ELEVATOR PRIMARY MECHANICAL CONTROL - ADJUSTMENT/TEST

EFFECTIVITY: ALL

1. General

A. This section gives the procedures to do:

- A functional check to find the backlash of the elevators, servo tabs, and spring tabs.
- The adjustments of the elevator primary mechanical control through the primary backstops and secondary backstops.
- The elevator deflection check.
- The inspection and adjustment of the elevator connecting rod.

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*
27-31-00-700-801-A ♦	ELEVATOR PRIMARY MECHANICAL CONTROL BACKLASH - FUNCTIONAL CHECK	ALL
27-31-00-700-802-A	ADJUSTMENT OF THE ELEVATOR PRIMARY BACKSTOP AND SECONDARY BACKSTOP	ALL
27-31-00-700-803-A	ELEVATOR - DEFLECTIONS	ALL
27-31-00-700-804-A	ELEVATOR CONNECTING ROD - ADJUSTMENT/CHECK	ALL
27-31-00-700-805-A	TEST OF CLEARANCE BETWEEN ELEVATOR/SPRING TAB AND BOOM FAIRING	ALL

TASK 27-31-00-700-801-A
EFFECTIVITY: ALL

2. ELEVATOR PRIMARY MECHANICAL CONTROL BACKLASH - FUNCTIONAL CHECK

A. General

(1) This task gives the procedures to do the functional check for backlash on the elevator, servo tab, and spring tab.

B. References

REFERENCE	*DESIGNATION*
AMM MPP 06-41-01/100	-
FIM TASK 27-31-00-810-804-A	-

C. Zones and Accesses

ZONE	*PANEL/DOOR*	*LOCATION*
123	123BL	Area below the cockpit floor

D. Tools and Equipment

ITEM	*DESCRIPTION*	*PURPOSE*	*QTY*
GSE 036	Hydraulic platform	To get access to the elevator and tabs	
GSE 056	Dynamometer	To apply loads on the elevator surface	
GSE 508	Dynamometer	To apply loads on the servo and spring tabs surfaces	
GSE 058	Kit, Rig Pins	To keep the surface and the control column locked at the neutral position	
GSE 196	Clamp-Locking, Elevator	To lock the elevator in the neutral position	
GSE 060	Kit, Backlash Measurement	To measure the elevator and tabs backlashes	
GSE 070	Digital Protractor	To measure the elevator deflections	
GSE 072	Magnetic Stand	To attach the Dial Indicator	
GSE 489	Dial Indicator	To measure the servo and spring tabs displacements	
GSE 378	Control Surface Backlash Calculation Software (Alternative)	To calculate the elevator and tabs backlashes	

E. Auxiliary Items

Not Applicable

F. Consumable Materials

SPECIFICATION (BRAND)	*DESCRIPTION*	*QTY*
Commercially available	Adhesive double-faced tape.	AR

G. Expandable Parts

Not Applicable

H. Persons Recommended

QTY	*FUNCTION*	*PLACE*
2	Do the task	Elevator

I. Preparation

SUBTASK 841-002-A

CAUTION: EMBRAER RECOMMENDS: THE AIRCRAFT MUST STAY IN THE HANGAR AND ON GROUND.

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

(2) Do not do other tasks on the horizontal stabilizer, elevators, and rudder.

(3) Make sure that the horizontal stabilizer is approximately in the neutral position.

(4) Open cockpit underfloor access hatch 123BL (AMM MPP 06-41-01/100).

J. Functionally Check of the Elevator Backlash

SUBTASK 720-002-A

(1) Do these procedures to install the GSEs on the left elevator.

(a) Install the rig pins (GSE 058) to the control column, and torque tube. Refer to (Figure 501).

(b) Get access to the elevator surfaces.

(c) Install the rig pins (GSE 058) to the rear quadrant. Refer to (Figure 501).

(d) Install dynamometer attachment device (GSE 060) on the elevator trailing edge. Refer to (Figure 502).

(e) Install the digital protractor (GSE 070) to the elevator-surface hinge axis. Refer to (Figure 502).

(f) Put the horizontal stabilizer in the neutral position, approximately

(g) Adjust the elevator surface to neutral position as follows:

1 Install the lock-clamp (GSE 196) to lock the elevator in the neutral position. Refer to (Figure 503).

2 Set the protractor to zero.

3 Remove the lock-clamp from the elevator surface.

(h) Remove the rig pins from the rear quadrant.

NOTE: Keep the rig pins of the control column and torque tube installed.

(2) Do the following procedures to find the backlash of the left elevator surface.

(a) Grasp the elevator trailing edge and force the surface 3 times up and down to cycle the surface.

(b) Install the dynamometer (GSE 056) in the attachment device (GSE 060).

(c) Gradually and continuously apply the load in the down direction for 4.0, 6.0, 8.0, 10.0 and 12.0 kgf (+ 8.8, 13.2, 17.6, 22.0 and 26.4 lbf) and write down in (Table 501) the values shown on the digital protractor for cycle 1.

(d) Remove the dynamometer from the attachment device.

(e) Install the dynamometer (GSE 056) in the attachment device (GSE 060).

(f) Gradually and continuously apply the load in the up direction for 12.0 kgf (+ 26.4 lbf) and write down in (Table 501) the value shown on the digital protractor for cycle 1.

(g) Gradually and continuously decrease the load for 10.0, 8.0, 6.0 and 4.0 kgf (+ 22.0, 17.6, 13.2 and 8.8 lbf) and write down in (Table 501) the values shown on the digital protractor for cycle 1.

Table 501 - ELEVATOR SURFACE DISPLACEMENTS X APPLIED LOADS

Applied Loads			**Elevator Surface Displacement (Degrees)**			
			Left Elevator		**Right Elevator**	
	(kgf)	**(lbf)**	**cycle 1**	**cycle 2**	**cycle 1**	**cycle 2**
UP	+ 12.0	+ 26.4				
	+ 10.0	+ 22.0				
	+ 8.0	+ 17.6				
	+ 6.0	+ 13.2				
	+ 4.0	+ 8.8				
Reverse application direction[1]						
Down	- 4.0	- 8.8				
	- 6.0	- 13.2				
	- 8.0	- 17.6				
	- 10.0	- 22.0				
	- 12.0	- 26.4				

[1] The release of the loads, during the change in the direction of the load application, must be slight to prevent sudden displacement of the elevator.

(3) Do step (2) for cycle 2.

NOTE: Do not set the protractor to zero, after you begin cycle 1, until you complete cycle 2

(4) (Only if the GSE 378 is not available) For each cycle, find the backlash as follows:

(a) Make a graph of the “applied load x displacement” for the left elevator for each cycle. Refer to (Figure 505).

1. Make sure that the data agree with the graph of (Figure 504).

2. If the graph does not agree with graph of (Figure 504), ignore the cycle and do a new cycle.

(b) The backlash of the left elevator surface is the average value of the backlash of the two cycles.

NOTE: You must check the quality of the readings when you make the graphs. Ignore the points that are too far from the straight lines. If there is too much dispersion of points around the straight line, you must do the test again.

(c) The maximum value of elevator backlash is:.

Table 502 - MAXIMUM PERMITTED ELEVATOR BACKLASH

MAXIMUM PERMITTED ELEVATOR BACK-LASH	2.20 degress

NOTE: If the value found is out of the limit, refer to FIM TASK 27-31-00-810-804-A.

(5) (Only if the GSE 378 is available) For each cycle, find the backlash as follows:

(a) Enter in the software with values of the cycles 1, and 2 indicated in the Table 501.

(b) Check the value of the Elevator Backlash according to Table 502.

(6) Remove the digital protractor from the left elevator.

(7) Remove the dynamometer and its support from the left elevator.

(8) Repeat the procedure for the right elevator surface.

(9) Remove the rig pins from control column and torque tube.

(10) Perform the Functional Check of the Servo Tab Backlash.

K. Functionally Check of the Servo Tab Backlash

SUBTASK 720-003-A

(1) Do this procedure to install GSEs to the left servo tab.

(a) Install the rig pins (GSE 058) to the control column, and torque tube. Refer to (Figure 501).

(b) Get access to the elevator surfaces.

(c) Put the horizontal stabilizer in the neutral position, approximately

(d) Install the rig pins (GSE 058) to the rear quadrant. Refer to (Figure 501).

WARNING: BE VERY CAREFUL NOT TO LET THE 5 kgf (11 lbf) WEIGHT DROP FROM THE ELEVATOR TRAILING EDGE BECAUSE THIS CAN CAUSE AN ACCIDENT

(e) Put a weight of 5.0 kg (11.0 lbf) on the elevator, near the servo tab. Refer to (Figure 506).

(f) Install a magnetic stand (GSE 072) to the elevator. Refer to (Figure 506). Use double-faced adhesive tape.

(g) Install dynamometer attachment device (GSE 060) on the servo tab trailing edge. Refer to (Figure 506).

(h) Install the dial indicator (GSE 489) to the magnetic stand. Refer to (Figure 506).

NOTE: The dial indicator stylus must be perpendicular to the longitudinal axis of the servo tab.

(2) Do the following procedures to find the backlash of the left servo tab.

(a) Grasp the servo-tab trailing edge and force the surface 3 times up and down to cycle the surface.

(b) Set the dial indicator to zero.

(c) Install the dynamometer (GSE 508) in the attachment device (GSE 060).

(d) Gradually and continuously apply the load in the down direction for 0.5, 1.0, 1.5, 2.0 and 2.5 kgf (+ 1.1, 2.2, 3.3, 4.4 and 5.5 lbf) and write down in (Table 503) the values shown on the dial indicator for cycle 1.

NOTE: The servo tab will tend to move its trailing edge up in relation to the elevator movement.

(e) Remove the dynamometer from the attachment device.

(f) Install the dynamometer (GSE 508) in the attachment device (GSE 060).

(g) Gradually and continuously apply the load in the up direction for 2.5 kgf (+ 5.5 lbf) and write down in (Table 503) the value shown on the digital protractor for cycle 1.

NOTE: The servo tab will tend to move its trailing edge down in relation to the elevator movement.

(h) Gradually and continuously decrease the load for 2.0, 1.5, 1.0 and 0.5 kgf (+ 4.4, 3.3, 2.2 and 1.1 lbf) and write down in (Table 503) the values shown on the digital protractor for cycle 1.

NOTE: The servo tab will tend to move its trailing edge up in relation to the elevator movement.

Table 503 - SERVO TAB BACKLASH

Applied Loads			Servo Tab Displacement mm (in)			
			Left Servo Tab		Right Servo Tab	
	(kgf)	(lbf)	cycle 1	cycle 2	cycle 1	cycle 2
UP	+ 2.5	+ 5.5				
	+ 2.0	+ 4.4				
	+ 1.5	+ 3.3				
	+ 1.0	+ 2.2				
	+ 0.5	+ 1.1				
Reverse application direction[1]						
Down	- 0.5	- 1.1				
	- 1.0	- 2.2				
	- 1.5	- 3.3				
	- 2.0	- 4.4				
	- 2.5	- 5.5				

[1] The release of the loads, during the change in the direction of the load application, must be slight to prevent sudden displacement of the servo tab.

(3) Do step (2) for cycle 2.

NOTE: Do not set the dial indicator to zero, after you begin cycle 1, until you complete cycle 2.

(4) (Only if the GSE 378 is not available) For each cycle, find the backlash as follows:

(a) Make a graph of the “applied load x displacement” for the left servo tab for each cycle. Refer to (Figure 509).

1. Make sure that the data agree with the graph of (Figure 507).

2. If the graph does not agree with graph of (Figure 507), ignore the cycle and do a new cycle.

(b) The backlash of the left servo tab is the average value of the backlash of the two cycles.

NOTE:
- The kinematics of the servo tab mechanism causes the direction of the displacement measured on the dial indicator to be opposite to the direction of application of the loads. Because of this, the Load x Displacement graph made for the servo tab is not equivalent to the Elevator and Spring tab graphs.
- You must make sure of a good quality of the readings when you make the graphs. Ignore the points that are too far from the straight lines. If there is too much dispersion of points around the straight line, you must do the test again.

(c) The maximum value permitted for the servo tab backlash is:

Table 504 - MAXIMUM VALUE PERMITTED FOR THE SERVO TAB BACK-LASH

MAXIMUM PERMITTED SERVO TAB BACKLASH	
1.97 mm	0.077 in

NOTE: If the value found is out of the limit, refer to FIM TASK 27-31-00-810-804-A.

(5) (Only if the GSE 378 is available) For each cycle, find the backlash as follows:

(a) Enter in the software with values of the cycles 1, and 2 indicated in the Table 503.

(b) Check the value of the Elevator Backlash according to Table 504.

