AILERON CONTROL CABLES - ADJUSTMENT/TEST

EFFECTIVITY: ACFT MODEL(S) EMB-135

1. General

A. This section gives the procedures to do the check and adjustment of the aileron control cables tension and aileron autopilot-servo cables tension.

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*
27-11-01-700-801-A	TENSION OF AILERON CONTROL CABLES - FUNCTIONAL CHECK	ACFT MODEL(S) EMB-135
27-11-01-700-802-A	AILERON AUTOPILOT-SERVO CABLES TENSION - FUNCTIONAL CHECK AND ADJUSTMENT	ACFT MODEL(S) EMB-135

TASK 27-11-01-700-801-A
EFFECTIVITY: ACFT MODEL(S) EMB-135

2. TENSION OF AILERON CONTROL CABLES - FUNCTIONAL CHECK

A. General

(1) This task gives the procedures to do the check of the tension of the aileron control cables.

(2) Figure 501 shows the rig pin locations.

(3) Figure 502 shows the Aileron Control Cables in the Forward Fuselage.

(4) Figure 503 gives the load x temperature graph.

B. References

REFERENCE	*DESIGNATION*
AMM MPP 06-41-01/100	-
AMM MPP 06-41-02/100	-
AMM MPP 06-44-00/100	- COMPONENT LOCATION
AMM TASK 25-11-01-000-801-A/400	PILOT SEAT - REMOVAL
AMM TASK 25-11-01-400-801-A/400	PILOT SEAT - INSTALLATION
AMM TASK 25-21-01-000-801-A/400	-
AMM TASK 25-21-01-400-801-A/400	-
AMM TASK 28-41-00-200-801-A/600	-
IPC 27-11-00	AILERON PRIMARY MECHANICAL CONTROL

C. Zones and Accesses

ZONE	*PANEL/DOOR*	*LOCATION*
123	123BL	Below the cockpit floor
221	221GF	Cockpit
221	221EF	Cockpit
222	222FF	Cockpit
241	241DF	Passenger cabin - LH
251	251BF	Passenger cabin - LH
251	251AF	Passenger cabin - LH
252	252AF	Passenger cabin - RH
551	551CB	Left wing
651	651CB	Right wing

D. Tools and Equipment

ITEM	*DESCRIPTION*	*PURPOSE*	*QTY*
GSE 058	Rig Pin Kit	To keep the aileron and elevator surface and the control column locked at the neutral position	

(Continued)

ITEM	DESCRIPTION	PURPOSE	QTY
GSE 074	Tensiometer	To measure the loads	
Commercially available	Thermometer	To measure the temperature	
GSE 380	Clip - Tension Adj, Control Cable	To prevent twist of the control cable during adjustment	

E. Auxiliary Items

Not Applicable

F. Consumable Materials

Not Applicable

G. Expendable Parts

ITEM	IPC REFERENCE (VENDOR REFERENCE)	QTY
Locking clip	IPC 27-11-00	AR

H. Persons Recommended

QTY	FUNCTION	PLACE
1	Does the task	Fuselage and wings
1	Helps the other technician	Fuselage and wings

I. Preparation

SUBTASK 841-018-C

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

(2) Do not do other tasks on the aileron systems.

(3) Remove the pilot seats AMM TASK 25-11-01-000-801-A/400 to get access to the aileron control cables that connect the control yoke to the aileron torque tube (forward torque tube).

(4) Remove the lens of the landing lights of the LH and RH wing inboard leading-edges get access to the aileron control cables in the wing.

(5) Remove the passenger seats (refer to AMM TASK 25-21-01-000-801-A/400) as necessary in order to get access to the floor panels listed below (AMM MPP 06-41-02/100):

(a) 221GF to get access to the aileron torque tube and autopilot-servo cables.

(b) 241DF and 251BF to get access to the aileron control cables in the fuselage.

(c) 221EF and 222FF to get access to the aileron control cables that connect the control yoke to the aileron torque tube (forward torque tube).

(6) Remove access doors 251AF and 252AF to get access to the turnbuckle of the aileron control cables in the fuselage.

(7) Remove access doors 551CB and 651CB (AMM MPP 06-44-00/100) to get access to the wing aileron sectors.

(8) Remove the floor panels listed below (AMM MPP 06-41-02/100):

- 221GF to get access to the aileron torque tube and autopilot-servo cables.
- 241DF and 251BF to get access to the aileron control cables in the fuselage.
- 221EF and 222FF to get access to the aileron control cables that connect the control yoke to the aileron torque tube (forward torque tube).

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

(10) Install the rig pins (GSE 058) to the control yoke, aileron torque tube, elevator torque tube, aileron fuselage sector and aileron wing sector. Refer to Figure 501.

NOTE: Make sure that the rig pins moves freely.

J. Functionally Check of Aileron Control Cables Tension (Figure 501)

SUBTASK 720-030-C

CAUTION:
- DO NOT OPERATE THE AILERON SYSTEM WITH THE RIG PINS INSTALLED. IF YOU DO, THE RIGGING HOLES/PINS WILL BE DAMAGED.
- TURN THE BARREL OF THE TURNBUCKLE TO APPLY TENSION TO THE CONTROL CABLE. DO NOT TURN THE CONTROL CABLE TO TENSION IT.

(1) Measure the temperature on the 5/32-inch control cables that connect the control yoke to the aileron torque tube (forward torque tube).

NOTE:
- You must adjust the aileron control cables with the aircraft parked for a minimum of one hour in the hangar.
- To measure the temperature, you must put the thermometer near the control cable circuit. Let the thermometer stay in position for a minimum of 5 minutes, until the temperature becomes stable.

(2) Use the Graph of Figure 503 to get the load value related to the temperature, and check the tension value of the Aileron Control Cable.

NOTE: The tolerance for the tension of the aileron control cables is ± 5 lbf (± 2.3 kgf).

(3) If the value of tension of the aileron control cable is out of the tolerance go to SUBTASK 720-031-C step (3) or (4) as applicable.

(4) Do steps (1) thru (3) again for the 1/8-inch control cables at the fuselage and wings sector.

(5) If both 5/32 and 1/8 control cables are within tolerance, go to Follow-On (SUBTASK 842-018-C)

K. Adjustment of the Aileron Control Cables Tension (Figure 502)

SUBTASK 720-031-C

CAUTION: • DO NOT OPERATE THE AILERON SYSTEM WITH THE RIG PINS INSTALLED. IF YOU DO, THE RIGGING HOLES/PINS WILL BE DAMAGED.

