

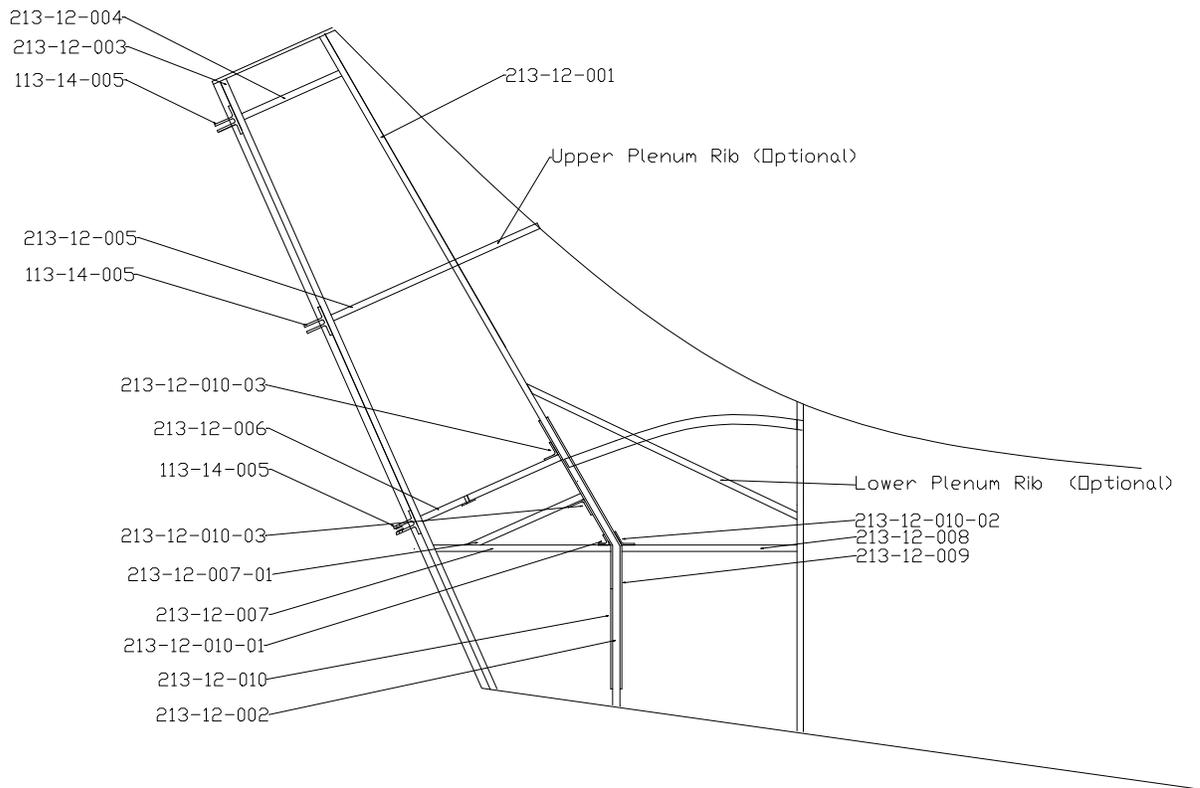
PROCEDURE 4.080**VERTICAL SPAR, SHEAR WEB & RIB INSTALLATION***In this procedure...*

The Vertical Spar, Vertical Shear Web, ribs and Horizontal Stabilizer mounting plates will be installed in the vertical stabilizer.

For this Procedure, the following parts will be required...