(6) Remove the weight of 5.0 kgf (11.0 lbf) from the elevator near the servo tab.

(7) Remove the magnetic stand from the elevator.

(8) Remove the dynamometer attachment device from the servo tab trailing edge.

(9) Repeat the procedure for the right servo tab surface.

(10) Remove the rig pins from control column, torque tube, and rear quadrant.

(11) Perform the Functional Check of the Spring Tab Backlash.

L. Functionally Check of the Spring Tab Backlash

SUBTASK 720-004-A

(1) Do this procedure to install GSEs to the left spring tab.

(a) Install the rig pins (GSE 058) to the control column, and torque tube. Refer to (Figure 501).

(b) Get access to the elevator surfaces.

(c) Put the horizontal stabilizer in the neutral position, approximately

WARNING: BE VERY CAREFUL NOT TO LET THE 5 kgf (11 lbf) WEIGHT DROP FROM THE ELEVATOR TRAILING EDGE BECAUSE THIS CAN CAUSE AN ACCIDENT

(d) Put a weight of 5.0 kg (11.0 lbf) on the elevator, near the servo tab. Refer to (Figure 508).

(e) Install a magnetic stand (GSE 072) to the elevator. Refer to (Figure 508). Use double-faced adhesive tape.

(f) Install the dynamometer attachment device (GSE 060) on the inboard side spring-tab trailing edge. Refer to (Figure 508).

(g) Install the dial indicator (GSE 489) to the magnetic stand. Refer to (Figure 508).

NOTE: The dial indicator stylus must be perpendicular to the longitudinal axis of the spring-tab.

(2) Do the following procedures to find the backlash of the left spring tab.

(a) Grasp the spring-tab trailing edge and force the surface 3 times up and down to cycle the surface.

(b) Set the dial indicator to zero.

(c) Install the dynamometer (GSE 508) in the attachment device (GSE 060).

(d) Gradually and continuously apply the load in the down direction for 0.5, 1.0, 1.5, 2.0 and 2.5 kgf (+ 1.1, 2.2, 3.3, 4.4 and 5.5 lbf) and write down in (Table 505) the values shown on the dial indicator for cycle 1.

(e) Remove the dynamometer from the attachment device.

(f) Install the dynamometer (GSE 508) in the attachment device (GSE 060).

(g) Gradually and continuously apply the load in the up direction for 2.5 kgf (+ 5.5 lbf) and write down in (Table 505) the value shown on the digital protractor for cycle 1.

(h) Gradually and continuously decrease the load for 2.0, 1.5, 1.0 and 0.5 kgf (+ 4.4, 3.3, 2.2 and 1.1 lbf) and write down in (Table 505) the values shown on the digital protractor for cycle 1.

Table 505 - SPRING TAB BACKLASH

Applied Loads			Spring Tab Displacement mm (in)			
			Left Spring Tab		Right Spring Tab	
	(kgf)	(lbf)	cycle 1	cycle 2	cycle 1	cycle 2
UP	+ 2.5	+ 5.5				
	+ 2.0	+ 4.4				
	+ 1.5	+ 3.3				
	+ 1.0	+ 2.2				
	+ 0.5	+ 1.1				
Reverse application direction[1]						
Down	- 0.5	- 1.1				
	- 1.0	- 2.2				
	- 1.5	- 3.3				
	- 2.0	- 4.4				
	- 2.5	- 5.5				

[1] The release of the loads, during the change in the direction of the load application, must be slight to prevent sudden displacement of the spring tab.

(3) Do step (2) for cycle 2.

NOTE: Do not set the dial indicator to zero, after you begin cycle 1, until you complete cycle 2.

(4) (Only if the GSE 378 is not available) For each cycle, find the backlash as follows:

(a) Make an “applied load x displacement” graph for the left spring tab for each cycle. Refer to (Figure 509).

- Make sure that the data agree with the graph of (Figure 504).
- If the graph does not agree with graph of (Figure 504), ignore the cycle and do a new cycle.

(b) The backlash of the left spring tab is the average value of the backlash of the two cycles.

NOTE: You must make sure of the quality of the readings when you make the graphs. Ignore the points that are too far from the straight lines. If there too much dispersion of points around the straight line, you must do the test again.

(c) The maximum value permitted for the spring tab backlash is:

Table 506 - MAXIMUM VALUE PERMITTED FOR THE SPRING TAB BACK-LASH

MAXIMUM PERMITTED SPRING TAB BACKLASH	
1.06 mm	0.041 in

NOTE: If the value found is out of the limit, refer to FIM TASK 27-31-00-810-804-A.

(5) (Only if the GSE 378 is available) For each cycle, find the backlash as follows:

(a) Enter in the software with values of the cycles 1, and 2 indicated in the table 505.

(b) Check the value of the Spring Tab Backlash according to Table 506.

(6) Remove the weight of 5.0 kgf (11.0 lbf) from the elevator near the servo tab.

(7) Remove the magnetic stand from the elevator.

(8) Remove the dynamometer attachment device from the spring tab trailing edge.

(9) Repeat the procedure for the right spring tab surface.

(10) Remove the rig pins from control column, and torque tube.

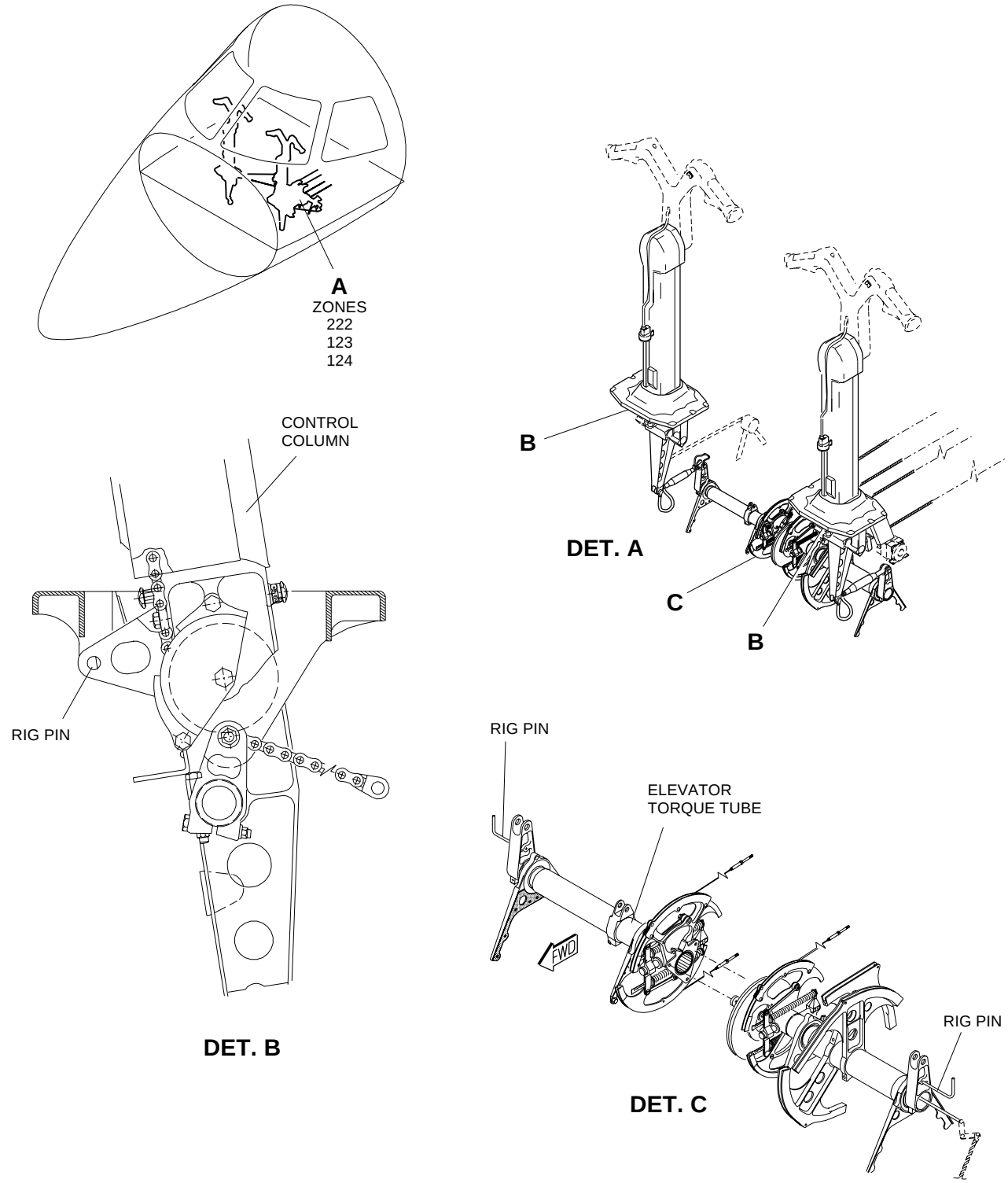
M. Follow-on

SUBTASK 842-002-A

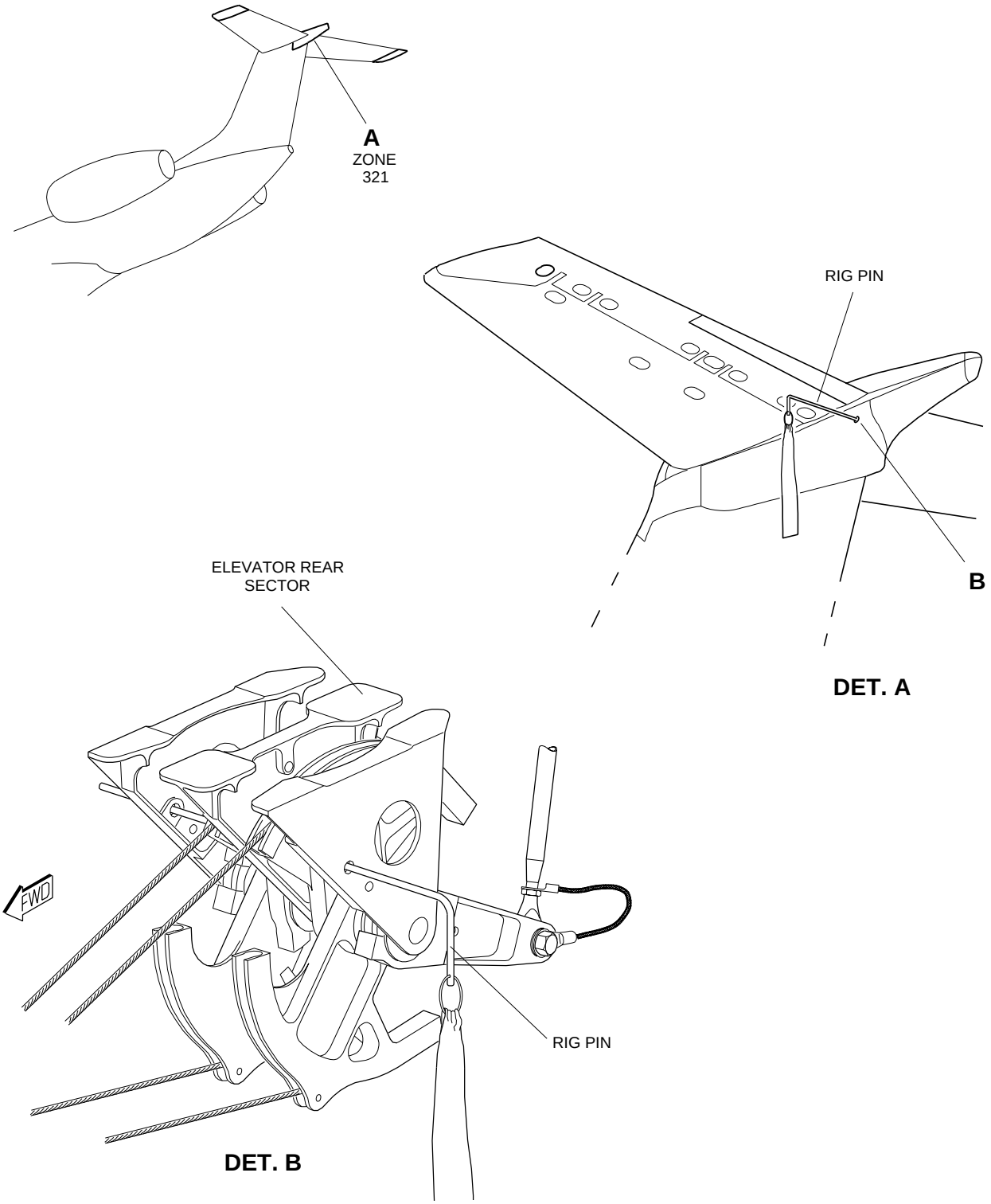
(1) Remove platform GSE 036.

