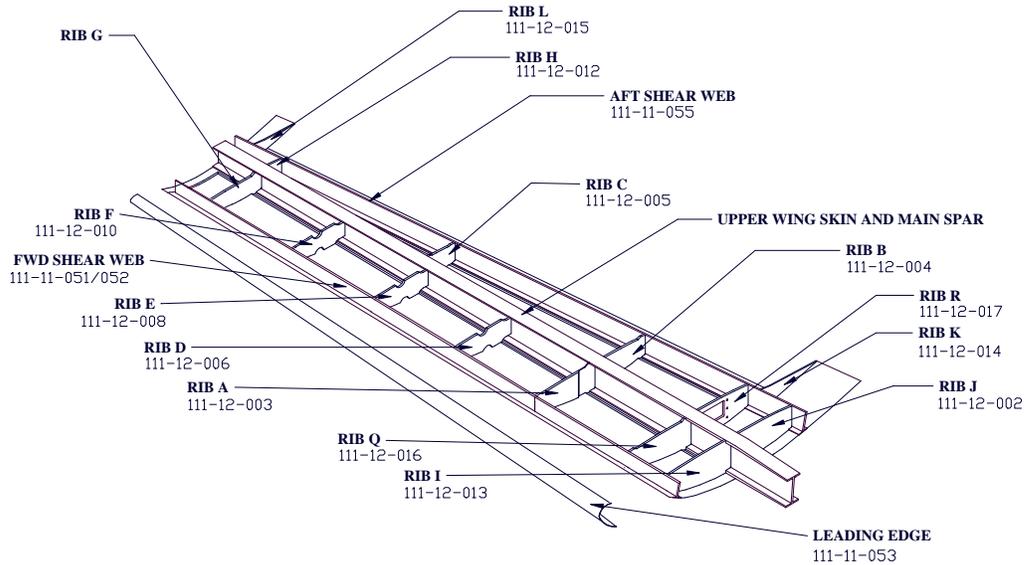


**PROCEDURE 3.010
INTRODUCTION**

During this section you will construct both wings, starting with the left wing. The work will include assembling the wing structure, installation of controls, fuel system, miscellaneous systems, and finally wing closeout.



When the left wing is completed, it will be placed out of the way, so the right wing can be constructed.

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WHAT YOU NEED TO DO FIRST

Before starting construction on the wing, you should order any parts that are not included in the kit that you will need during these procedures. Ordering now will assure that the parts are available for installation when needed. You can order these parts directly from *Express Aircraft*, or shop around.

Following is a list of the parts needed during wing, construction, their quantities, and whether they are mandatory.

PARTS TO BE ORDERED:

Mandatory	Description	Qty
Yes	Fuel Sending Unit	2
Yes	Pitot-Static Unit	1
Yes	Antenna	1
No	Navigation/Strobe Lights	2

A. WING SAWHORSE ASSEMBLY**DESCRIPTION:**

Sawhorses of specific dimensions are required for supporting the wing jigs. Four are required per wing, and the same four can be used for each wing. Material quantities given are for 4 sawhorses. You can cut all of the parts at once, but we suggest you assemble one at a time.

MATERIALS:

Index	Description	Qty
	1 x 4 Fir, 8'length (3/4" x 3 1/2" actual)	10
	3/8" Grade A Plywood, 4' x 4'	1
1	Leg	16
2	Outer Gusset	8
3	Lower Cap	8
4	Inner Gusset	8
5	Main Web	4
6	Galvanized Box Nail, 5d, 1 1/4 length	144
7	Drywall Screw, *8, 1 1/2" length	16
	Wood Glue	

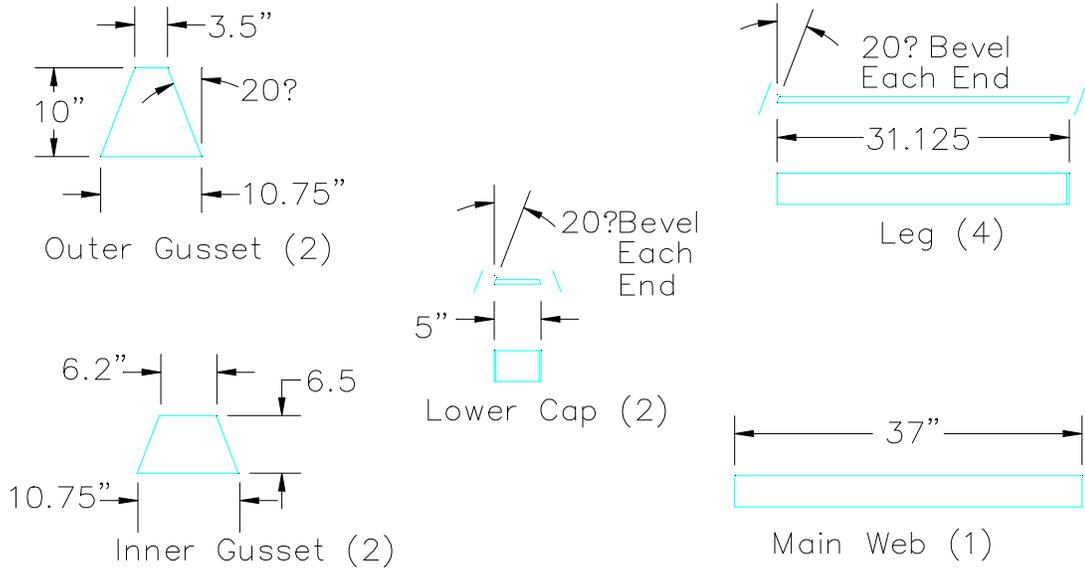
PROCEDURE:

