ELEVATOR CONTROL CABLES - ADJUSTMENT/TEST

EFFECTIVITY: ALL

1. General

A. This section gives the procedures to do:

- The adjustment of the scale of the tension regulator.
- The adjustment of the elevator position.
- The check of the tension of the elevator autopilot-servo cables.

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*
27-31-01-700-801-A ♦	TENSION OF THE ELEVATOR CONTROL CABLES - FUNCTIONAL CHECK	ALL
27-31-01-700-802-A	TENSION OF THE ELEVATOR AUTOPILOT-SERVO CABLES	ALL

TASK 27-31-01-700-801-A
EFFECTIVITY: ALL

2. TENSION OF THE ELEVATOR CONTROL CABLES - FUNCTIONAL CHECK

A. General

(1) This task gives the procedures to do the adjustment of the scale of the tension regulator and of the elevator position and the procedures to adjust the tension of the elevator control cables.

(2) The elevator system includes two tension regulators that do the adjustment of the tension of the control cables automatically.

(3) Figure 502 shows the graph of the Tension Regulator Scale Position x Temperature for elevator-control stainless-steel or carbon-steel cables.

(4) Figure 506 gives the load x temperature graph for elevator-control stainless-steel or carbon-steel cables tension.

B. References

REFERENCE	*DESIGNATION*
AMM MPP 06-41-01/100	-
AMM MPP 06-41-02/100	-
AMM TASK 25-27-02-000-801-A/400	-
AMM TASK 25-27-02-400-801-A/400	-
IPC 27-31-00	ELEVATOR PRIMARY MECHANICAL CONTROL
S.B.145-27-0064	-

C. Zones and Accesses

ZONE	*PANEL/DOOR*	*LOCATION*
123	123BL	Area below cockpit floor
261	261BF	Passenger cabin
251	251HF	Passenger cabin
251	251JF	Passenger cabin

D. Tools and Equipment

ITEM	*DESCRIPTION*	*PURPOSE*	*QTY*
GSE 036	Hydraulic Platform	To get access to the elevator surfaces	
GSE 044	Headset, Ramp	For communications	
GSE 058	Rig Pin Kit	To lock the elevator system in the neutral position	
GSE 070	Digital Protractor	To measure the elevator deflections	
GSE 074	Tensiometer	To measure the tensions	
Commercially available	Thermometer	To measure the temperature	

(Continued)

ITEM	DESCRIPTION	PURPOSE	QTY
GSE 380	Clip - Tension Adj, Control Cable	To prevent the 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 27-31-00	AR

H. Persons Recommended

QTY	FUNCTION	PLACE
1	Does the task	Fuselage
1	Helps the other technician	Elevator

I. Preparation

SUBTASK 841-002-A

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

(2) Do not do other tasks on the elevator system.

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

(4) If it is necessary to adjust the elevator control cables, remove the cover of the FWD Cargo-Compartment Partition (AMM TASK 25-27-02-000-801-A/400).

(5) If it is necessary to adjust the elevator control cables, remove floor panels as follows:

(a) For 145 aircraft model, remove the floor panel 261BF(AMM MPP 06-41-02/100)

(b) For 140 aircraft model, remove the floor panels 261BF and 251JF (AMM MPP 06-41-02/100)

(c) For 135 aircraft model, remove the floor panel 251HF (AMM MPP 06-41-02/100)

J. Functionally Check Tension of Elevator Control Cables

SUBTASK 720-002-A

CAUTION: • DO NOT OPERATE THE ELEVATOR SYSTEM WITH THE RIG PINS INSTALLED TO PREVENT DAMAGE TO THE RIGGING HOLES/PINS.

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

(1) Do this step to adjust the elevator control cables for aircraft POST-MOD S.B. 145-27-0064.

(a) Measure the temperature in the fuselage. Write the value in table 501.

NOTE:
- You must adjust the elevator 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. Leave the thermometer in place for a minimum of 5 minutes, until the temperature becomes stable.

Table 501 - FUSELAGE TEMPERATURE AND LIMITS OF THE TENSION REGULATOR SCALE

Fuselage Temperature °C (°F)	Limit of the scale	
	minimum	maximum

(b) Do ten (10) full elevator command cycles (fully forward - neutral - fully backward - neutral).

(c) Install rig pins at the elevator torque tube. See Figure 501.

(d) Do a check of the position of the scale of the tension regulator and for misalignment of the elevator surface.

1 Do a check of the position of the scale of the left tension regulators. See Figure 504.

- This position must agree with the graph of Figure 502.

NOTE: Read one scale only on the left tension regulator. Use the easier-to-read scale.

2 Do this procedure for the left elevator surface to make sure that its misalignment is of 0.0 ± 0.5 degrees.

a Install the rig pin at the rear sector. See Figure 501.

b Install the digital protractor in the left elevator. Use double-face adhesive tape. See Figure 503.

c Set the digital protractor to zero.

d Remove the rig pin from the rear sector.

e Make sure that you get the 0.0 ± 0.5-degree indication in the digital protractor.

3 Do steps (i) thru (q) to adjust the elevator control cables if one or two of the conditions listed below occurs:

- If the position of the left tension regulator does not agree with the graph of Figure 502.

- If the misalignment is not of 0.0 ± 0.5 degrees.

(e) Do step (d) again for the right elevator surface to do a check of the position of the scale of the right tension regulator and for misalignment of the right elevator surface.

(f) With the rig pin removed from the rear sector, do a check of the tension of the four control cables of the elevator control cable circuits.

- The tension must be of 40.0 lbf to 62.5 lbf (19.3 kgf to 27.2 kgf).
- The internal cables of the two circuits must be tensioned to 0 to 5 lbf (2.3 kgf) more than the external cables of the two circuits.

(g) This task is completed if:

- The position of the scale of the both tension regulators agree with the graph of Figure 502.
- The misalignment of the both elevator surfaces is of 0.0 ± 0.5 degrees as in step (d).
- The tension of the four control cables is 40.0 lbf to 62.5 lbf (19.3 kgf to 27.2 kgf).

(h) Do step (i) thru (q) to adjust the elevator control cables if:

- The position of the scale of one tension regulator does not agree with the graph of Figure 502. Adjust the related control cable circuit.
- The position of the scale of the two tension regulators do not agree with the graph of Figure 502. Adjust the two control cable circuits.
- The misalignment of one elevator is not of 0.0 ± 0.5 degrees as in step (d). Adjust the related control cable circuit.
- The misalignment of the two elevators is not of 0.0 ± 0.5 degrees as in step (d). Adjust the two control cable circuits.

