



EMB145 - EMB135

AIRCRAFT
MAINTENANCE MANUAL

AILERON HYDRAULIC ACTUATION - ADJUSTMENT/TEST

EFFECTIVITY: ACFT MODEL(S) EMB-135

1. General

- A. This section gives the procedures to do:
- (1) The functional check of the aileron hydraulic actuation.
 - (2) The functional check of the aileron hydraulic damping.
 - (3) The functional check for external leakage of the aileron hydraulic actuator.
- 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
27-12-00-700-801-A	AILERON HYDRAULIC ACTUATION - FUNCTIONAL CHECK	ACFT MODEL(S) EMB-135
27-12-00-700-803-A	EXTERNAL LEAKAGE OF AILERON HYDRAULIC ACTUATOR - FUNCTIONAL CHECK	ACFT MODEL(S) EMB-135

TASK 27-12-00-700-801-A
EFFECTIVITY: ACFT MODEL(S) EMB-135
2. AILERON HYDRAULIC ACTUATION - FUNCTIONAL CHECK
A. General

(1) This task gives the procedures to do the functional check of the aileron hydraulic actuation.

B. References

<i>REFERENCE</i>	<i>DESIGNATION</i>
AMM MPP 06-44-00/100	- 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
AMM TASK 29-10-00-860-803-A/200	HYDRAULIC SYSTEM - BLEED OF AIR
IPC 27-11-02	AILERON INSTL
IPC 27-12-00	AILERON HYDRAULIC ACTUATION
S.B.145-27-0093	-

C. Zones and Accesses

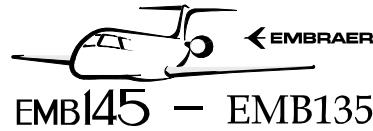
<i>ZONE</i>	<i>PANEL/DOOR</i>	<i>LOCATION</i>
551	551CB	Wing lower skin
651	651CB	Wing lower skin
551	551FT	Wing upper skin
651	651FT	Wing upper skin

D. Tools and Equipment

<i>ITEM</i>	<i>DESCRIPTION</i>	<i>PURPOSE</i>	<i>QTY</i>
GSE 056	Dynamometer	To apply loads on the aileron surface	
GSE 060	Aileron backlash measurement kit	To use dynamometer support AGE-00313-403 to apply loads to the aileron surfaces	
Commercially available	Stopwatch	To measure the time	

E. Auxiliary Items

<i>ITEM</i>	<i>DESCRIPTION</i>	<i>PURPOSE</i>	<i>QTY</i>
Commercially available	Container with graduation	To collect the hydraulic fluid (SKYDROL)	1
Commercially available	Skydrol-resistant hydraulic hose	To collect the hydraulic fluid (SKYDROL)	2
Commercially available	Rubber Gloves, Phosphate Ester-Base, Fluid-Resistant	For protection of the hands	1



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ITEM	DESCRIPTION	PURPOSE	QTY
Commercially available	Rubber Goggles, Phosphate Ester-Base, Fluid-Resistant	For protection of the eyes	1

F. Consumable Materials

Not Applicable

G. Expendable Parts

ITEM	IPC REFERENCE (VENDOR REFERENCE)	QTY
Cotter pin	IPC 27-11-02	2
Cotter pin	IPC 27-12-00	2

H. Persons Recommended

QTY	FUNCTION	PLACE
1	Does the task	Fuselage
1	Does the task	Wing

I. Preparation

SUBTASK 841-014-C

- (1) Make sure that the aircraft is safe for maintenance.
- (2) Do not do other tasks on the aileron system.
- (3) Remove access doors 551CB, 551FT, 651CB, and 651FT ([AMM MPP 06-44-00/100](#)).
- (4) Energize the aircraft with the external DC power supply ([AMM TASK 20-40-01-860-801-A/200](#)).
- (5) Make sure that the EICAS display shows the AIL SYS 1-2 INOP caution message.

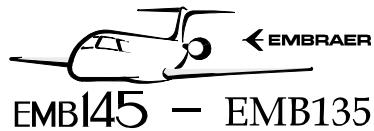
J. Functionally Check Aileron Hydraulic Actuation

SUBTASK 720-014-C

WARNING: THE HYDRAULIC SYSTEM CONTAINS PHOSPHATE-ESTER HYDRAULIC FLUID. THE FLUID CAN CAUSE IRRITATION IN YOUR SKIN OR INJURY TO YOUR EYES. USE THE APPLICABLE RUBBER GOGGLES AND GLOVES. IF THE FLUID TOUCHES YOU, FLUSH YOUR SKIN WITH WATER. IF IT GETS IN YOUR EYES, FLUSH THEM WITH WATER AND GET MEDICAL HELP.

