



EMB145 - EMB135

AIRCRAFT
MAINTENANCE MANUAL

OUTBOARD FLAP ACTUATORS - REMOVAL/INSTALLATION

EFFECTIVITY: ALL

1. General

- A. This section gives the procedures to remove and install the actuators of the outboard flap.
- B. The outboard flap root actuator is the flap screwjack actuator 3 (FSA 3).
- C. The outboard flap tip actuator is the flap screwjack actuator 4 (FSA 4).
- D. 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
27-51-10-000-801-A	OUTBOARD FLAP ROOT ACTUATOR (FSA 3) - REMOVAL	ALL
27-51-10-400-801-A	OUTBOARD FLAP ROOT ACTUATOR (FSA 3) - INSTALLATION	ALL
27-51-10-000-802-A	OUTBOARD FLAP TIP ACTUATOR (FSA 4) - REMOVAL	ALL
27-51-10-400-802-A	OUTBOARD FLAP TIP ACTUATOR (FSA 4) - INSTALLATION	ALL



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TASK 27-51-10-000-801-A

EFFECTIVITY: ALL

2. OUTBOARD FLAP ROOT ACTUATOR (FSA 3) - REMOVAL

A. General

(1) This task gives the procedures to remove the actuator of the root of the outboard flap.

B. References

REFERENCE	DESIGNATION
AMM TASK 20-40-01-860-801-A/200	ENERGIZATION OF THE AIRCRAFT WITH AN EXTERNAL POWER SOURCE
AMM TASK 27-51-06-000-801-A/400	FLAP FLEXIBLE SHAFT SECTION 3 - REMOVAL
AMM TASK 27-51-07-000-801-A/400	FLAP FLEXIBLE SHAFT SECTION 4 - REMOVAL
AMM TASK 27-53-04-700-801-A/500	FLAP ZERO-DEGREE RIGGING
AMM TASK 57-56-01-000-801-A/400	INBOARD AND OUTBOARD FLAP LOWER SHROUDS - REMOVAL
SRM 51-20-01	-

C. Zones and Accesses

ZONE	PANEL/DOOR	LOCATION
5721		Outboard flap lower shroud
6721		Outboard flap lower shroud

D. Tools and Equipment

Not Applicable

E. Auxiliary Items

ITEM	DESCRIPTION	PURPOSE	QTY
Commercially available	PVC Gloves	Protection for the hands	1
Commercially available	Goggles	Protection for the eyes	1

F. Consumable Materials

Not Applicable

G. Expandable Parts

Not Applicable

H. Persons Recommended

QTY	FUNCTION	PLACE
1	Does the task	Wing trailing edge



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I. Preparation

SUBTASK 841-002-A

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

- (1) Make sure that the aircraft is safe for maintenance.
- (2) Energize the aircraft with External DC Power Supply ([AMM TASK 20-40-01-860-801-A/200](#)).
- (3) Set the Flaps to the 45-degree position.
- (4) On the circuit breaker panel, open the FLAP 1 and FLAP 2 circuit breakers and attach a DO-NOT-CLOSE tag to them.
- (5) Open the outboard flap lower shroud ([AMM TASK 57-56-01-000-801-A/400](#)).
- (6) If it is possible, do not remove the two actuator from the same flap panel not to make the flap rigging incorrect.

NOTE: If the FSA 4 is removed at the same time of the FSA 3 do the rigging ([AMM TASK 27-53-04-700-801-A/500](#)) after the actuator installation.

J. Removal ([Figure 401](#))

SUBTASK 020-002-A

- (1) Remove the screws (25) to remove the protection cover (24) from the outboard flap (2). Refer to DET. B.
- (2) Remove the bolts (10) and washers (11/12/13) to release the jumpers (9) from FSA 3 (1).
- (3) Remove FFS section 3 (7) from the angle gear box (6) that is attached to the FSA 3 (1). Refer to [AMM TASK 27-51-06-000-801-A/400](#).
- (4) Remove FFS section 4 (8) from FSA 3 (1). Refer to [AMM TASK 27-51-07-000-801-A/400](#).

WARNING: CA-1000 CORROSION-INHIBITING COMPOUND IS TOXIC TO SKIN, EYES AND RESPIRATORY TRACT. USE PVC GLOVES AND EYE PROTECTION. USE ONLY IN WELL VENTILATED AREAS. OBEY THE MANUFACTURERS' HEALTH AND SAFETY INSTRUCTIONS.

- (5) Remove the nuts (14), bolts (16), washers (15), and actuator gimbal pins (17) to release the gimbal of the actuator from the outboard flap (2).
- (6) Remove and discard the cotter pin (18).
- (7) Remove the nut (19), bolt (23), and washers (20/22) to release FSA 3 (1) from the wing rear spar bracket (21).
- (8) Remove FSA 3 (1).
- (9) On the bench, cut the lockwire (5) and remove the bolts (4) and washers (3) to release the angle gear box (6) from the FSA 3 (1).