(i) Remove and discard the locking clips from the turnbuckles of the elevator control cables. See Figure 505.

(j) Install the rig pins at the rear sectors.

(k) Install the digital protractor in the elevator. Use double-face adhesive tape. See Figure 503.

(l) Set the digital protractor to zero.

(m) Remove the rig pin from the rear sector.

(n) With the aid of GSE 380 (Figure 509), adjust the elevator control cables to get these two conditions:

- You must get the value on the scale of the tension regulator read in step (d).

- You must return the elevator surface to the aligned position (0.0 ± 0.5 degrees indication on the digital protractor).

NOTE:
- If you retract the turnbuckle of the inboard cable and extend the turnbuckle of the outboard one, you move the elevator trailing edge surface upward, and vice versa. See Figure 505.
- If you equally retract the turnbuckle of two cables of the same circuit, you increase the value on the scale of the Cable Tension Regulator without movement of the elevator surface, and vice versa.

(o) Install new locking clips to the turnbuckles of the elevator control cables. See Figure 505.

(p) While you do step (n), the adjustment of the elevator control cables may fail due to locking of the cable tension regulator. Do this procedure to get the two conditions of step (n), if you think that the cable tension regulator is locked:

1 Remove the digital protractor from the elevator surface.

2 Shake the elevator surface.

3 Install the rig pin at the rear sector.

4 Install the digital protractor in the same previous position.

5 Set the digital protractor to zero.

6 Remove the rig pin from the rear sector.

7 Do steps (n) and (o) to adjust the elevator control cables.

(q) With the rig pin removed from the rear sector, do a check of the tension of the four control cables.

- The tension must be of 40.0 lbf to 62.5 lbf (19.3 kgf to 27.2 kgf).
- The internal cables of the two circuits must be tensioned to 0 to 5 lbf (2.3 kgf) more than the external cables of the two circuits.

(2) Do this step to adjust the elevator control cables for aircraft PRE-MOD S.B. 145-27-0064.

(a) Measure the temperature in the fuselage.

NOTE:
- You must adjust the elevator 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.

(b) Do ten (10) full elevator command cycles (fully forward - neutral - fully backward - neutral).

(c) Install rig pin at the elevator torque tube and at the rear sector. Refer to Figure 501.

(d) Measure the tension in the four control cables. Use the graph of Figure 506 to get the tension value related to the temperature.

- The tolerance for the tension of the elevator control cables is ± 5 lbf (± 2.3 kgf).
- Use approximately the same value (maximum difference of 2 lbf or 1 kgf) for the four cables.

(e) If necessary, do this procedure to adjust the tension of the cables to get these two conditions.

1 Remove and discard the locking clips from the turnbuckles of the elevator control cables. See Figure 505.

2 With the aid of GSE 380 (Figure 509), turn the barrel of the turnbuckle to apply tension to the control cable. Do not turn the control cable to tension it.

3 Install new locking clips to the turnbuckles of the elevator control cables. See Figure 505.

(f) Do this procedure for the left elevator surface to make sure that its misalignment is of 0.0 ± 0.5 degrees.

1 Make sure that the rig pin of the rear sector is installed (Figure 501).

2 Install the digital protractor at the left elevator. Use double-face adhesive tape. Refer to Figure 503.

3 Set the digital protractor to zero.

4 Remove the rig pin from the rear sector.

5 Make sure that you get the 0.0 ± 0.5-degree indication on the digital protractor.

(g) If necessary, with the aid of GSE 380 (Figure 509), adjust the elevator control cables to get the aligned position of the elevator (0.0 ± 0.5 degrees in the digital protractor).

NOTE: If you retract the turnbuckle of the inboard cable and extend the turnbuckle of the outboard one, you move the elevator trailing edge surface upward, and vice versa. See Figure 505.

(h) Do steps (f) and (g) for the right elevator surface.

(i) This task is completed if:

- The misalignment of each elevator surface is of 0.0 ± 0.5 degrees.
- The four elevator control cables are correctly tensioned. Refer to step (d).

K. Follow-on

SUBTASK 842-002-A

(1) Remove the rig pins from the elevator torque tube (Figure 501).

(2) Do ten (10) full elevator command cycles (fully forward - neutral - fully backward - neutral).

(3) Install the cover of the FWD Cargo Compartment Partition (AMM TASK 25-27-02-400-801-A/400).

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

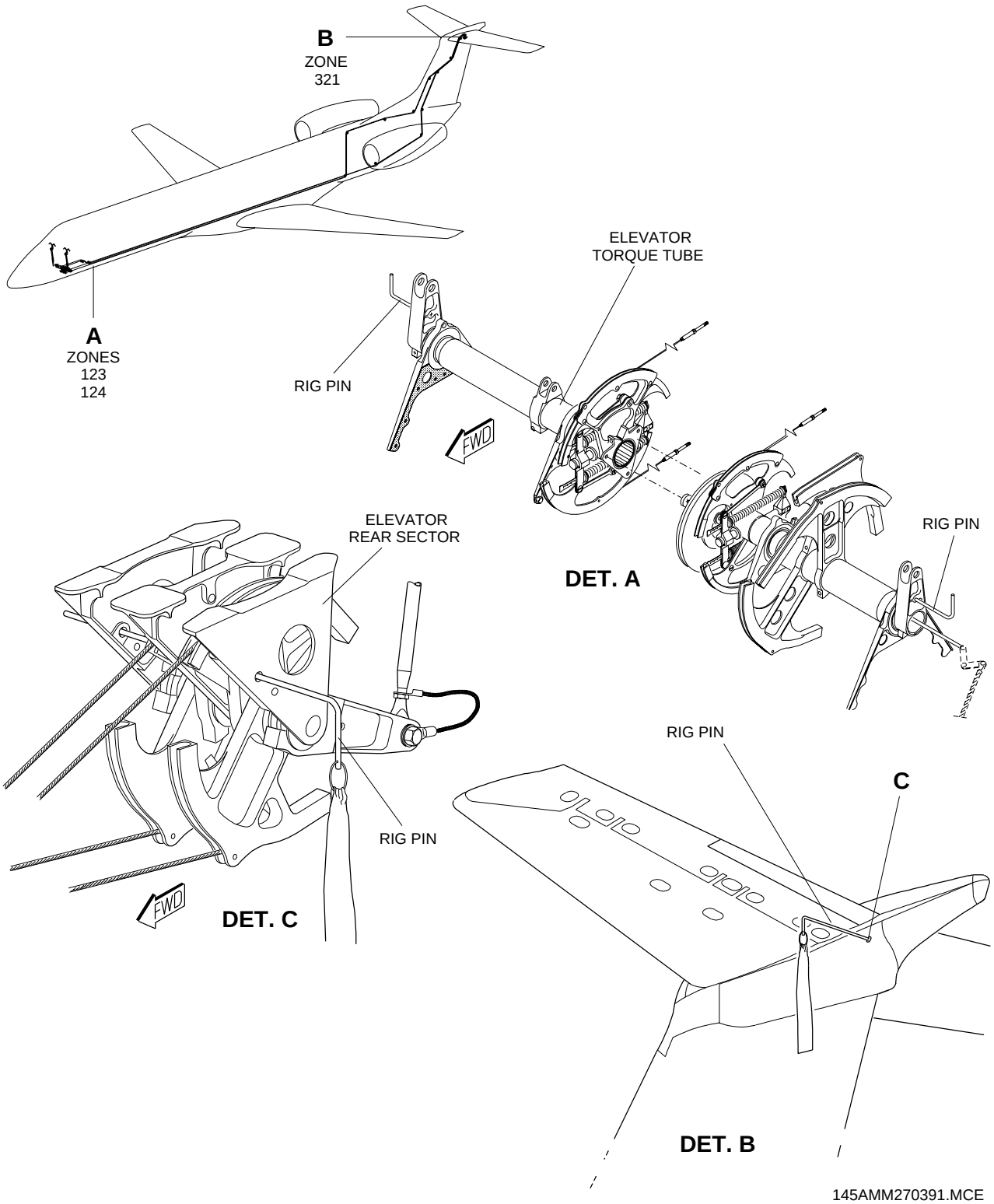
(5) Install the floor panels as follows:

(a) For 145 aircraft model, install the floor panel 261BF(AMM MPP 06-41-02/100)

(b) For 140 aircraft model, install the floor panels 261BF and 251JF (AMM MPP 06-41-02/100)

(c) For 135 aircraft model, install the floor panel 251HF (AMM MPP 06-41-02/100)

EFFECTIVITY: ALL
Rig Pin Locations
Figure 501



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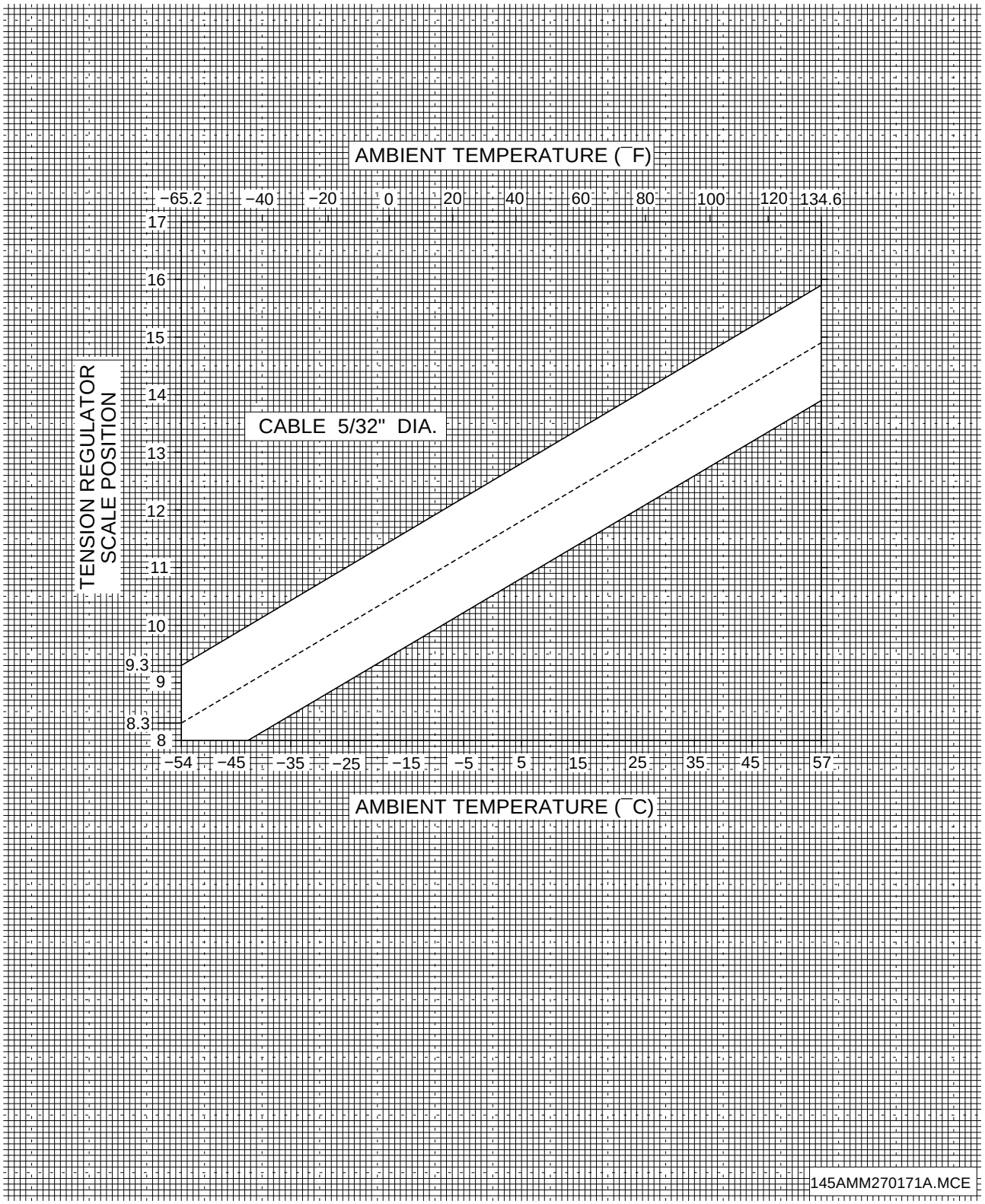
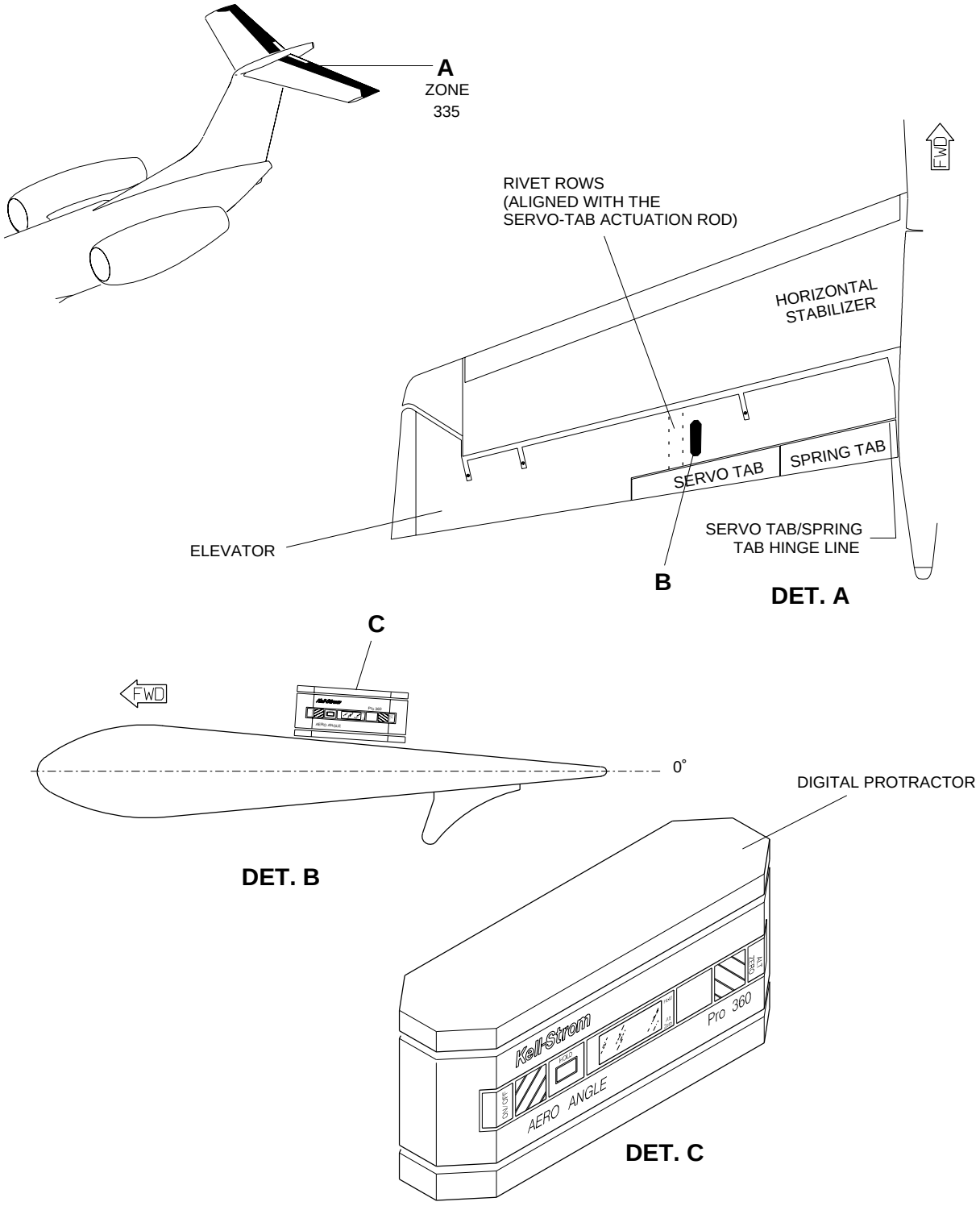
EFFECTIVITY: POST MOD SB 145-27-0064