- (1) Do a check for internal leakage in hydraulic system 1 of the left aileron PCA.
 - (a) Make sure that the hydraulic system is not pressurized.
 - (b) Install the rig pin to the aileron wing sector ([Figure 501](#)).

- (c) Disconnect the return hose of hydraulic system 1 ([Figure 502](#)) from the PCA and seal the hose end with a cap.
 - (d) Install the test hose in the PCA return port ([Figure 502](#)).
 - (e) Pressurize the hydraulic system ([AMM TASK 29-10-00-860-801-A/200](#)).
 - (f) Make sure that the AILERON SHUTOFF SYS 1 pushbutton light is off.
 - (g) Collect the hydraulic fluid during 1 minute, see [Figure 502](#). Use the container with graduation.
 - (h) (FOR AIRCRAFT PRE-MOD S.B.145-27-0093) The maximum internal leakage permitted is 75 cc/min.
 - (i) (FOR AIRCRAFT POST-MOD S.B.145-27-0093) The maximum internal leakage permitted is 150 cc/min.
 - (j) Release the pressure from the hydraulic system ([AMM TASK 29-10-00-860-801-A/200](#)).
- NOTE: When you depressurize the hydraulic system, a short angular movement downward of the aileron surface is normal.
- (2) Connect the return hose of hydraulic system 1 to the hydraulic port.
 - (3) Do steps 1 and 2 for hydraulic system 2 of the left aileron PCA.
 - (4) Remove the rig pin from the aileron wing sector.
 - (5) Do steps 1 thru 4 for the right wing PCA.
 - (6) Do a check on the mechanical linkage of the NRU with the aileron PCA and the wing structure.
 - (a) Disconnect the input rod from the PCA of the left wing ([Figure 503](#)).
 - (b) Make sure that the hydraulic system (one or two systems) is pressurized ([AMM TASK 29-10-00-860-801-A/200](#)).
 - (c) Manually move the left aileron to the fully-up position with the aileron input lever. Then release the input lever.
Result:
1 The PCA and surface must return to the neutral position by the action of the NRU.
 - (d) Manually move the left aileron to the fully-down position with the aileron input lever. Then release the input lever.
Result:
1 The PCA and surface must return to the neutral position by the action of the NRU.
 - (7) Release the pressure from the hydraulic system ([AMM TASK 29-10-00-860-801-A/200](#)).



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NOTE: When you depressurize the hydraulic system, a short angular movement downward of the aileron surface is normal.

- (8) Do steps 6 and 7 for the PCA and aileron of the right wing.
- (9) Do a check on the mechanical linkage of the PCA of the left wing with the aileron and wing structure.
 - (a) Install the rig pin to the aileron wing sector ([Figure 501](#)).
 - (b) Remove the cotter pins, washers, pins, bushings, and nuts of the ends of the PCA/aileron and PCA/wing attaching rods of the left side. See sheet 1 of ([Figure 504](#)). Discard the cotter pins.
 - (c) Do an inspection on the pins, nuts, and washers for condition.
 - (d) Install the dynamometer support on the aileron-surface trailing edge near the PCA.
 - (e) Pressurize hydraulic systems 1 and 2 ([AMM TASK 29-10-00-860-801-A/200](#)).
 - (f) Use the dynamometer to apply a load of approximately 133.4 N (30 lb) up and down on the aileron trailing edge.
 - The aileron surface does not move from the neutral position.
 - (g) Release the pressure from the hydraulic system ([AMM TASK 29-10-00-860-801-A/200](#)).

NOTE: When you depressurize the hydraulic system, a short angular movement downward of the aileron surface is normal.

- (h) Install the cotter pins, washers, pins, bushings, nuts, and cotter pins to the ends of the PCA/aileron and PCA/wing attaching rods of the left side. See sheet 1 of ([Figure 504](#)).
- (i) Remove the cotter pins, washers, pins, bushings, and nuts of the ends of the PCA/aileron and PCA/wing attaching rods of the right side. See sheet 2 of ([Figure 504](#)). Discard the cotter pins.
- (j) Do an inspection on the pins, nuts, and washers for condition.
- (k) Install the dynamometer support on the aileron-surface trailing edge near the PCA.
- (l) Pressurize hydraulic systems 1 and 2 ([AMM TASK 29-10-00-860-801-A/200](#)).
- (m) Use the dynamometer to apply a load of approximately 133.4 N (30 lb) up and down on the aileron trailing edge.
 - The aileron surface does not move from the neutral position.
- (n) Release the pressure from the hydraulic system ([AMM TASK 29-10-00-860-801-A/200](#)).