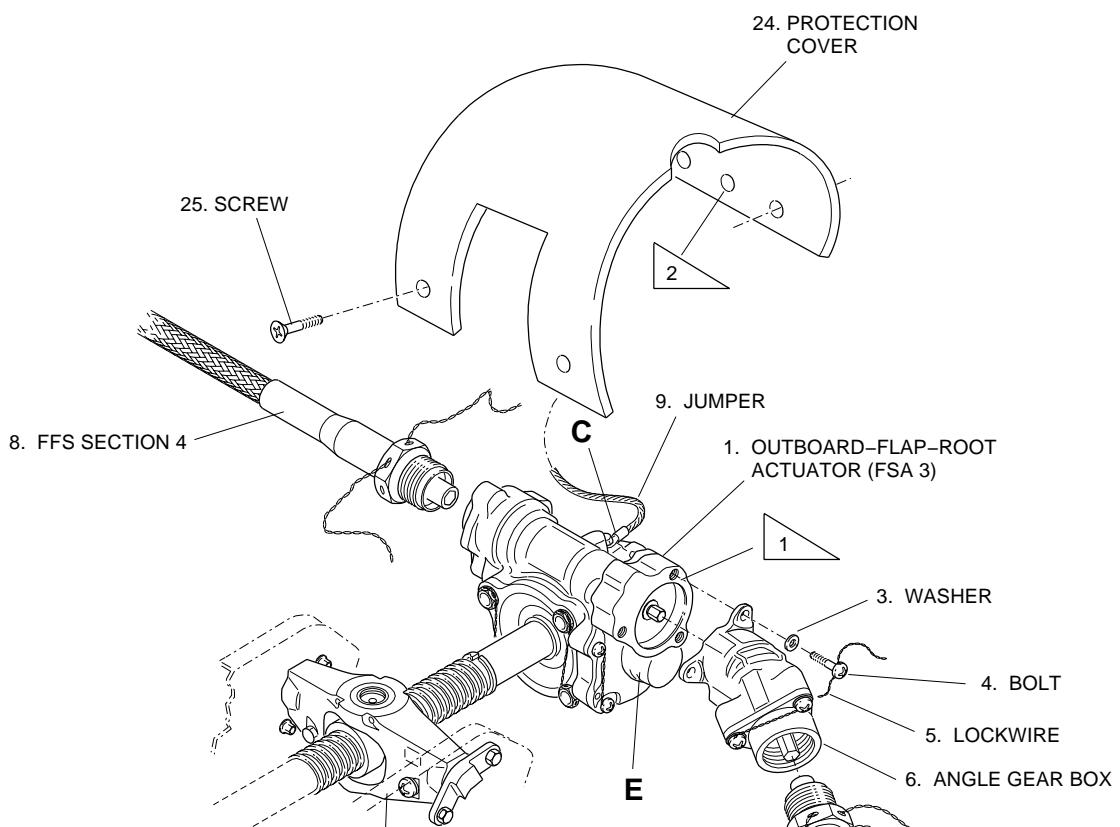
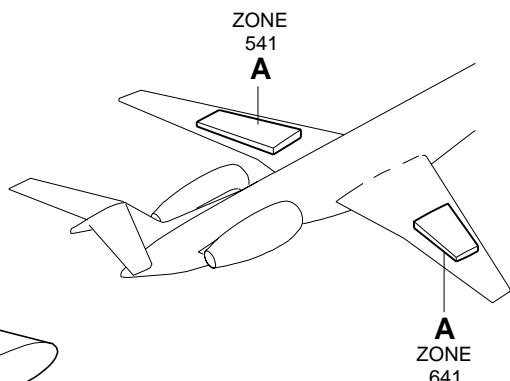
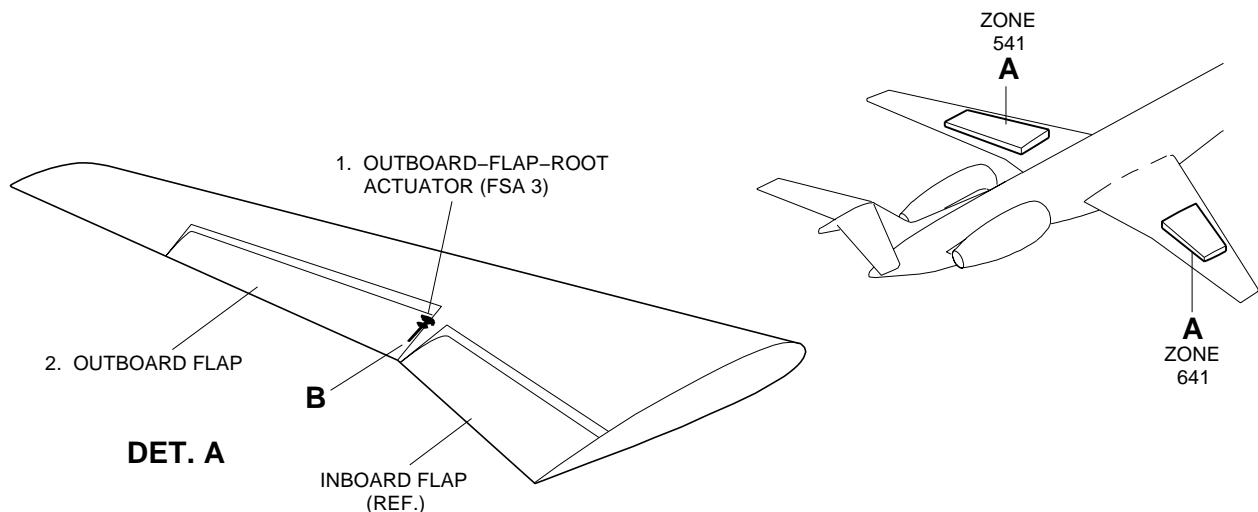
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- (10) Remove old sealant from the flap angle gear box (6) and the flap screwjack actuator 3 (1). Refer to ([Figure 401](#)) and SRM 51-20-01.

