



AIRCRAFT
MAINTENANCE MANUAL

FLAP POWER DRIVE UNIT - ADJUSTMENT/TEST

EFFECTIVITY: ALL

1. General

- A. This section gives the procedures to do the zero-degree rigging of the flaps.
- 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
27-53-04-700-801-A	FLAP ZERO-DEGREE RIGGING	ALL

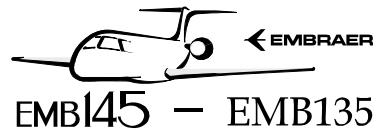
TASK 27-53-04-700-801-A
EFFECTIVITY: ALL
2. FLAP ZERO-DEGREE RIGGING
A. General

- (1) This task gives the procedures to do the zero-degree rigging of the flaps when you install the Flaps ([AMM MPP 27-50-00/400](#)), the Flap Actuators ([AMM MPP 27-51-09/400](#) and [AMM MPP 27-51-10/400](#))..
- (2) There are two ways to perform the zero-degree rigging procedures, with GSE-350 or without GSE-350.

NOTE: The procedure with GSE-350 requires only one mechanic and has a shorter accomplishment time.

B. References

REFERENCE	DESIGNATION
AMM MPP 06-41-01/100	-
AMM MPP 27-50-00/400	- REMOVAL/INSTALLATION
AMM MPP 27-51-09/400	- REMOVAL/INSTALLATION
AMM MPP 27-51-10/400	- REMOVAL/INSTALLATION
AMM TASK 20-40-01-860-801-A/200	ENERGIZATION OF THE AIRCRAFT WITH AN EXTERNAL POWER SOURCE
AMM TASK 27-51-04-000-801-A/400	FLAP FLEXIBLE SHAFT SECTION 1 - REMOVAL
AMM TASK 27-51-04-400-801-A/400	FLAP FLEXIBLE SHAFT SECTION 1 - INSTALLATION
AMM TASK 27-51-05-000-801-A/400	FLAP FLEXIBLE SHAFT SECTION 2 - REMOVAL
AMM TASK 27-51-05-400-801-A/400	FLAP FLEXIBLE SHAFT SECTION 2 - INSTALLATION
AMM TASK 27-51-06-000-801-A/400	FLAP FLEXIBLE SHAFT SECTION 3 - REMOVAL
AMM TASK 27-51-06-400-801-A/400	FLAP FLEXIBLE SHAFT SECTION 3 - INSTALLATION
AMM TASK 27-51-07-000-801-A/400	FLAP FLEXIBLE SHAFT SECTION 4 - REMOVAL
AMM TASK 27-51-07-400-801-A/400	FLAP FLEXIBLE SHAFT SECTION 4 - INSTALLATION
AMM TASK 27-51-08-000-801-A/400	FLAP FLEXIBLE SHAFT SECTION 5 - REMOVAL
AMM TASK 27-51-08-400-801-A/400	FLAP FLEXIBLE SHAFT SECTION 5 - INSTALLATION
AMM TASK 27-51-09-000-802-A/400	INBOARD FLAP TIP ACTUATOR (FSA 2) - REMOVAL
AMM TASK 27-51-09-400-802-A/400	INBOARD FLAP TIP ACTUATOR (FSA 2) - INSTALLATION
AMM TASK 27-51-10-000-802-A/400	OUTBOARD FLAP TIP ACTUATOR (FSA 4) - REMOVAL
AMM TASK 27-51-10-400-802-A/400	OUTBOARD FLAP TIP ACTUATOR (FSA 4) - INSTALLATION
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 57-56-01-000-802-A/400	INBOARD AND OUTBOARD FLAP LOWER SHROUDS - OPEN



AIRCRAFT MAINTENANCE MANUAL

(Continued)

REFERENCE	DESIGNATION
AMM TASK 57-56-01-400-802-A/400	INBOARD AND OUTBOARD FLAP LOWER SHROUDS - CLOSE
WM 27-53-01	-

C. Zones and Accesses

ZONE	PANEL/DOOR	LOCATION
193	193AL	Rear wing-to-fuselage fairing

D. Tools and Equipment

ITEM	DESCRIPTION	PURPOSE	QTY
Commercially Available	Electric/Pneumatic Screwdriver	To turn the Flap Flexible Shaft	
Commercially Available	Wrench	To turn the Flap Flexible Shaft	
GSE 064	Adapter, Drive, Flap	To adapt the FFS to the pneumatic or electric screwdriver	
GSE 350	Gauge-Flap, Zero-Degree Position	To adjust the Flap zero -degree position	
GSE 066	Clamp - Locking , Spoiler Actuator	To lock the spoiler actuator	

E. Auxiliary Items

Not Applicable

F. Consumable Materials

Not Applicable

G. Expandable Parts

Not Applicable

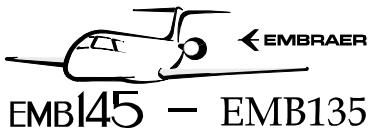
H. Persons Recommended

QTY	FUNCTION	PLACE
1	Does the task	Wing
1	Helps the other technician	Wing, rear wing-to-fuselage internal area and cockpit

I. Preparation

SUBTASK 841-003-A

- (1) Make sure that the aircraft is safe for maintenance.
- (2) Do not do other tasks on the flap system.
- (3) Make sure that the FLAP 1 and FLAP 2 circuit breakers are closed.



