AILERONS AND CONTROL COLUMN - MAINTENANCE PRACTICES

1. General

A. For lubrication requirements of the aileron and control system, refer to Chapter 12, Flight Controls - Servicing.

2. Control Column Removal/Installation

A. Remove the Control Column (Refer to Figure 201).

(1) Remove the carpet or vinyl cover to get access to the floorboard. Refer to Chapter 25, Floor Covering/Control Column Cover - Maintenance Practices.

(2) Remove the screws from the control column covers, then disconnect the floor column covers from the column tubes.

(3) Remove the screws from the scuff plates and disconnect the scuff plates from the floorboard. Remove the floor cover plates as required to get access to the torque tube assembly mounting bolts.

(4) Remove the nuts, washers and screws. Remove the cover plate from the instrument panel.

(5) Remove the nut, washer and bolt. Disconnect the control tube and control wheel from the shaft. Disconnect the housing cap and remove the control tube, cover plate and cable from the system.

(6) Remove the safety wire or clip, and loosen the turnbuckles. Remove the safety wire and screws from the cable guard. Disconnect the cable guard from the column.

(7) Remove the screws and spacers from the quadrant and release the cables.

(8) Remove the nuts, washers and bolts. Disconnect the column from the torque tube.

(9) Remove the screws from the inboard channels, outboard stiffeners and cap strips. Disconnect the inboard channels and outboard stiffeners from the longerons. Disconnect the cap strips from the supports.

(10) Remove the nuts, washers and bolts from the cables. Disconnect the cables from the rudder arms.

(11) Cut the safety-wire and remove the roll pin from the coupler. Disconnect the flex shaft from the coupler.

(12) Remove the nuts, washer, bolts, bearing and bushing. Disconnect the link and the plates from the steering pushrod.

(13) Remove the cotter pin, nut, washer and bolt. Disconnect the pushrod from the support arm.

(14) Remove the cotter pin, nut, washer and bolt from the support arms.

(15) Lift the torque tube assembly with the inboard and outboard cables attached from under the floorboard, and remove them from the system.

NOTE: Remove the bearings from the support arms. Clean, dry with air, and lubricate the bearings with MIL-G- 81322 general purpose grease before installation of the torque tube assembly. Replace the bearings in the support arms.

B. Install Control Column (Refer to Figure 201).

(1) Find the torque tube assembly with the inboard and outboard cables attached, under the floorboard mounting brackets.

(2) Replace the bolts, washers, nuts and cotter pins.

(3) Connect the pushrod to the support arm and replace the bolt, washer, nut and cotter pin.

(4) Connect the link and the plates to the steering pushrod. Replace the bolts, bearing, washers, bushings and nuts.

(5) Connect the flex shaft to the coupler, align the attaching holes and replace the roll pin. Use safety wire to connect the roll pin.

(6) Connect the rudder cables to the rudder arms and replace the bolts, washers and nuts.

(7) Attach the column tubes to the torque tube. Align the attaching holes and replace the bolts, washers and nuts.

(8) Attach the control tubes to the shaft, replace the bolts, washers and nuts.

(9) Connect the housing cap to the electrical plug, attach the cover plate to the instrument panel, and replace the screws, washers and nuts.

(10) Connect the ball-ends of the right inboard and right outboard cables to the right quadrant and replace the screws and spacers. Use safety wire to connect the screws.

(11) Connect the ball-ends of the left inboard and left outboard cables to the left quadrant and replace the screws and spacers. Use safety wire to connect the screws.

(12) Use tape to attach a rod or bar across the top of the control wheels.

(13) Tighten the turnbuckles until the cable tension is 30 pounds, +5 or -5 pounds (133.45 N, +22.24 or -22.24 N). Use safety wire or install clips in the turnbuckles. Remove the rod or bar from the top of the control wheels.

NOTE: All control surface cable tensions must be set at an ambient temperature of 70°F (21°C). Let the temperature of the airplane stabilize for four hours before setting the cable tension.

(14) Attach the inboard channels and the outboard stiffeners to the longerons. Replace the screws.

(15) Attach the cap strips to the supports and replace the screws.

(16) Attach the scuff plates to the supports and replace the screws.

(17) Install the control column covers on the column tube assemblies and attach the control column covers to the scuff plates and instrument panels. Replace the screws.

(18) Replace the access panels and carpet or vinyl floor cover.

3. Column Tube Assembly Bearings Removal/Installation

A. Remove the Column Tube Assembly Bearings (Refer to Figure 201).

(1) Cut the safety wire and remove the nut from the shaft.

(2) Remove the cotter pin, nut, washer, and bolt. Disconnect the quadrant from the shaft. Disconnect the shaft from the column tube assembly.

(3) Remove the seals and bearings from the column tube assembly.

B. Install the Column Tube Assembly Bearings (Refer to Figure 201).

(1) Clean the column tube assembly, bearings, seals and shaft and dry with air.

(2) Replace the bearings and seals in the column tube assembly. Push the shaft through the seals, bearings, and column tube assembly.

(3) Attach the quadrant to the shaft. Align the mounting holes and replace the bolt, washer, nut, and cotter pin.

(4) Replace the nut on the shaft. Torque the nut at 5 to 10 inch pounds (0.56 to 1.13 N-m) and attach with safety wire.

4. Pulleys, Cables, Quadrants and Bell Cranks Removal/Installation

A. Remove the Pulleys, Cables, Quadrants and Bell Cranks (Refer to Figure 202).

(1) Remove the carpet or vinyl floor covers, plywood floor covers in Model 208 and 208B airplanes, floorboard access covers, scuff plates, wing access covers and unzip the headliner to get access to the system.

(2) Remove the screws, washers and nuts from the lower aileron quadrant.

(3) Remove the cable guard from the support.

(4) Cut the safety wire or remove the clips and loosen the turnbuckles on the direct and fuselage loop cables.

(5) Cut the safety wire, remove the screws and spacers. Disconnect the ball-ends of the fuselage loop cables from the quadrant.

(6) Remove the bolt, spacer, washer and nut and disconnect the pulleys from the support.

(7) Remove the nuts, washers and bolts. Disconnect the pulleys from the supports.

(8) (208) Remove the bolt and disconnect the pulley from the support.

(9) (208B) Remove the bolt, washer and nut. Disconnect the pulley and cable guard from the bracket.

(10) (208B) Remove the bolt, washer and nut. Disconnect the pulley from the bracket.

(11) (208B) Remove the bolt, washer and nut. Disconnect the pulley from the bracket.

(12) Remove the bolt and washer and disconnect the pulley and cable guard from the bearing.

(13) Remove the cotter pins, washers and pins. Disconnect the ball-ends of the fuselage loop and direct cables from the lower quadrant.

(14) Remove the nuts, washers and bolts. Disconnect the direct and carry-thru pulleys from the support.

(15) Disconnect the cables from the upper quadrant and lower bell crank.

(a) On Airplanes 20800001 thru 20800415 and 20800417 thru 20800420 and Airplanes 208B0001 thru 208B1215 and 208B1217 thru 208B1313 Incorporating CAB08-6 and Airplanes 20800416 and 20800421 and On and Airplanes 208B1216 and 208B1314 and On, remove the cotter pins, nuts (two each left and right), washers, lock washer and bolts from the upper quadrant.

(b) On Airplanes 20800001 thru 20800415 and 20800417 thru 20800420 and Airplanes 208B0001 thru 208B1215 and 208B1217 thru 208B1313 Not Incorporating CAB08-6 remove the cotter pins, washers, pins and nuts. Disconnect the carry-thru cables from the upper quadrant.

(c) Remove the cotter pins, nuts, washers and bolts from the lower bell crank.

(d) Remove the terminal ends of the direct and carry-thru cables from the bell crank.

NOTE: The direct and carry-thru cables are routed to the bell crank in the opposite wing. Removal procedures for the cables, quadrants, pulleys, spoiler and aileron pushrods are identical for both wings.

(16) Remove the fuselage loop, direct and carry-thru cables from system.

NOTE: To make the replacement of cables easier, attach a length of wire to the cable to be removed from the system. After removing the cable, leave the wire in place, routed through the structure. To replace the cable, attach it to wire, and pull the cable into position with the wire.

(17) Remove the nut, washer and bolt. Disconnect the upper and lower quadrants from the support.

(18) Disconnect the spacer, washers and the upper and lower quadrant bearings from the quadrant.

NOTE: Remove the upper and lower quadrant bearings from the quadrant. Clean and dry the bearings with air and lubricate by hand with MIL-PRF-81322 general purpose grease. Replace the bearings and stake each bearing a minimum of six places.

(19) Remove the cotter pins, nuts, washers and bolts. Disconnect the spoiler pushrod from the bell crank and the bracket.

(20) Remove the washer, cotter pin, nut, washer and bolt. Disconnect the aileron pushrod from the bell crank and the support.

(21) Remove the bolt and washer. Disconnect the bell crank from the support.

B. Install Pulleys, Cables and Bell Cranks (Refer to Figure 202).

(1) Attach the bell crank to the support. Install the washer and bolt.

(2) Attach the aileron pushrod to the bell crank and the support. Install the washer, bolts, nut and cotter pin.

(3) Attach the spoiler pushrod to the bell crank and to the spoiler attach bracket. Install the bolts, washers, nuts and cotter pins.

