AILERON HYDRAULIC ACTUATION - ADJUSTMENT/TEST

EFFECTIVITY: ACFT MODEL(S) EMB-145

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-145
27-12-00-700-802-A ♦	AILERON PCA HYDRAULIC DAMPING - FUNCTIONAL CHECK	ACFT MODEL(S) EMB-145
27-12-00-700-803-A ♦	EXTERNAL LEAKAGE OF AILERON HYDRAULIC ACTUATOR - FUNCTIONAL CHECK	ACFT MODEL(S) EMB-145

TASK 27-12-00-700-801-A
EFFECTIVITY: ACFT MODEL(S) EMB-145

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

REFERENCE	*DESIGNATION*
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

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

ITEM	*DESCRIPTION*	*PURPOSE*	*QTY*
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

ITEM	*DESCRIPTION*	*PURPOSE*	*QTY*
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

(Continued)

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 841-011-B

(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 720-011-B

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).

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.

(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

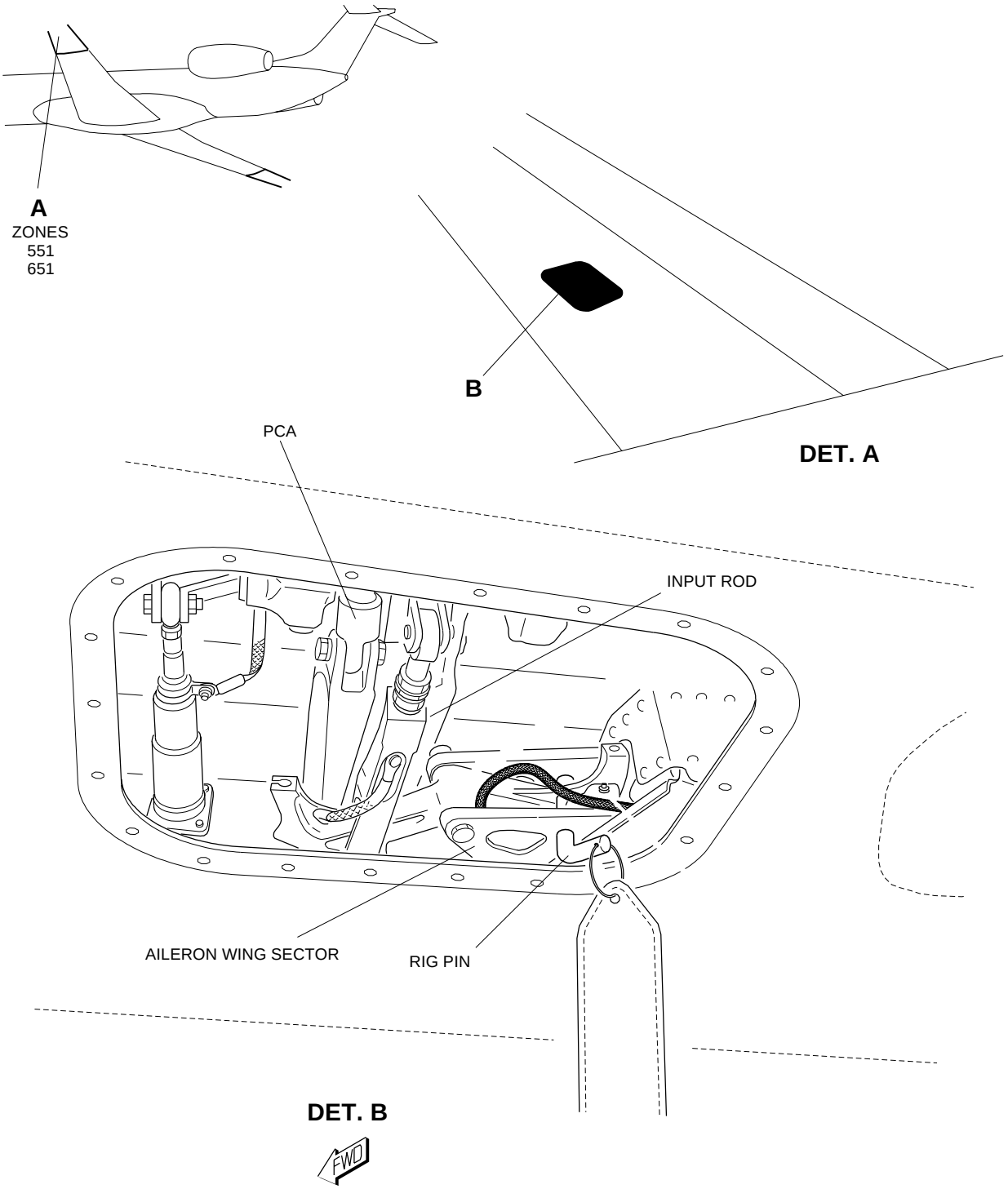
SUBTASK 842-011-B

(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-145
Aileron Wing Sector - Location
Figure 501