EMB145 – EMB135

AIRCRAFT
MAINTENANCE MANUAL

- (4) Energize the aircraft with the External DC Power Supply ([AMM TASK 20-40-01-860-801-A/200](#)).
- (5) Put the flap in the 45-degree position.
- (6) Clean the area around the FSA face (where screwjack goes into the gearbox) to remove the signs of leakage and old reference marks.
- (7) Open access panel 193AL (AMM MPP 06-41-01/100).

CAUTION: WHEN YOU OPEN THE INBOARD-FLAP LOWER SHROUD, IF IT IS NECESSARY TO MOVE THE FLAPS, 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](#)).

- (8) Open the flap lower shroud ([AMM TASK 57-56-01-000-802-A/400](#)).

J. Flap Zero-Degree Rigging ([Figure 501](#)) ([Figure 502](#)) ([Figure 503](#)) ([Figure 504](#)) ([Figure 505](#))
SUBTASK 720-003-A

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

- (1) Flap pre-rigging:
 - (a) Put the flap in the 22- or 45-degree position.
 - (b) On the Circuit Breaker Panel, open the FLAP 1 and FLAP 2 circuit breakers and attach a DO-NOT-CLOSE tag to them.
 - (c) Remove the actuator gimbal pins of the outboard and inboard flap tip actuators (FSA 2 and FSA 4). Refer to [AMM TASK 27-51-09-000-802-A/400](#) and [AMM TASK 27-51-10-000-802-A/400](#).

NOTE: The actuator gimbal pin must be easy to remove.

- (d) If the actuator gimbal pin is hard to remove, do the steps below:
 - 1 Remove flap flexible shaft (FFS) section 5 from the flap actuator (of the outboard flap tip actuator - FSA 4). Refer to [AMM TASK 27-51-08-000-801-A/400](#).
 - 2 Remove flap flexible-shaft section 2 and section 3 from the flap actuator (of the inboard flap tip actuator - FSA 2). Refer to [AMM TASK 27-51-05-000-801-A/400](#) and [AMM TASK 27-51-06-000-801-A/400](#).
 - 3 Turn the spindle clockwise or counterclockwise until the gimbal becomes free.

- 4 Install flap flexible shaft sections 2, 3, and 5 ([AMM TASK 27-51-05-400-801-A/400](#)), ([AMM TASK 27-51-06-400-801-A/400](#)), and ([AMM TASK 27-51-08-400-801-A/400](#)).
- (e) Install the actuator gimbal pins ([AMM TASK 27-51-09-400-802-A/400](#)) and ([AMM TASK 27-51-10-400-802-A/400](#)).
 - (f) On the Circuit Breaker Panel, close the FLAP 1 and FLAP 2 circuit breakers and remove the DO-NOT-CLOSE tag from them.
 - (g) Set the flap to the 0-degree position.
- (2) Electrically release the Flap Transmission Brake (FTB):
- (a) On the Circuit Breaker Panel, open the FLAP 1 and FLAP 2 circuit breakers.
 - (b) Disconnect electrical connector P1104 (WM 27-53-01) from the FECU.
 - (c) (For the LH FTB) Connect a jumper between pins 7 and 46 of electrical connector P1104 (WM 27-53-01).
 - (d) (For the RH FTB) Connect a jumper between pins 115 and 128 of electrical connector P1104 (WM 27-53-01).
 - (e) On the Circuit Breaker Panel, close the FLAP 1 and FLAP 2 circuit breakers.
- (3) For Zero-Degree Rigging procedure with GSE-350, do the steps below:
- (a) Release the pressure from the hydraulic system ([AMM TASK 29-10-00-860-801-A/200](#)), and install the GSE 066 to the ground spoiler (Figure 505).
 - (b) Disconnect FFS section 1 from the FPDU ([AMM TASK 27-51-04-000-801-A/400](#)).
- CAUTION:** THE AVAILABLE OUTPUT TORQUE OF THE PNEUMATIC OR ELECTRIC SCREWDRIVER MUST NOT BE HIGHER THAN 12 N.M (105 LBF.IN) TO PREVENT PERMANENT DAMAGE TO THE FFS.
- (c) Use a pneumatic or electric screwdriver or use a wrench, with GSE-064, on the FFS section 1, to move the surface to a position slightly more than 9 degrees.
- NOTE:** It is not necessary to measure the real position of the flap surfaces.
- (d) Install GSE-350 to the tracks of the flap. See [Figure 501](#).
- NOTE:** The thicker Gauge-Flap (GSE-350) shall be installed on the track of the flap actuator 2 that is located on the inboard flap surface.
- CAUTION:** MAKE SURE THAT THE TRANSLATION SPEED OF THE FLAPS IS REDUCED WHEN THE SURFACES GET CLOSE TO THE ZERO-DEGREE POSITION.
- (e) Turn FFS section 1 to move the flap surfaces until they touch the stops of GSE-350.



