

AIRCRAFT MAINTENANCE MANUAL

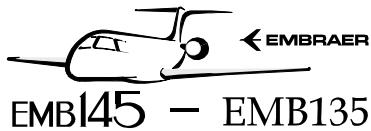
MAXIMUM FLAP EXTENDED SPEED - INSPECTION/CHECK

EFFECTIVITY: ALL

1. General

- A. This section gives the procedure to do an inspection after the aircraft is submitted to a speed higher than the maximum flap extended speed (V_{FE}).
- B. The procedures in this section are given in the sequence below. The tasks identified with (♦) are part of the Scheduled Maintenance Requirements Document (SMRD).

TASK NUMBER	DESCRIPTION	EFFECTIVITY
05-50-07-200-801-A	MAXIMUM FLAP EXTENDED SPEED	ALL



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TASK 05-50-07-200-801-A

EFFECTIVITY: ALL

2. MAXIMUM FLAP EXTENDED SPEED

A. General

- (1) This task gives the procedure to do an inspection after the aircraft is submitted to a speed higher than the maximum flap extended speed (V_{FE}).

NOTE: • There is no message on the EICAS and CMC displays.
• There are distinct values of V_{FE} according to the deflection angle of the flap surface.
• To consider only the flap lever position to determine whether the flap has exceeded its maximum speed.

(2) *EFFECTIVITY: FOR EMB-145 MODELS EXCEPT EMB-145 XR*

The Maximum Flap Extended Speeds are given in the LIMITATIONS section of the Airplane Flight Manual and are according to the table below:

Table 601

Flap Lever Position	V_{FE} (KIAS)	T_v (KIAS)
9°	250	260
18°	200	210
22°	200	210
45°	145	160

NOTE: If the flap speed is between V_{FE} (maximum flap extended speed) and T_v (threshold value), for a given flap lever position, no inspection is necessary. If the flap speed is greater than T_v , the necessary inspections are listed in this task.

(3) *EFFECTIVITY: FOR EMB-145 XR*

The Maximum Flap Extended Speeds are given in the LIMITATIONS section of the Airplane Flight Manual and are according to the table below:

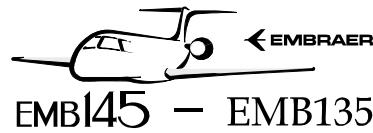
Table 602

Flap Lever Position	V_{FE} (KIAS)	T_v (KIAS)
9°	250	260
18°	200	210
22°	200	210
45°	160	160

NOTE: If the flap speed is between V_{FE} (maximum flap extended speed) and T_v (threshold value), for a given flap lever position, no inspection is necessary. If the flap speed is greater than T_v , the necessary inspections are listed in this task.

B. References

REFERENCE	DESIGNATION
AMM TASK 20-40-02-910-801-A/200	STATIC GROUNDING - STANDARD PRACTICES



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(Continued)

REFERENCE	DESIGNATION
AMM TASK 27-50-00-000-801-A/400	INBOARD FLAP - REMOVAL
AMM TASK 27-50-00-000-802-A/400	OUTBOARD FLAP - REMOVAL
AMM TASK 27-50-00-400-801-A/400	INBOARD FLAP - INSTALLATION
AMM TASK 27-50-00-400-802-A/400	OUTBOARD FLAP - INSTALLATION
AMM TASK 27-51-00-200-801-A/600	FLAP MECHANICAL LINE - GENERAL VISUAL IN-SPECTION
NDI 57-28-00-210-808-A00	-
NDI 57-50-00-220-803-A00	-
NDI 57-28-00-220-801-A00	-
NDI 57-28-00-220-807-A00	-
NDI 57-50-00-220-801-A00	-
NDI 57-50-00-220-802-A00	-
NDI 57-52-00-210-802-A00	-
NDI 57-52-00-210-803-A00	-
NDI 57-52-00-210-804-A00	-
NDI 57-52-00-220-802-A00	-
NDI 57-52-00-220-803-A00	-
NDI 57-53-00-210-802-A00	-
NDI 57-53-00-210-803-A00	-
NDI 57-53-00-210-804-A00	-
NDI 57-53-00-210-805-A00	-
NDI 57-53-00-220-801-A00	-
NDI 57-53-00-220-802-A00	-
NDI 57-53-00-220-805-A00	-

C. Zones and Accesses

Not Applicable

D. Tools and Equipment

Not Applicable

E. Auxiliary Items

Not Applicable

F. Consumable Materials

Not Applicable

G. Expandable Parts

Not Applicable

H. Persons Recommended

Not Applicable

I. Inspection After Aircraft is Submitted to Maximum Flap Extended Speed
SUBTASK 212-002-A

- (1) Refer to [Figure 601](#) and to the [Table 603](#) below to find the procedures applicable to every V_{FE} exceedance event.

**Table 603 - INSPECT REQUIREMENTS TO VFE EXCEEDANCE WITH THE FLAP
AT 9°, 18°, 22° OR 45°**

Region	Immediate Action	Fly-by	Permanent Action
A	No inspection needed		
B	AMM TASK 27-51-00-200-801-A/600 - NDI 57-50-00-220-801-A00 NDI 57-50-00-220-802-A00 - NDI 57-50-00-220-803-A00 NDI 57-52-00-220-802-A00 - NDI 57-52-00-220-803-A00 NDI 57-52-00-210-802-A00 - NDI 57-52-00-210-803-A00 NDI 57-52-00-210-804-A00 - NDI 57-53-00-220-801-A00		
B (Continued)	NDI 57-53-00-220-802-A00 - NDI 57-53-00-220-805-A00 NDI 57-53-00-210-802-A00 - NDI 57-53-00-210-803-A00 NDI 57-53-00-210-805-A00 - NDI 57-53-00-210-804-A00 NDI 57-28-00-220-801-A00 - NDI 57-28-00-220-807-A00 NDI 57-28-00-210-808-A00 Inspections according to item "J" or Inspections according to item "K"	N/A	

J. Eddy Current Inspection Procedure for VFE Exceedance
SUBTASK 212-003-A

- (1) This task gives the procedure to inspect the SSI 57-28-59 and SSI 57-50-80, by the Eddy Current Inspection Method.
- (2) This inspection requires flap removal if the V_{FE} exceedance event occurred with the flap at 45° position and can be done without flap removal for V_{FE} exceedance at 9°, 18° and 22° position.
- (a) For V_{FE} exceedance event occurred with the flap at 9°, 18° and 22° position, extend the flap at 45° position and inspect the areas specified in the tasks, according to [Table 603](#).
- (3) Any other Eddy Current instrument that satisfies the performance requirements of this procedure may be used.
- (4) Tools, Equipment and Auxiliary Items.

Table 604

ITEM	DESCRIPTION	PURPOSE
Commercially Available	Mirror	To inspect the Flap Tracks
Commercially Available	DEFECTOSCOP S 2830 or similar - Eddy Current Instrument	To do this inspection
Commercially Available	PENCIL, PROBE SHIELDED 2.835.01-2140 or similar	To do this inspection
GSE 333	Kit Reference Standard NDI - Plate, NDI - General Eddy Current Test - Plate, Titanium 6AL4V US AMS2631 CL A1 1/2" - PN 145-44131-005	To do this inspection

(5) Preparation

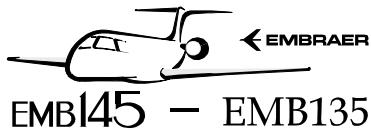
- (a) Statically ground the aircraft ([AMM TASK 20-40-02-910-801-A/200](#)).
- (b) Set the Flap at 45° position, if the V_{FE} exceedance occurred with the flap at 9°, 18° and 22° position.
- (c) Remove the inboard flap ([AMM TASK 27-50-00-000-801-A/400](#)) and the outboard flap ([AMM TASK 27-50-00-000-802-A/400](#)) if the V_{FE} exceedance occurred with the flap at 45° position.
- (d) Clean the parts to be inspected.

(6) Equipment Calibration ([Figure 602](#)) and ([Figure 603](#)).

- (a) After having connected the probe to the equipment, adjust the instrument frequency in agreement with the used probe.
- (b) Put the probe in the reference standard ([Figure 602](#)) in an area that does not have an artificial crack. The probe must fit tightly but not to the point that it causes excessive wear on the probe coil.
- (c) Select the control of rotation phase to obtain the sign of lift-off in the horizontal position or, if using an analog equipment, compensate the lift-off in accordance with the operation manual.
- (d) Scan the reference standard in a similar way and adjust the controls of gain of the equipment for obtaining the sign of the smallest artificial crack, 0.2 mm (0.008 in.) artificial crack depth, at least 10% of the scale ([Figure 603](#)).
- (e) Before beginning to scan an area of different geometry than the previous one, a balance should be made in the equipment because geometric variations, edge or hole margins, and presence of different materials close to the scanning area can induce false indications.
- (f) Balance the instrument as specified in the manufacturer's instructions.
- (g) Adjust the sensitivity of the instrument to give an 80% meter deflection when a scan is done slowly over the reference artificial crack with the probe.
- (h) Position the probe again in an area that is not an artificial crack. Check the balance and the lift-off. If adjustments are needed, check the sensitivity again.

(7) Procedure ([Figure 604](#), [Figure 605](#), [Figure 606](#), [Figure 607](#), [Figure 608](#) and [Figure 609](#)).