EFFECTIVITY: ALL

Outboard Flap Root Actuator - Removal/Installation

Figure 401 - Sheet 1



1 APPLY INTERFACE SEALANT RTV780. REFER TO SRM 51-20-01.
FOR ALTERNATIVE SEALANTS, REFER TO AMM 20-30-03/201.



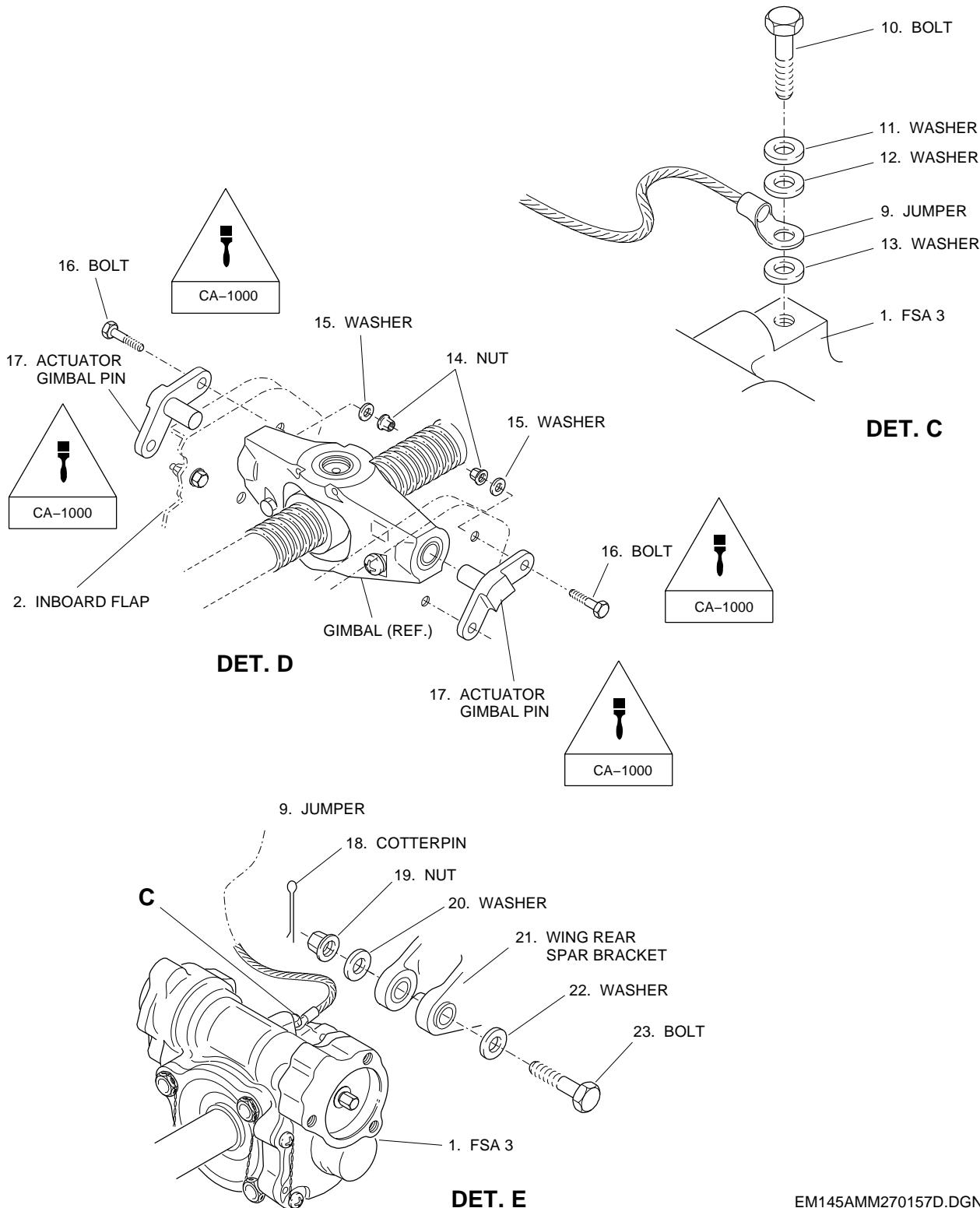
2 APPLICABLE TO AIRCRAFT PRE-MOD SB 145-57-0027.