EMB145 – EMB135

AIRCRAFT
MAINTENANCE MANUAL

- (f) Disconnect the FFS section 2 from FSA 1, FFS section 3 from FSA 2, FFS section 4 from the FSA 3. Refer to [AMM TASK 27-51-05-000-801-A/400](#), [AMM TASK 27-51-06-000-801-A/400](#), and [AMM TASK 27-51-07-000-801-A/400](#))

CAUTION: THE AVAILABLE OUTPUT TORQUE OF THE PNEUMATIC OR ELECTRIC SCREWDRIVER MUST NOT BE HIGHER THAN 12 N.M (105 LBF.IN) TO PREVENT PERMANENT DAMAGE TO THE FFS.

- (g) Use a pneumatic or electric screwdriver or use a wrench, with GSE-064 to connect to the flap flexible shafts and do as follows:

- 1 Turn the FFS section 1, to move the FSA 1 until the flap surface rollers reach GSE 350 with no gaps.
- 2 Turn the FFS section 2, to move the FSA 2 until the flap surface rollers reach GSE 350 with no gaps.
- 3 Turn the FFS section 3, to move the FSA 3 until the flap surface rollers reach GSE 350 with no gaps.
- 4 Turn the FFS section 4, to move the FSA 4 until the flap surface rollers reach GSE 350 with no gaps.

- (h) Connect the FFS sections 2, 3 and 4 to the flap actuators. Refer to [AMM TASK 27-51-05-400-801-A/400](#), [AMM TASK 27-51-06-400-801-A/400](#), and [AMM TASK 27-51-07-400-801-A/400](#) and connect the FFS section 1 to the FPDU [AMM TASK 27-51-04-400-801-A/400](#).

- (i) Use a pen to make a reference mark on the FSA 2 and FSA 3 screws/face. See [Figure 502](#).

- (j) Draw 3 parallel reference lines on a piece of adhesive tape and apply it on the inboard flap surface and torque box as shown in [Figure 502](#). Do the same procedure to the outboard flap surface.

- (k) Cut the tape along the gap between the flap surfaces and the torque box and fold the tape ends into the gap [Figure 502](#).

- (l) On the Circuit Breaker Panel, open the FLAP 1 and FLAP 2 circuit breakers.

- (m) Disconnect the jumpers from the electrical connector P1104 (WM 27-53-01).

- (n) Reconnect the electrical connector P1104 (WM 27-53-01) to the FECU.

- (o) On the Circuit Breaker Panel, close the FLAP 1 and FLAP 2 circuit breakers.

- (p) Set the flaps to the 9-degree position.

- (q) Remove GSE-350 from the track of the flaps. See [Figure 501](#).

- (r) Set the flaps to the 45-degree and then to the zero-degree position.

- (s) Check the alignment of the marks on FSA 2 and FSA 3 and the alignment between the 3 parallel lines on the adhesive tapes.

NOTE: If the lines do not align, do the rigging procedure again.

- (4) For Zero-Degree Rigging procedure without GSE-350, do the steps below:
- (a) Release the pressure from the hydraulic system ([AMM TASK 29-10-00-860-801-A/200](#)), and install the GSE 066 to the ground spoiler (Figure 505).
 - (b) Disconnect FFS section 1 from FPDU, FFS section 2 from the FSA 1, FFS section 3 from FSA 2, and FFS section 4 from FSA 3. Refer to [AMM TASK 27-51-04-000-801-A/400](#), [AMM TASK 27-51-05-000-801-A/400](#), [AMM TASK 27-51-06-000-801-A/400](#), and [AMM TASK 27-51-07-000-801-A/400](#).
- CAUTION:** THE AVAILABLE OUTPUT TORQUE OF THE PNEUMATIC OR ELECTRIC SCREWDRIVER MUST NOT BE HIGHER THAN 12 N.M (105 LBF.IN) TO PREVENT PERMANENT DAMAGE TO THE FFS.
- (c) Connect the pneumatic or electric screwdriver to FFS 1 and put the inboard flap root roller to the upper mechanical stop.
 - (d) Connect the pneumatic or electric screwdriver to FFS 2 and put the inboard flap tip roller to the upper mechanical stop.
 - (e) Connect the pneumatic or electric screwdriver to FFS 3 and put the outboard flap root roller to the upper mechanical stop.
 - (f) Connect the pneumatic or electric screwdriver to FFS 4 and put the outboard flap tip roller to the upper mechanical stop.
 - (g) Use a pen to make a reference mark on the FSA 2 and FSA 3 screw/face (Figure 503).
 - (h) Connect the FFS 2 to FSA 1.
 - (i) Connect the pneumatic or electric screwdriver to FFS 1 and move the screwdriver in the appositive direction (to extend the flap panel) and slowly set the flap panel with a 13/16 turn of the FSA 2 screw (refer to the reference mark). See [Figure 504](#).
- NOTE:** It corresponds to approximately 6.00 mm (0.24 in) of the FSA 1 linear displacement.
- (j) Disconnect the FFS 2 from FSA 1.
 - (k) Connect the pneumatic or electric screwdriver to FFS 2 and put the inboard flap tip roller to the upper mechanical stop.
 - (l) Move the screwdriver in the appositive direction (to extend the flap panel) and slowly set the flap panel with a 1 11/16 turn of the FSA 2 screw (refer to the reference mark). See [Figure 504](#).
- NOTE:** It corresponds to approximately 8.30 mm (0.33 in) of the FSA 2 linear displacement.
- (m) Connect the FFS 4 to FSA 3.



