



AIRCRAFT MAINTENANCE MANUAL

SPOILERS - ADJUSTMENT/TEST

EFFECTIVITY: ALL

1. General

- A. This section gives the procedures to do the operational check of the spoiler system and the adjustment of the actuator of the spoilers.
- 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
27-63-01-700-801-A ♦	SPOILER SYSTEM - OPERATIONAL CHECK	ALL
27-63-01-700-802-A	SPOILER SURFACE - ADJUSTMENT	ALL
27-63-01-700-803-A	SPOILER SYSTEM (LOGIC) - OPERATIONAL CHECK	ALL



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TASK 27-63-01-700-801-A

EFFECTIVITY: ALL

2. SPOILER SYSTEM - OPERATIONAL CHECK

A. General

(1) This task gives the procedures to do the operational check of the spoiler system.

B. References

REFERENCE	DESIGNATION
AMM MPP 06-41-03/100	- COMPONENT LOCATION
AMM TASK 20-40-01-860-801-A/200	ENERGIZATION OF THE AIRCRAFT WITH AN EXTERNAL POWER SOURCE
AMM TASK 29-10-00-860-801-A/200	HYDRAULIC SYSTEM - PRESSURIZATION WITH HTS
SB 145-27-0028	-
SB 145-27-0032	-
SB 145-27-0059	-

C. Zones and Accesses

ZONE	PANEL/DOOR	LOCATION
223	223LZ	Cockpit

D. Tools and Equipment

ITEM	DESCRIPTION	PURPOSE	QTY
GSE 044	Head Set, Ramp	For communications	

E. Auxiliary Items

Not Applicable

F. Consumable Materials

Not Applicable

G. Expandable Parts

Not Applicable

H. Persons Recommended

QTY	FUNCTION	PLACE
1	Does the task	Cockpit
1	Does the task	Outside the aircraft

I. Preparation

SUBTASK 841-002-A

(1) Make sure that the aircraft is safe for maintenance.



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- (2) Make sure that the flaps are in the 0-degree position.
- (3) Open Maintenance Panel door 223LZ ([AMM MPP 06-41-03/100](#)).
- (4) Energize the aircraft with the External DC Power Supply ([AMM TASK 20-40-01-860-801-A/200](#)).
- (5) Pressurize the hydraulic system ([AMM TASK 29-10-00-860-801-A/200](#)).

J. Operationally Check Spoiler System ([Figure 501](#))

SUBTASK 710-002-A

WARNING: MAKE SURE THAT THERE ARE NO PERSONS OR EQUIPMENT IN THE FLAP AND SPOILER TRAVEL AREA.

- (1) Make sure that the AIR GROUND A, B, C, and D circuit breakers are closed.
 - (2) Do an operational check of the ground spoiler.
 - (a) Set the engine thrust lever to the flight IDLE position.
 - (b) On the Maintenance Panel, set the SPOILER switch to the TEST position until the spoilers open.
 - 1 The ground spoiler panels open.
 - 2 On the EICAS display, there is an indication of open spoiler.
 - (c) On the Maintenance Panel, release the SPOILER switch at the NORM position.
 - 1 The ground spoiler panels close.
 - 2 On the EICAS display, there is an indication of closed spoiler.
 - (3) Do an operational check of the speed brake.
 - (a) Do this step (a) only for aircraft PRE-MOD [SB 145-27-0032](#) (for FAA-Certified Aircraft) or PRE-MOD [SB 145-27-0059](#) (for JAA-Certified Aircraft).
 - 1 On the Maintenance Panel, set the ADC 1 and ADC 2 test switches and keep them in this position.
 - (b) Make sure that the engine thrust levers are in the flight IDLE position.
 - (c) Set the horizontal stabilizer to the neutral position.
- NOTE: The maximum actuation time of the pitch trim is 3 seconds.
- WARNING: MAKE SURE THERE ARE NO PERSONS OR EQUIPMENT IN THE HORIZONTAL STAB MOVEMENT AREA.**
- (d) Set the speed-brake control lever to the OPEN position.
 - 1 The speed brake panels open.
 - 2 On the EICAS display, there is an indication of open spoiler.



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- 3 On the EICAS display, the pitch-trim indication arrow moves up.
 - (e) Set the speed-brake control lever to the CLOSE position.
 - 1 The speed brake panels close.
 - 2 On the EICAS display, the pitch-trim indication arrow moves down.
 - (f) Do this step (f) only for aircraft, PRE-MOD [SB 145-27-0032](#)(for FAA-Certified Aircraft) or PRE-MOD [SB 145-27-0059](#) (for JAA-Certified Aircraft).
 - 1 Set the speed-brake control lever to the OPEN position.
 - a The speed brake panels open.
 - b On the EICAS display, there is an indication of open spoiler.
 - c On the EICAS display, the pitch-trim indication arrow moves up.
 - 2 On the Maintenance Panel, release the ADC 1 and ADC 2 test switches.
 - a The speed brake panels close.
 - b On the EICAS display, the pitch-trim indication arrow moves down.
 - c On the EICAS display, the SPBK LVR DISAGREE caution message comes into view.
 - 3 Set the speed-brake control lever to the CLOSE position.
 - a On the EICAS display, the SPBK LVR DISAGREE caution message goes out of view.
 - 4 Set the ADC 1 and ADC 2 test switches and keep them in this position.
- (g) Do this step (g) only for aircraft POST-MOD [SB 145-27-0028](#).
 - 1 Set the flap selector lever to the 9-degree position.
 - 2 Set the speed-brake control lever to the OPEN position.
 - a The speed brake panels open.
 - b On the EICAS display, there is an indication of open spoiler.
 - c On the EICAS display, the pitch-trim indication arrow moves up.
 - 3 Set the flap selector lever to a position above 9 degrees.
 - a The speed brake panels close automatically.
 - b On the EICAS display, the SPBK LVR DISAGREE caution message comes into view.

