0

-  THERMOGRAPHIC INDICATION
-  X-RAY INDICATION
-  TOTAL INDICATION TO BE MARKED

Example of Thermographic and X-Ray indication marking  
Figure 205

EFFECTIVITY: A318,A319,A320,A321

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PART 10 - THERMOGRAPHIC  
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1. COMPONENT OR AREA TO BE INSPECTED (Refer to Figure 1001)

A. The honeycomb structure of both the upper and lower elevator panels, LH/RH.

2. DESCRIPTION OF POSSIBLE DAMAGE

A. Honeycomb cells containing more than 10% of trapped water in areas equal to or more than 120 mm<sup>2</sup> (0.186 in<sup>2</sup>) in size.

3. RELATED DOCUMENTS

A. NTM, Chapter 51-10-03, Page Block 501, Resonance Frequency, Inspection of CFRP and GFRP. Composite Components - Honeycomb Sandwich Parts

B. NTM, Chapter 51-10-90, Page Block 1001, Thermography - General

C. AMM, Chapter 27-34-41, Page Block 401, Elevator - Removal/Installation

4. EQUIPMENT AND MATERIALS

A. Any combination of thermographic equipment and systems for thermal excitation may be used provided that it satisfies the requirements of this procedure and they give similar resolution.

(1) Minimum thermocamera requirements

: Real time image. Automatic adjustment of level and span (contrast and brightness)  
Spatial resolution < 1.5 mrad  
Thermal resolution < 0.2° C near ambient temperature  
Focus range lower value ≤ 500 mm (20 in)  
Temperature range including -18° C to 100° C (-0.4° F to 212° F)

(2) Minimum monitor requirements

: 3.5 in. minimum dimensions, portable

(3) Minimum thermal excitation systems requirements

: METHOD A  
An industrial oven of the correct dimensions to fully heat an elevator, that can give 100° C (212° F) with temperature controller (minimum of 6 thermocouples are recommended).

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METHOD B

A heating blanket kit of the correct dimensions (Refer to Figure 1002) with temperature controller that can supply the temperature slope shown in Figure 1003.

METHOD C

An industrial refrigerator of the correct dimensions to receive an elevator and able to keep an internal temperature of -5° C (23° F) or less

B. The equipment used in the development of this procedure was as follows:

- (1) Instrument : Portable ThermaCAM PM545 with 24° Lens from FLIR SYSTEMS and the following technical features:  
Thermal resolution of 0.1° C (0.18° F) at 30° C (86° F)  
Spatial resolution 1.3 mrad  
Focus range lower value 500 mm (20 in.)  
Temperature range of -20° C to 120° C (-4° F to 248° F)  
Field of view (HxV) 24° x 18°  
Spectral band 7.5 to 13 μm
- (2) Portable Monitor : FD-2560 from FLIR SYSTEMS
- (3) Elongation Cable : Greater than 2000 mm (78.74 in.)

NOTE: ThermaCAM P10 and remote control with monitor were also used in the development of this procedure.

NOTE: AIRBUS identifies each proper combination of thermocamera, monitor, remote control and elongation cable as tool kit 551024T01.

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- (4) Heating blankets  
for METHOD B : 220 volts kit GMIDS32-HK010-2 with integrated  
thermocouples from GMI
- (5) Temperature  
controller  
for METHOD B : GMIDS34CK010-2 from GMI
- (6) 110/220 volts  
transformer  
for METHOD B : GMIDS34TK010-2 from GMI

NOTE: CHROMALOX and BRISKHEAT vendors have been validated by Airbus as  
alternative manufacturers for METHOD B kit. Complete kits are sold  
under following P/Ns:

CHROMALOX kit for METHOD B:

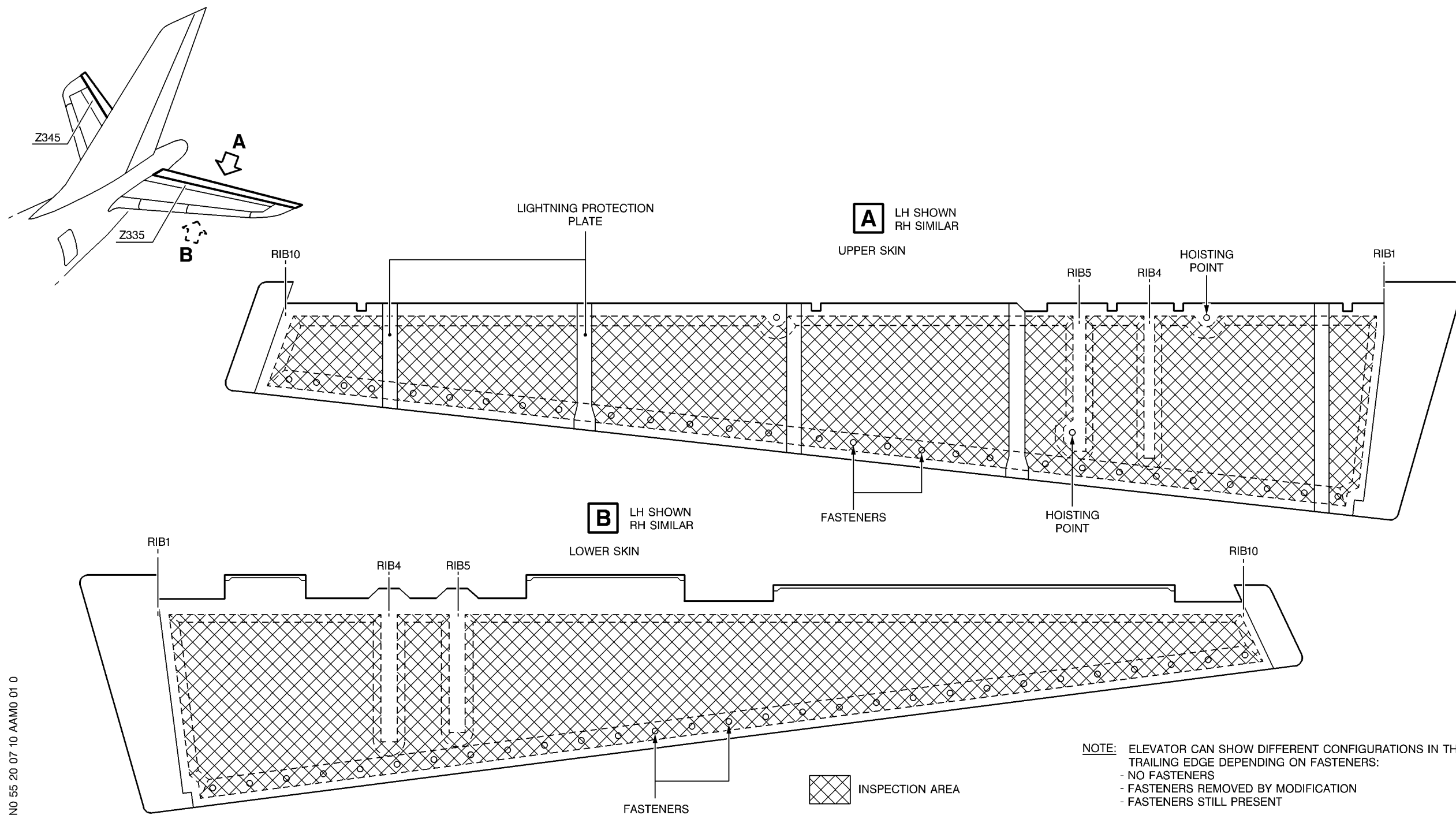
- Temperature controller (220 volts): N38422
- A320 Heating Blankets: N38423
- 110/220 volts transformer (if 110 volts supply): N38424