EMB145 – EMB135

AIRCRAFT
MAINTENANCE MANUAL

- (n) Connect the pneumatic or electric screwdriver to FFS 3 and move the screwdriver in the appositive direction (to extend the flap panel) and slowly set the flap panel with a 1 3/4 turn of the FSA 4 screw (refer to the reference mark). See [Figure 504](#).

NOTE: It corresponds to approximately 6.00 mm (0.24 in) of the FSA 4 linear displacement.

- (o) Disconnect the FFS 4 to FSA 3.
- (p) Connect the pneumatic or electric screwdriver to FFS 3 and put the outboard flap root roller to the upper mechanical stop.
- (q) Move the screwdriver in the appositive direction (to extend the flap panel) and slowly set the flap panel with a 1 1/4 turn of the FSA 3 screw (refer to the reference mark). See [Figure 504](#).

NOTE: It corresponds to approximately 6.00 mm (0.24 in) of the FSA 3 linear displacement.

- (r) Reconnect all FFS's to FSA's.
- (s) On the Circuit Breaker Panel, open the FLAP 1 and FLAP 2 circuit breakers.
- (t) Disconnect the jumpers from the electrical connector P1104 (WM 27-53-01).
- (u) Reconnect the electrical connector P1104 (WM 27-53-01) to the FECU.
- (v) On the Circuit Breaker Panel, close the FLAP 1 and FLAP 2 circuit breakers.
- (w) Set the flaps to the 45-degree position.
- (x) Hold the middle section of the flap trailing edge (inboard and outboard panels), and apply a light force so as to shake the flap panel.
- (y) Make sure that flap panel is not rigid.

NOTE: If the flap panel is rigid, to the steps below.

- (z) For the inboard panel:
- 1 Disconnect FFS 2 from FSA 1 ([AMM TASK 27-51-05-000-801-A/400](#)) and the FFS 3 from the FSA 2 ([AMM TASK 27-51-06-000-801-A/400](#)).
 - 2 Manually turn the FFS 2 to move the FSA 2 forward and backward until the maximum flap free play.

NOTE: Hold on the flap trailing edge and shake it to feel the flap free play.
 - 3 When the maximum free play is found reconnect FFS 2 and FFS 3 ([AMM TASK 27-51-05-400-801-A/400](#)) and ([AMM TASK 27-51-06-400-801-A/400](#)).
- (aa) For the outboard panel:
- 1 Disconnect FFS 4 from FSA 3 ([AMM TASK 27-51-07-000-801-A/400](#)).

- 2 Manually turn the FFS 4 to move the FSA 4 forward and backward until the maximum flap free play.

NOTE: Hold on the flap trailing edge and shake it to feel the flap free play.

- 3 When the maximum free play is found reconnect FFS 4 ([AMM TASK 27-51-07-400-801-A/400](#)).

(5) Set the flap to the 0-degree.

(6) Torque and Lockwire the FFS 1, FFS 2, FFS 3, and FFS 4. Refer to [AMM TASK 27-51-04-400-801-A/400](#), [AMM TASK 27-51-05-400-801-A/400](#), [AMM TASK 27-51-06-400-801-A/400](#), and [AMM TASK 27-51-07-400-801-A/400](#).

(7) Release the pressure from the hydraulic system ([AMM TASK 29-10-00-860-801-A/200](#)), and remove the GSE 066 (Figure 505).