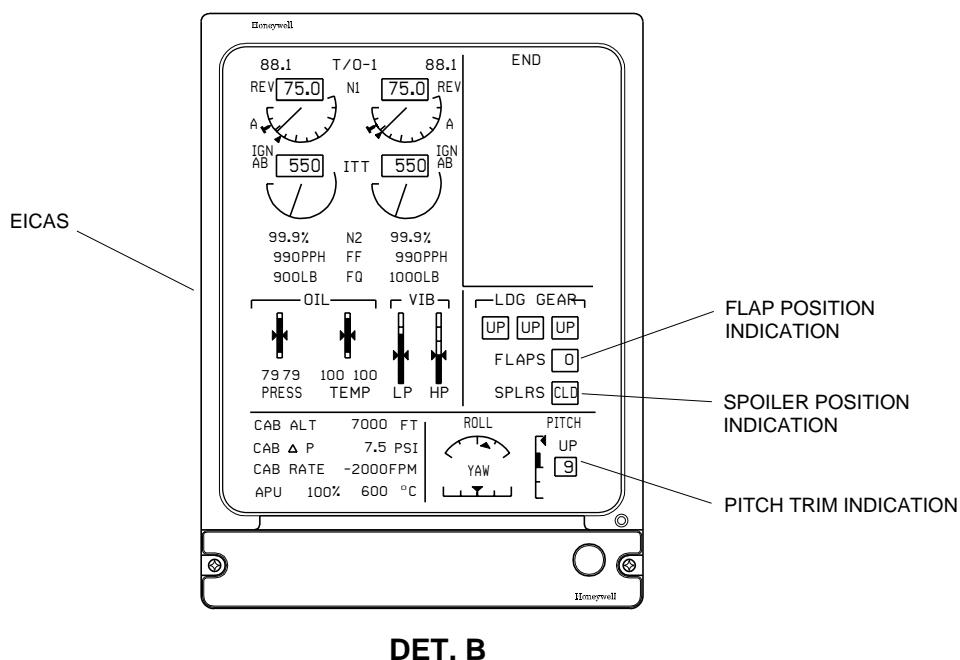
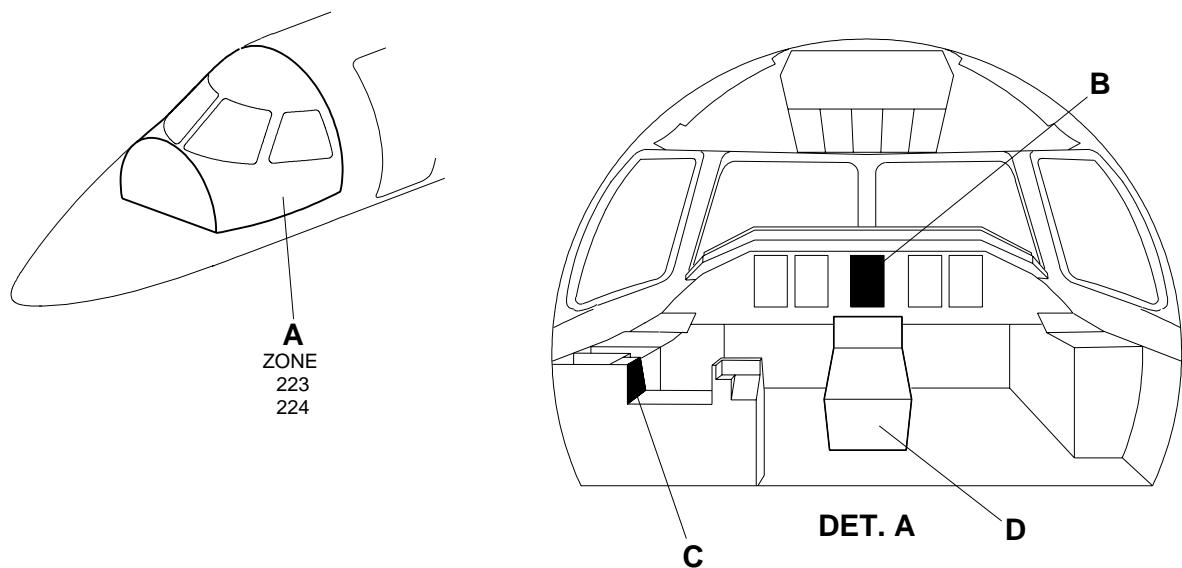


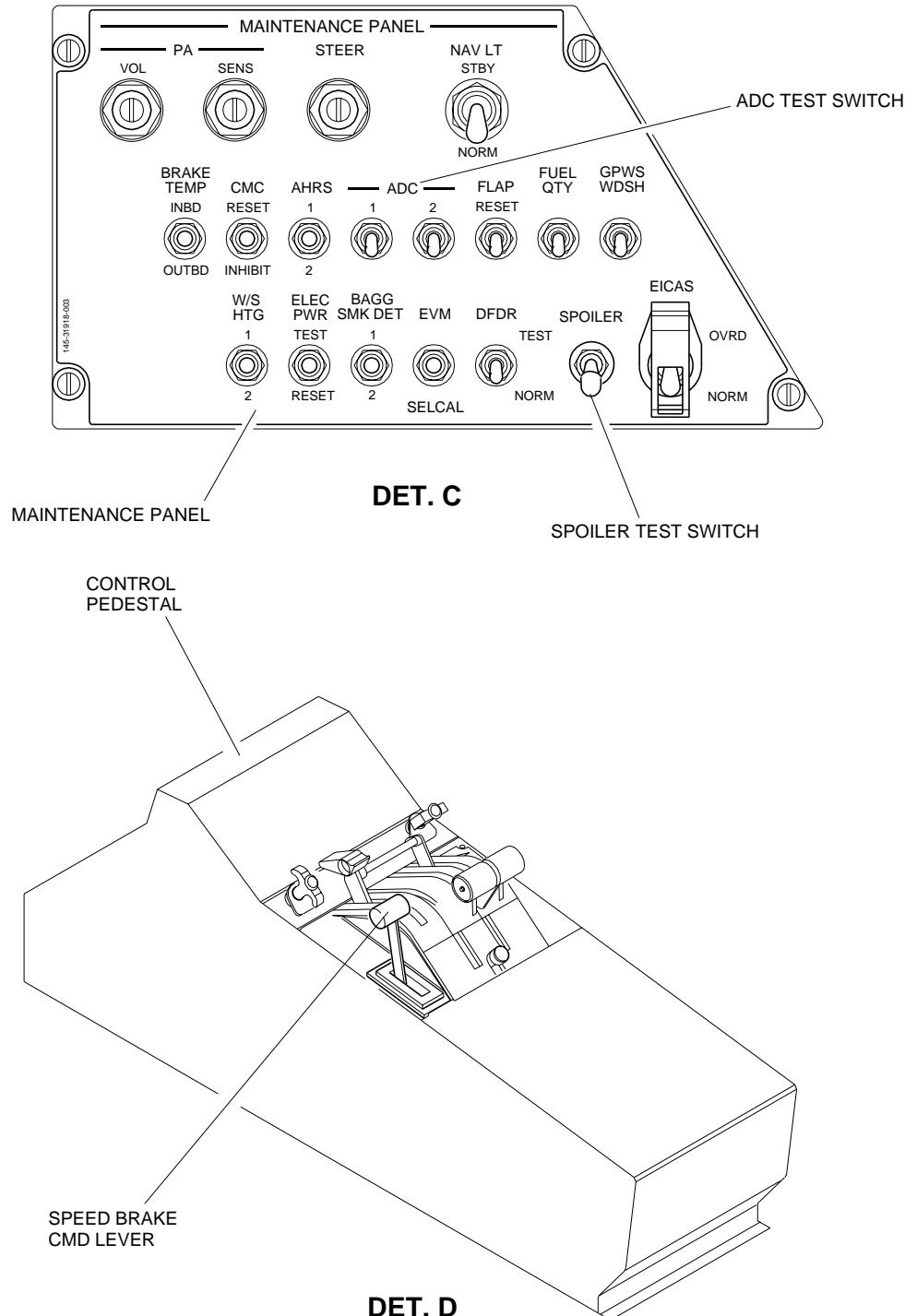
- 4 Set the speed-brake control lever to the CLOSE position.
 - a On the EICAS display, the SPBK LVR DISAGREE caution message goes out of view.
 - 5 Set the flap selector lever to zero-degree position.
- (h) Do this step (h) only for aircraft, PRE-MOD [SB 145-27-0032](#) (for FAA-Certified Aircraft) or PRE-MOD [SB 145-27-0059](#) (for JAA-Certified Aircraft).
- 1 On the Maintenance Panel, release the ADC 1 and ADC 2 test switches.