BRISKHEAT kit for METHOD B:

- Temperature controller (110/220 volts): NDTCONTROLLER
- A320 Heating Blankets: A320BLANKETKIT

- (7) Auxiliary Equipment : Timer with alarm  
Elevator support tooling (for methods A and C only)  
(Refer to Figure 1004)

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NNO 55 20 07 10 AAMD 01 0

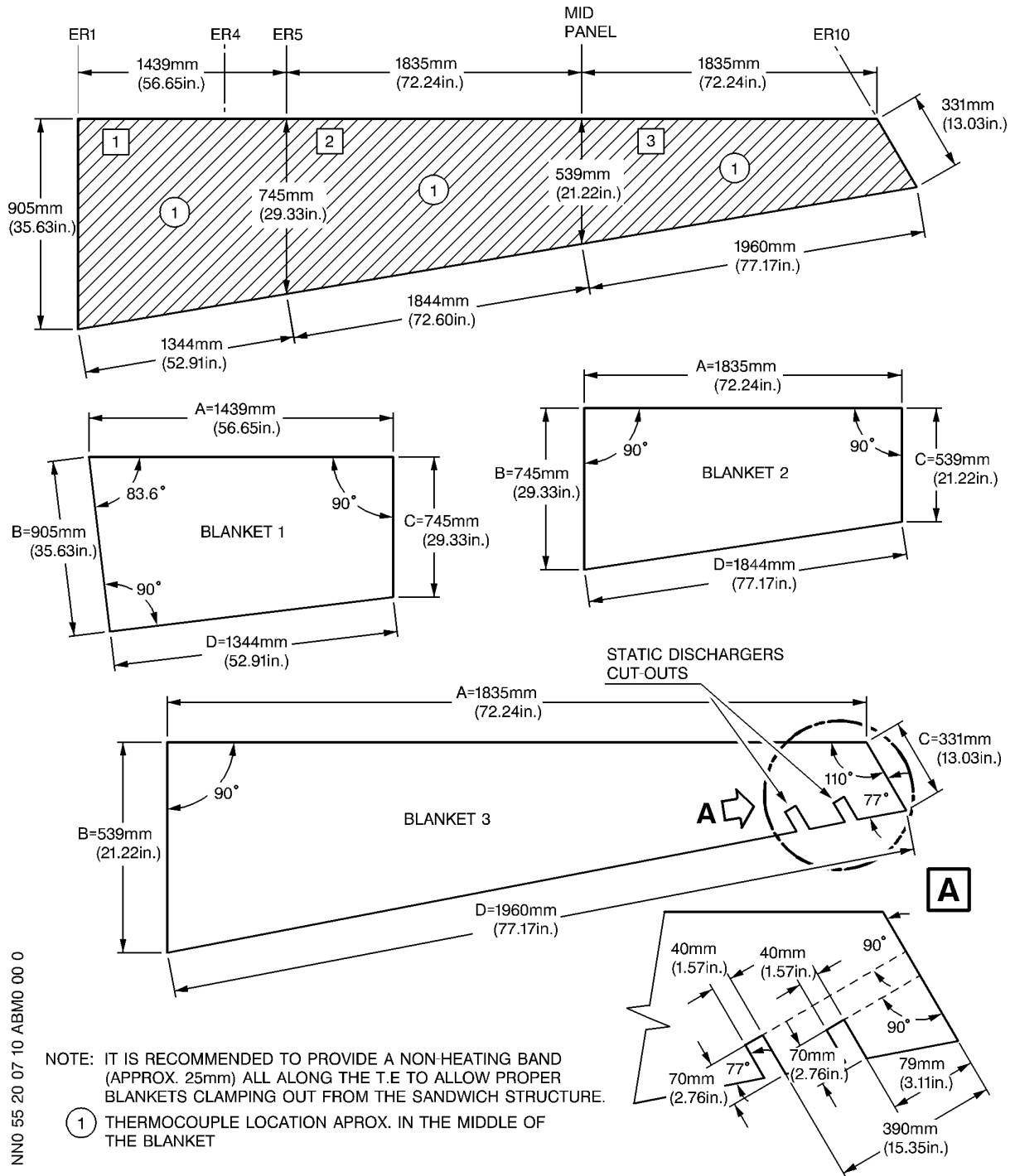
Area to be Inspected

Figure 1001

EFFECTIVITY: A318,A319,A320,A321

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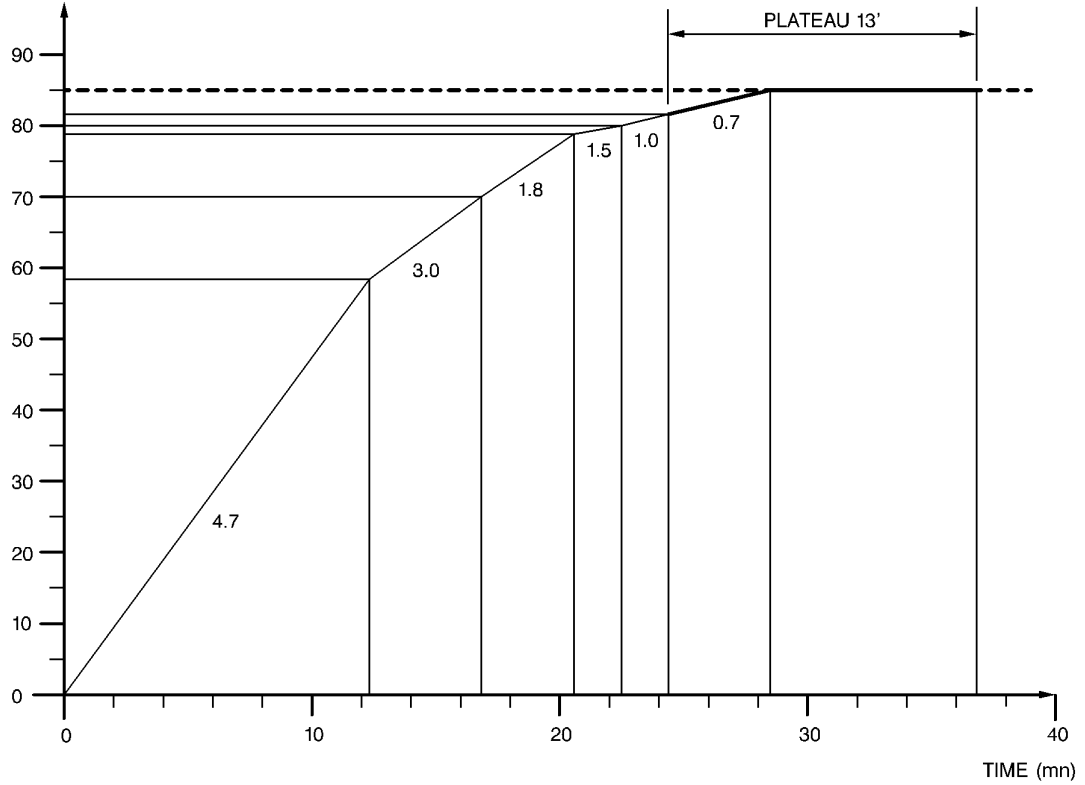


NND 55 20 07 10 ABM0 00 0

Dimensions of the heating area and position of the blankets (thermal excitation METHOD B)  
Figure 1002

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TEMPERATURE SLOPE



NNO 5 20 07 10 ADMO 00 0

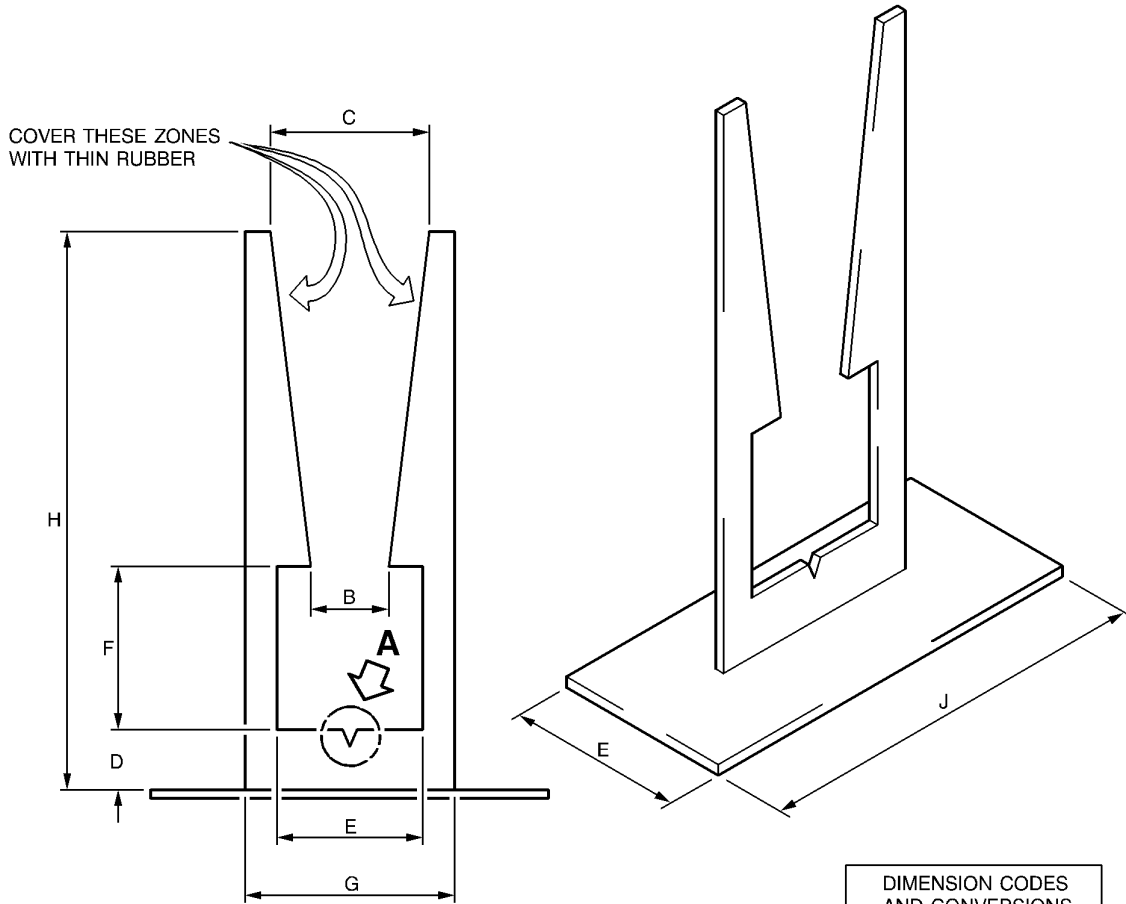
Controller temperature slope  
Figure 1003

EFFECTIVITY: A318,A319,A320,A321

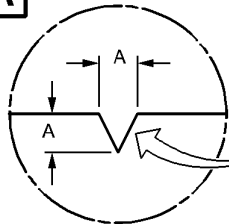