K. Follow-on

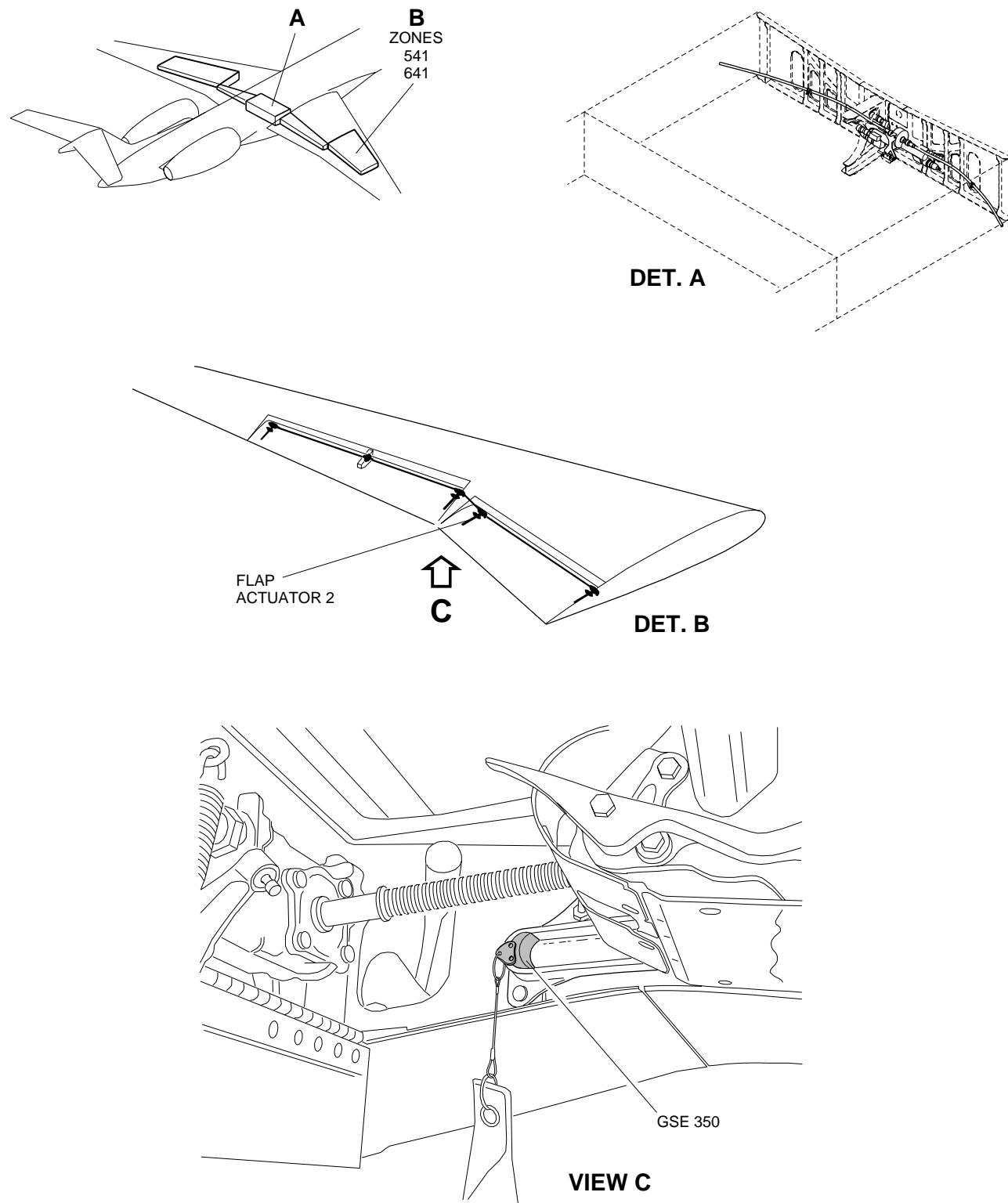
SUBTASK 842-003-A

- (1) Deenergize the aircraft ([AMM TASK 20-40-01-860-801-A/200](#)).
- (2) Close the flap lower shroud ([AMM TASK 57-56-01-400-802-A/400](#)).
- (3) Close access panel 193AL (AMM MPP 06-41-01/100).