K. Follow-on

SUBTASK 842-002-A

- (1) Close Maintenance Panel door 223LZ ([AMM MPP 06-41-03/100](#)).
- (2) Release the pressure from the hydraulic system ([AMM TASK 29-10-00-860-801-A/200](#)).
- (3) Deenergize the aircraft ([AMM TASK 20-40-01-860-801-A/200](#)).

EFFECTIVITY: ALL
EICAS Display, Maintenance Panel, and Control Pedestal - Location
Figure 501 - Sheet 1


EFFECTIVITY: ALL
EICAS Display, Maintenance Panel, and Control Pedestal - Location
Figure 501 - Sheet 2


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TASK 27-63-01-700-802-A

EFFECTIVITY: ALL

3. SPOILER SURFACE - ADJUSTMENT

A. General

- (1) This task gives the procedures to adjust the spoiler surface.
- (2) The adjustment of the spoiler surface is done in the spoiler actuators and in the proximity sensors. The adjustment of the inboard and outboard panels is independent of each other.
- (3) After the adjustment, the disagreement between the inboard and outboard spoiler surfaces is normal.

B. References

REFERENCE	DESIGNATION
AMM TASK 20-40-01-860-801-A/200	ENERGIZATION OF THE AIRCRAFT WITH AN EXTERNAL POWER SOURCE
AMM TASK 27-63-01-700-801-A/500	SPOILER SYSTEM - OPERATIONAL CHECK
AMM TASK 29-10-00-860-801-A/200	HYDRAULIC SYSTEM - PRESSURIZATION WITH HTS
AMM TASK 57-56-01-000-801-A/400	INBOARD AND OUTBOARD FLAP LOWER SHROUDS - REMOVAL
AMM TASK 57-56-01-400-801-A/400	INBOARD AND OUTBOARD FLAP LOWER SHROUDS - INSTALLATION
IPC 57-72-00	GROUND SPOILER

C. Zones and Accesses

Not Applicable

D. Tools and Equipment

ITEM	DESCRIPTION	PURPOSE	QTY
GSE 044	Headset, Ramp	For communications	

E. Auxiliary Items

Not Applicable

F. Consumable Materials

SPECIFICATION (BRAND)	DESCRIPTION	QTY
MS20995C32	Lockwire	AR

G. Expendable Parts

ITEM	IPC REFERENCE (VENDOR REFERENCE)	QTY
Shim	IPC 57-72-00	AR

H. Persons Recommended

QTY	FUNCTION	PLACE
1	Does the task	Cockpit
1	Does the task	Wing trailing edge

I. Preparation
SUBTASK 841-003-A

WARNING: MAKE SURE THAT THERE ARE NO PERSONS OR EQUIPMENT IN THE FLAP AND SPOILER TRAVEL AREA.

- (1) Make sure that the aircraft is safe for maintenance.
- (2) Energize the aircraft with the External DC Power Supply ([AMM TASK 20-40-01-860-801-A/200](#)).

WARNING: MAKE SURE THAT THERE ARE NO PERSONS OR EQUIPMENT IN THE FLAP TRAVEL AREA.

- (3) Set the flaps to the 45-degree position.

CAUTION: TO MOVE THE FLAPS WHEN YOU OPEN THE INBOARD-FLAP LOWER SHROUD, DO AS FOLLOWS (IT WILL PREVENT DAMAGE TO THE INBOARD-FLAP LOWER SHROUD AND INBOARD-FLAP LEADING EDGE):

- RELEASE THE SPRING FROM THE ROOT AND TIP SUPPORTS OF THE INBOARD-FLAP LOWER SHROUD.
- REMOVE THE TIP AND ROOT SUPPORTS ONLY FROM THE INBOARD-FLAP LOWER SHROUD ([AMM TASK 57-56-01-000-801-A/400](#)).

- (4) Open the lower shroud of the inboard flap ([AMM TASK 57-56-01-000-801-A/400](#)).

- (5) Cut and remove the lockwire from the jam nut and the lock washer ([Figure 504](#)).

WARNING: MAKE SURE THAT THERE ARE NO PERSONS OR EQUIPMENT IN THE FLAP TRAVEL AREA.

- (6) Set the flaps to the zero-degree position.

- (7) Make sure that the spoiler panels are closed and the spoiler actuators are fully retracted.

- (8) Pressurize the hydraulic system ([AMM TASK 29-10-00-860-801-A/200](#)).

J. Adjustment of the Spoiler Surface ([Figure 502](#))
SUBTASK 720-002-A

- (1) Measure the gap between the speed brake trailing edge, and ground spoiler trailing edge to the rubbing strips of the inboard flap. These gaps measurements must be done only on rubbing strips 2 and 4 (Refer to DET. A and DET. B).
 - The table below shows the three possible aircraft configuration to do the spoilers adjustment.

Table 501 - SPOILERS ADJUSTMENT

AIRCRAFT CONFIGURATION	GROUND SPOILER (mm)	SPEED BRAKE (mm)
ON JACK NO FUEL	0.5 ± 0.5	0.5 ± 0.5
ON GROUND NO FUEL	2.5 ± 0.8	1.2 ± 0.6
ON GROUND WITH FUEL	3.5 ± 0.8	1.7 ± 0.8

- NOTE:**
- Consider aircraft ON GROUND NO FUEL if the wing tanks are filled to less than half their capacity.
 - Consider aircraft ON GROUND WITH FUEL if the wing tanks are filled to more than half their capacity.
 - The auxiliary tanks, if applicable, need to be empty considering the three possible aircraft configuration showed on the table.

- (2) Release the pressure from the hydraulic system ([AMM TASK 29-10-00-860-801-A/200](#)).
- (3) If necessary, adjust the spoiler actuator in relation to the surface that is out of specification ([Figure 503](#) and [Figure 504](#)):

WARNING: MAKE SURE THAT THERE ARE NO PERSONS OR EQUIPMENT IN THE FLAP TRAVEL AREA.

- (a) Set the flaps to the 45-degree position.
- (b) Release the jam nut and lock washer ([Figure 504](#)).
- (c) Adjust the rod end of the actuator. Turn the piston hex end to decrease the gap ([Figure 504](#)).

NOTE: The rod end of the actuator is adjustable at each 60 degrees.

WARNING: MAKE SURE THAT THERE ARE NO PERSONS OR EQUIPMENT IN THE FLAP TRAVEL AREA.

- (d) Set the flaps to the zero-degree position.

- WARNING:**
- MAKE SURE THAT THERE ARE NO PERSONS OR EQUIPMENT IN THE SPOILER TRAVEL AREA.**
 - WHEN YOU PRESSURIZE THE HYDRAULIC SYSTEM, THE SPOILER PANELS CLOSE.**

- (e) Pressurize the hydraulic system ([AMM TASK 29-10-00-860-801-A/200](#)).
- (4) Do an inspection to make sure that the gap between the panels and the inboard flap is correct, according to the Table 501.
- (5) If not, do step (3) again, until the gap is adjusted.

WARNING: MAKE SURE THAT THERE ARE NO PERSONS OR EQUIPMENT IN THE FLAP TRAVEL AREA.