Tension Regulator Scale Position x Temperature (Stainless-Steel or Carbon-Steel Cables) - Graph
Figure 502



EFFECTIVITY: ALL

Digital Protractor - Location
Figure 503



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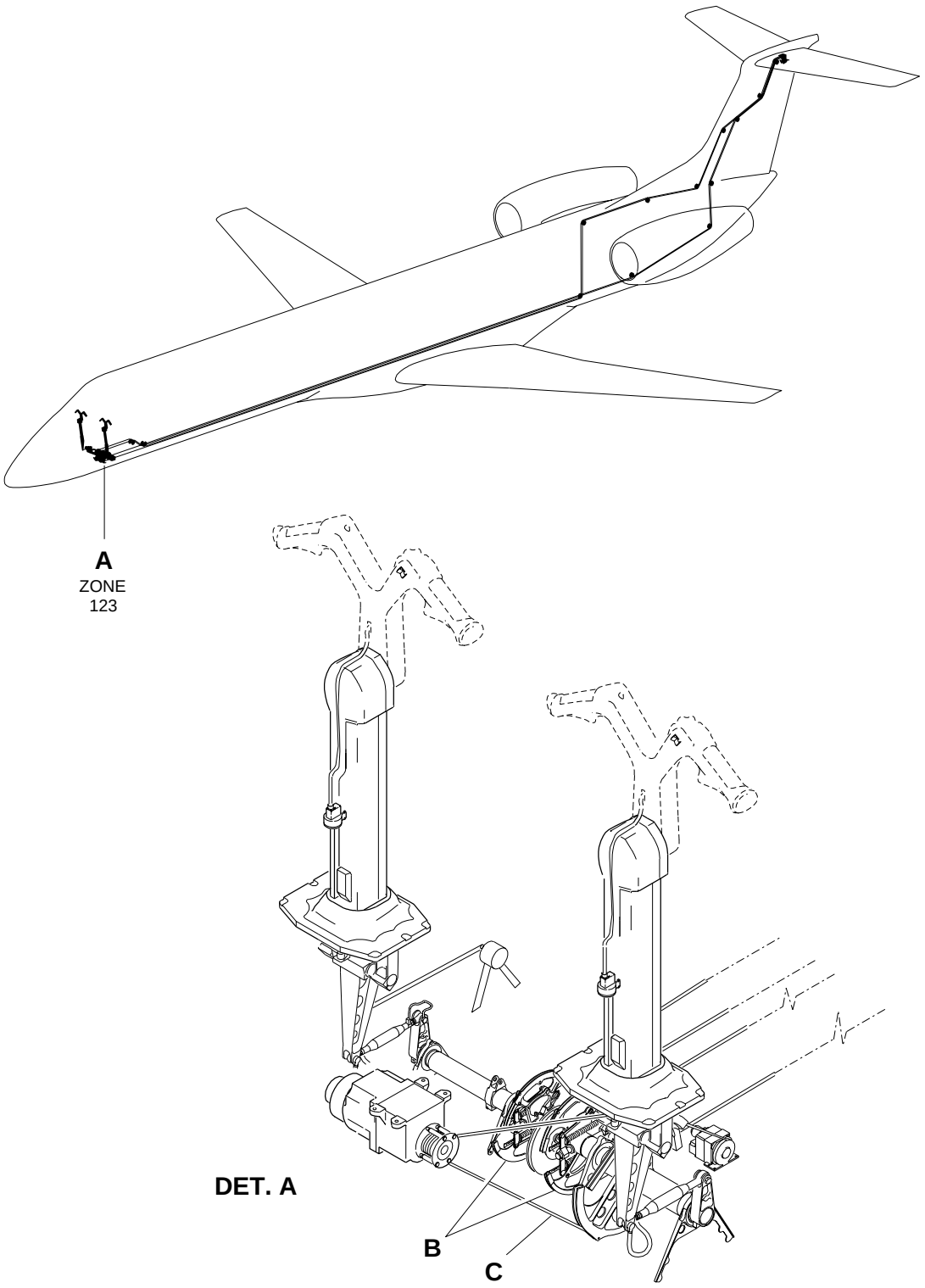
EFFECTIVITY: ALL