EFFECTIVITY: For Zero-Degree Rigging with GSE-350

Zero-Degree Flap Rigging - Adjustment

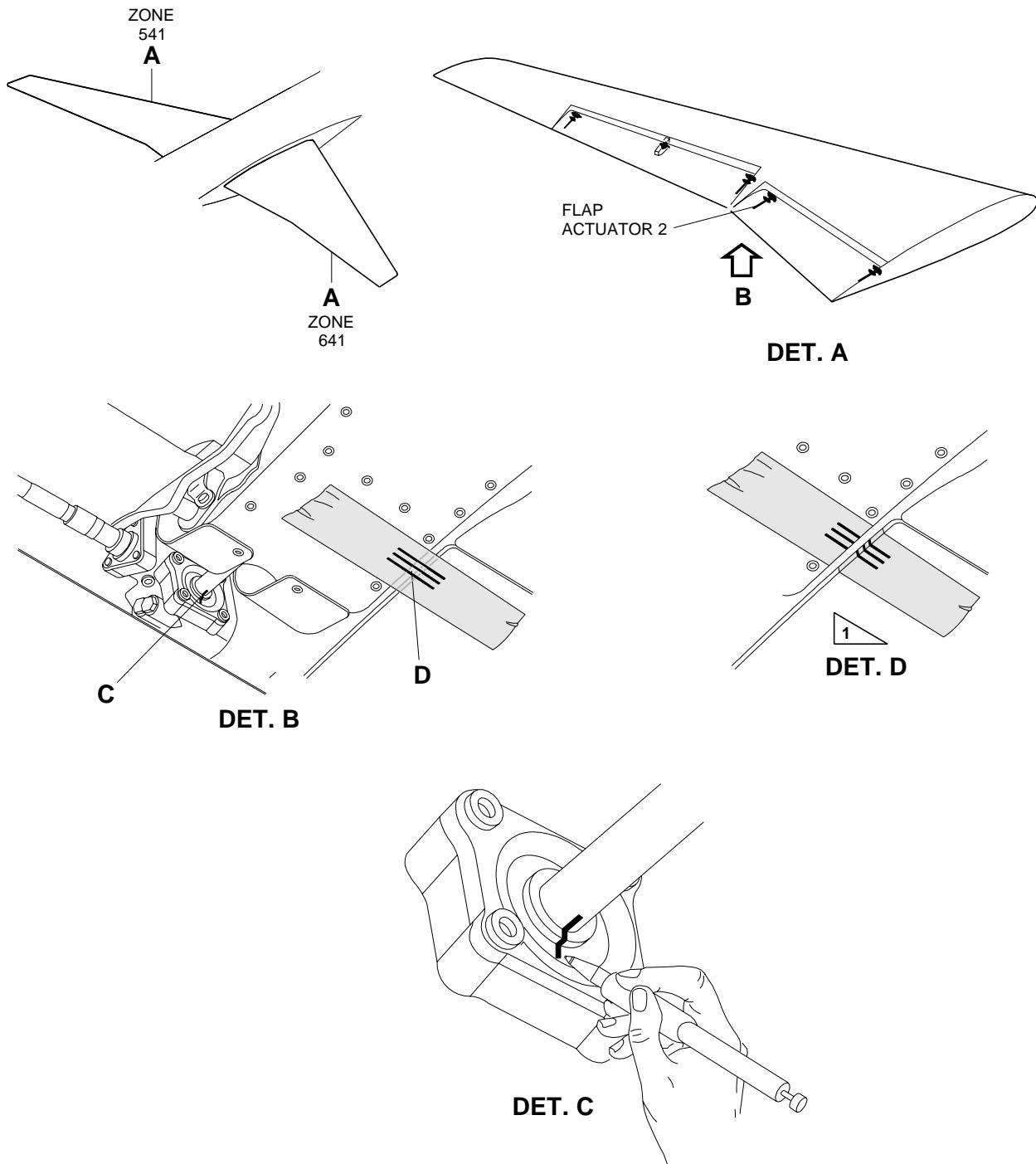
Figure 501



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EFFECTIVITY: ALL

Zero-Degree Flap Rigging - Alignment marks
Figure 502



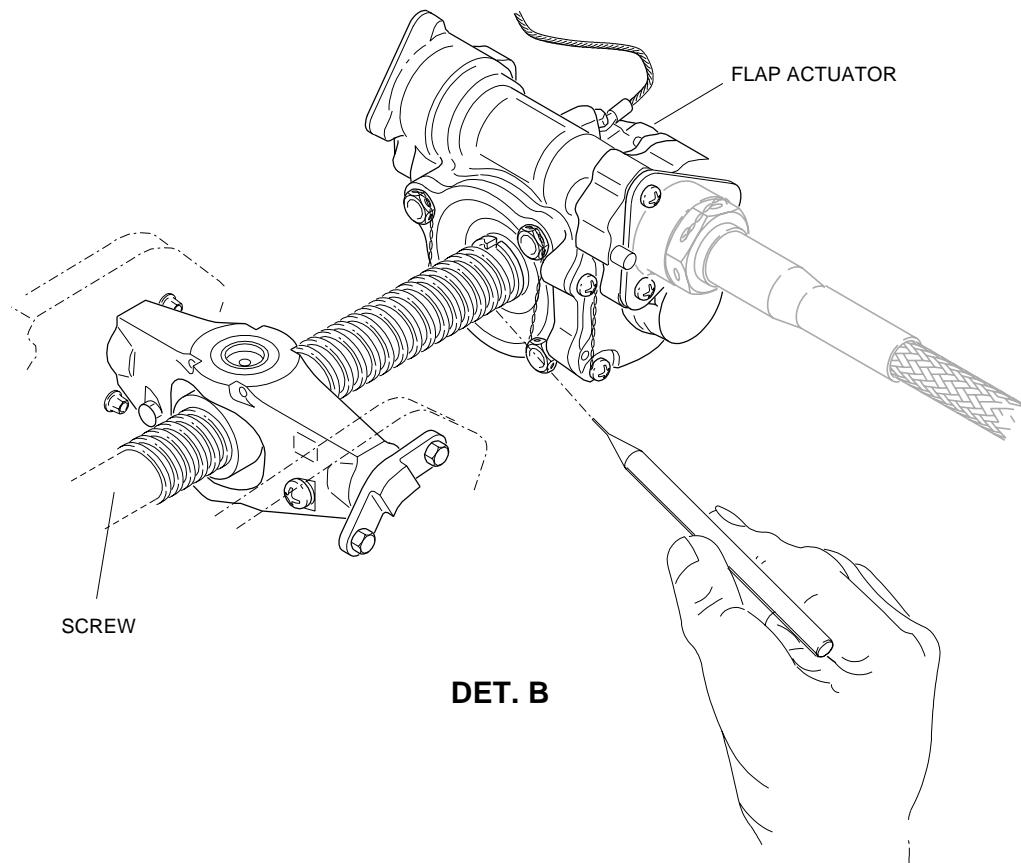
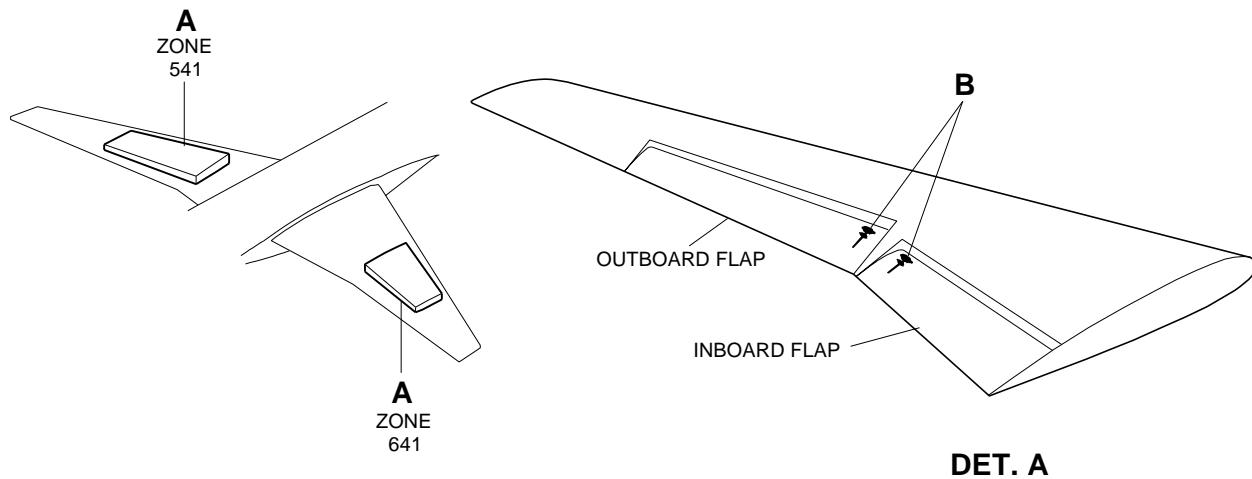
DRAW 3 REFERENCE PARALLEL LINES ON A PIECE OF ADHESIVE TAPE AND APPLY IT TO THE SURFACES AS SHOWN.
CUT THE TAPE ALONG THE GAP BETWEEN THE SURFACES AND FOLD THE TAPE ENDS INTO THE GAP

