AILERON ACTUATOR - ADJUSTMENT/TEST

EFFECTIVITY: ON AIRCRAFT POST-MOD SB 145-27-0062

1. General

A. This section gives the procedures to do the functional check of the aileron-actuator damping components and monitoring devices.

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*
27-12-01-700-801-A ♦	AILERON-ACTUATOR DAMPING COMPONENTS AND MONITORING DEVICES - FUNCTIONAL CHECK	ON AIRCRAFT POST-MOD SB 145-27-0062
27-12-01-700-802-A ♦	AILERON ACTUATOR FORCE FIGHT - FUNCTIONAL CHECK	ON AIRCRAFT POST-MOD SB 145-27-0062

TASK 27-12-01-700-801-A
EFFECTIVITY: ON AIRCRAFT POST-MOD SB 145-27-0062

2. AILERON-ACTUATOR DAMPING COMPONENTS AND MONITORING DEVICES - FUNCTIONAL CHECK

A. General

(1) This task gives the procedures to do the functional check of the aileron-actuator damping components and monitoring devices.

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 27-11-07-000-801-A/400	AILERON NEUTRAL RECOVERY UNIT - REMOVAL
AMM TASK 27-11-07-400-801-A/400	AILERON NEUTRAL RECOVERY UNIT - INSTALLATION
AMM TASK 27-12-01-000-801-A/400	AILERON POWER-CONTROL ACTUATOR (PCA) - REMOVAL
AMM TASK 27-12-01-400-801-A/400	AILERON POWER-CONTROL ACTUATOR (PCA) - INSTALLATION
AMM TASK 29-10-00-860-801-A/200	HYDRAULIC SYSTEM - PRESSURIZATION WITH HTS
IPC 27-12-00	AILERON HYDRAULIC ACTUATION

C. Zones and Accesses

ZONE	*PANEL/DOOR*	*LOCATION*
551	551CB	Wing
651	651CB	Wing

D. Tools and Equipment

ITEM	*DESCRIPTION*	*PURPOSE*	*QTY*
GSE 219	Test Cable	To connect the internal leak detection valve to the multimeter for electrical continuity check.	
GSE 270	Cap Removal Tool	To remove the end cap of the Internal Leak Detection Valve	
Commercially available	Multimeter	To do the check for electrical continuity	
Commercially available	Torque wrench	To apply the torques	

E. Auxiliary Items

ITEM	*DESCRIPTION*	*PURPOSE*	*QTY*
Commercially available	Flashlight	To make the lighting condition better	1

F. Consumable Materials

SPECIFICATION (BRAND)	*DESCRIPTION*	*QTY*
MS20995C20	Lockwire	AR
TT-I-735	Isopropyl Alcohol	AR

G. Expendable Parts

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

H. Persons Recommended

QTY	*FUNCTION*	*PLACE*
1	Does the task	Wing
1	Helps the other technician	Cockpit

I. Preparation

SUBTASK 841-002-A

(1) Do not do other tasks in the aileron system.

(2) Remove access panels 551CB and 651CB (AMM MPP 06-44-00/100).

(3) Energize the aircraft with the External DC Power Supply (AMM TASK 20-40-01-860-801-A/200).

J. Functionally Check Aileron-Actuator Damping Components and Monitoring Devices

SUBTASK 720-002-A

CAUTION: IF THE SYSTEM IS PRESSURIZED DURING THE LAST TWO HOURS, FAILURES OF THE COMPENSATOR MAY NOT BE DETECTABLE.

(1) Before you do the task, make sure that hydraulic systems 1 and 2 and aileron systems 1 and 2 were not pressurized in the last two hours. Also make sure that these systems were pressurized 2 to 3 hours before you do this task.

(2) Do a visual inspection in the compensator level indicator of systems 1 and 2 in the PCAs of the left and right ailerons.

NOTE: Use the flashlight to make the lighting condition better.

(a) Do steps 4 and on, if the compensator level indicators are green.

(b) Do steps 3 and on, if one or the two of the compensator level indicators are red, silver or gold (this indicates a depressurized compensator).

(3) Do a check of the compensator of PCA system 1 and/or system 2 as applicable:

(a) Make sure that aileron systems 1 and 2 are not pressurized.

(b) Remove the end cap from the system which contains the depressurized compensator.

WARNING: USE EYE PROTECTION WHEN YOU REMOVE OR INSTALL LOCKWIRE OR SAFETY CABLE. IF YOU DO NOT USE EYE PROTECTION, CUT PIECES OF WIRE CAN HIT YOUR EYES AND CAUSE INJURY.

CAUTION: DO NOT LET PIECES OF DISCARDED LOCK WIRE STAY IN THE WORK AREA. IF NECESSARY, USE A VACUUM CLEANER TO REMOVE THEM.

1 Remove the lockwire.

NOTE:
- Cut off only the lockwire that attaches the end cap to its nut.
- Remove the end cap to reduce the pre-load spring on the check valve and allow the check valve to open further during the aileron actuator cycling.
- Pump the piston of the leak detection valve a minimum of five times to dislodge any foreign material.

(c) Pressurize the hydraulic system (AMM TASK 29-10-00-860-801-A/200).

(d) On the overhead panel, push pushbutton AILERON SHUTOFF SYS 1 or 2 as applicable to turn on aileron system 1 or 2, respectively.

- Make sure that the pushbutton lights go off.

(e) Do five full aileron command cycles (fully left - neutral - fully right - neutral - for each cycle) with the aileron system energized.

(f) On the overhead panel, push pushbutton AILERON SHUTOFF SYS 1 or 2 to turn off aileron system 1 or 2, respectively.

(g) Release the pressure from the hydraulic system (AMM TASK 29-10-00-860-801-A/200).

(h) Place the end cap on the PCA (Figure 505).

1 Clean end caps with isopropyl alcohol.

2 Install the end caps to the PCA. Use GSE 270 for this.

3 Apply torque and safety them.

(i) Pressurize the hydraulic system (AMM TASK 29-10-00-860-801-A/200).

(j) On the overhead panel, push pushbutton AILERON SHUTOFF SYS 1 or 2 to turn on aileron system 1 or 2, respectively.

(k) Do five full aileron command cycles (fully left - neutral - fully right - neutral - for each cycle) to charge the compensator.

(l) Do a check on the compensator to make sure that it is fully charged (the end of the indicator shows green in the sight window).