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EFFECTIVITY: ALL

Outboard Flap Root Actuator - Removal/Installation

Figure 401 - Sheet 2



EM145AMM270157D.DGN



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TASK 27-51-10-400-801-A

EFFECTIVITY: ALL

3. OUTBOARD FLAP ROOT ACTUATOR (FSA 3) - INSTALLATION

A. General

(1) This task gives the procedures to install the actuator of the root of the outboard flap.

B. References

REFERENCE	DESIGNATION
AMM TASK 20-40-01-860-801-A/200	ENERGIZATION OF THE AIRCRAFT WITH AN EXTERNAL POWER SOURCE
AMM TASK 27-51-00-700-801-A/500	FLAP CONTROL SYSTEM - OPERATIONAL CHECK
AMM TASK 27-51-06-400-801-A/400	FLAP FLEXIBLE SHAFT SECTION 3 - INSTALLATION
AMM TASK 27-51-07-400-801-A/400	FLAP FLEXIBLE-SHAFT SECTION 4 - INSTALLATION
AMM TASK 27-53-04-700-801-A/500	FLAP ZERO-DEGREE RIGGING
AMM TASK 57-56-01-400-801-A/400	INBOARD AND OUTBOARD FLAP LOWER SHROUDS - INSTALLATION
IPC 27-51-00	FLAP MECHANICAL
SRM 51-20-01	-

C. Zones and Accesses

ZONE	PANEL/DOOR	LOCATION
5721		Outboard flap lower shroud
6721		Outboard flap lower shroud

D. Tools and Equipment

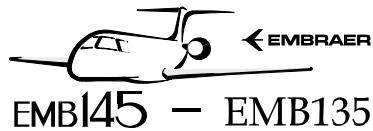
Not Applicable

E. Auxiliary Items

ITEM	DESCRIPTION	PURPOSE	QTY
Commercially available	PVC Gloves	Protection for the hands	1
Commercially available	Goggles	Protection for the eyes	1

F. Consumable Materials

SPECIFICATION (BRAND)	DESCRIPTION	QTY
MS20995C32	Lockwire	AR
MIL-S-81733, Type II-2	Sealant	AR
Fed. Spec. ASTM C-920	Silicone Sealant - RTV 780	AR
MEP 09-060	Corrosion-Inhibiting Compound	AR



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G. Expendable Parts

ITEM	IPC REFERENCE (VENDOR REFERENCE)	QTY
Cotter pin	IPC 27-51-00	1

H. Persons Recommended

QTY	FUNCTION	PLACE
1	Does the task	Wing trailing edge

I. Installation (Figure 401)

SUBTASK 420-002-A

WARNING: CA-1000 CORROSION-INHIBITING COMPOUND IS TOXIC TO SKIN, EYES AND RESPIRATORY TRACT. USE PVC GLOVES AND EYE PROTECTION. USE ONLY IN WELL VENTILATED AREAS. OBEY THE MANUFACTURERS' HEALTH AND SAFETY INSTRUCTIONS.

- (1) Apply corrosion-inhibiting compound to the gimbal pins (17) and bolts (16). For this, use PVC gloves and goggles.
- (2) Apply sealant to the flap angle gear box (6) and the flap screwjack actuator 3 (1). Refer to (Figure 401) and SRM 51-20-01.
- (3) On the bench, install the Angle Gear Box (6) in FSA 3 (1). Use the bolts (4), washers (3), and safety it.
- (4) Install FSA 3 (1) in the wing rear spar bracket (21). Use bolt (23), washers (20/22), nut (19), and safety it.

CAUTION: • MANUALLY TURN THE ACTUATOR GIMBAL OR THE ACTUATOR SCREW TO TRANSLATE THE GIMBAL.

- MANUALLY TURN THE ACTUATOR SCREW UNTIL THE HOLES OF THE GIMBAL SPHERICAL BEARING ALIGN WITH THE HOLES OF THE FLAP PANEL TO INSTALL THE ACTUATOR GIMBAL PINS.
- DO NOT USE FORCE TO MOVE THE FLAP PANEL UP OR DOWN TO ALIGN THE HOLES AND INSTALL THE GIMBAL PINS.
- MAKE SURE THAT THE GIMBALS ARE REMOVED AND INSTALLED WITH A MINIMUM OF INTERFERENCE. IT IS NECESSARY TO MAKE SURE THAT THE FLAP IS IN THE CORRECT POSITION.
- MAKE SURE THAT THE LUBRICATION HOLE OF THE GIMBAL IS UP.