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**PART 10 - THERMOGRAPHIC**  
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**A**



COVER THESE ZONES WITH THIN RUBBER

DIMENSION CODES AND CONVERSIONS		
DIM	mm	(in.)
A	40	1.57
B	70	2.76
C	145	5.71
D	150	5.91
E	300	11.81
F	370	14.57
G	520	20.47
H	990	38.98
J	1000	39.37

NNO 55 20 07 10 AEM0 01 0

**NOTES:** MANUFACTURED FROM 20mm (0.79in.) PLYWOOD.  
PLACE THE ELEVATOR ON 2 SUPPORT TOOLS,  
ONE TOOL ON ER4 OR ER5, SUCH THAT  
THEY DO NOT AFFECT THE INSPECTION.  
THIS SUPPORT TOOLING IS ADVISED FOR APPROPRIATE ELEVATOR  
PLACING IN VERTICAL POSITION.

**Elevator Support Tool - For Procedure A and Procedure C only**  
**(Local Manufacture)**

Figure 1004

EFFECTIVITY: A318,A319,A320,A321

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5. PREPARATION FOR INSPECTION

**WARNING:** OBEY STANDARD WARNINGS BEFORE WORKING ON, OR NEAR, THE HORIZONTAL STABILIZER WHEN THE ELEVATOR IS ON THE A/C.