Elevator Control Cables - Forward Fuselage
Figure 504 - Sheet 1



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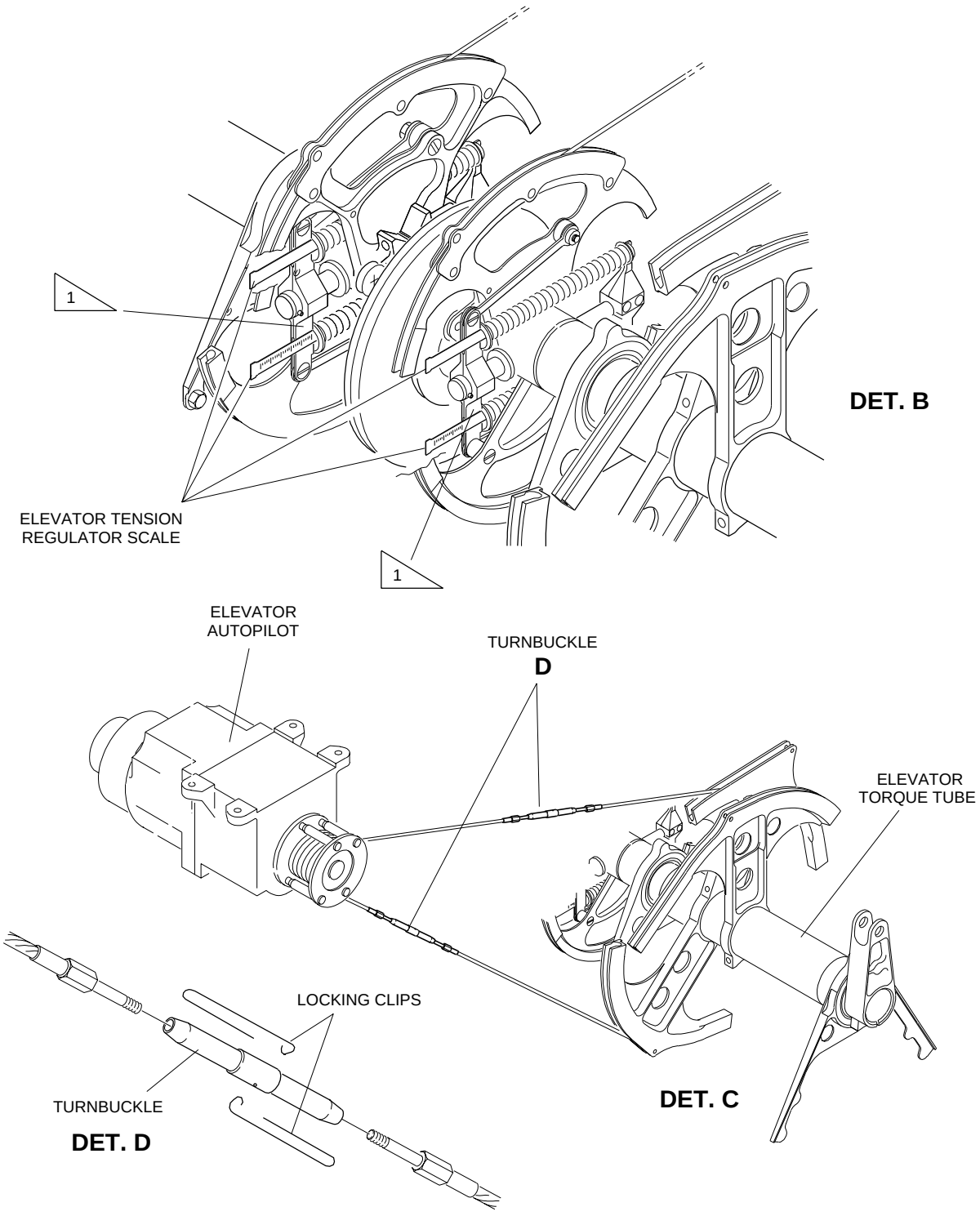
EFFECTIVITY: ALL