(4) Attach the spacer, washers, and the upper and lower quadrant to the support. Install the bolt, washer and nut.

(a) Make sure that the minimum distance between the upper and lower quadrant is 0.040 inch (1.01600 mm).

(5) Install the fuselage loop, carry-thru and direct cables in system.

(6) On Airplanes 20800001 thru 20800415 and 20800417 thru 20800420 and Airplanes 208B0001 thru 208B1215 and 208B1217 thru 208B1313 Incorporating CAB08-6 and Airplanes 20800416 and 20800421 and On and Airplanes 208B1216 and 208B1314 and On do the steps that follow:

(a) Install the fittings of the direct cables to the quadrant.

(b) Install the fittings of the carry-thru cables to the quadrant.

1 If a square carry-thru cable fitting is installed, make sure that the carry thru cable fitting is turned so that it is flush with the surface of the upper quadrant before you tighten the nuts.

2 Torque the nut that is close to the carry thru cable fitting to 40 inch pounds, +5 or -5 inch pounds (4.5 N-m, +.564 or - .564 N-m).

3 Install safety wire between the two nuts installed on the carry-thru cable.

(c) Install the cotter pins, nuts (two each left and right) , washers, lock washer and bolts from the upper quadrant.

(d) Install the cotter pins, nuts, washers and bolts from the lower bell crank.

(e) Install the fittings of the direct and carry-thru cables from the bell crank.

NOTE: The direct and carry-thru cables are routed to the bell crank in the opposite wing. Installation procedures for the cables, quadrants, pulleys, spoiler and aileron pushrods are identical for both wings.

(7) On Airplanes 20800001 thru 20800415 and 20800417 thru 20800420 and Airplanes 208B0001 thru 208B1215 and 208B1217 thru 208B1313 Not Incorporating CAB08-6 do the steps that follow:

(a) Attach the carry-thru cables to the upper quadrant. Install the nuts, pins, washers and cotter pins.

(b) Install the cotter pins, nuts, washers and bolts from the lower bell crank.

(c) Install the fittings of the direct and carry-thru cables from the bell crank.

NOTE: The direct and carry-thru cables are routed to the quadrant in the opposite wing. Installation procedures for cables, quadrant, pulleys, spoilers and aileron pushrods are the same for both wings.

(8) Attach the ball-ends of the fuselage loop and direct cables to the lower quadrant. Install the pins, washers and cotter pins.

(9) Attach the direct and carry-thru pulleys to the support. Install the bolts, washers and nuts.

(10) Attach the pulley and cable guard to the bearing. Install the bolt and washer.

(11) (208) Attach the pulley to the support. Install the bolt and washer.

(12) (208B) Attach the pulley and cable guard to the bracket. Install the bolt, washer and nut.

(13) (208B) Attach the pulley to the bracket and install the bolt.

(14) (208B) Attach pulley to the bracket. Install the bolt, washer and nut.

(15) Attach the left and right pulleys to the supports. Install the bolts, washers, and nuts.

(16) Attach the left and right pulleys to the support (SD). Replace the bolt, spacer, washer, and nut (SC).

(17) Attach the ball-ends of the fuselage loop cables to the quadrant. Replace the spacers and bolts.

(18) Tighten and attach with safety wire or install clips on the fuselage loop and direct loop turnbuckles.

(19) Attach the cable guard to the support. Replace the screws, washers, and nuts.

(20) Do the rigging for the aileron system, refer to Chapter 27, Ailerons and Control Column-Maintenance Practices.

(21) Close the headliner, replace the wing access covers, scuff plates, floorboard access covers and carpet or vinyl floor covers (plywood floor covers in Model 208 and 208B airplanes).

5. Rigging Aileron System

A. Rigging Procedures (Refer to Figure 202).

(1) Remove the wing access plates and open the headliner to get access to the turnbuckles and bell cranks as needed.

NOTE: All control surface cable tensions must be adjusted at an ambient temperature of 70°F (21°C). Let the temperature of the airplane stabilize for four hours before the cable tensions are set.

(2) Remove the safety wire or clips from the fuselage loop and direct cable turnbuckles.

(3) If installed, remove the safety wire from between the nuts on the terminal ends of the carry-thru cables.

(4) Loosen the nuts on the terminal ends of the carry-thru cables.

(5) Release the tension on all cables.

(6) Put a bar across the control wheels and look for level. If not level, refer to Control Column Removal/Installation for leveling control wheels.

(7) Put tape across the top of the control wheels to hold them in a neutral position.

(8) Install the rigging pins, in each of the bell cranks. Use tape to hold the rigging pins in place.

(9) Remove the bolts and washers to disconnect the aileron pushrod from the aileron.

(10) On Airplanes 20800001 thru 20800415 and 20800417 thru 20800420 and Airplanes 208B0001 thru 208B1215 and 208B1217 thru 208B1313 Incorporating CAB08-6 and Airplanes 20800416 and 20800421 and On and Airplanes 208B1216 and 208B1314 and On do the steps that follow:

(a) If a square carry-thru cable fitting is installed, make sure that the carry thru cable fitting is turned so that it is flush with the surface of the upper quadrant before you tighten the nuts.

(b) Tighten the nuts on the terminal ends of the carry-thru cables evenly to set the cable tension at 40 pounds, +5 or -5 pounds (177.93 N, +22.41 or -22.41 N).

(c) Tighten the turnbuckle on the direct cable to set the cable tension at 40 pounds, +5 or -5 pounds (177.93 N, +22.41 or -22.41 N). Use safety wire or install clips on the turnbuckle.

(d) Torque the nut that is close to the carry thru cable fitting to 40 inch pounds, +5 or -5 inch pounds (4.5 N-m, +.564 or - .564 N-m).

(e) Install safety wire between the two nuts installed on the carry-thru cable.

(11) On Airplanes 20800001 thru 20800415 and 20800417 thru 20800420 and Airplanes 208B0001 thru 208B1215 and 208B1217 thru 208B1313 Not Incorporating CAB08-6 do the steps that follow:

(a) Tighten the nuts on the terminal ends of the carry-thru cables evenly to set the cable tension at 40 pounds, +5 or -5 pounds (177.93 N, +22.41 or -22.41 N).

(b) Tighten the turnbuckle on the direct cable to set the cable tension at 40 pounds, +5 or -5 pounds (177.93 N, +22.41 or -22.41 N). Use safety wire or install clips on the turnbuckle.

(12) Tighten the fuselage loop turnbuckles on the fuselage loop cables to set the cable tension at 20 pounds, +5 or -5 pounds (88.96 N, +22.41 or -22.41 N). Use safety wire or install clips on the turnbuckles.

(13) With the ailerons streamlined, (inboard trailing edge of aileron aligned with outboard trailing edge of flap), attach the aileron pushrods to the supports. Replace the washers and bolts.

(14) Remove the rigging pins from each of the bell cranks.

(15) Attach an inclinometer to the left aileron and set at zero degrees.

WARNING: If turning the control wheels counterclockwise does not put the left aileron in the raised position, the system is rigged backwards. The system must be correctly rigged. Check for crossed or wrapped cables.

(16) Remove the bar from the control wheels and turn the control wheels counterclockwise. This will put the left aileron in a raised position.

(17) Adjust the stop bolt so that it touches the right bell crank at 25 degrees (+4 or -0 degree tolerance) up travel on the left aileron. Tighten the locknut.

(18) Turn the control wheels clockwise, and adjust the stop bolt so that it touches the left bell crank at 16 degrees (+1 or -0 degree tolerance) down travel on the left aileron.

(19) Streamline the right aileron and attach an inclinometer; set at zero degrees.

(20) Examine the travel on the right aileron. Set the locknuts and use safety wire on the pushrods.

(21) When the ailerons have been rigged properly, put the rig pin into the upper quadrant and lower quadrant.

(22) With the ailerons held in a neutral position and flaps completely retracted, make sure the trailing edge of the spoiler is 0.55 inch, +0.05 or -0.05 inch, (13.97 mm, +1.27 or -1.27 mm) above the surface of the flap at the outboard end of the spoiler. Adjust as required.

(23) Remove the rig pin from the upper quadrant and lower quadrant. Turn the control wheels slowly back and forth from stop to stop. Adjust the spoiler pushrod as required to give a 0.01 to 0.03 inch (0.25 to 0.76 mm) clearance between the spoiler trailing edge and the top of the flap surface at the minimum clearance position. The total spoiler travel is 40 degrees up (+5 or -5 degrees), and 0 degrees down (+0 to -5 degrees).

(24) Lock the adjusting nuts on the pushrod safety wire.

(25) Replace the wing access plates and close the headliner.

6. Friction Band Requirements

A. Measuring Friction Band.

NOTE: All friction measurements must be taken with load scale so that the force necessary to move the ailerons is applied tangentially to the direction of rotation of the control wheel. The load scale must be attached to the control wheel inside grip at the lowest possible moment arm. The friction band requirements apply over the complete travel range of the ailerons.

(1) Rotate control wheel approximately 30 degrees counterclockwise from neutral position, attach load scale, rotate wheel clockwise, and check scale reading as wheel passes through neutral position.

(2) Make same check in opposite direction of control wheel rotation.