(2) Close cockpit underfloor access hatch 123BL (AMM MPP 06-41-01/100).

EFFECTIVITY: ALL
Rig Pins - Location
Figure 501 - Sheet 1



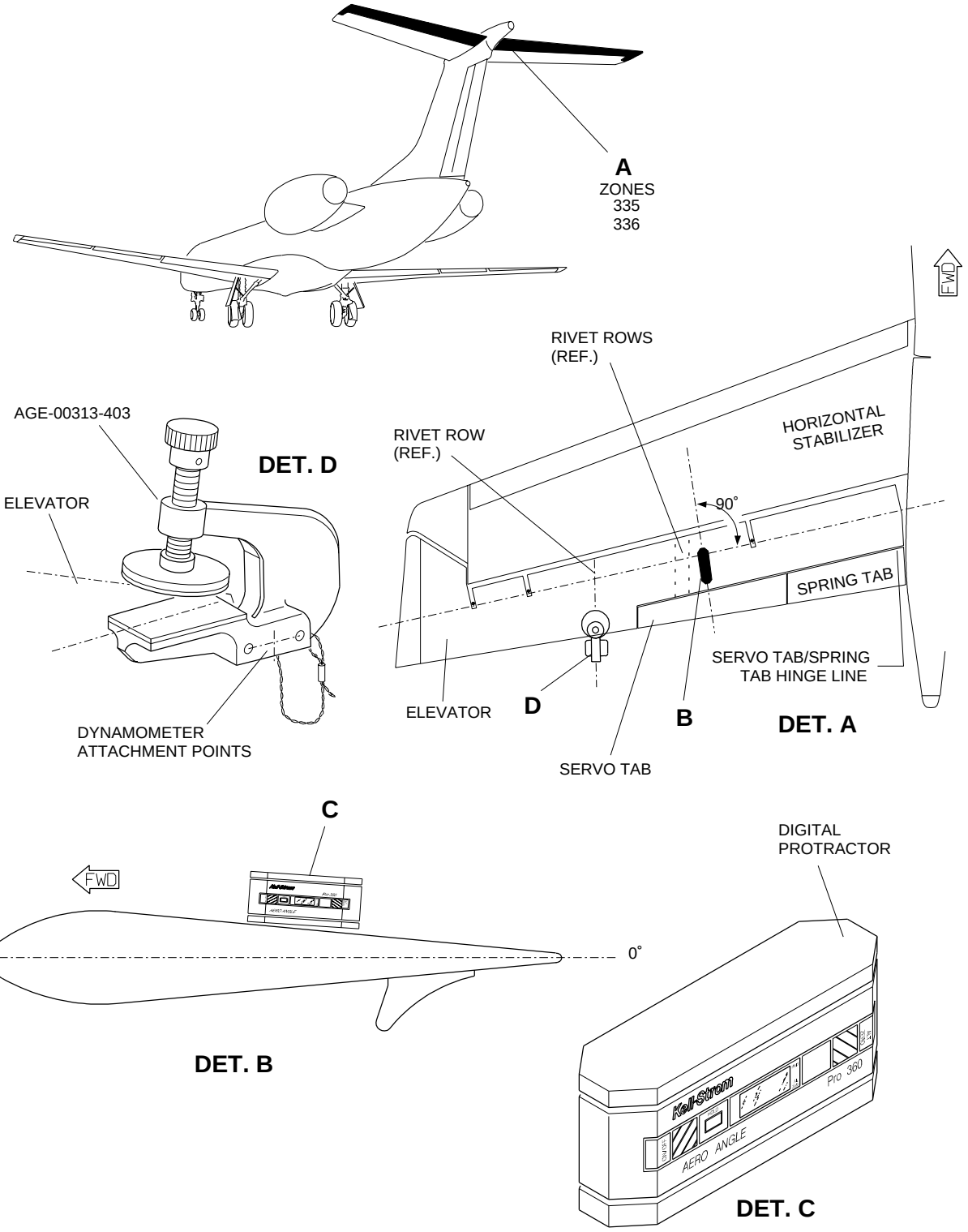
EFFECTIVITY: ALL
Rig Pins - Location
Figure 501 - Sheet 2



145AMM270424.MCE A

EFFECTIVITY: ALL

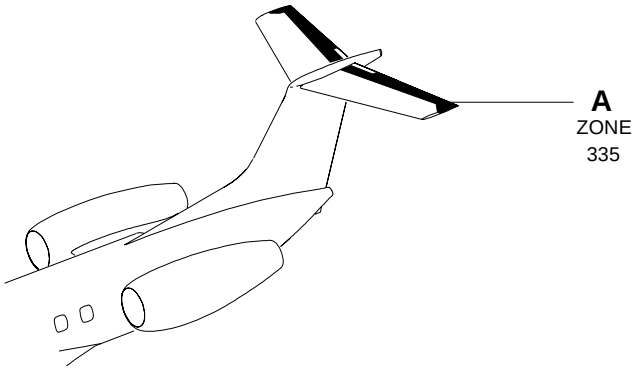
Location of the GSEs for Elevator Backlash
Figure 502

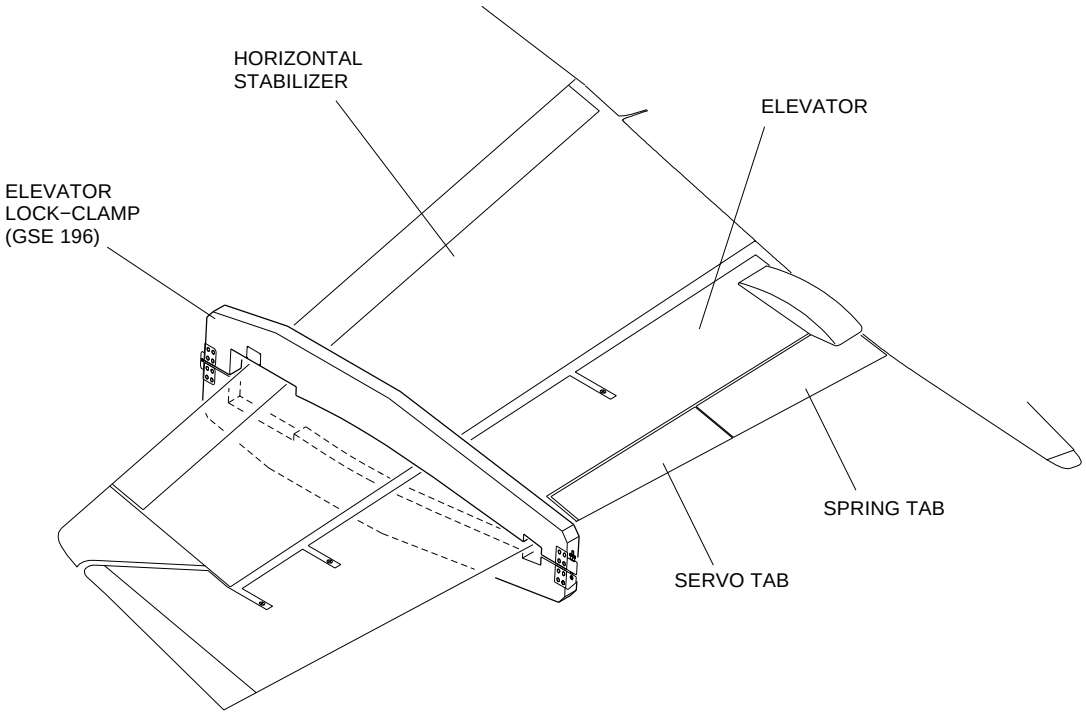


145AMM270402.MCE

EFFECTIVITY: ALL

Elevator Lock Clamp - Location
Figure 503



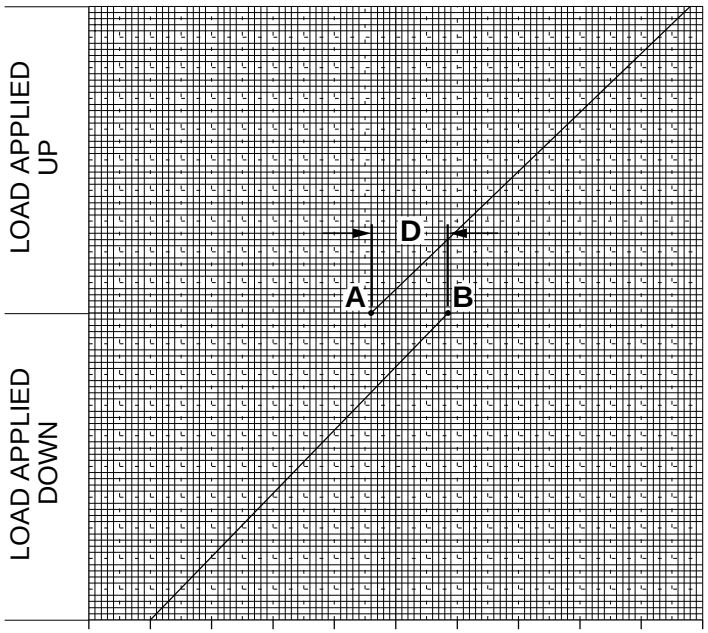


DET. A

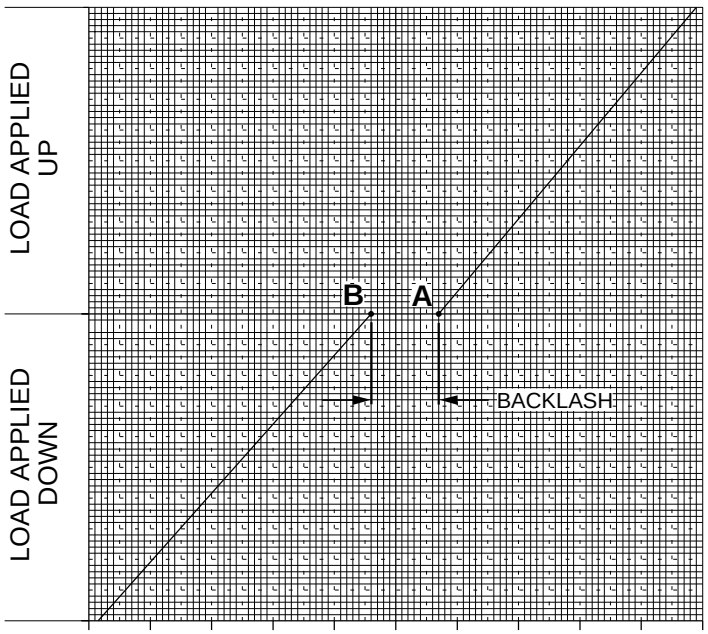
EM145AMM270795A.DGN

EFFECTIVITY: ALL

Elevator and Spring Tab Backlashes - Graph
Figure 504



GRAPH I - "A" IS LESS THAN "B" (INCORRECT RESULTS)



GRAPH II - "A" IS MORE THAN "B" (CORRECT RESULTS)

NOTES:

1 - WHEN YOU MAKE A GRAPH, IF "A" IS LESS THAN "B" (GRAPH I), YOU MUST IGNORE THE DATA AND MAKE A NEW CYCLE UNTIL YOU GET A GRAPH THAT IS EQUIVALENT TO GRAPH II. BUT, IF YOUR GRAPH IS SIMILAR TO THE GRAPH I AND "D" VALUE IS EQUIVALENT TO 20% OF MAXIMUM VALUE PERMITTED FOR THE BACKLASH, THIS GRAPH IS ACCEPTABLE, AND THE BACKLASH IS CONSIDERED EQUAL TO ZERO.

2 - THE GRAPH THAT SHOWS THE INCORRECT RESULTS ("A" IS LESS THAN "B") AND THE GRAPH THAT SHOWS THE CORRECT RESULTS ("A" IS MORE THAN "B") CAN BE WITH THE POINTS "A" AND "B" TO THE LEFT OR TO THE RIGHT OF "Y" AXIS.

