



AIRCRAFT MAINTENANCE MANUAL

SPRING TAB BALANCING - ADJUSTMENT/TEST

EFFECTIVITY: ACFT MODEL(S) EMB-135

1. General

- A. This section gives the procedures necessary to do the static balancing of the left and right spring tabs after a rework, repair, or paint.

- NOTE:
- The static balancing value is the numerical value of the moment necessary to fully balance a flight control surface that is out of balancing.
 - The static balancing of a flight control surface that is out of balancing is the moment of its center of gravity related to the centerline of its hinge (flight control surface in the neutral position).
 - The static balancing value is usually given in kg x cm or in kg x mm.

- 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
51-60-01-700-801-A	SPRING TAB STATIC BALANCING	ACFT MODEL(S) EMB-135



EMB145 – EMB135

AIRCRAFT
MAINTENANCE MANUAL

TASK 51-60-01-700-801-A

EFFECTIVITY: ACFT MODEL(S) EMB-135

2. SPRING TAB STATIC BALANCING

A. General

- (1) This task gives the procedures necessary to do the static balancing of the left and right spring tabs.
- (2) When you remove the spring tab to repair it or paint it, you must do a check to make sure that its operational balancing limit does not go farther than the permitted point.

NOTE: • The operational balance limit is the maximum unbalance moment permitted for the heavy spring tab leading edge, with no need for a new static balancing procedure.

- Moment is a force (weight, for example) multiplied by an arm that makes a flight control surface turn around the centerline of its hinge.
- There is no tolerance for a heavy trailing edge. This means that if the heavy trailing edge is out of balancing, you must do the static balancing procedure again.

B. References

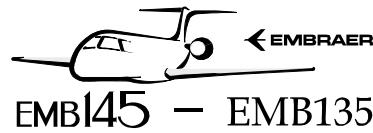
REFERENCE	DESIGNATION
AMM TASK 27-31-08-000-801-A/400	SPRING TAB - REMOVAL
AMM TASK 27-31-08-400-801-A/400	SPRING TAB - INSTALLATION
AMM TASK 51-60-00-700-801-A/500	ELEVATOR STATIC BALANCING
AMM TASK 55-22-00-000-801-A/400	-
AMM TASK 55-22-00-400-801-A/400	-
Delaminable Steel Shim (0.5 mm, 1.6 mm or 2.0 mm)	-
SRM 51-20-01	-

C. Zones and Accesses

ZONE	PANEL/DOOR	LOCATION
335	-	LH Elevator
336	-	RH Elevator

D. Tools and Equipment

ITEM	DESCRIPTION	PURPOSE	QTY
GSE 140	Control-Surface Balancer	To do the spring tab static balancing	
Commercially available	Precision beam scale	To weigh the spring tab assembly and the mass balances used to do the spring tab static balancing	
Commercially available	Torque wrench	To tighten the attachment nuts	



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(Continued)

ITEM	DESCRIPTION	PURPOSE	QTY
Commercially available	Height Gage	To calibrate the height 182 mm in relation to the trailing edge	

E. Auxiliary Items

ITEM	DESCRIPTION	PURPOSE	QTY
Commercially available	Soft (cotton), lint-free cloths	To clean the spring tab assembly	AR
Commercially available	Bench vise	To tie the spring tab mass balance and cut or file it	1
Commercially available	Pin with 100 mm in length and 1/4 in in diameter	To put the spring tab on the control surface balancer	1
Commercially available	Hacksaw frame	To cut the mass balance and/or the steel shim	1
Commercially available	Hacksaw for metal	To cut the mass balance and/or the steel shim	1
Commercially available	Dead smooth file	To rough down the lead mass balance	1
Commercially available	Scriber	To do the marking on the lead mass balance and/or steel shim	1
Commercially available	Straight edge	To do a straight marking on the lead mass balance and/or steel shim	1
Commercially available	Level or surface plate	To do the static balancing on a level surface	1

F. Consumable Materials

SPECIFICATION (BRAND)	DESCRIPTION	QTY
MIL-S-81733 type IV - 12	Sealant P/S 870C-12	AR
TT-T-266	Thinner	AR

