RUDDER - ADJUSTMENT/TEST

EFFECTIVITY: ALL

1. General

   A. This section gives the procedures to adjust the rudder neutral position and shows the deflections of rudder I and rudder II.

   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*
27-20-00-700-801-A	ADJUSTMENT OF THE RUDDER NEUTRAL POSITION AND DEFLECTIONS OF RUDDER I AND RUDDER II	ALL
27-20-00-700-803-A	RUDDER SECONDARY BACKSTOP - ADJUSTMENT	ALL

TASK 27-20-00-700-801-A
EFFECTIVITY: ALL

2. ADJUSTMENT OF THE RUDDER NEUTRAL POSITION AND DEFLECTIONS OF RUDDER I AND RUDDER II

A. General

(1) This task gives the procedures to adjust the rudder neutral position and shows the deflections of rudder I and rudder II.

(2) Figure 501 shows the position of the rudder pedals and the location of their rig pins.

(3) Figure 502, Figure 503, and Figure 504 show the location of the rig pins, rudder forward torque tube, rudder rear torque tube, and PCU.

(4) Figure 505 shows the location of the eccentric pin.

(5) Figure 506 gives the gauge setting installation.

(6) Figure 507 gives the protractor installation.

(7) Figure 508 shows the adjustment of the rudder stop microswitches.

(8) Figure 509 shows the location of the shims.

B. References

REFERENCE	*DESIGNATION*
AMM MPP 06-41-01/100	-
AMM MPP 06-42-00/100	-
AMM TASK 20-40-01-860-801-A/200	ENERGIZATION OF THE AIRCRAFT WITH AN EXTERNAL POWER SOURCE
AMM TASK 25-12-06-000-801-A/400	PEDAL ASSEMBLY LINING - REMOVAL
AMM TASK 25-12-06-400-801-A/400	PEDAL ASSEMBLY LINING - INSTALLATION
AMM TASK 27-20-00-700-803-A/500	RUDDER SECONDARY BACKSTOP - ADJUSTMENT
AMM TASK 27-25-02-700-801-A/500	RUDDER POSITION MICROSWITCHES - ADJUSTMENT/TEST
AMM TASK 29-10-00-860-801-A/200	HYDRAULIC SYSTEM - PRESSURIZATION WITH HTS

C. Zones and Accesses

ZONE	*PANEL/DOOR*	*LOCATION*
123	123BL	Area below the cockpit floor - LH
312	312AR	Empennage
325	325AL	Vertical stabilizer

D. Tools and Equipment

ITEM	DESCRIPTION	PURPOSE	QTY
GSE 036	Platform, hydraulic, aircraft	To get access to the rudder	
GSE 044	Headset, ramp handling	Communication	
GSE 058	Kit, rig pins, flight controls	To keep the surface and rudder pedals locked in the neutral position	
GSE 059	Protractor, control surface deflection	To measure the rudder deflection	
GSE 069	Supporting straight edge	To support the gauge setting	
GSE 336	Gauge setting, Rudder Neutral Pos.	To adjust the rudder neutral position	

E. Auxiliary Items

ITEM	DESCRIPTION	PURPOSE	QTY
Commercially available	Screw, NASM(MS)24694-6 (or similar with #8-32UNC thread, 19/32 in. length)	To attach the base of GSE-059 to the aircraft	1

F. Consumable Materials

SPECIFICATION (BRAND)	DESCRIPTION	QTY
MS20995C32	Lockwire	AR
MIL-S-8802 TYPE II	Sealant PR1440B-2	AR
Commercially available	Double-face adhesive-tape	AR

G. Expandable Parts

Not Applicable

H. Persons Recommended

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

I. Preparation

SUBTASK 841-002-A

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

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

(3) Open cockpit underfloor access hatch 123BL (AMM MPP 06-41-01/100) and access door 312AR (AMM MPP 06-42-00/100).

(4) Remove the pedal assembly linings (AMM TASK 25-12-06-000-801-A/400).

(5) Put the rudder pedals in the neutral position and install the rig pin (1) (Figure 501).

(6) Install the rig pins (1), (2), (3), (4), (5), and (6) to the PCU, pedals, and torque tubes (Figure 502, Figure 503, or Figure 504).

(7) Make sure that the rudder secondary backstops are correctly adjusted according to AMM TASK 27-20-00-700-803-A/500.

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

(9) Make sure that the yaw trim indicator, on the EICAS, shows zero position.

(10) Pressurize hydraulic system 2 (AMM TASK 29-10-00-860-801-A/200).

J. Adjustment of the Rudder Neutral Position (Figure 505) (Figure 506) (Figure 509)

SUBTASK 720-002-A

WARNING:
- **MAKE SURE THAT THERE ARE NO PERSONS OR EQUIPMENT IN THE TRAVEL AREA.**
- **OBEY ALL SAFETY INSTRUCTIONS RELATED TO SKYDROL FLUID.**

(1) Do a check of the rudder neutral position, as follows:

(a) Remove two screws from the access panel 325AL, as shown in Figure 506.

NOTE: You must remove exactly the same screws as shown in Figure 506.

(b) Install the supporting straight edge (GSE 069) in the two points given in the step above.

(c) Install the gauge setting (GSE 336) as shown in Figure 506.

(d) Make sure that the rudder is in the neutral position.

NOTE: The rudder is in the neutral position when the rudder II trailing edge centerline is between the zero degree limit marks of the gauge setting with a tolerance of ± 1 degree.

(e) If the rudder is in the neutral position, remove the supporting straight edge and the gauge setting, install the two screws to access panel 325AL, and go to step (2). If it is not, do the adjustment as follows:

1 Remove the cotter pins (5) and (6), nut (4), and washer (3) to remove the eccentric pin lock (2) (Figure 505).

2 Turn the eccentric pin until you align the rudder II trailing edge with the mark of the gauge setting. If the eccentric pin could not provide enough adjustment to align the rudder, and it remains deflected to the right side by 0.5 degree max, do as follows:

a Fabricate one solid shim made from Al-2024-T3, 1.0 mm thick, profiled to follow base contour of fitting support, finished with alodine and primer. Install shim between fitting support and structure with one fillet of sealant, fasten in position using original bolts (Figure 509).

NOTE: Make sure that, at the end of the adjustment, the spherical bearing rod end contour is inside the pair of fittings, with no

protrusion. If does not, turn the eccentric pin 180º to put the spherical bearing rod end to the inside of the pair of fitting, and do the adjustment again if necessary.

3 Install a lock to the eccentric pin and, if necessary, slowly turn the eccentric pin to permit the lock installation.

4 Attach the lock (2) to the eccentric pin (1) with the nut (4), washer (3), and cotter pins (5) and (6) (Figure 505) and make sure that the stop pins are correctly installed.

5 Remove the supporting straight edge, the gauge setting, and install the two screws to panel 325AL.

K. Deflections of Rudder I and Rudder II (CTA/FAA/IAC-AR) (Figure 501) (Figure 502) (Figure 507)

SUBTASK 720-012-A

EFFECTIVITY: CTA/FAA/IAC-AR certified aircraft

(1) Install the protractor (GSE 059) to the fin/rudder I, with screw NASM(MS)24694-6 or with a double face adhesive tape, and set it to the zero position (Figure 507).

(2) Remove the rig pins from the pedals (1) (Figure 501).

(3) Remove the rig pins (1), (2), (3), (4), (5), and (6) from the PCU, pedals, and torque tubes (Figure 502).

(4) Do a check of the rudder deflection:

(a) With the pedals, control the rudder fully to the left and measure the deflection.

Result:

1 The deflection must be 15 degrees ± 1 degrees. If it is not, adjust one of the backstops of the rudder rear torque tube to get the necessary deflection (Figure 502).

(b) If necessary, adjust it as follows:

Result:

1 Loosen the nut and nut of the backstop bolt and adjust its position as necessary, until you get 15 degrees ± 1 degrees.

2 Tighten the nut and nut and safety.

(c) With the pedals, control the rudder fully to the right and measure the deflection.

Result:

1 The deflection must be 15 degrees ± 1 degree. If it is not, adjust one of the backstops of the rudder rear torque tube (Figure 502).

(d) If necessary, adjust it as follows:

Result:

1 Loosen the nut and nut of the backstop bolt and adjust its position as necessary, until you get 15 degrees ± 1 degrees.

2 Tighten the nut and nut and safety.

(e) With the pedals, control the rudder to the neutral position.

(f) With the yaw trim switch, control the rudder to the left, as far as the rudder primary backstop.

NOTE: The yaw trim switch must be operated for 3 seconds and then for 3 more seconds until the trim actuator comes to its stop.

Result:

1 The deflection must be 15 degrees ± 1 degree.

(g) With the yaw trim switch, control the rudder to the right, as far as the rudder primary backstop.

NOTE: The yaw trim switch must be operated for 3 seconds and then for 3 more seconds until the trim actuator comes to its stop.

Result:

1 The deflection must be 15 degrees ± 1 degree.

(h) With the yaw trim switch, control the rudder to the neutral position.

(i) If the backstops were adjusted, safety the backstops.

(5) Remove the protractor from fin/rudder I (Figure 507).

(6) Install the protractor (GSE 059) to rudder I/rudder II, with screw NASM(MS)24694-6 or with a double face adhesive tape, and set it to the zero position (Figure 507).