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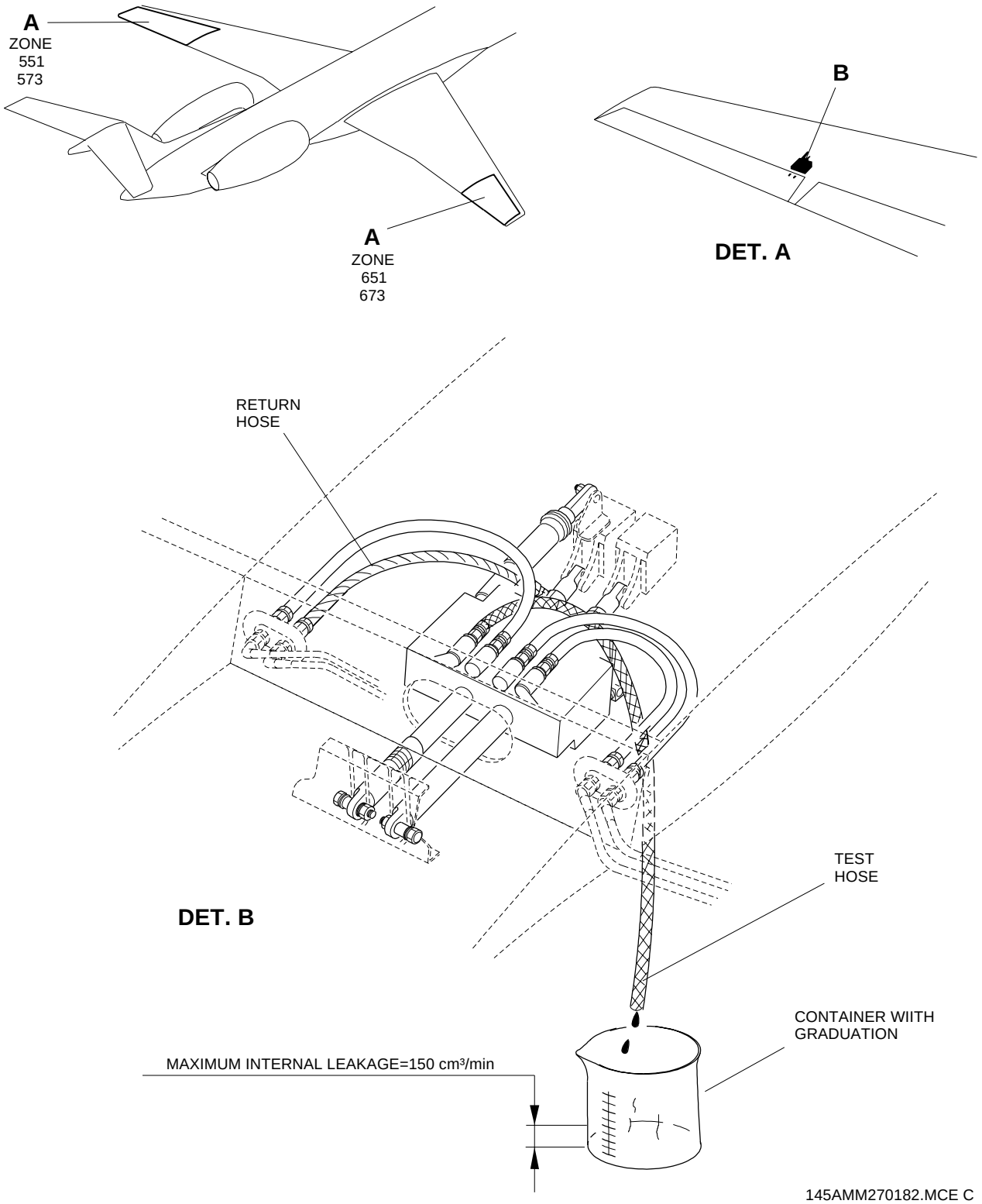