- (a) Check the setting of the lift-off again as referred to in item (6) (c).
- (b) Scanning in radii should be made in longitudinal and traverse directions, with attention being paid to the edge effect.
- (c) Be sure that the probe is set as close as possible to 90° to the surface of the part.
- (d) Scan the whole area of interest as described in:



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- [Figure 604](#), [Figure 605](#) and [Figure 606](#), for V_{FE} exceedance at 9°, 18° and 22° flap position.
- [Figure 607](#), [Figure 608](#) and [Figure 609](#), for V_{FE} exceedance at 45° flap position.

(8) Indication Evaluation

- (a) Note the locations of any questionable crack-like indications. Repeat the inspection, paying particular attention to the areas where the indications have been noted. Record all locations and responses to all crack indications.

(9) Acceptance and Rejection Criteria

- (a) In case of any crack indications, contact Embraer Technical Support Department.

(10) Follow-on

- (a) Remove the grounding cable from the aircraft ([AMM TASK 20-40-02-910-801-A/200](#)).
- (b) For V_{FE} exceedance with flap at 45° position reinstall the inboard flap ([AMM TASK 27-50-00-400-801-A/400](#)) and outboard flap ([AMM TASK 27-50-00-400-802-A/400](#)).

K. Eddy Current Inspection Procedure for VFE Exceedance with the Flap at 45° position without Flap Removal

SUBTASK 212-004-A

- (1) This Procedure is applicable to V_{FE} exceedance event occurred with the flap at 45° position.
- (2) This task gives the procedure to do an inspection of the SSI 57-28-59 and SSI 57-50-80 by the Eddy current inspection method.
- (3) It is not necessary to remove the flap to do this inspection.
- (4) The Equipment and its accessories listed in paragraph (5) were used in development of this procedure, all equipment commercially available that can be calibrated as specified in this procedure can be used.
- (5) Tools, Equipment and Auxiliary Items.

Table 605

ITEM	DESCRIPTION	PURPOSE
Hocking Phasec 2d or Phasec 3d	Eddy Current Instrument with Impedance Plane Display	To do this inspection
GEIT 076-102-009 106P9C	Pencil Probe Shielded Flex Adjustable Copper Shaft Delrin Handle (200 KHz – 2 MHz, 9 Length)	To do this inspection
GEIT 076-090-017 - 815P238	Pencil Probe Shielded Flex Adjustable Copper Shaft Delrin Handle (200 KHz – 2 MHz, 9 Length, 0.7 Tip Drop)	To do this inspection

Table 605 (Continued)

ITEM	DESCRIPTION	PURPOSE
GSE 333	Kit Reference Standard NDI - Plate, NDI - General Eddy Current Test - Plate, Titanium 6AL4V US AMS2631 CL A1 1/2" - PN 145-44131-005	To do this inspection
Snap-on P/N UIM325	Mirror Articulated with Telescopic Handle	To inspect the Flap Tracks
Snap-on ECF2B	Flashlight, Heavy Duty with Magnet (2 "D" cells) or similar	To inspect the Flap Tracks

(6) Preparation ([Figure 602](#)).

- (a) Statically ground the aircraft ([AMM TASK 20-40-02-910-801-A/200](#)).
- (b) Remove access panels (1), (2), (3) and (4) ([Figure 612](#)).
- (c) Open the lower shroud of the inboard and outboard flaps.
- (d) Set the inboard and outboard flaps to 18° and after to 20° positions.

NOTE: Adjust the inboard and outboard flaps to $\pm 2^\circ$ position, as indicated above, to increase the exposed inspection area.

- (e) On the Circuit Breaker Panel, open the FLAP 1 and FLAP 2 circuit breakers and attach a DO-NOT-CLOSE tag to them.

WARNING: BE CAREFUL WHEN USING SOLVENTS BECAUSE THEY ARE A HEALTH AND FIRE HAZARD. USE SAFETY GOGGLES AND PROTECTIVE CLOTHING WHEN HANDLING THEM. AVOID TO BREATHE SOLVENT VAPORS AND WORK IN A WELL VENTILATED AREA.

- (f) Before the inspection, wipe the surface clean with methyl-ethyl-ketone (MEK) (ASTM-D-740) or similar solvent.
- (g) Do visual check at inspection area for obvious damages that can cause false indications on equipment signals or can cause excessive wear to the probe tip.

(7) Equipment Calibration ([Figure 602](#), [Figure 610](#), [Figure 611](#), [Figure 612](#), [Figure 613](#) and [Figure 614](#)).

- (a) Mold the probe to get access to the area where you will do the inspection, in compliance with [Table 606](#) ([Figure 610](#), [Figure 612](#), [Figure 613](#) and [Figure 614](#)).

Table 606 - INSPECTION AREA – FLAP POSITION X PROBE CONFIGURATION

Flap Posi- tion	Figure 610	Flex Probe - Shape	Inboard Flap Track - Inner Surface		Outboard Flap Track - Inner Sur- face		Torque Box Flap Track - Inner Sur- face	
			Upper	Lower	Upper	Lower	Upper	Lower
18°	a	L					X	X
	b	J	X		X			
	c	S		X		X		

Table 606 - INSPECTION AREA – FLAP POSITION X PROBE CONFIGURATION (Continued)

Flap Position	Figure 610	Flex Probe - Shape	Inboard Flap Track - Inner Surface		Outboard Flap Track - Inner Surface		Torque Box Flap Track - Inner Surface	
			Upper	Lower	Upper	Lower	Upper	Lower
20°	b	J	X					
	c	S		X				

- (b) Connected the probe to the equipment, turn-on the equipment and allow warm-up time as specified in manufacturer manual.
 - (c) Adjust the instrument frequency 2 MHz. Set Gain to 30 dB (to start setup).
 - (d) Put the probe in the reference standard ([Figure 602](#)) surface, far enough from EDM Notches. Hold probe as near as possible to 90° at standard surface; do not use excessive force to avoid excessive wear on the probe tip.
 - (e) Use the phase rotation control to get the lift-off signal in the horizontal position of Impedance Plane Display. If you use Meter Display equipment, compensate the liftoff as shown in the operation manual ([Figure 602](#)).
 - (f) Scan the reference standard in a proper velocity and adjust the Gain of the equipment to get at least 10% of the scale signal for the smallest artificial crack depth of 0.2 mm (0.008 in.) ([Figure 611](#)).
 - (g) Scan again the reference standard in a proper velocity and check if the equipment displays at least 80% of the scale signal for the artificial crack depth of 1.0 mm (0.040 in.) ([Figure 611](#)).
 - (h) Balance the instrument signals as specified in the manufacturer's instructions.
 - (i) Position the probe again in an area that is not an artificial crack. Do a check of the balance and lift-off. If adjustments are necessary, do a check of the sensitivity again.
- (8) Procedure ([Figure 610](#), [Figure 612](#), [Figure 613](#), and [Figure 614](#)).
- (a) Before you start to scan an area of different geometry than the previous one, you must make a balance in the equipment. This is because geometric variations, track edges or fastener holes edge, and presence of different materials near the scanning area can cause false indications.
- NOTE: During the inspection, do not change the frequency or gain controls in order to avoid missing the signal amplitude from reference standard. If necessary to increase or decrease gain, check the amplitude level at reference standard (Paragraph 7).
- (b) Do a check of the setting of the lift-off again as indicated in item (7) (c).
 - (c) You must do the scanning in radii in longitudinal and transverse directions. Pay attention to the edge effect signals.
 - (d) Be sure that the probe is set as near as possible to 90° to the surface of the part.

- (e) Scan the whole area of interest as described in:
- 1 [Figure 610](#) and [Figure 612](#), for flap adjusted at 18° flap position: inspect the torque box flap tracks, lower and upper internal surface by L-shaped flex probe.
 - 2 [Figure 610](#), [Figure 613](#) and [Figure 614](#), for flap adjusted at 18° flap position: inspect the outboard flap tracks (positions B and C), and inboard flap track (position C), upper and lower internal surface by J-shaped and S-shaped flex probe, respectively.
 - 3 [Figure 610](#) and [Figure 614](#), for flap adjusted at 20° flap position: inspect the inboard flap track (position B), upper and lower internal surface by J-shaped and S-shaped flex probe, respectively.

(9) Indication Evaluation

- (a) Record the locations of any questionable crack-like indications. Do the inspection again, while you pay particular attention to the areas where the indications were noted. Record the track position and displayed signals to all crack indications.

(10) Acceptance and Rejection Criteria

- (a) In case of any crack indications, contact Embraer Technical Support Department.