• TURN THE BARREL OF THE TURNBUCKLE TO APPLY TENSION TO THE CONTROL CABLE. DO NOT TURN THE CONTROL CABLE TO TENSION IT.

(1) Measure the temperature on the 5/32-inch control cables that connect the control yoke to the aileron torque tube (forward torque tube) and 1/8-inch control cables in the fuselage and wings.

NOTE: • You must adjust the aileron control cables with the aircraft parked for a minimum of one hour in the hangar.

• To measure the temperature, you must put the thermometer near the control cable circuit. Let the thermometer stay in position for a minimum of 5 minutes, until the temperature becomes stable.

(2) Remove and discard the locking clips from the turnbuckle (DET. C Figure 502).

(3) Settling-down check (Immediately after the replacement of an old cable with a new one only):

(a) Apply tension to the 5/32-inch control cables that connect the control yoke to the aileron torque tube, as follows:

1 Put a screwdriver on the chain to lock it and prevent torsion of the chain.

2 Use a pin or wire to turn the barrel and get a load 50% higher than the load related to the measured temperature. Refer to Figure 503.

(b) Apply tension to the 1/8-inch control cables in the fuselage and wings, as follows:

1 Install the GSE 380 (Figure 506) on the 1/8-inch control cable.

2 Apply to the new aileron 1/8-inch control cable circuit a load 50% higher than the load related to the measured temperature, refer to Figure 503.

(c) Remove the rig pins (GSE 058) from the control yoke, aileron torque tube, aileron fuselage sector and aileron wing sector. Refer to Figure 501.

(d) (ON AIRCRAFT WITH AILERON−CONTROL STAINLESS−STEEL CABLES) Do ten (10) full aileron command cycles (fully left - neutral - fully right - neutral - for each cycle).

NOTE: You can operate the aileron system in two modes: mechanical reversion or hydraulic power. Use the mode which is easier for you.

(e) (ON AIRCRAFT WITH AILERON−CONTROL CARBON−STEEL CABLES) Do twenty (20) full aileron command cycles (fully left - neutral - fully right - neutral - for each cycle).

NOTE: You must operate the aileron system in the mechanical reversion mode.

(f) Install the rig pins (GSE 058) on the control yoke, aileron torque tube, aileron fuselage sector and aileron wing sector. Refer to Figure 501.

NOTE: Make sure that the rig pins moves freely.

(g) (ON AIRCRAFT WITH AILERON−CONTROL STAINLESS−STEEL CABLES) With the aid of GSE 380 or with the pin and wire, as applicable, adjust the loads of the control cables to the value related to the measured temperature in step 1. Refer to the Graph in Figure 503, as necessary.

(h) (ON AIRCRAFT WITH AILERON−CONTROL CARBON−STEEL CABLES) Measure the tension of the 5/32-inch control cables that connect the control yoke to the aileron torque tube (forward torque tube) and 1/8-inch control cables in the fuselage and wings:

1 If you get the tension value 50% higher than the load related to the measured temperature given in the Graph Figure 503, keep the system under tension for a minimum of 24 hours.

2 If you do not get the tension value 50% higher than the load related to the measured temperature given in the Graph Figure 503, do steps (a) thru (h) again until you have the tension specified.

(i) Remove the rig pins (GSE 058) from the control yoke, aileron torque tube, aileron fuselage sector and aileron wing sector. Refer to Figure 501.

(j) (ON AIRCRAFT WITH AILERON−CONTROL STAINLESS−STEEL CABLES) Do ten (10) full aileron command cycles (fully left - neutral - fully right - neutral - for each cycle).

NOTE: You can operate the aileron system in two modes: mechanical reversion or hydraulic power. Use the mode which is easier for you.

(k) (ON AIRCRAFT WITH AILERON−CONTROL CARBON−STEEL CABLES) Do twenty (20) full aileron command cycles (fully left - neutral - fully right - neutral - for each cycle).

NOTE: You must operate the aileron system in the mechanical reversion mode.

(l) Install the rig pins (GSE 058) on the control yoke, aileron torque tube, aileron fuselage sector and aileron wing sector. Refer to Figure 501.

NOTE: Make sure that the rig pins moves freely.

(m) Measure the temperature on the 5/32-inch control cables that connect the control yoke to the aileron torque tube (forward torque tube) and 1/8-inch control cables in the fuselage and wings.

(n) (ON AIRCRAFT WITH AILERON−CONTROL CARBON−STEEL CABLES) With the aid of GSE 380 or with the pin and wire, as applicable, adjust the loads of the control cables to the value related to the measured temperature. Refer to the Graph in Figure 503, as necessary.

(o) (ON AIRCRAFT WITH AILERON−CONTROL STAINLESS−STEEL CABLES) Measure the tension of the 5/32-inch control cables that connect the control yoke to the aileron torque tube (forward torque tube) and 1/8-inch control cables in the fuselage and wings.

1 If you get the tension value given in the Graph Figure 503, install new locking clips to the turnbuckle.

NOTE: If necessary, use an inspection mirror to help you see the alignment between the barrel and the rod end.

2 If you do not get the specified value, do steps (f) thru (n) again until you have the tension specified.

(4) Apply tension to the aileron control cables as follows (for used cables only):

(a) Aileron 5/32-inch control cables that connect the control yoke to the aileron torque tube:

1 Put a screwdriver on the chain to lock it and to prevent torsion of the chain.

2 Use a pin or wire to turn the barrel and get the load related to the measured temperature. Refer to Figure 503.

(b) Aileron 1/8-inch control cables in the fuselage and wings:

1 Install GSE 380 (Figure 506) on the aileron control cable.

2 Apply to the aileron control cable the load related to the measured temperature. Refer to Figure 503.

(c) Remove the rig pins (GSE 058) from the control yoke, aileron torque tube, aileron fuselage sector and aileron wing sector. Refer to Figure 501.

(d) Do ten (10) full aileron command cycles (fully left - neutral - fully right - neutral - for each cycle).

NOTE: You can operate the aileron system in two modes: mechanical reversion or hydraulic power. Use the mode which is easier for you.

(e) Install the rig pins (GSE 058) on the control yoke, aileron torque tube, aileron fuselage sector and aileron wing sector. Refer to Figure 501.

NOTE: Make sure that the rig pins moves freely.