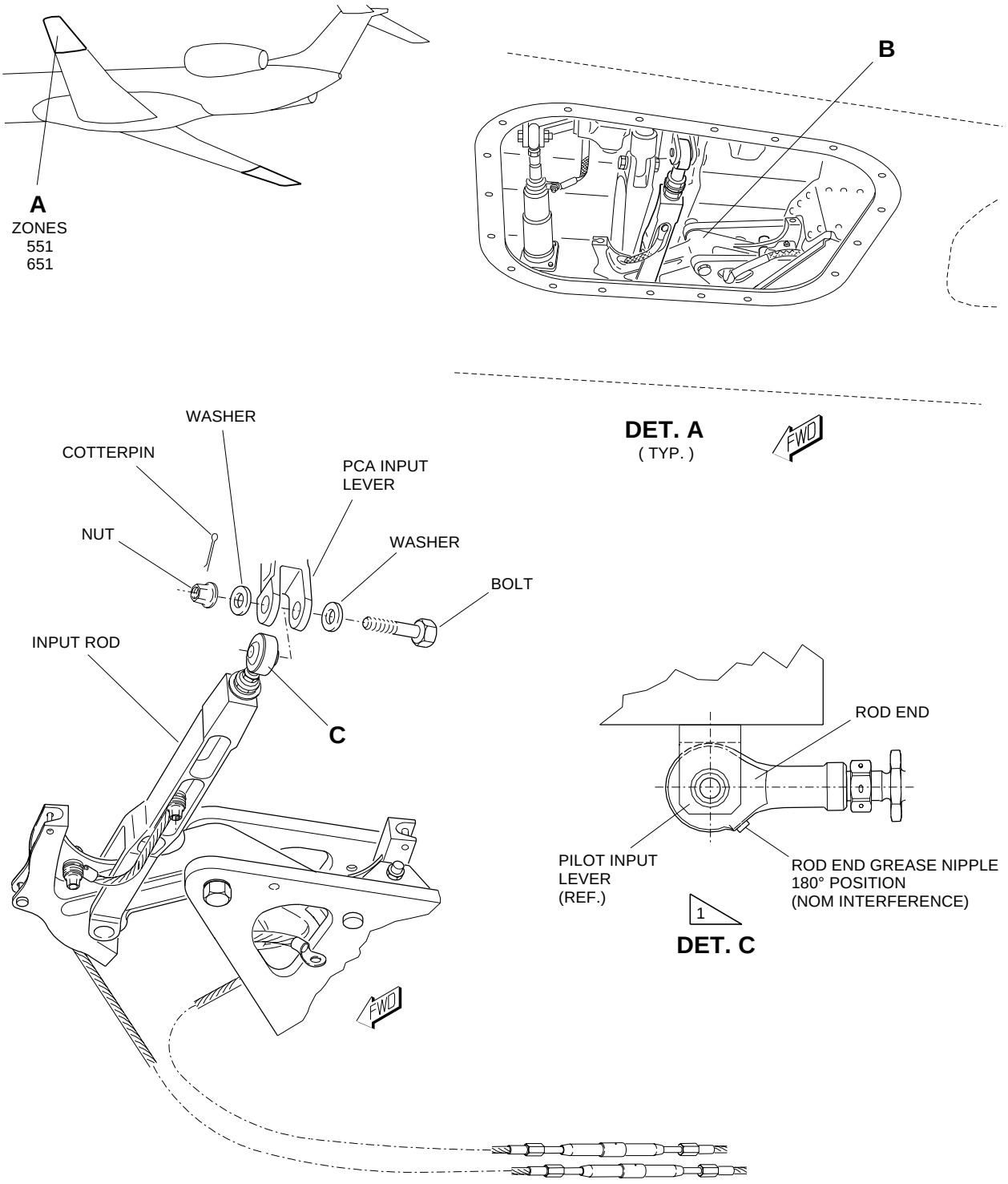
EFFECTIVITY: ACFT MODEL(S) EMB-145
Internal Leakage in the Aileron PCA
Figure 502