NOTE: When you depressurize the hydraulic system, a short angular movement downward of the aileron surface is normal.

- (o) Install the cotter pins, washers, pins, bushings, nuts, and cotter pins to the ends of the PCA/aileron and PCA/wing attaching rods of the right side. See sheet 2 of ([Figure 504](#)).
- (p) Remove the rig pin from the aileron wing sector.



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- (10) Do step 9 for the mechanical linkage of the PCA of the right wing with the aileron and wing structure.

- (11) Connect the input rod to the PCA of left wing and right wing.

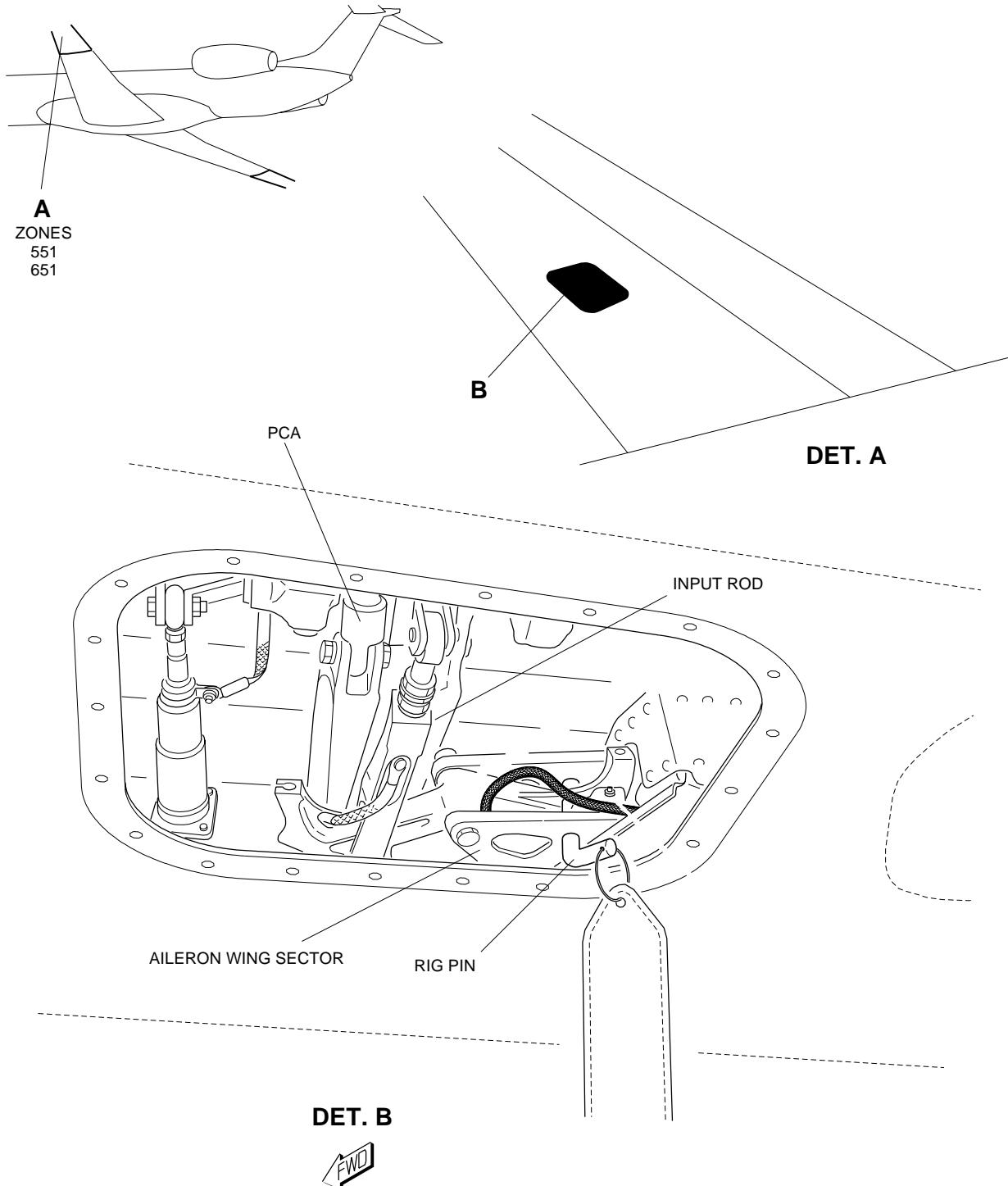
NOTE: If the input rod end has a grease nipple, make sure that the rod end grease nipple is pointed down and there is no interference with the PCA surface (Refer to [Figure 501](#), DET. C). If the grease nipple is pointed up an interference with the PCA surface can occur.