(f) Measure the tension of the 5/32-inch control cables that connect the control yoke to the aileron torque tube (forward torque tube) and 1/8-inch control cables in the fuselage and wings.

1 If you get the tension value given in the Graph Figure 503, install new locking clips to the turnbuckle.

NOTE: If necessary, use an inspection mirror to help you see the alignment between the barrel and the rod end.

2 If you do not get the specified value, do steps (a) thru (f) again until you have the tension specified.

L. Follow-on

SUBTASK 842-018-C

(1) Remove the rig pins (GSE 058) from the control yoke, aileron torque tube, aileron fuselage sector and aileron wing sector, and elevator torque tube. Refer to Figure 501.

(2) Do ten (10) full aileron command cycles (fully left - neutral - fully right - neutral - for each cycle).

NOTE: You can operate the aileron systems in two modes: mechanical reversion or hydraulic power. Use the mode which is easier for you.

(3) Install the lens to the landing lights of the LH and RH wing inboard leading-edges.

(4) Do an inspection on the fuel quantity indication harness (AMM TASK 28-41-00-200-801-A/600).

NOTE: The inspection of fuel quantity indication harness is part of Critical Design Configuration Control Limitations (CDCCL) in the Airworthiness Limitations of the Aircraft Maintenance Program.

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

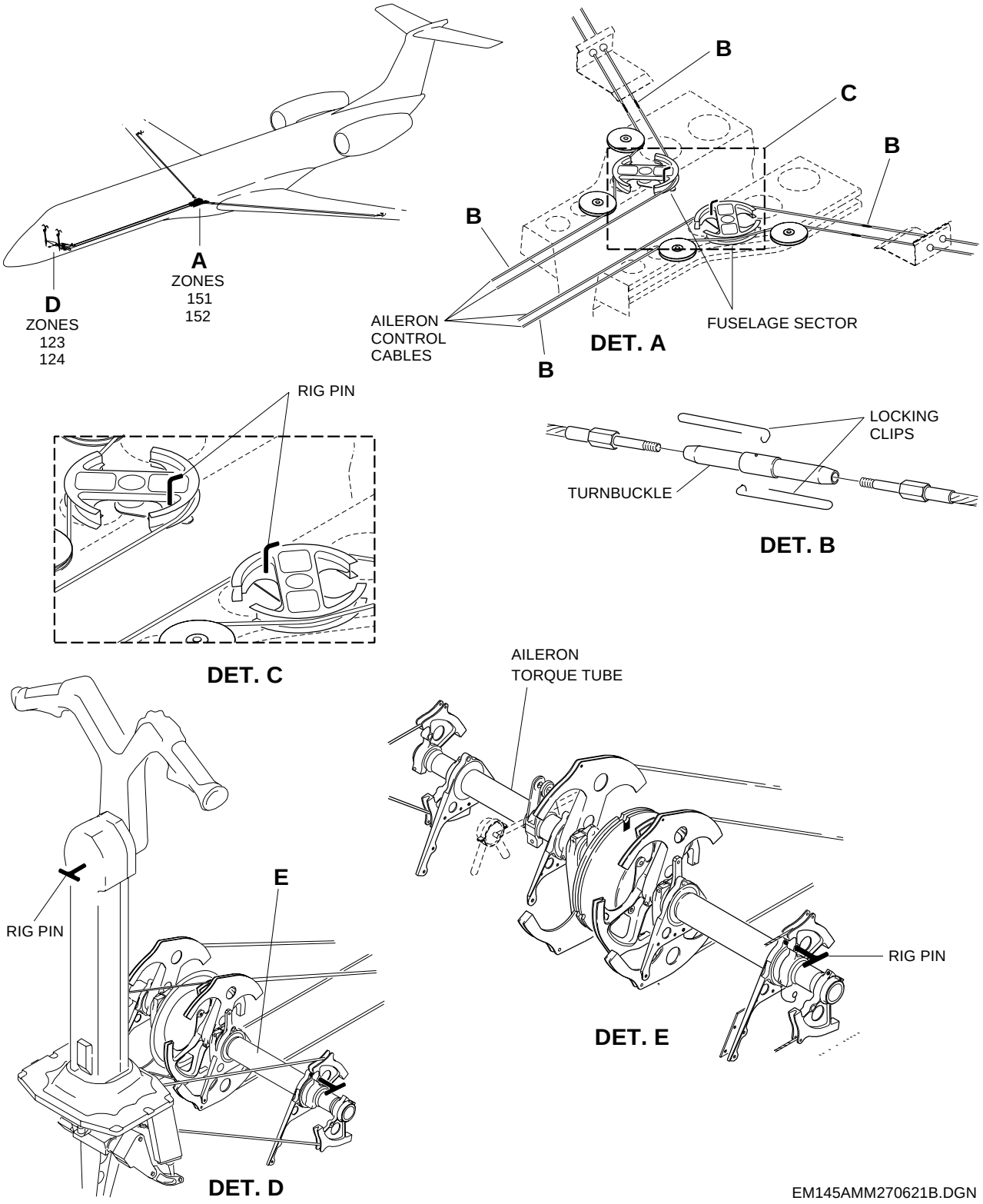
(6) Install the floor panels listed below, as applicable (AMM MPP 06-41-02/100):

- 123BL
- 221GF
- 221EF
- 222FF
- 241DF
- 251BF
- 251AF
- 252AF
- 551CB
- 651CB

(7) Install the passenger seat, as applicable. See AMM TASK 25-21-01-400-801-A/400.

(8) Install the pilot seat (AMM TASK 25-11-01-400-801-A/400) as applicable.