EFFECTIVITY: ACFT MODEL(S) EMB-145

Input Rod - Location

Figure 503



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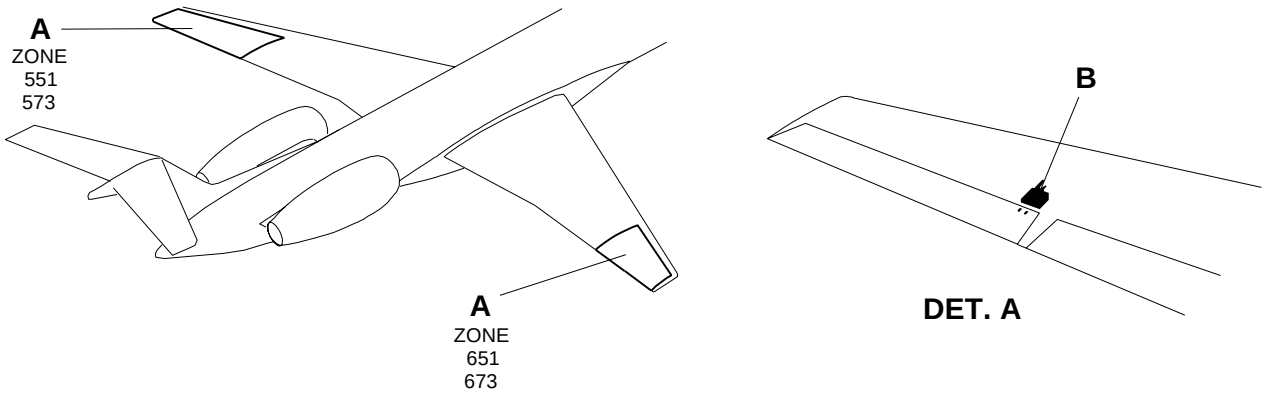
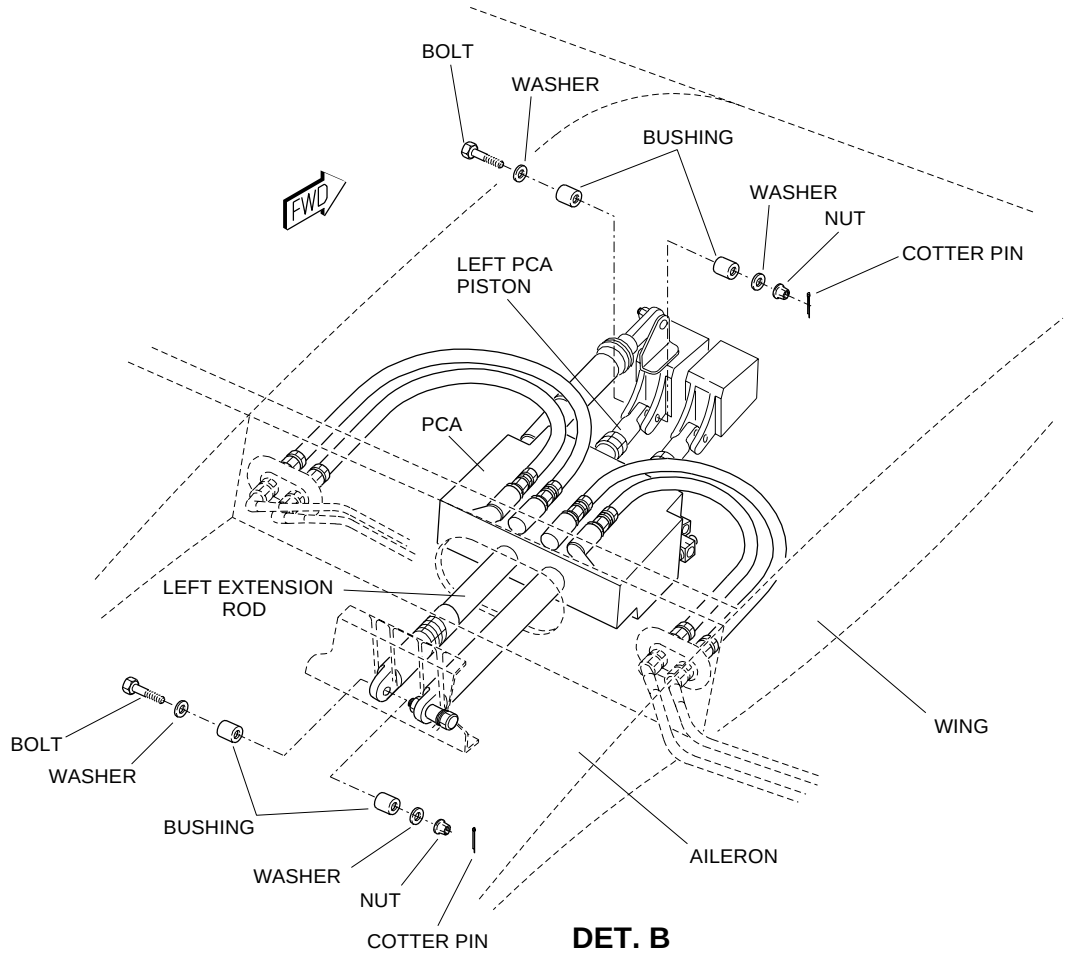
EFFECTIVITY: ACFT MODEL(S) EMB-145
Extension Rod and PCA Piston - Location
Figure 504 - Sheet 1