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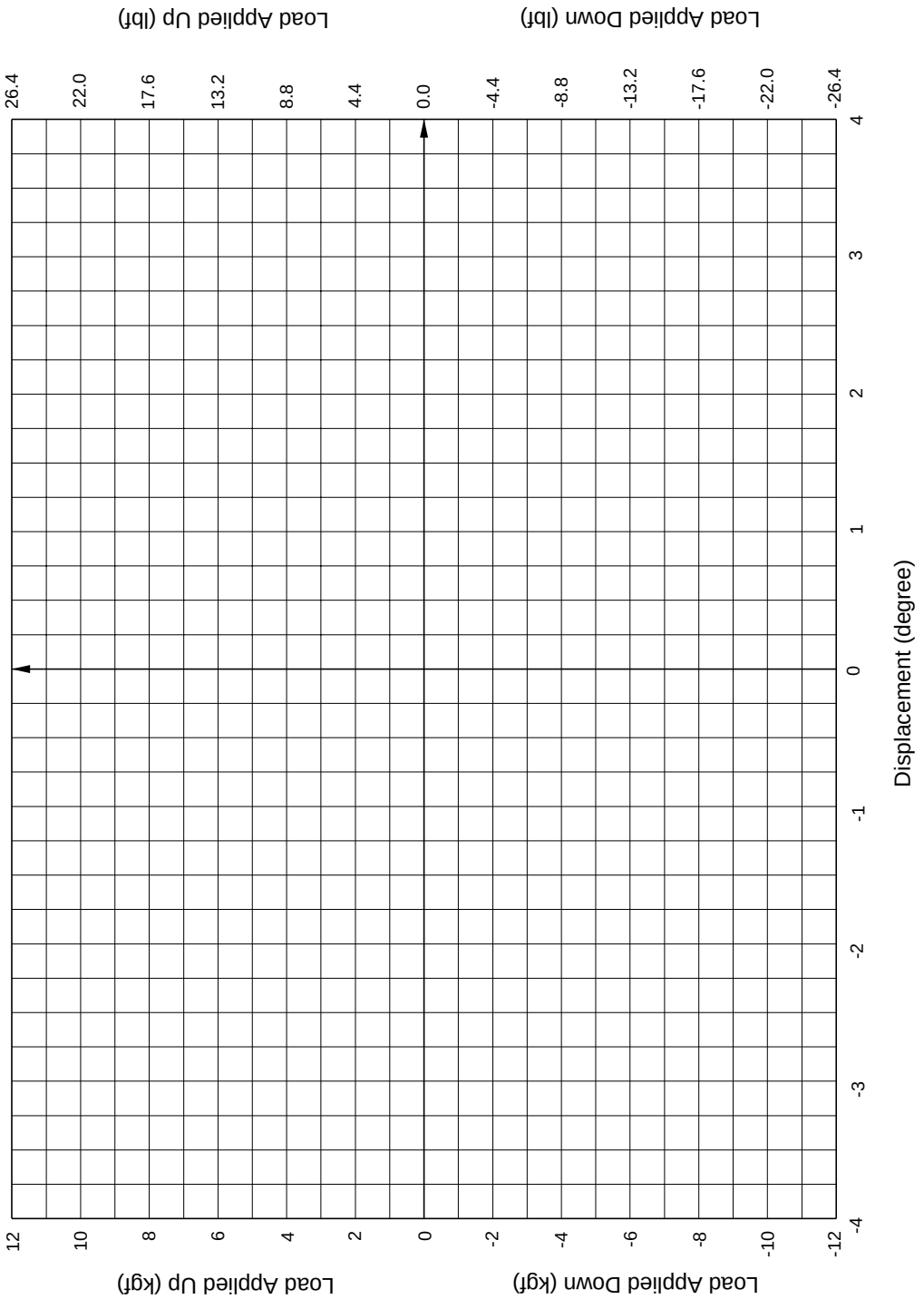
EFFECTIVITY: ALL

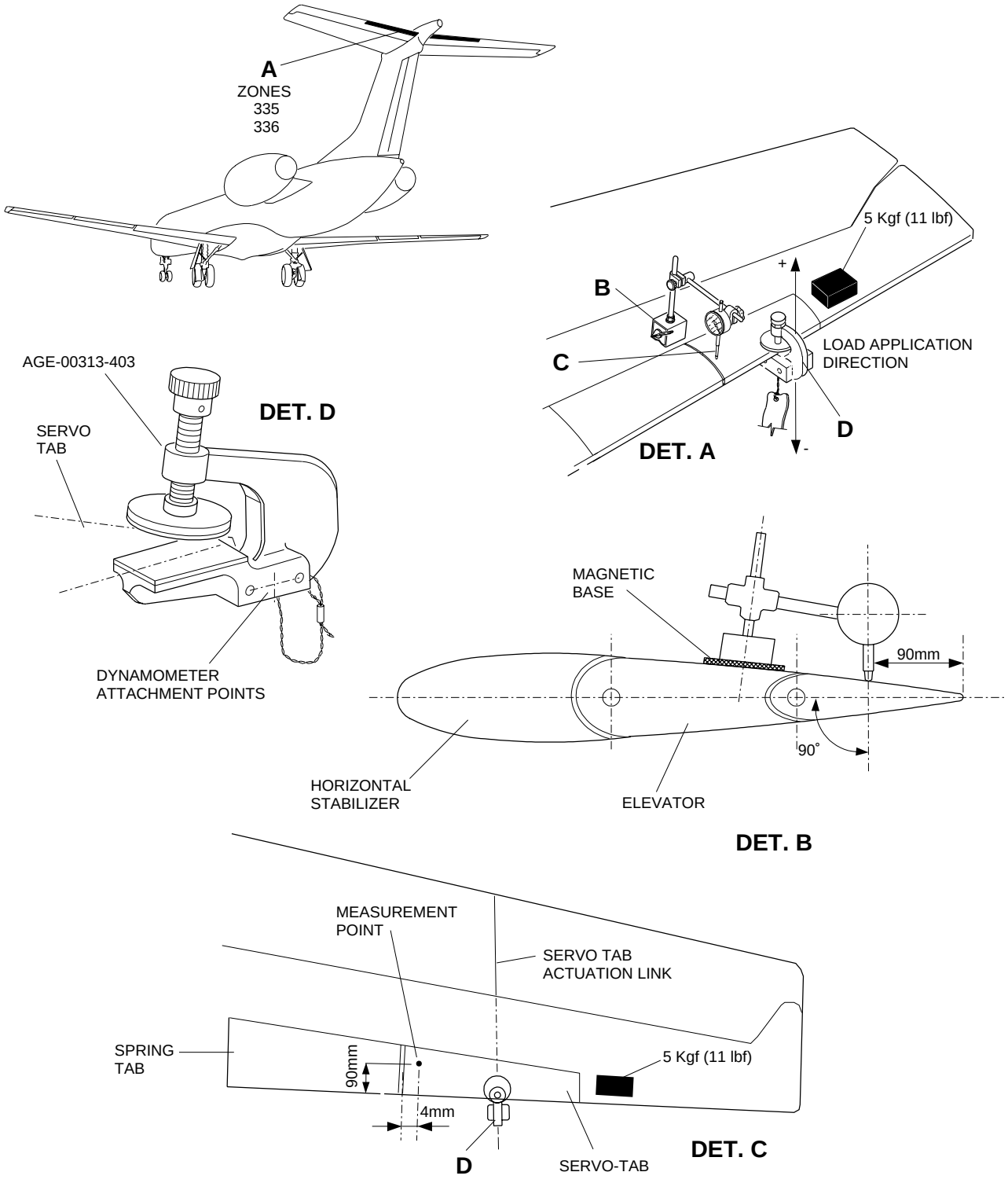
Elevator Backlash - Sample Graph
Figure 505



145AMM270485.MCE

EFFECTIVITY: ALL

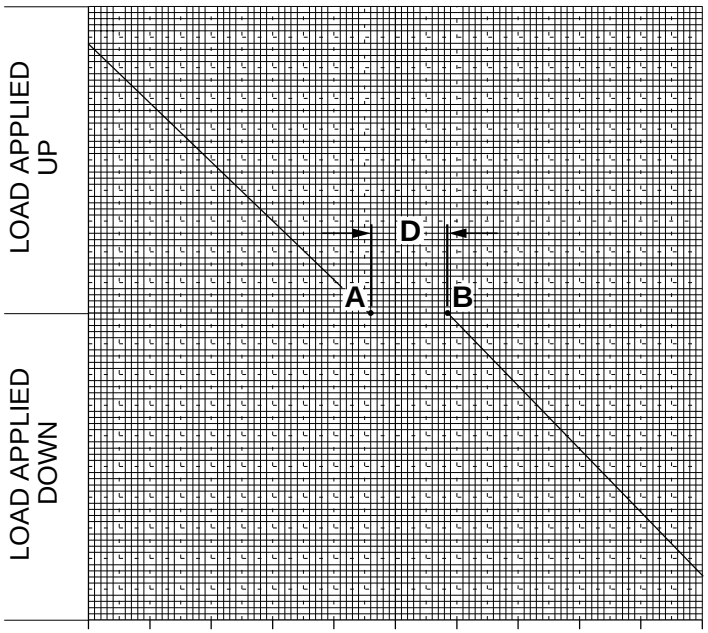
Location of the GSEs for Servo Tab Backlash
Figure 506



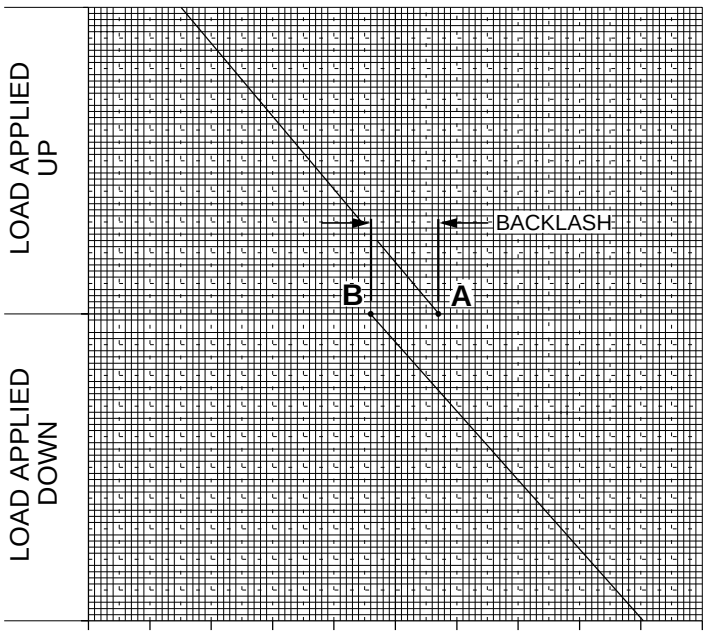
145AMM270403.MCE

EFFECTIVITY: ALL

Servo Tab Backlash - Graph
Figure 507



GRAPH I - "A" IS LESS THAN "B" (INCORRECT RESULTS)



GRAPH II - "A" IS MORE THAN "B" (CORRECT RESULTS)

NOTES:

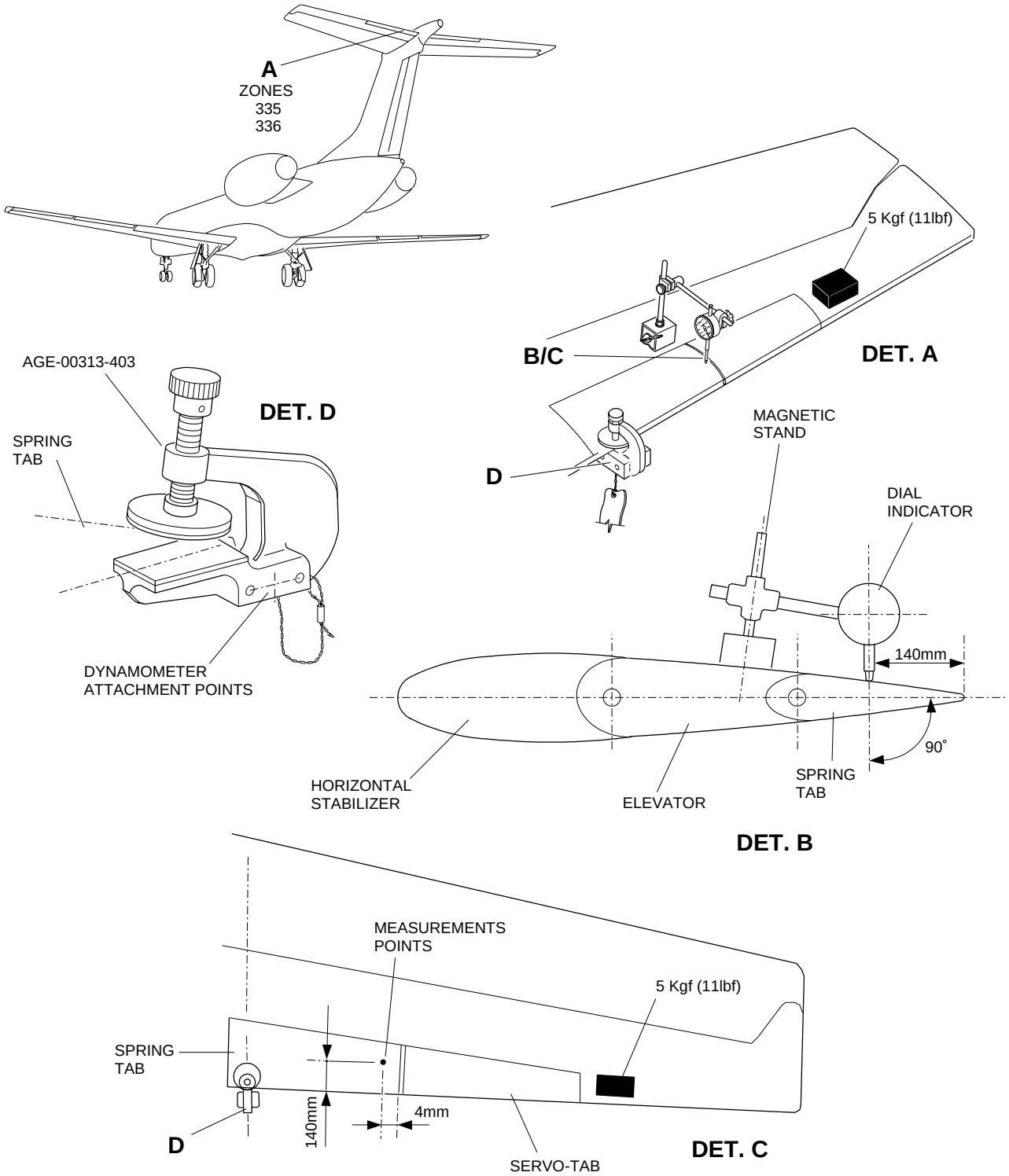
1 - WHEN YOU MAKE A GRAPH, IF "A" IS LESS THAN "B" (GRAPH I), YOU MUST IGNORE THE DATA AND MAKE A NEW CYCLE UNTIL YOU GET A GRAPH THAT IS EQUIVALENT TO GRAPH II. BUT, IF YOUR GRAPH IS SIMILAR TO THE GRAPH I AND "D" VALUE IS EQUIVALENT TO 20% OF MAXIMUM VALUE PERMITTED FOR THE BACKLASH, THIS GRAPH IS ACCEPTABLE, AND THE BACKLASH IS CONSIDERED EQUAL TO ZERO.