NOTE: The aileron friction band is calculated by adding scale readings from (1) to scale readings from (2), therefore (1) plus (2) equals friction band.

(3) The maximum permitted friction band is six pounds or less without the autopilot installed, or eight pounds or less with the autopilot installed.

B. Adjusting Friction Band

NOTE: When the friction band exceeds the limitations, the following steps shall be taken to reduce the system friction to an acceptable level:

(1) Check fuselage loop and wing loop for clearance and eliminate all interference as indicated.

(2) Reduce aileron cable tension as required, 15 pounds (66.72 N), fuselage loop, 35 pounds (155.69 N), wing loop with ailerons in neutral position.

(3) Check and adjust pulley alignment as indicated.

Figure 201 : Sheet 1 : Control Column Installation

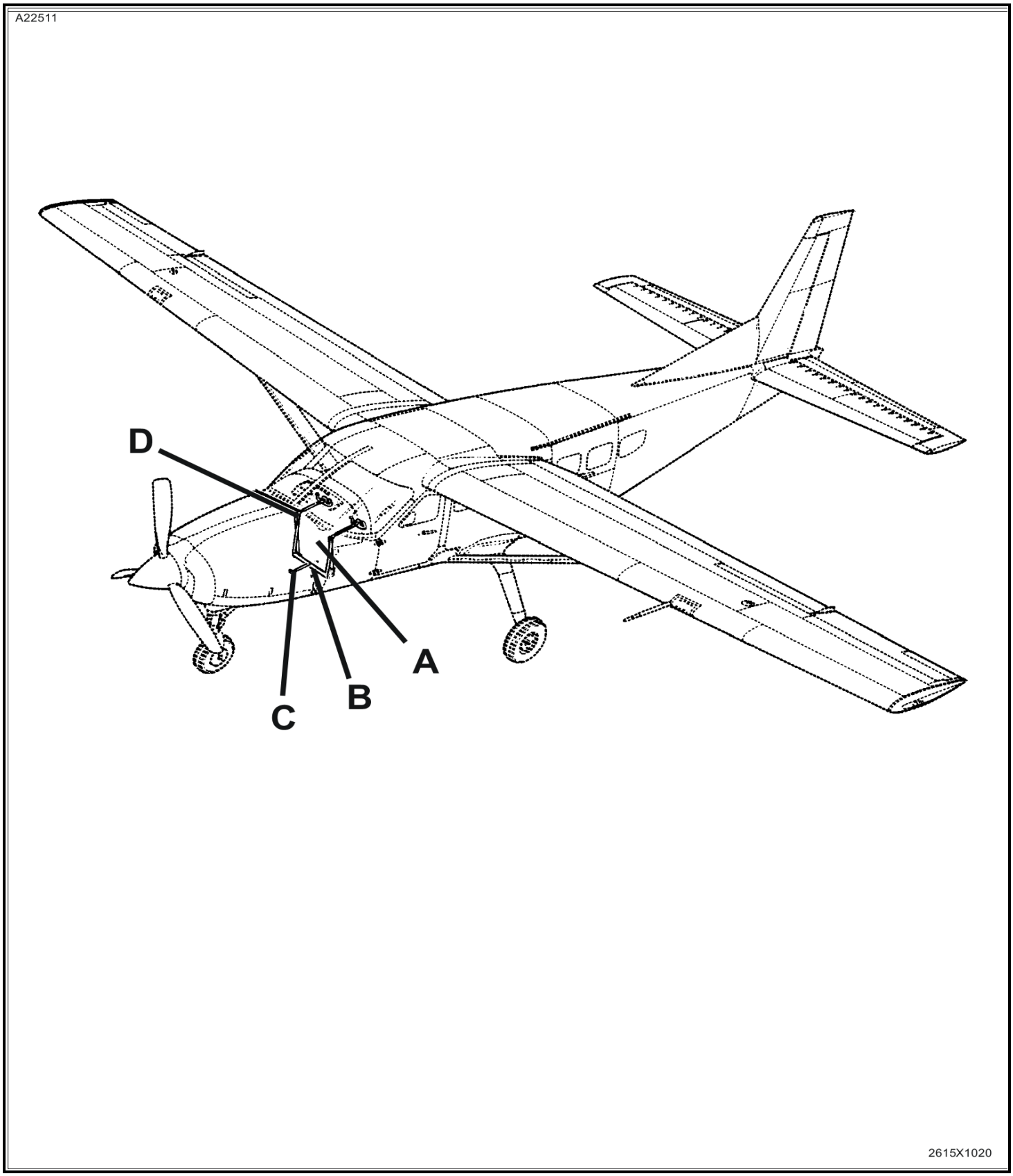


Figure 201 : Sheet 2 : Control Column Installation

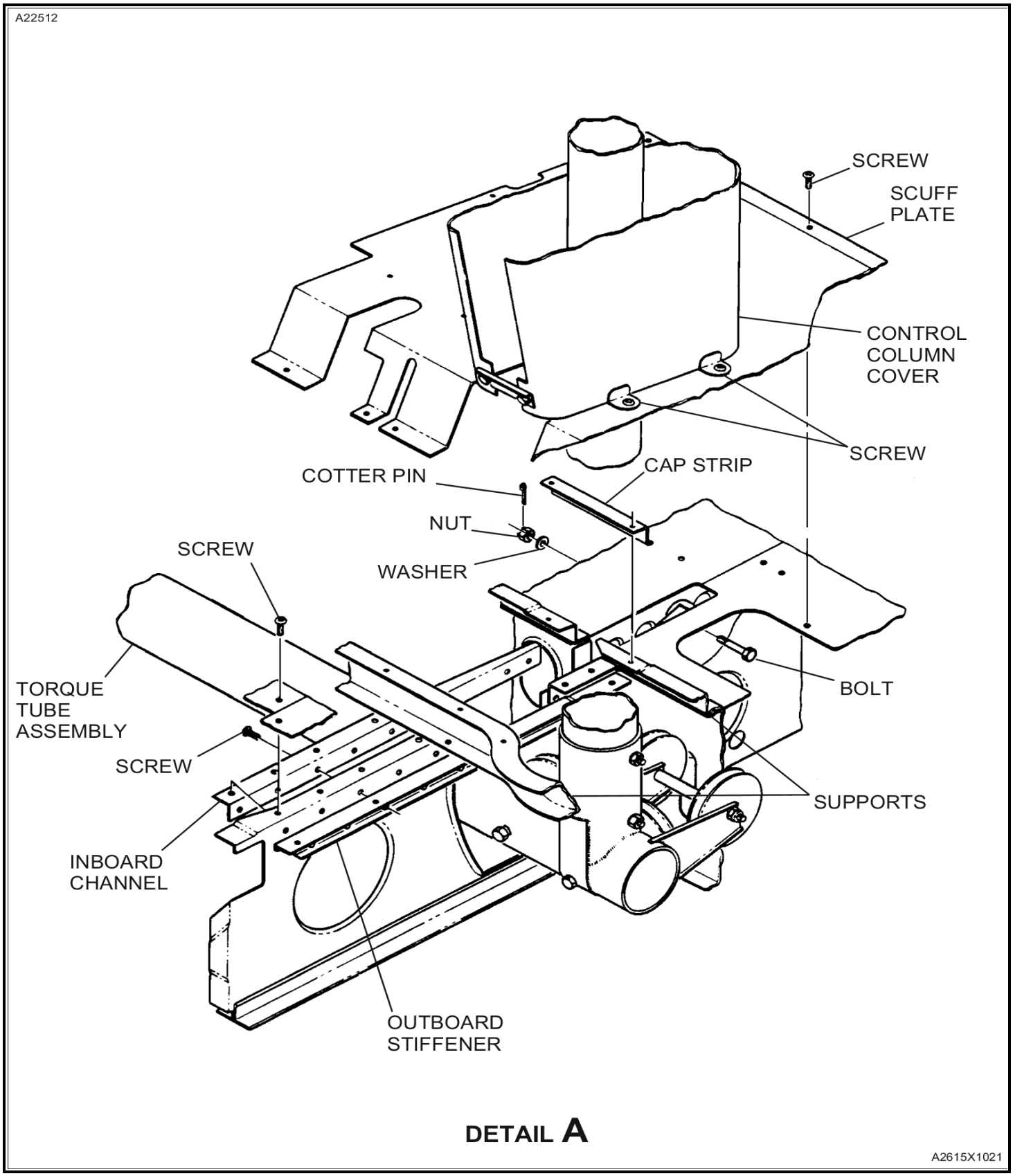


Figure 201 : Sheet 3 : Control Column Installation

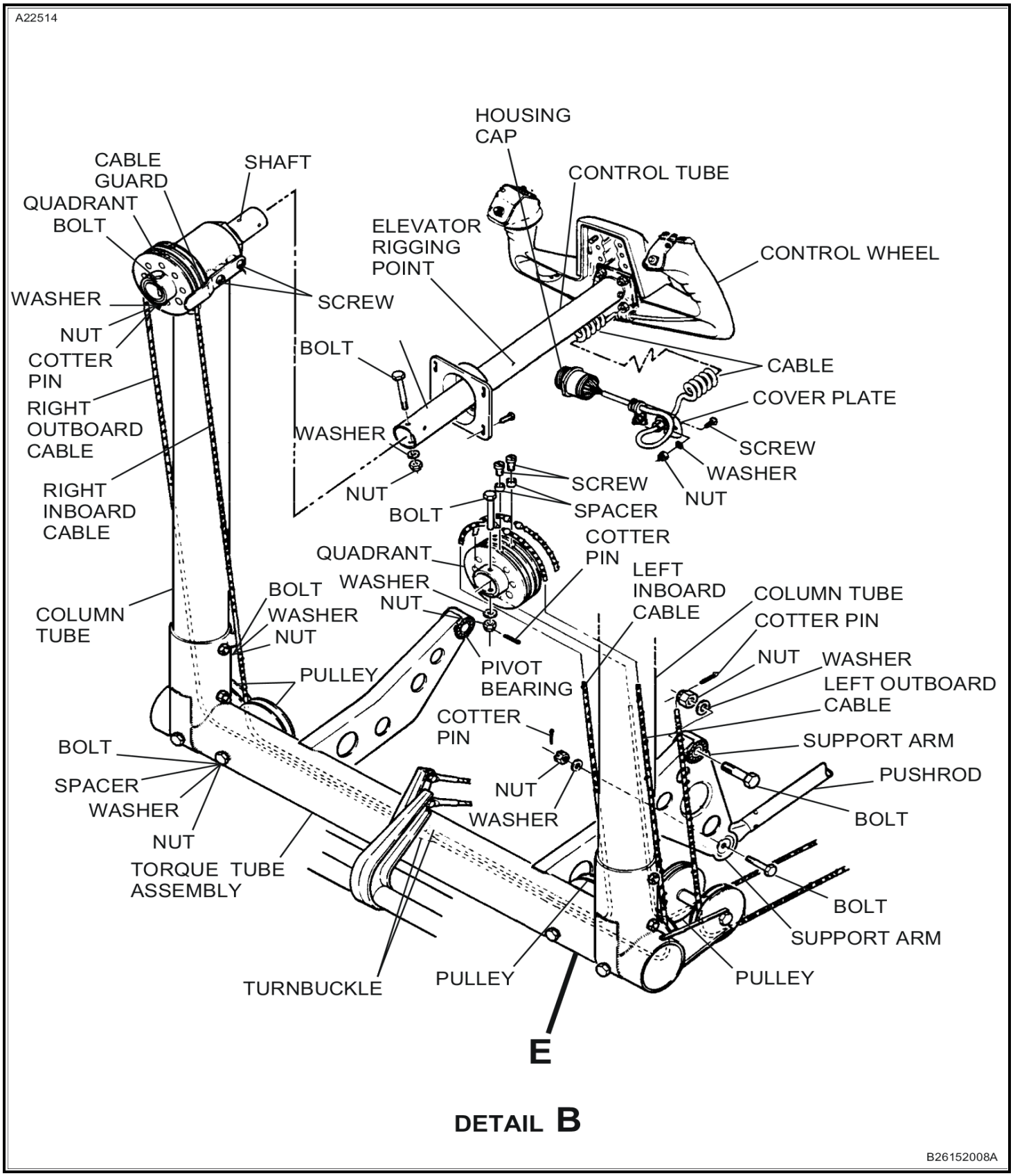


Figure 201 : Sheet 4 : Control Column Installation

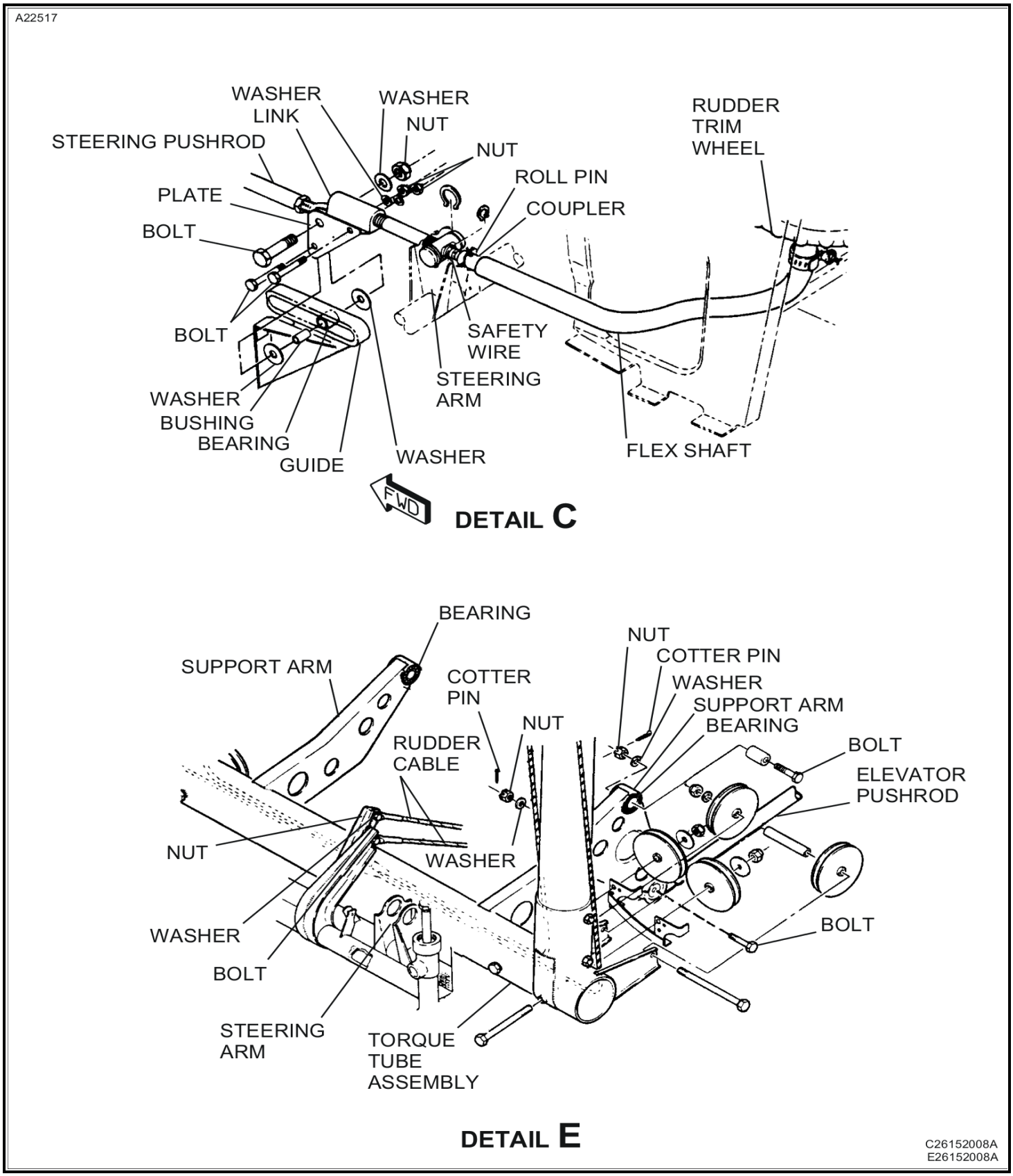
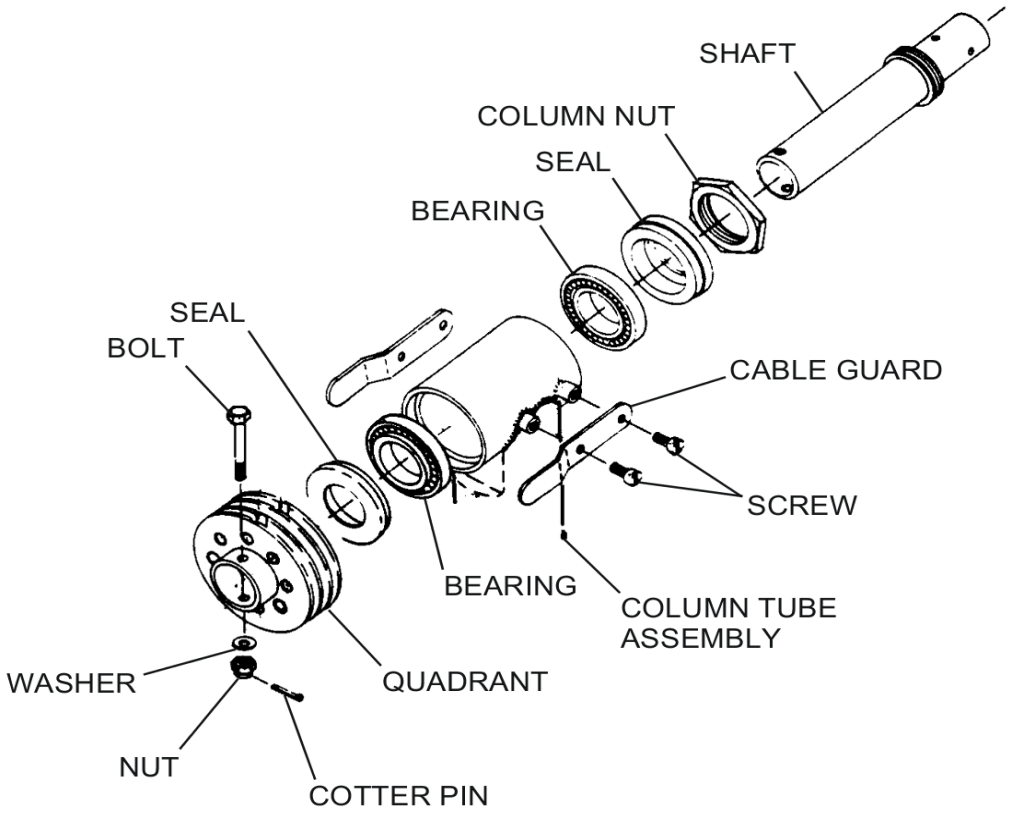