**CAUTION:** THE AMBIENT TEMPERATURE MUST BE KEPT TO WITHIN THE RANGE OF 10° C (50° F) TO 30° C (86° F). IT IS RECOMMENDED TO PERFORM THE INSPECTION INSIDE AN HANGAR. THERE MUST BE NO HOT OR COLD AIR FLOWS AROUND THE INSPECTION AREA.

- A. Make sure that the surface of elevator is clean and smooth.
- B. Make sure that all hand holes of the front spar are covered.
- C. Check all the inspection areas for visible damage, discontinuity, signs of repairs or any condition which could affect the inspection.

**NOTE:** A visual inspection parallel to the elevator surface (upper and lower) to compare the differences in surface reflection can help to detect repairs or discontinuities.

D. Check and record the ambient temperature.

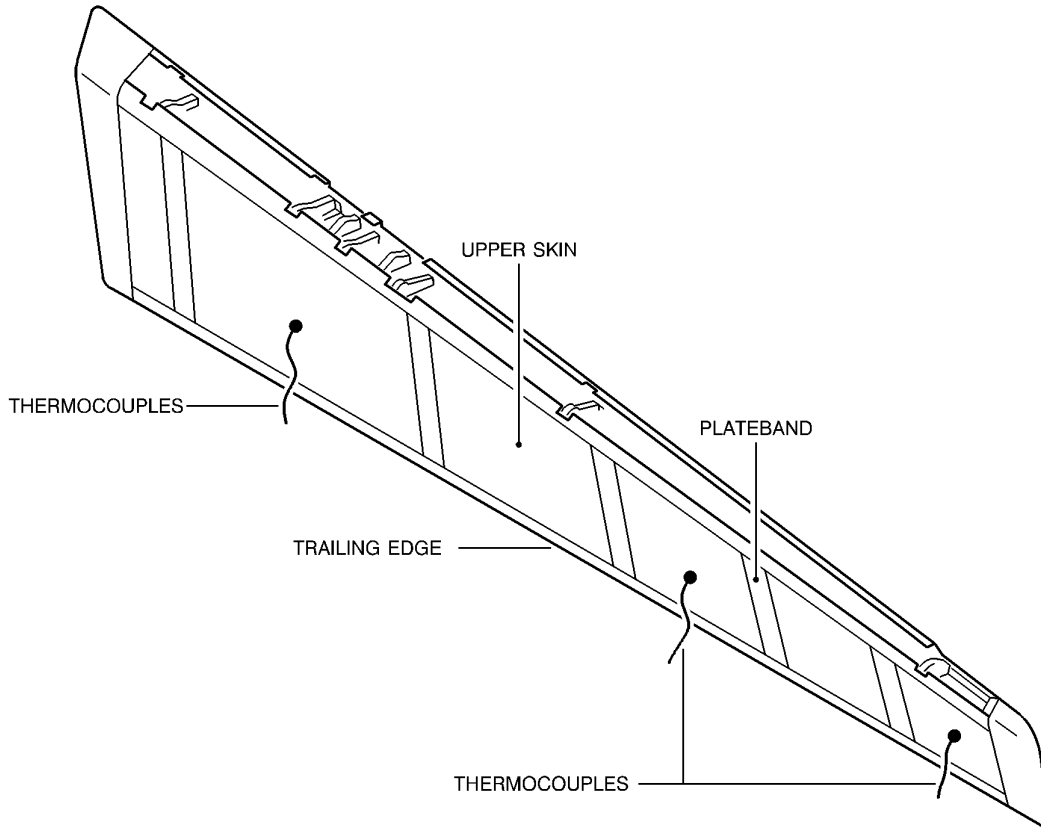
E. For METHOD A only (oven):

- (1) Make sure that the Elevator is removed from the Horizontal Stabilizer (Refer to AMM, Chapter 27-34-41, Page Block 401).
- (2) Use a support tool to put the elevator in a vertical position, with trailing edge down, so that the two panels are positioned at the same angle to the floor (Refer to Figure 1004).
- (3) Put the elevator inside the oven.

**CAUTION:** MAKE SURE THE THERMOCOUPLES HAVE GOOD CONTACT WITH THE ELEVATOR PANEL.

- (4) Fix 3 thermocouples to each elevator panel with adhesive tape such that they are uniformly distributed and approximately in the middle of panel areas (Refer to Figure 1005).
- (5) Gradually heat the elevator in the oven. 4 of the 6 thermocouples must be at 40° C (72° F) more than the ambient temperature in less than 10 minutes.

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NNO 55 20 07 10 ACMO 00 0

Thermocouple Positions  
(Thermal excitation METHOD A)  
Figure 1005

EFFECTIVITY: A318,A319,A320,A321

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- (6) Hold this temperature value stable (+2° C, 0° C / +3.6° F, 0° F) in the elevator for at least 30 minutes. The total heating period should be 40 minutes minimum.

NOTE: Where thermocouple control is not possible, oven temperature, with the elevator inside, shall be maintained at 40° C (72° F) above ambient temperature for minimum 40 minutes.

- (7) After heating, move the elevator out of the oven to a place away from cold/hot airflows.

F. For METHOD B only (blankets):

- (1) Make sure that the inspection is done away from cold/hot airflows.

CAUTION: DO NOT OVERLAP HEATING BLANKETS AND POSITION CAREFULLY TO PREVENT DAMAGE THERMOCOUPLES, CONECTORS, ETC.

- (2) Put the three blankets over the upper skin.

- (3) Make marks to show the limits and reference number of each inspection area on the elevator skin.(Refer to Figure 1002).

- (4) Make sure there is good contact between the heating blankets and the skin.

CAUTION: DO NOT PLACE ANY MATERIAL OVER THE THERMOCOUPLE AREA OF THE BLANKETS.

- (5) Hold the blankets with anti-slip clamps to hold the heating blankets in place.