(m) On the overhead panel, push pushbutton AILERON SHUTOFF SYS 1 or 2 to turn off aileron system 1 or 2, respectively.

(n) Release the pressure from the hydraulic system (AMM TASK 29-10-00-860-801-A/200).

(o) Do five full aileron command cycles (fully left - neutral - fully right - neutral - for each cycle) with the mechanical reversion mode.

(p) During two hours, do a check on the compensator level indicator to make sure that it is green. If the indicator is red, silver or gold the PCA shall be replaced by a serviceable one (AMM TASK 27-12-01-000-801-A/400).

NOTE: Make sure that hydraulic systems 1 and 2 were not pressurized during the last two hours.

(4) Do the inspection on the compensator level indicator of systems 1 and 2, in the PCAs of the left and right ailerons.

(5) Do a check for excess internal leakage in the Aileron PCA of the left aileron.

NOTE:
- If problems occur during this step, the PCA is defective. Replace it with a serviceable one (AMM TASK 27-12-01-000-801-A/400).
- Make sure that the spring actuates the piston of the leak detection valve.
- If necessary, pull the piston down. If the piston does not go down, replace the PCA with a serviceable one (AMM TASK 27-12-01-000-801-A/400).

WARNING: USE EYE PROTECTION WHEN YOU REMOVE OR INSTALL LOCKWIRE OR SAFETY CABLE. IF YOU DO NOT USE EYE PROTECTION, CUT PIECES OF WIRE CAN HIT YOUR EYES AND CAUSE INJURY.

CAUTION: DO NOT LET PIECES OF DISCARDED LOCKWIRE STAY IN THE WORK AREA. IF NECESSARY, USE A VACUUM CLEANER TO REMOVE THEM.

(a) If applicable, cut the lockwire of the end cap.

CAUTION: FOR AIRCRAFT POST-MOD. S.B. 145-27-0062, LOOSEN THE CAP SLOWLY TO PREVENT THE BREAKAGE OF THE STEEL WIRE CORD.

(b) Remove the end caps of aileron systems 1 and 2 (Figure 501).

- The compensator level indicator must be in colors red, silver or gold.

(c) Connect GSE 219 to the PCA. Connect it to the multimeter (Figure 501).

(d) Pressurize the hydraulic system (AMM TASK 29-10-00-860-801-A/200).

(e) On the overhead panel, push pushbutton AILERON SHUTOFF SYS 1 or 2 as applicable to turn on aileron system 1 or 2, respectively.

(f) Use the control yoke to command the aileron up and down quickly.

NOTE: If you command the control yoke slowly, the multimeter can incorrectly show that there is electrical continuity (the signal must be closed) while the aileron moves.

1. Make sure that there is no electrical continuity (the signal must be open) while the aileron moves.

2. Stop the aileron command and make sure that there is electrical continuity (the signal must be closed) during 15 seconds minimum, after the command stops.

(g) Release the pressure from the hydraulic system (AMM TASK 29-10-00-860-801-A/200).

(h) Disconnect the input rod from the PCA (Figure 502). Refer to AMM TASK 27-12-01-000-801-A/400.

(i) Disconnect the NRU from the PCA (Figure 503). Refer to AMM TASK 27-11-07-000-801-A/400.

(j) Manually move the aileron surface fully up (trailing edge up), until the PCA stops.

(k) Put the PCA input lever at the extend command stop. For this, move the input lever totally rearward (Figure 504).

WARNING:
- **MAKE SURE THAT THERE ARE NO PERSONS IN THE AILERON TRAVEL AREA.**
- **IF THE AILERON MOVES DOWN, LET THE AILERON MOVE FREELY. AFTER THIS, LOOK AT THE PCA INPUT LEVER TO MAKE SURE THAT IT IS IN THE EXTEND COMMAND STOP (INPUT LEVER IN REARWARD POSITION).**

(l) Pressurize the hydraulic system (AMM TASK 29-10-00-860-801-A/200).

(m) On the overhead panel, push pushbutton AILERON SHUTOFF SYS 1 or 2 as applicable to turn on aileron system 1 or 2, respectively.

(n) With the aileron up, make sure that there is electrical continuity (the signal must be closed) during 15 seconds minimum, after the command stops.

(o) Release the pressure from the hydraulic system (AMM TASK 29-10-00-860-801-A/200).

(p) Manually move the aileron surface fully down (trailing edge down), until the PCA stops.

(q) Put the PCA input lever at the retract command stop. For this, move the input lever totally forward.

WARNING:
- **MAKE SURE THAT THERE ARE NO PERSONS IN THE AILERON TRAVEL AREA.**
- **IF THE AILERON MOVES UP, LET THE AILERON MOVE FREELY. AFTER THIS, LOOK AT THE PCA INPUT LEVER TO MAKE SURE THAT IT IS IN THE RETRACT COMMAND STOP (INPUT LEVER IN THE FORWARD POSITION).**

(r) Pressurize the hydraulic system (AMM TASK 29-10-00-860-801-A/200).

(s) On the overhead panel, push pushbutton AILERON SHUTOFF SYS 1 or 2, as applicable, to turn on aileron system 1 or 2.

(t) With the aileron down, make sure that there is electrical continuity (the signal must be closed) during 15 seconds minimum, after the command stops.

(u) On the overhead panel, push pushbutton AILERON SHUTOFF SYS 1 or 2, as applicable, to turn off aileron system 1 or 2.

(v) Release the pressure of the hydraulic system (AMM TASK 29-10-00-860-801-A/200).

(6) Do this procedure to put the left aileron system back to the normal condition.

NOTE: After you install the end cap and before you pressurize the aileron system, the compensator level indicator must be red.

(a) Connect the input rod to the PCA (Figure 502). Refer to AMM TASK 27-12-01-400-801-A/400.

(b) Connect the NRU to the PCA (Figure 503). Refer to AMM TASK 27-11-07-400-801-A/400.

(c) Disconnect GSE 219 from the PCA. Disconnect it from the multimeter (Figure 501).

(d) Install the end caps to the aileron PCA (Figure 505).

1. Clean end caps with isopropyl alcohol.
2. Install the end caps to the PCA. Use GSE 270 for this.
3. Apply torque and safety them.

(7) Do steps 5 thru 6 for the PCA of the right aileron.