2 - THE GRAPH THAT SHOWS THE INCORRECT RESULTS ("A" IS LESS THAN "B") AND THE GRAPH THAT SHOWS THE CORRECT RESULTS ("A" IS MORE THAN "B") CAN BE WITH THE POINTS "A" AND "B" TO THE LEFT OR TO THE RIGHT OF "Y" AXIS.

145AMM270404.MCE

EFFECTIVITY: ALL

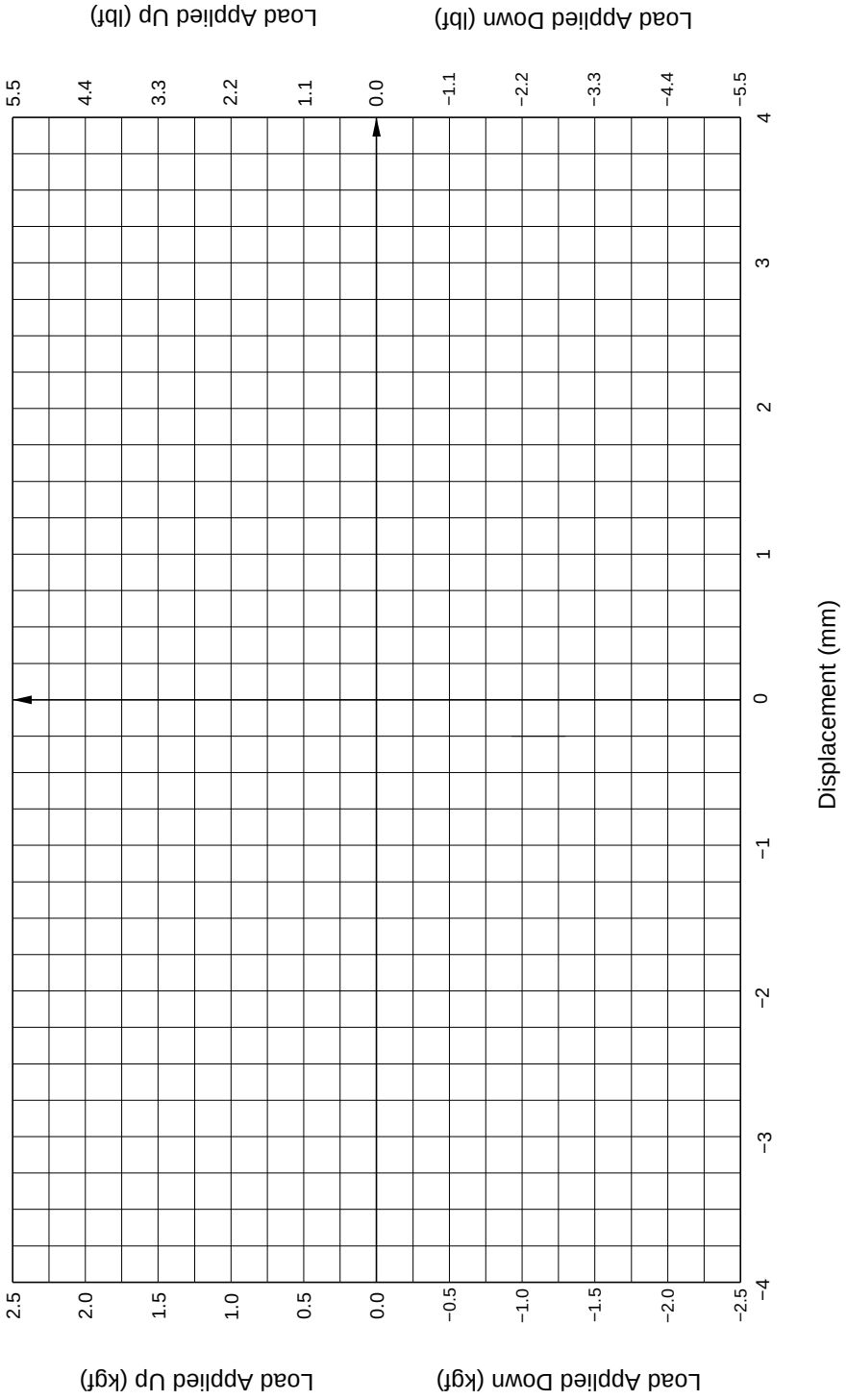
Location of the GSEs for Spring-Tab Backlash
Figure 508



145AMM270400.MCE

EFFECTIVITY: ALL

Servo Tab and Spring Tab Backlashes - Sample Graph
Figure 509



EM145AMM270486A.DGN

TASK 27-31-00-700-802-A
EFFECTIVITY: ALL

3. ADJUSTMENT OF THE ELEVATOR PRIMARY BACKSTOP AND SECONDARY BACKSTOP

A. General

(1) This task gives the procedures to adjust the elevator primary and secondary backstops.

B. References

REFERENCE	*DESIGNATION*
AMM MPP 06-41-02/100	-
AMM TASK 25-11-01-000-801-A/400	PILOT SEAT - REMOVAL
AMM TASK 25-11-01-400-801-A/400	PILOT SEAT - INSTALLATION
SB145-27-0050	-

C. Zones and Accesses

ZONE	*PANEL/DOOR*	*LOCATION*
123	123BL	Area below the cockpit floor - LH
221	221EF	Area below the cockpit floor
222	222FF	Area below the cockpit floor
325	325EL	Empennage
325	325LR	Empennage

D. Tools and Equipment

ITEM	*DESCRIPTION*	*PURPOSE*	*QTY*
GSE 036	Platform, Hydraulic, Aircraft	To get access to the elevator	
GSE 044	Headset, Ramp Handling	For communication	
GSE 058	Rig Pin Kit	To keep the surface and the control column locked at the neutral position	
GSE 070	Protractor, Digital	To measure the elevator deflection	

E. Auxiliary Items

Not Applicable

F. Consumable Materials

SPECIFICATION (BRAND)	*DESCRIPTION*	*QTY*
MS20995C32	Lockwire	AR
Commercially available	Adhesive, double-faced tape	AR

G. Expandable Parts

Not Applicable

H. Persons Recommended

QTY	*FUNCTION*	*PLACE*
1	Does the task	Elevator
1	Does the task	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 elevator system.

(3) Make sure that there are no objects or persons in the elevator travel area.

(4) Open access hatch 123BL (AMM MPP 06-41-02/100).

(5) Remove the pilot and copilot seats (AMM TASK 25-11-01-000-801-A/400).

(6) Remove floor panels 221EF and 222FF (AMM MPP 06-41-02/100).

(7) Cut the lockwires of the control column backstops (secondary backstop) (Figure 511).

(8) Open access panels 325EL and 325LR (AMM MPP 06-41-02/100).

(9) Cut the lockwire of the elevator primary backstops (Figure 510).

(10) Install the rig pin on the rear sector (Figure 501).

J. Adjustment of the Elevator Travel and Secondary Backstops

SUBTASK 720-005-A

WARNING: MAKE SURE THAT THERE ARE NO PERSONS OR OBJECTS IN THE ELEVATOR TRAVEL AREA.

(1) Install GSE 070 to the left elevator and set it to zero (Figure 502).

(2) Remove the rig pin from the rear sector.

(3) Move the control column to the aircraft nose-down position until you get the deflection of (Table 507), Refer to (Figure 513):

Table 507 - DEFLECTION OF THE ELEVATOR NOSE-DOWN POSITION

PRE-MOD SB145-27-0050	POST-MOD SB145-27-0050
16.5 degrees ± 1.0 degree	14.0 degrees ± 1.0 degree

- If necessary, adjust the primary backstops and safety them.

(4) Move the control column to the aircraft nose-up position until GSE 070 shows 27.0 degrees ± 1.0 degrees. Refer to (Figure 513).

- If necessary, adjust the primary backstops and safety them.

(5) Remove the protractor from the elevator.

(6) Install rig pins to the forward elevator torque tube (Figure 512).

(7) Install rig pins to the left and right control columns (Figure 512).

(a) If it is impossible to install the rig pins to the control columns, adjust the rods that connect the elevator bellcrank, at the forward torque tube, to the control columns.

1 Disconnect the left and right rod ends (2) from the end of the elevator control columns (1). Remove the cotters pins (4), nuts (5), washers (6), (8), (9) and (11), bushing (7), bonding straps (10) and bolts (12).

2 Cut and remove the rear and/or forward lockwires (3) from the rods (2) (Figure 514).

3 Install the rig pin to the control columns (Figure 512).

4 Adjust the rods (2) for a correct fitting.

5 Install new lockwires (3) to the rods (2).

6 Connect the left and right rod ends (2) to the end of the elevator control columns (1). Install the bolts (12), bonding straps (10), bushing (7), washers (6), (8), (9) and (11), nuts (5) and cotter pins (4).

(8) Put GSE 070 to the left (right) control column and set it to zero (Figure 515).

(9) Remove the rig pins from the control column and the forward elevator torque tube.

(10) Control the pilot control column fully forward as far as the elevator secondary backstop and fully rearward as far as the elevator secondary backstop.

NOTE: To get to the secondary backstops, the control column must be controlled to a position beyond the primary stops. Use some force for this.

- Then, measure the control column deflection. The values got must be:

Table 508 - DEFLECTION OF THE CONTROL COLUMN

	PRE-MOD SB145-27-0050	POST-MOD SB145-27-0050
CONTROL COLUMN NOSE-UP POSITION	15.0 degrees ± 0.5 degrees[1]	19.0 degrees ± 0.5 degrees[1]
CONTROL COLUMN NOSE-DOWN POSITION	9.0 degrees ± 0.5 degrees[1]	8.5 degrees ± 0.5 degrees[1]

[1] Applicable only to elevator deflection for the secondary backstop.

(11) Do step 10 again for the copilot control column.

K. Follow-on

SUBTASK 842-003-A

(1) Safety the secondary backstops.