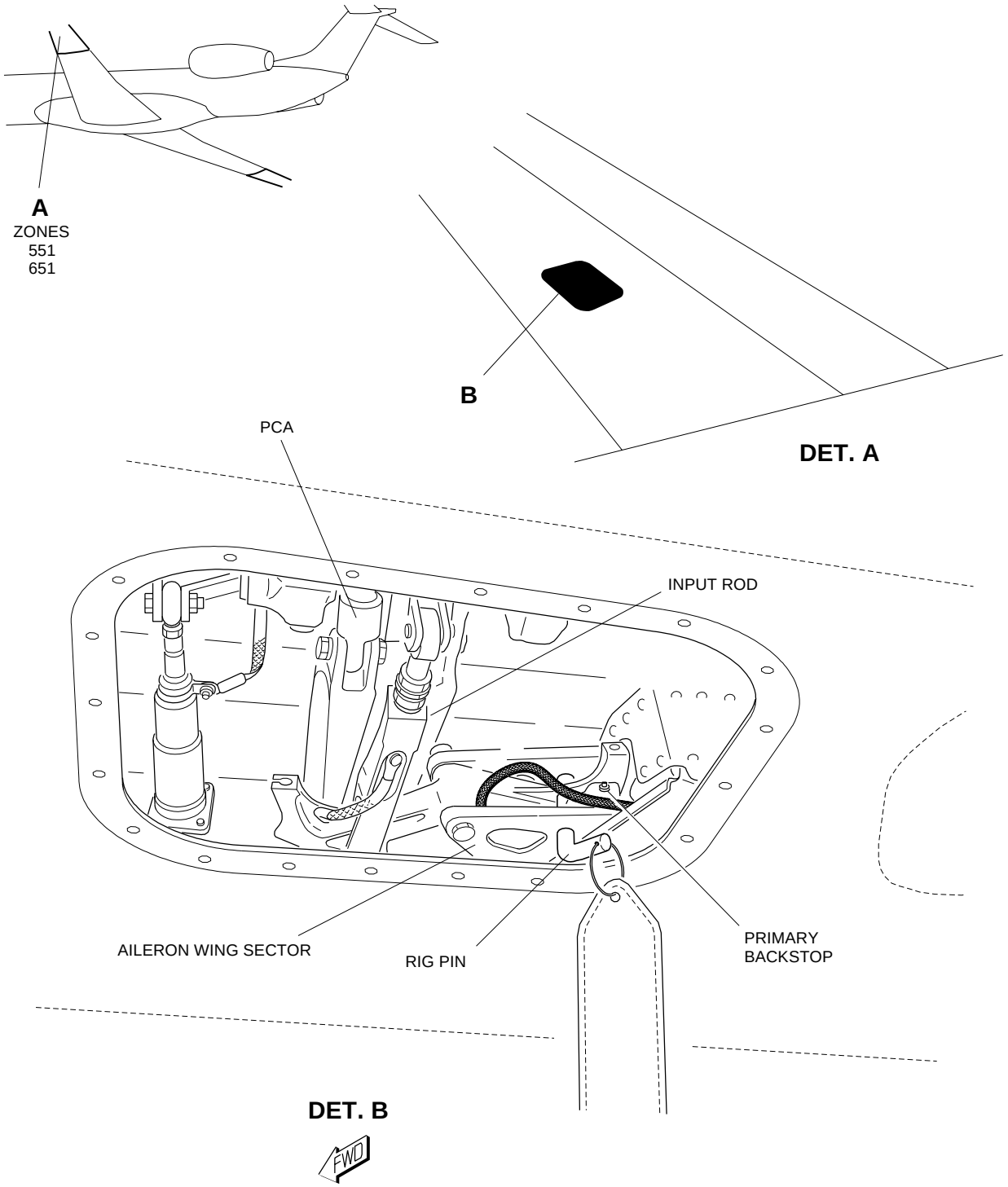
EFFECTIVITY: ACFT MODEL(S) EMB-135
Rig Pins Location
Figure 501 - Sheet 1



EFFECTIVITY: ACFT MODEL(S) EMB-135

Rig Pins Location

Figure 501 - Sheet 2



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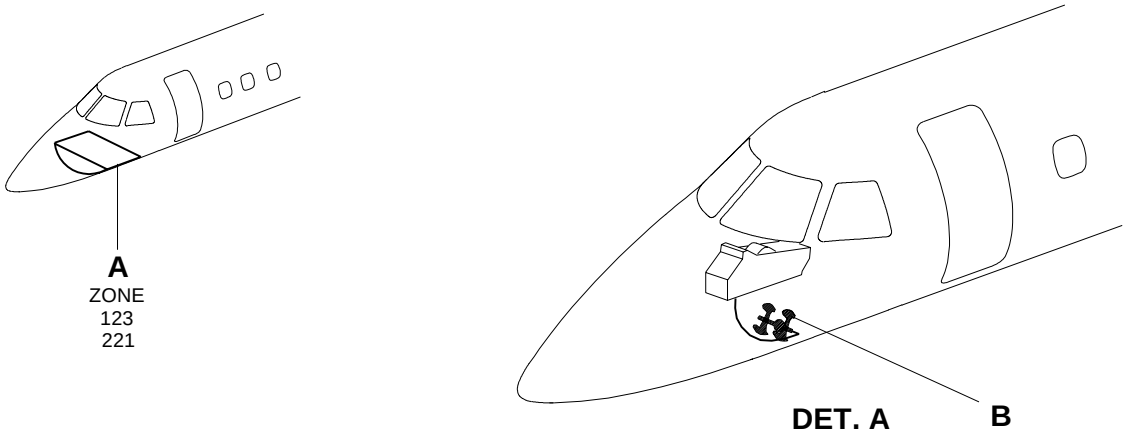
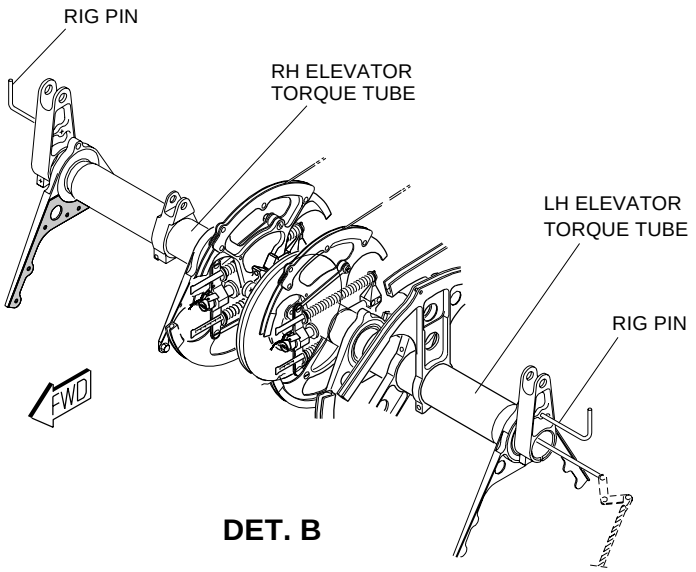
EFFECTIVITY: ACFT MODEL(S) EMB-135