Elevator Control Cables - Forward Fuselage
Figure 504 - Sheet 2

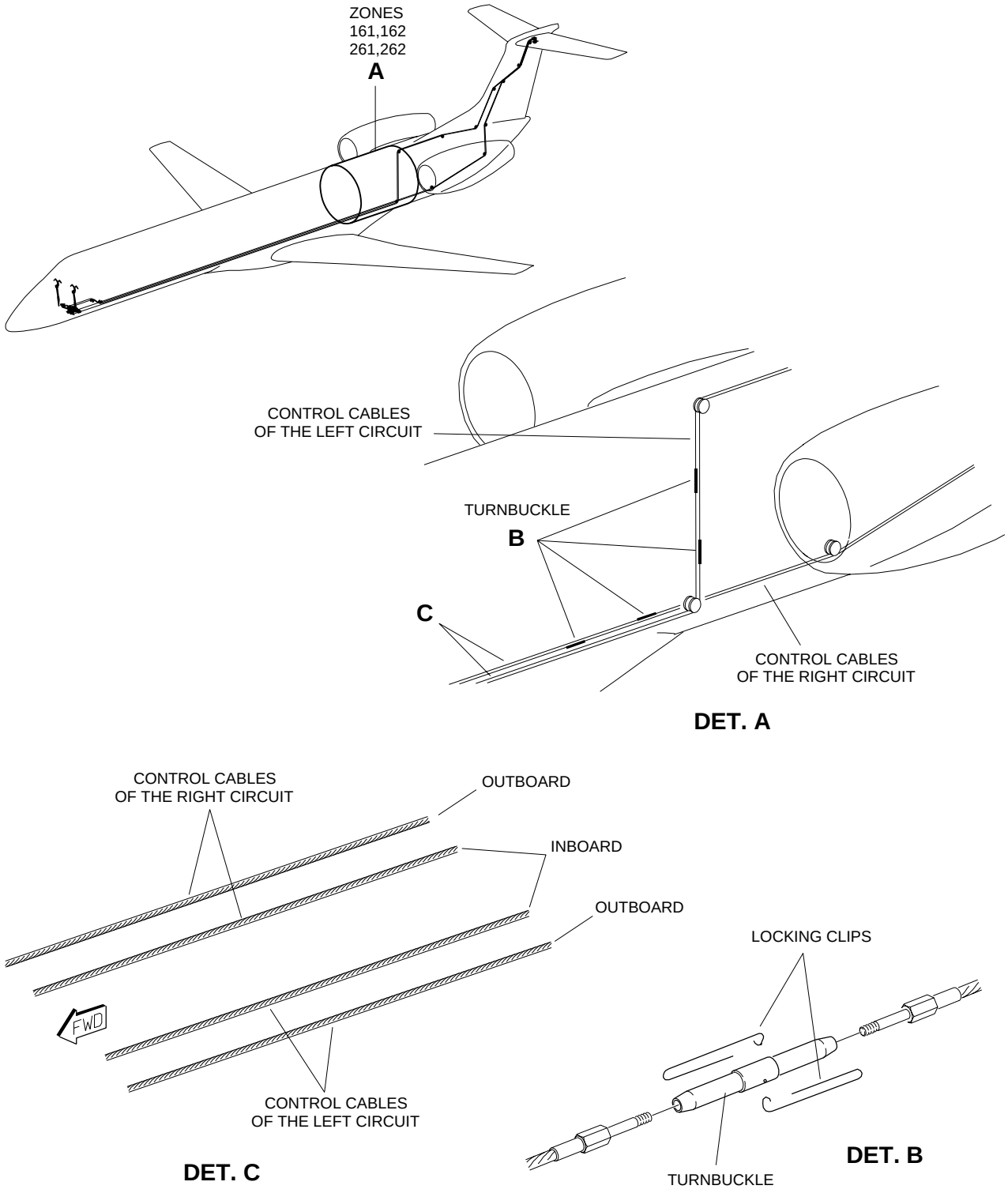


1 REFERENCE POINT TO READ THE SCALE

145AMM270170.MCE A

EFFECTIVITY: ALL

Elevator Control Cables - Rear Fuselage
Figure 505



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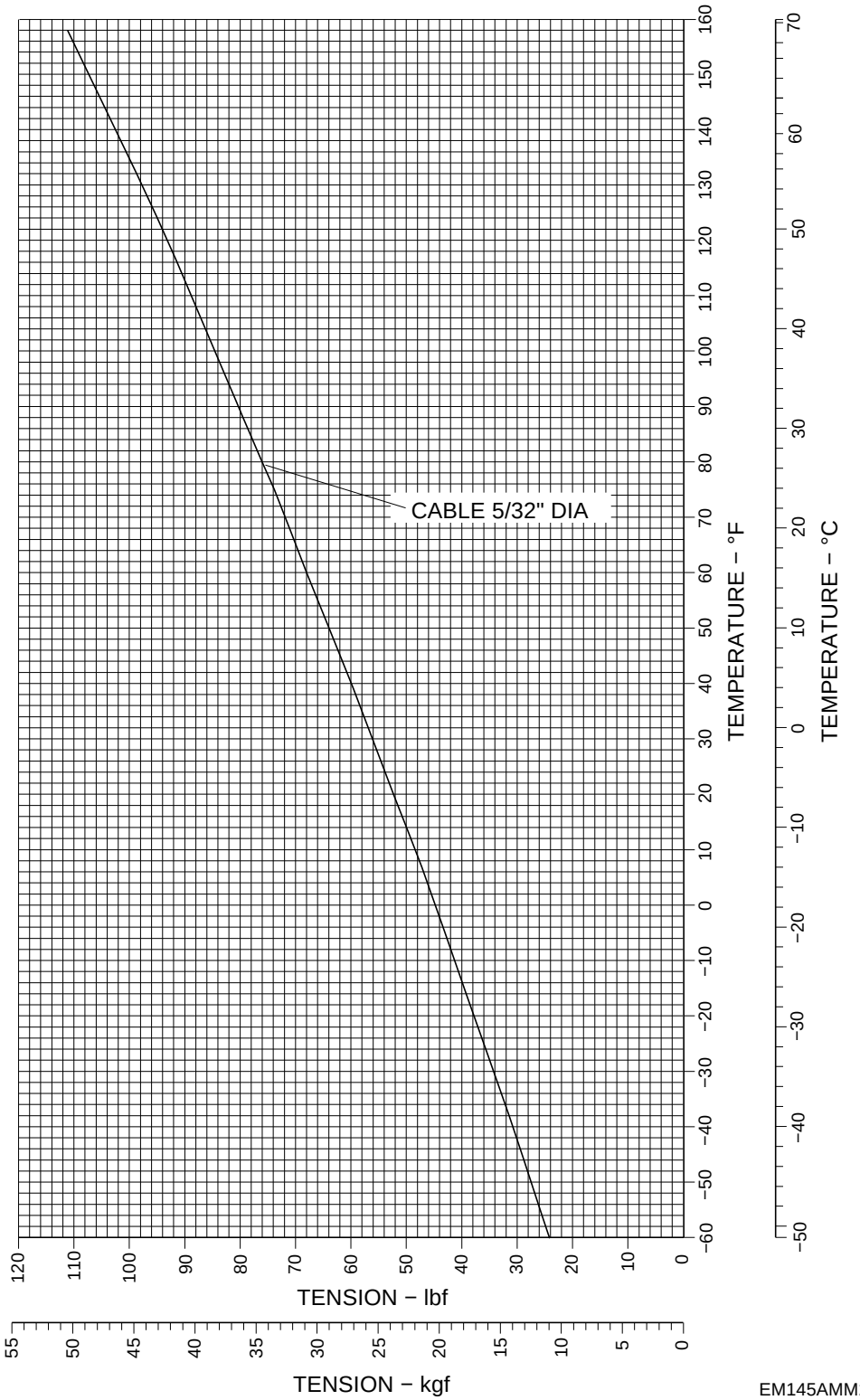
EFFECTIVITY: PRE MOD SB 145-27-0064

Load x Temperature for Elevator-Control Stainless-Steel or Carbon-Steel Cables Tension - Graph
Figure 506



TASK 27-31-01-700-802-A
EFFECTIVITY: ALL

3. TENSION OF THE ELEVATOR AUTOPILOT-SERVO CABLES

A. General

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

(2) Figure 507 shows the location of the elevator autopilot-servo cables.