G. Expendable Parts

ITEM	IPC REFERENCE (VENDOR REFERENCE)	QTY
MIL-S-22499/3	Delaminable Steel Shim (0.5 mm, 1.6 mm or 2.0 mm)	AR

H. Persons Recommended

QTY	FUNCTION	PLACE
1	A - Does the task	In the work area
1	B - Helps technician A	In the work area

I. Preparation

SUBTASK 840-004-A

- (1) Remove the spring tab assembly from the elevator ([AMM TASK 27-31-08-000-801-A/400](#)).
- (2) Install the spring tab bolt in the outer hinge, and the 100 mm pin in the hinge of the spring tab control ([Figure 501](#)).

NOTE: • These are the positioning points for the control-surface balancer (GSE 140).
• The 100 mm pin must be completely smooth, not to cause interference on the spring tab static balancing.
- (3) Clean the spring tab assembly with a lint-free cloth and thinner.
- (4) Put the control surface balancer assembly on a level table. Align and level it ([Figure 501](#)).

NOTE: • If possible, use a surface plate as an alternative.
• You must correctly align the control-surface balancer assembly with the level table or with the surface plate edge.
- (5) Put the height gage indicator at 182 mm ([Figure 502](#)).

J. Inspection/Check

SUBTASK 750-007-B

- CAUTION:**
- MAKE SURE THAT THE PRECISION BEAM SCALE, TORQUE WRENCH, AND HEIGHT GAGE ARE CORRECTLY CALIBRATED.
 - YOU MUST DO THE STATIC BALANCING PROCEDURE IN A CLOSED AREA, WITH NO AIR CURRENT.
 - YOU MUST LEVEL THE CONTROL-SURFACE BALANCER ASSEMBLY CORRECTLY (USE A SURFACE PLATE, IF POSSIBLE).
 - MAKE SURE THAT THE SPRING TAB IS FREE OF DIRT (GREASE, OIL, ADHESIVE TAPE, ETC). DIRT CAN CAUSE WRONG RESULTS DURING THE STATIC BALANCING PROCEDURE.
 - MAKE SURE THAT THE SPRING TAB HAS NO FRICTION. THE SPRING TAB MUST MOVE FREELY WHEN IT IS INSTALLED ON THE CONTROL-SURFACE BALANCER ASSEMBLY.
 - MAKE SURE THAT THE SPRING TAB IS PAINTED OR POLISHED, AS APPLICABLE.
 - MAKE SURE THAT THE BONDING STRAP OF THE SPRING TAB ASSEMBLY IS INSTALLED.
 - MAKE SURE THAT THE BALANCING MASS USED BEFORE IS CORRECTLY INSTALLED.

- (1) Put the spring tab assembly on the control-surface balancer assembly, with its lower surface up, and let it move freely.
- (2) Put the height gage in front of the spring tab assembly trailing edge ([Figure 502](#)).

NOTE: Do not change the position of the spring tab assembly during the balancing procedure.
- (3) Remove the spring tab inner and outer mass balances (AMM TASK 55-22-00-000-801-A/400).

NOTE: If you find delaminable steel shims already installed, remove and keep them. They will possibly be necessary for the static balancing procedure.
- (4) Remove all the old sealant with a plastic or wooden spatula, and prepare the surface (SRM 51-20-01).
- (5) Weigh the spring tab mass balances made up by the lead weight, steel plates, bolts, nuts, washers, and delaminable steel shims, and write the value.
- (6) Install the spring-tab mass balance (AMM TASK 55-22-00-400-801-A/400).
- (7) Look at the position of the spring-tab trailing edge in relation to the height gage indicator ([Figure 502](#)). Use the position of the spring-tab trailing edge (upward, downward or no deflection) as a reference and do the steps below:
 - (a) Upward deflection:
 - 1 Remove the spring-tab mass balances (AMM TASK 55-22-00-000-801-A/400).
 - 2 Put the two steel plates together and make a mark 11.5 mm away from the center of the holes ([Figure 503](#)).