K. Follow-on

SUBTASK 842-002-A

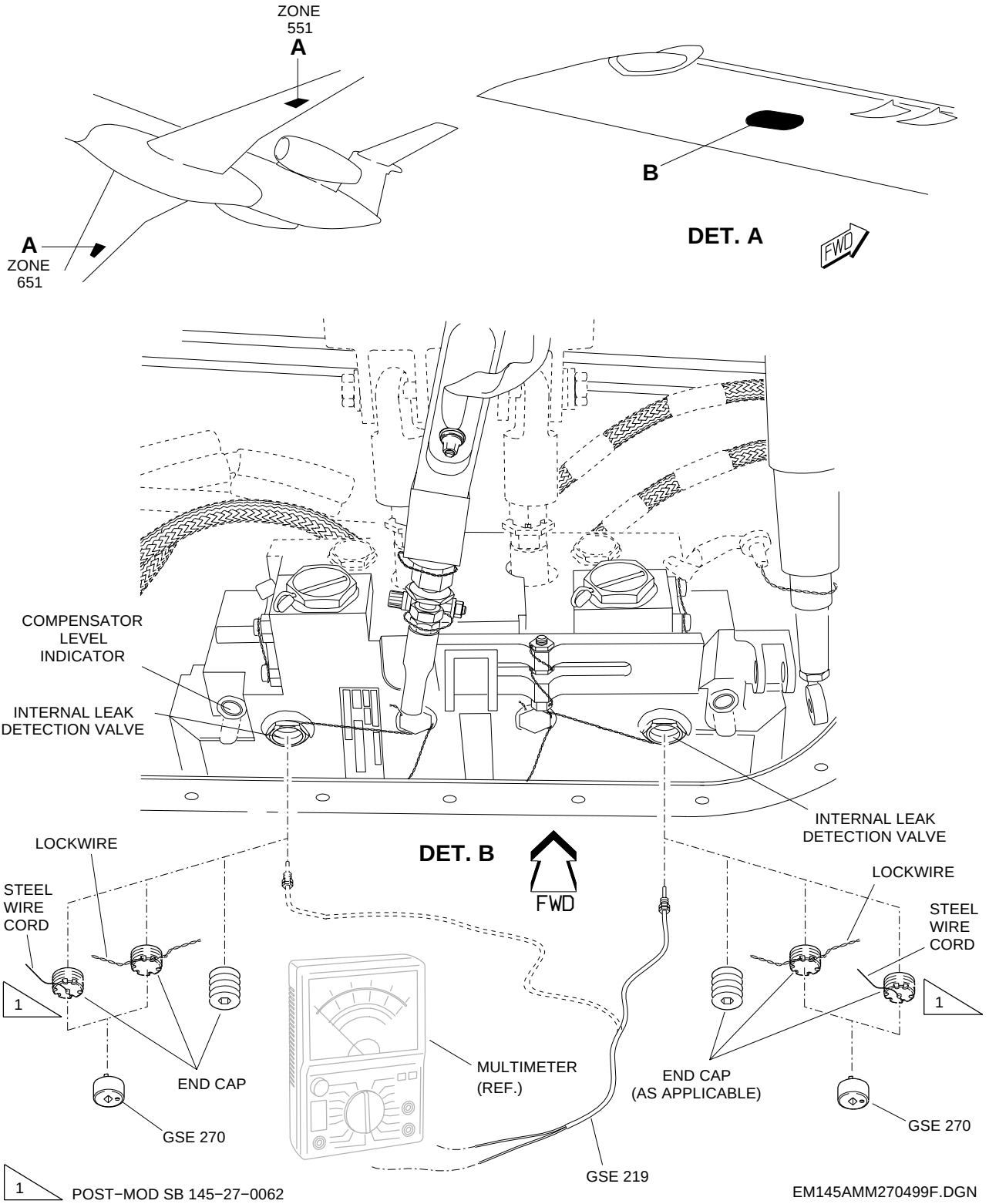
(1) De-energize the aircraft (AMM TASK 20-40-01-860-801-A/200).

(2) Install access doors 551CB and 651CB (AMM MPP 06-44-00/100).