(7) With the pedals, control the rudder to the left, as far as the primary backstop. The deflection must be of 11 degrees ± 1 degree.

(8) With the pedals, control the rudder to the right, as far as the primary backstop. The deflection must be of 11 degrees ± 1 degree.

L. Deflections of Rudder I and Rudder II (JAA - Pre-Mod SB 145-27-0015 or not equipped with Movable Primary Stop System) (Figure 501) (Figure 503) (Figure 507)

SUBTASK 720-003-A

EFFECTIVITY: JAA-certified aircraft (Pre-Mod SB 145-27-0015) or not equipped with Movable Primary Stop System

(1) Install the protractor (GSE 059) to the fin/rudder I, with screw NASM(MS)24694-6 or with a double face adhesive tape, and set it to the zero position (Figure 507).

(2) Remove the rig pins from the pedals (1) (Figure 501).

(3) Remove the rig pins (1), (2), (3), (4), (5), and (6) from the PCU, pedals and torque tubes (Figure 503).

(4) Do a check of the rudder deflection:

(a) With the pedals, control the rudder fully to the left and measure the deflection.

Result:

1 The deflection must be 10 degrees ± 30 minutes (Figure 503).

(b) If necessary, adjust it as follows:

Result:

1 Loosen the nut and nut of the backstop bolt and adjust its position as necessary, until you get 10 degrees ± 30 minutes.

2 Tighten the nut and nut and safety.

(c) With the pedals, control the rudder fully to the right and measure the deflection.

Result:

1 The deflection must be 10 degrees ± 30 minutes (Figure 503).

(d) If necessary, adjust it as follows:

Result:

1 Loosen the nut and nut of the backstop bolt and adjust its position as necessary, until you get 10 degrees ± 30 minutes.

2 Tighten the nut and nut and safety.

(e) With the pedals, control the rudder to the neutral position.

(f) With the yaw trim switch, control the rudder to the left, as far as the rudder primary backstop.

NOTE: The yaw trim switch must be operated for 3 seconds and then for 3 more seconds until the trim actuator comes to its stop.

Result:

1 The deflection must be 10 degrees ± 30 minutes.

(g) With the yaw trim switch, control the rudder to the right, as far as the rudder primary backstop.

NOTE: The yaw trim switch must be operated for 3 seconds and then for 3 more seconds until the trim actuator comes to its stop.

Result:

1 The deflection must be 10 degrees ± 30 minutes.

(h) With the yaw trim switch, control the rudder to the neutral position.

(i) If the backstops were adjusted, safety the backstops.

(5) Remove the protractor from fin/rudder I.

(6) Install the protractor (GSE 059) to rudder I/rudder II, with screw NASM(MS)24694-6 or with a double face adhesive tape, and set it to the zero position (Figure 507).

(7) With the pedals, control the rudder to the left, as far as the primary backstop. The deflection must be 7.0 degrees ± 1 degree.

(8) With the pedals, control the rudder to the right, as far as the primary backstop. The deflection must be of 7.0 degrees ± 1 degree.

M. Deflections of Rudder I and Rudder II (JAA - Post-Mod SB 145-27-0015 or equipped with Movable Primary Stop System) (Figure 501) (Figure 504) (Figure 507) (Figure 508)

SUBTASK 720-004-A

EFFECTIVITY: JAA-certified aircraft (Post-Mod SB 145-27-0015) or equipped with Movable Primary Stop System.

(1) Do a check of the gap of the microswitches (1) installed in the stop actuators (2) (Figure 508):

(a) On the circuit breaker panel, open the AIR/GND C circuit breaker and attach a DO-NOT-CLOSE tag to it.

(b) Measure the gap of the microswitches installed in the stop actuators.

- The gap must be 11.1 mm + 0.3 mm - 0.0 mm.

(c) If necessary, adjust the gap between the microswitches and their target as follows:

1 Loosen the nut and nut of the microswitch and adjust it to a gap of 11.1 mm + 0.3 mm - 0.0 mm (Figure 508).

2 Tighten the nut and nut and safety.

(2) Install the protractor (GSE 059) to the fin/rudder I, with screw NASM(MS)24694-6 or with a double face adhesive tape, and set it to the zero position (Figure 507).

(3) Do a check of the rudder deflection with the aircraft in a simulated in-flight condition:

(a) Remove the rig pins from the pedals (1) (Figure 501).

(b) Remove the rig pins (1), (2), (3), (4), (5), and (6) from the PCU, pedals, and torque tubes (Figure 504).

(c) Make sure that hydraulic system 2 is pressurized (AMM TASK 29-10-00-860-801-A/200).

(d) Make sure that the AIR/GND C circuit breaker is open, on the circuit breaker panel.

(e) Control the rudder totally to the left.

(f) Do a check of the deflection.

- It must be 10 degrees ± 30 minutes.

(g) If necessary, adjust it as follows:

1 Loosen the nut and nut of the backstop bolt and adjust its position as necessary, until you get 10 degrees ± 30 minutes.

2 Tighten the nut and nut and safety.

(h) Control the rudder totally to the right.

(i) Measure the deflection.

- It must be 10 degrees ± 30 minutes.

(j) If necessary, adjust it as follows:

1 Loosen the nut and nut of the backstop bolt and adjust its position as necessary, until you get 10 degrees ± 30 minutes.

2 Tighten the nut and nut and safety.

(4) Do a check of the rudder deflection with the aircraft in a simulated on-the-ground condition:

(a) Make sure that hydraulic system 2 is pressurized (AMM TASK 29-10-00-860-801-A/200).

(b) On the circuit breaker panel, close the AIR/GND C circuit breaker and remove the DO-NOT-CLOSE tag from it.

(c) Control the rudder totally to the left.

(d) Do a check of the deflection.

- It must be 15 degrees ± 1 degree.

(e) Control the rudder totally to the right.

(f) Do a check of the deflection.

- It must be 15 degrees ± 1 degree.

(g) With the pedals, control the rudder to the neutral position.

(5) Do a check of the deflection of rudder I, when you control the rudder with the yaw trim switch:

(a) Make sure that the YAW TRIM circuit breaker is closed, on the circuit breaker panel.

(b) Make sure that the arrows of the yaw trim indication, on the EICAS, is at the middle of the scale.

(c) On the circuit breaker panel, open the AIR/GND C circuit breaker.

(d) With the yaw trim switch, control the rudder to the left, as far as the rudder primary backstop. The deflection must be 10 degrees ± 30 minutes.

- The arrows of the yaw trim indication moves to the left side of the scale.

NOTE: The yaw trim switch must be operated for 3 seconds and then for 3 more seconds until the trim actuator comes to its stop.

(e) With the yaw trim switch, control the rudder to the right, as far as the rudder primary backstop. The deflection must be 10 degrees ± 30 minutes.

- The arrows of the yaw trim indication moves to the right side of the scale.

NOTE: The yaw trim switch must be operated for 3 seconds and then for 3 more seconds until the trim actuator comes to its stop.

(6) With the yaw trim switch, control the rudder to the neutral position.

(7) Remove the protractor from fin/rudder I.

(8) Install the protractor (GSE 059) to rudder I/rudder II, with screw NASM(MS)24694-6 or with a double face adhesive tape, and set it to the zero position (Figure 507).

(9) Do a check of the rudder II deflection with the aircraft in a simulated in-flight condition:

(a) Make sure that hydraulic system 2 is pressurized (AMM TASK 29-10-00-860-801-A/200).

(b) Make sure that the AIR/GND C circuit breaker is open, on the circuit breaker panel.

(c) With the pedals, control the rudder to the left, as far as the primary backstop. The deflection must be 7.5 degrees ± 30 minutes.

(d) With the pedals, control the rudder to the right, as far as the primary backstop. The deflection must be 7.5 degrees ± 30 minutes.

(10) Do a check of the rudder II deflection with the aircraft in a simulated on-the-ground condition:

(a) On the circuit breaker panel, close the AIR/GND C circuit breaker.

(b) With the pedals, control the rudder to the left, as far as the primary backstop. The deflection must be 11 degrees ± 1 degree.

(c) With the pedals, control the rudder to the right, as far as the primary backstop. The deflection must be 11 degrees ± 1 degree.

N. Follow-on

SUBTASK 842-002-A

(1) Do the adjustment and test of the rudder position microswitches (AMM TASK 27-25-02-700-801-A/500).

(2) Remove the protractor from rudder I/rudder II.

(3) Release the pressure of hydraulic system 2 (AMM TASK 29-10-00-860-801-A/200).