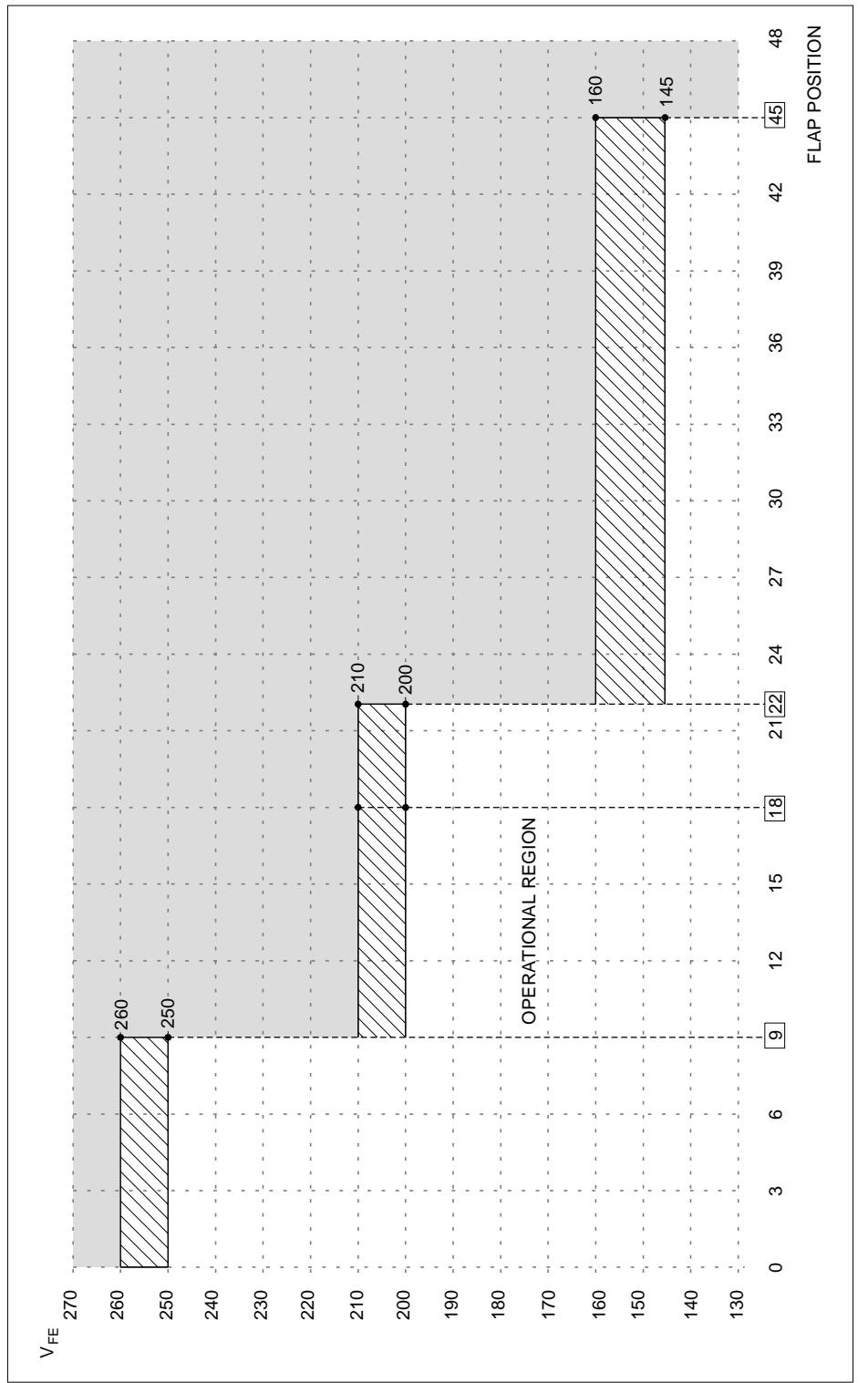
(11) Follow-on

- (a) After the inspection, clean all inspection area with MEK (Methyl Ethyl Ketone) or equivalent cleaner.

CAUTION: TO PREVENT DAMAGE, EXAMINE ALL THE WORK AREAS TO MAKE SURE THAT YOU REMOVED ALL TOOLS AND EQUIPMENT AFTER YOU COMPLETED THE WORK.

- (b) Remove all tools, equipment, and unwanted materials from the inspection area.
- (c) Remove the grounding cable from the aircraft ([AMM TASK 20-40-02-910-801-A/200](#)).
- (d) Reinstall the access panels (1), (2), (3) and (4). ([Figure 612](#), [Figure 613](#) and [Figure 614](#))
- (e) Close the inboard and outboard flaps lower shroud.
- (f) Remove the DO-NOT-CLOSE tag and close the FLAP 1 and FLAP 2 circuit breakers.
- (g) Return the inboard and outboard flaps to the initial configuration.

EFFECTIVITY: ALL
VFE Exceedance Chart
Figure 601

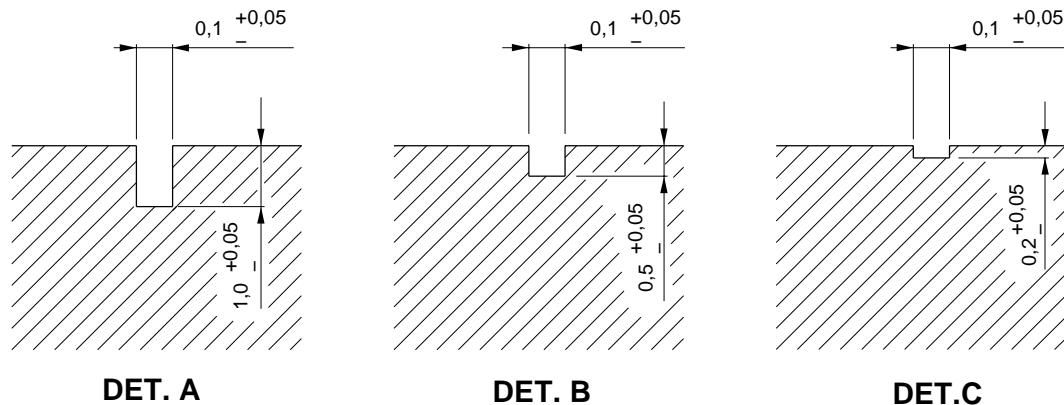
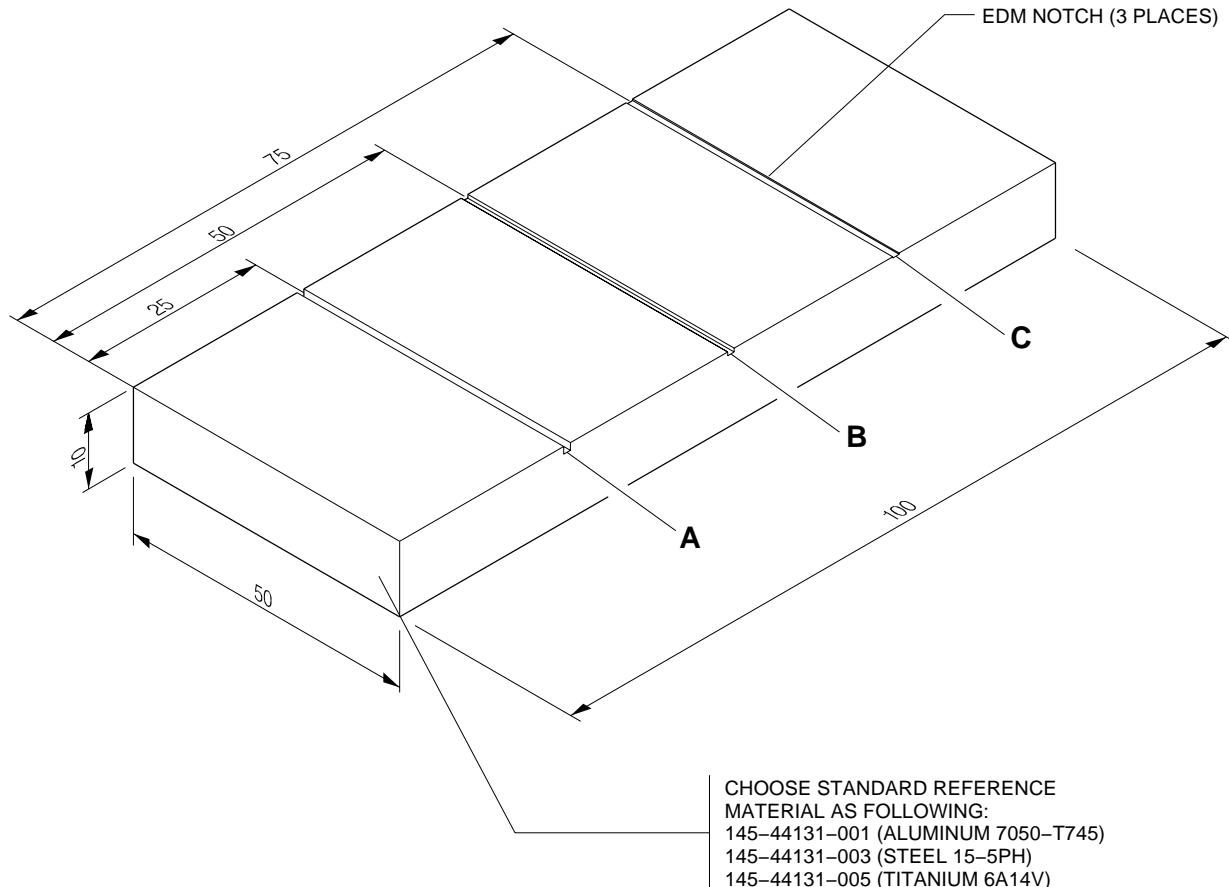


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EFFECTIVITY: ALL

Reference Standard

Figure 602



DIMENSIONS IN mm.