NOTE:

 - This is the limit of roughness.
 - To make this mark, use the scribe and the straight edge.
 - 3 With the hacksaw cut the two steel plates together on the bench-vise at the limit of roughness.
 - 4 Remove the steel plates from the bench-vise and install the spring-tab mass balances (AMM TASK 55-22-00-400-801-A/400).
 - 5 See if the assembly trailing edge is coincident with the height gage indicator:
 - a If the spring tab moves up, continue the procedure in step 6.
 - b If it is coincident, go to step (c) "No deflection".
 - c If it has lower deflection, go to step (b) "Downward deflection".

- 6 Remove the spring-tab mass balances (AMM TASK 55-22-00-000-801-A/400) and put the spring-tab mass balance assembly all together on the bench vise, with the steel plate cut face upwards.

NOTE: The two spring-tab lead mass balances, steel plates, bolts, nuts, washers, and delaminable steel shims are the spring tab mass balance assembly.

- 7 Rough the two lead mass balances at the same time.

NOTE:

- Cut or roughen the mass balance gradually and carefully. Weigh it as necessary to make sure that you will not roughen it more than necessary.
- If it is necessary to roughen the mass balance more than the marking on the right side of the steel plate (roughness limit shown in [Figure 503](#)), you must roughen it lightly on the opposite side. You must then be very careful when you roughen the mass balance.

- 8 Remove the spring-tab mass balance assembly from the bench vise, put the components apart and install the spring-tab mass balances (AMM TASK 55-22-00-400-801-A/400).

- 9 See if the spring-tab-assembly trailing edge is coincident with the height gage indicator.

NOTE: If it is not coincident, do the static balance procedure again, and go to step 5.

- 10 Go to step (8) below.

(b) Downward deflection:

- 1 Cut the delaminable steel shim with the same shape and holes as the spring-tab mass balance.

- 2 Remove the spring-tab mass balance (AMM TASK 55-22-00-000-801-A/400).

- 3 Install the delaminable steel shim with the spring-tab mass balance (AMM TASK 55-22-00-400-801-A/400).

NOTE: If necessary, use longer bolts with the same characteristics.

- 4 See if the spring-tab-assembly trailing edge is coincident with the height gage indicator.

- 5 If the spring tab moves down, install other delaminable steel shim, until the spring-tab-assembly trailing edge is coincident with the height gage indicator.

- 6 If the spring tab moves up, remove one or two shims or cut pieces of the delaminable steel shims until it has no deflection.

7 Go to step (8) below.

(c) No deflection:

1 The spring tab assembly is statically balanced. Go to step (8) below:

- (8) Remove the spring-tab mass balance (AMM TASK 55-22-00-000-801-A/400).
- (9) Remove the bolt and the 100 mm pin of the control surface balancer positioning points from the spring tab.
- (10) Weigh the spring-tab mass balance assembly, and write the value.
- (11) Prepare the surfaces of the spring-tab mass balance (SRM 51-20-01).
- (12) Apply the faying surface sealant (SRM 51-20-01) all over the surface that touches the spring tab fairing, and on the surface of contact with the steel plate.
- (13) Install the spring-tab mass balance (AMM TASK 55-22-00-400-801-A/400) and the necessary delaminable steel shim.
- (14) Weigh the spring-tab assembly and write the value.