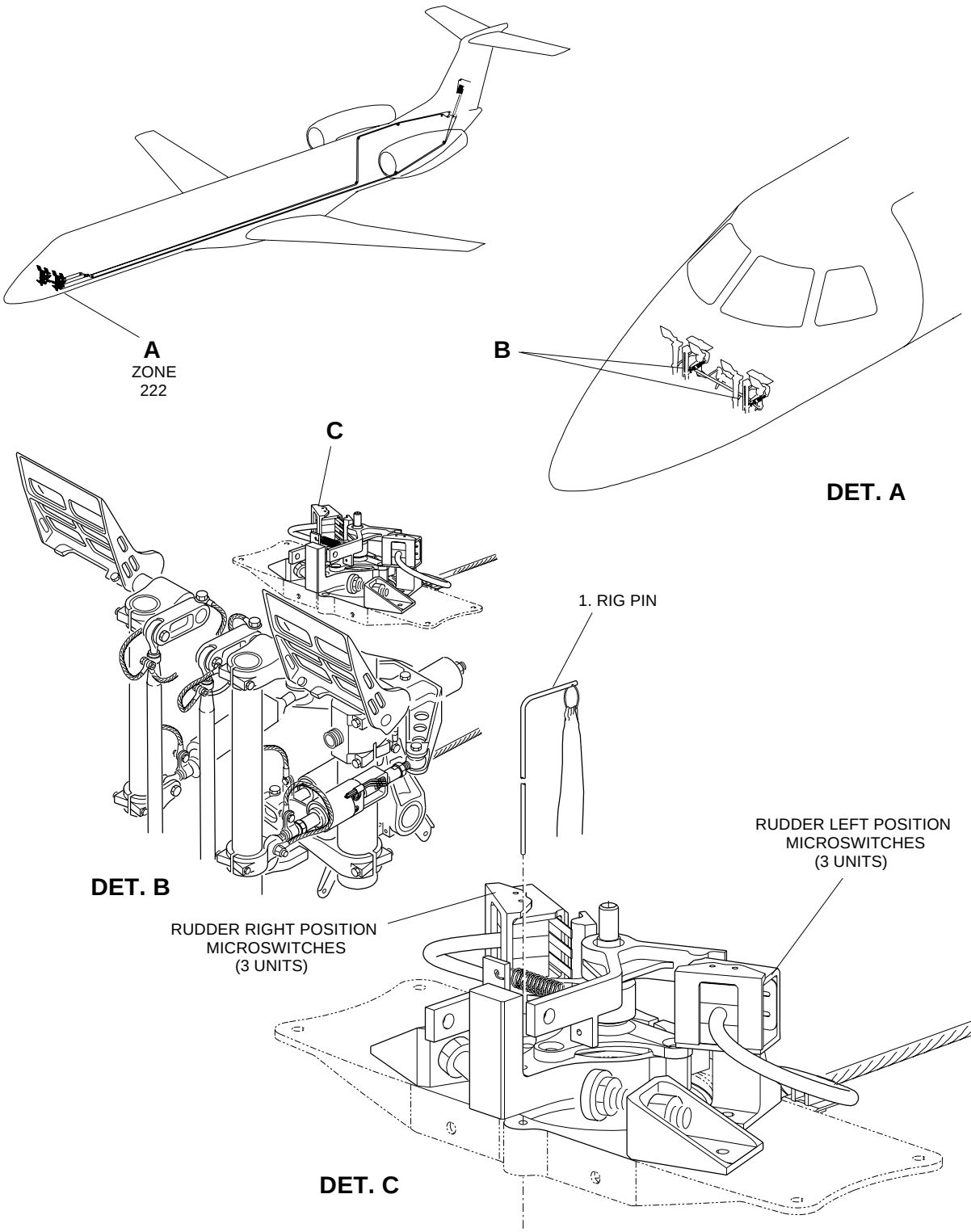
(4) Deenergize the aircraft (AMM TASK 20-40-01-860-801-A/200).

(5) Install the pedal assembly linings (AMM TASK 25-12-06-400-801-A/400).

(6) Close cockpit underfloor access hatch 123BL (AMM MPP 06-41-01/100) and access door 312AR (AMM MPP 06-42-00/100).