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EMB-145 - AMM 1285

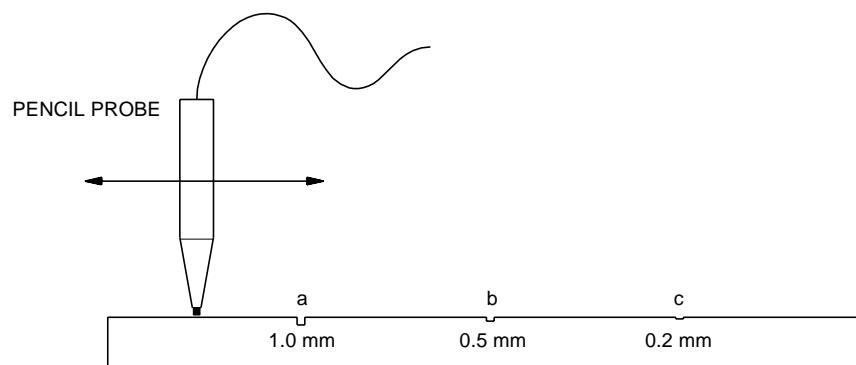
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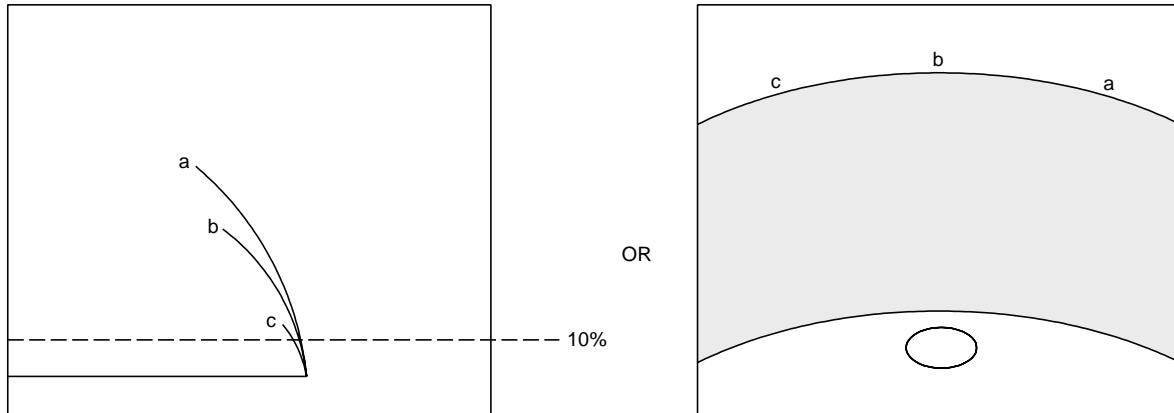
EFFECTIVITY: ALL

Representation of Indications of Pattern in Equipment

Figure 603



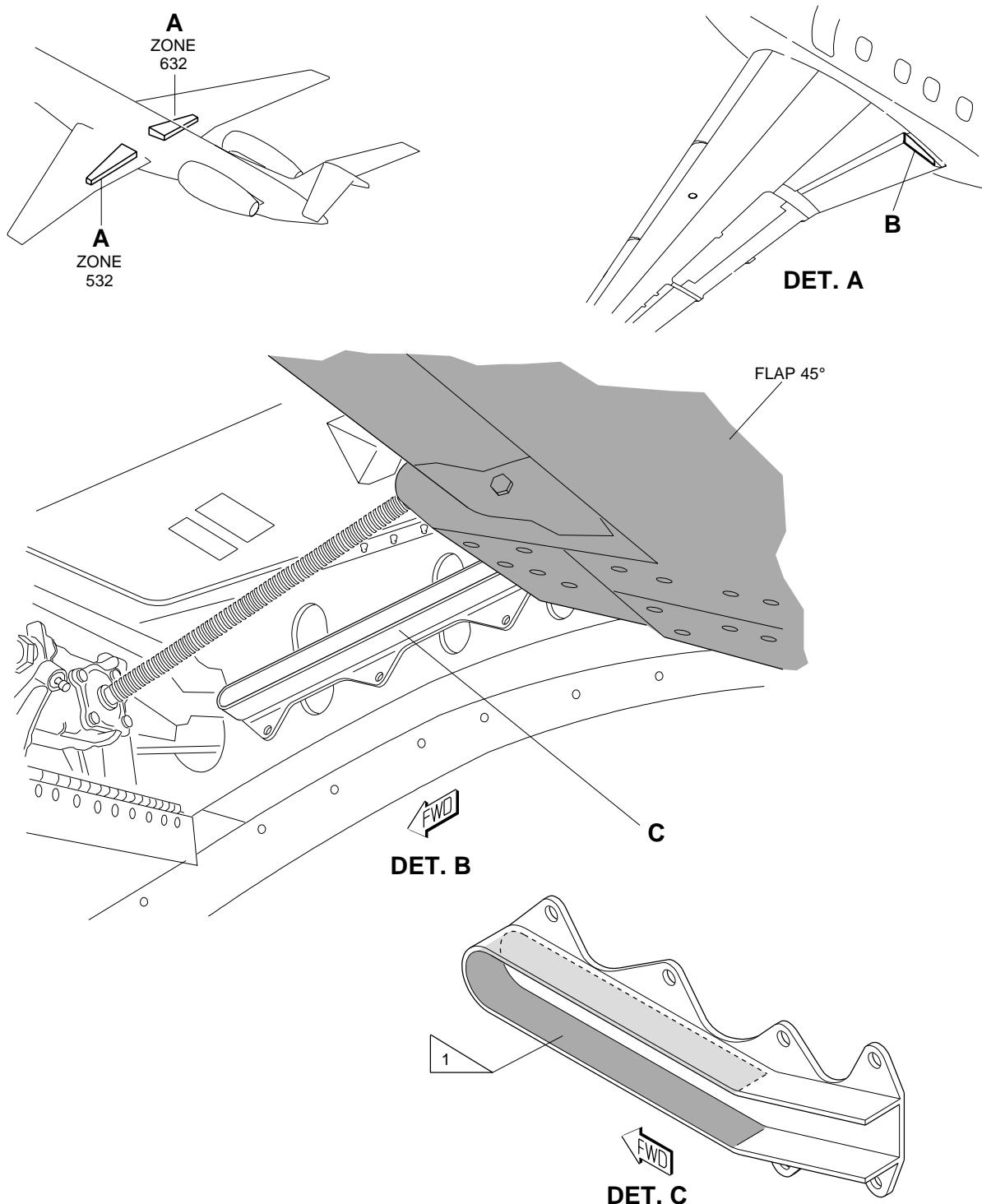
REFERENCE STANDARD



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EFFECTIVITY: ALL

Area to Inspect the Torque Box I Flap Track for VFE Exceedance at 9°, 18° and 22° Flap Position
Figure 604