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EFFECTIVITY: ALL

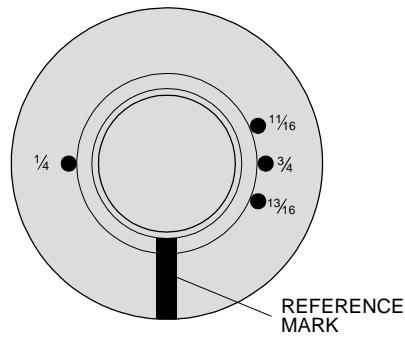
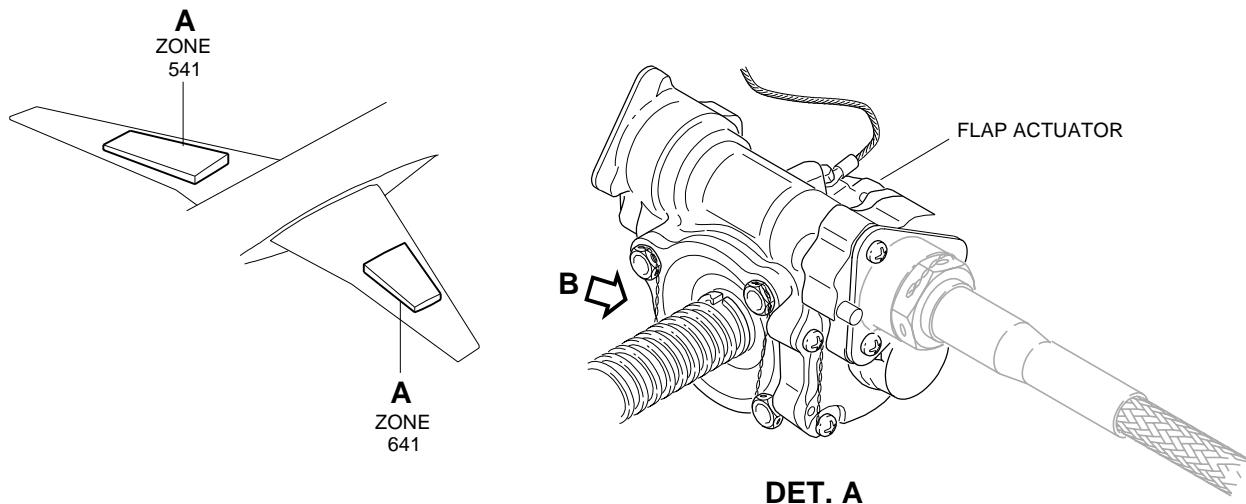
Zero-Degree Flap Rigging - Reference mark

Figure 503

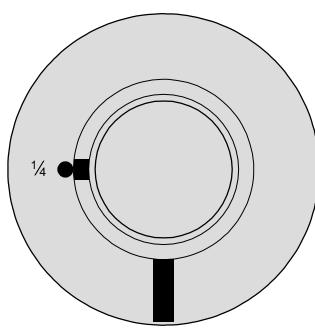


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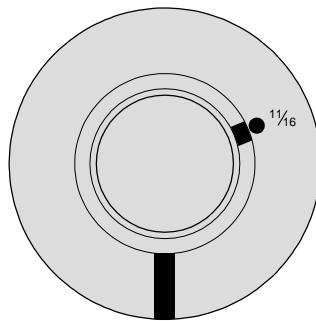
EFFECTIVITY: For Zero-Degree Rigging without GSE-350
Zero-Degree Flap Rigging - Adjustment
Figure 504