EFFECTIVITY: ALL

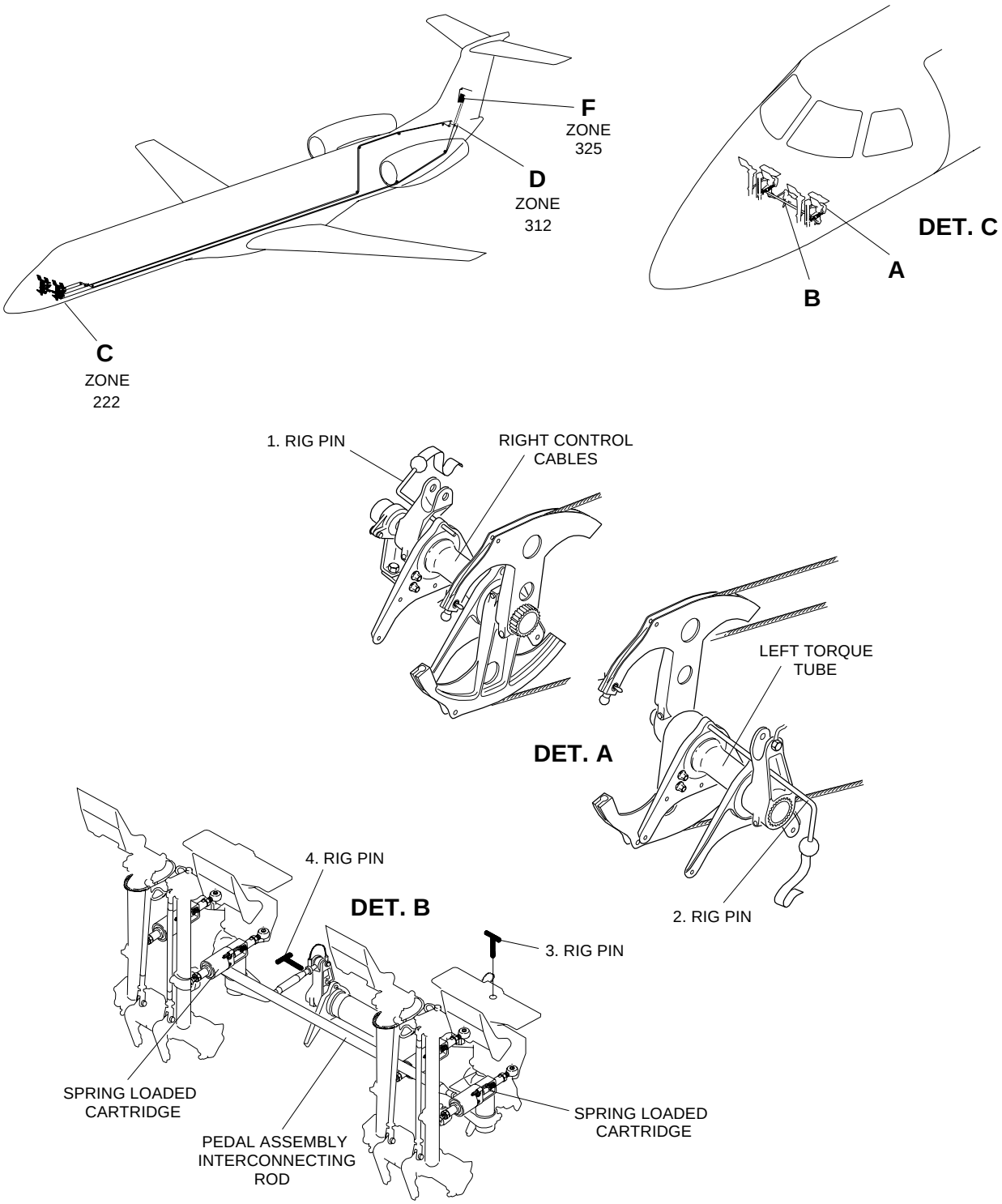
Rudder Pedals - Location
Figure 501



EFFECTIVITY: CTA/FAA/IAC-AR CERTIFIED AIRCRAFT

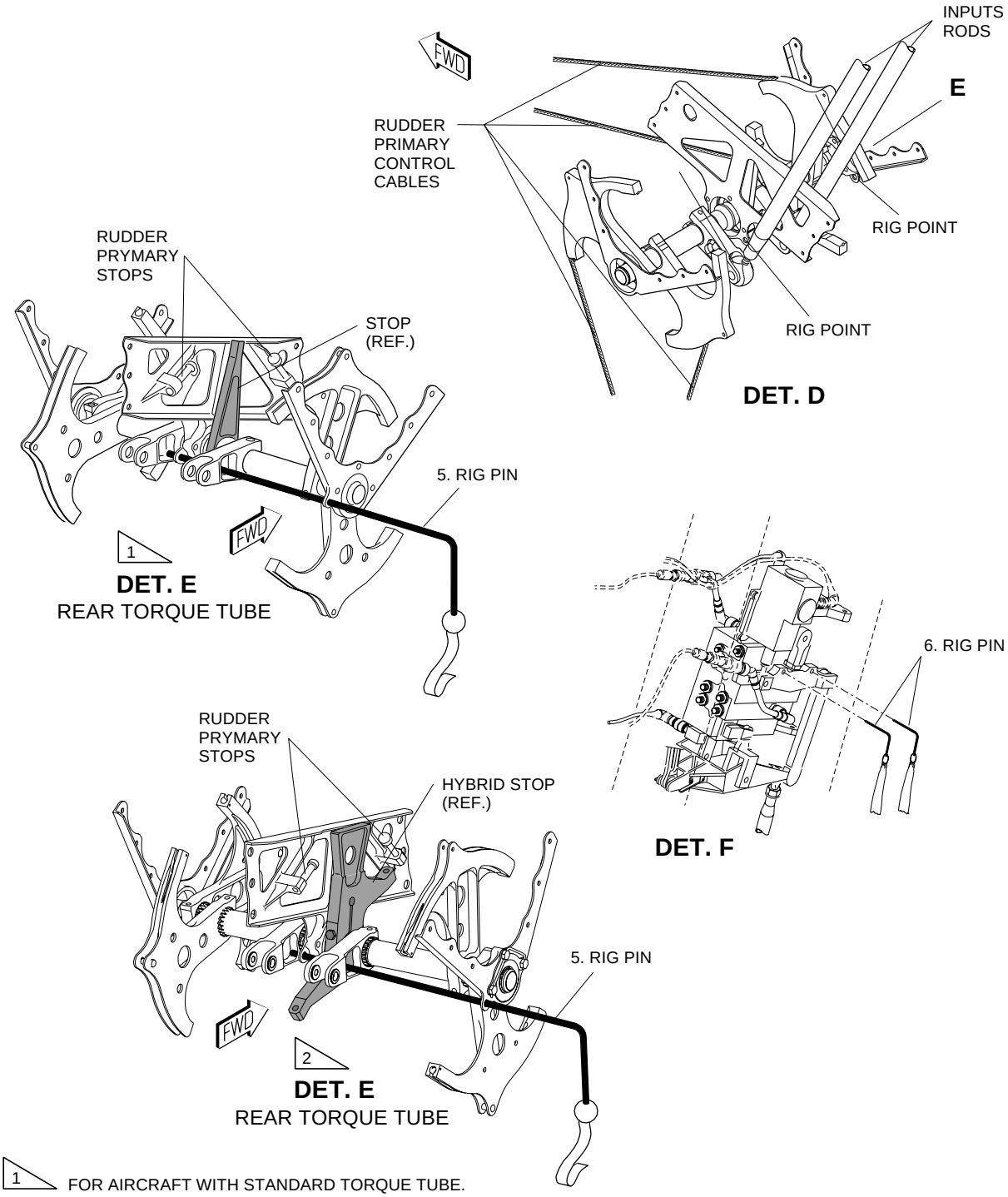
Rudder Torque Tubes - Location

Figure 502 - Sheet 1



EM145AMM270230B.DGN

EFFECTIVITY: CTA/FAA/IAC-AR CERTIFIED AIRCRAFT
Rudder Torque Tubes - Location
Figure 502 - Sheet 2



1 FOR AIRCRAFT WITH STANDARD TORQUE TUBE.

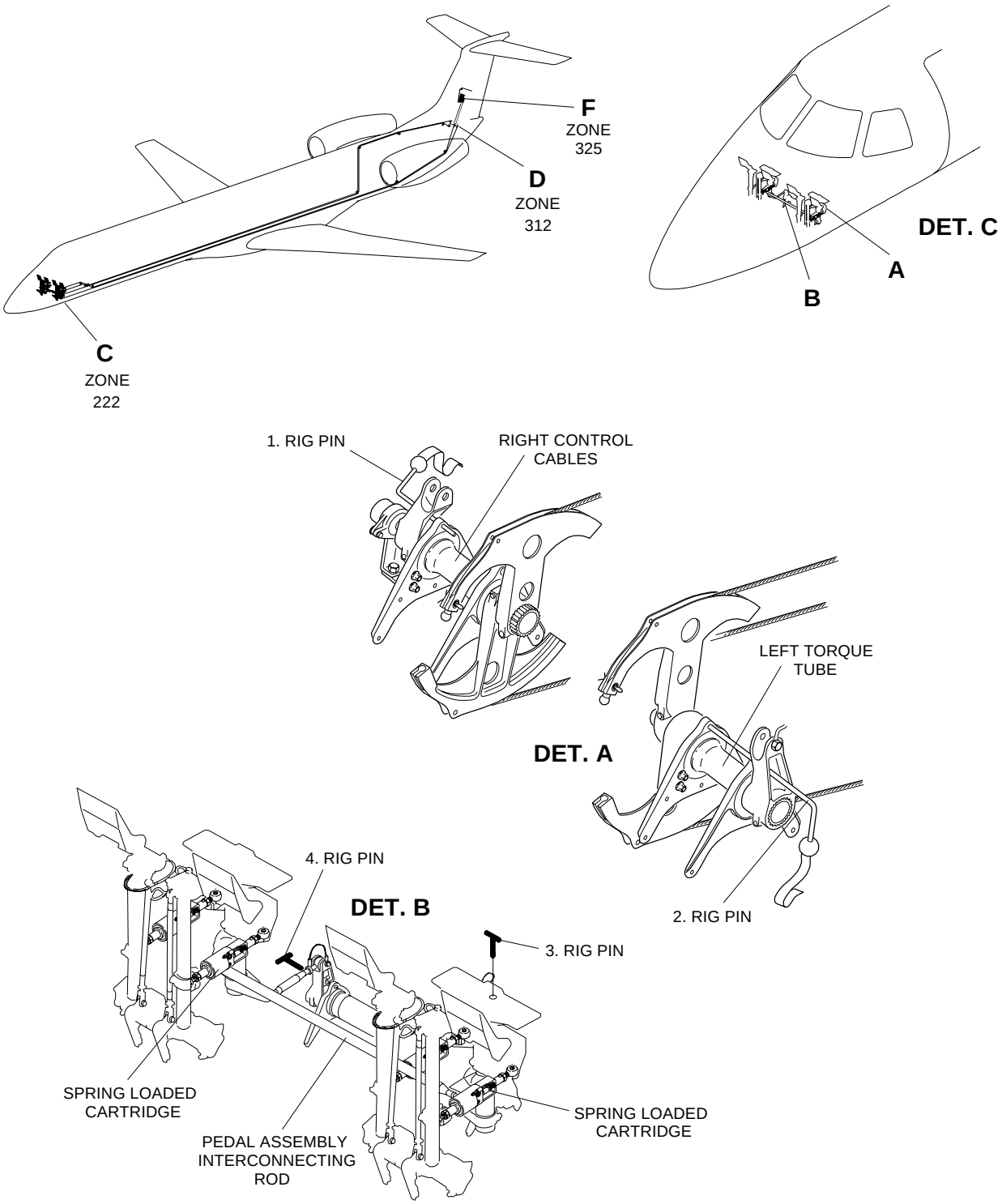
2 FOR AIRCRAFT WITH HYBRID TORQUE TUBE.

EM145AMM270814B.DGN

EFFECTIVITY: JAA CERTIFIED AIRCRAFT (PRE-MOD SB 145-27-0015) or not equipped with MOVABLE PRIMARY STOP SYSTEM.

Rudder Torque Tubes - Location

Figure 503 - Sheet 1

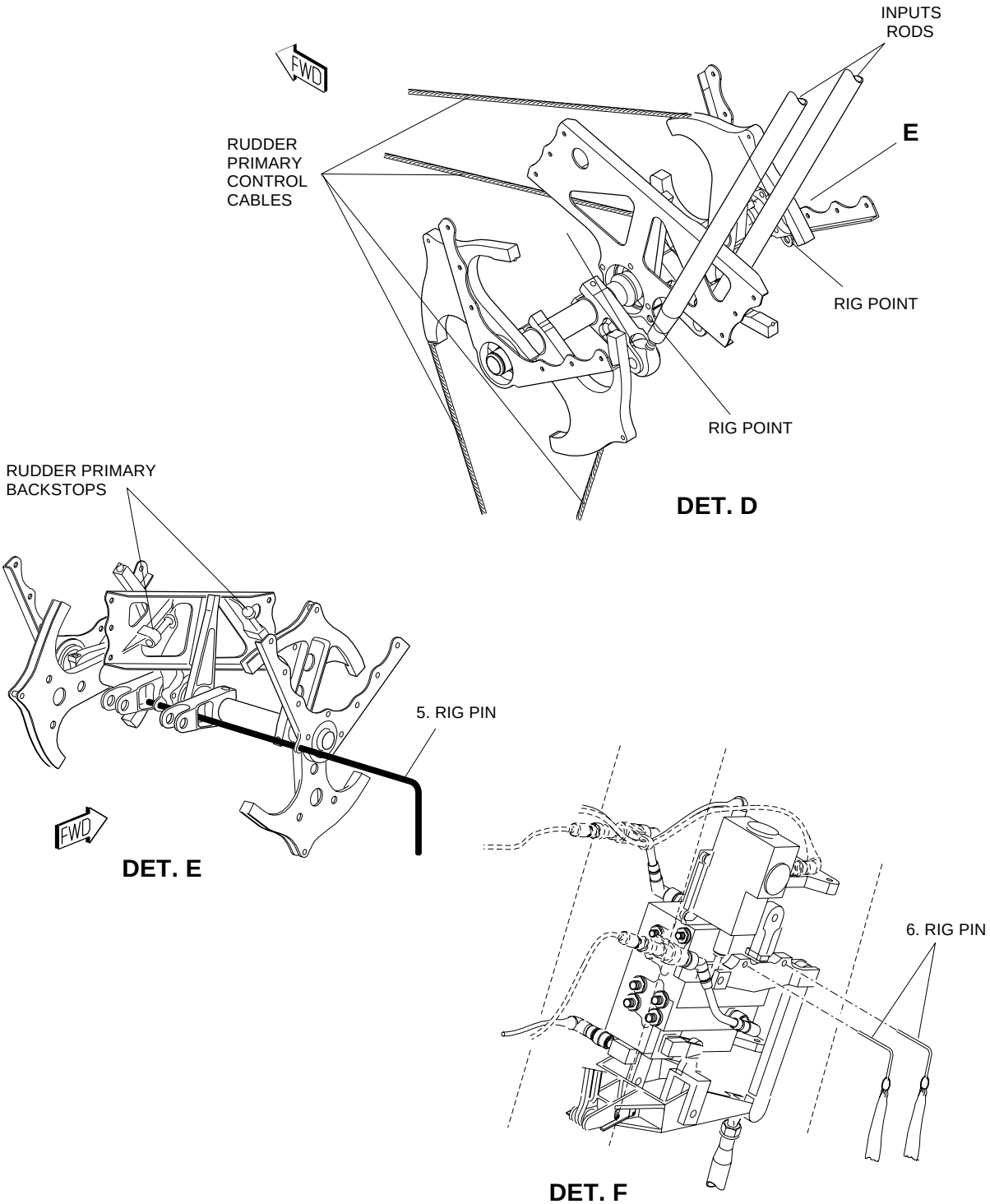


EM145AMM270885A.DGN

EFFECTIVITY: JAA CERTIFIED AIRCRAFT (PRE-MOD SB 145-27-0015) or not equipped with MOVABLE PRIMARY STOP SYSTEM.