Rig Pins Location

Figure 501 - Sheet 3





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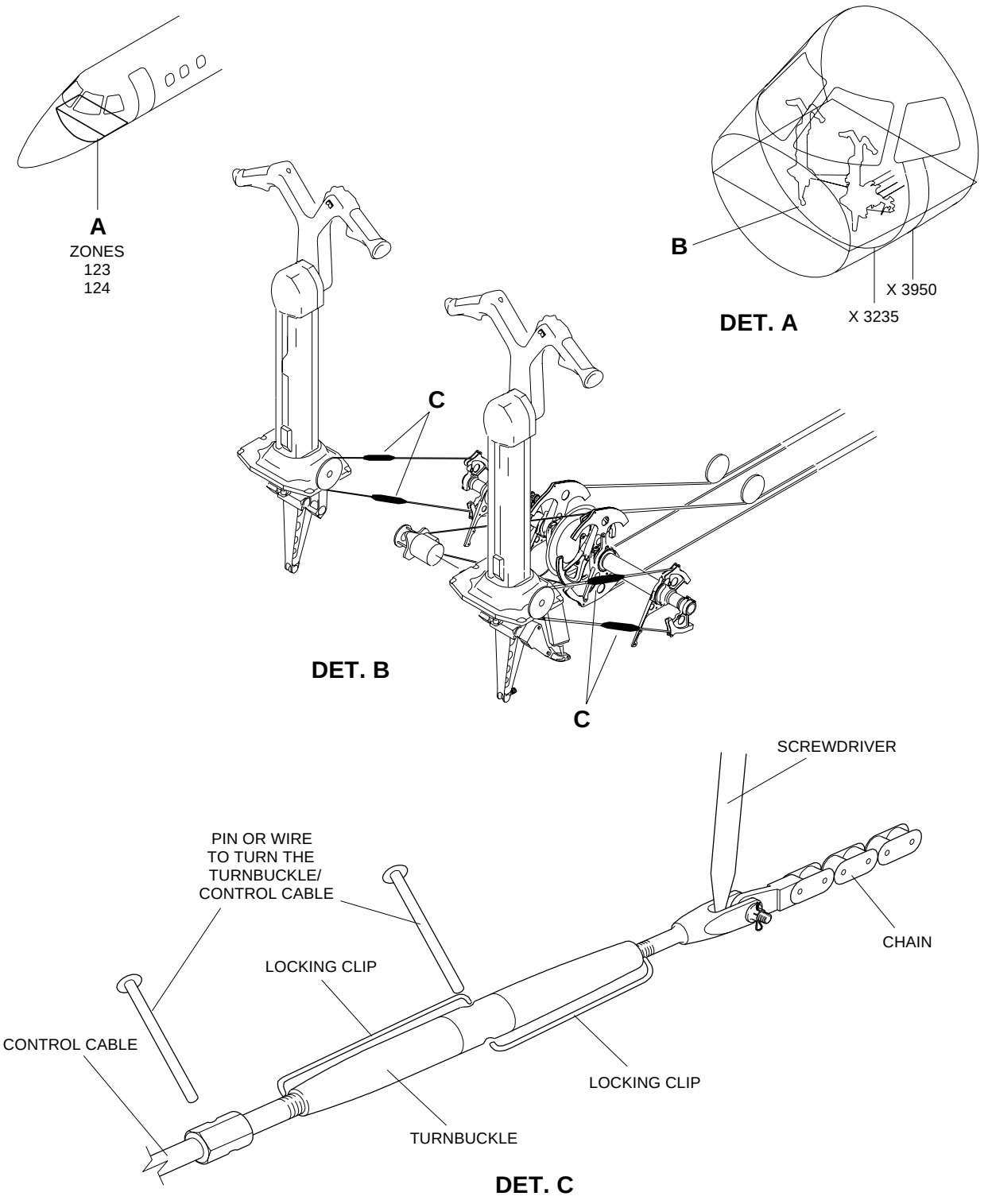
EFFECTIVITY: ACFT MODEL(S) EMB-135

Aileron Control Cables in the Forward Fuselage - Location
Figure 502



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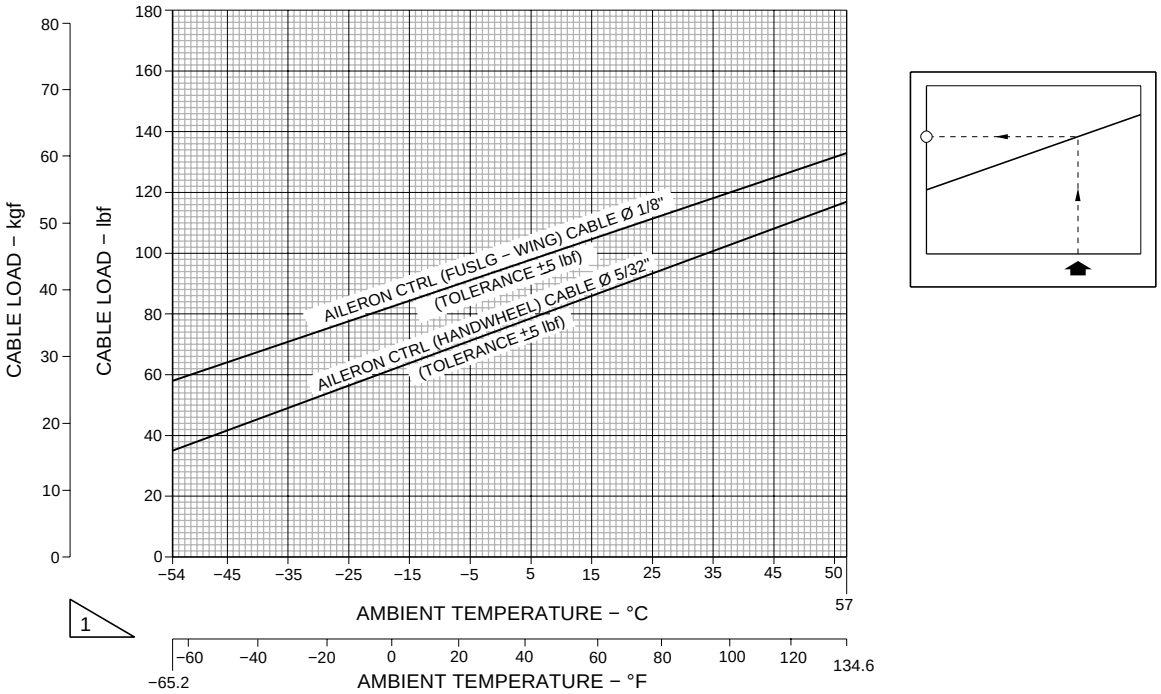
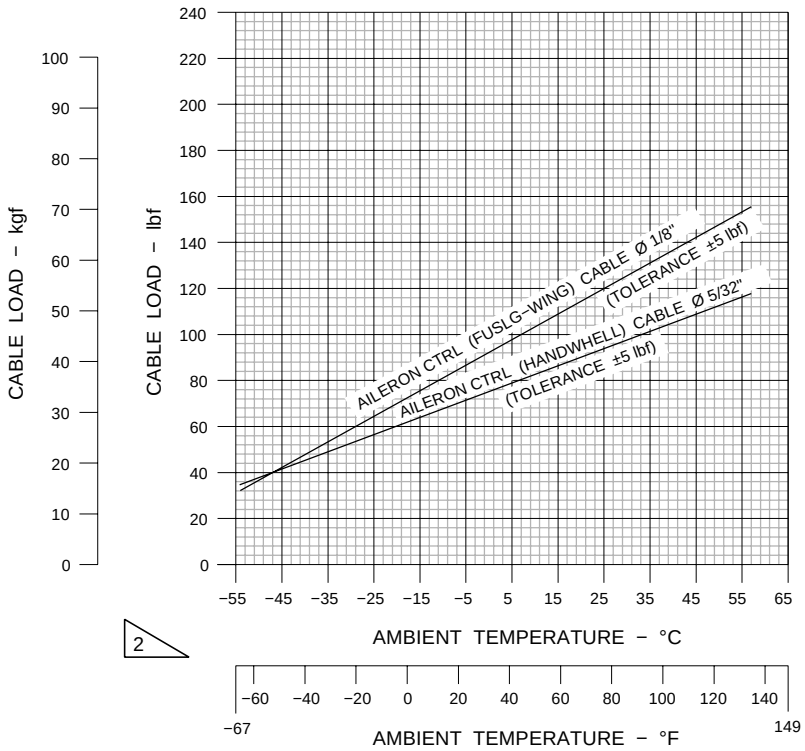
EFFECTIVITY: ACFT MODEL(S) EMB-135