<u>Part Number</u>	<u>Description</u>	<u>Quantity</u>
113-14-005	Hinge "U"	3
213-12-001	Spar Vertical Stabs Upper	1
213-12-002	Bulkhead 235	1
213-12-003	Shear Web Vertical Stab	1
213-12-004	Rib Vertical Spar #1	1
213-12-005	Rib Vertical Spar #2	1
213-12-06	Rib Vertical Spar #3	1
213-12-007	Rib Vertical Spar #4	1
213-12-007-01	Rib, Rudder Bellcrank #6	1
312-12-008	Rib Vertical Spar #5	1
213-12-009	Tie Plate Vertical Spar Fwd	1
213-12-010	Tie Plate Vertical Spar Aft	1
213-12-010-01	Attach Angle, Tie Plate	3
113-14-016	Backing Plate,	6
AN3-10A	Bolt	12
F2000-3	Anchor Nut	16
AN426AD3-4	Rivet	40
AN960-10	Washer	12
AN3-11A	Bolt	8
AN3-12	Bolt	4
AN3-15A	Bolt	4
K2000-3	Anchor Nut Plate	4
MS24693-S51	Screw	4
BSP	Pop Rivet	16
213-12-039	Backing Plate	1
K2000-4	Anchor Nut	1

NOTE: Prior to installing the vertical spar and ribs, insure that the fuselage is level and that you have a centerline string above the fuselage to facilitate use of a plumb bob during the construction process.



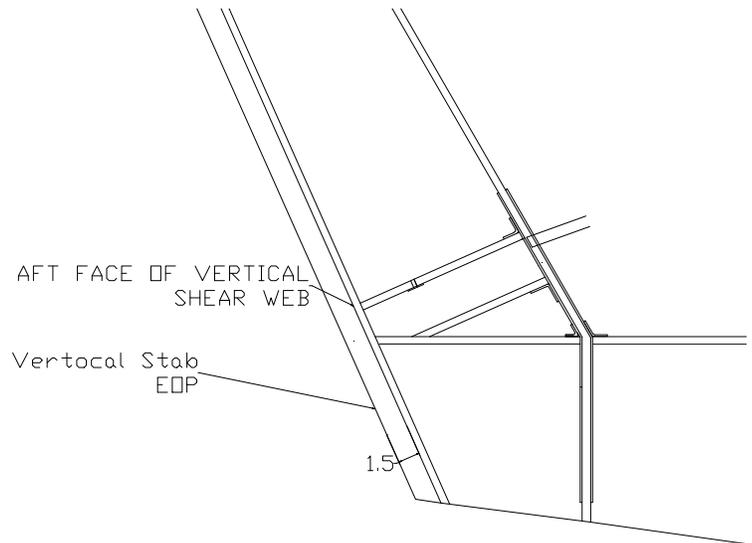
Step 1. Install Bulkhead 235.

Place and align bulkhead 235 at station 234.5. The forward edge of bulkhead must be aligned at station 234.5. Extreme care must be taken to insure that the bulkhead is perpendicular (90°) to both the fuselage waterlines and aircraft centerline.

When exact alignment is established, Q-cell all radius and apply 4 layers of tapes to both sides of the bulkhead. The tapes should extend across the entire face of the bulkhead and 3 inches onto the fuselage.

Step 2. Install the Aft Shear Web.