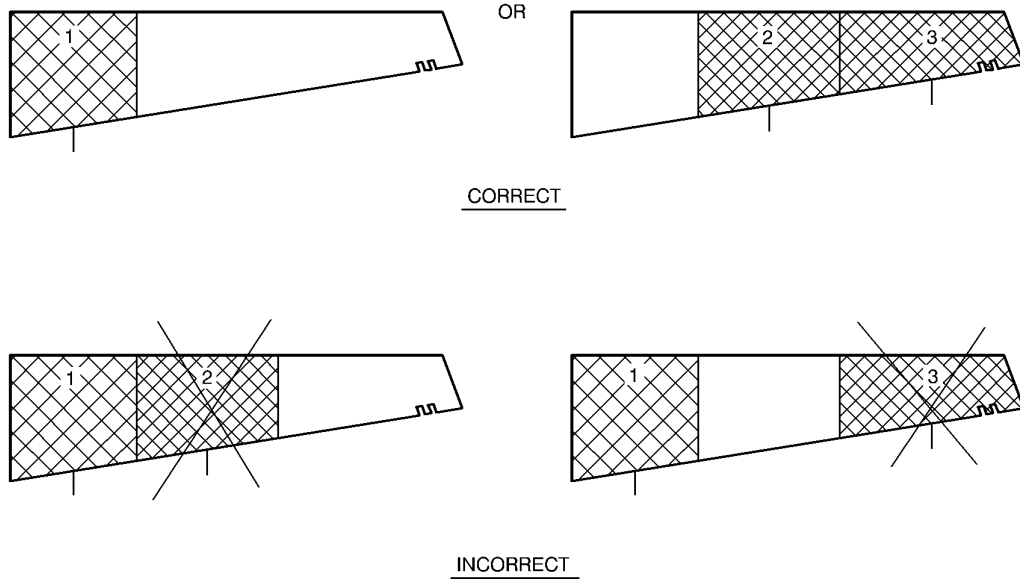
- (6) Put insulation blankets on the blankets to be heated.

NOTE: It is mandatory to heat areas 2 and 3 at the same time. Areas 2 and 3 can be heated while area 1 is being inspected, or vice versa. (Refer to Figure 1006).

- (7) Do a check and record that ambient temperature is between 10°C (50°F) and 30°C (86°F).

- (8) Ground the temperature controller to the elevator and refer to the manufacturer instructions for operation.

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NND 55 20 07 10 AGM0 00 0

Preparation-Correct / Incorrect blanket supply  
Figure 1006

EFFECTIVITY: A318,A319,A320,A321

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- (7) Gradually heat the inspection area/s for a minimum of 32 minutes. Make sure that the inspection area is  $85 \pm 3^{\circ} \text{C}$  ( $185 \pm 5.4^{\circ} \text{F}$ ) during a minimum of the last 13 minutes of the heating period.

NOTE: Heating blankets of the kit have an average increasing temperature slope of  $4^{\circ} \text{C/min}$  ( $7.2^{\circ} \text{F/min}$ ) so you need between 14 and 19 minutes to reach  $85^{\circ} \text{C}$  ( $185^{\circ} \text{F}$ ) as corresponds to an ambient temperature between  $30^{\circ} \text{C}$  ( $86^{\circ} \text{F}$ ) and  $10^{\circ} \text{C}$  ( $50^{\circ} \text{F}$ ).

NOTE: At slow or fast increasing temperature rate, keep  $85 \pm 3^{\circ} \text{C}$  ( $185 \pm 5.4^{\circ} \text{F}$ ) during the last 13 minutes or more of the heating period.

- (8) Remove blankets from the heated area/s.

G. For METHOD C only (refrigerator):

- (1) Make sure that the Elevator is removed from the Horizontal Stabilizer (Refer to AMM, Chapter 27-34-41, Page Block 401).
- (2) Use a support tool to put the elevator in a vertical position, with trailing edge down, so that the two panels are positioned at the same angle to the floor (Refer to Figure 1004).
- (3) Make sure that the ambient temperature inside the refrigerator is maintained stable at  $-5^{\circ} \text{C}$  ( $23^{\circ} \text{F}$ ) or below.
- (4) Put the elevator inside the refrigerator.
- (5) Keep the elevator inside the refrigerator during a minimum of 2 hours.
- (6) Move the elevator out of the refrigerator to a place away from cold/hot airflow.

6. INSTRUMENT CALIBRATION

CAUTION: IT IS EXTREMELY IMPORTANT NOT TO TOUCH THE INSPECTION AREA DURING THE CALIBRATION, INSPECTION OR MARKING PROCESSES.

- A. Operate the instrument in accordance with the manufacturer's instructions.
- B. Set the power to on and wait approximately 30 seconds.
- C. Select Image menu and make sure that temperature range  $-20^{\circ}$  to  $120^{\circ} \text{C}$  ( $-4^{\circ} \text{F}$  to  $248^{\circ} \text{F}$ ) is selected.

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D. Select in Set up - Image menu the following parameters:

Auto Adjust : Level and Span  
Continuous adjust. : None  
Colour scale : METHOD A and METHOD B - Grey inverted  
METHOD C - Grey

E. Adjust the monitor controls such that images are shown same shape, grey color, contrast and brightness on both the thermocamera and monitor screens.

NOTE: No adjustment is needed when the remote control monitor is used.

F. Calibrate the thermocamera as follows:

- For methods A and C during the waiting time
- For method B immediately before the end of the heating period on the lower panel of the area of inspection
- Also, do this calibration again immediately before the start of the thermographic inspection.

(1) Point the camera, as perpendicular as possible, to a part of the inspection area so that:

- Only inspection area is in the viewfinder, so no other items (floor, walls, etc) are seen in the viewer during calibration
- The trailing edge aligns with the bottom edge of the viewer (Refer to Figure 1007).

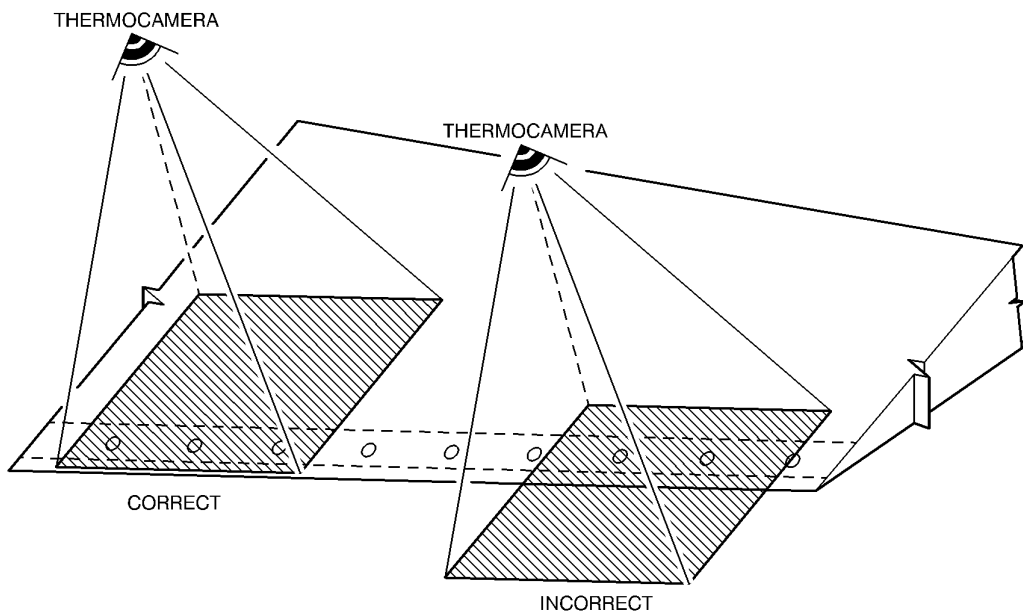
(2) Press button "A" (auto-adjust) to pre-adjust the camera.