Load x Temperature for Aileron Control Cable Tension - Graph
Figure 503





1 ON AIRCRAFT WITH AILERON−CONTROL STAINLESS−STEEL CABLES.

2 ON AIRCRAFT WITH AILERON−CONTROL CARBON−STEEL CABLES.

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TASK 27-11-01-700-802-A
EFFECTIVITY: ACFT MODEL(S) EMB-135

3. AILERON AUTOPILOT-SERVO CABLES TENSION - FUNCTIONAL CHECK AND ADJUSTMENT

A. General

(1) This task gives the procedures to do the check of the tension of the aileron autopilot-servo cables.

(2) Figure 504 shows the location of the Aileron autopilot-servo cables.

(3) Figure 505 gives the load x temperature graph.

B. References

REFERENCE	*DESIGNATION*
AMM MPP 06-41-02/100	-
AMM MPP 06-44-00/100	- COMPONENT LOCATION
AMM TASK 28-41-00-200-801-A/600	-
IPC 22-10-03	AILERON SERVO

C. Zones and Accesses

ZONE	*PANEL/DOOR*	*LOCATION*
221	221GF	Cockpit

D. Tools and Equipment

ITEM	*DESCRIPTION*	*PURPOSE*	*QTY*
GSE 058	Rig Pin Kit	To lock the aileron system in the neutral position	
GSE 074	Tensiometer	To measure the loads	
Commercially available	Thermometer	To measure the temperature	
GSE 380	Clip - Tension Adj, Control Cable	To prevent twist of the control cable during adjustment	

E. Auxiliary Items

Not Applicable

F. Consumable Materials

Not Applicable

G. Expendable Parts

ITEM	*IPC REFERENCE (VENDOR REFERENCE)*	*QTY*
Locking clip	IPC 22-10-03	4

H. Persons Recommended

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

I. Preparation

SUBTASK 841-019-B

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

(2) Do not do other tasks on the aileron systems.

(3) Remove floor panels 221GF (AMM MPP 06-44-00/100).

J. Tension of the Aileron Autopilot-servo Cables (Figure 504) (Figure 505) (Figure 506)

SUBTASK 720-032-B

CAUTION:
- DO NOT OPERATE THE AILERON SYSTEM WITH THE RIG PINS INSTALLED. IF YOU DO, THE RIGGING HOLES/PINS WILL BE DAMAGED.
- TURN THE BARREL OF THE TURNBUCKLE TO APPLY TENSION TO THE CONTROL CABLE. DO NOT TURN THE CONTROL CABLE TO TENSION IT.

(1) Install the rig pins to the aileron torque tubes (forward torque tube) (Figure 504).

(2) Measure the temperature on 3/32-inch aileron autopilot-servo control cables.

NOTE:
- You must adjust the aileron autopilot-servo cables with the aircraft parked for a minimum of one hour in the hangar.
- To measure the temperature, you must put the thermometer near the aileron autopilot-servo cables. Let the thermometer stay in position for a minimum of 5 minutes, until the temperature becomes stable.

(3) Use the graph of Figure 506 to get the load value related to the temperature.

NOTE: The tolerance for the tension of the aileron autopilot-servo cables is ± 5 lbf (± 2.3 kgf).

(4) Apply tension to the aileron autopilot-servo control cables as follows:

(a) Remove and discard the locking clips from the turnbuckle (DET. C Figure 505).

(b) Use a pin or wire to turn the barrel and get the specified tension.

(c) Remove the rig pins from the aileron torque tubes. See Figure 504

(d) Do ten (10) full aileron command cycles (fully left - neutral - fully right - neutral - for each cycle).

NOTE: You can operate the aileron system in two modes: mechanical reversion or hydraulic power. Use the mode which is easier for you.

(e) With the aid of GSE 380 (Figure 506), adjust the load of the autopilot-servo control cables to the value related to the measured temperature in step 2.

(f) When you get the tension value according to the Graph Figure 506, install new locking clips on the turnbuckle.

NOTE: If necessary, use an inspection mirror to help you see the alignment between barrel and rod end.