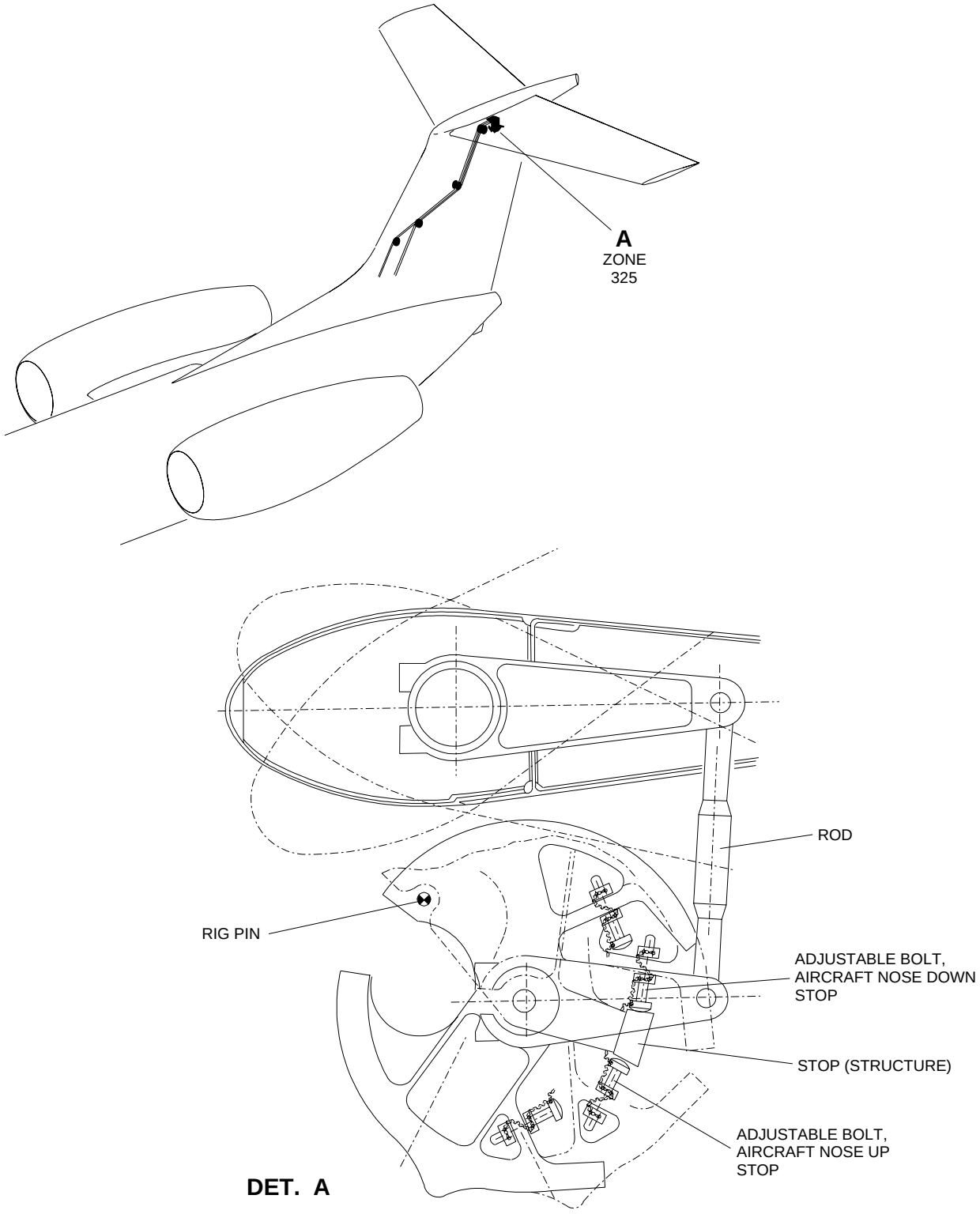
(2) Remove the rig pins.

(3) Install the pilot and copilot seats (AMM TASK 25-11-01-400-801-A/400).

(4) Close all access panels.

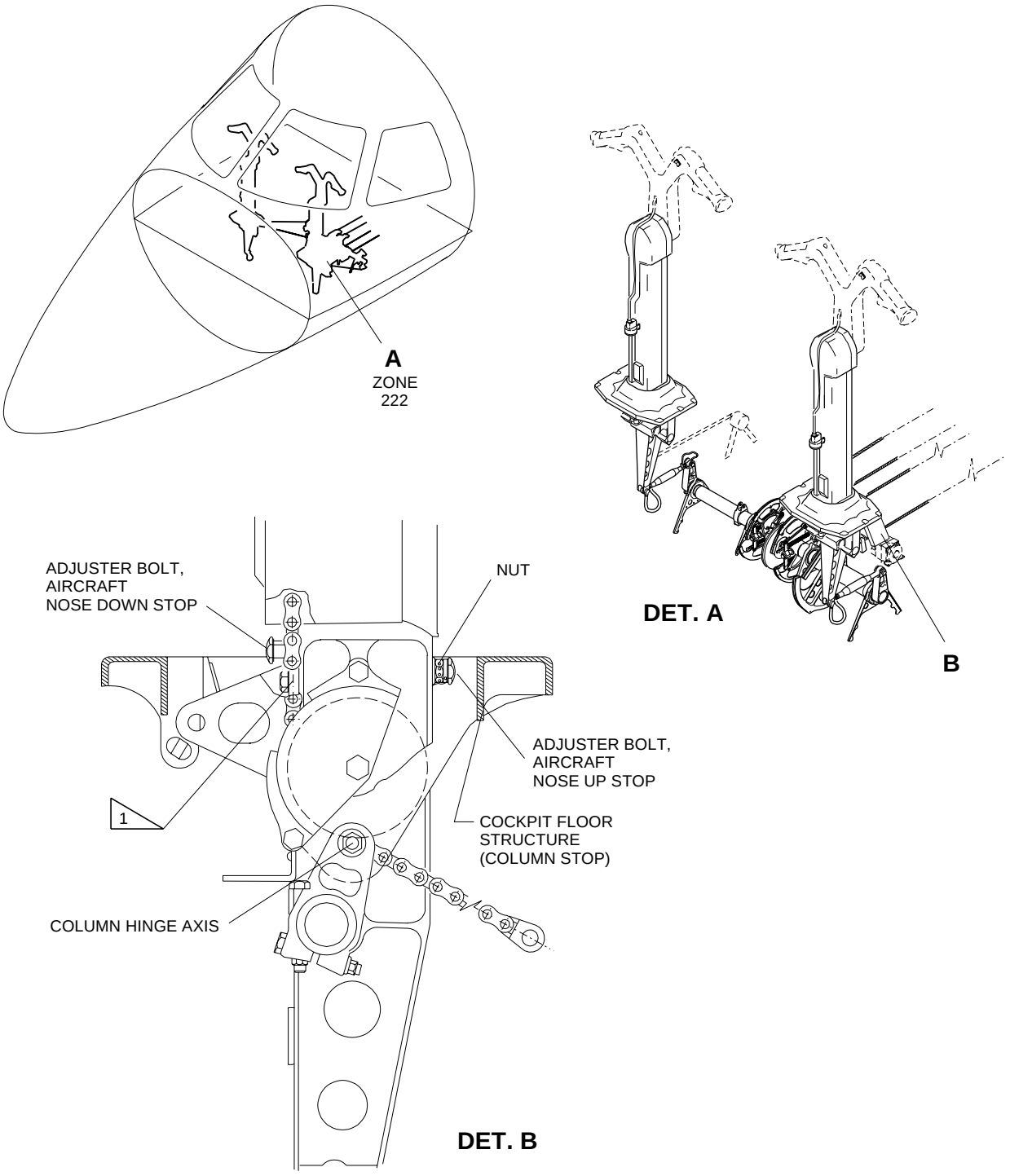
EFFECTIVITY: ALL

Primary backstops - Location
Figure 510



EFFECTIVITY: ALL

Secondary backstops - Location
Figure 511



1 ADJUST SHIM BLADE ACCORDING TO NEED NOTICE THAT THE STICK MUST BE RIGGED ON NEUTRAL POSITION.

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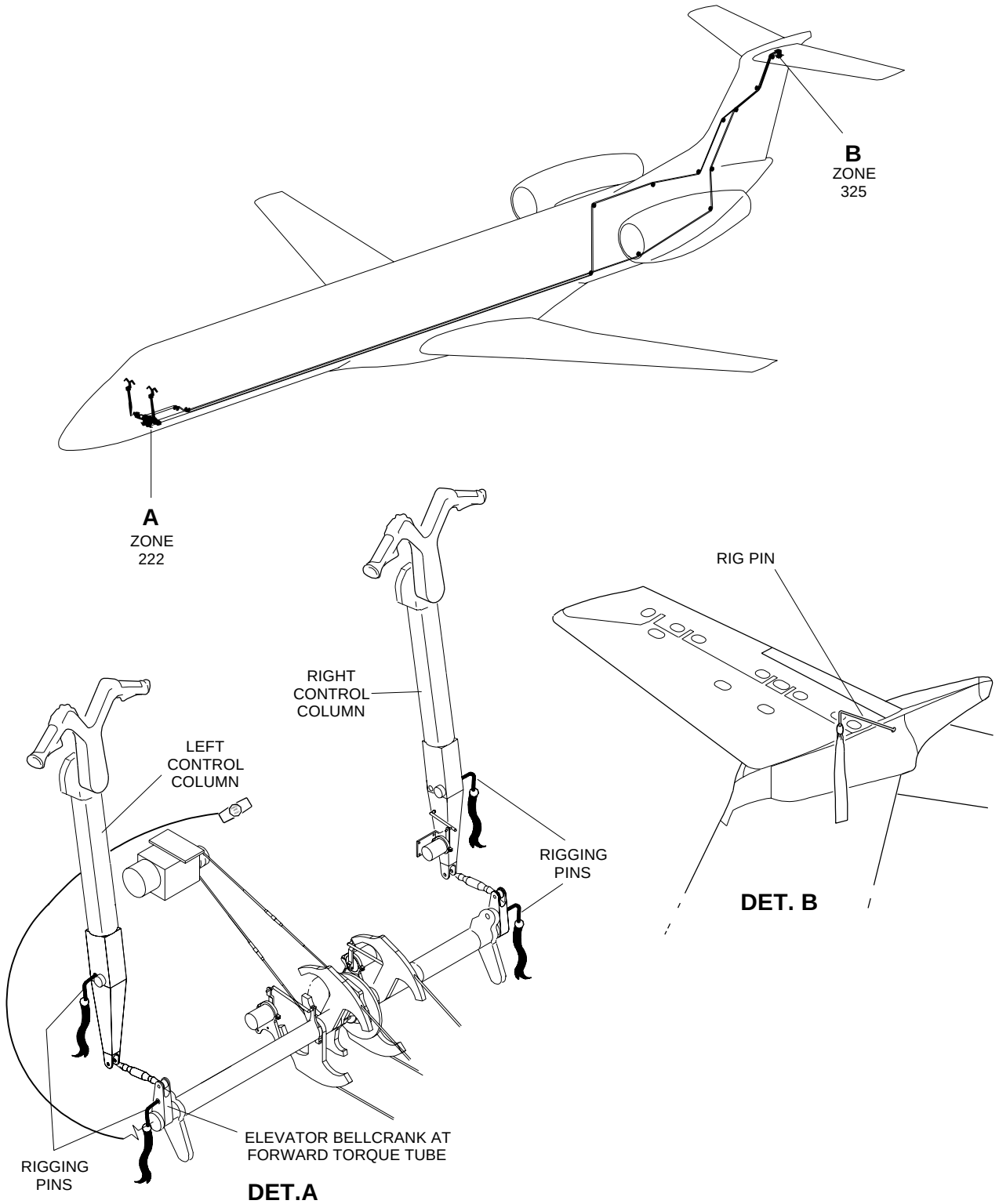
EFFECTIVITY: ALL
Rig pin - Location
Figure 512