- (5) Install the gimbal of FSA 3 (1) to the outboard flap (2). Use actuator gimbal pins (17), bolts (16), washers (15), and nuts (14).

CAUTION: TO ALIGN THE FSA 3 AND FFS HEX SHAFTS, DO A MINIMUM TURN OF THE ACTUATOR SCREW (LESS THAN 1 DEGREE IS SUFFICIENT).

- (6) Install FFS section 3 (7) to the angle gear box (6) that is attached to the FSA 3 (1). Refer to [AMM TASK 27-51-06-400-801-A/400](#).
- (7) Install FFS section 4 (8) to FSA 3 (1). Refer to [AMM TASK 27-51-07-400-801-A/400](#).
- (8) Install the jumpers (9) in FSA 3 (1). Use the bolts (10) and washers (11/12/13).
- (9) On the circuit breaker panel, close the FLAP 1 and FLAP 2 circuit breakers and remove the DO-NOT-CLOSE tag from them.
- (10) Energize the aircraft with External DC Power Supply ([AMM TASK 20-40-01-860-801-A/200](#)).
- (11) Set the flap to 45° position.
- (12) Hold the middle section of the flap trailing edge, and apply a light force so as to shake the flap panel.
- (13) Make sure that flap panel is not rigid.

NOTE: • If the flap panel is rigid, perform the [AMM TASK 27-53-04-700-801-A/500](#) in order to adjust the flap correctly.
• There must be a small relative movement of the flap panel in relation to the wing trailing edge.
• If the FSA 4 was removed at the same time of the FSA 3, do the rigging procedure ([AMM TASK 27-53-04-700-801-A/500](#)).

- (14) Install the protection cover (24) to the outboard flap (2) and attach it with the screws (25). Refer to DET. B.
- (15) Apply sealant along the contour of the protection cover (24).

J. Follow-on

SUBTASK 842-002-A

- (1) Close the outboard flap lower shroud ([AMM TASK 57-56-01-400-801-A/400](#)).
- (2) Do the operational check of the flap control system ([AMM TASK 27-51-00-700-801-A/500](#)).



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TASK 27-51-10-000-802-A

EFFECTIVITY: ALL

4. OUTBOARD FLAP TIP ACTUATOR (FSA 4) - REMOVAL

A. General

(1) This task gives the procedures to remove the actuator of the tip of the outboard flap.

B. References

REFERENCE	DESIGNATION
AMM TASK 20-40-01-860-801-A/200	ENERGIZATION OF THE AIRCRAFT WITH AN EXTERNAL POWER SOURCE
AMM TASK 27-51-08-000-801-A/400	FLAP FLEXIBLE SHAFT SECTION 5 - REMOVAL
AMM TASK 27-51-12-000-801-A/400	FLAP VELOCITY SENSOR - REMOVAL
AMM TASK 27-53-04-700-801-A/500	FLAP ZERO-DEGREE RIGGING
AMM TASK 57-56-01-000-801-A/400	INBOARD AND OUTBOARD FLAP LOWER SHROUDS - REMOVAL

C. Zones and Accesses

ZONE	PANEL/DOOR	LOCATION
5721		Outboard flap lower shroud
6721		Outboard flap lower shroud

D. Tools and Equipment

Not Applicable

E. Auxiliary Items

ITEM	DESCRIPTION	PURPOSE	QTY
Commercially available	PVC Gloves	Protection for the hands	1
Commercially available	Goggles	Protection for the eyes	1

F. Consumable Materials

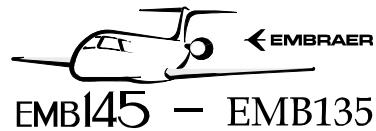
Not Applicable

G. Expandable Parts

Not Applicable

H. Persons Recommended

QTY	FUNCTION	PLACE
1	Does the task	Wing trailing edge



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I. Preparation

SUBTASK 841-003-A

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

- (1) Make sure that the aircraft is safe for maintenance.
- (2) Energize the aircraft with External DC Power Supply ([AMM TASK 20-40-01-860-801-A/200](#)).
- (3) Set the Flaps to the 45-degree position.
- (4) On the circuit breaker panel, open the FLAP 1 and FLAP 2 circuit breakers and attach a DO-NOT-CLOSE tag to them.
- (5) Open the outboard flap lower shroud ([AMM TASK 57-56-01-000-801-A/400](#)).
- (6) If it is possible, do not remove the two actuator from the same flap panel not to make the flap rigging incorrect.

NOTE: If the FSA 3 is removed at the same time of the FSA 4 do the rigging ([AMM TASK 27-53-04-700-801-A/500](#)) after the actuator installation.

J. Removal ([Figure 402](#))

SUBTASK 020-003-A

- (1) Remove FFS section 5 (5) from FSA 4 (1). Refer to [AMM TASK 27-51-08-000-801-A/400](#).