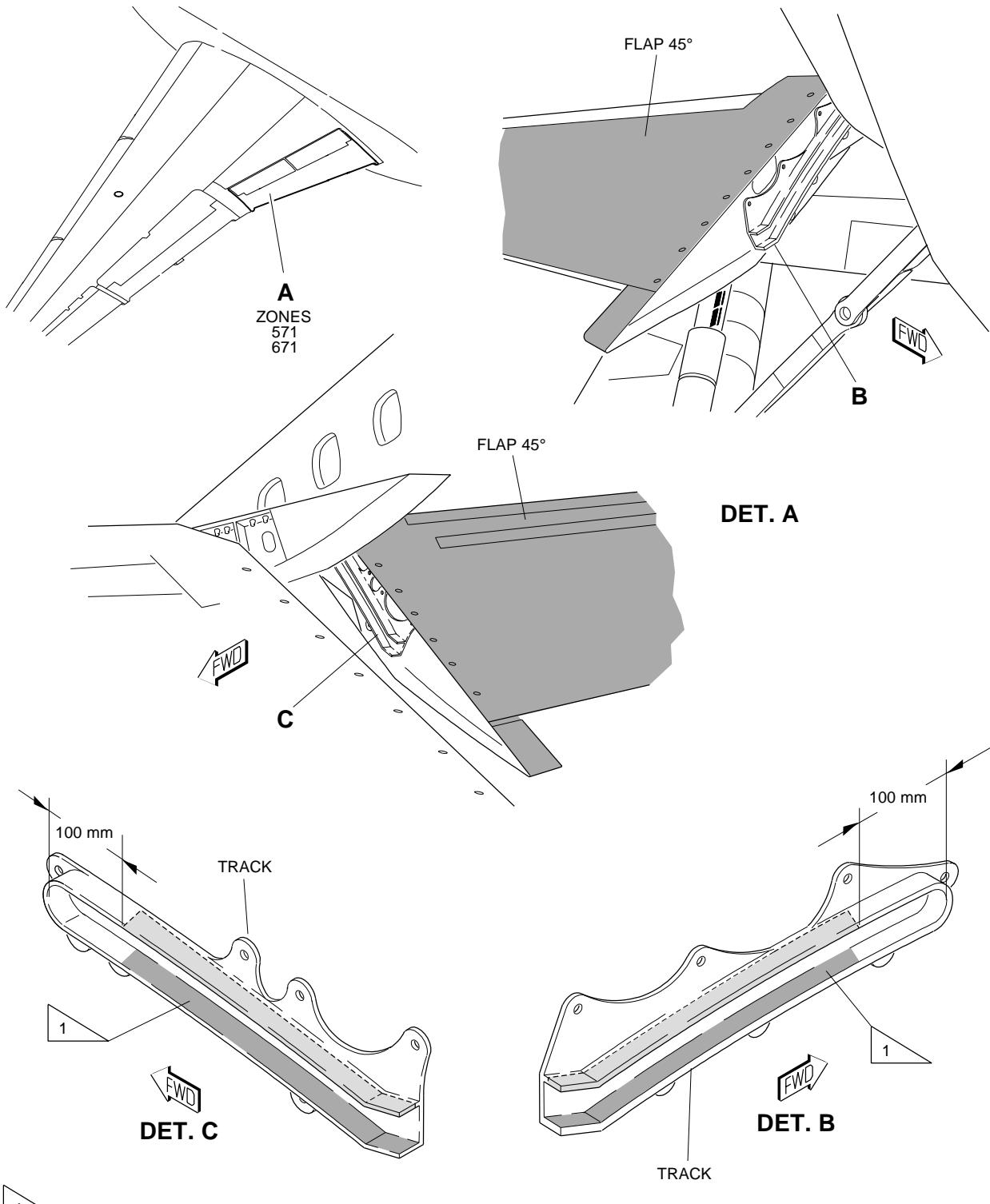


1 INSPECT THE SHADED AREA

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EFFECTIVITY: ALL

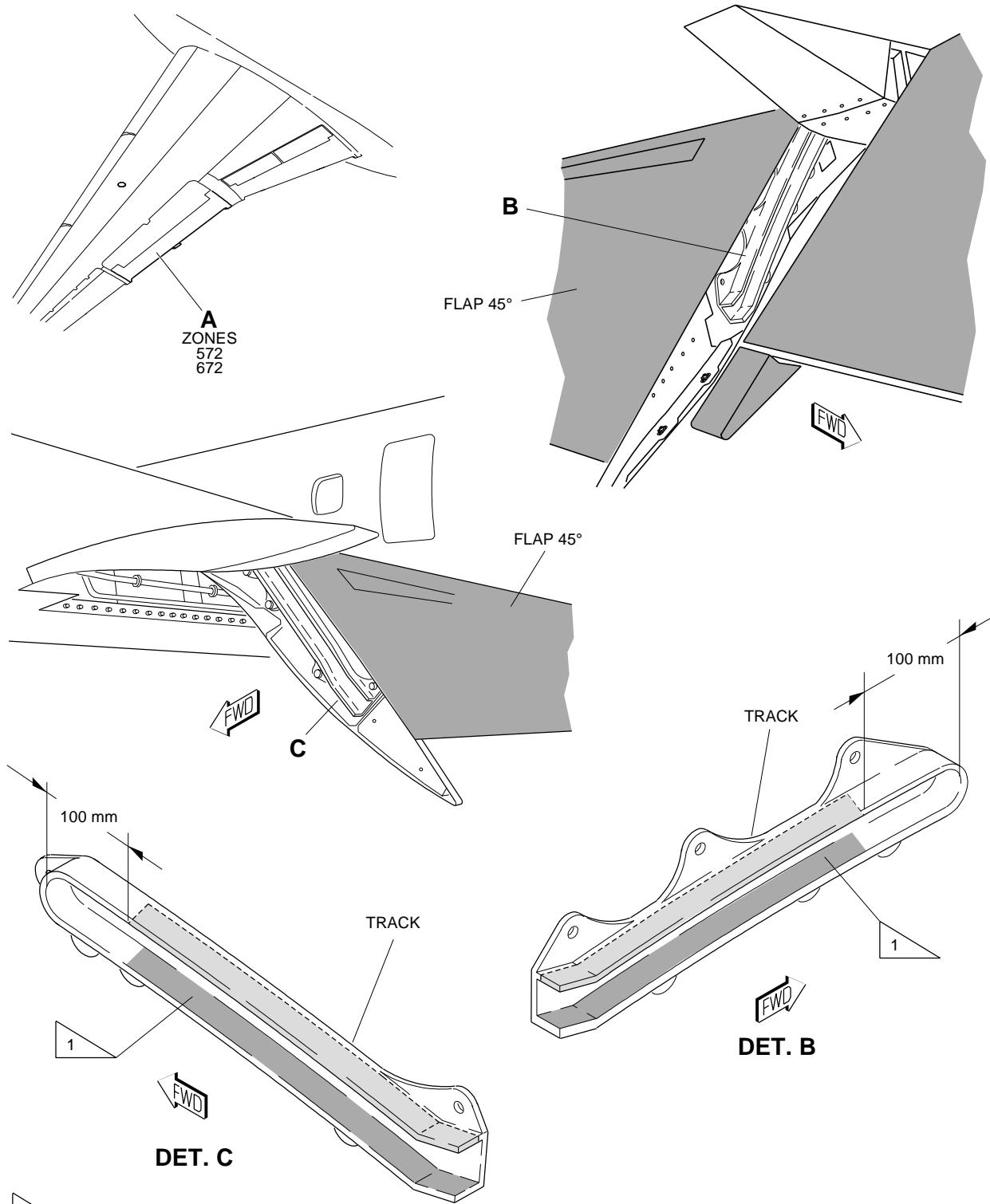
Area to Inspect the Inboard Flap Tracks for VFE Exceedance at 9°, 18° and 22° Flap Position
 Figure 605



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EFFECTIVITY: ALL

Area to Inspect the Outboard Flap Tracks for VFE Exceedance at 9°, 18° and 22° Flap Position
Figure 606

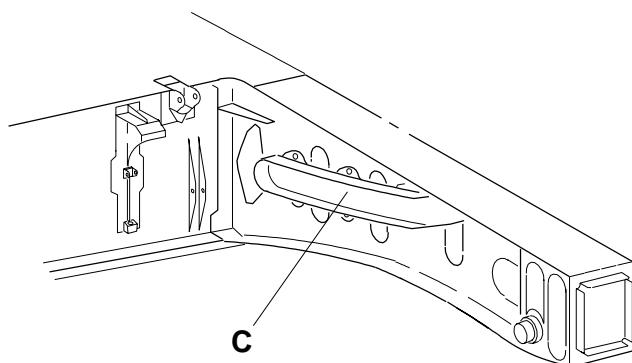
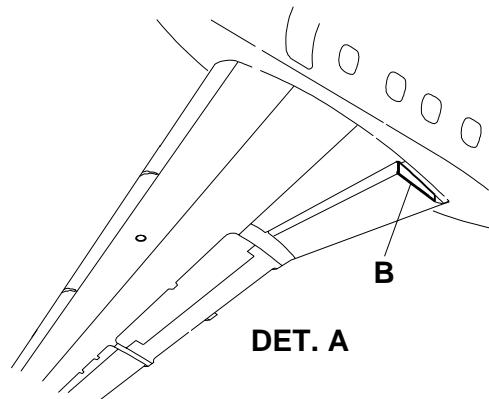
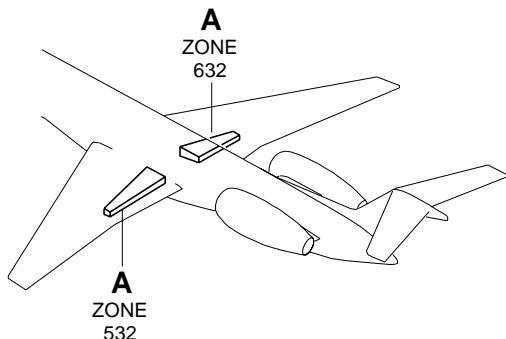
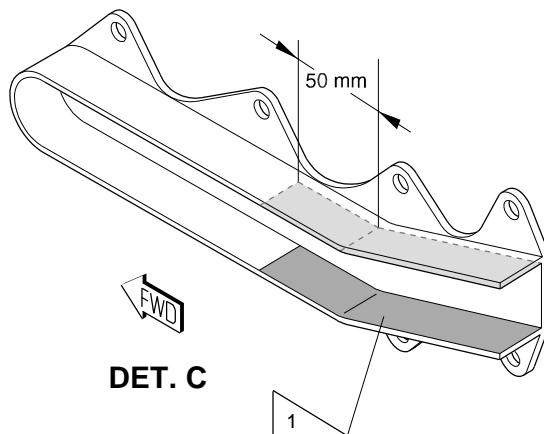


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EFFECTIVITY: ALL

Area to Inspect the Torque Box I Flap Track for VFE Exceedance at 45° Flap Position