EFFECTIVITY: ON AIRCRAFT POST-MOD SB 145-27-0062

End Caps of the Leak Detect Valve - Installation

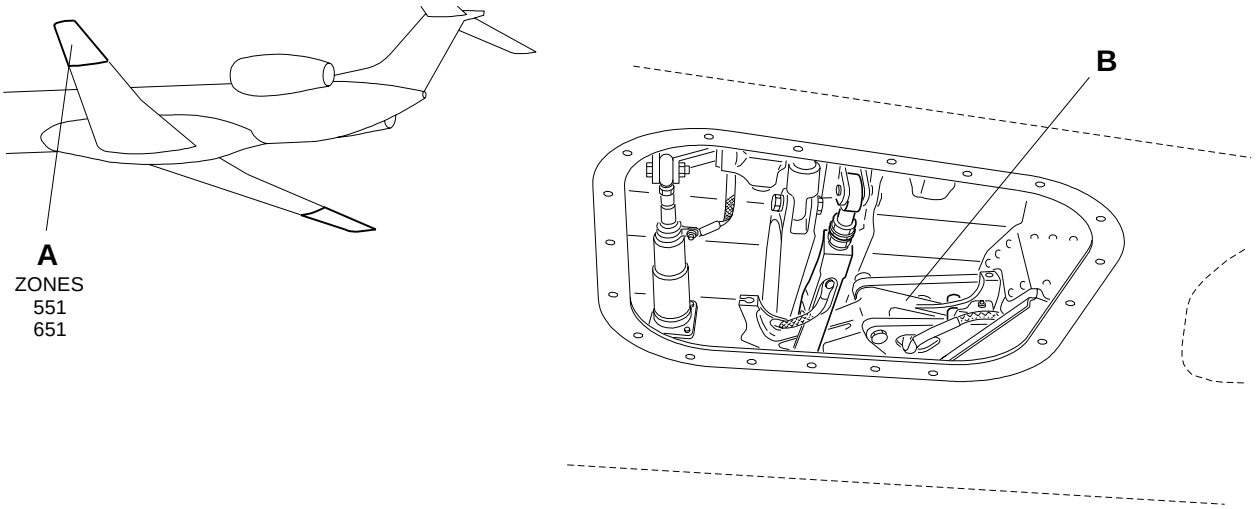
Figure 501

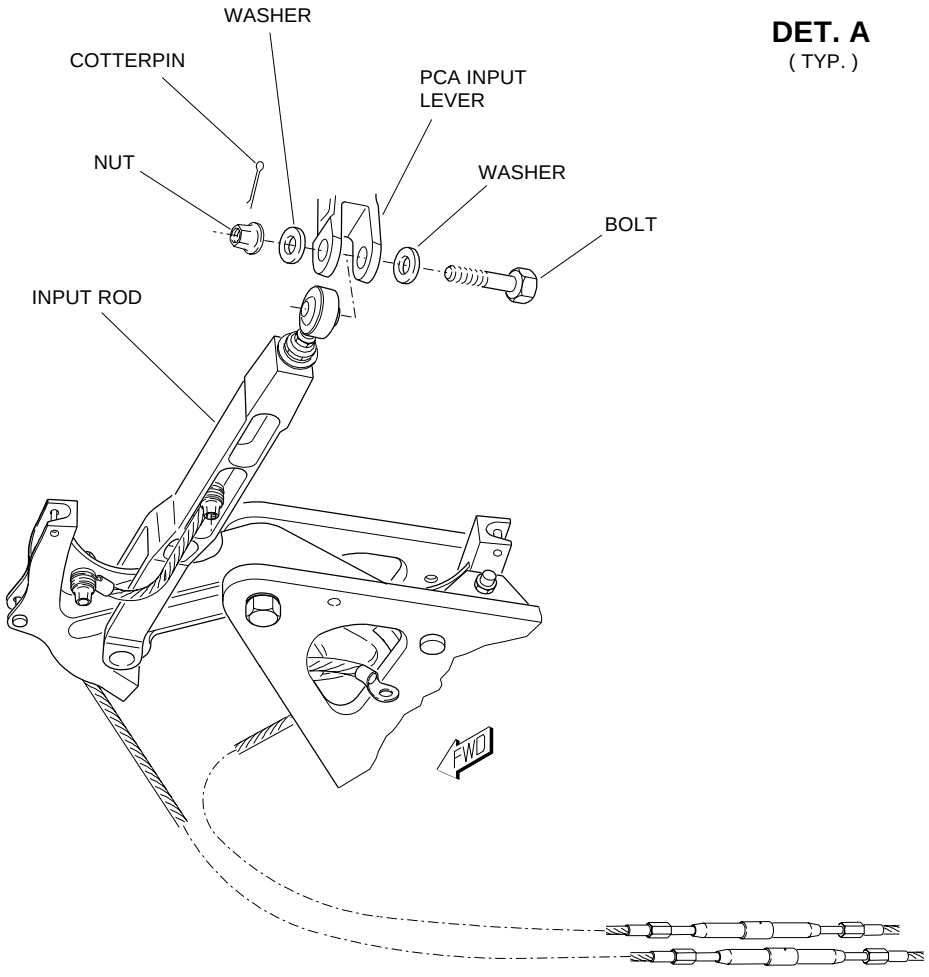


EFFECTIVITY: ON AIRCRAFT POST-MOD SB 145-27-0062

Input Rod - Location

Figure 502





DET. A
(TYP.)

FWD

DET. B

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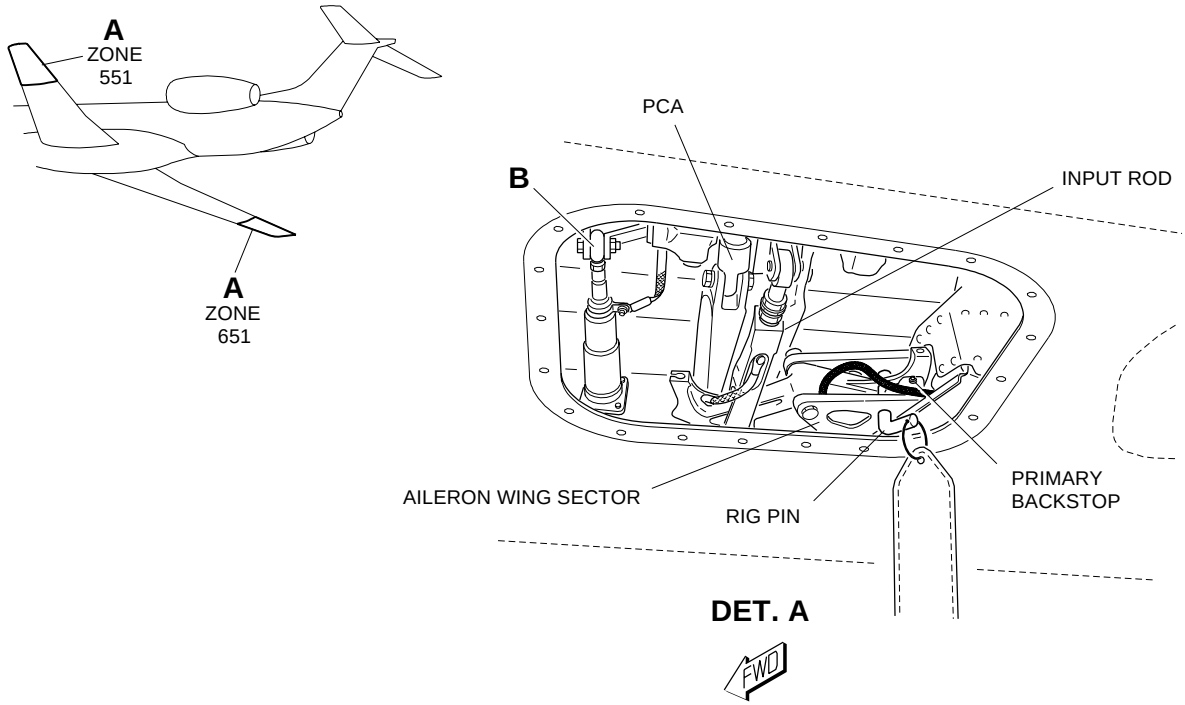
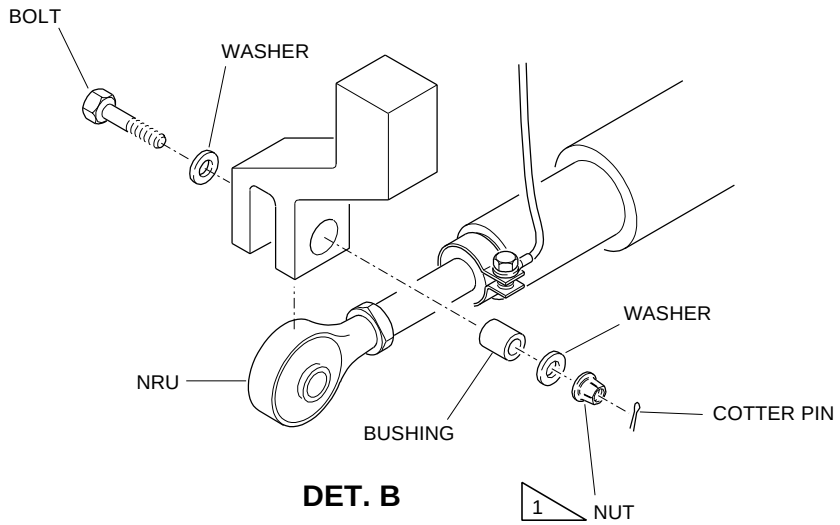
EFFECTIVITY: ON AIRCRAFT POST-MOD SB 145-27-0062
NRU - Location
Figure 503