- (6) Set the flaps to the 45-degree position.
- (7) Tighten the jam nut and lock washer against the piston and safety them ([Figure 504](#)).
- (8) Measure the gap from the target to the proximity sensor. See [Figure 505](#).

Table 502

GAP = 1.4 ± 0.1 mm

- (9) Measure the gap from the target to the proximity sensor. See [Figure 506](#).

Table 503

GAP = 1.8 ± 0.1 mm

- (10) If necessary, adjust the gap of the proximity sensors ([Figure 505](#) and [Figure 506](#)).
 - (a) Adjust the gap of 1.4 ± 0.1 mm between the target (1) of each panel and the tip of the proximity sensor. See [Figure 505](#).
 - 1 To adjust the gap, replace the target delaminable shim (2).
 - (b) Adjust the gap of 1.8 ± 0.1 mm between the target (3) installed in the speed brake and the proximity sensor (4) installed in the wing trailing edge. See [Figure 506](#).

NOTE: This proximity sensor is installed in the left wing only.

 - 1 To adjust the gap, adjust the proximity sensor support by loosing the bolt (1) and moving the bracket (3).

NOTE: After the adjustment, the disagreement between the inboard and outboard spoiler surfaces is normal.

K. Follow-on

SUBTASK 842-003-A

- (1) Do the operational check of the Spoiler System ([AMM TASK 27-63-01-700-801-A/500](#)).

WARNING: MAKE SURE THAT THERE ARE NO PERSONS OR EQUIPMENT IN THE FLAP TRAVEL AREA.

- (2) Set the flaps to the 45-degree position.
- (3) Close the lower shroud of the inboard flap ([AMM TASK 57-56-01-400-801-A/400](#)).

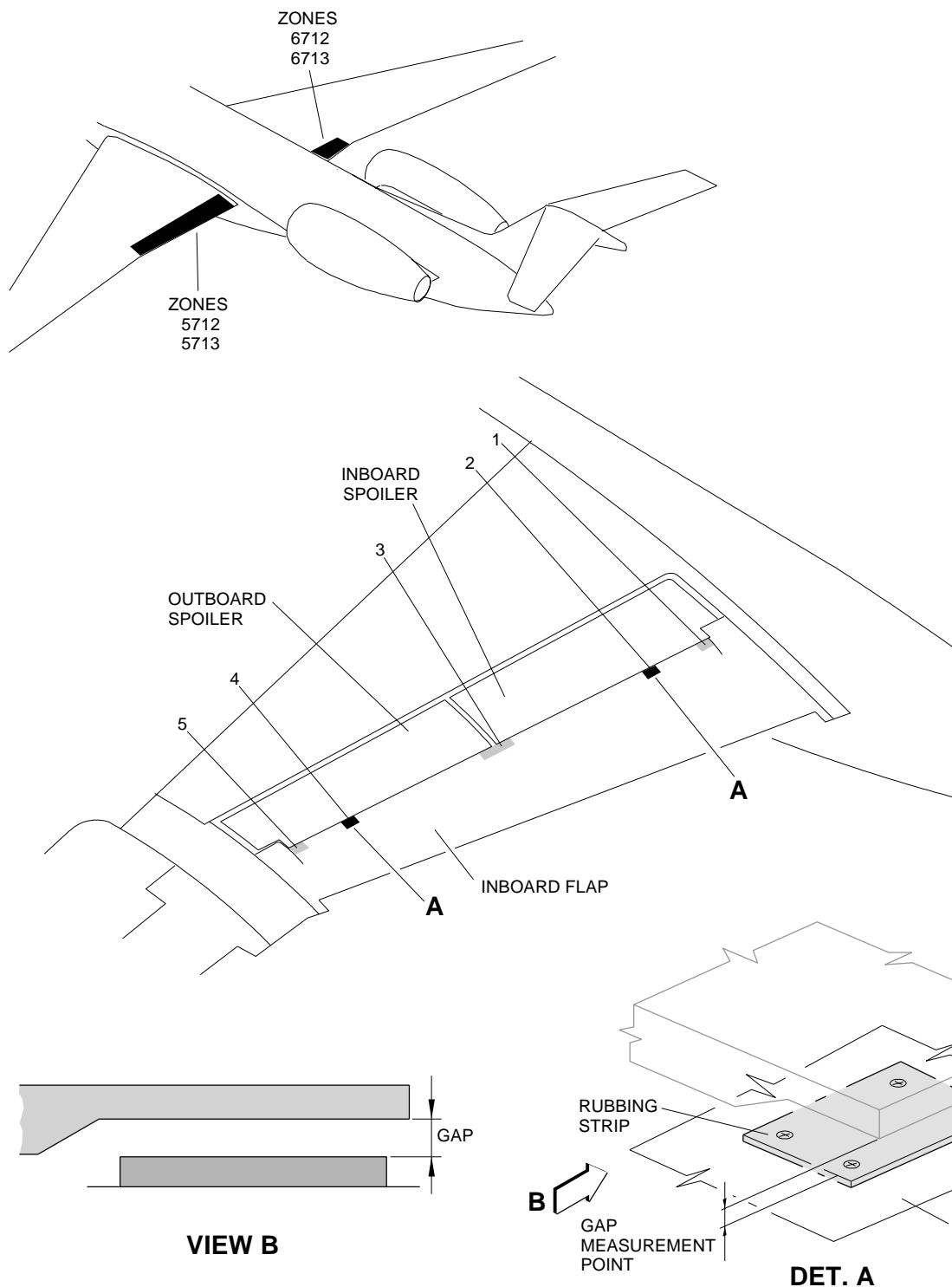
WARNING: MAKE SURE THAT THERE ARE NO PERSONS OR EQUIPMENT IN THE FLAP TRAVEL AREA.

- (4) Set the flaps to the zero-degree position.
- (5) Deenergize the aircraft ([AMM TASK 20-40-01-860-801-A/200](#)).