Figure 201 : Sheet 5 : Control Column Installation

A22520



DETAIL D

D26152008A

Figure 201 : Sheet 6 : Control Column Installation

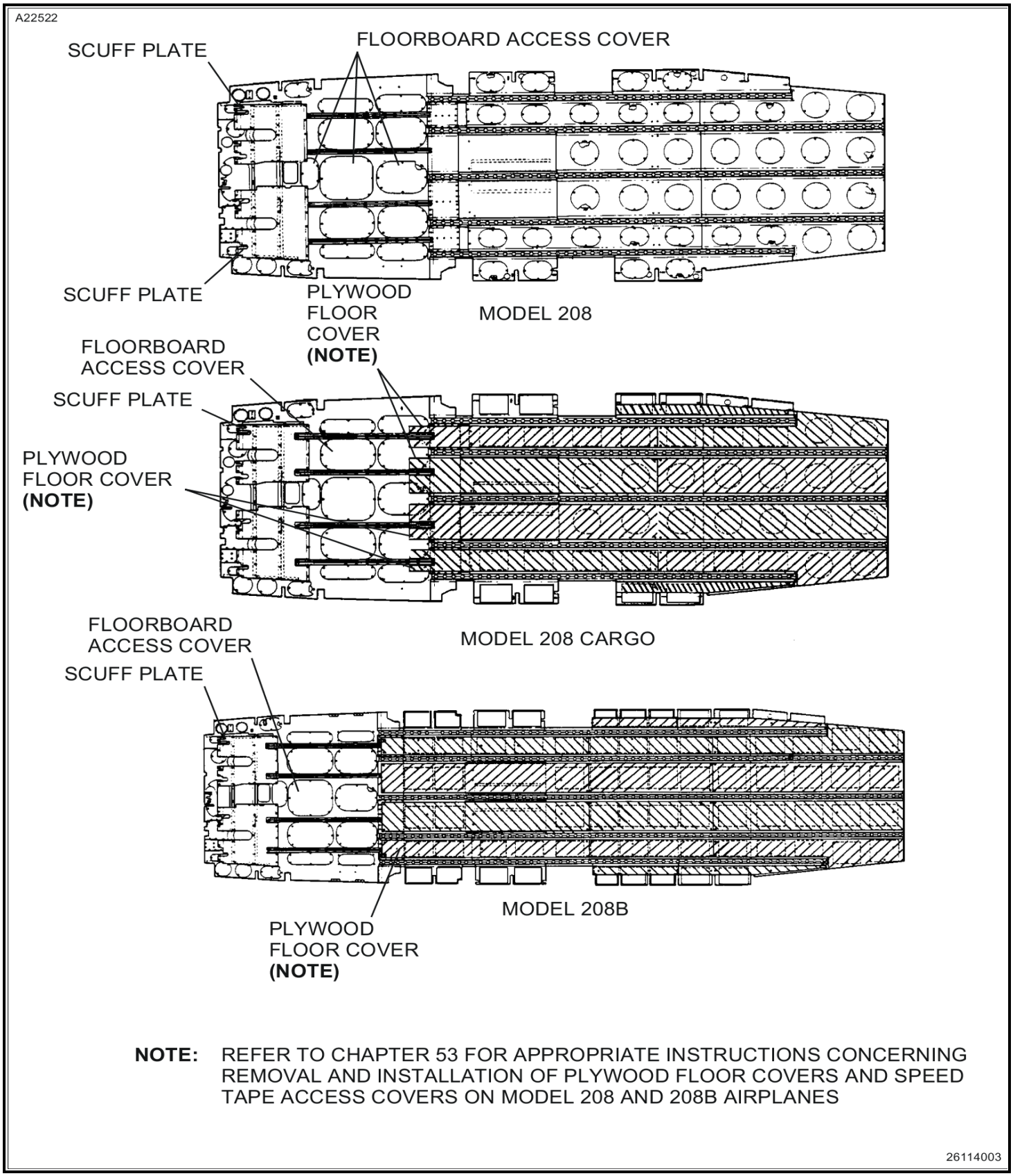
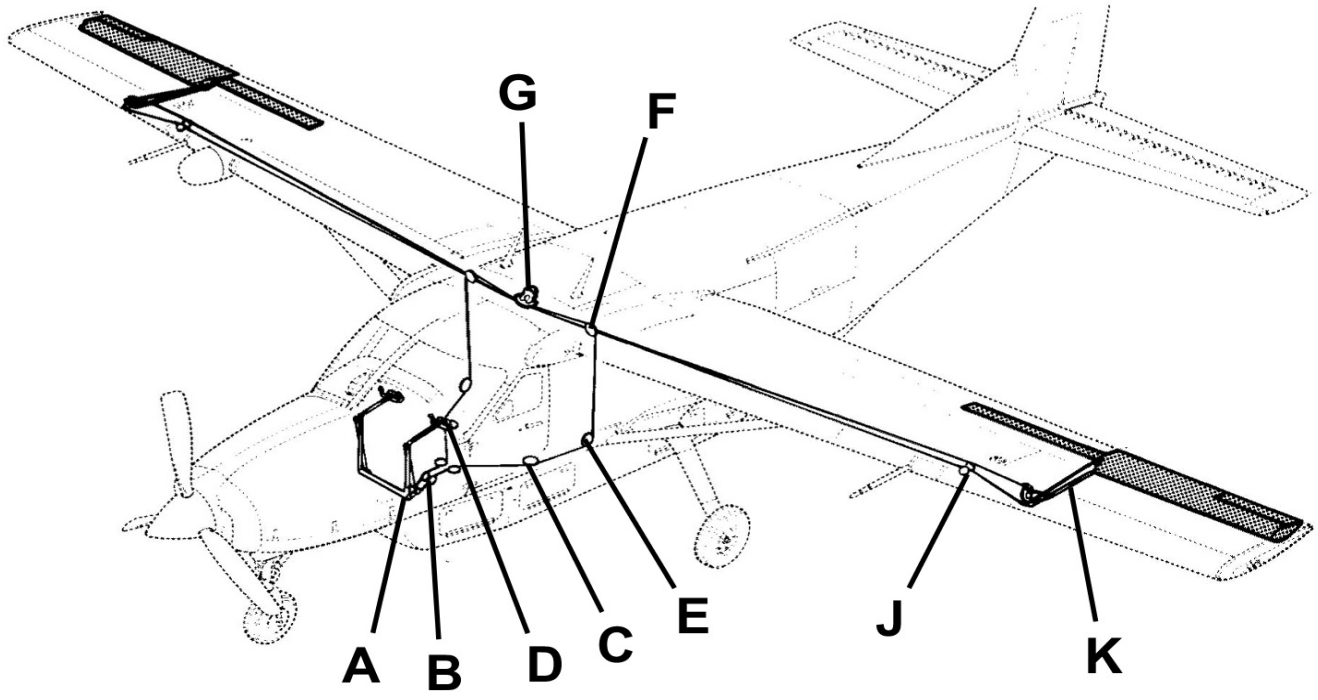