K. Follow-on

SUBTASK 842-014-C

- (1) Bleed the air from the hydraulic system lines ([AMM TASK 29-10-00-860-803-A/200](#)).
- (2) Deenergize the aircraft ([AMM TASK 20-40-01-860-801-A/200](#)).
- (3) Install access doors 551CB, 551FT, 651CB, and 651FT ([AMM MPP 06-44-00/100](#)).

EFFECTIVITY: ACFT MODEL(S) EMB-135
Aileron Wing Sector - Location
Figure 501

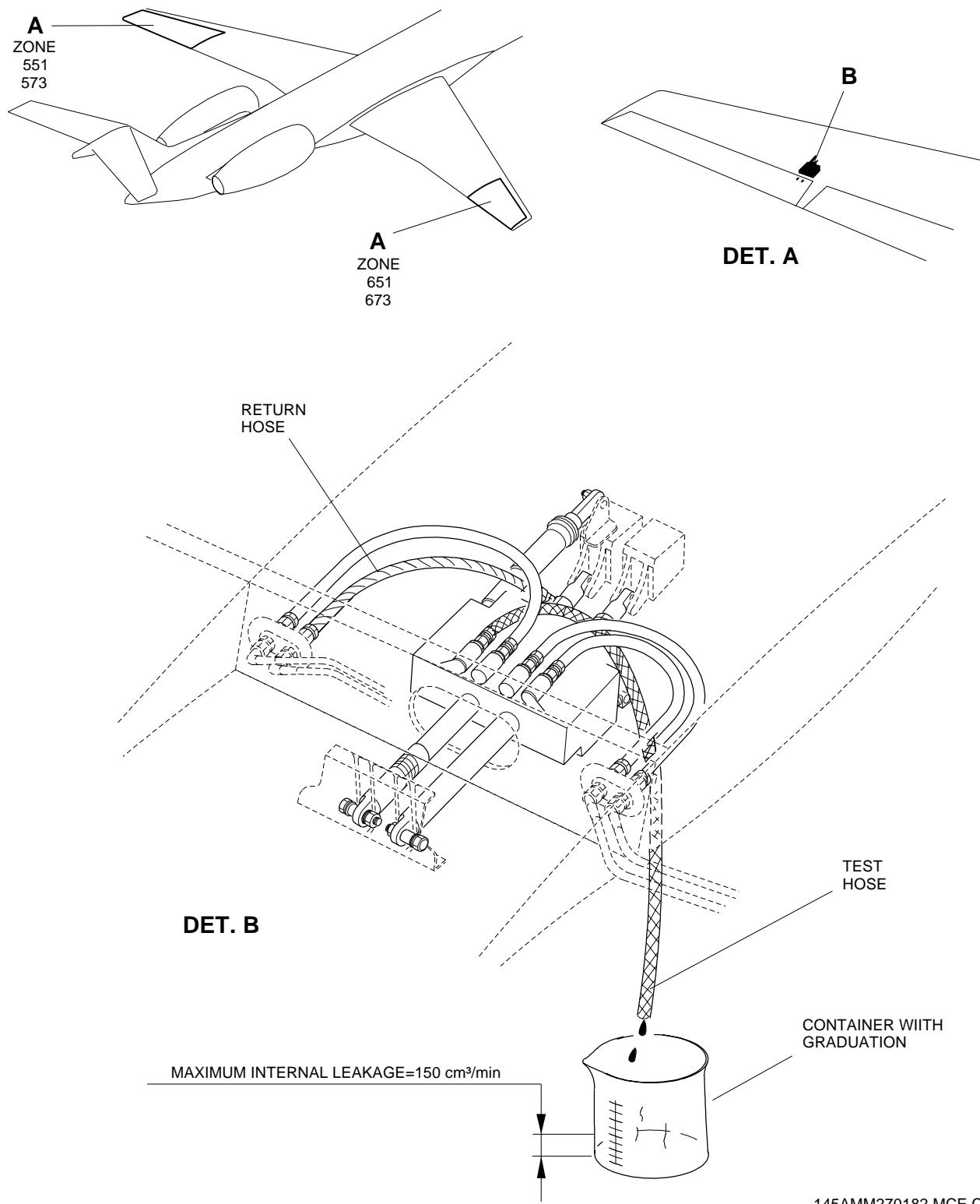


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EFFECTIVITY: ACFT MODEL(S) EMB-135