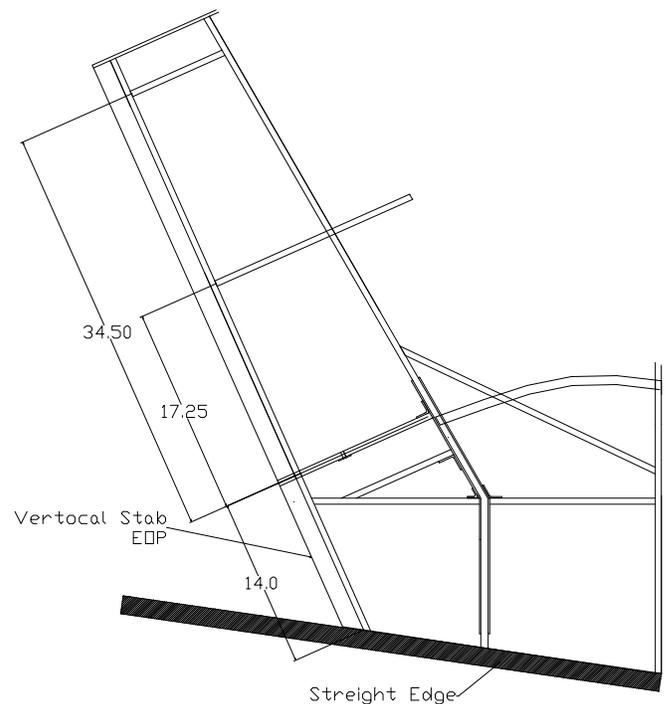
Place and align the aft shear web along the rear vertical fin, end of part (EOP). Measure 1.5" forward from the vertical fin EOP and draw a line parallel to the aft EOP. Place a "U" hinge against the aft face of the shear web and check to insure that the hinge centerline is centered on the vertical fin EOP, and hot glue in place. Use Q-cell and radius the forward side of the shear web and laminate in place with two tapes the length of the shear web. Use care to insure that the shear web remains perpendicular to the centerline of the aircraft.

**Step 3. Locate Rudder Hinge Positions.**

Place a straight edge along the bottom of the lower fuselage and measure 14" up the trailing edge of the vertical stabilizer, along the aft shear web. Mark a spot here. This is the vertical centerline for the lower rudder hinge.

Mark the middle hinge center point 17.25" up from the lower hinge center point.

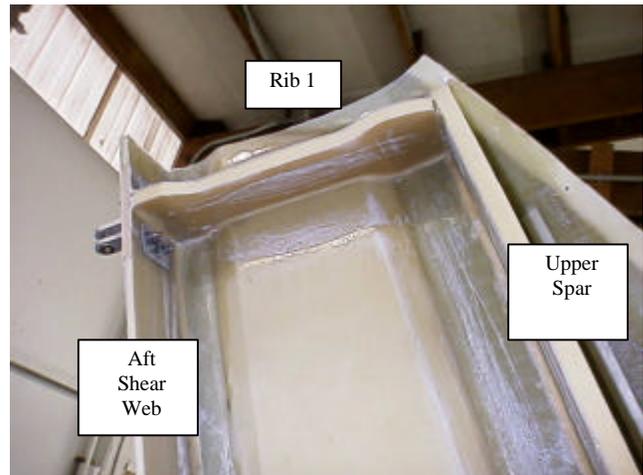
Mark the upper hinge center point 34.5" up from the lower hinge center point.



NOTE: If the hinges have already been installed on the rudder spar, insure that the spacing for the hinges match the vertical stabilizer.

Step 4. Install stabilizer ribs.

Position the 3 stabilizer ribs at the center point of the 3 hinge points, 90° from the aft shear web. Hot glue the upper and middle ribs in place. The lower rib will be laminated during a later step.

**Step 5. Install Upper Vertical Spar.**

Set the vertical spar on top of bulkhead 235, slanting it aft to rest on ribs 1, 2 and 3. Cut a bevel on the lower end of the spar to match the top of bulkhead 235, allowing for a flush mating between the two. Hot glue it in place.

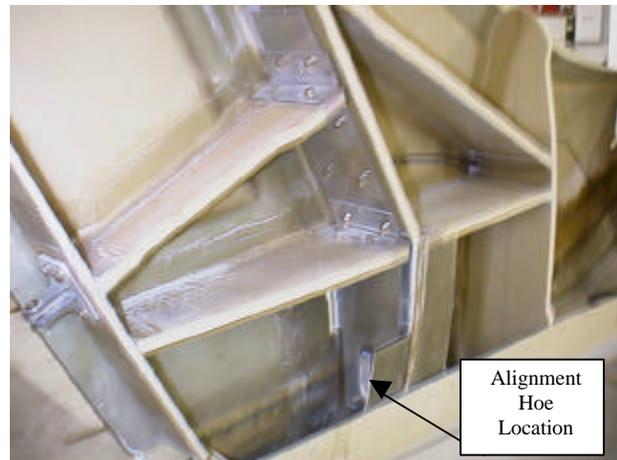
Step 6. Install front and rear Spar Tie Plates.