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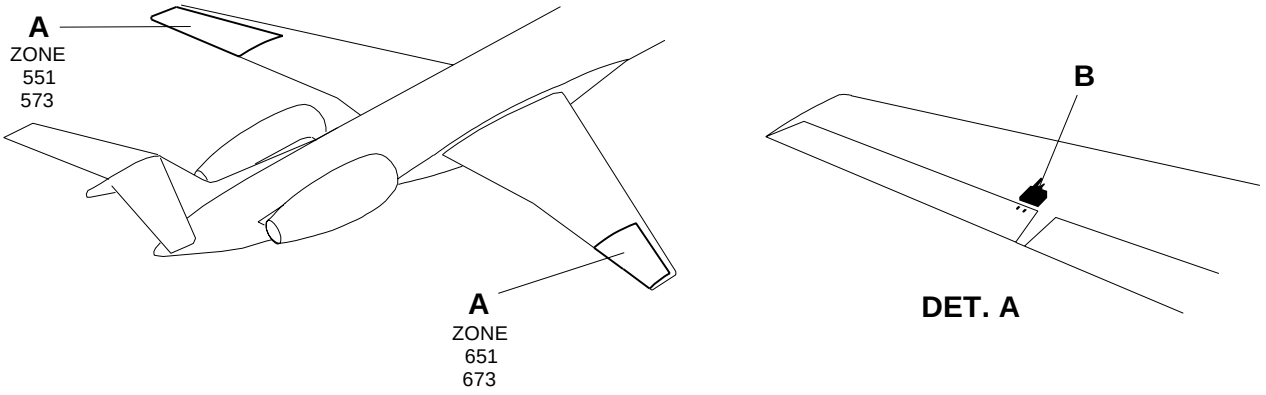
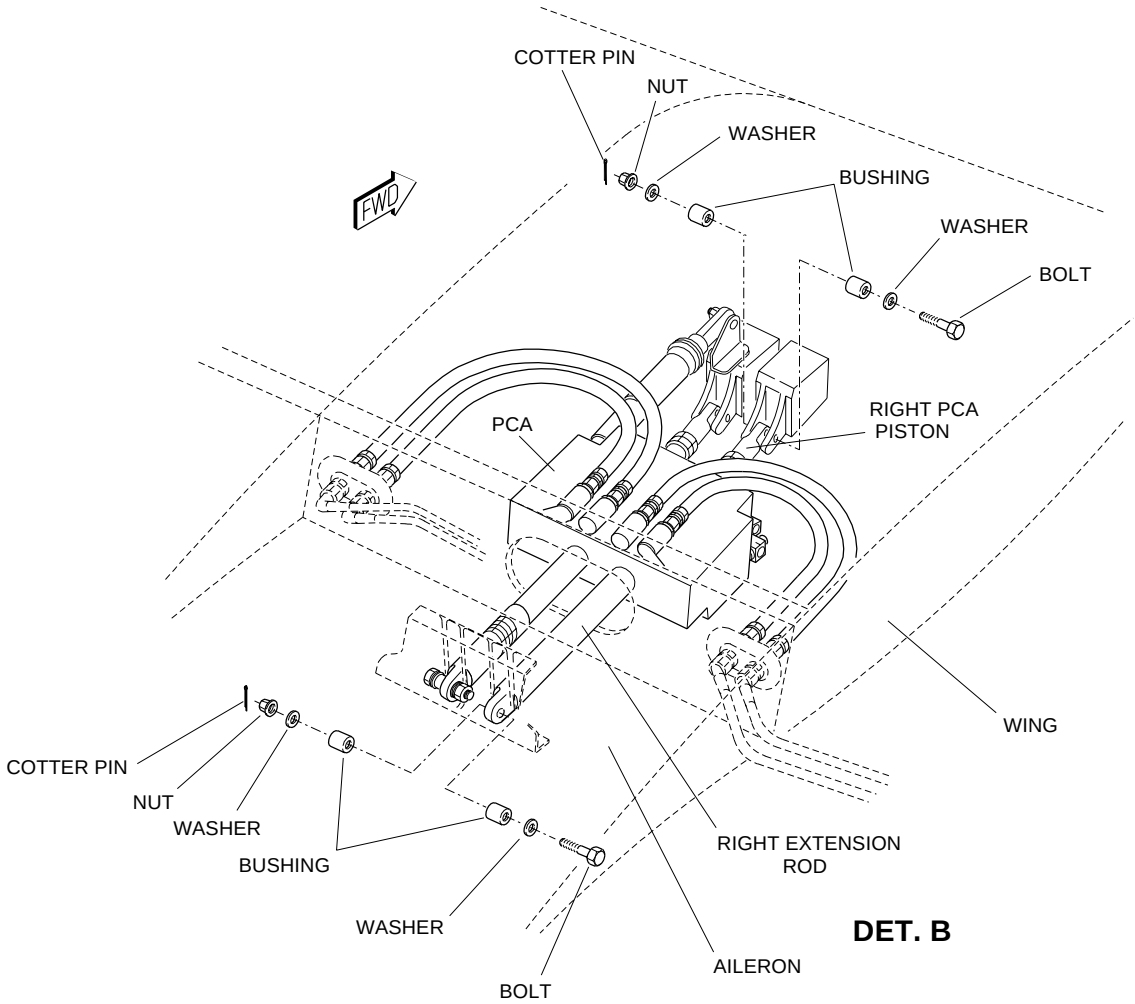
EFFECTIVITY: ACFT MODEL(S) EMB-145
Extension Rod and PCA Piston - Location
Figure 504 - Sheet 2