EFFECTIVITY: ALL

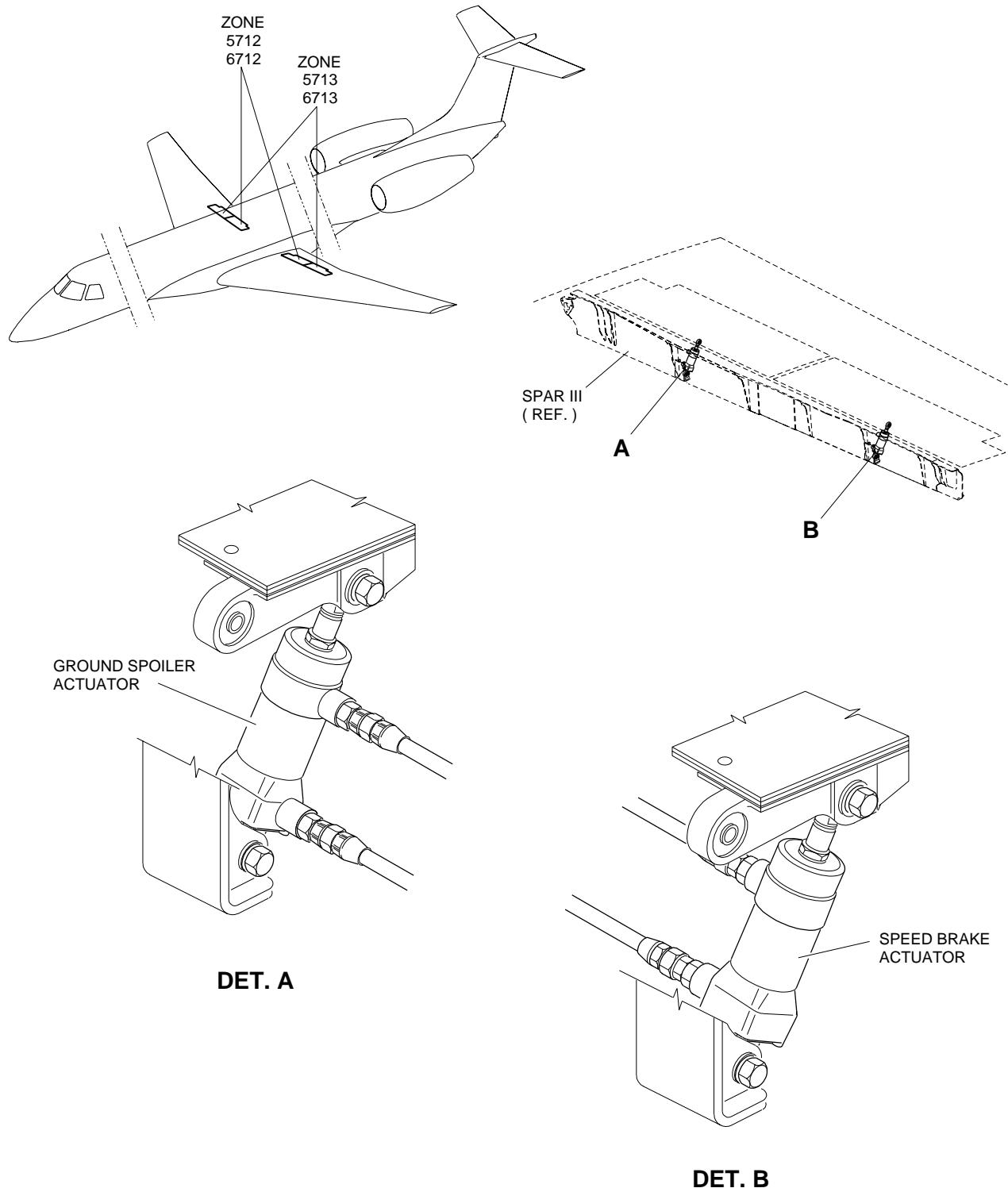
Gap between Spoiler and Inboard Flap

Figure 502



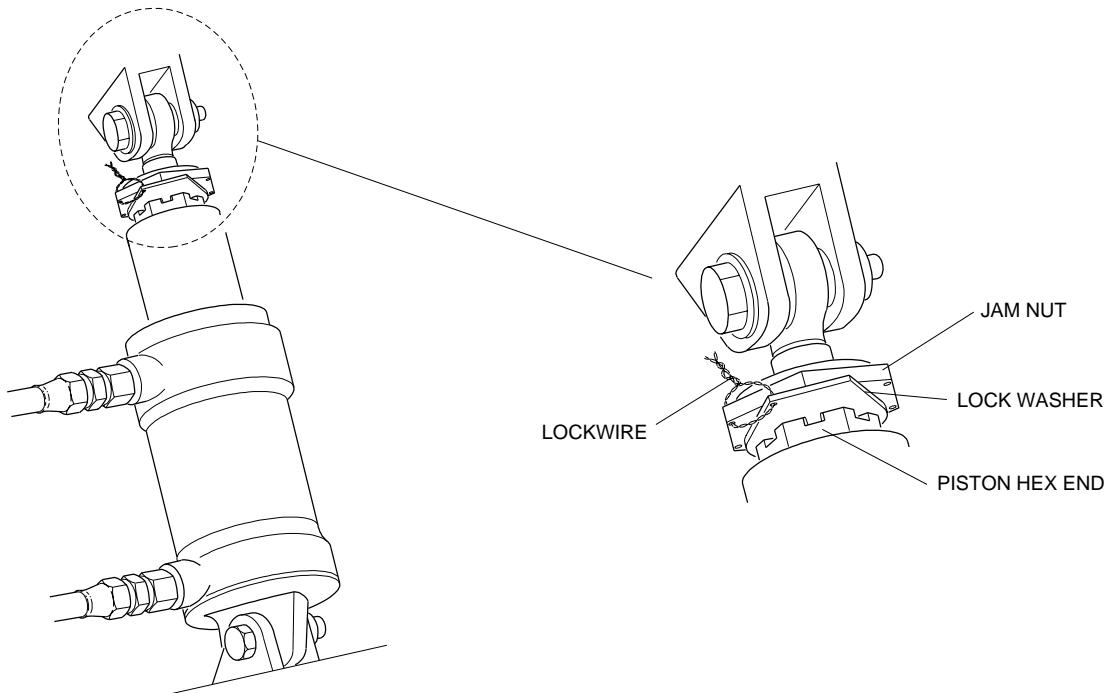
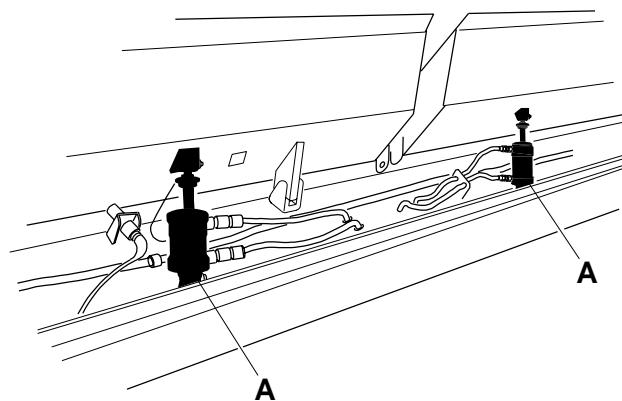
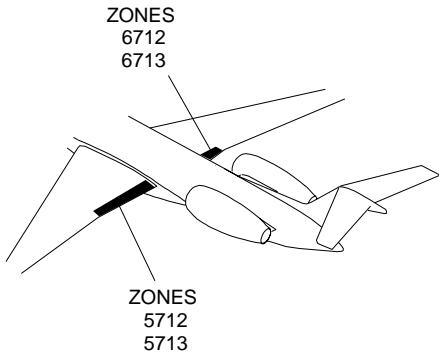
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EFFECTIVITY: ALL
 Spoiler Actuator, GSE 066
 Figure 503