1 TORQUE: 1.4 – 1.7 N.m (12 – 15 lb.in)

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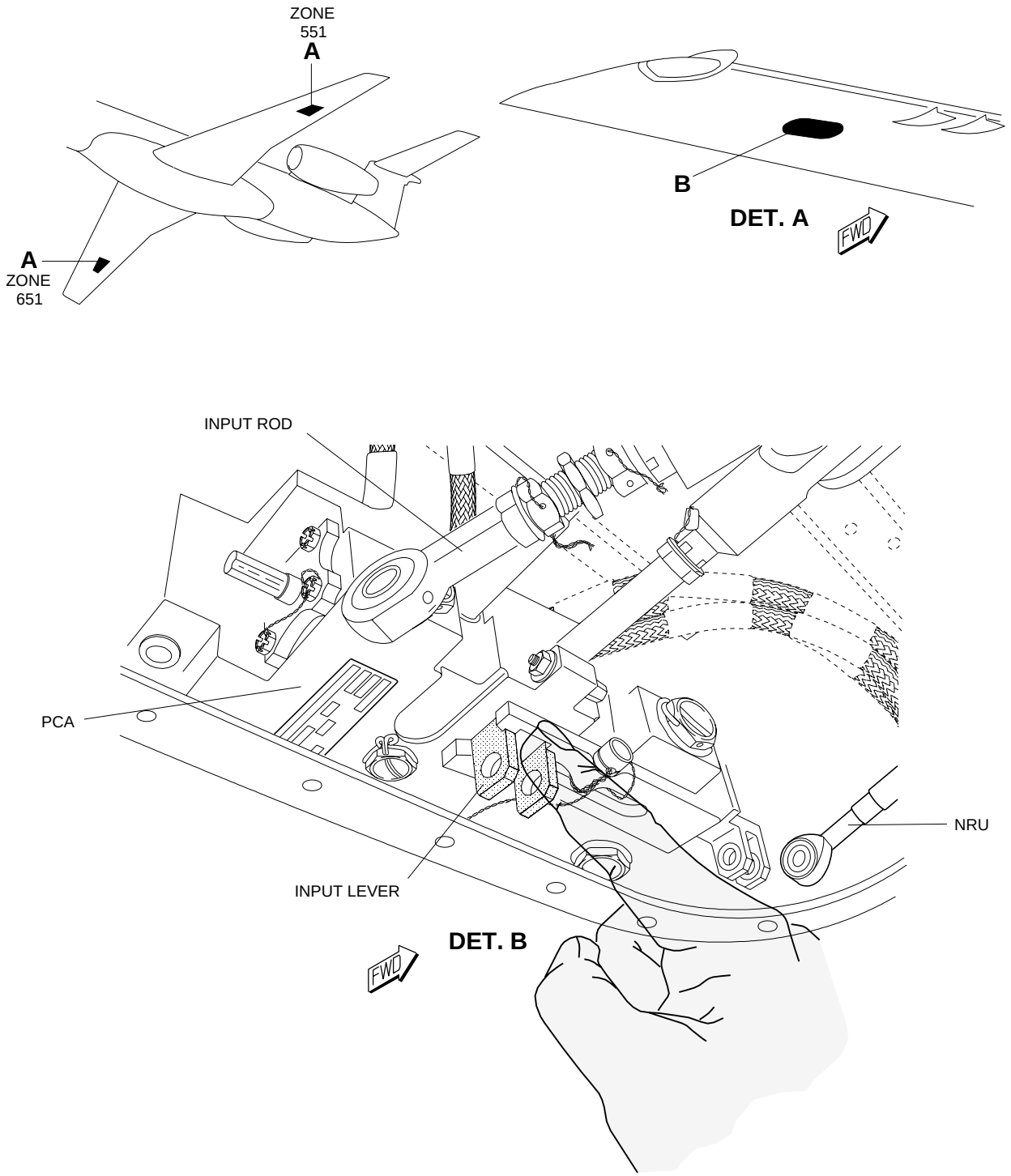
EFFECTIVITY: ON AIRCRAFT POST-MOD SB 145-27-0062