Rudder Torque Tubes - Location

Figure 503 - Sheet 2

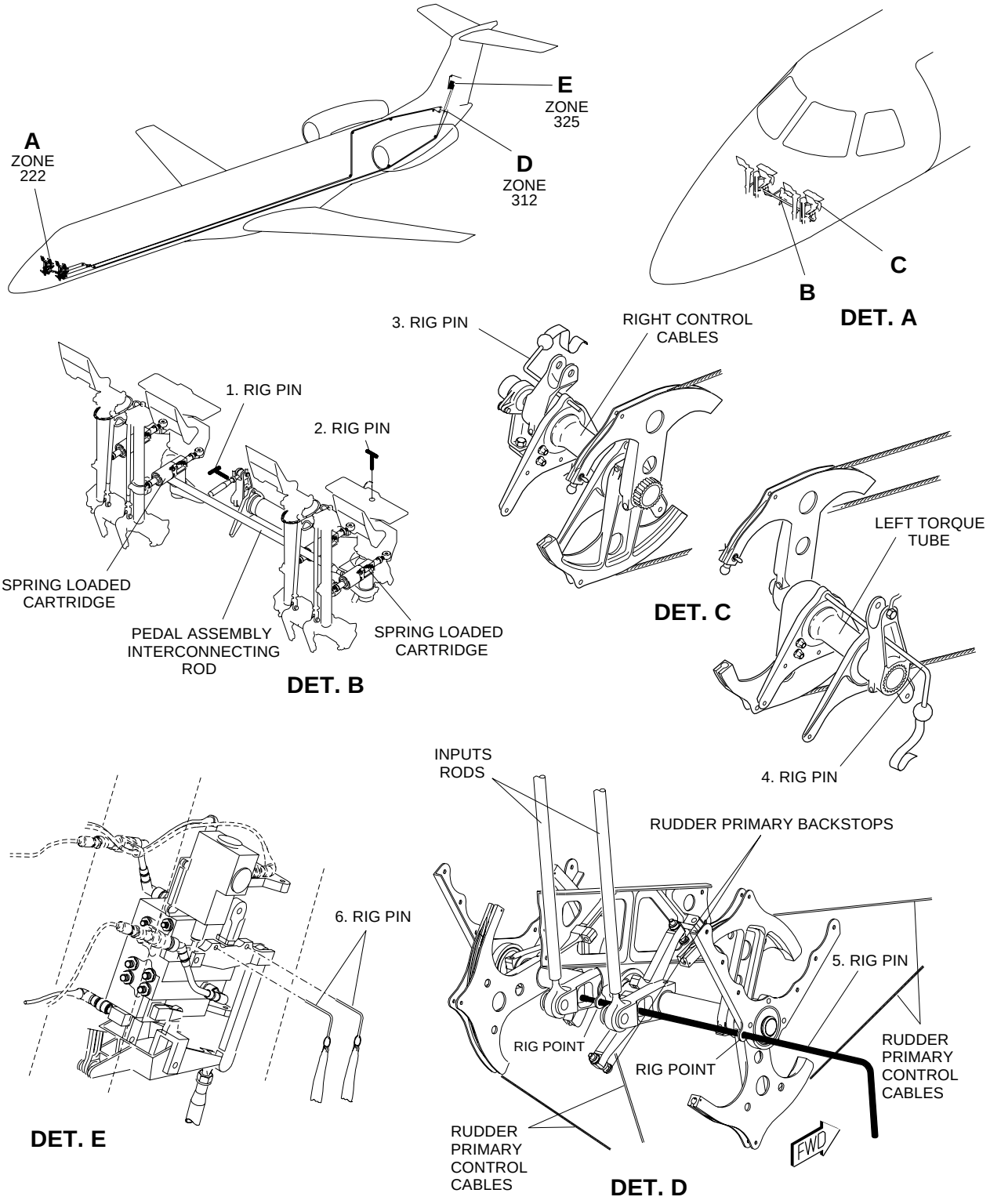


EM145AMM270713E.DGN

EFFECTIVITY: JAA CERTIFIED AIRCRAFT (POST-MOD SB 145-27-0015) or equipped with MOVABLE PRIMARY STOP SYSTEM.