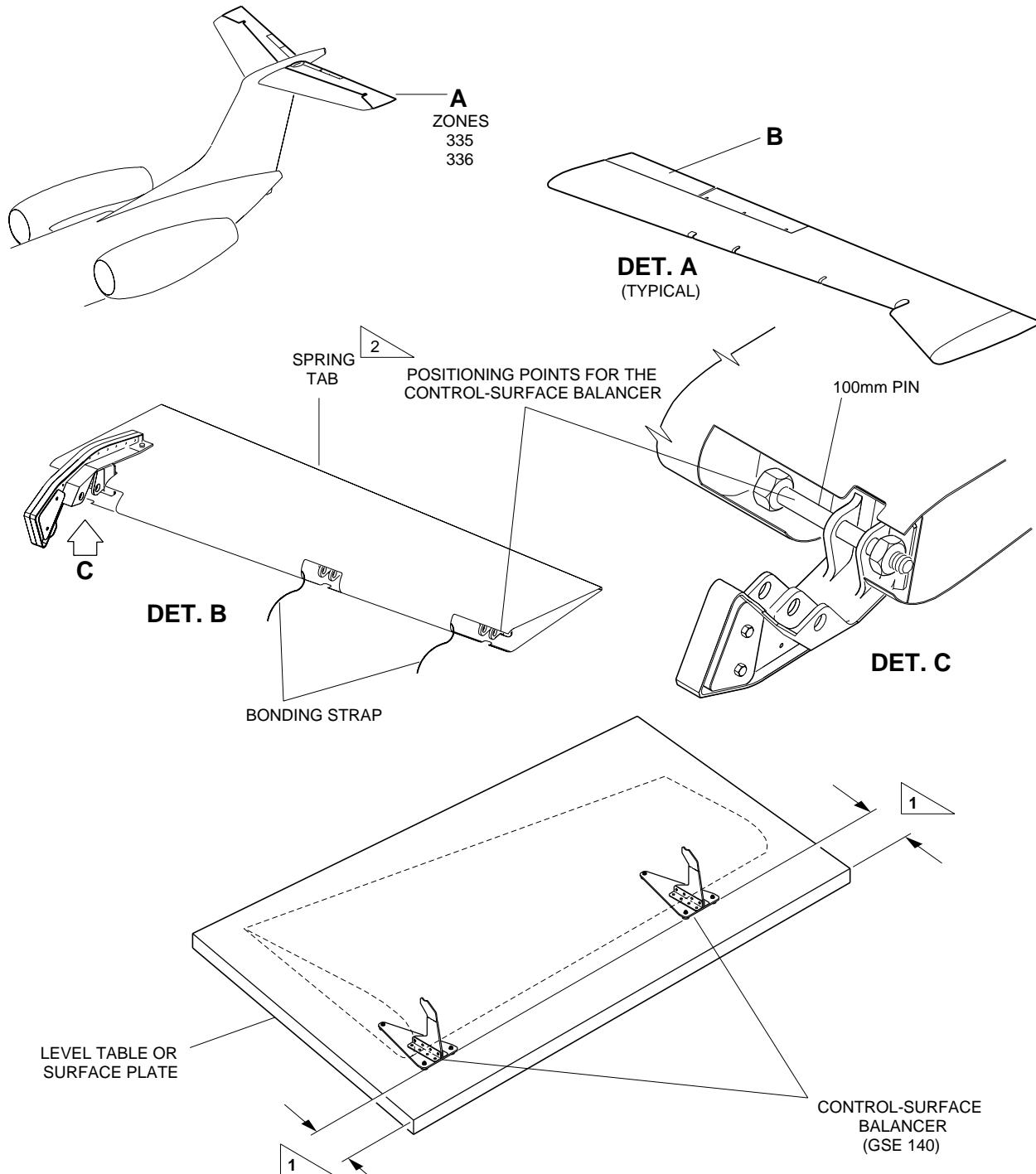
NOTE: After the static balancing, the spring-tab assembly must weigh 2300 ± 100 g.

K. Follow-on

SUBTASK 840-005-A

- (1) Install the spring tab assembly on the elevator assembly ([AMM TASK 27-31-08-400-801-A/400](#)).
- (2) Do the elevator static balancing ([AMM TASK 51-60-00-700-801-A/500](#)) after installation of the spring tab.