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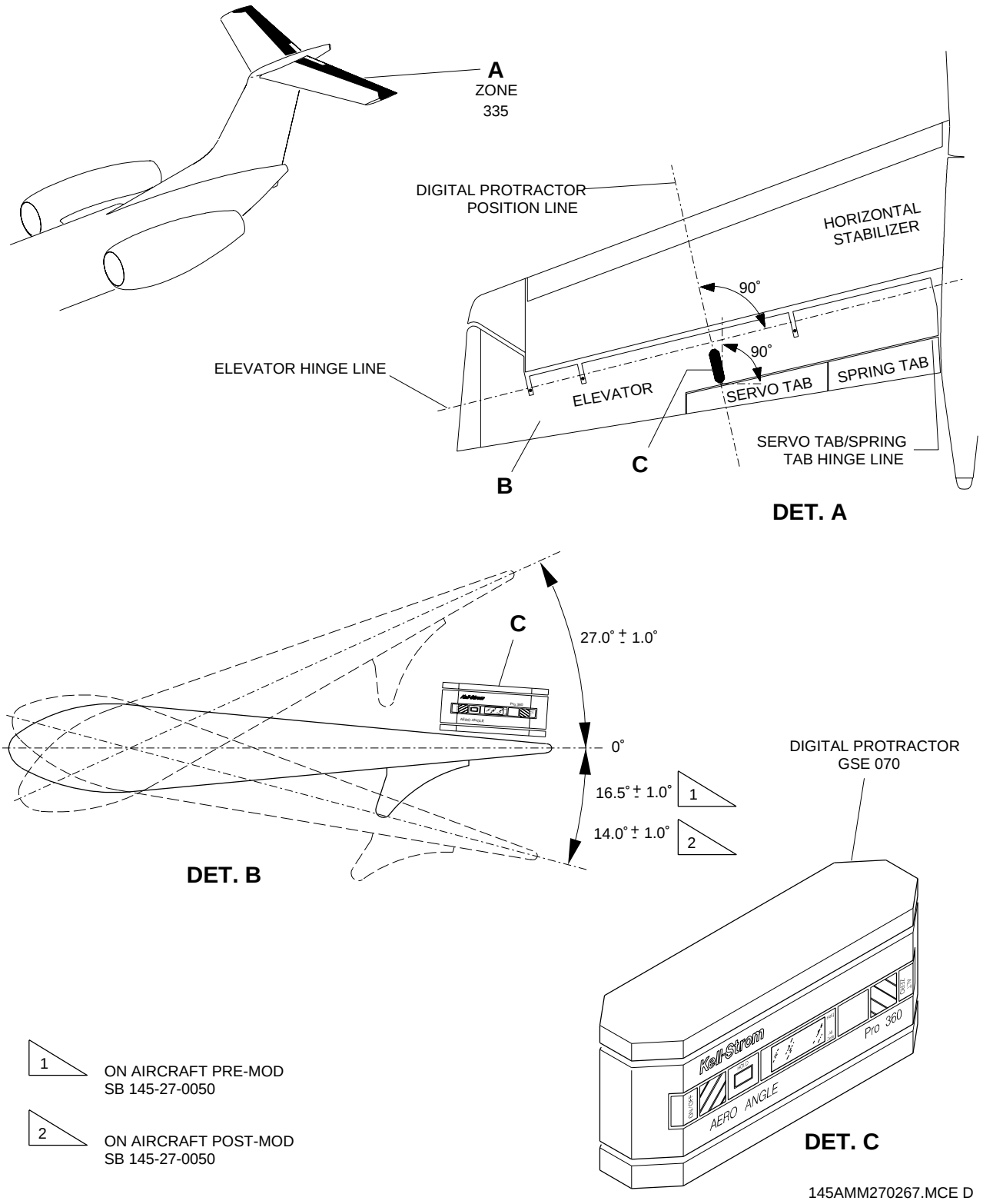
EFFECTIVITY: ALL

Protractor - Location

Figure 513



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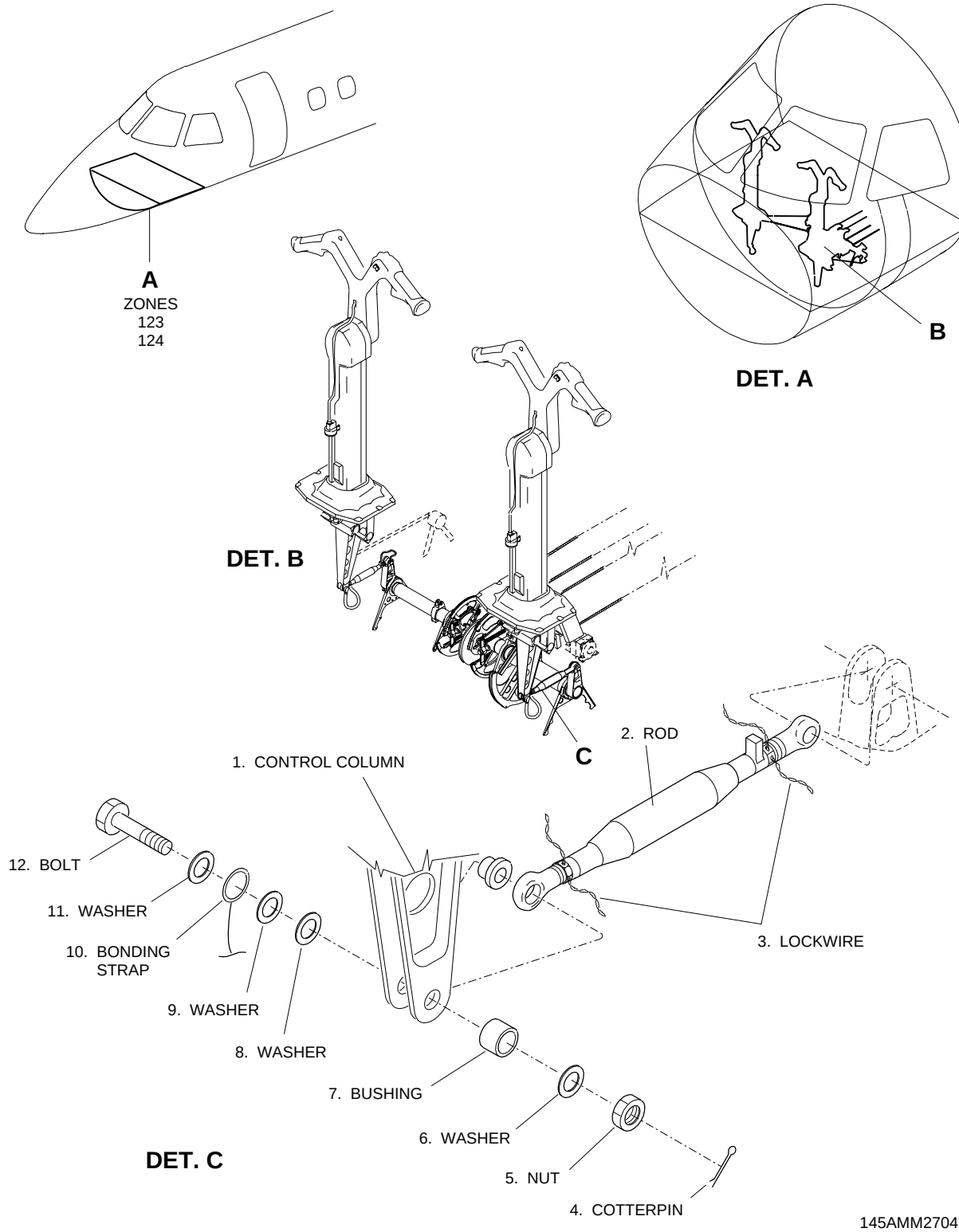
EFFECTIVITY: ALL
Rod - Removal/Installation
Figure 514



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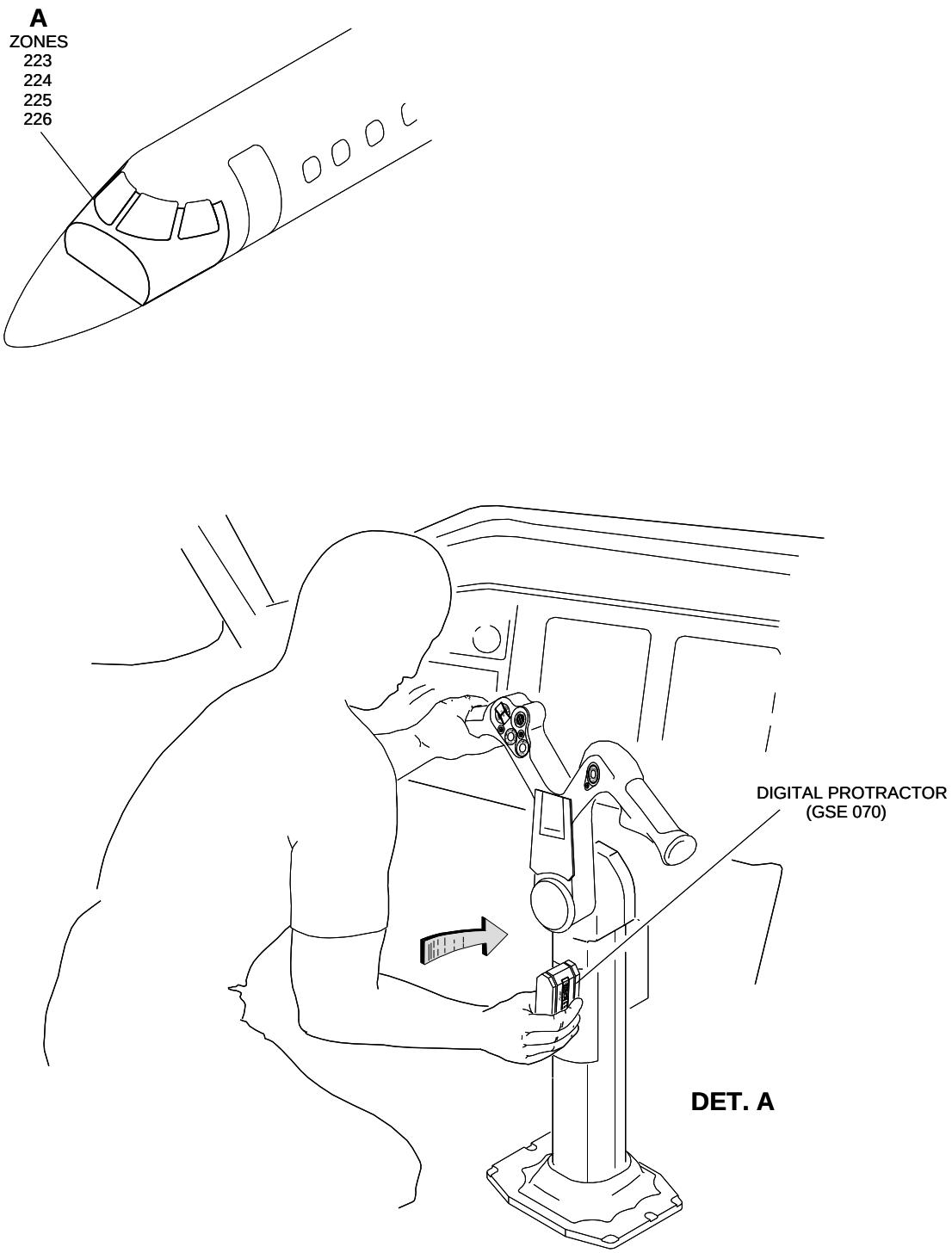
EFFECTIVITY: ALL

Control Column Deflection - Measurement
Figure 515



TASK 27-31-00-700-803-A
EFFECTIVITY: ALL

4. ELEVATOR - DEFLECTIONS

A. General

(1) This task gives the procedures to do a check of the elevator deflections.

B. References

REFERENCE	*DESIGNATION*
AMM TASK 27-31-00-700-802-A/500	ADJUSTMENT OF THE ELEVATOR PRIMARY BACK-STOP AND SECONDARY BACKSTOP
SB145-27-0050	-

C. Zones and Accesses

Not Applicable

D. Tools and Equipment

ITEM	*DESCRIPTION*	*PURPOSE*	*QTY*
GSE 036	Platform, Hydraulic, Aircraft	To get access to the elevator	
GSE 044	Headset, Ramp Hailer	For communication	
GSE 058	Rig Pin Kit	To keep the surface and the control column locked at the neutral position	
GSE 070	Protractor, Digital	To measure the elevator deflection	

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	Elevator
1	Does the task	Cockpit

I. Preparation

SUBTASK 841-004-A

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

(2) Do not do other tasks on the elevator system.

(3) Make sure that there are no objects or persons in the elevator travel area.

(4) Install the rig pin in the rear sector.

J. Deflections of the Elevator

SUBTASK 720-006-A

(1) Install digital protractor GSE 070 to the elevator surface and set it to zero. Refer to (Figure 513).

(2) Remove the rig pin from the rear sector.

(3) Move the control column to the aircraft nose-down position. The elevator deflection must be:

Table 509 - ELEVATOR NOSE-DOWN DEFLECTION

PRE-MOD SB145-27-0050	**POST-MOD SB145-27-0050**
16.5 degrees ± 1.0 degree	14.0 degrees ± 1.0 degree

(4) Move the control column to the aircraft nose-up position. The elevator deflection must be 27.0 degrees ± 1.0 degree.

(a) If necessary, adjust the elevator primary backstop and secondary backstop (AMM TASK 27-31-00-700-802-A/500).

K. Follow-on

SUBTASK 842-004-A

(1) Remove digital protractor GSE 070 from the elevator surface.

TASK 27-31-00-700-804-A
EFFECTIVITY: ALL

5. ELEVATOR CONNECTING ROD - ADJUSTMENT/CHECK

A. General

(1) This task gives the procedures to do an adjustment and a check of the elevator connecting rod.