Figure 202 : Sheet 1 : Aileron Systems Installation

A22525



2661R2006

Figure 202 : Sheet 2 : Aileron Systems Installation

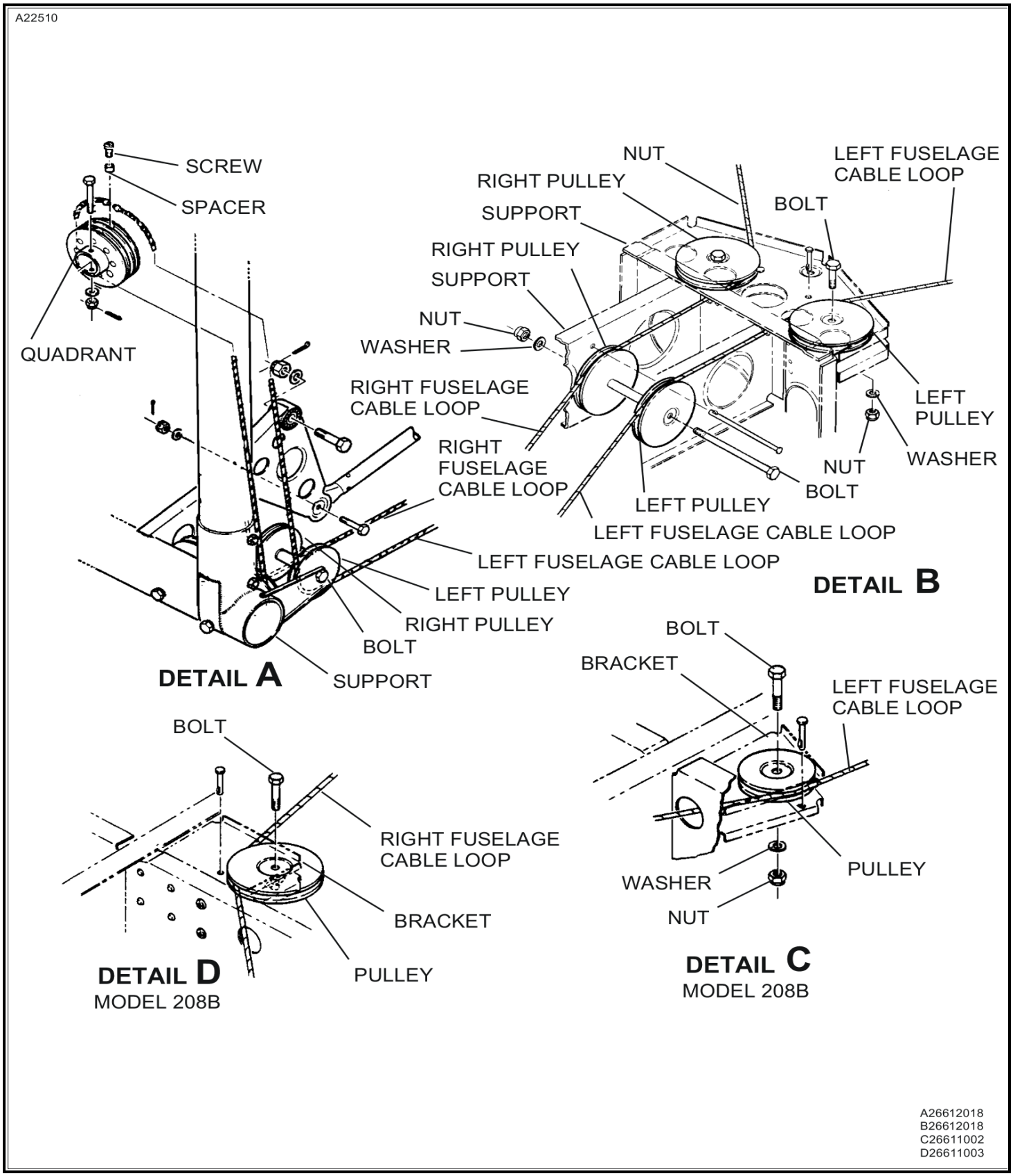


Figure 202 : Sheet 3 : Aileron Systems Installation

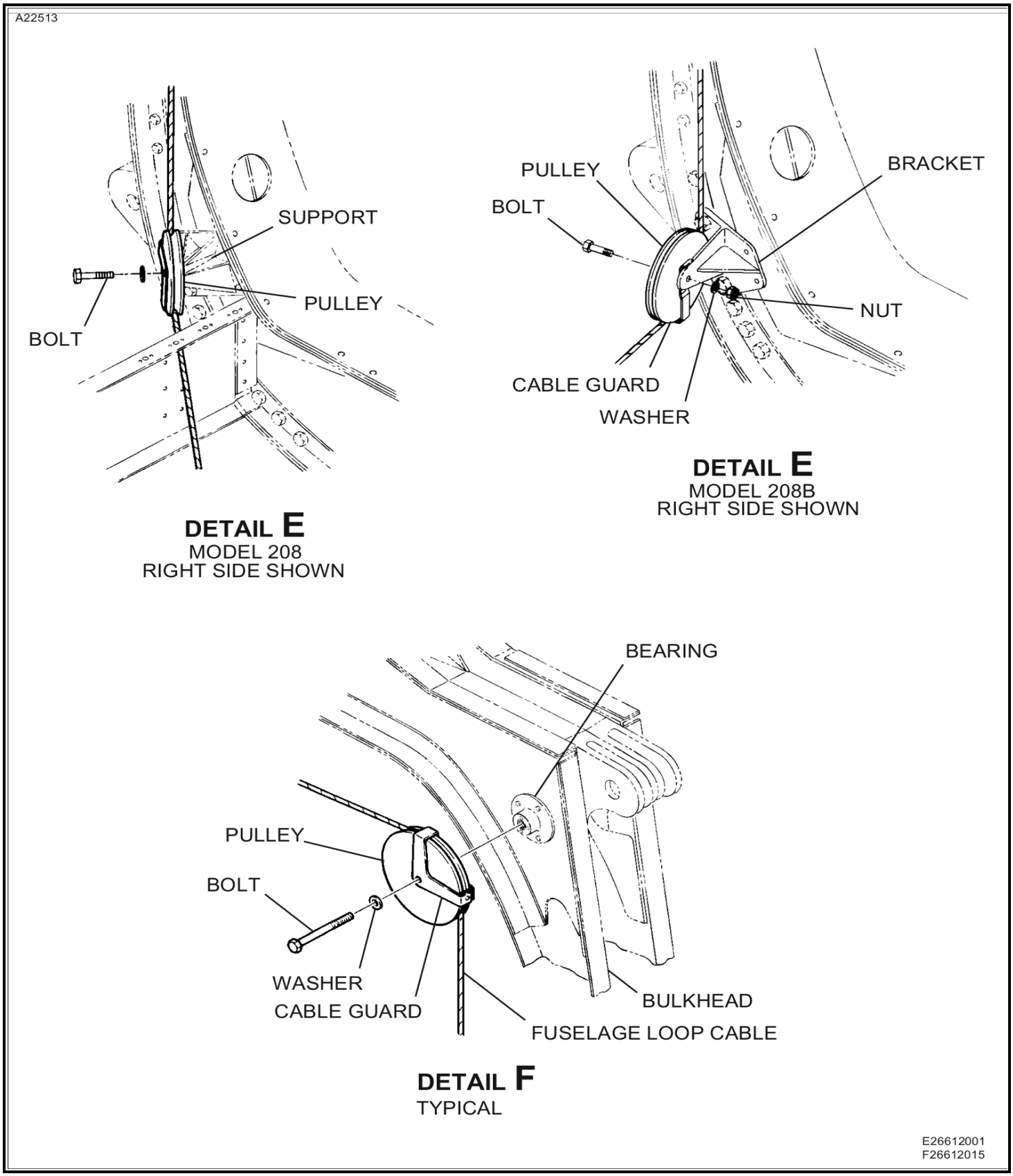
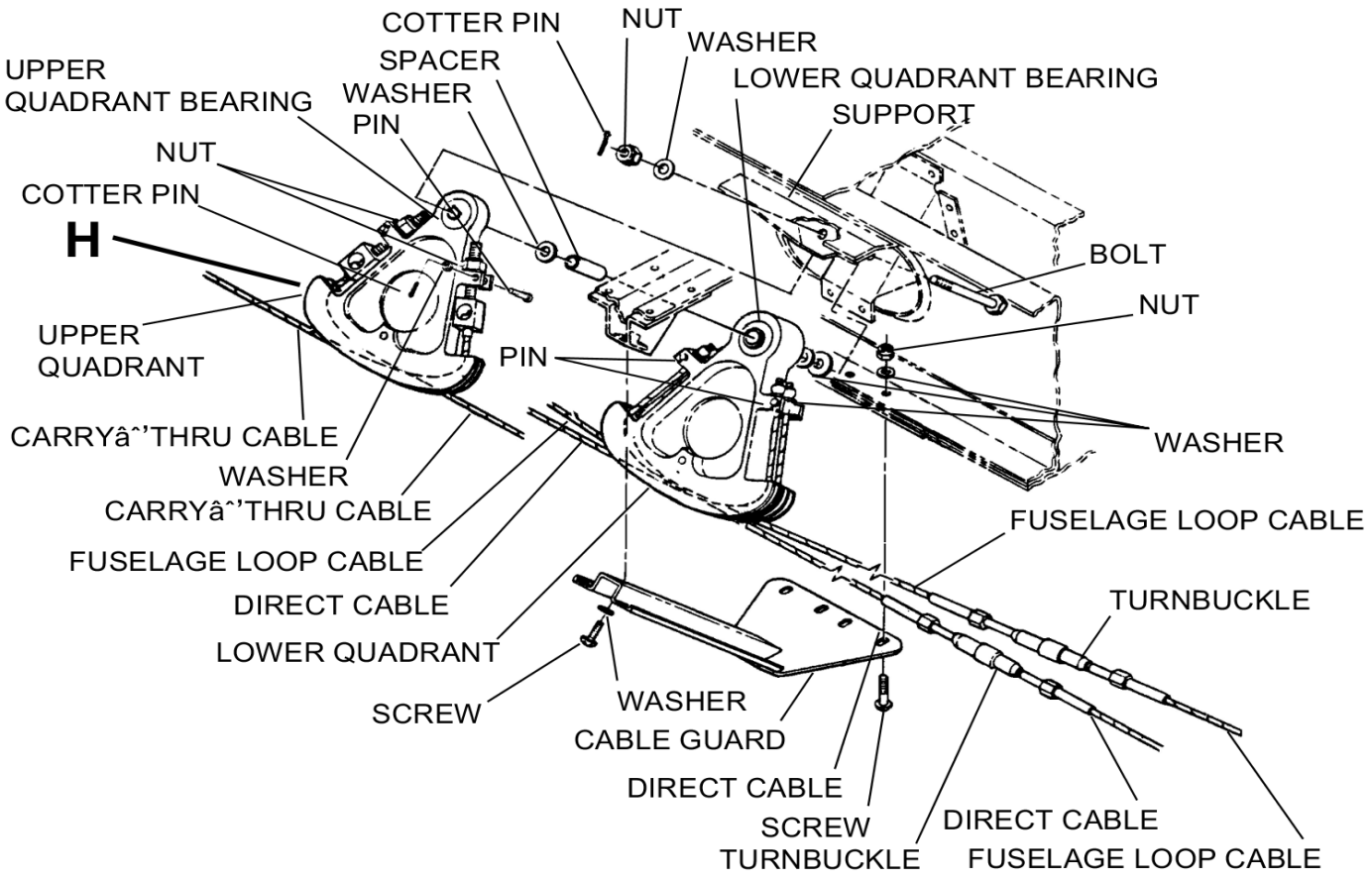