EFFECTIVITY: ACFT MODEL(S) EMB-135
Spring-Tab Static Balancing - Component Locations
Figure 501

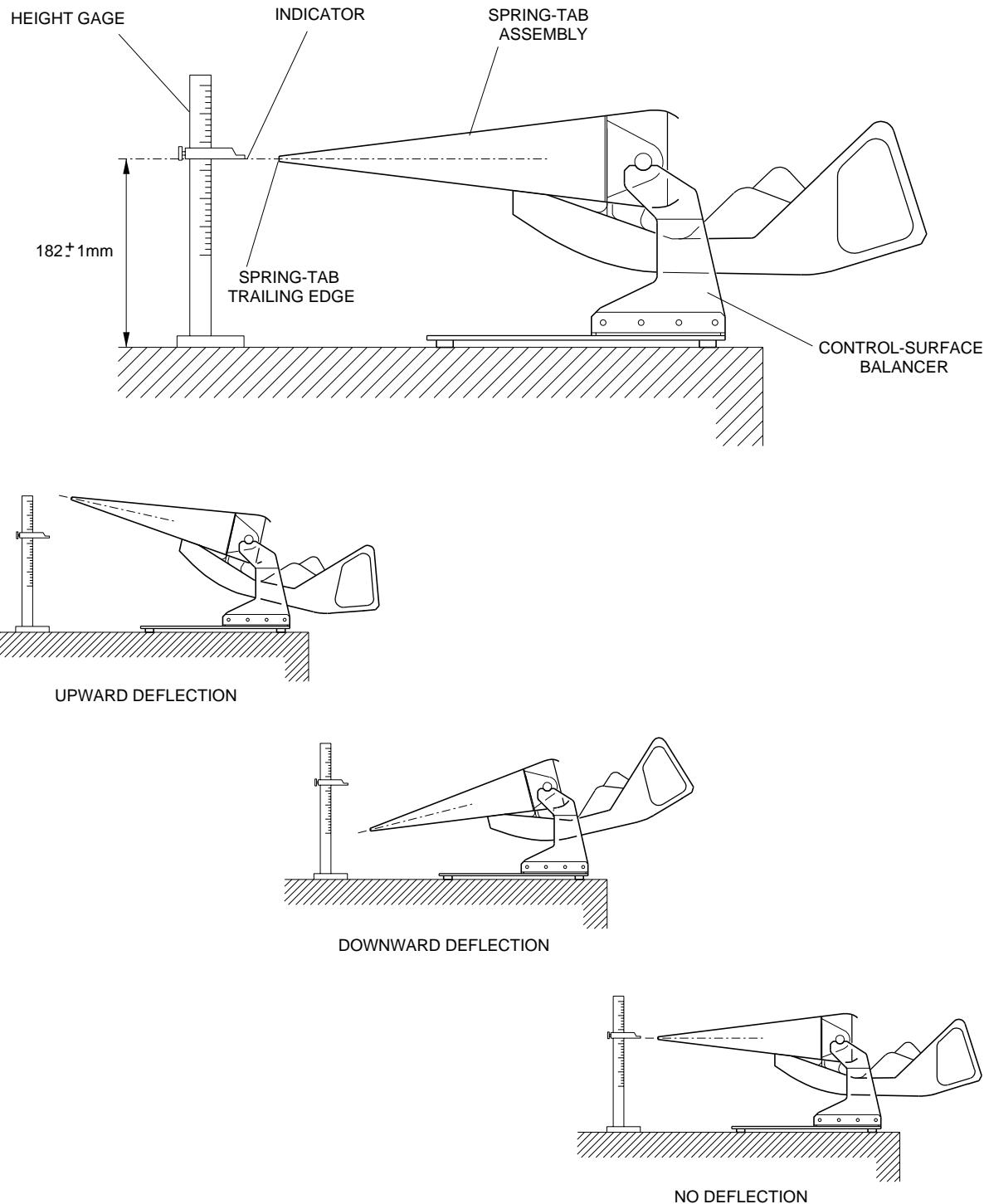


1 ALIGN WITH THE SAME DISTANCE

2 DURING THE BALANCING PROCEDURE, THE SPRING TAB MUST BE KEPT IN THE INVERTED POSITION (LOWER SURFACE UP).

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EFFECTIVITY: ACFT MODEL(S) EMB-135
Spring-Tab Static Balancing - Deflection Positioning
Figure 502



145AMM510002.MCE A

EFFECTIVITY: ACFT MODEL(S) EMB-135
Spring-Tab Static Balancing - Dimensions
Figure 503