Place the forward spar tie plate on the forward side of bulkhead 235, and the vertical spar. Clamp it in place.

Using the pre-drilled holes in the forward tie plate to drill the two (2) lower holes through Bulkhead 235.

Drill the six (6) upper holes through the vertical spar. The two holes in the second row from the top are enlarged to $\frac{3}{4}$ " to allow the rudder cables to pass through.

Locate the Horizontal Stabilizer alignment hole in bulkhead 235 by measuring up 9" from the inside surface of the lower fuselage skin along the centerline of the aft side of bulkhead 235. Using a drill guide, drill a $\frac{3}{16}$ " hole through bulkhead 235 at the center point established in the above step. Drill and tap a 10-32 hole in the horizontal stabilizer bracket attached to the horizontal stabilizer spar. This hole should already be pre-drilled on the bracket.



Make an alignment pin from a 3/16" bolt and screw it into the tapped hole. This pin should be no longer than 3/4".

Position the Horizontal Stabilizer in position on the fuselage and slip the alignment pin into the centering hole in bulkhead 235. Insure that the stabilizer is level horizontally and that the mounting bracket is flush against the bulkhead.

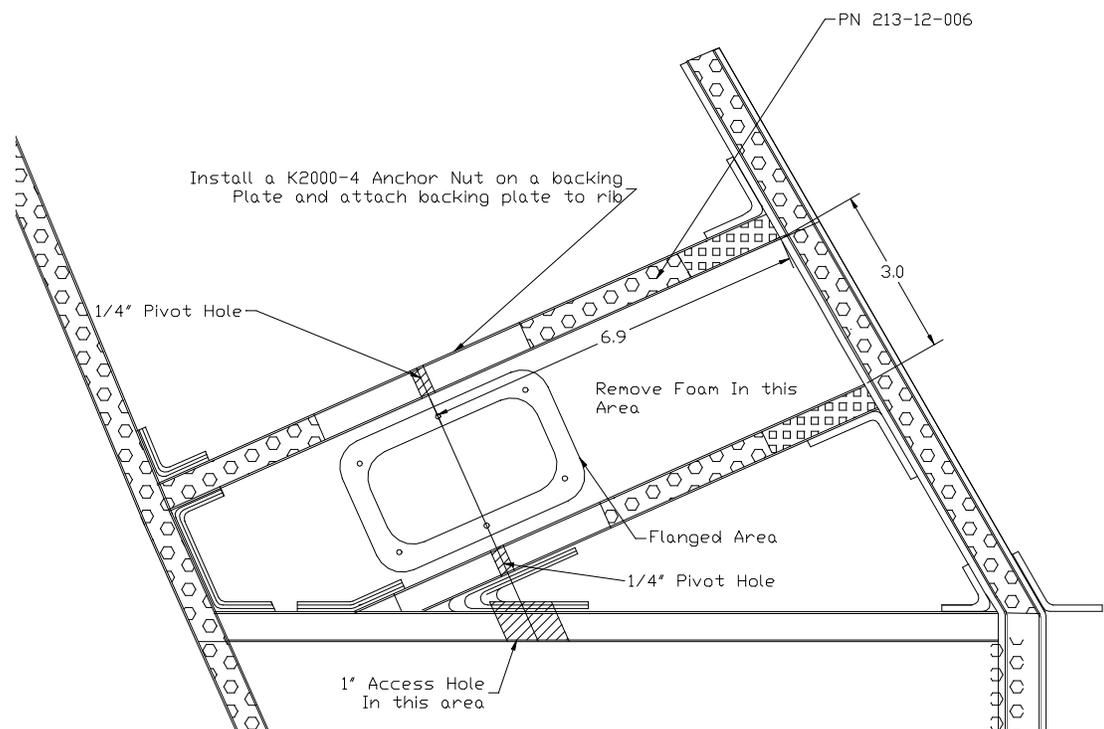
Back drill the four (4) stabilizer mounting holes into bulkhead 235. Then remove the Horizontal Stabilizer.