(3) Figure 508 gives the load x temperature graph.

B. References

REFERENCE	*DESIGNATION*
AMM MPP 06-41-01/100	-
IPC 27-31-00	ELEVATOR PRIMARY MECHANICAL CONTROL

C. Zones and Accesses

ZONE	*PANEL/DOOR*	*LOCATION*
123	123BL	Area below the cockpit floor

D. Tools and Equipment

ITEM	*DESCRIPTION*	*PURPOSE*	*QTY*
GSE 058	Rig Pin Kit	To lock the elevator 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 the 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 27-31-00	AR

H. Persons Recommended

QTY	*FUNCTION*	*PLACE*
1	Does the task	Area below the cockpit floor

I. Preparation

SUBTASK 841-003-A

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

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

J. Tension of the Elevator Autopilot-Servo Cables

SUBTASK 720-003-A

CAUTION:
- DO NOT OPERATE THE ELEVATOR SYSTEM WITH THE RIG PINS INSTALLED TO PREVENT DAMAGE TO THE RIGGING HOLES/PINS.
- 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 in the fuselage.

NOTE:
- You must adjust the elevator 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 elevator autopilot-servo cables. Let the thermometer stay in position for a minimum of 5 minutes, until the temperature becomes stable.

(2) Use graph of Figure 508 to get the load value related to the temperature.

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

(3) Do ten (10) full elevator command cycles (fully forward - neutral - fully backward - neutral).

(4) Measure the tension of the elevator autopilot-servo cables.

(5) If the tension is not that specified in the graph of Figure 508, do the procedure below:

(a) Install the rig pin at the elevator torque tube.

(b) Remove and discard the locking clips from the turnbuckles of the elevator autopilot-servo cables. See Figure 507.

(c) With the aid of GSE 380 (Figure 509), apply tension to the elevator autopilot-servo cables related to the measured temperature.

(d) Remove the rig pins and do ten (10) full elevator command cycles (fully forward - neutral - fully backward - neutral).

(e) Install rig pins at the elevator torque tube.

(f) Measure the tension of the elevator autopilot-servo cables.

(6) Do step 5 until you get the tension of the graph of Figure 508.

(7) Install new locking clips to the turnbuckle. See Figure 507.

K. Follow-on

SUBTASK 842-003-A

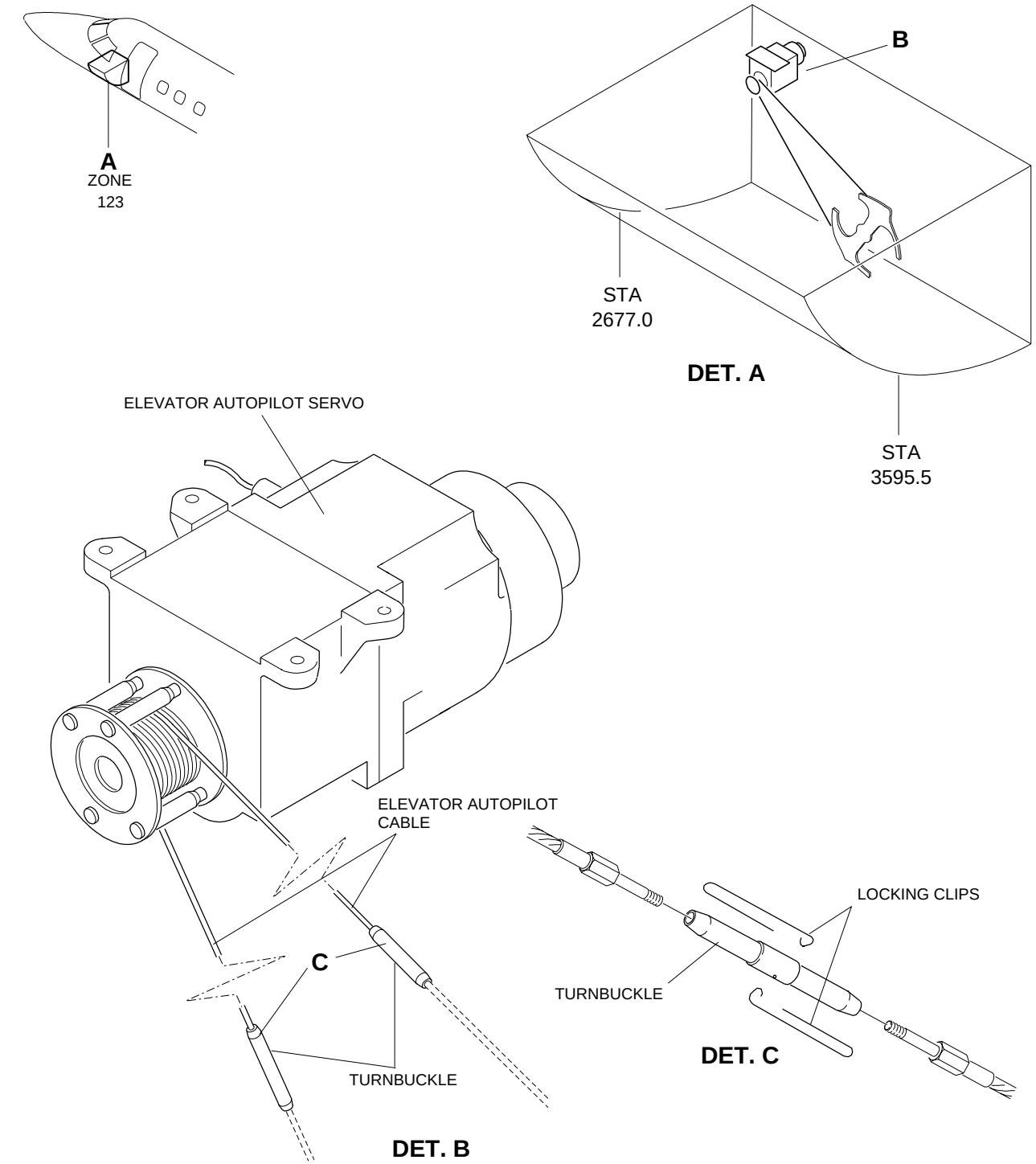
(1) Remove the rig pins from the elevator torque tube (Figure 501).