(3) Adjust the focus to clearly define any discontinuity in the area (fasteners, hoisting point, rib, or other discontinuity).

(4) Do the automatic contrast and brightness calibration by pressing button "A".

(5) If necessary, move the camera away to a distance between 1000 mm and 2000 mm (39.37 in. and 78.74 in.), from the inspection area and re-focus the thermocamera.

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NN0 55 20 07 10 ALLM0 00 0

Calibration-Correct / Incorrect area in the viewer  
Figure 1007

EFFECTIVITY: A318,A319,A320,A321

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7. INSPECTION PROCEDURE

CAUTION: PERFORMANCE OF THE INSPECTION CAN ONLY BE ENSURED IF ALL CALIBRATION AND HEATING/COOLING PARAMETERS ARE CAREFULLY FOLLOWED.

CAUTION: IT IS EXTREMELY IMPORTANT NOT TO TOUCH INSPECTION AREA DURING THE CALIBRATION, INSPECTION OR MARKING PROCESSES.

CAUTION: IT IS ESSENTIAL THAT THE INSPECTOR IS MADE AWARE OF THE ELEVATOR STRUCTURE LAYOUT BEFORE PERFORMING THIS INSPECTION.

NOTE: Two people are necessary to perform this procedure: one inspector and one assistant. The assistant will scan the inspection areas and the inspector will mark out the panel trapped water areas.

A. Calibrate the equipment in accordance with paragraph 6.

B. Repeat paragraph 6.F. adjustment just before starting the inspection.

C. For METHOD A only (oven)

CAUTION: START THE THERMOGRAPHIC INSPECTION 8 MINUTES AFTER THE END OF THE THERMAL EXCITATION (HEAT/COLD) APPLICATION.

CAUTION: CHECK THAT GREY INVERTED POLARITY (HOT/BLACK) HAS BEEN SELECTED IN THE COLOUR SCALE BY LOOKING AT HOISTING POINTS, FASTENERS OR RIB IN BLACK COLOUR.

(1) Do the inspection by scanning between 1000 mm and 2000 mm (39.37 in. to 78.74 in.) as perpendicular as possible to the skin (Refer to Figure 1008).

(2) Focus the camera during the inspection period as necessary.

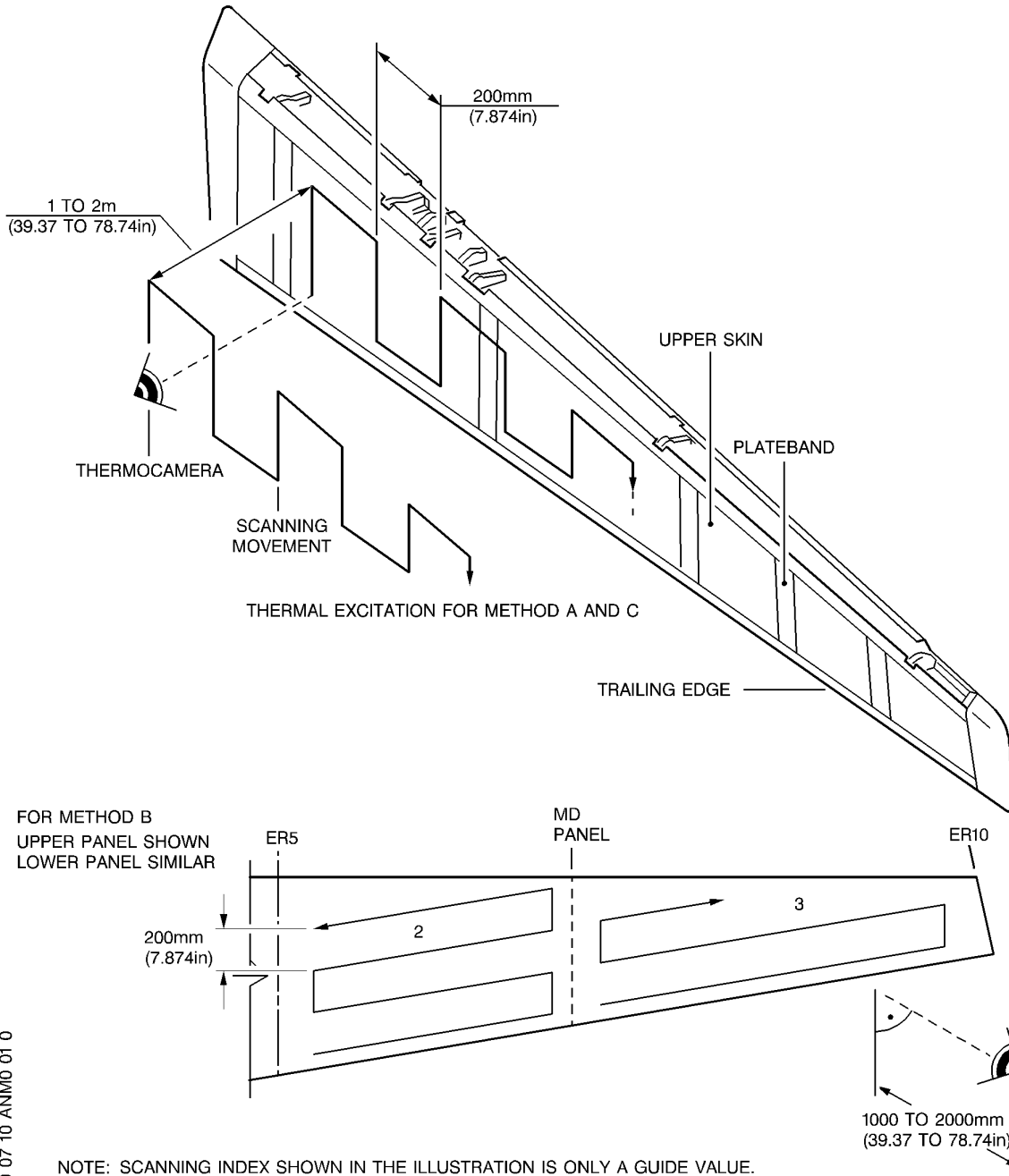
(3) Auto-adjust the camera at least every 2-3 minutes of continuous inspection following the requirements in paragraph 6.F.