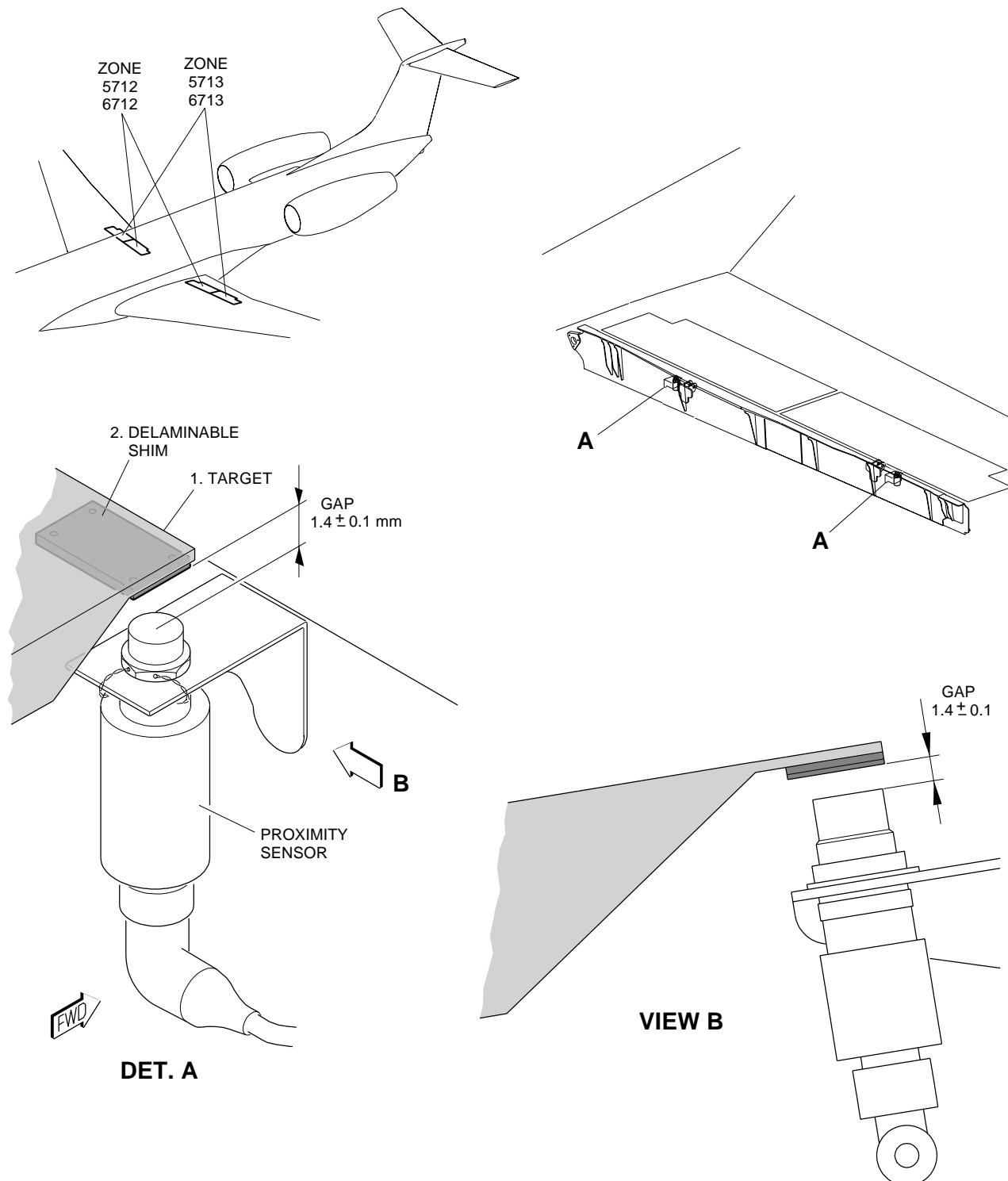
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EFFECTIVITY: ALL
Spoiler Actuator - Adjustment
Figure 504



DET. A
(TYPICAL)

EFFECTIVITY: ALL
Proximity Sensor - Adjustment
Figure 505

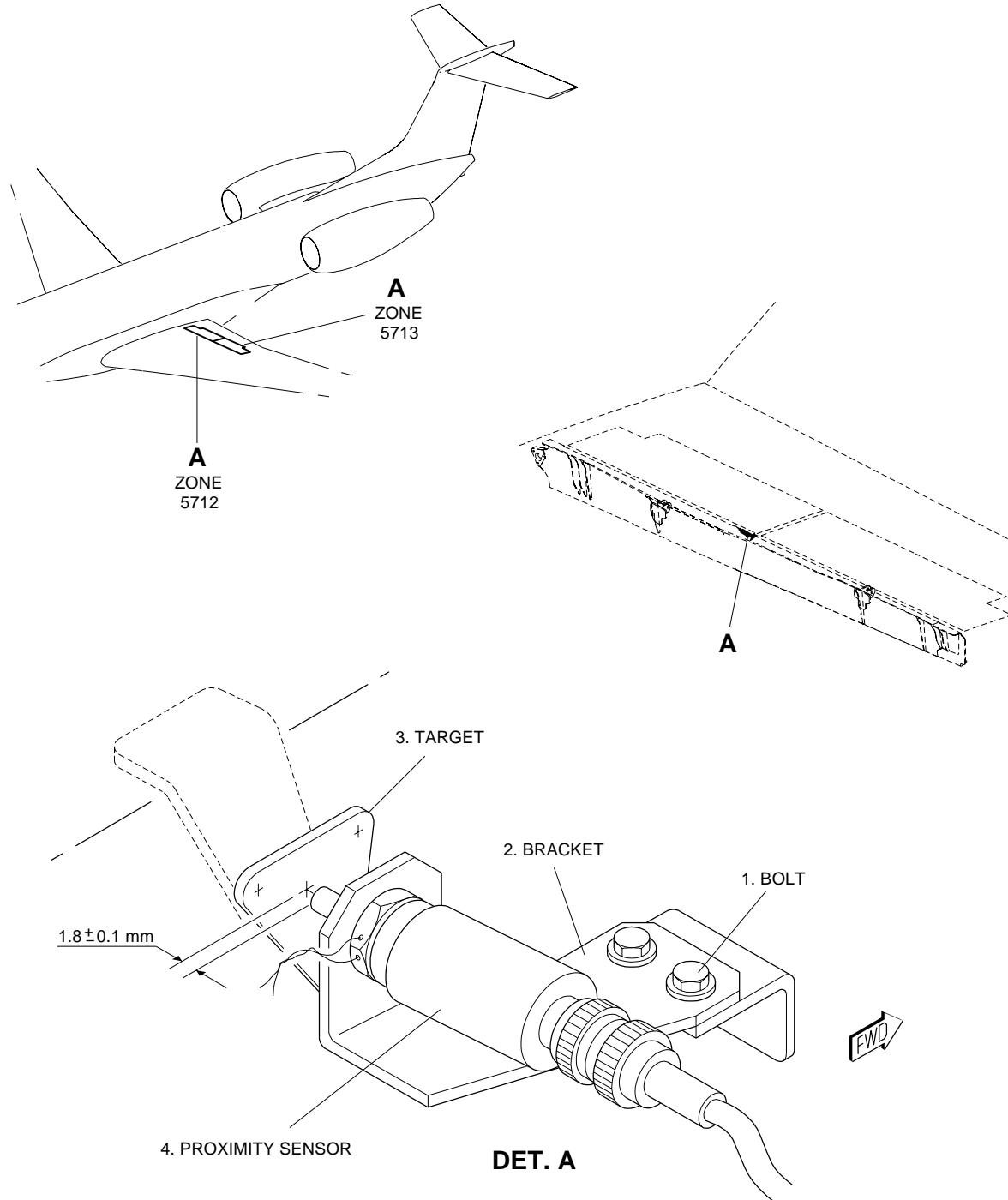


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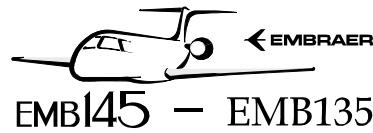
EFFECTIVITY: ALL

Proximity Sensor - Adjustment

Figure 506



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TASK 27-63-01-700-803-A

EFFECTIVITY: ALL

4. SPOILER SYSTEM (LOGIC) - OPERATIONAL CHECK

A. General

(1) This task gives the procedures to do the operational check of the spoiler system.