Input Lever - Location

Figure 504



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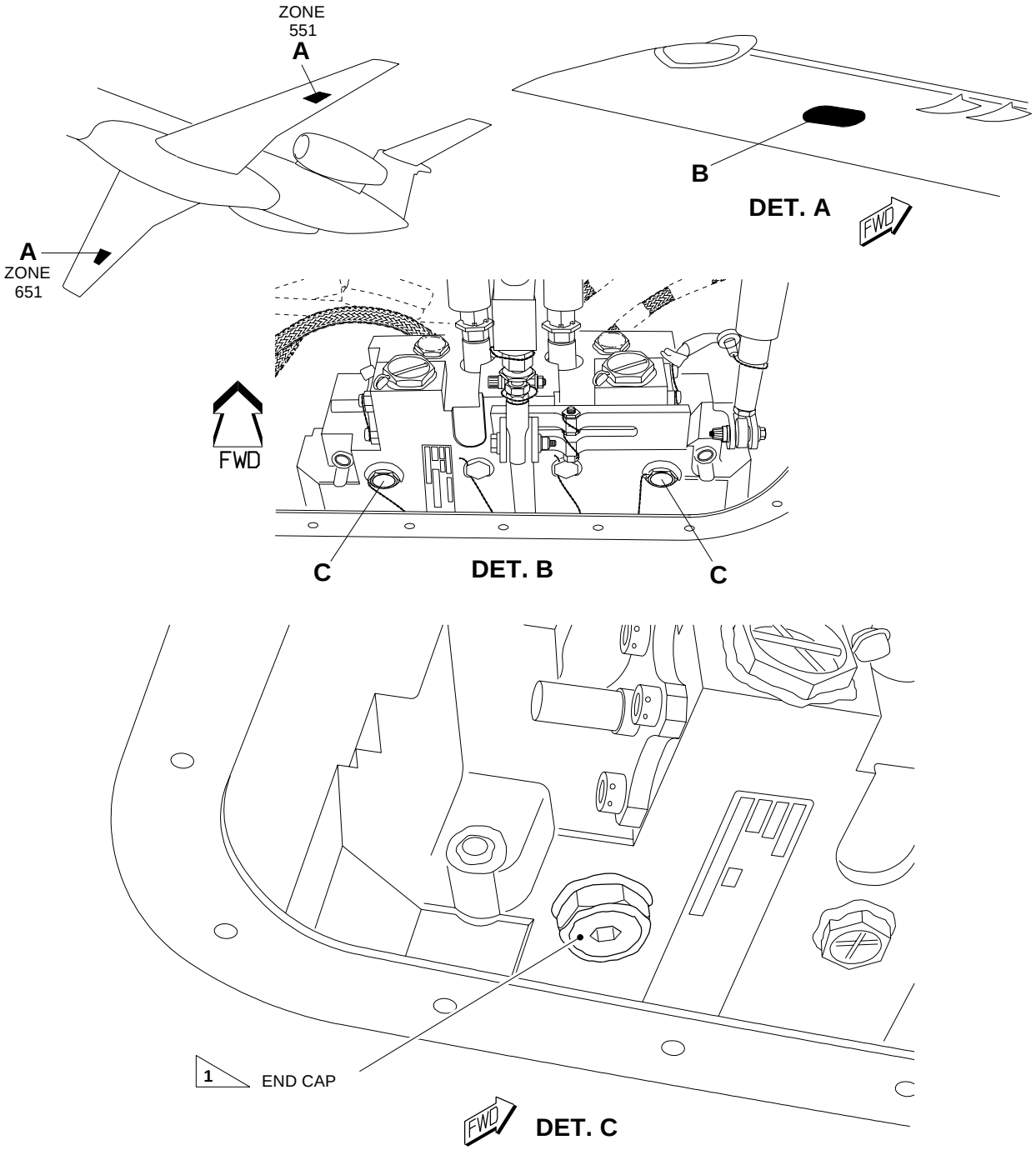
EFFECTIVITY: ON AIRCRAFT POST-MOD SB 145-27-0062

Input Lever - Installation

Figure 505



1 APPLY TORQUE OF 4.52 TO 6.78 N.m (40 TO 60 lbf.in).

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TASK 27-12-01-700-802-A
EFFECTIVITY: ON AIRCRAFT POST-MOD SB 145-27-0062

3. AILERON ACTUATOR FORCE FIGHT - FUNCTIONAL CHECK

A. General

(1) This task gives the procedure to measure the aileron PCA force fight.

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 27-12-01-000-801-A/400	AILERON POWER-CONTROL ACTUATOR (PCA) - REMOVAL
AMM TASK 27-12-01-400-801-A/400	AILERON POWER-CONTROL ACTUATOR (PCA) - INSTALLATION
AMM TASK 29-10-00-860-801-A/200	HYDRAULIC SYSTEM - PRESSURIZATION WITH HTS
IPC 27-12-00	AILERON HYDRAULIC ACTUATION

C. Zones and Accesses

ZONE	*PANEL/DOOR*	*LOCATION*
551	551CB	Wing
651	651CB	Wing

D. Tools and Equipment

ITEM	*DESCRIPTION*	*PURPOSE*	*QTY*
GSE 215	Digital Load Indicator	To measure the aileron-actuator force fight.	
GSE 058	Kit, Rig pin	To lock the aileron system in the neutral position.	

E. Auxiliary Items

Not Applicable

F. Consumable Materials

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

G. Expendable Parts

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

H. Persons Recommended

QTY	*FUNCTION*	*PLACE*
1	Does the task	Wing
1	Helps the other technician	Cockpit

I. Preparation

SUBTASK 841-003-A

(1) Do not do other tasks on the aileron system.

(2) Remove access doors 551CB and 651CB (AMM MPP 06-44-00/100).

(3) Make sure that hydraulic systems 1 and 2 are depressurized (AMM TASK 29-10-00-860-801-A/200).

(4) Install the rig pin to the aileron wing sector (Figure 506).

(5) Energize the aircraft with the External DC Power Supply (AMM TASK 20-40-01-860-801-A/200).

J. Functionally Check Aileron Actuator Force Fight

SUBTASK 720-003-A

(1) Do this procedure for the right aileron.

(a) Adjust the digital load indicator (Figure 507):

1. Connect the digital load indicator cable to the shearing-stress sensor pin with no load applied and turn on the digital load indicator.
2. See the value on the display and set it to zero if necessary.
3. Wait for one minute for the indicator to warm up and reset it to zero if applicable.
4. Remove the electrical cable from the shearing-stress sensor pin.
5. Turn off the digital load indicator.

CAUTION: MAKE SURE THAT THE SHEARING-STRESS SENSOR PIN IS CORRECTLY INSTALLED, AS FOLLOWS:

- THE ARROWS MARKED ON THE PIN BODY MUST BE ALIGNED WITH THE PCA PISTONS AND POINTING REARWARD.
- THE PIN MUST BE PUT TOTALLY INTO THE LUNGS, THUS THE PCA PISTON ROD END IS BETWEEN THE PIN GROOVES.

(b) Remove the cotter pins, nuts, washers, bushings and bolt that connect the PCA inboard piston end to the wing fitting (AMM TASK 27-12-01-000-801-A/400) (Figure 508).

(c) Install shearing-stress sensor pin with its bushings in the PCA inboard piston.

(d) Connect the digital load indicator to the shearing-stress sensor pin, installed in the PCA inboard piston.

(e) Turn on and set the digital load indicator to zero.

(f) Pressurize the hydraulic system (AMM TASK 29-10-00-860-801-A/200).

(g) Make sure that aileron systems 1 and system 2 are on.

NOTE: The AILERON SHUTOFF SYS 1 and AILERON SHUTOFF SYS 2 pushbutton lights, installed on the flight controls panel, on the overhead panel, are off.

(h) Make sure that the EICAS display does not show the AIL SYS 1-2 INOP caution message.