Now place the aft tie plate into position. Clamp it in place and back drill the holes. Use caution not to enlarge the four (4) Horizontal Stabilizer mounting holes. Install the four (4) mounting bolts through the bulkhead and tighten to 15" lbs. torque. Install the remaining six bolts and torque to 30" lbs.

Step 7. Install Ribs 4,5 & 6.

Place ribs 4 & 5 level and flush with the top edge of bulkhead 235 and hot glue in place. Position Rib 6, three inches below and Parallel to Rib 3.

Use the Attach Angle, Tie Plate (P/N 213-12-010-01) to attach the forward end of ribs 3, 4, 6, and the aft end of rib 5 to the Spar Tie Plate.



Step 8. Tape all ribs in place.

Q-cell and tape all ribs, spars and shear webs in place. Two plies of 2" fiberglass tapes should be used in all areas.

Locate and drill "Pass Through" holes for the elevator push-pull tubes and rudder cables in all bulkheads.

Step 9. Install Rudder Bellcrank Attach Bolt.

Measure 5" forward from the Aft Shear Web along the aircraft centerline. Drill a ¼" hole through Rib 3 and Rib 6 at this location. Using these holes as guides use a long bit and drill a hole through Rib 4. This hole will be used to install the pivot bolt once the tail has been closed out. Use a 1 ½" hole saw and enlarge the hole just drilled in Rib 4.

Step 10. Install Backing Plate and Anchor Nut on Rib 3.

Attach a K2000-4 Anchor Nut to Backing Plate (PN 213-12-039). Place the backing plate on the upper side of Rib 3 and align with the ¼" hole drilled through ribs 3, 6, and 4. Attach the backing plate to Rib 3 using 3 pop rivets.

Step 11. Fabricate Bellcrank Access Panel.

Cut out a 3" by 4" access panel on the left vertical stabilizer. The center of this cut out should be on the rudder bellcrank pivot bolt and centered vertically between Ribs 3 and 6. Use the same instructions described in previous procedures to fabricate a ½" flange around the cutout. Use the piece your removed from the tail as the access panel. Secure the panel with 6 8-32 screws and anchor nuts as shown in the above diagram.

Step 12. Install Rudder Cable Conduit.

Install the rudder cable conduit as shown in the photo to the right. Secure the conduit at each end using RTV. In addition seal the conduit where it passes through the lower air plenum rib if installed. (**Note: Use caution not to get any RTV inside the conduit. The rudder cable must slide through the conduit freely.**)



Step 13. Install Rudder Cable Lock Bolts.

Temporarily install the rudder cable through the conduit. Place one of the locking tabs into the groove in the cable. Center the cable in the hole and mark the location of the locking tab mounting bolt. This hole should be approximately $\frac{3}{4}$ " from the center of the hole which the cable is passing through. Drill a $\frac{3}{16}$ " hole through the tie plates and spar. Pop rivets an anchor nut on the forward side of the spar. This will allow you to loosen the lock plate bolt, swing the lock plates aside and remove the cable once the tail is closed out.



Make sure you can remove the cable lock tabs before you close out your tail.

Place and hot glue foil antenna elements on the vertical stabilizer section just forward of the vertical spar. Secure with 2 layers of tape over elements. Make sure that the element attached to the braided shield is oriented down.

**Step 10. Install the Rudder Hinges**

Place the rudder hinges (U hinges) in position. Make sure they are centered on the shear web and aligned with the ribs as previously marked. Drill the 4 mounting holes. Attach the backing plates to the shear web using pop rivets.