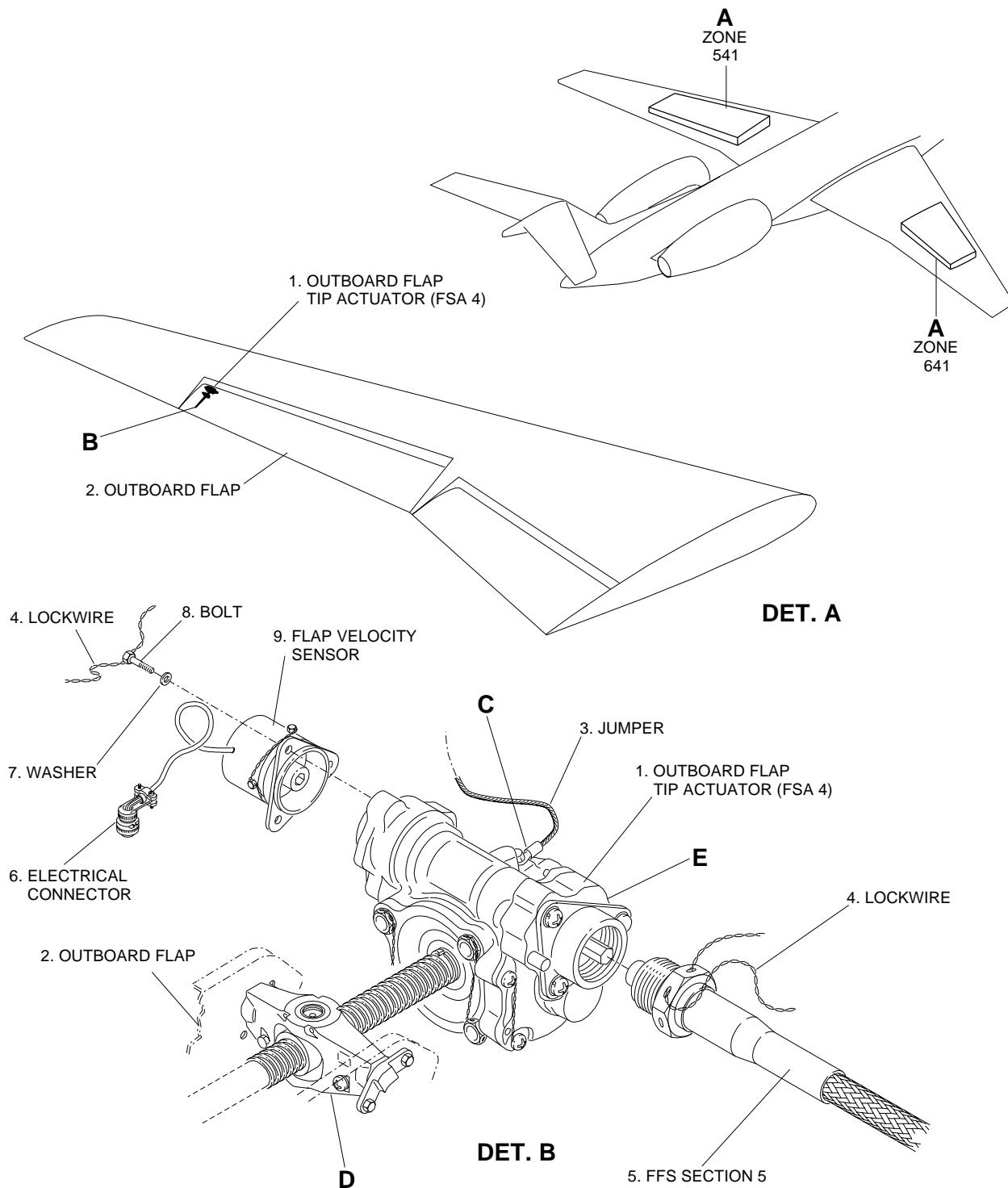
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- (2) Remove the nuts (14), bolts (16), washers (15) and actuator gimbal pins (17) and (26) to release the gimbal of the actuator from the outboard Flap (2).
- (3) Remove and discard the cotter pin (23).
- (4) Remove the nut (22), bolt (18), and washers (19/21) to release FSA 4 (1) from the wing rear spar bracket (20).
- (5) Remove the bolt (10) and washers (11/12/13) to release the jumper (3) from FSA 4 (1).
- (6) Disconnect the FVS electrical connector. Refer to [AMM TASK 27-51-12-000-801-A/400](#)
- (7) Remove FSA 4 (1).
- (8) On the bench, cut the lockwire (4) and remove the bolt (8) and washers (7) to release the flap velocity sensor (9) from FSA 4 (1).