Figure 607

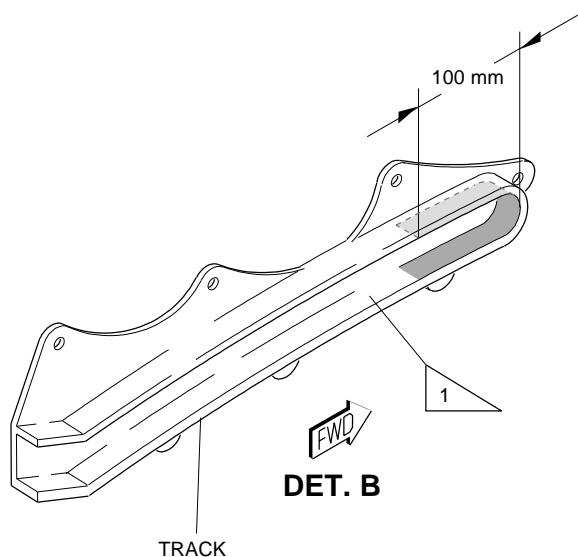
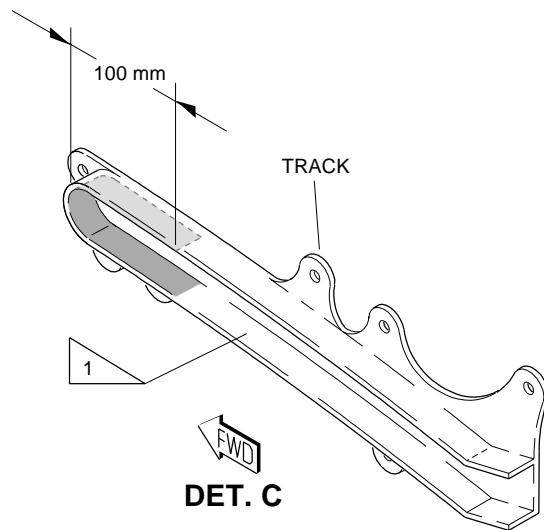
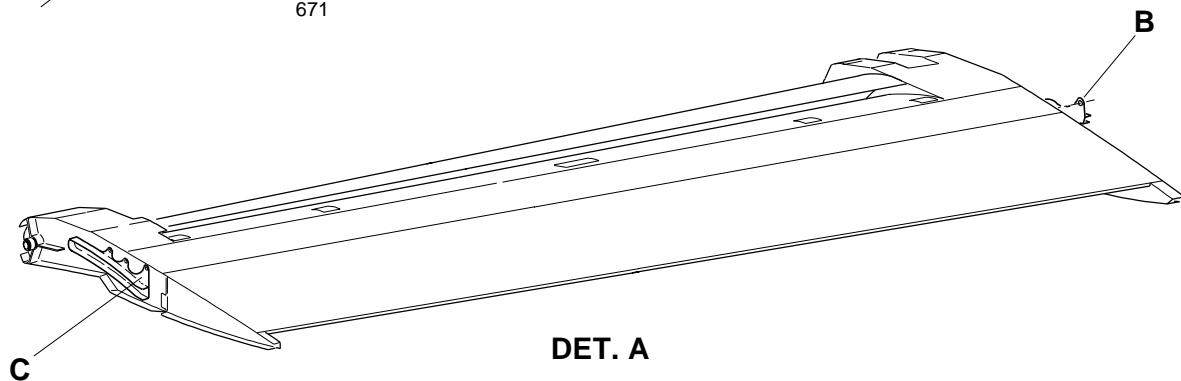
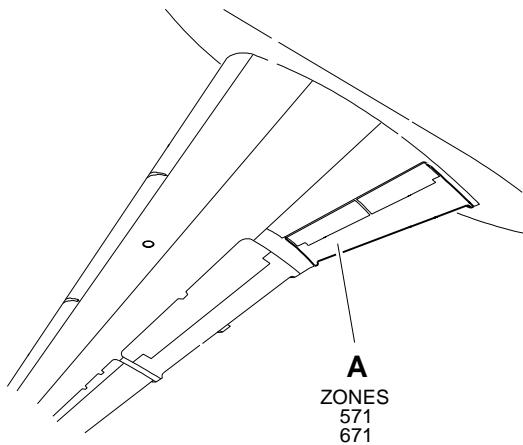

DET. B


INSPECT THE SHADED AREA

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EFFECTIVITY: ALL

Area to Inspect the Inboard Flap Tracks for VFE Exceedance at 45° Flap Position
Figure 608