NOTE: In case of findings auto-adjust the camera on the indication when needed to facilitate indication bordering. Then direct the camera to T.E. for camera calibration following requirements in paragraph 6.F.

(4) You have only 30 minutes to do the inspection of the elevator. If you need more time to complete the inspection, repeat the steps from paragraph 5.E.

(5) You must do an inspection of the two elevator panels.

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FOR METHOD B  
UPPER PANEL SHOWN  
LOWER PANEL SIMILAR

NOTE: SCANNING INDEX SHOWN IN THE ILLUSTRATION IS ONLY A GUIDE VALUE.  
INDEX VALUE DEPENDS ON THE LENS FIELD OF VIEW AND INSPECTION DISTANCE.  
SELECT THE SCANNING INDEX IN SUCH A WAY THAT EACH PART OF THE ELEVATOR  
IS INSPECTED AT LEAST TWICE, DURING TWO CONSECUTIVE PATHS.

NND 55 20 07 10 ANM0 01 0

Inspection Method  
Figure 1008

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D. For METHOD B only (blankets)

**CAUTION:** CHECK THAT GREY INVERTED POLARITY (HOT/BLACK) HAS BEEN SELECTED IN THE COLOUR SCALE BY LOOKING AT HOISTING POINTS, FASTENERS OR RIB IN BLACK COLOUR.

**CAUTION:** START THE THERMOGRAPHIC INSPECTION OF THE LOWER PANEL IMMEDIATELY AFTER THE END OF THE HEAT APPLICATION. THERE IS NO WAITING TIME NECESSARY FOR THIS PROCEDURE.

**CAUTION:** THIS PROCEDURE PERMITS THE INSPECTION OF THE UPPER AND LOWER PANELS AFTER HEATING ONLY THROUGH THE UPPER PANEL. (REFER TO FIGURE 1009 FOR INSPECTION SEQUENCE).

- (1) This inspection is applicable to each of the inspection areas (1 to 3) after instructions in paragraph 5.F. and 6 are obeyed.
- (2) Do a scan of the lower panel inspection area from the T.E. forwards as shown in Figure 1008, between 1000 mm and 2000 mm (39.37 in. to 78.74 in.) as perpendicular as possible to the skin. You must overlap scan paths one after the other. When 2 inspection areas are heated at the same time it is recommended to do an inspection in sequence as shown in Figure 1008.
- (3) Focus the camera during the inspection as necessary.
- (4) Auto-adjust the camera before the start each scanning path, include part of the rib in the viewer to not exaggerate the contrast of the inspection.  
  
**NOTE:** Auto-adjust the camera over the indication to facilitate indication bordering. Then come back to the previous auto-adjustment point at the beginning of the corresponding scanning path, auto-adjust the camera and continue the inspection.
- (5) Do an inspection the lower panel area/s during 10 minutes maximum.
- (6) Start the inspection of the upper panel area/s 10 minutes after the end of heat application.
- (7) Scan the upper panel inspection area from the T.E. forwards as shown in Figure 1008, between 1000 mm and 2000 mm (39.37 in. to 78.74 in.) as perpendicular as possible to the skin. You must overlap scan paths one after the other. When 2 inspection areas are heated at the same time it is recommended to do an inspection in sequence as shown in Figure 1008.
- (8) Focus the camera during the inspection as necessary.

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- (9) Auto-adjust the camera before the start each scanning path, include part of the rib in the viewer to not exaggerate the contrast of the inspection.

NOTE: Auto-adjust the camera over the indication to facilitate indication bordering. Then come back to the previous auto-adjustment point at the beginning of the corresponding scanning path, auto-adjust the camera and continue the inspection.

- (10) Do an inspection of the upper panel areas during 10 minutes maximum.

- (11) Total time for the inspection must not be more than 20 minutes. Repeat from paragraph 5.F. if necessary to complete the inspection.

NOTE: Inspection areas 2 and 3 must always be heated together although just one of these areas is to be re-inspected.

E. For METHOD C only (refrigerator)

CAUTION: START THE THERMOGRAPHIC INSPECTION 8 MINUTES AFTER THE END OF COLD APPLICATION.

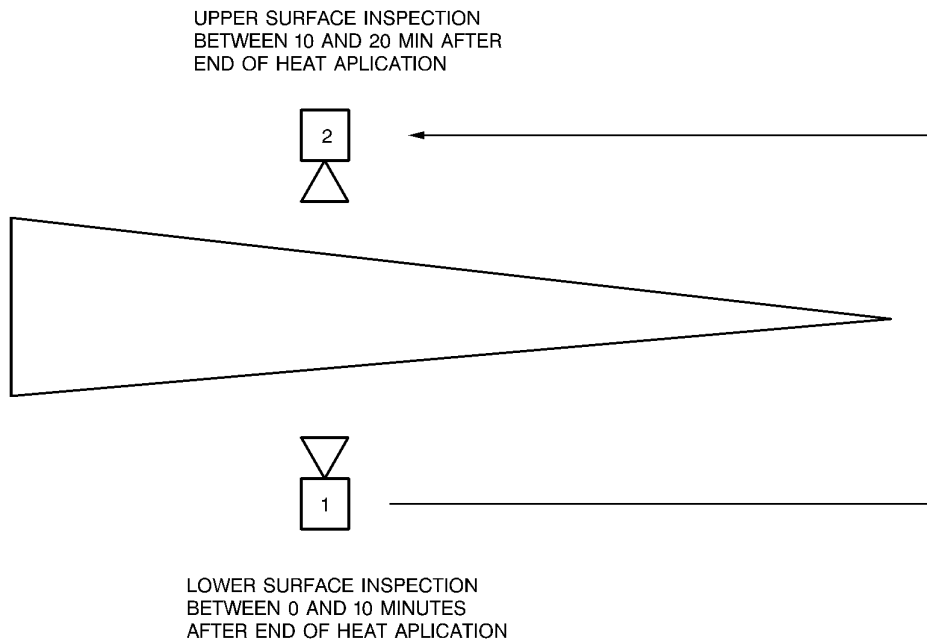
CAUTION: CHECK THAT GREY POLARITY (COLD/BLACK) HAS BEEN SELECTED IN THE COLOUR SCALE BY LOOKING AT HOISTING POINTS, FASTENERS OR RIB IN BLACK COLOUR.

- (1) Clean the condensation from the skin with a clean tissue. Do not touch the elevator skin with your hands.
- (2) Do the inspection by scanning between 1000 mm and 2000 mm (39.37 in. to 78.74 in.) as perpendicular as possible to the skin (Refer to Figure 1008).
- (3) Focus the camera during the inspection as necessary.
- (4) Auto-adjust the camera every 2-3 minutes minimum of continuous inspection following the requirements in paragraph 6.F.