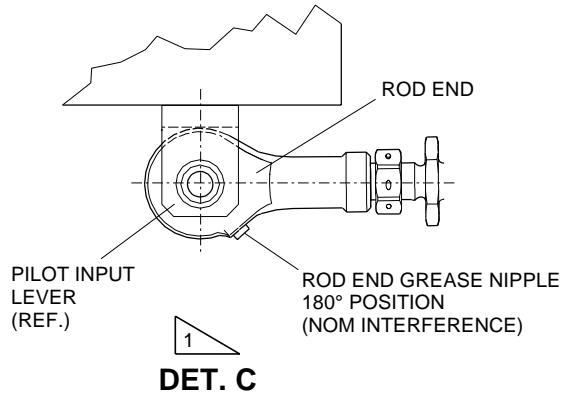
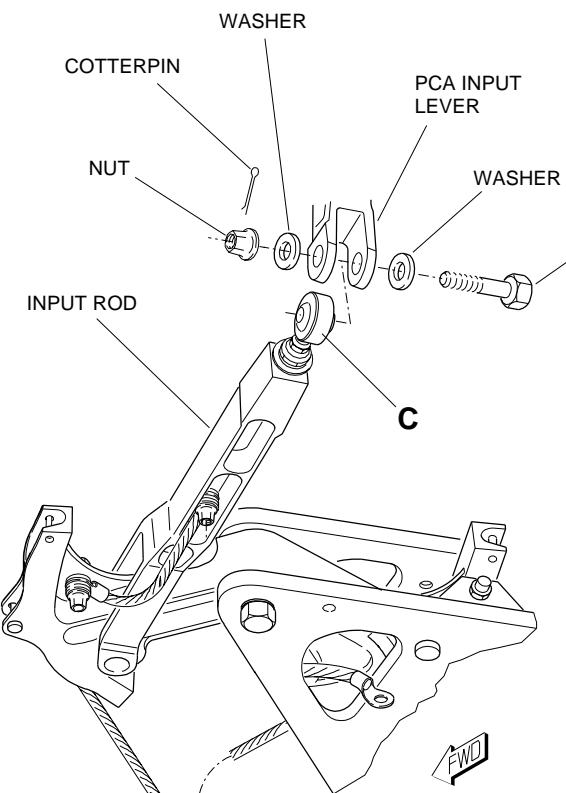
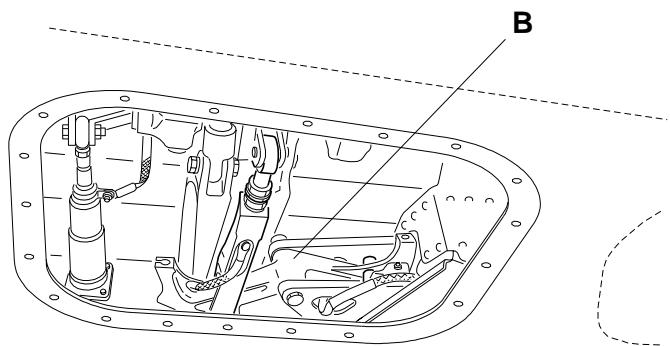
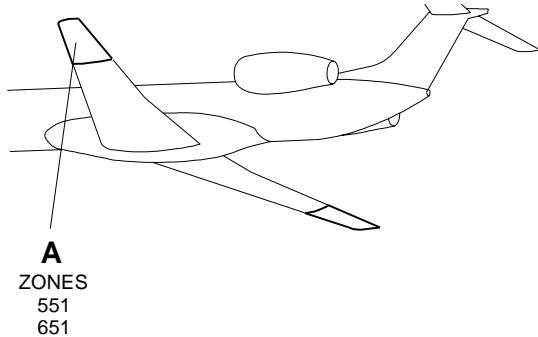
Internal Leakage in the Aileron PCA