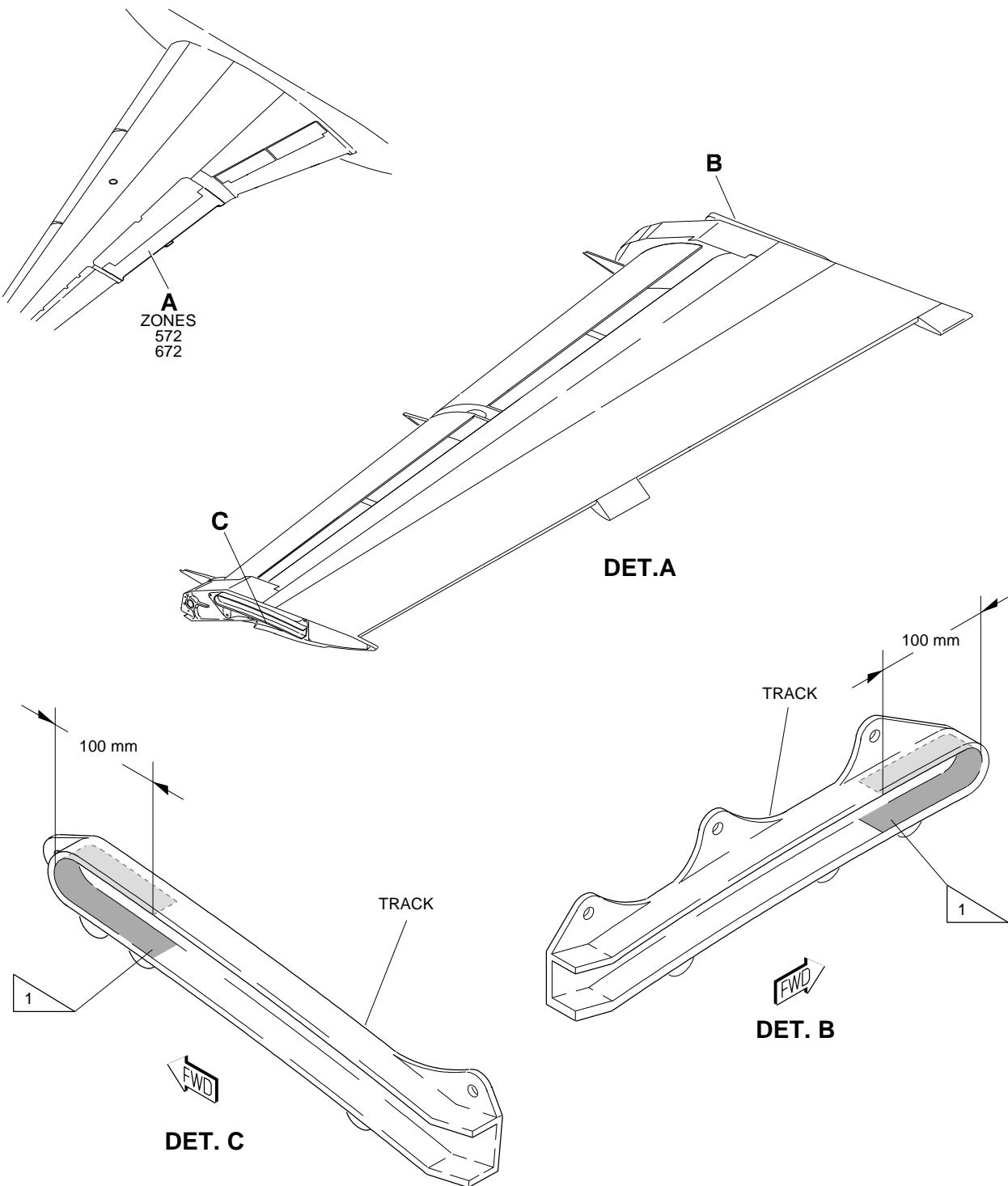


 1 INSPECT THE SHADED AREA

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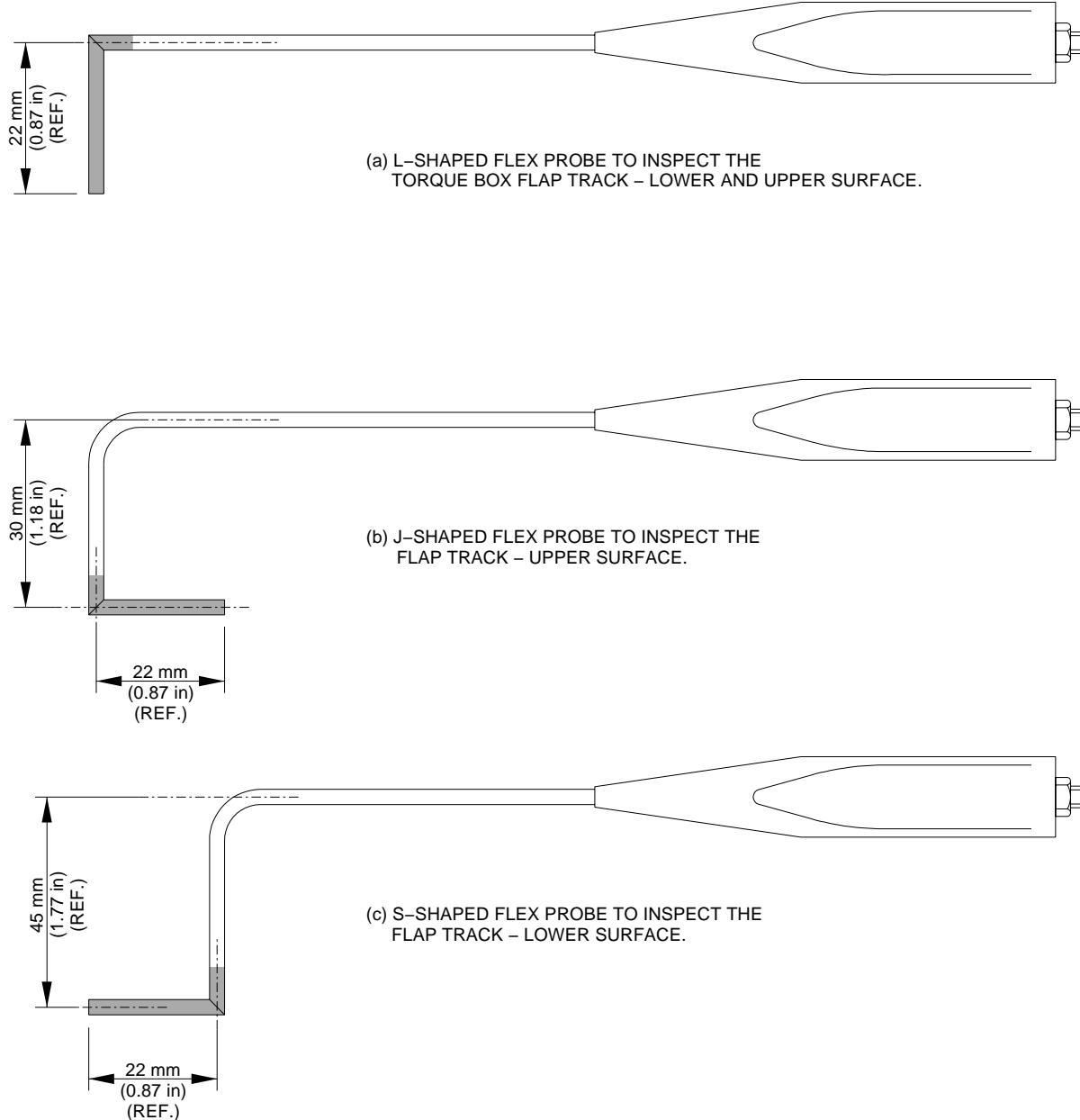
EFFECTIVITY: ALL

Area to Inspect the Outboard Flap Tracks for VFE Exceedance at 45° Flap Position
 Figure 609



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EFFECTIVITY: ALL

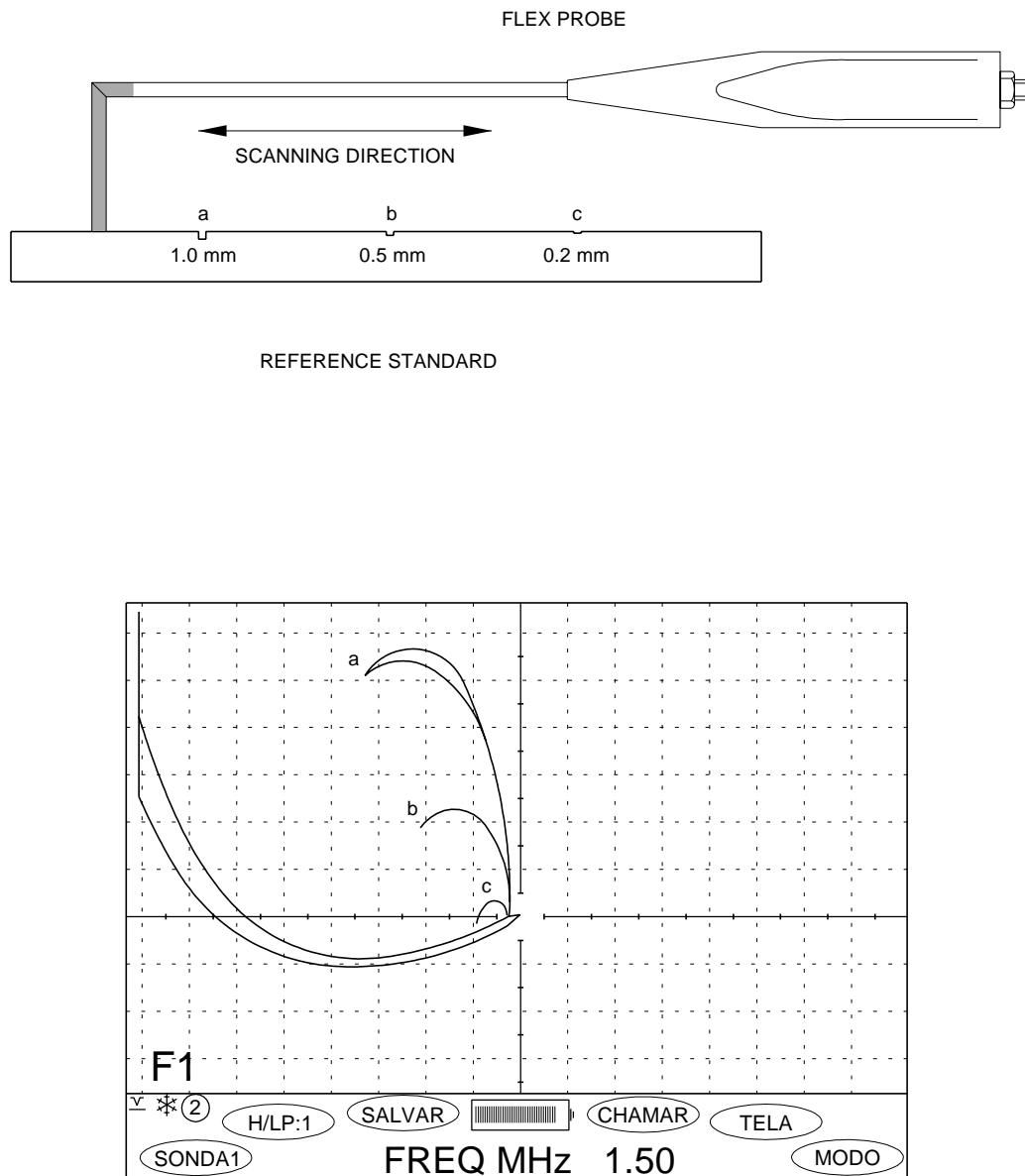
 Flex Probe Molding to do an Inspection of the Torque Box Flap Tracks and Flap Tracks
 Figure 610