Figure 202 : Sheet 4 : Aileron Systems Installation

A22515



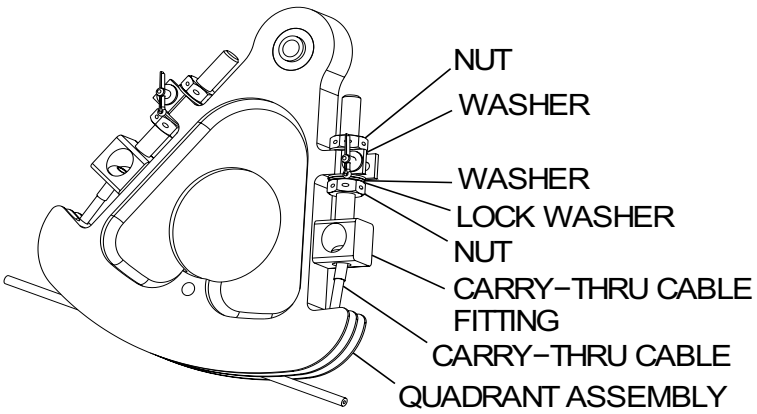
DETAIL G

AIRPLANES 20800001 THRU 20800415 AND 20800417 THRU 20800420 AND
AIRPLANES 208B0001 THRU 208B1215 AND 208B1217 THRU 208B1313
NOT INCORPORATING CAB08âˆ’06

G2661R2003

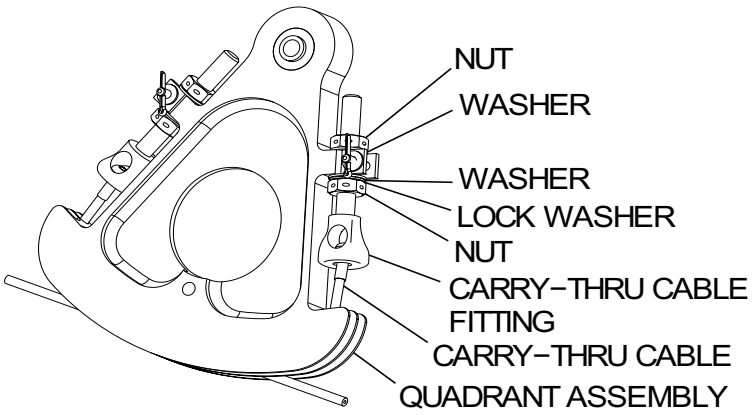
Figure 202 : Sheet 5 : Aileron Systems Installation

A81407



DETAIL H

AIRPLANES 20800001 THRU 20800415 AND 20800417 THRU 20800420 AND
AIRPLANES 208B0001 THRU 208B1215 AND 208B1217 THRU 208B1313
INCORPORATING CAB08−6 AND
AIRPLANES 20800416 AND 20800421 THRU 20800523 AND
AIRPLANES 208B1216 AND 208B1314 THRU 208B2229