Rudder Torque Tubes - Location

Figure 504

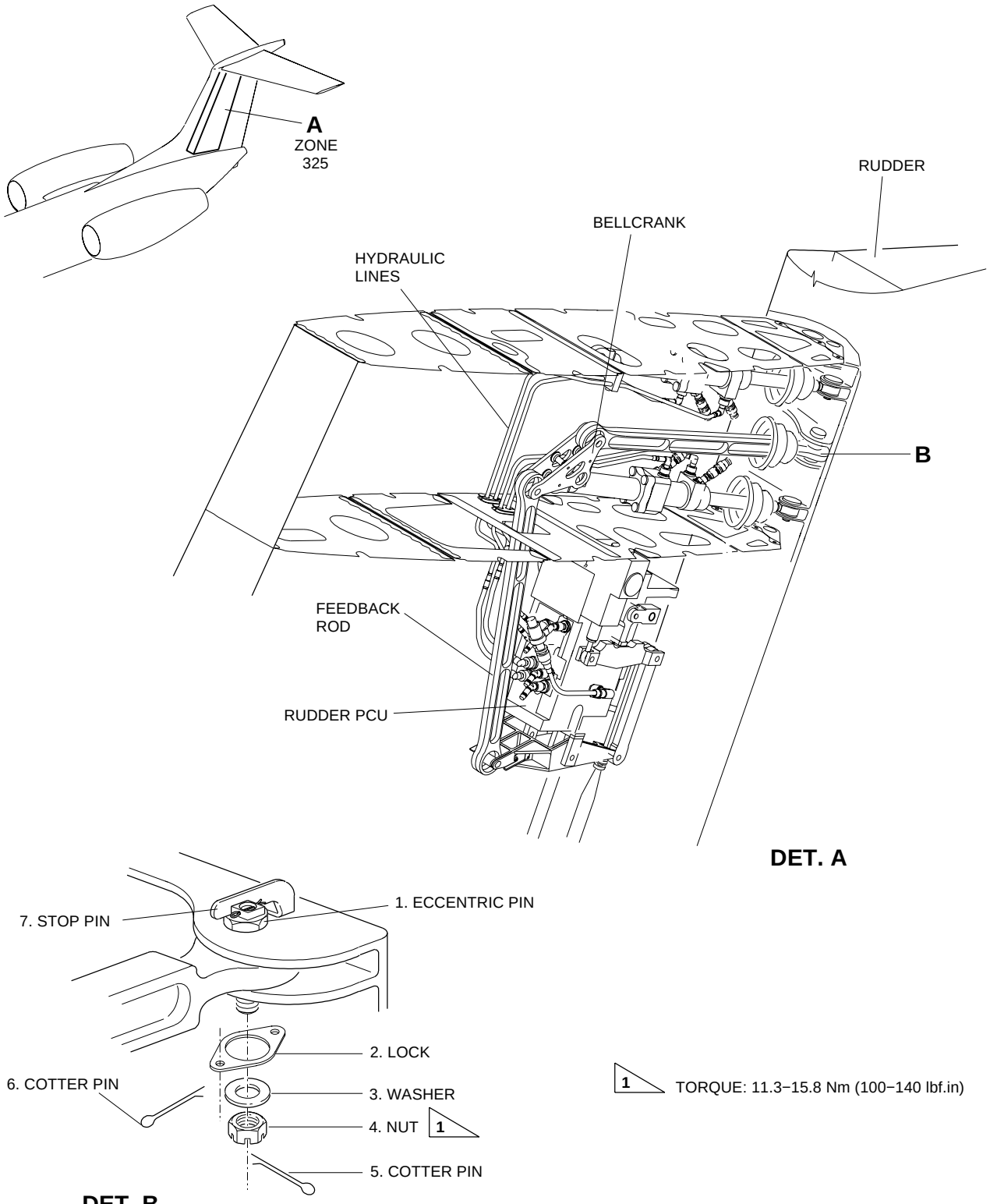


EM145AMM270339C.DGN

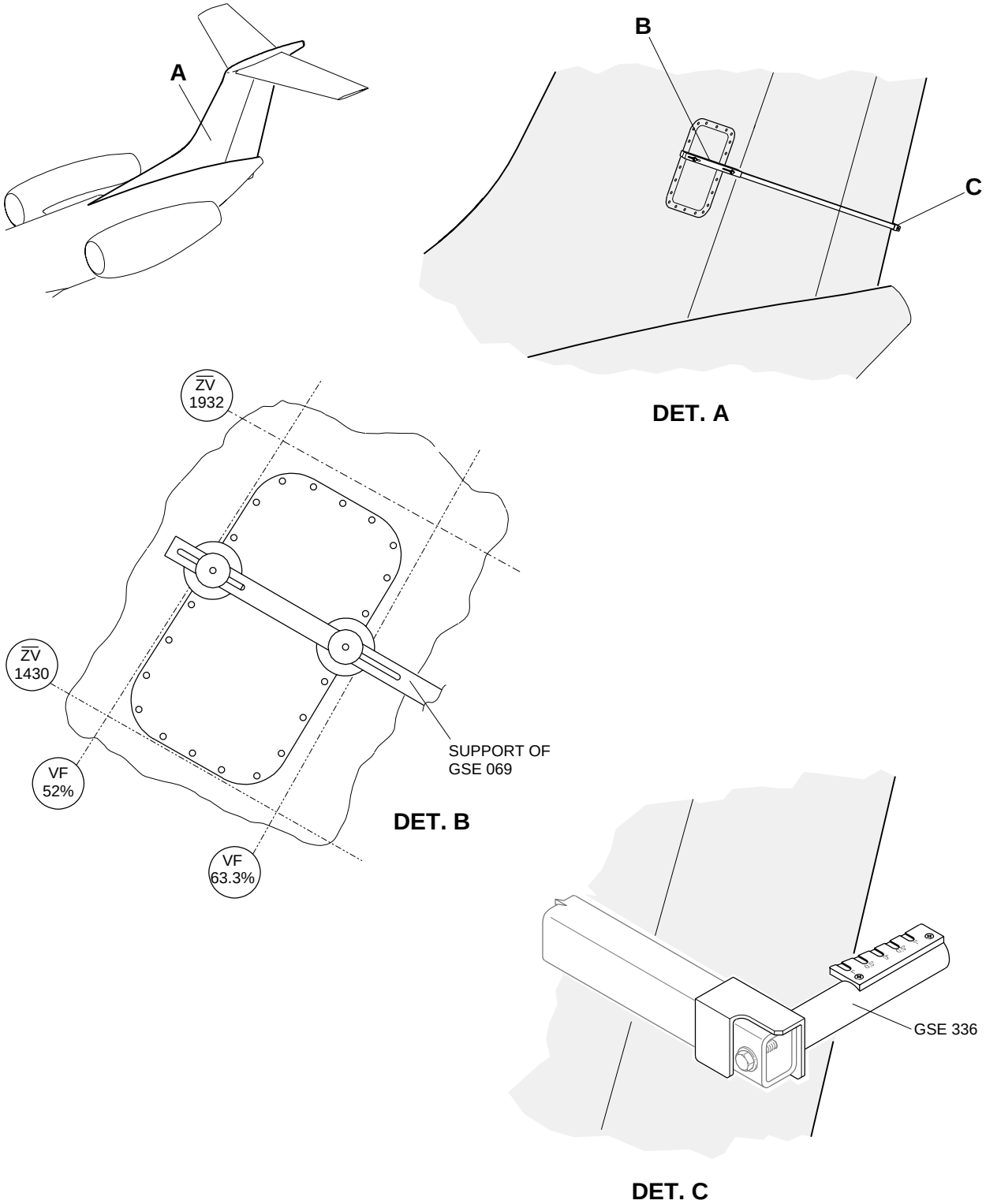
EFFECTIVITY: ALL

Eccentric Pin - Location

Figure 505

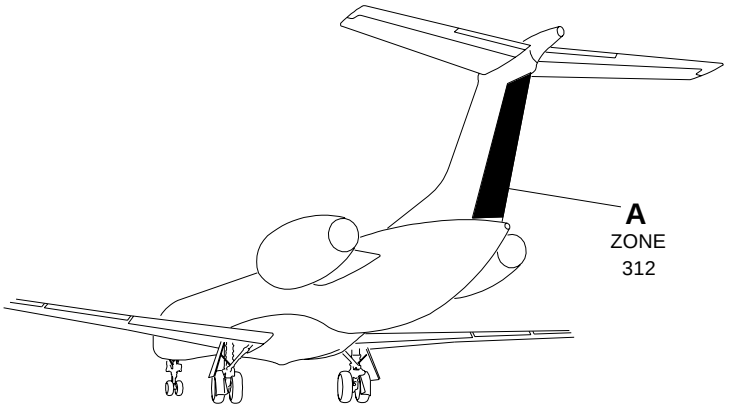


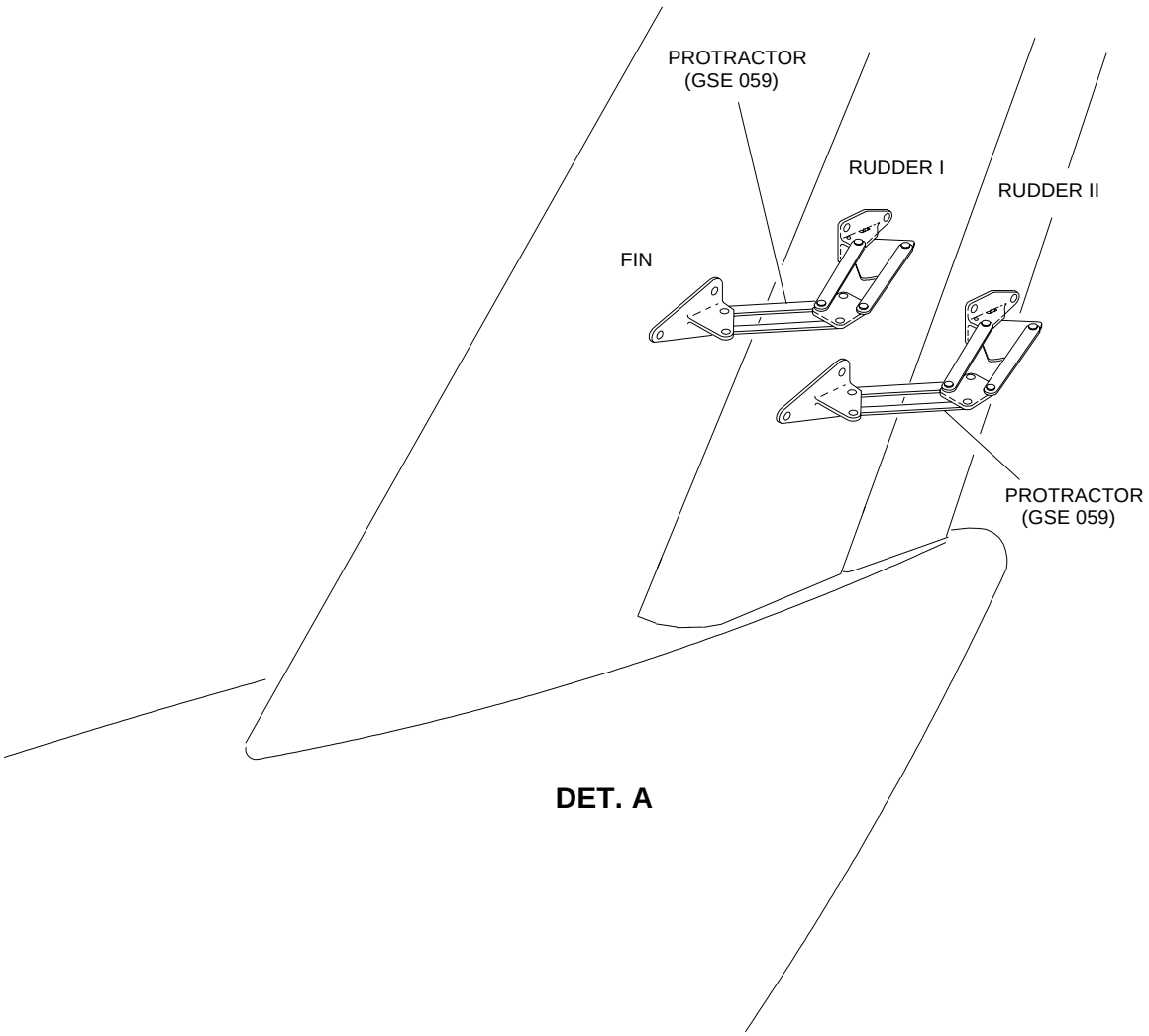
EFFECTIVITY: ALL
Gauge-Setting - Installation
Figure 506