NOTE: In case of findings auto-adjust the camera on the indication when necessary to help indication bordering. Then point the camera to T.E. for camera calibration obeying paragraph 6.F.

- (5) You have only 20 minutes to inspect the elevator. If you need more time to complete the inspection, repeat the steps from paragraph 5.G.
- (6) You must do an inspection of the two elevator panels.

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Inspection sequence for METHOD B  
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F. For all METHODS

- (1) Trapped water inside the honeycomb core will be identified by darker indications when compared with the adjacent area. Refer to Figure 1010 to identify different thermographic indications.

CAUTION: SPECIAL CARE MUST BE TAKEN WITH INDICATIONS THAT MAY APPEAR ON THE SCREEN WHICH ARE CAUSED BY:

- SURFACE REFLECTIONS OF HEAT SOURCES SUCH AS LIGHTNING, AIR CONDITIONING, ETC.
- HONEYCOMB FILLER AROUND THE FASTENERS (25 mm (1 in.) dia.)
- CORE SPLICES (MAINLY IN THE RIB END)
- GEOMETRIC INDICATIONS (REPAIRS)

- (2) In case of findings that may be partially occluded by a lightning strip:

- Do an X-Ray inspection of this area or
- Remove the lightning strip and do the thermographic inspection again to find full damage size.

- (3) All thermographic indications with a regular shape or located at the end of a rib, shall be checked by a tap test, refer to Chapter 51-10-03 Page Block 501 to avoid misinterpretation of structural changes such as repairs, core splices, etc.

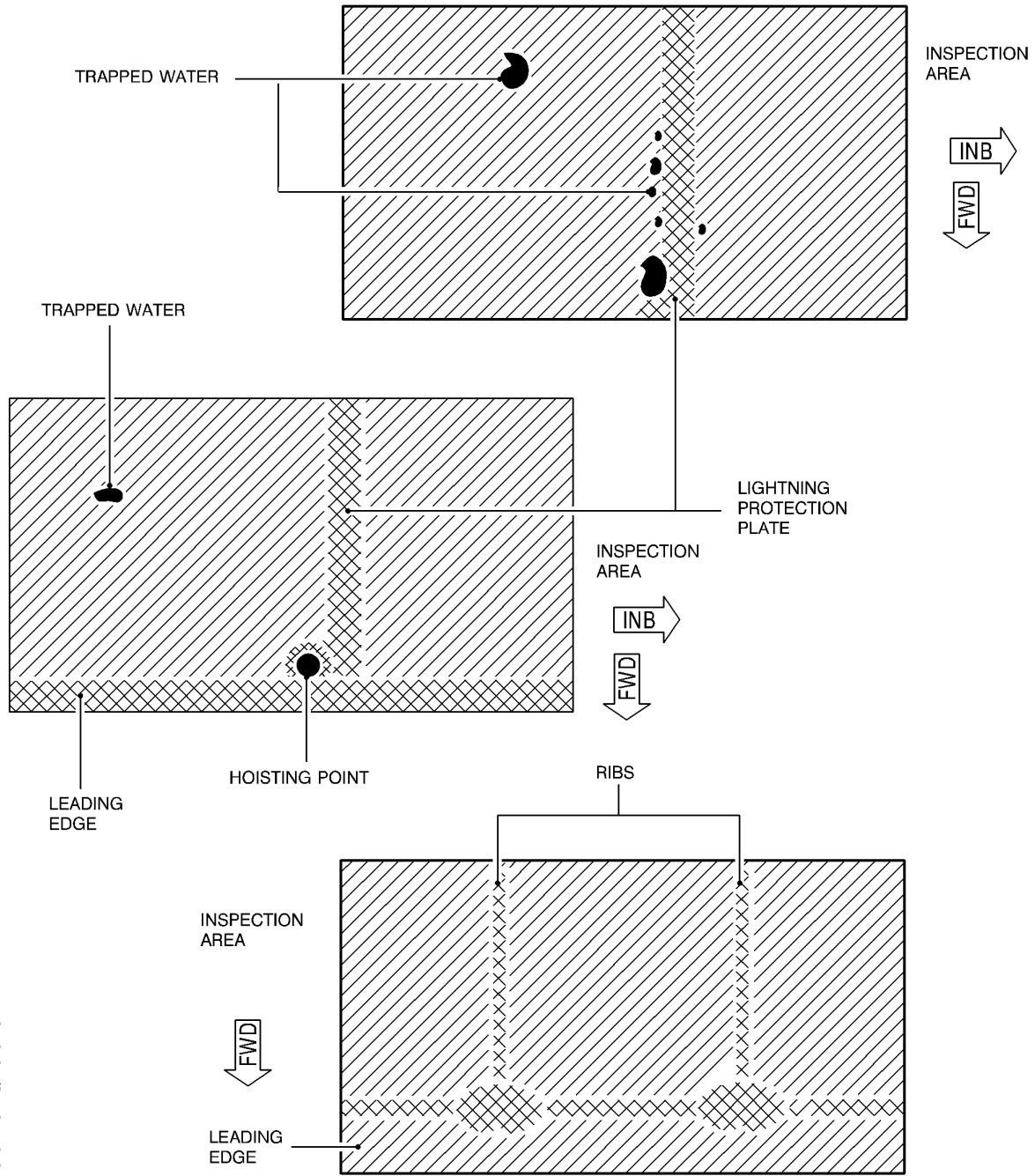
- (4) To make marks on areas identified as trapped water:

- Put the portable monitor near the inspection area
- Refer to the indication on the screen
- The inspector will make marks on the edge of the darker areas to identify trapped water while the assistant keeps the image.

8. ACCEPTANCE CRITERIA

- A. All dark indications which cannot be identified as geometric changes such as ribs, hoisting points, fasteners, core splice, honeycomb filler, etc., surface irregularities, foreign materials or heat/cold source reflections on the surface must be considered to be water indications.
- B. Make a full-scale map of the findings on a plastic foil, including distance or references to the elevator front spar rivet rows and other geometrical references such as ribs, lightning protection plates, fastener numbering, etc. to help the elevator repairs.

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NOTE: THE EXAMPLES CORRESPOND TO AN UPPER RIGHT HAND INSPECTION

Example of Thermographic Indications in zones with different discontinuities such as hoisting point, ribs and lightning protection plate  
Figure 1010

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C. Include in the full scale map information such as:

- Elevator serial number
- LH/RH elevator
- Upper/lower panel
- Inboard/fwd directions

9. FINAL NDT REQUIREMENTS

None