Figure 502



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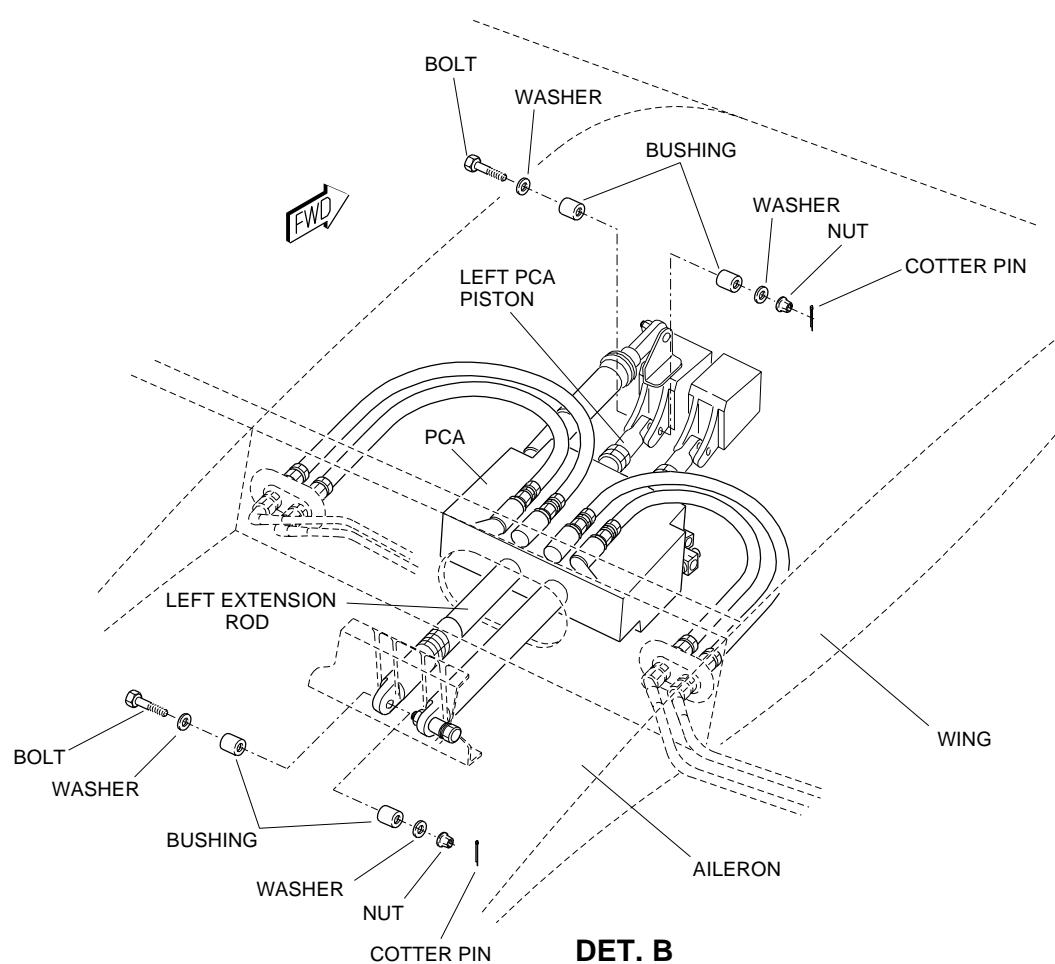
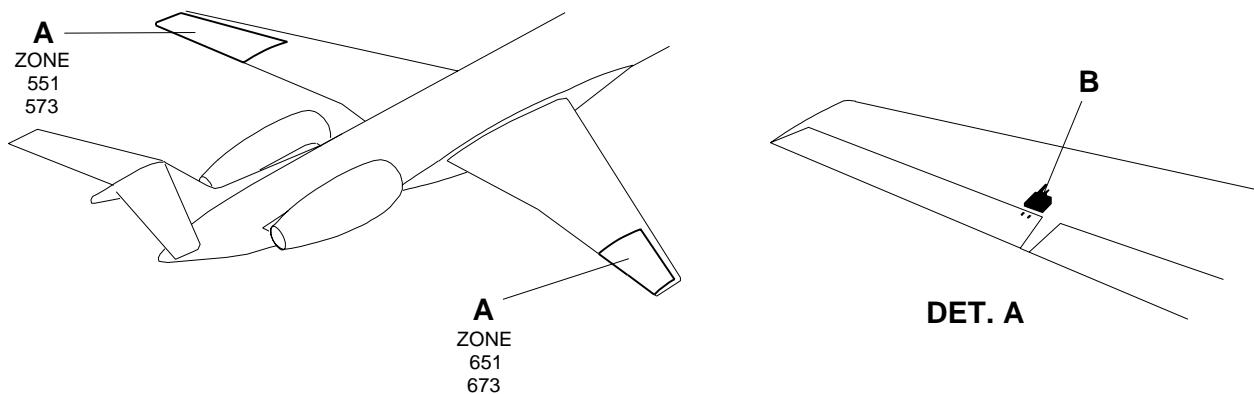
EFFECTIVITY: ACFT MODEL(S) EMB-135
Input Rod - Location
Figure 503