145AMM270569.MCE

EFFECTIVITY: ALL
Protractor - Installation
Figure 507





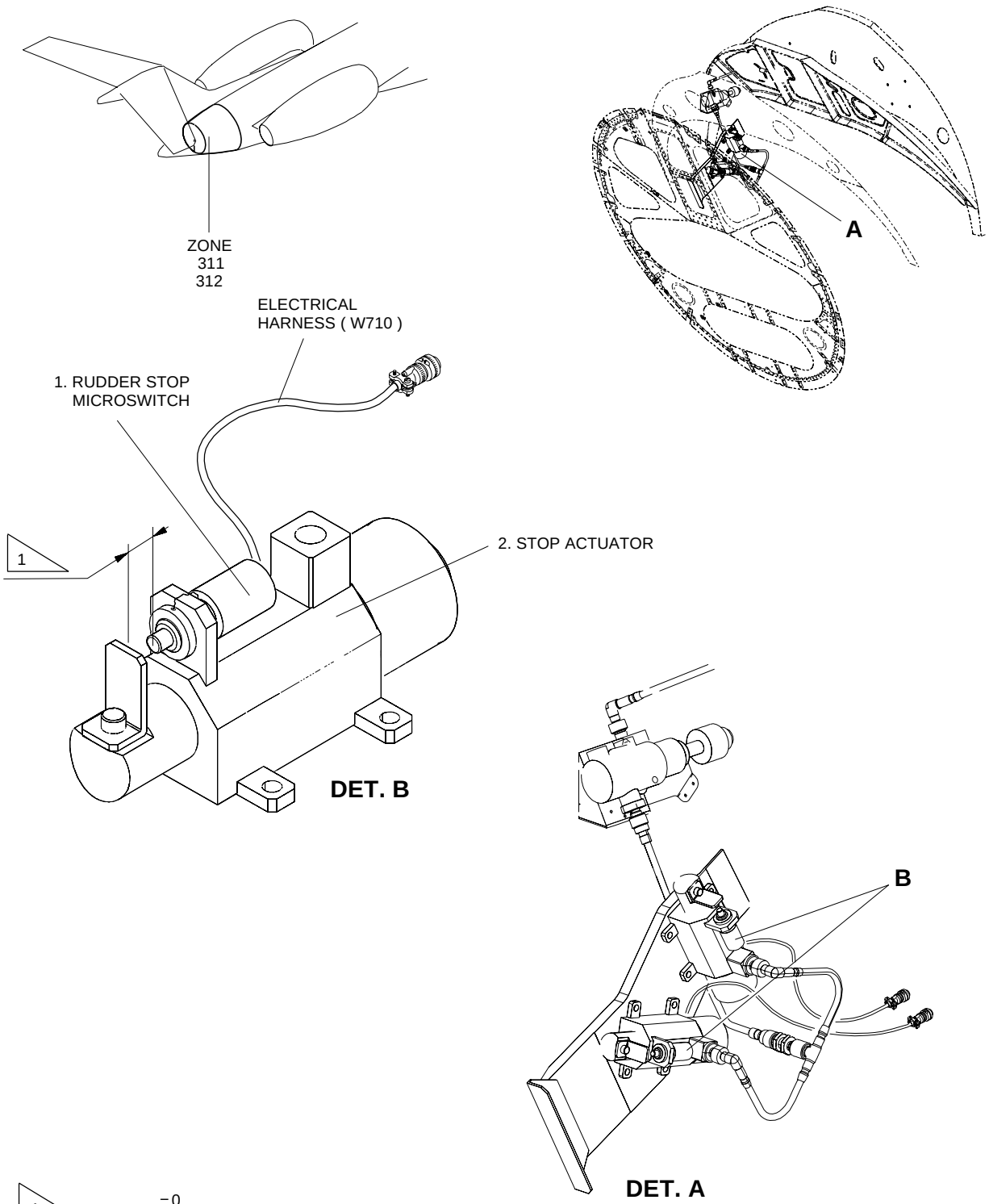
DET. A

EM145AMM270883A.DGN

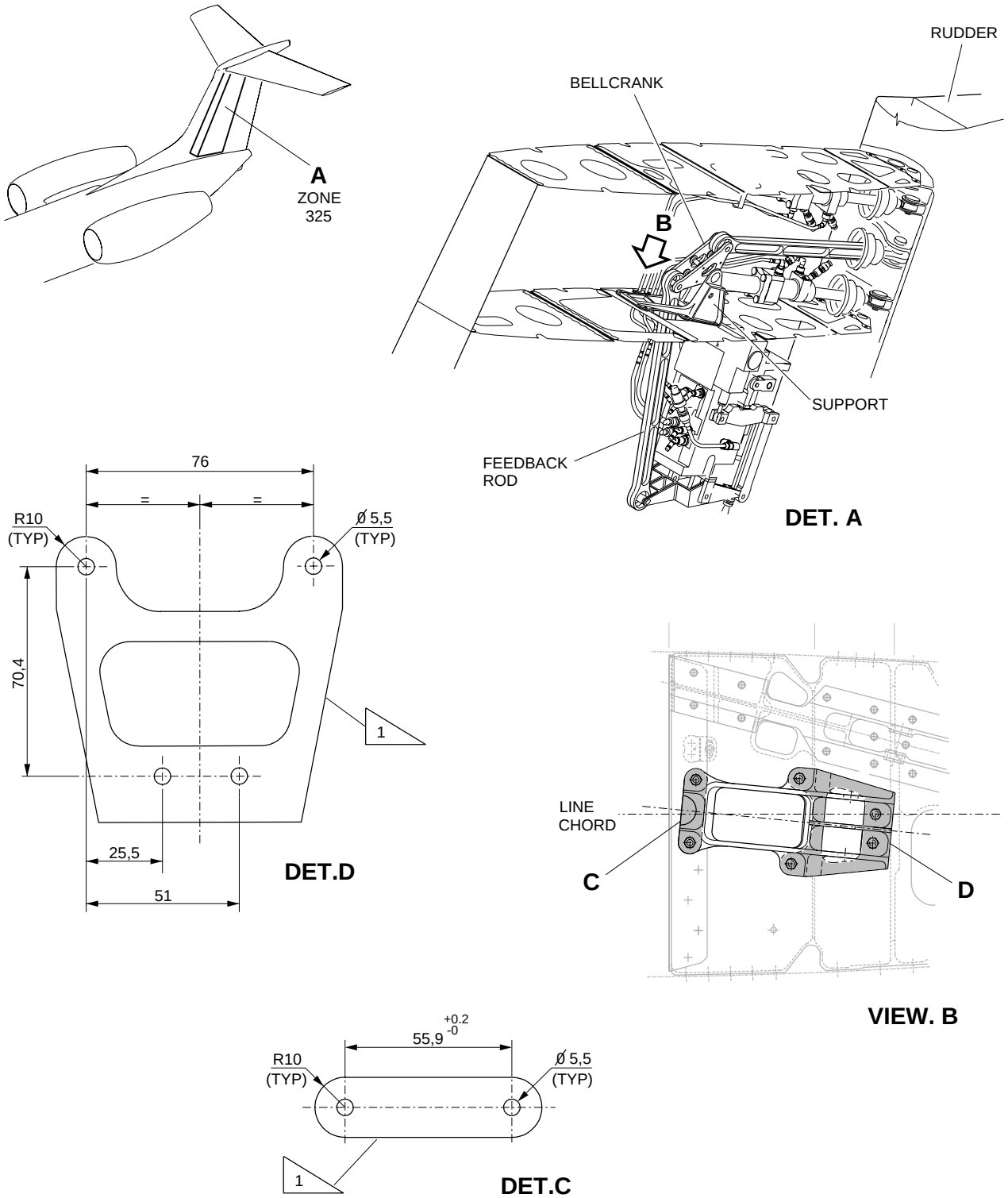
EFFECTIVITY: JAA CERTIFIED AIRCRAFT (POST-MOD SB 145-27-0015) or equipped with MOVABLE PRIMARY STOP SYSTEM.

Rudder Stop Microswitch - Adjustment

Figure 508



EFFECTIVITY: ALL
Shims - Location
Figure 509



145AMM270600.MCE

TASK 27-20-00-700-803-A
EFFECTIVITY: ALL

3. RUDDER SECONDARY BACKSTOP - ADJUSTMENT

A. General

(1) This task gives the procedures to the check and adjustment of the rudder secondary backstop.

B. References

REFERENCE	*DESIGNATION*
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 25-12-06-000-801-A/400	PEDAL ASSEMBLY LINING - REMOVAL
AMM TASK 25-12-06-400-801-A/400	PEDAL ASSEMBLY LINING - INSTALLATION
AMM TASK 27-20-00-700-801-A/500	ADJUSTMENT OF THE RUDDER NEUTRAL POSITION AND DEFLECTIONS OF RUDDER I AND RUDDER II

C. Zones and Accesses

ZONE	*PANEL/DOOR*	*LOCATION*
223	223HZ	Cockpit
224	224HZ	Cockpit

D. Tools and Equipment

ITEM	*DESCRIPTION*	*PURPOSE*	*QTY*
GSE 058	Kit, rig pins, flight controls	To keep the surface and rudder pedals locked in the neutral position	
Commercially available	Vernier caliper	To measure the correct length of the rudder secondary backstop	

E. Auxiliary Items

Not Applicable

F. Consumable Materials

SPECIFICATION (BRAND)	*DESCRIPTION*	*QTY*
MS20995C32	Lockwire	AR

G. Expandable Parts

Not Applicable

H. Persons Recommended

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

I. Preparation

SUBTASK 841-003-A

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

(2) Do not do other task on the rudder system.

(3) Make sure that hydraulic systems 1 and 2 are depressurized.