(i) After reading has stabilized, measure and write the value shown on the digital load indicator display.

1 The values must be less, in absolute value, than 2304.2 N (518 lbf). If not, replace the PCA (AMM TASK 27-12-01-000-801-A/400) and do this procedure again for the serviceable PCA.

2 Turn off the digital load indicator.

(j) Release the pressure from the hydraulic system (AMM TASK 29-10-00-860-801-A/200).

(k) Remove the shearing-stress sensor pin from the PCA piston end.

(l) Install the original fasteners (nuts, washers, bushings, and bolt) that connect the PCA piston end to the wing fitting. Install new cotter pin (AMM TASK 27-12-01-400-801-A/400) (Figure 508).

(m) Do steps (b) thru (l) again for the PCA outboard piston.

(2) Do the procedure of item (1) again for the left aileron.

K. Follow-on

SUBTASK 842-003-A

(1) De-energize the aircraft (AMM TASK 20-40-01-860-801-A/200).

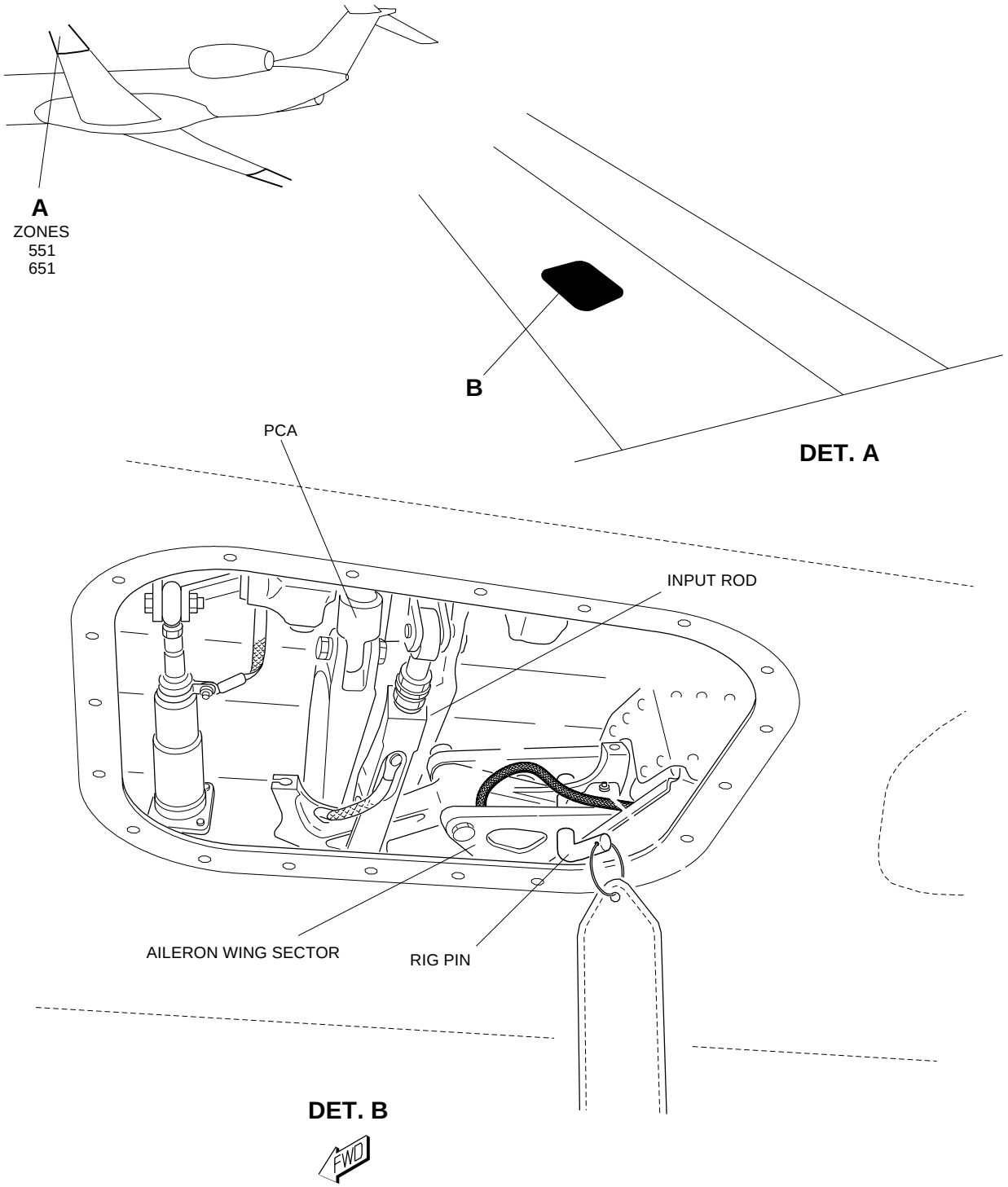
(2) Remove the rig pin to the aileron wing sector (Figure 506).

(3) Install access doors 551CB and 651CB (AMM MPP 06-44-00/100).