(2) Do ten (10) full elevator command cycles (fully forward - neutral - fully backward - neutral).

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

EFFECTIVITY: ALL

Elevator Autopilot-Servo Cables - Location
Figure 507



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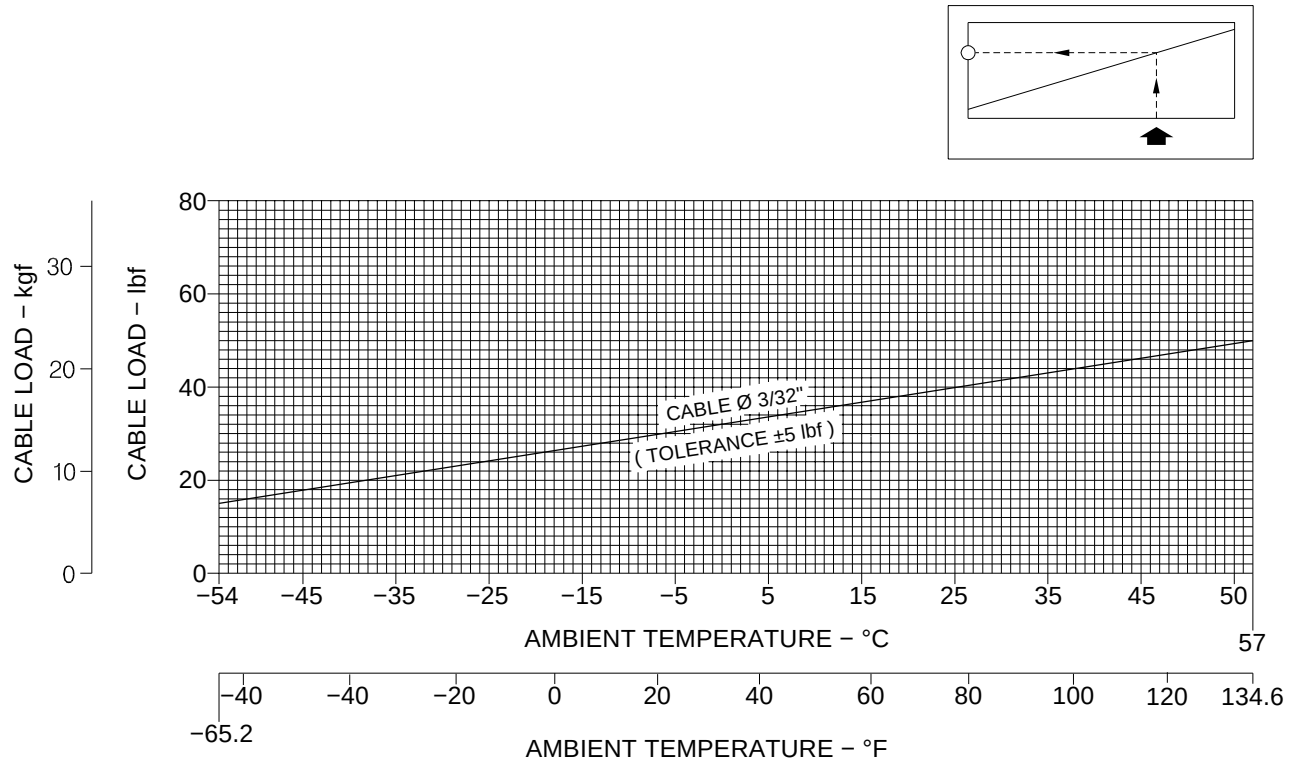
EFFECTIVITY: ALL

Load x Temperature for Elevator Autopilot-Servo Cables Tension - Graph
Figure 508



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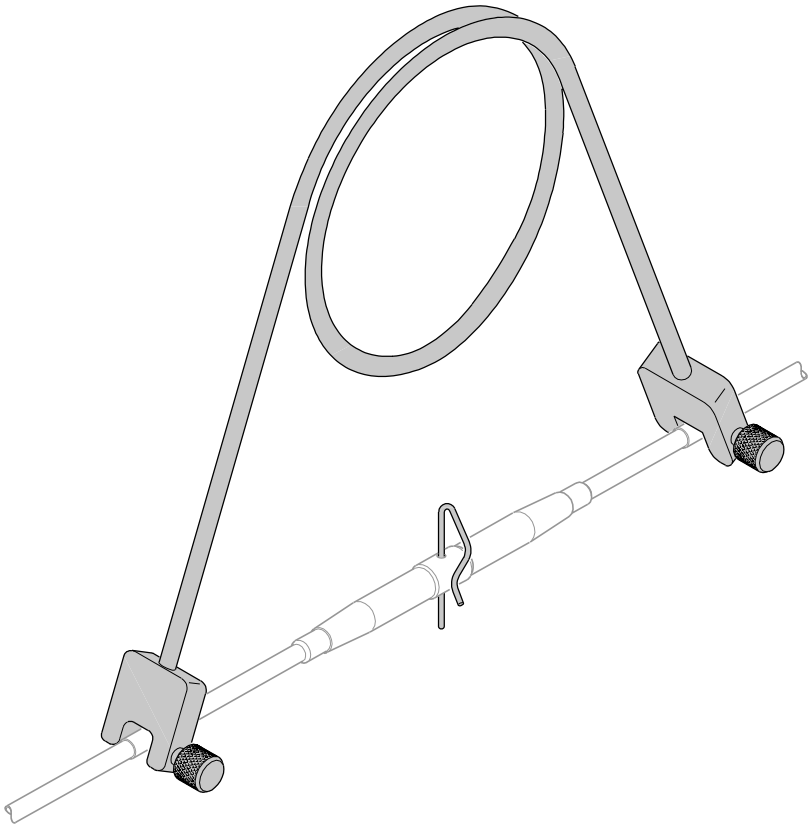
EFFECTIVITY: ALL
GSE 380 - Clip - Tension Adj, Control Cables
Figure 509



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