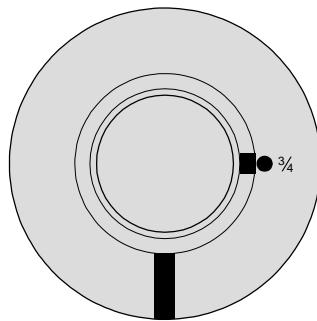
FSA SCREW POSITION WITH ZERO TURN



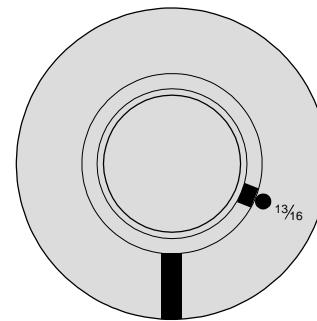
FSA SCREW POSITION WITH 1/4 TURN



FSA SCREW POSITION WITH 11/16 TURN



FSA SCREW POSITION WITH 3/4 TURN

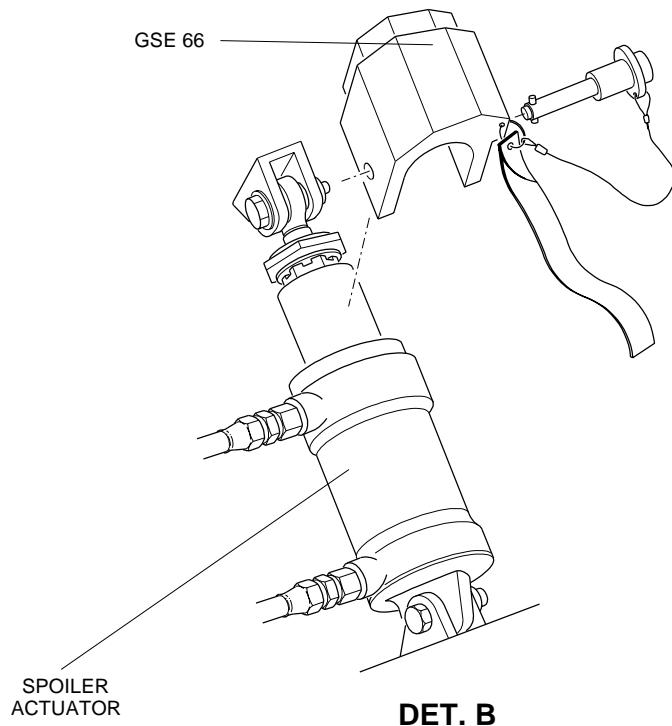
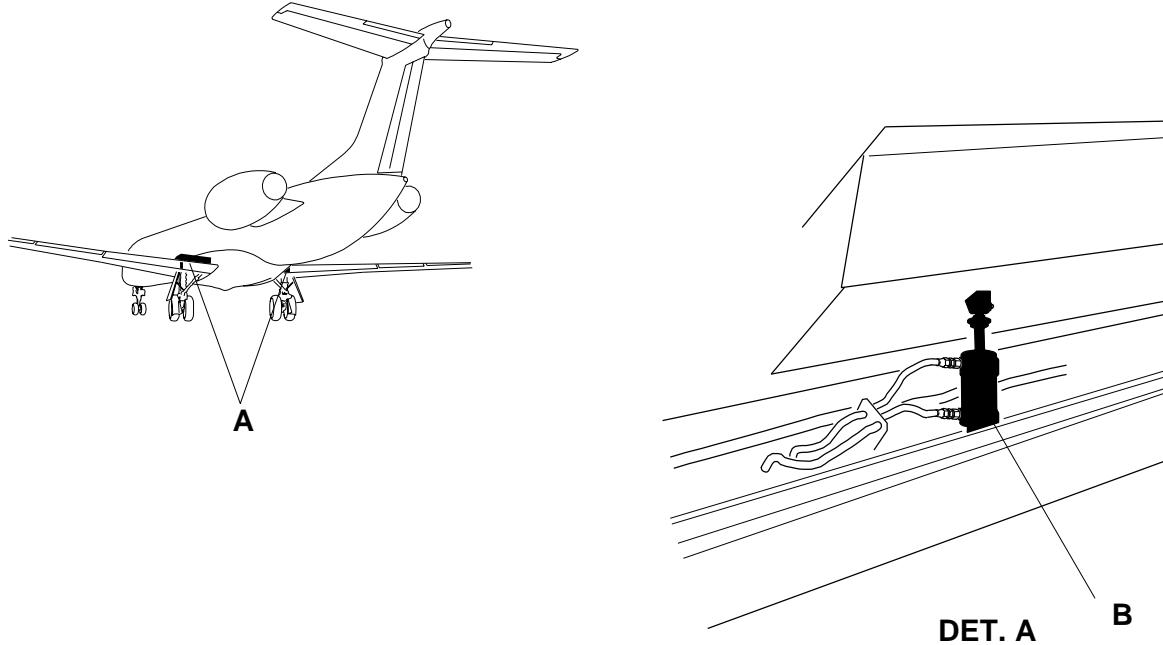


FSA SCREW POSITION WITH 13/16 TURN

VIEW B

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EFFECTIVITY: ALL
GSE 066 - Installation
Figure 505



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