(4) If necessary, remove the pilot seats (AMM TASK 25-11-01-000-801-A/400).

(5) Remove the pedal assembly linings (AMM TASK 25-12-06-000-801-A/400) to get access to the rudder secondary backstops.

J. Adjustment of the Rudder Secondary Backstop (Figure 510) (Figure 511)

SUBTASK 720-005-A

(1) With a vernier caliper, measure the length of the rudder secondary backstops. The value must be 29.5 ± 0.4 mm (1.1614 ± 0.0157 in).

(2) If necessary, adjust the backstop:

(a) Cut and remove the lockwire.

(b) Install the rig pin to the rudder pedals (Figure 510).

(c) Release the nuts.

(d) Do step (1) again.

(e) Tighten the nuts.

(f) Remove the rig pin from the rudder pedals.

(g) Do a check of the deflection of the rudder surface (AMM TASK 27-20-00-700-801-A/500 as applicable).

NOTE: If necessary, adjust the secondary backstops again. Do steps (b) thru (g).

(h) Safety the backstops with new lockwire.

K. Follow-on

SUBTASK 842-003-A

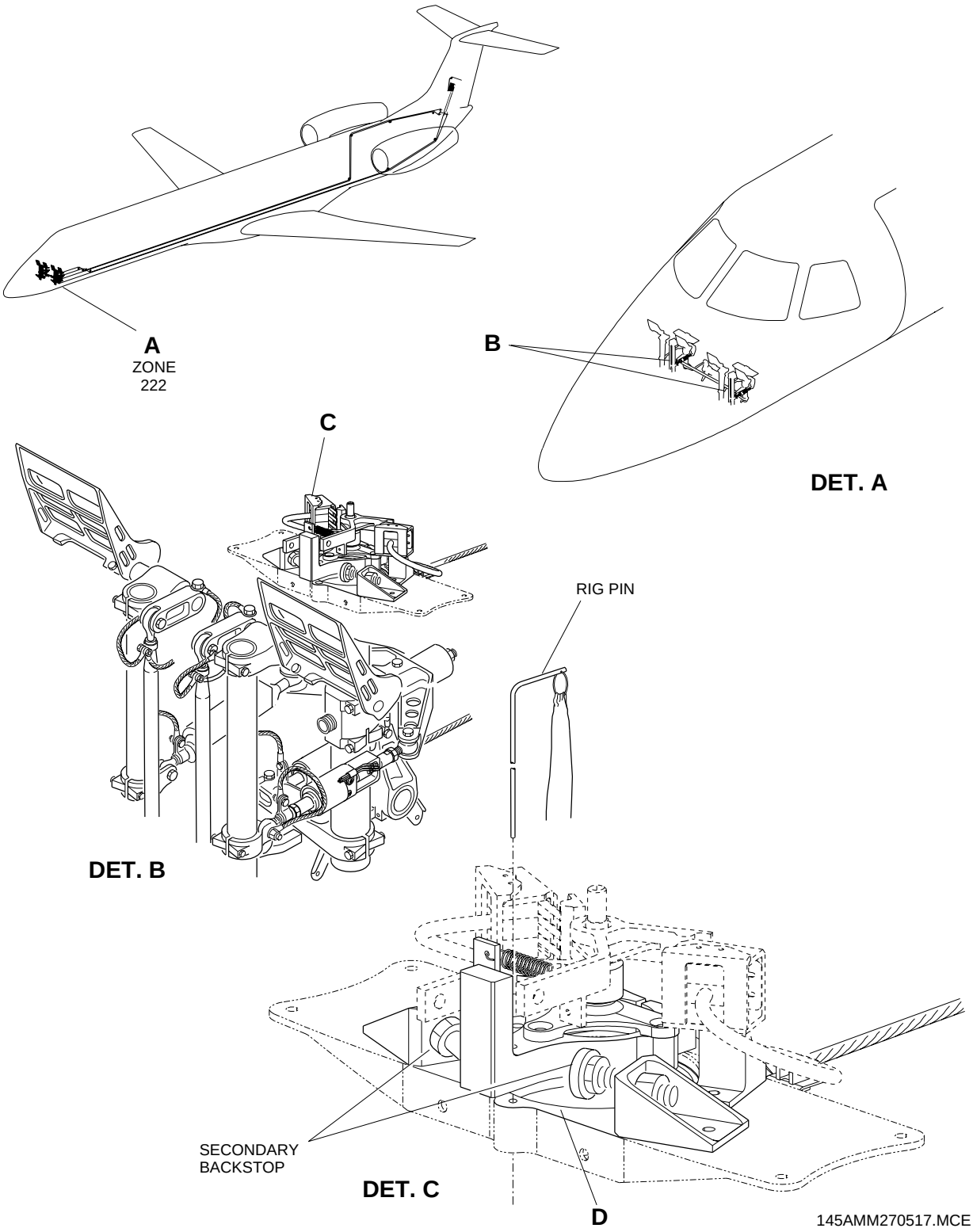
(1) Install the pedal assembly linings (AMM TASK 25-12-06-400-801-A/400).

(2) If you removed the pilot seats, install them again now (AMM TASK 25-11-01-400-801-A/400).

EFFECTIVITY: ALL

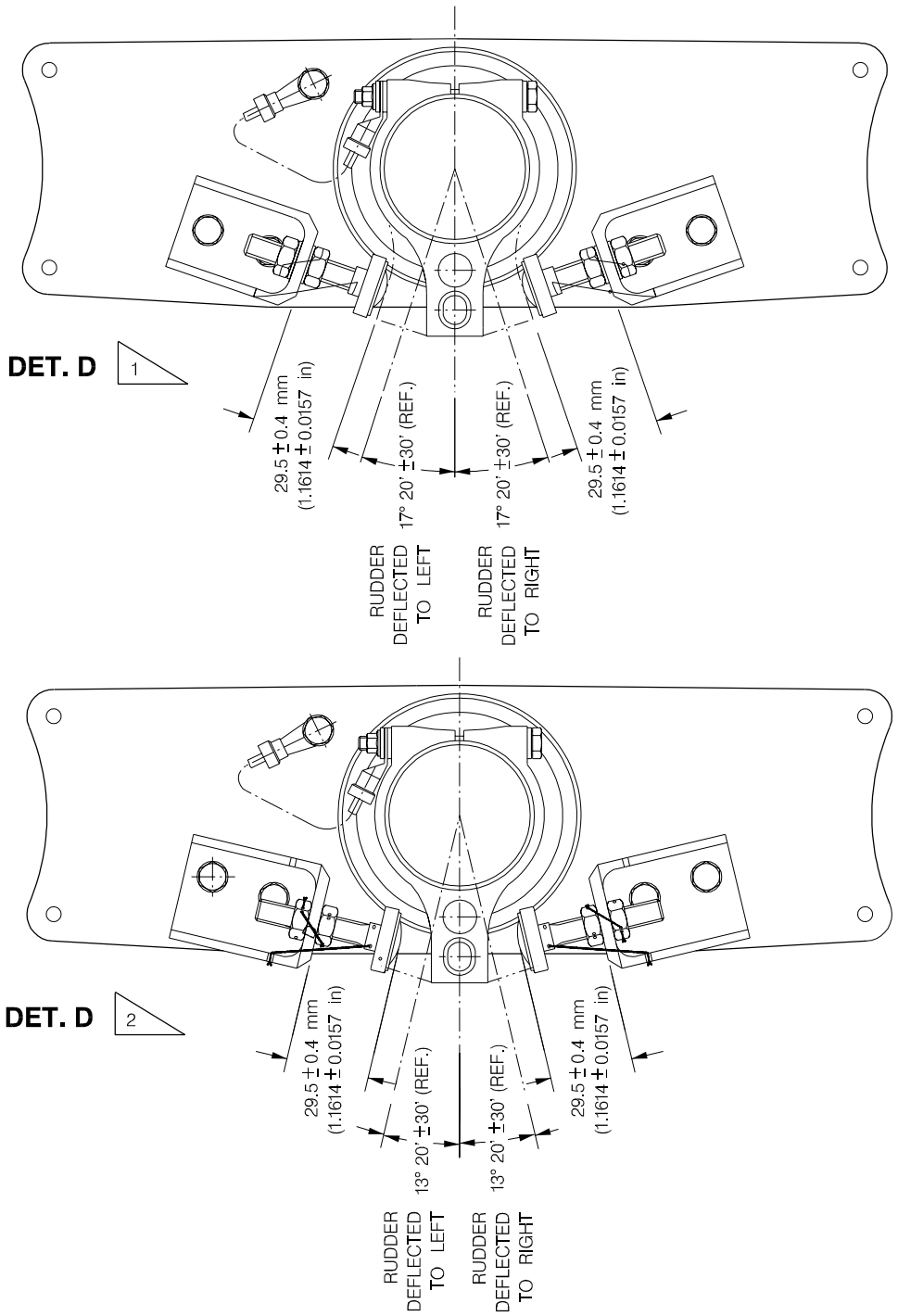
Secondary Backstops - Location

Figure 510



EFFECTIVITY: ALL

Secondary Backstops - Adjustment
Figure 511



1 AIRCRAFT WITHOUT RUDDER MOVABLE PRIMARY STOP

2 AIRCRAFT WITH RUDDER MOVABLE PRIMARY STOP

AMM270518.MCE A