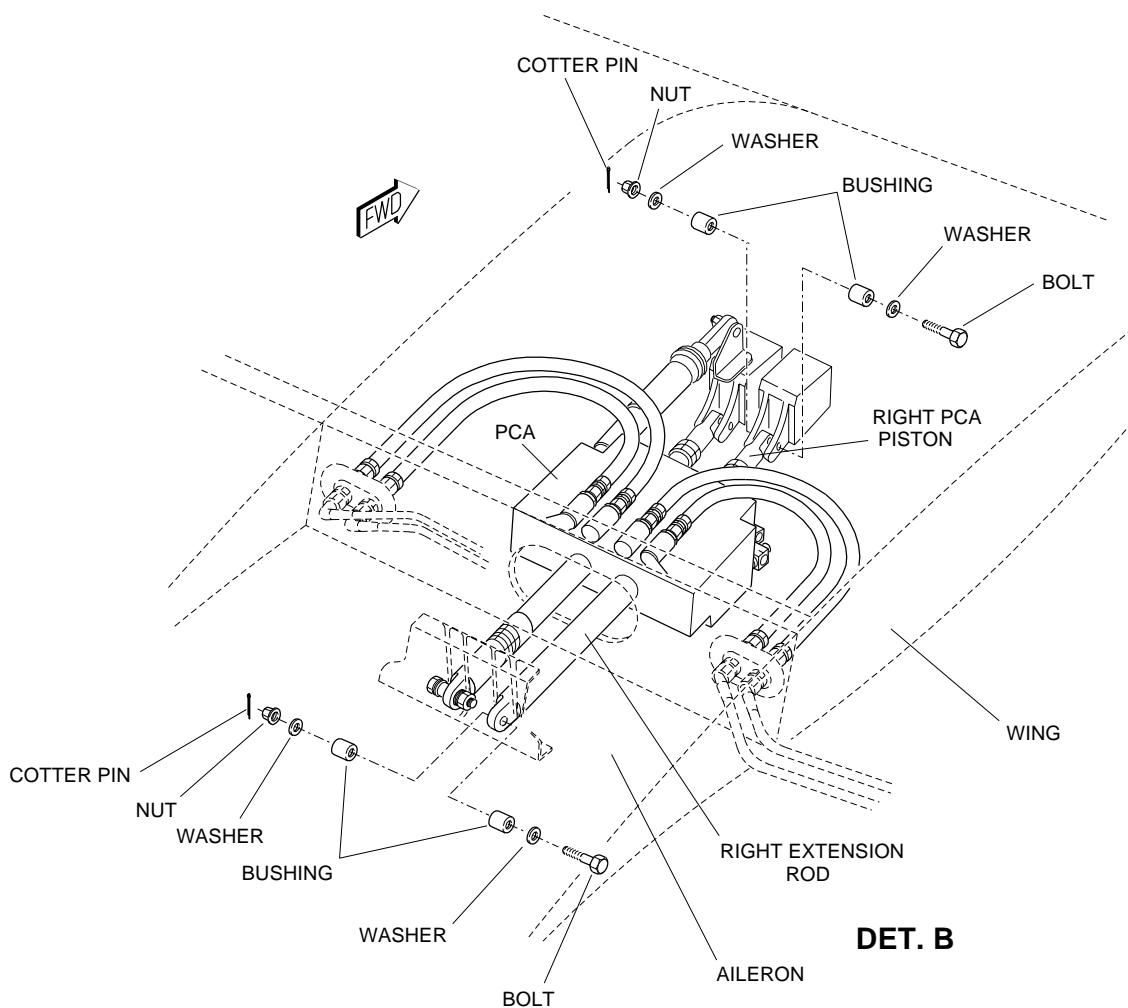
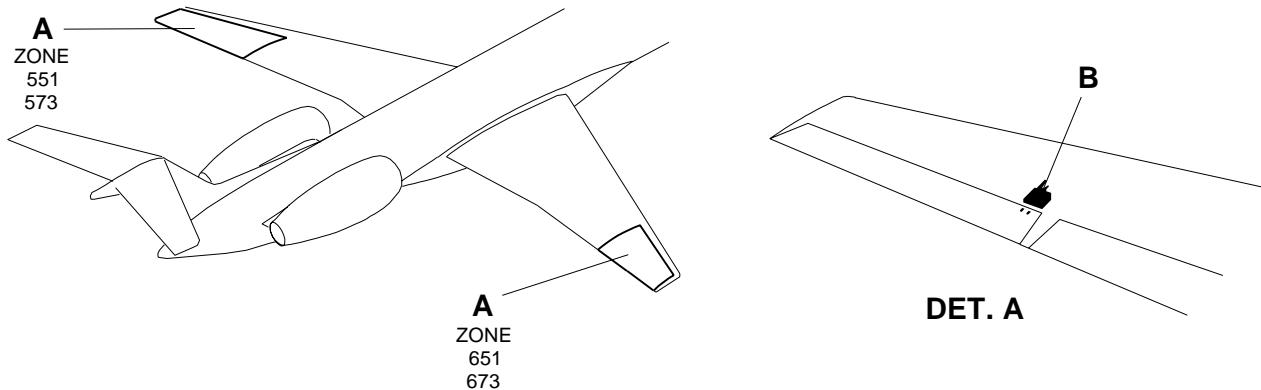
1 IF APPLICABLE