(g) If you do not get the specified value, do steps (a) thru (g) again until you have the tension specified:

K. Follow-on

SUBTASK 842-019-B

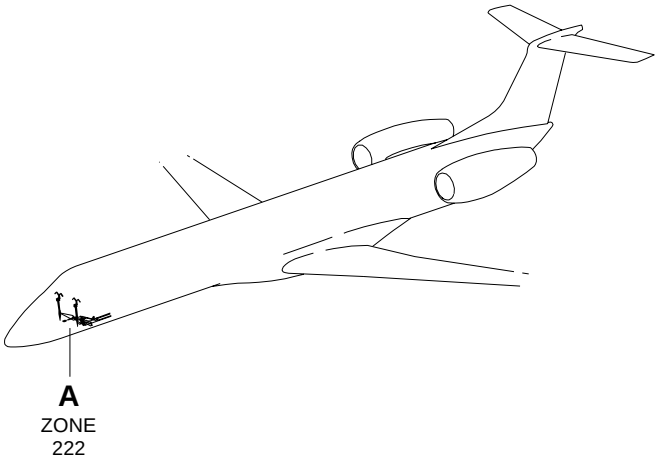
(1) Do an inspection on the fuel quantity indication harness (AMM TASK 28-41-00-200-801-A/600).

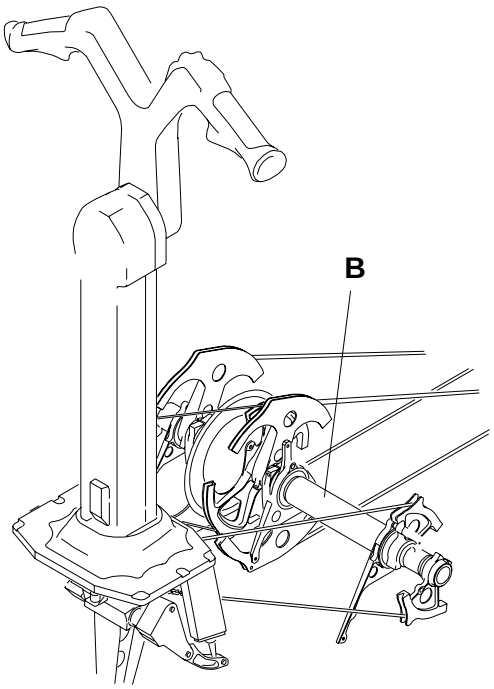
NOTE: The inspection of fuel quantity indication harness is part of Critical Design Configuration Control Limitations (CDCCL) in the Airworthiness Limitations of the Aircraft Maintenance Program.

(2) Install floor panel 221GF (AMM MPP 06-41-02/100).

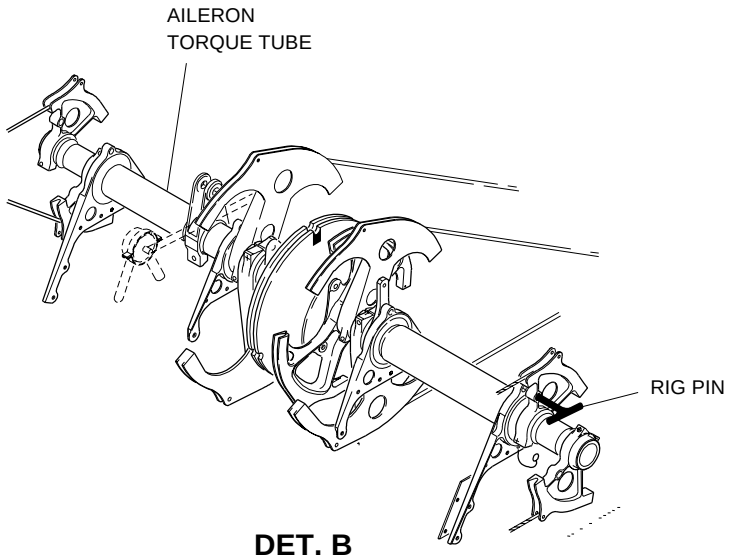
EFFECTIVITY: ACFT MODEL(S) EMB-135

Rig Pins Location
Figure 504





DET. A



DET. B

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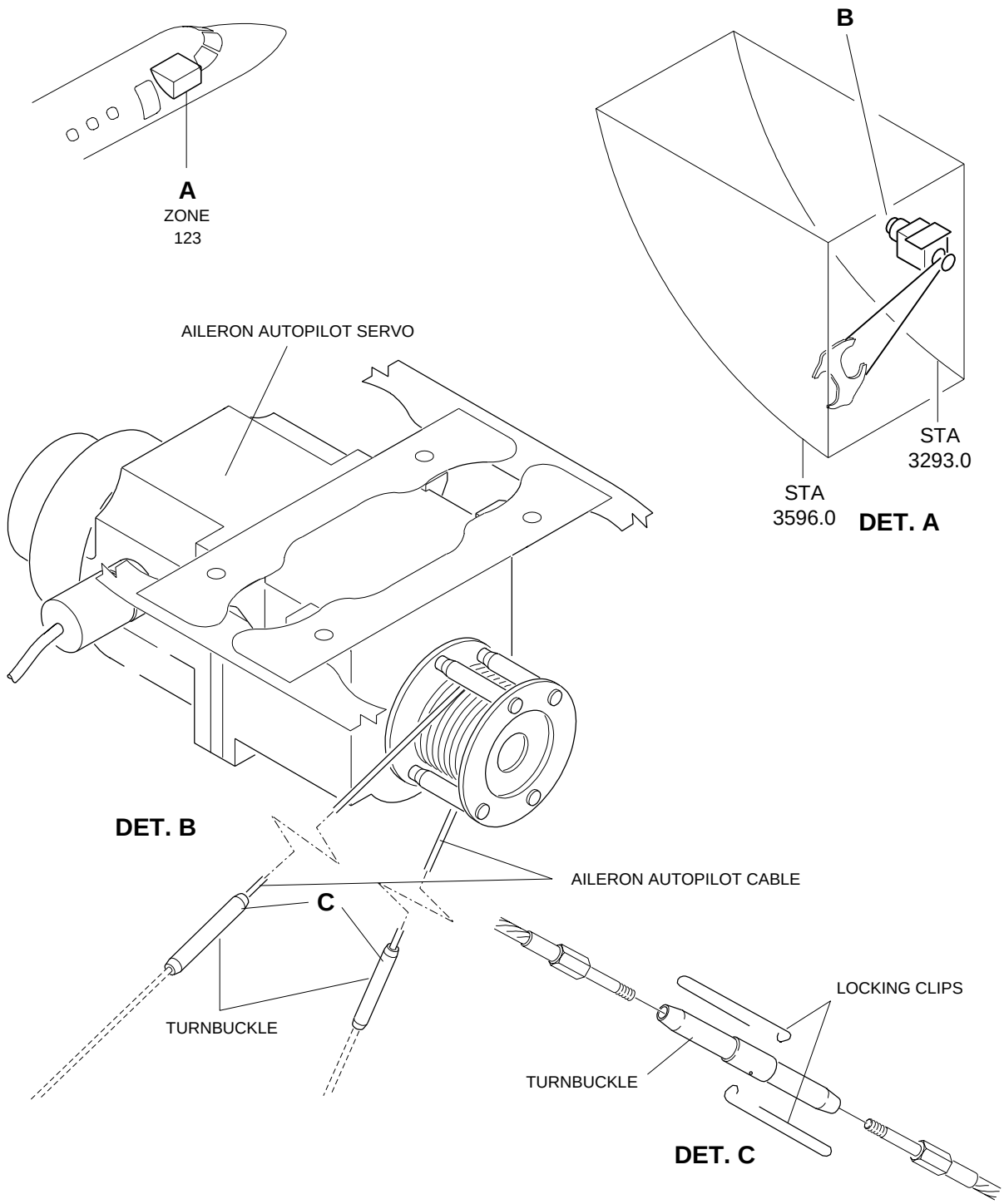
EFFECTIVITY: ACFT MODEL(S) EMB-135
Aileron Autopilot-servo Cables - Location
Figure 505