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TASK 27-12-00-700-802-A
EFFECTIVITY: ACFT MODEL(S) EMB-145

3. AILERON PCA HYDRAULIC DAMPING - FUNCTIONAL CHECK

A. General

(1) This task gives the procedures to do a check of the PCA damping of the aileron.

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 27-12-03-000-801-A/400	AILERON DAMPER - REMOVAL
AMM TASK 27-12-03-400-801-A/400	AILERON DAMPER - INSTALLATION
AMM TASK 29-10-00-860-801-A/200	HYDRAULIC SYSTEM - PRESSURIZATION WITH HTS
S.B.145-27-0063	-

C. Zones and Accesses

ZONE	*PANEL/DOOR*	*LOCATION*
551		LH/RH wing sector

D. Tools and Equipment

ITEM	*DESCRIPTION*	*PURPOSE*	*QTY*
GSE 056	Dynamometer	To apply load to the aileron surface	
GSE 060	Aileron Measurement Backlash Kit	To use the dynamometer attaching device AGE-00313-403 to apply loads to the aileron surface	
GSE 070	Digital Protractor	To measure the aileron deflection	
Commercially Available	Stopwatch	To measure the time	

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	Aileron
1	Helps the other technician	Aileron

I. Preparation

SUBTASK 841-012-A

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

(2) Get access to the left aileron.

(3) For aircraft POST-MOD S.B.145-27-0063, disconnect aileron damper rod from the aileron surface refer to (AMM TASK 27-12-03-000-801-A/400).

J. Functionally Check Aileron Hydraulic Damping (Figure 505)

SUBTASK 720-012-A

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

(1) Install dynamometer attaching device AGE-00313-403 to the aileron trailing edge, in the middle point of the aileron surface and in the PCA direction. Refer to Figure 505.

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

(3) Pressurize hydraulic systems 1 and 2 (AMM TASK 29-10-00-860-801-A/200).

(4) Push the AILERON SHUTOFF SYS 1 and AILERON SHUTOFF SYS 2 pushbuttons to turn on the aileron systems. Make sure that the pushbutton lights go off.

(5) Move a control yoke to the left, to the right, and to the neutral position, five times.

(6) With the aileron surface in the neutral position, install the rig pins in the aileron wing sector. See Figure 501.

(7) Install the digital protractor on the aileron surface, in the PCA direction and perpendicular to the hinge points of the aileron. See Figure 505. Use the double-face adhesive tape for this.

(8) Set the digital protractor to zero.

(9) Push pushbuttons AILERON SHUTOFF SYS 1 and 2 to turn off the aileron systems. Make sure that the pushbutton lights come on.

(10) 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.

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

(12) Disconnect the input rod from the PCA. See Figure 503.

NOTE: Do not turn the rod end of the input rod. If you do, you will lose the adjustment points.

(13) Remove the rig pins from the aileron wing sector. See Figure 501.

(14) Install the dynamometer to its attaching device.

(15) Deflect the aileron ten degrees down, while you apply a load of 6.5 kgf ± 0.5 kgf down.

(16) Manually move the aileron surface to the neutral position.

(17) Deflect the aileron twenty degrees up, while you apply a load of 11.5 kgf ± 0.5 kgf up.

(18) Smoothly do ten aileron command cycles in the mechanical reversion mode (fully down - neutral - fully up for each cycle).

NOTE: To do this step, move the aileron surface manually.

(19) Do steps 15 thru 17 again and:

(a) Measure the time to deflect the aileron ten degrees down, while you apply a load of 6.5 kgf ± 0.5 kgf down.

- The time must be of more than 3 seconds. If it is not, replace the PCA (AMM TASK 27-12-01-000-801-A/400).

(b) Measure the time to deflect the aileron twenty degrees up, while you apply a load of 11.5 kgf ± 0.5 kgf up.

- The time must be of more than 5 seconds. If it is not, replace the PCA (AMM TASK 27-12-01-000-801-A/400).

(20) Do steps 1 thru 19 for the right aileron.