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EFFECTIVITY: ALL

Equipment Signal Display and Probe Position

Figure 611

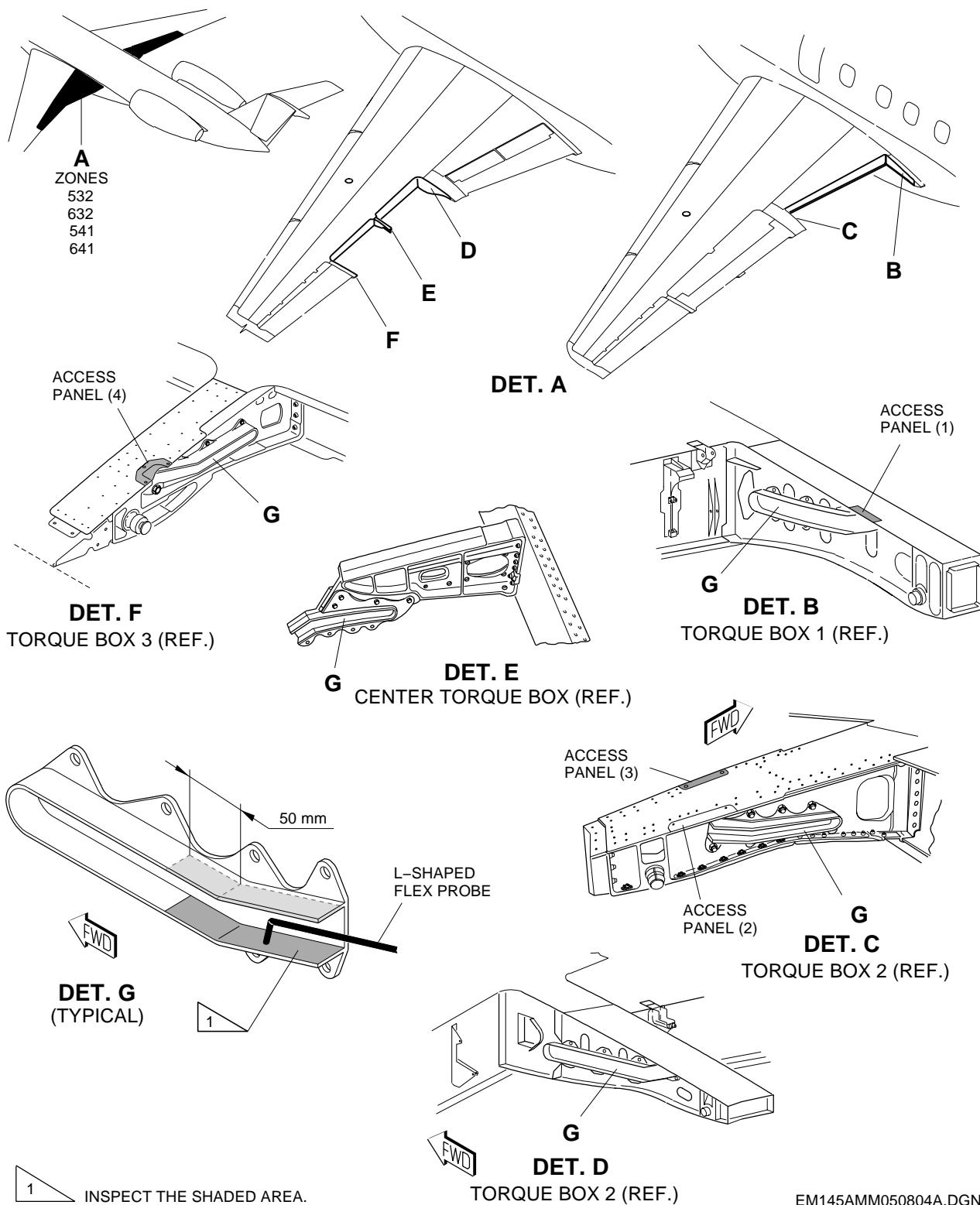


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EFFECTIVITY: ALL

Torque Box Flap Tracks Inspection using L-Shaped Flex Probe

Figure 612

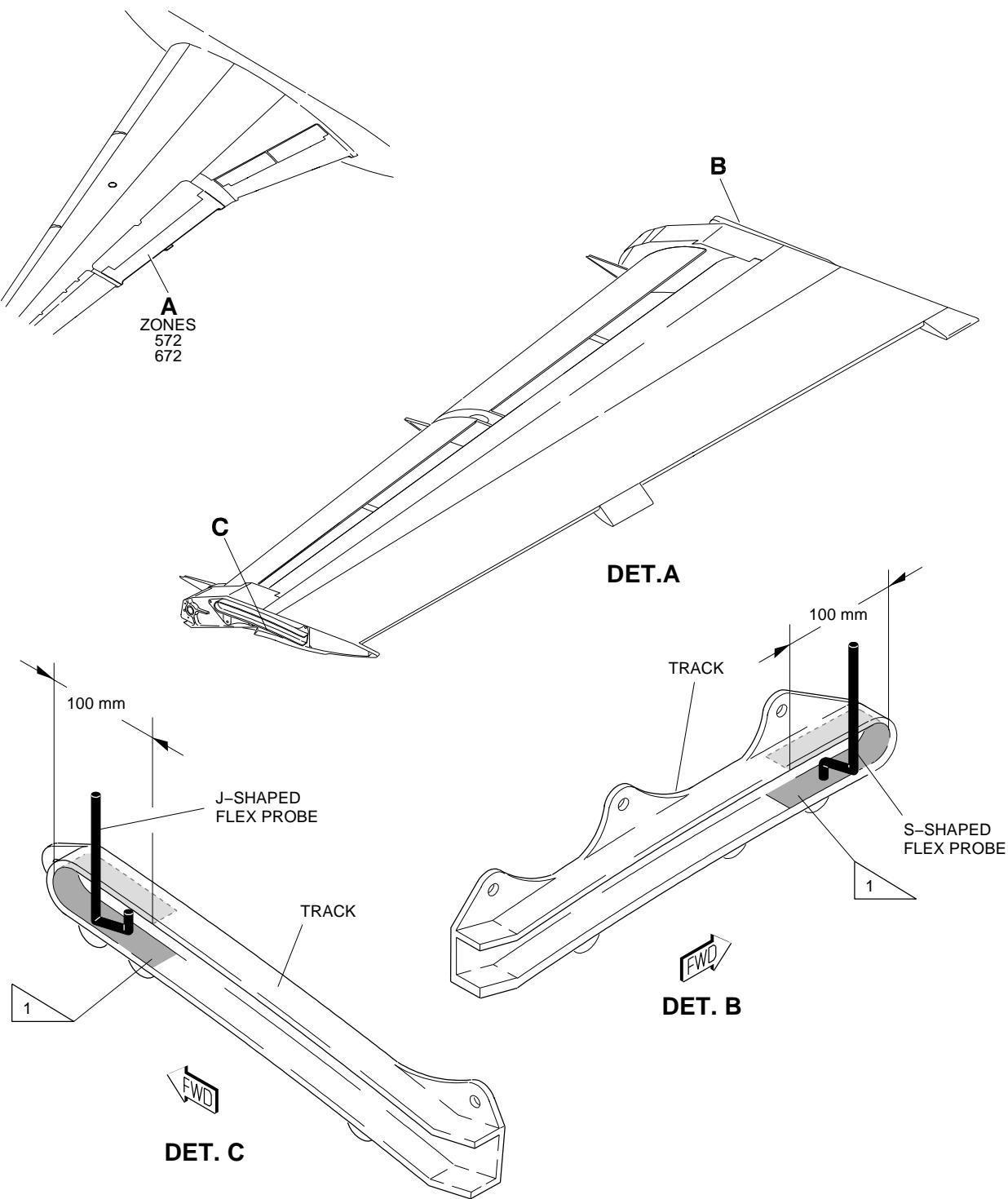


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EFFECTIVITY: ALL

Outboard Flap Tracks Inspection using J-Shaped and S-Shaped Flex Probe

Figure 613



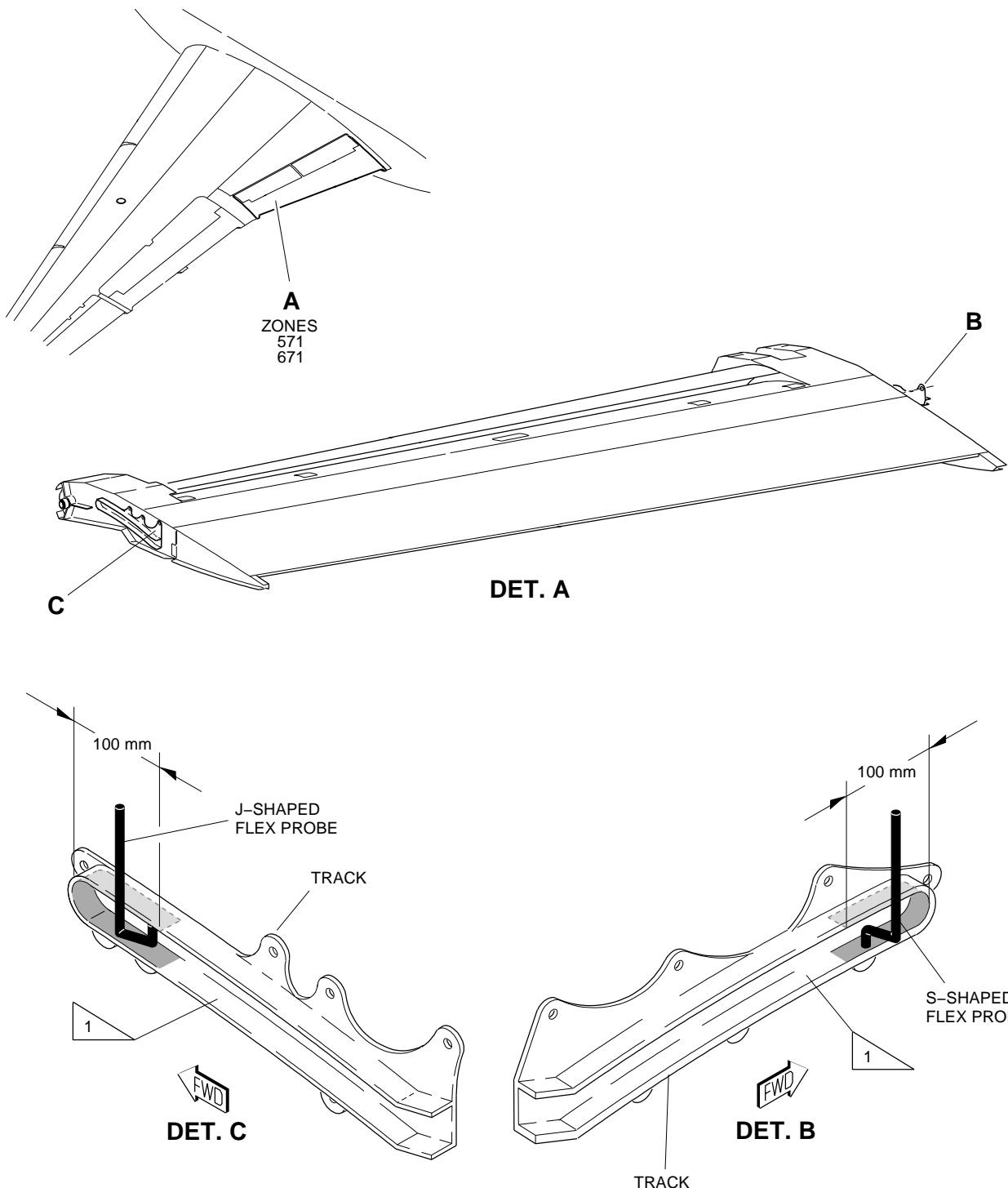
1 INSPECT THE SHADED AREA.

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EFFECTIVITY: ALL

Inboard Flap Tracks Inspection using the J-Shaped and S-Shaped Flex Probe

Figure 614



INSPECT THE SHADED AREA.

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