DET. B

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EFFECTIVITY: ACFT MODEL(S) EMB-135
Extension Rod and PCA Piston - Location
Figure 504 - Sheet 1


EFFECTIVITY: ACFT MODEL(S) EMB-135
Extension Rod and PCA Piston - Location
Figure 504 - Sheet 2



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TASK 27-12-00-700-803-A

EFFECTIVITY: ACFT MODEL(S) EMB-135

3. EXTERNAL LEAKAGE OF AILERON HYDRAULIC ACTUATOR - FUNCTIONAL CHECK

A. General

(1) This task gives the procedures to do a check of the external leakage of the PCA.

B. References

REFERENCE	DESIGNATION
AMM TASK 20-40-01-860-801-A/200	ENERGIZATION OF THE AIRCRAFT WITH AN EXTERNAL POWER SOURCE
AMM TASK 27-12-01-000-801-A/400	AILERON POWER-CONTROL ACTUATOR (PCA) - REMOVAL
AMM TASK 29-10-00-860-801-A/200	HYDRAULIC SYSTEM - PRESSURIZATION WITH HTS

C. Zones and Accesses

ZONE	PANEL/DOOR	LOCATION
551	551CB	Wing lower skin
651	651CB	Wing lower skin
551	551FT	Wing upper skin
651	651FT	Wing upper skin

D. Tools and Equipment

Not Applicable

E. Auxiliary Items

ITEM	DESCRIPTION	PURPOSE	QTY
Commercially available	Rubber Gloves, Phosphate Ester-Base, Fluid-Resistant	For protection of the hands	1
Commercially available	Rubber Goggles, Phosphate Ester-Base, Fluid-Resistant	For protection of the eyes	1

F. Consumable Materials

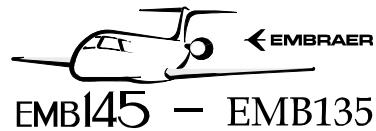
Not Applicable

G. Expandable Parts

Not Applicable

H. Persons Recommended

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



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I. Preparation

SUBTASK 841-015-C

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

SUBTASK 010-006-C

- (4) To get access to the aileron hydraulic actuator open these access panels:
 - 551CB
 - 651CB
 - 551FT
 - 651FT

J. Functionally Check External Leakage of Aileron Hydraulic Actuator

SUBTASK 720-015-C

WARNING: THE HYDRAULIC SYSTEM CONTAINS PHOSPHATE-ESTER HYDRAULIC FLUID. THE FLUID CAN CAUSE IRRITATION IN YOUR SKIN OR INJURY TO YOUR EYES. USE THE APPLICABLE RUBBER GOGGLES AND GLOVES. IF THE FLUID TOUCHES YOU, FLUSH YOUR SKIN WITH WATER. IF IT GETS IN YOUR EYES, FLUSH THEM WITH WATER AND GET MEDICAL HELP.

- (1) Do a check on the left aileron PCA for leakage:
 - (a) Move the left control yoke fully to the left and to the right and then move it back to the neutral position. Do this cycle again 25 times.
Result:
 - 1 The external leakage on the aileron PCA must not be more than 6 drops, during the 25 cycles. If it is, replace the PCA ([AMM TASK 27-12-01-000-801-A/400](#)).
- (2) Again do step (1) for the right aileron PCA.

K. Follow-on

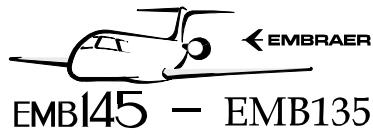
SUBTASK 842-015-C

- (1) Deenergize the aircraft ([AMM TASK 20-40-01-860-801-A/200](#)).
- (2) Release the pressure from the hydraulic system ([AMM TASK 29-10-00-860-801-A/200](#)).

NOTE: When you depressurize the hydraulic system, a short angular movement downward of the aileron surface is normal.

SUBTASK 410-006-C

- (3) Close these access panels:



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- 551CB
- 651CB
- 551FT
- 651FT

EFFECTIVITY: ACFT MODEL(S) EMB-135

External Leakage of the PCA

Figure 505