EFFECTIVITY: ALL

Outboard Flap Tip Actuator - Removal/Installation

Figure 402 - Sheet 1

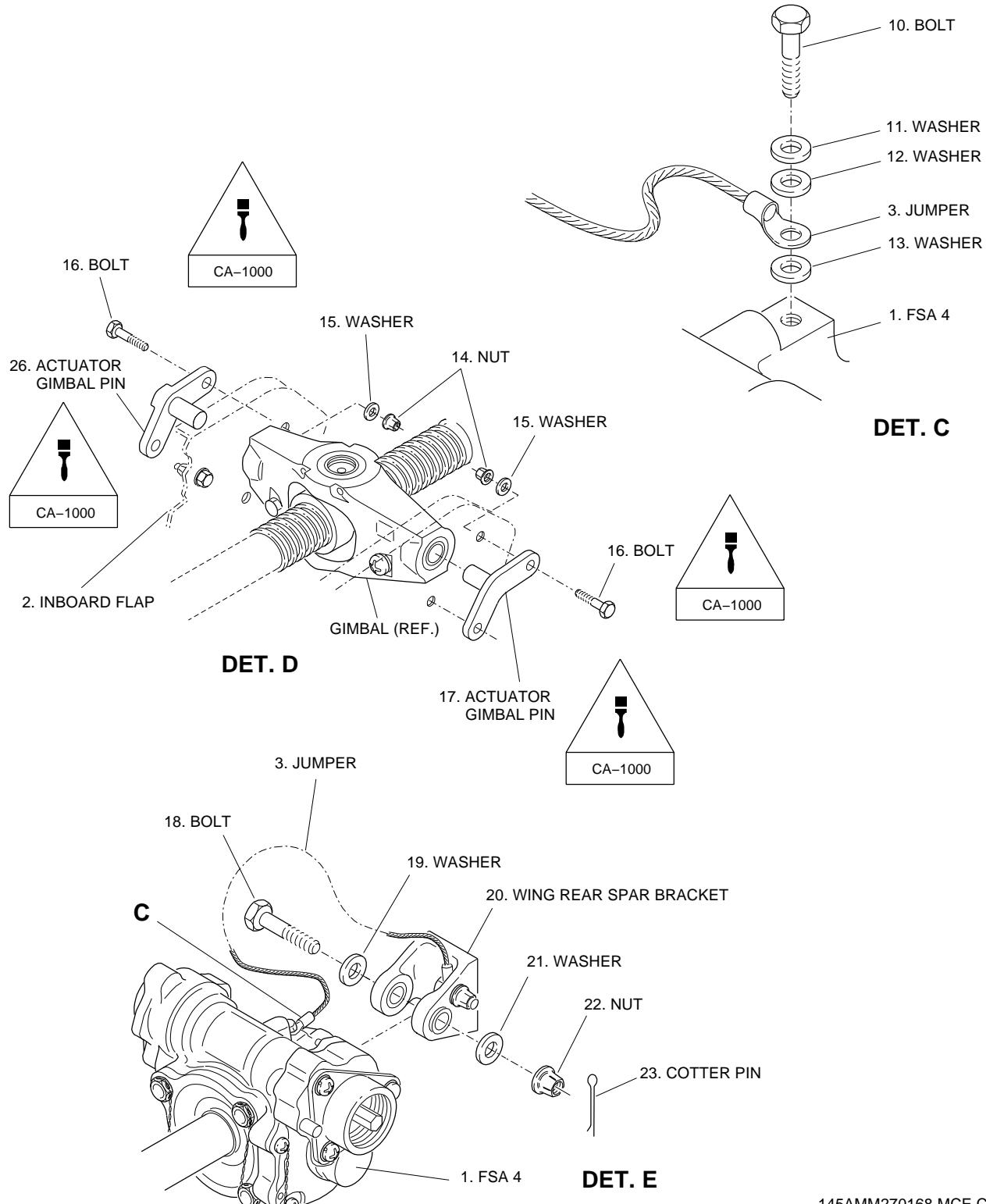


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EFFECTIVITY: ALL

Outboard Flap Tip Actuator - Removal/Installation

Figure 402 - Sheet 2



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TASK 27-51-10-400-802-A

EFFECTIVITY: ALL

5. OUTBOARD FLAP TIP ACTUATOR (FSA 4) - INSTALLATION

A. General

(1) This task gives the procedures to install the actuator of the tip of the outboard flap.

B. References

REFERENCE	DESIGNATION
AMM TASK 20-40-01-860-801-A/200	ENERGIZATION OF THE AIRCRAFT WITH AN EXTERNAL POWER SOURCE
AMM TASK 27-51-00-700-801-A/500	FLAP CONTROL SYSTEM - OPERATIONAL CHECK
AMM TASK 27-51-08-400-801-A/400	FLAP FLEXIBLE-SHAFT SECTION 5 - INSTALLATION
AMM TASK 27-51-12-400-801-A/400	FLAP VELOCITY SENSOR - INSTALLATION
AMM TASK 27-53-04-700-801-A/500	FLAP ZERO-DEGREE RIGGING
AMM TASK 57-56-01-400-801-A/400	INBOARD AND OUTBOARD FLAP LOWER SHROUDS - INSTALLATION
IPC 27-51-00	FLAP MECHANICAL