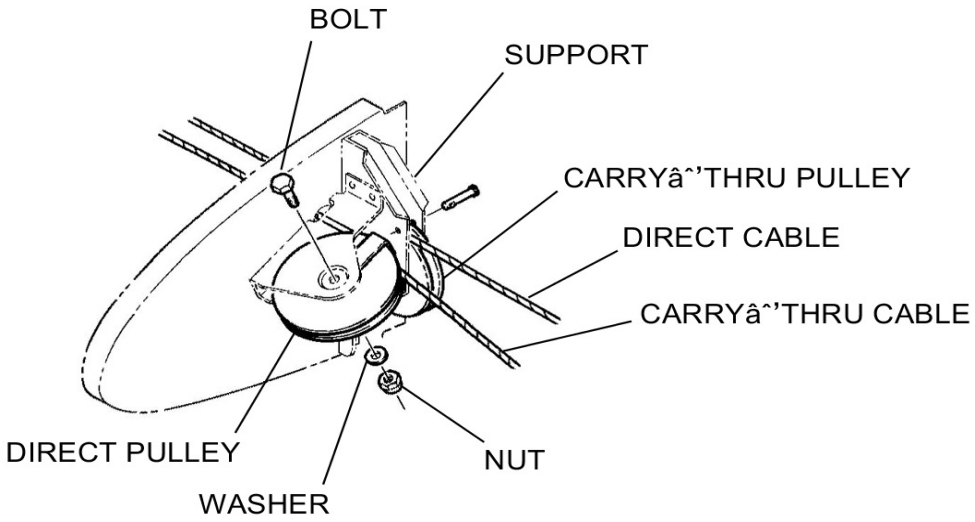
DETAIL H

AIRPLANES 2080524 AND ON AND
AIRPLANES 208B2230 AND ON

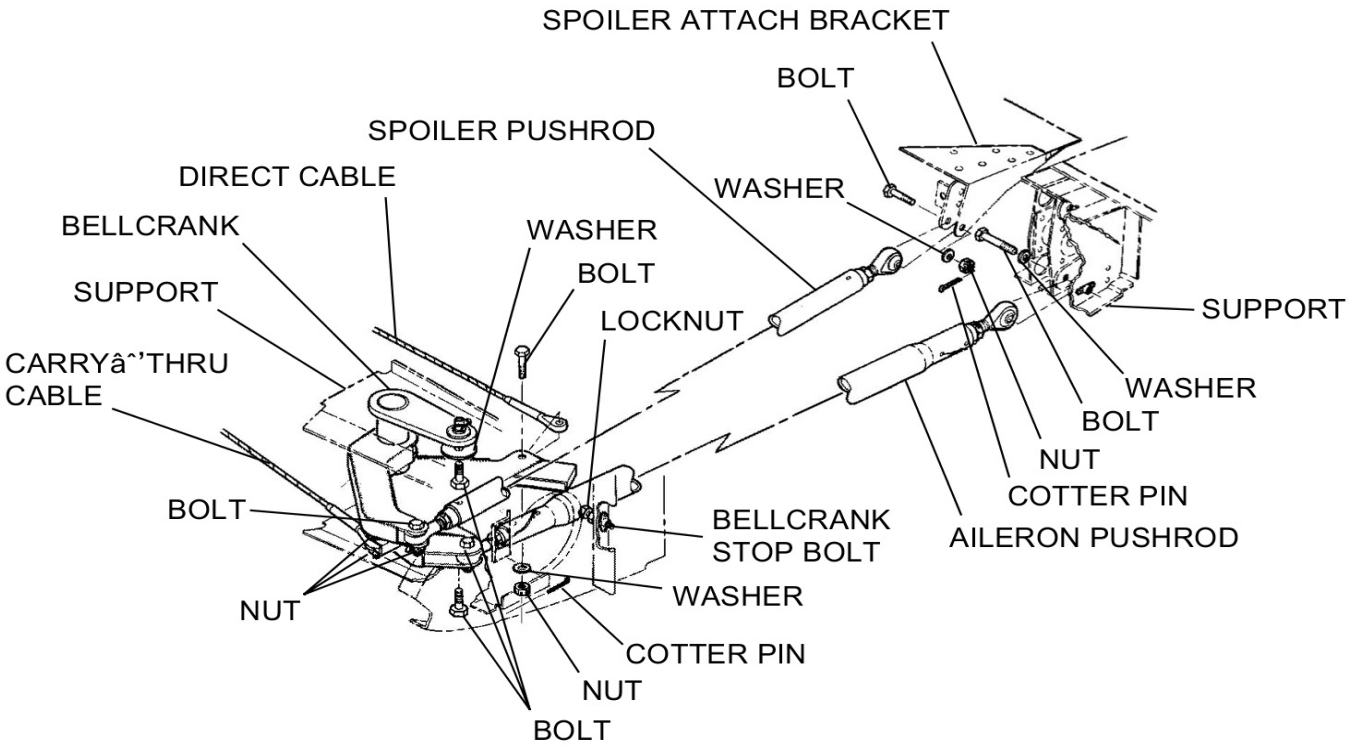
H2661T1040

Figure 202 : Sheet 6 : Aileron Systems Installation

A22516



DETAIL J
TYPICAL



DETAIL K
TYPICAL

J2661R1006
K2661R3001

Figure 202 : Sheet 7 : Aileron Systems Installation

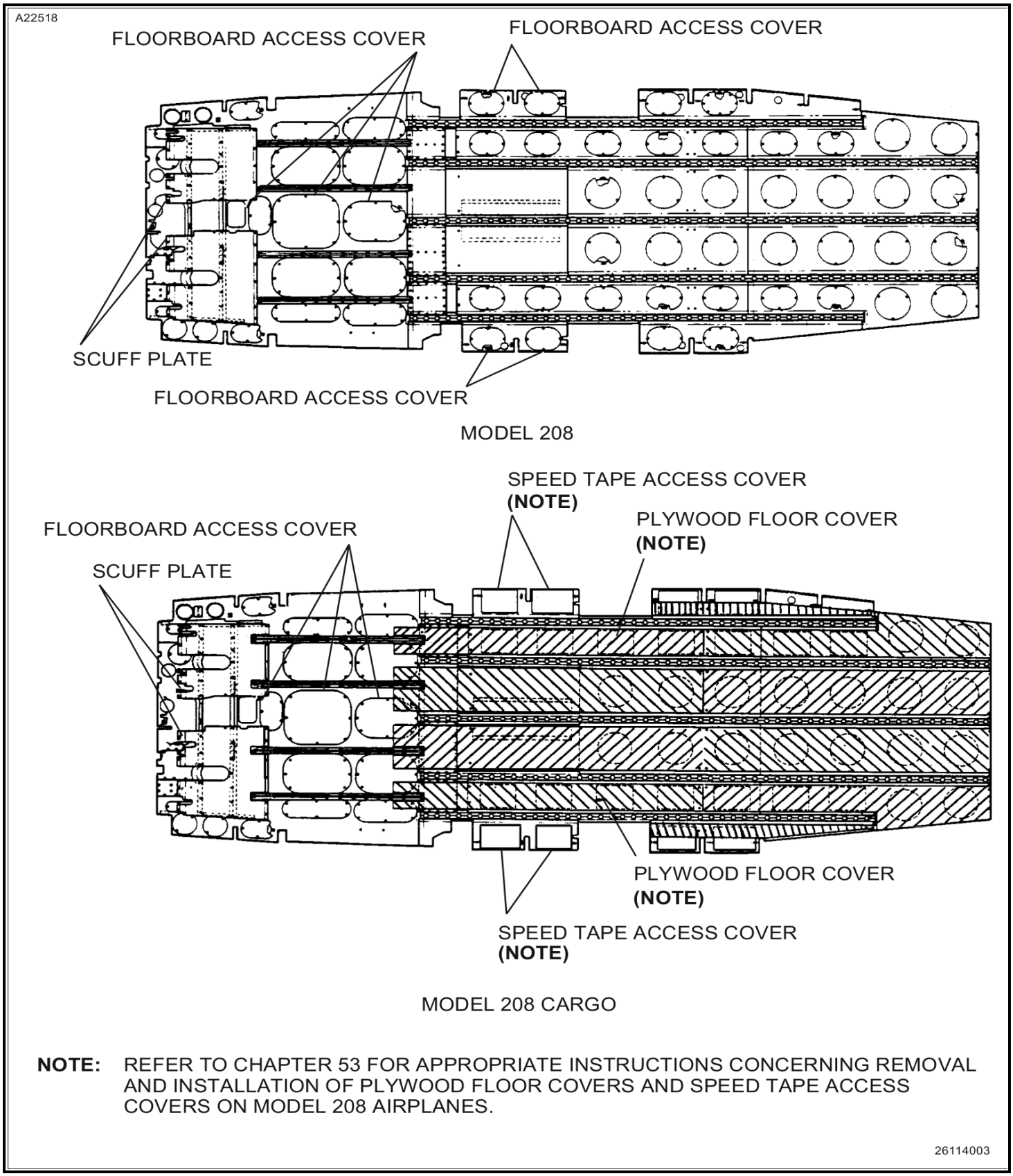
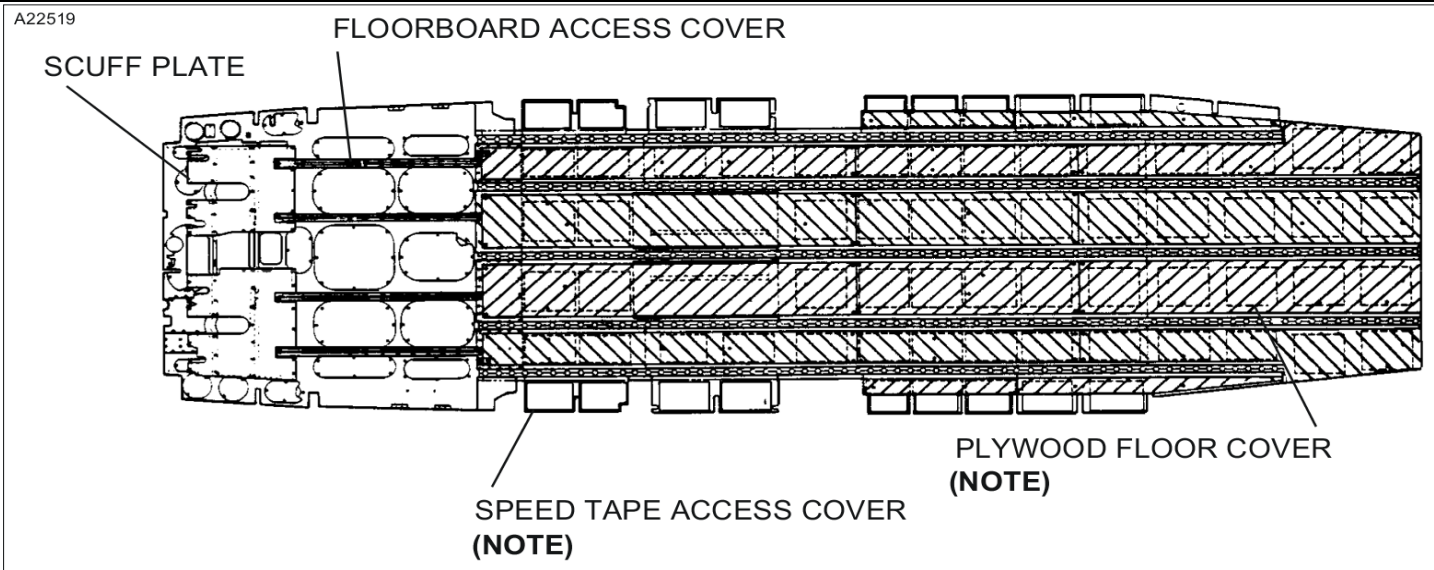
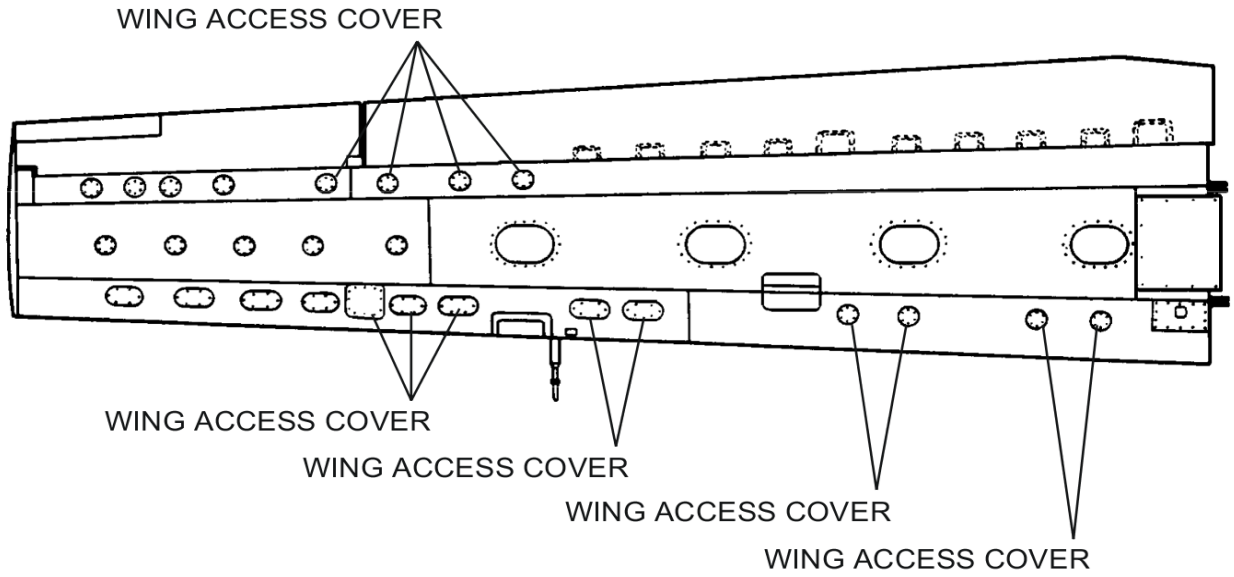


Figure 202 : Sheet 8 : Aileron Systems Installation



MODEL 208B



NOTE: REFER TO CHAPTER 53 FOR APPROPRIATE INSTRUCTIONS CONCERNING REMOVAL AND INSTALLATION OF PLYWOOD FLOOR COVERS AND SPEED TAPE ACCESS COVERS ON MODEL 208 AIRPLANES.

26114003
26102008