B. Zones and Accesses

Not Applicable

C. Tools and Equipment

ITEM	*DESCRIPTION*	*PURPOSE*	*QTY*
GSE 036	Platform, Hydraulic, Aircraft	To get access to the elevator	
GSE 044	Headset, Ramp Handling	For communication	
GSE 058	Rig Pin Kit	To keep the surface and the control column locked at the neutral position	
GSE 070	Protractor, Digital	To measure the elevator deflection	
GSE 196	Elevator Lock Clamp	To lock the elevator in the neutral position	

D. Auxiliary Items

Not Applicable

E. Consumable Materials

SPECIFICATION (BRAND)	*DESCRIPTION*	*QTY*
MS20995C20	Lockwire	AR

F. Expandable Parts

Not Applicable

G. Persons Recommended

QTY	*FUNCTION*	*PLACE*
2	Do the task	Elevator

H. Preparation

SUBTASK 841-005-A

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

(2) Do not do other tasks on the elevator system.

(3) Make sure that there are no objects or persons in the elevator travel area.

I. Elevator Connecting Rod - Inspect

SUBTASK 220-002-A

(1) Install GSE 196 to the elevator near the servo tab (Figure 503).

(2) Install GSE 070 to the elevator and set it to zero (Figure 502).

(3) Install the rig pin to the rear sector (Figure 501).

(4) Remove GSE 196 from the elevator.

(5) Make sure that the digital protractor shows 0.0 ± 0.5 degrees.

J. Elevator Connecting Rod - Adjustment

SUBTASK 720-007-A

(1) Remove the lockwire from the rod (Figure 517).

(2) Disconnect the rod from the rear sector.

(3) Install GSE 196 to the elevator near the servo tab (Figure 503).

(4) Install the rig pin to the rear sector (Figure 501).

(5) Adjust the rod for a correct fitting.

(6) Install a new lockwire to the rod.

(7) Connect the rod to the rear sector.

K. Follow-on

SUBTASK 842-005-A

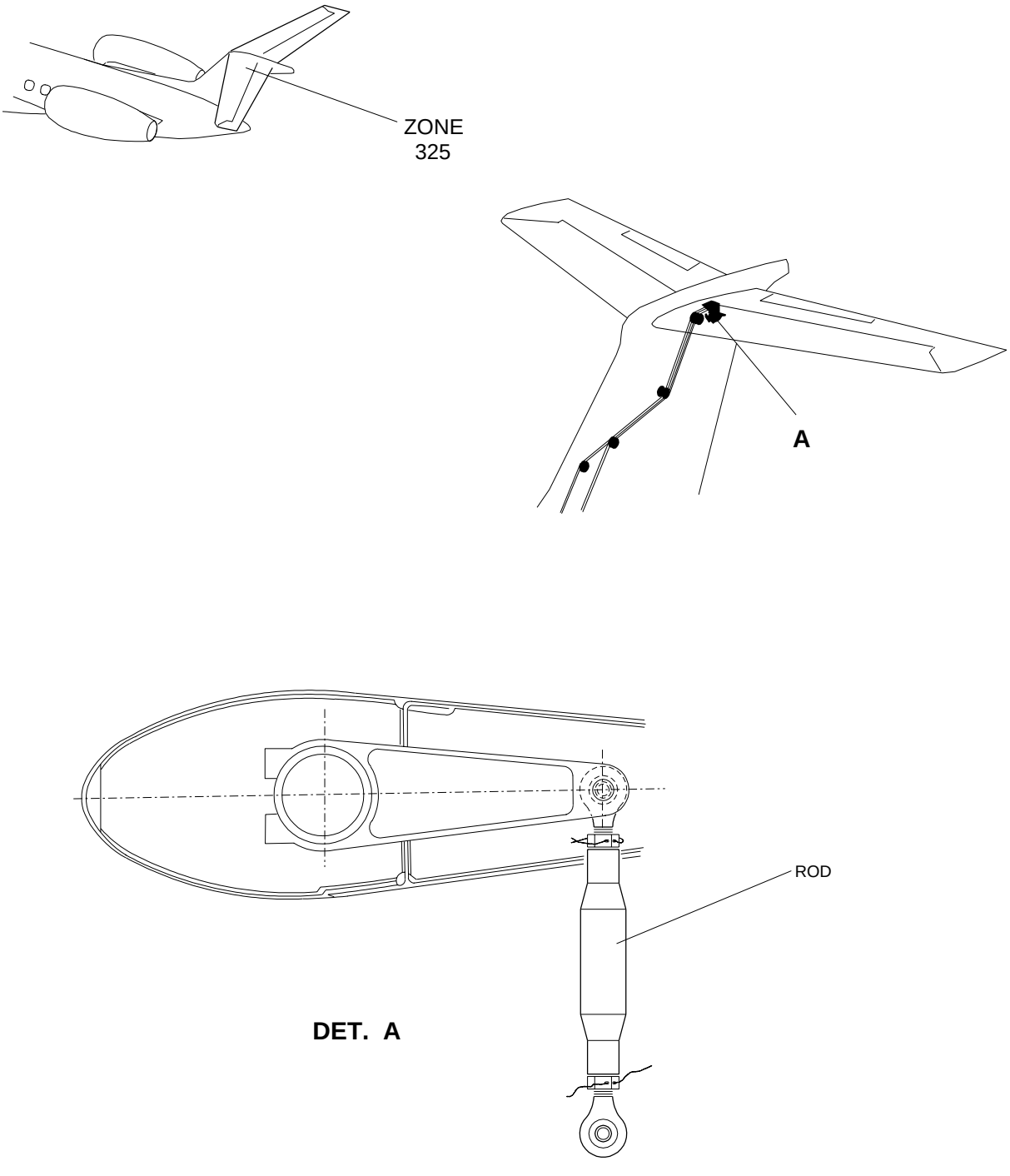
(1) Remove digital protractor GSE 070 from the elevator surface.

(2) Remove GSE 196 from the elevator.

(3) Remove the rig pin from the rear quadrant.

EFFECTIVITY: ALL

Elevator Connecting Rod - Adjustment
Figure 516



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TASK 27-31-00-700-805-A
EFFECTIVITY: ALL

6. TEST OF CLEARANCE BETWEEN ELEVATOR/SPRING TAB AND BOOM FAIRING

A. General

(1) This task gives the procedures to measure the clearance between the elevator/spring tab and the boom fairing.

B. References

REFERENCE	*DESIGNATION*
AMM TASK 20-40-01-860-801-A/200	ENERGIZATION OF THE AIRCRAFT WITH AN EXTERNAL POWER SOURCE
AMM TASK 27-31-00-700-802-A/500	ADJUSTMENT OF THE ELEVATOR PRIMARY BACKSTOP AND SECONDARY BACKSTOP
AMM TASK 27-31-01-700-801-A/500	TENSION OF THE ELEVATOR CONTROL CABLES - FUNCTIONAL CHECK
AMM TASK 27-31-08-700-801-A/500	SPRING TAB - ADJUSTMENT

C. Zones and Accesses

ZONE	*PANEL/DOOR*	*LOCATION*
335		Elevator
336		Elevator

D. Tools and Equipment

ITEM	*DESCRIPTION*	*PURPOSE*	*QTY*
GSE 058	Rig Pin Kit	To lock the control surface in the neutral position	

E. Auxiliary Items

ITEM	*DESCRIPTION*	*PURPOSE*	*QTY*
Commercially available	Feeler Gauge	To measure clearance	1

F. Consumable Materials

Not Applicable

G. Expandable Parts

Not Applicable

H. Persons Recommended

QTY	*FUNCTION*	*PLACE*
1	Does the task	Elevator

I. Preparation

SUBTASK 841-006-A

(1) Do not do other tasks on the horizontal stabilizer and on elevator system.

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

(3) Energize the aircraft with the external DC power supply (AMM TASK 20-40-01-860-801-A/200).

(4) Make sure that the elevator system is correctly adjusted (AMM TASK 27-31-00-700-802-A/500), (AMM TASK 27-31-01-700-801-A/500) and (AMM TASK 27-31-08-700-801-A/500).

(5) During the ground procedure, make sure that the aircraft does not move because of an external influence such as wind and people on board.

(6) Set the horizontal stabilizer to zero. Make sure that the EICAS display shows the zero position of the horizontal stabilizer.

(7) Turn off the red beacon.

J. Test of Clearance Between the Elevator/Spring Tab and the Boom Fairing

SUBTASK 720-008-A

(1) Install the rig pin in the rear sector(Figure 501).

(2) Measure the clearance between the elevator and the boom fairing with the feeler gauge in Regions I, II, and III(Figure 517).

Table 510 - CLEARANCE BETWEEN ELEVATOR/SPRING TAB AND THE BOOM FAIRING

Region	Position	Value
I	From Elevator leading edge 61% to elevator Front Spar 73%	4.0 mm to 7.0 mm
II	From Elevator Spar 73% to Elevator Rear Spar	4.0 mm to 9.7 mm
III	From Elevator Rear Spar and Trailing edge	4.0 mm to 9.7 mm

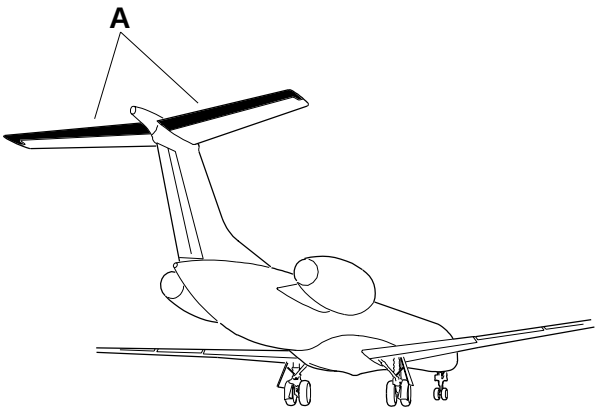
K. Follow-on

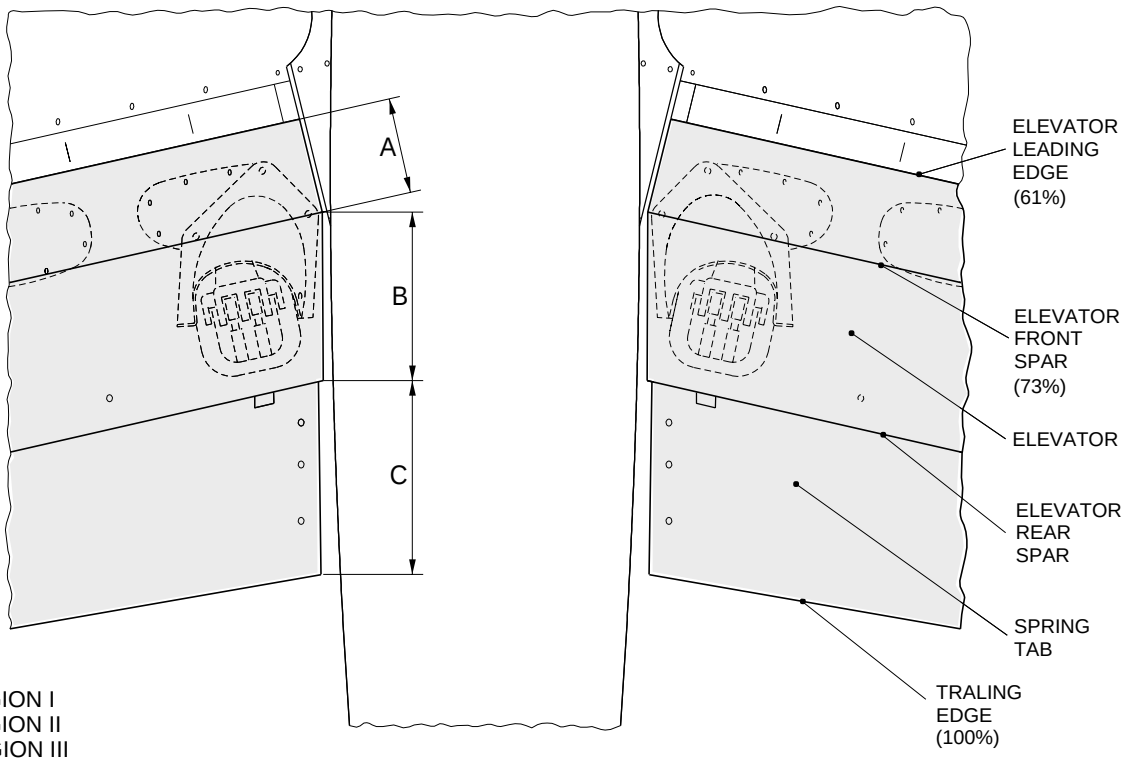
SUBTASK 842-006-A

(1) Remove the rig pin from the rear sector (Figure 501).

(2) Deenergize the aircraft (AMM TASK 20-40-01-860-801-A/200).

EFFECTIVITY: ALL
Elevator Regions
Figure 517





DET. A

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