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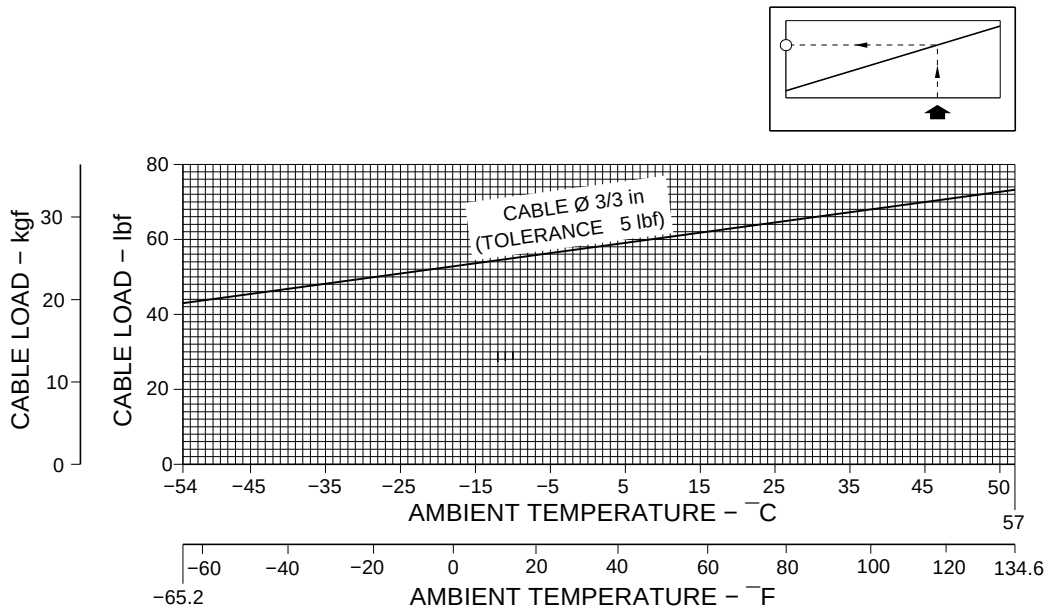
EFFECTIVITY: ACFT MODEL(S) EMB-135

Load x Temperature for Aileron Autopilot-Servo Cables Tension - Graph
Figure 506



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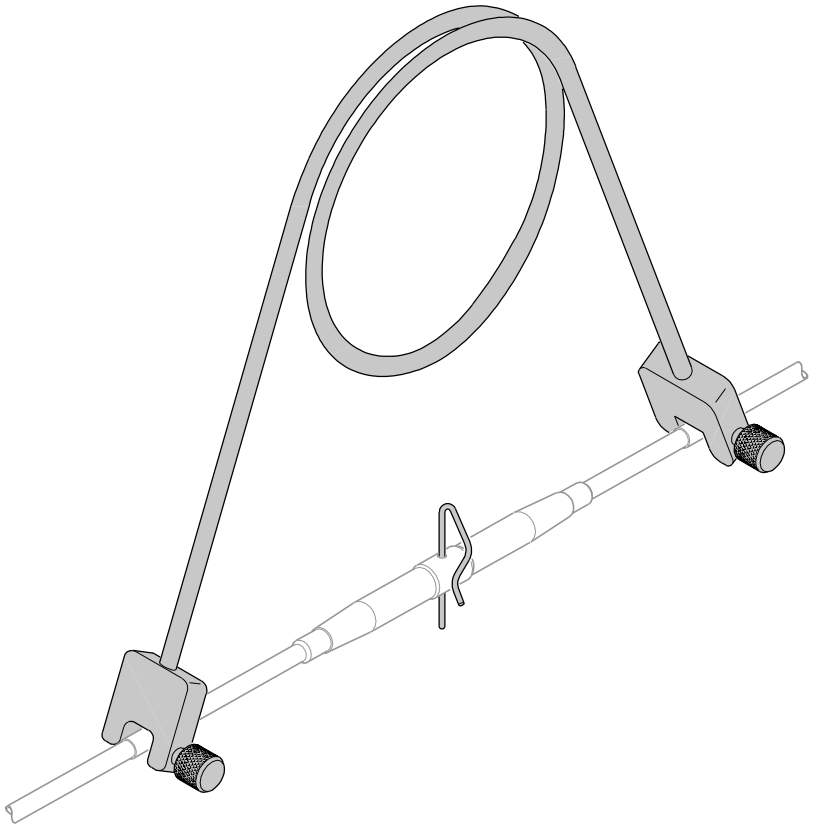
EFFECTIVITY: ACFT MODEL(S) EMB-135
GSE 380 - Clip - Tension Adj, Control Cable
Figure 507



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