B. References

REFERENCE	DESIGNATION
AMM MPP 06-41-03/100	- COMPONENT LOCATION
AMM TASK 20-40-01-860-801-A/200	ENERGIZATION OF THE AIRCRAFT WITH AN EXTERNAL POWER SOURCE
AMM TASK 29-10-00-860-801-A/200	HYDRAULIC SYSTEM - PRESSURIZATION WITH HTS
FIM TASK 27-63-00-810-802-A	-
SB 145-27-0028	-
SB 145-27-0032	-
SB 145-27-0059	-

C. Zones and Accesses

ZONE	PANEL/DOOR	LOCATION
223	223LZ	Cockpit

D. Tools and Equipment

ITEM	DESCRIPTION	PURPOSE	QTY
GSE 044	Head Set, Ramp	For communications	

E. Auxiliary Items

Not Applicable

F. Consumable Materials

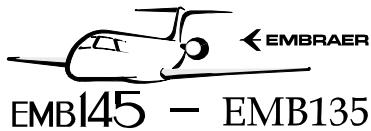
Not Applicable

G. Expandable Parts

Not Applicable

H. Persons Recommended

QTY	FUNCTION	PLACE
1	Does the task	Cockpit
1	Does the task	Outside the aircraft



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I. Preparation

SUBTASK 841-004-A

- (1) Make sure that the aircraft is safe for maintenance.
- (2) Make sure that the flaps are in the 0-degree position.
- (3) Open Maintenance Panel door 223LZ ([AMM MPP 06-41-03/100](#)).
- (4) Energize the aircraft with the External DC Power Supply ([AMM TASK 20-40-01-860-801-A/200](#)).
- (5) Pressurize the hydraulic system ([AMM TASK 29-10-00-860-801-A/200](#)).

J. Operationally Check Spoiler System (Logic) (Figure 501)

SUBTASK 710-003-A

WARNING: MAKE SURE THAT THERE ARE NO PERSONS OR EQUIPMENT IN THE FLAP AND SPOILER TRAVEL AREA.

- (1) Make sure that the AIR GROUND A, B, C, and D circuit breakers are closed.
- (2) Do an operational check of the ground spoiler.
 - (a) Set the engine thrust lever to the flight IDLE position.
 - (b) On the Maintenance Panel, set the SPOILER switch to the TEST position for 10 seconds.
 - 1 The ground spoiler panels open.
 - 2 On the EICAS display, there is an indication of open spoiler.
- (3) Do an operational check of the speed brake.
 - (a) Do this step (a) only for aircraft PRE-MOD [SB 145-27-0032](#) (for FAA-Certified Aircraft) or PRE-MOD [SB 145-27-0059](#) (for JAA-Certified Aircraft).
 - 1 On the Maintenance Panel, set the ADC 1 and ADC 2 test switches and keep them in this position.
 - (b) Make sure that the engine thrust levers are in the flight IDLE position.
 - (c) Set the horizontal stabilizer to the neutral position.
NOTE: The maximum actuation time of the pitch trim is 3 seconds.
 - (d) Set the speed-brake control lever to the OPEN position.

- 1 The speed brake panels open.
 - 2 On the EICAS display, there is an indication of open spoiler.
 - 3 On the EICAS display, the pitch-trim indication arrow moves up.
- (e) Set the speed-brake control lever to the CLOSE position.
 - 1 The speed brake panels close.
 - 2 On the EICAS display, the pitch-trim indication arrow moves down.
- (f) Do this step (f) only for aircraft, PRE-MOD [SB 145-27-0032](#)(for FAA-Certified Aircraft) or PRE-MOD [SB 145-27-0059](#) (for JAA-Certified Aircraft).
 - 1 Set the speed-brake control lever to the OPEN position.
 - a The speed brake panels open.
 - b On the EICAS display, there is an indication of open spoiler.
 - c On the EICAS display, the pitch-trim indication arrow moves up.
 - 2 On the Maintenance Panel, release the ADC 1 and ADC 2 test switches.
 - a The speed brake panels close.
 - b On the EICAS display, the pitch-trim indication arrow moves down.
 - c On the EICAS display, the SPBK LVR DISAGREE caution message comes into view.
 - 3 Set the speed-brake control lever to the CLOSE position.
 - a On the EICAS display, the SPBK LVR DISAGREE caution message goes out of view.
 - 4 Set the ADC 1 and ADC 2 test switches and keep them in this position.
- (g) Do this step (g) only for aircraft POST-MOD [SB 145-27-0028](#).
 - 1 Set the flap selector lever to the 9-degree position.
 - 2 Set the speed-brake control lever to the OPEN position.
 - a The speed brake panels open.
 - b On the EICAS display, there is an indication of open spoiler.
 - c On the EICAS display, the pitch-trim indication arrow moves up.
 - 3 Set the flap selector lever to a position above 9 degrees.
 - a The speed brake panels close automatically.
 - b On the EICAS display, the SPBK LVR DISAGREE caution message comes into view.