EFFECTIVITY: ON AIRCRAFT POST-MOD SB 145-27-0062

Rig Pin - Installation

Figure 506



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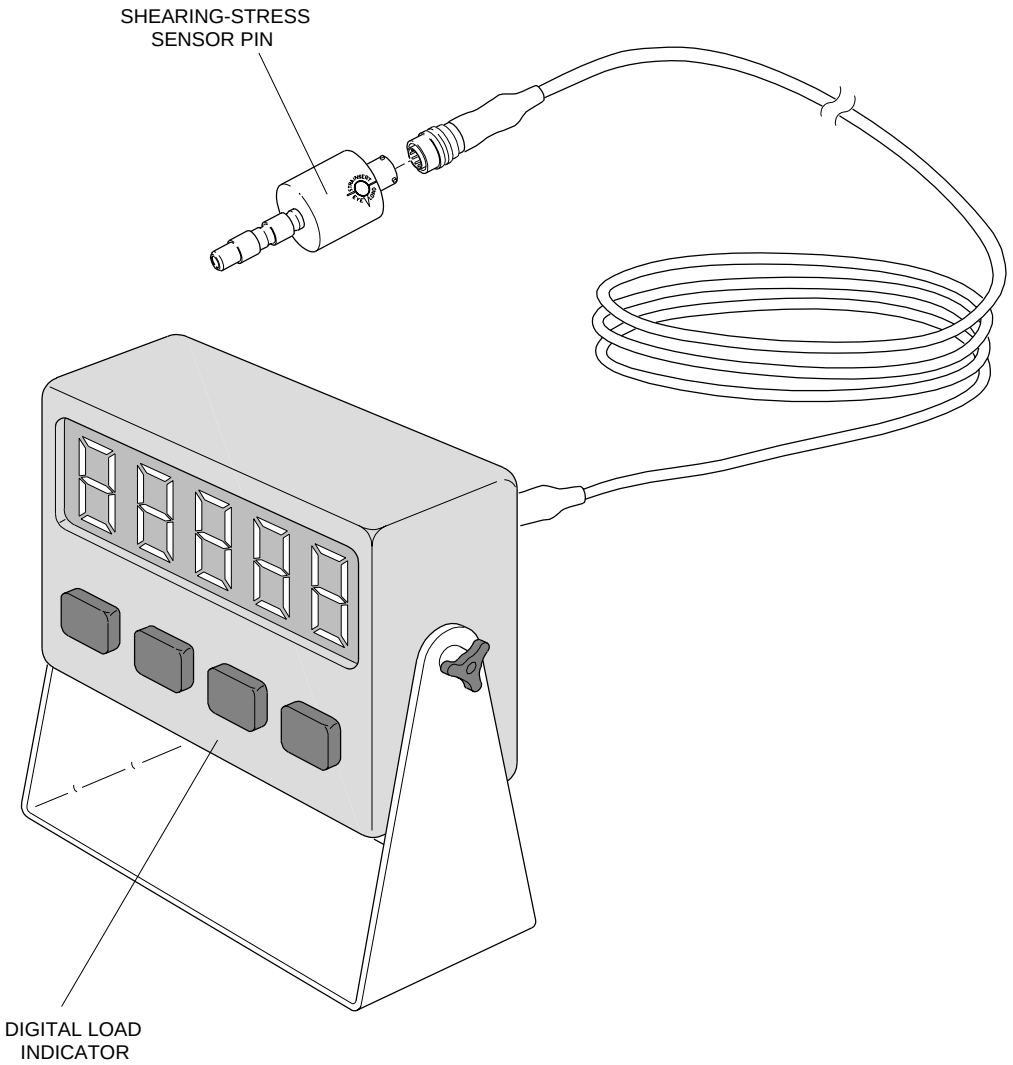
EFFECTIVITY: ON AIRCRAFT POST-MOD SB 145-27-0062
GSE 215 - Adjustment
Figure 507



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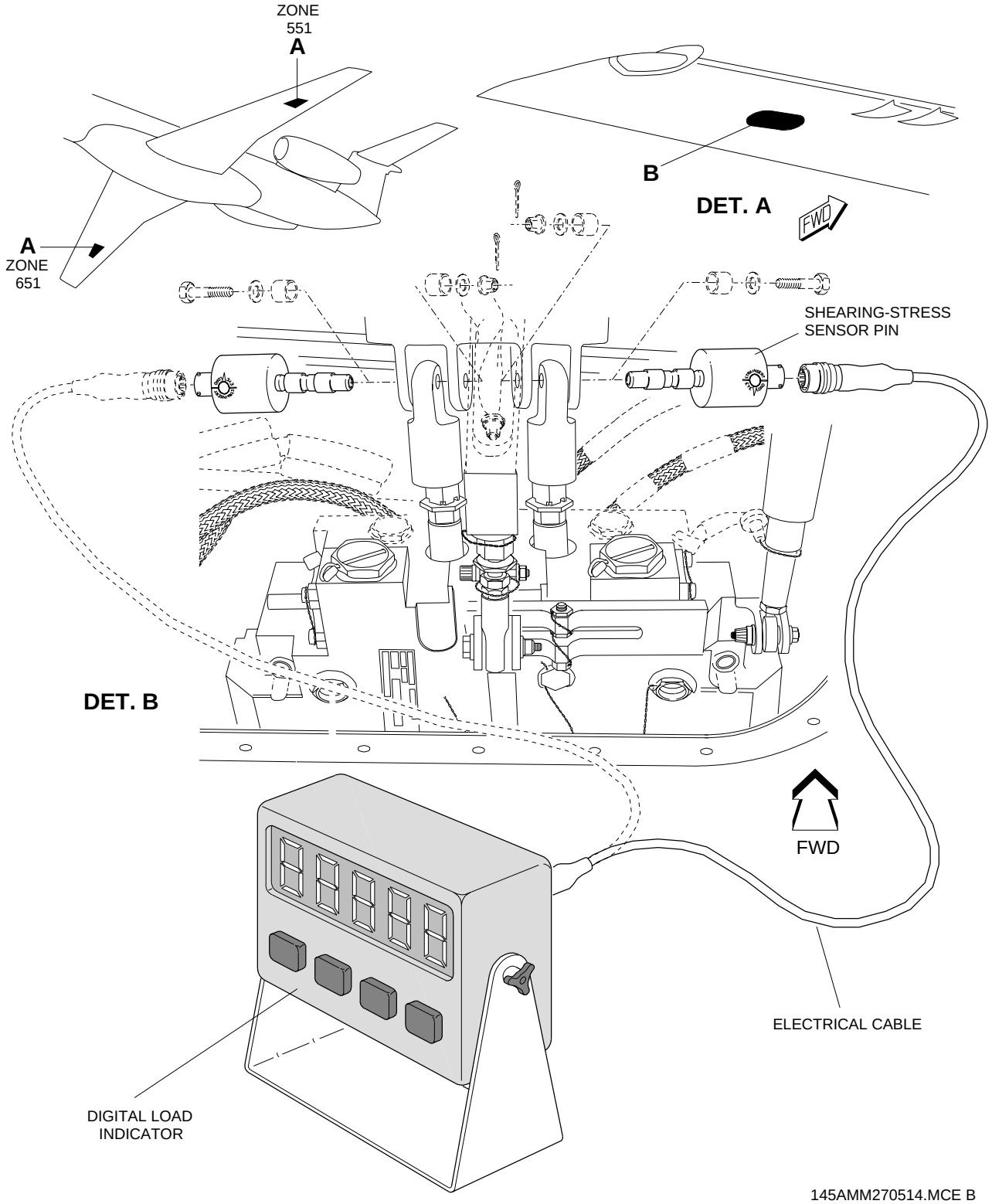
EFFECTIVITY: ON AIRCRAFT POST-MOD SB 145-27-0062
GSE 215 - Installation
Figure 508



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