K. Follow-on

SUBTASK 842-012-A

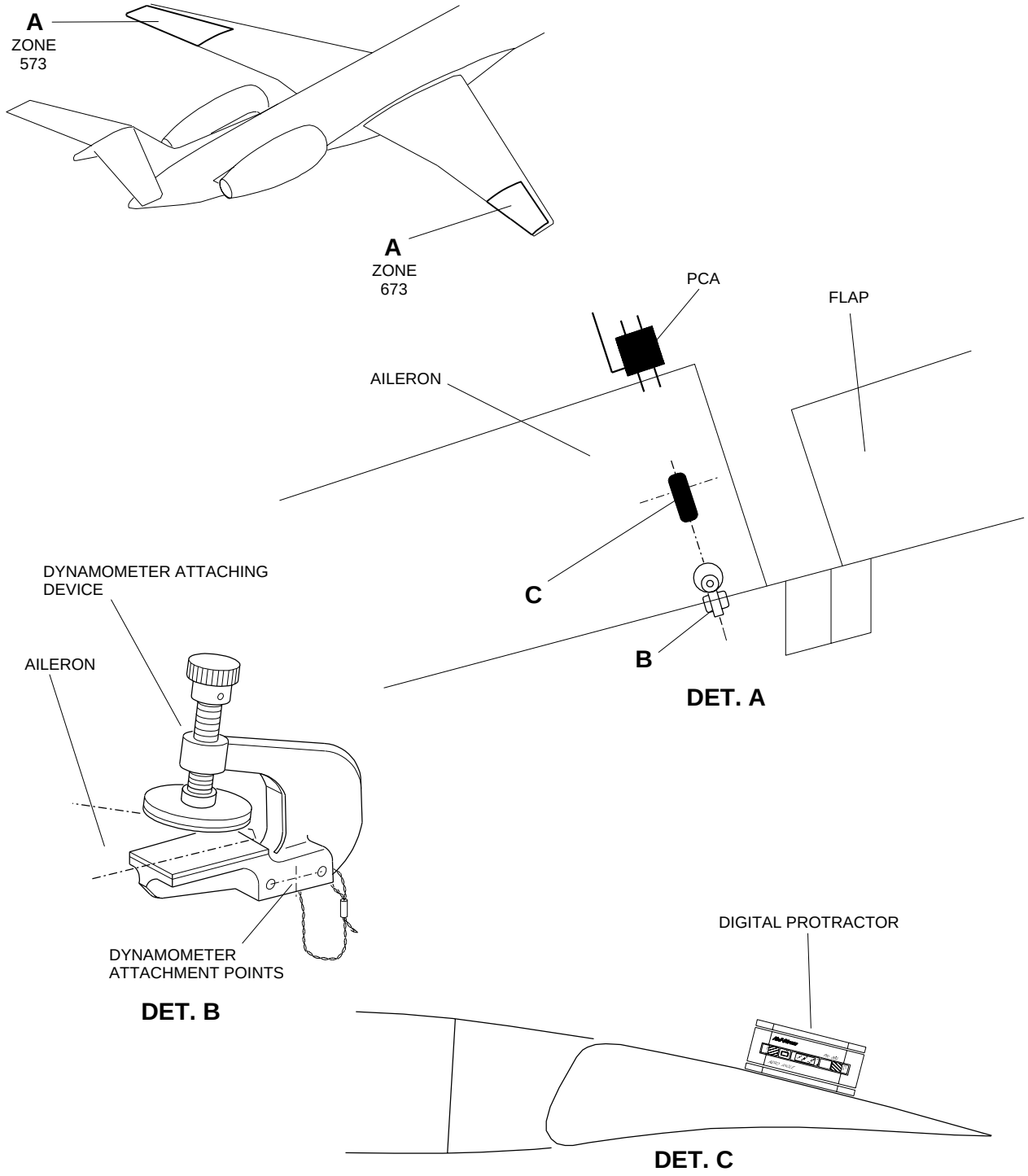
(1) Connect the input rod to the PCA. See Figure 503.

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.

(2) Remove the dynamometer, its support, and the digital protractor from the wing.

(3) For aircraft POST-MOD S.B.145-27-0063, connect aileron damper rod to the aileron surface (refer to AMM TASK 27-12-03-400-801-A/400).

EFFECTIVITY: ACFT MODEL(S) EMB-145
Aileron Hydraulic Damping
Figure 505



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TASK 27-12-00-700-803-A
EFFECTIVITY: ACFT MODEL(S) EMB-145

4. 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

I. Preparation

SUBTASK 841-013-B

(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 010-005-B

(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 720-013-B

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 842-013-B

(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 410-005-B

(3) Close these access panels:

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

EFFECTIVITY: ACFT MODEL(S) EMB-145

External Leakage of the PCA
Figure 506