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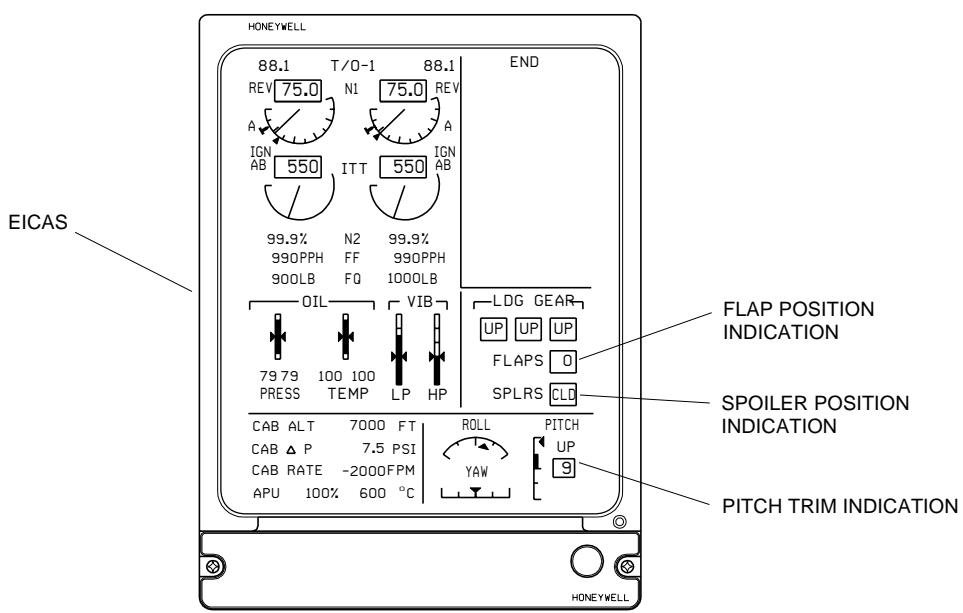
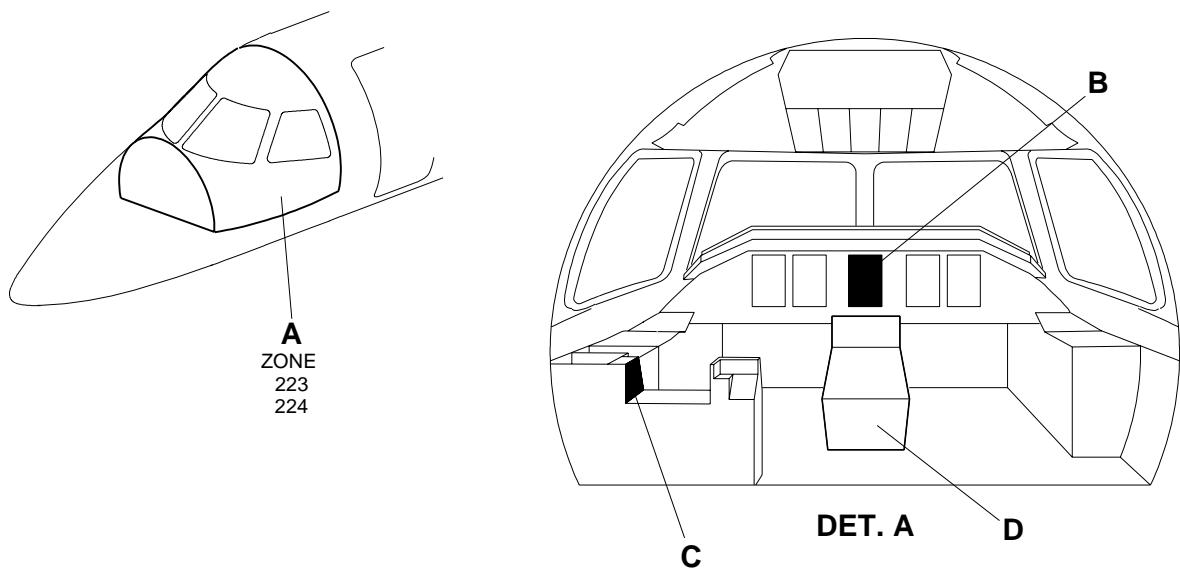
- 4 Set the speed-brake control lever to the CLOSE position.

 - a On the EICAS display, the SPBK LVR DISAGREE caution message goes out of view.
 - 5 Set the flap selector lever to zero-degree position.

(h) Do this step (h) only for aircraft, PRE-MOD [SB 145-27-0032](#) (for FAA-Certified Aircraft) or PRE-MOD [SB 145-27-0059](#) (for JAA-Certified Aircraft).

 - 1 On the Maintenance Panel, release the ADC 1 and ADC 2 test switches.

EFFECTIVITY: ALL

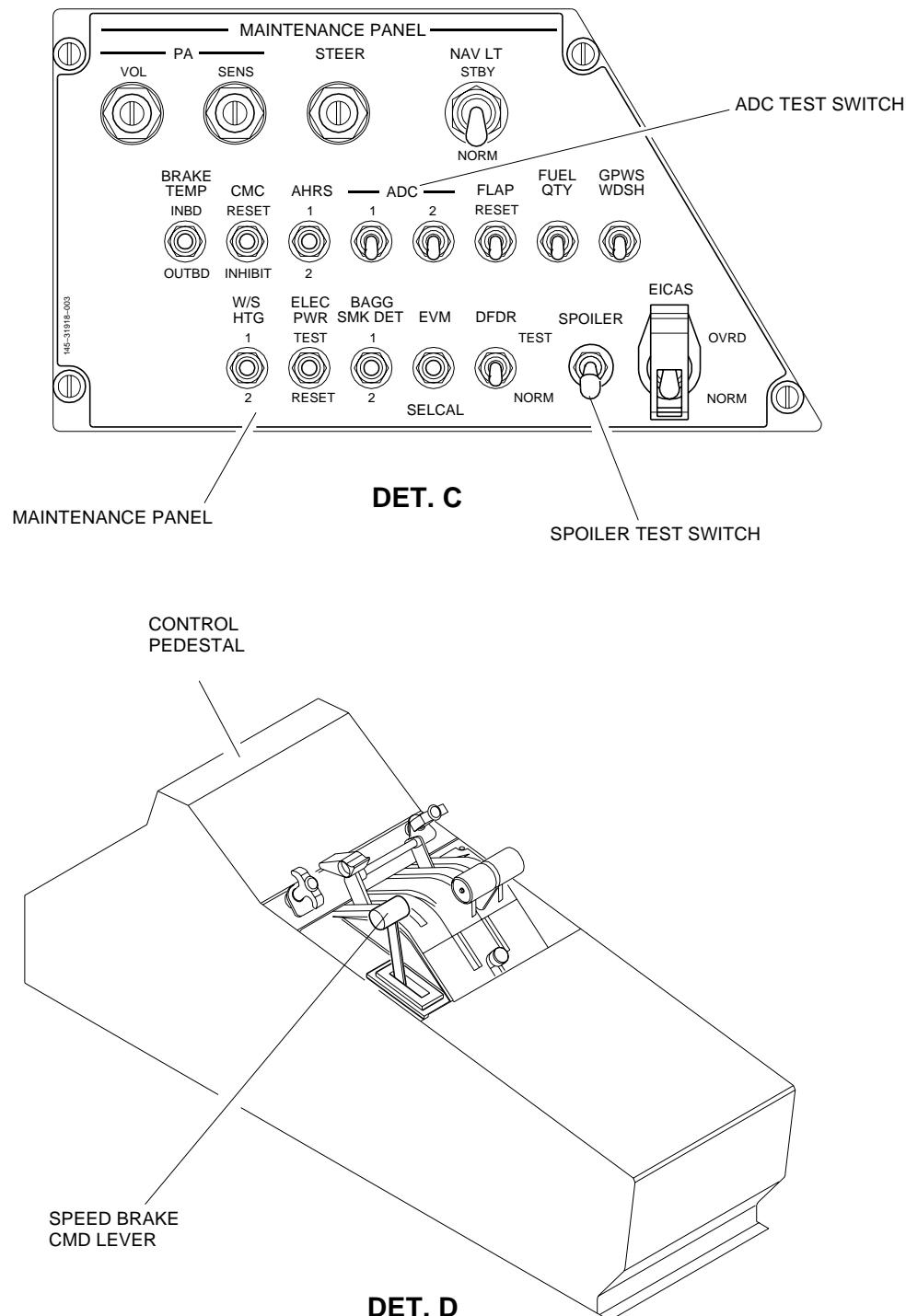
 EICAS Display, Maintenance Panel, and Control Pedestal - Location
 Figure 507 - Sheet 1

DET. B

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EFFECTIVITY: ALL

EICAS Display, Maintenance Panel, and Control Pedestal - Location

Figure 507 - Sheet 2



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