C. Zones and Accesses

ZONE	PANEL/DOOR	LOCATION
5721		Outboard flap lower shroud
6721		Outboard flap lower shroud

D. Tools and Equipment

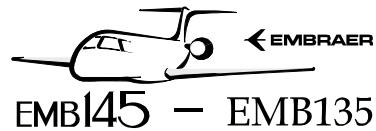
Not Applicable

E. Auxiliary Items

ITEM	DESCRIPTION	PURPOSE	QTY
Commercially available	PVC Gloves	Protection for the hands	1
Commercially available	Goggles	Protection for the eyes	1

F. Consumable Materials

SPECIFICATION (BRAND)	DESCRIPTION	QTY
MS20995C32	Lockwire	AR
MIL-S-81733, Type II-2	Sealant	AR
MEP 09-060	Corrosion-Inhibiting Compound	AR



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G. Expendable Parts

ITEM	IPC REFERENCE (VENDOR REFERENCE)	QTY
Cotter pin	IPC 27-51-00	1

H. Persons Recommended

QTY	FUNCTION	PLACE
1	Does the task	Wing trailing edge

I. Installation (Figure 402)

SUBTASK 420-003-A

WARNING: CA-1000 CORROSION-INHIBITING COMPOUND IS TOXIC TO SKIN, EYES AND RESPIRATORY TRACT. USE PVC GLOVES AND EYE PROTECTION. USE ONLY IN WELL VENTILATED AREAS. OBEY THE MANUFACTURERS' HEALTH AND SAFETY INSTRUCTIONS.

- (1) Apply corrosion-inhibiting compound to the gimbal pins (17) and (26) and bolts (16). For this, use PVC gloves and goggles.
- (2) On the bench, install the flap velocity sensor (9) in FSA 4 (1). Use the bolts (8), washer (7), and safety it.
- (3) Install FSA 4 (1) in the wing rear spar bracket (20). Use bolt (18), washers (19/21), nut (22), and safety it.

CAUTION: • MANUALLY TURN THE ACTUATOR GIMBAL OR THE ACTUATOR SCREW TO TRANSLATE THE GIMBAL.
• MANUALLY TURN THE ACTUATOR SCREW UNTIL THE HOLES OF THE GIMBAL SPHERICAL BEARING ALIGN WITH THE HOLES OF THE FLAP PANEL TO INSTALL THE ACTUATOR GIMBAL PINS.
• DO NOT USE FORCE TO MOVE THE FLAP PANEL UP OR DOWN TO ALIGN THE HOLES AND INSTALL THE GIMBAL PINS.
• MAKE SURE THAT THE GIMBALS ARE REMOVED AND INSTALLED WITH A MINIMUM OF INTERFERENCE. IT IS NECESSARY TO MAKE SURE THAT THE FLAP IS IN THE CORRECT POSITION.
• MAKE SURE THAT THE LUBRICATION HOLE OF THE GIMBAL IS UP.

- (4) Install the gimbal of FSA 4 (1) to the outboard flap (2). Use actuator gimbal pins (17) and (26), bolts (16), washers (15), and nuts (14).

CAUTION: TO ALIGN THE FSA 4 AND FFS HEX SHAFTS, DO A MINIMUM TURN OF THE ACTUATOR SCREW (LESS THAN 1 DEGREE IS SUFFICIENT).

- (5) Install FFS section 5 (5) to FSA 4 (1). Refer to [AMM TASK 27-51-08-400-801-A/400](#).
- (6) Install the jumpers (3) in FSA 4 (1). Use the bolts (10) and washers (11/12/13).

CAUTION: WHEN YOU INSTALL THE ELECTRICAL CONNECTOR, MAKE SURE THAT THERE IS NO FRICTION BETWEEN THE ELECTRICAL CONNECTOR AND THE FLAP MOVING PARTS.

- (7) Connect the electrical connector (6). Refer to [AMM TASK 27-51-12-400-801-A/400](#)
- (8) On the circuit breaker panel, close the FLAP 1 and FLAP 2 circuit breakers and remove the DO-NOT-CLOSE tag from them.
- (9) Energize the aircraft with External DC Power Supply ([AMM TASK 20-40-01-860-801-A/200](#)).
- (10) Set the flap to 45° position.
- (11) Hold the middle section of the flap trailing edge, and apply a light force so as to shake the flap panel.
- (12) Make sure that flap panel is not rigid.

NOTE: • If the flap panel is rigid, perform the [AMM TASK 27-53-04-700-801-A/500](#) in order to adjust the flap correctly.
• There must be a small relative movement of the flap panel in relation to the wing trailing edge.
• If the FSA 3 was removed at the same time of the FSA 4, do the rigging procedure ([AMM TASK 27-53-04-700-801-A/500](#)).

J. Follow-on

SUBTASK 842-003-A

- (1) Close the outboard flap lower shroud ([AMM TASK 57-56-01-400-801-A/400](#)).
- (2) Do the operational check of the flap control system ([AMM TASK 27-51-00-700-801-A/500](#)).