Step 1. Cut the gussets out of plywood.

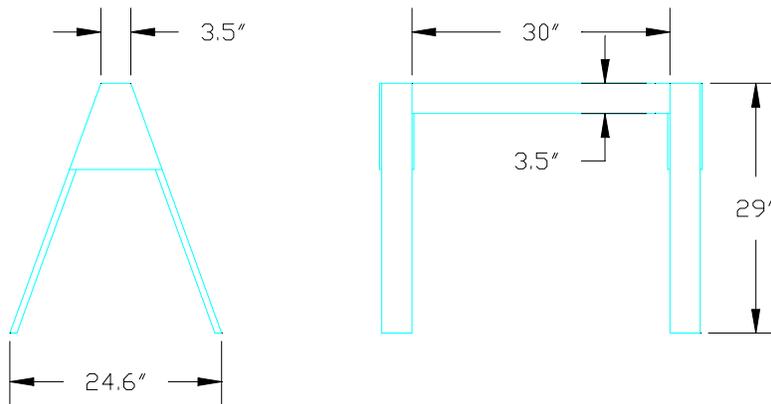
Step 2. Cut the parts out of 1 x 4.

Cut the legs, lower caps, and main web from 1 x 4 fir. Bevel both ends of the legs, making both bevels parallel. Bevel both ends of the lower caps, making bevels in opposite directions.

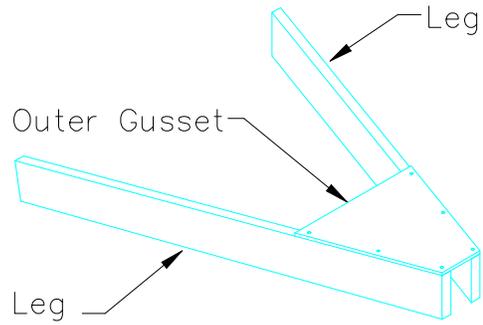
Dimensions of Sawhorse Parts



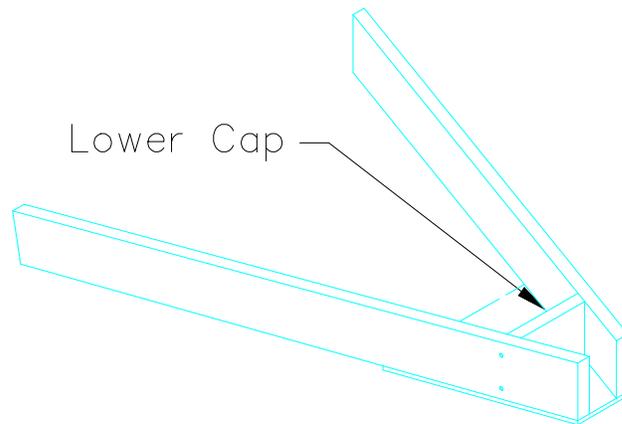
Wing Sawhorse Dimensions



Step 3. Glue and nail the outer gussets to the legs.

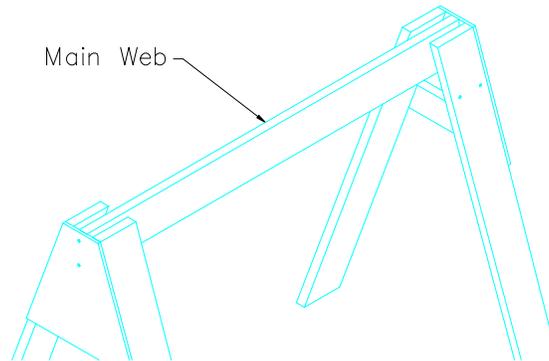
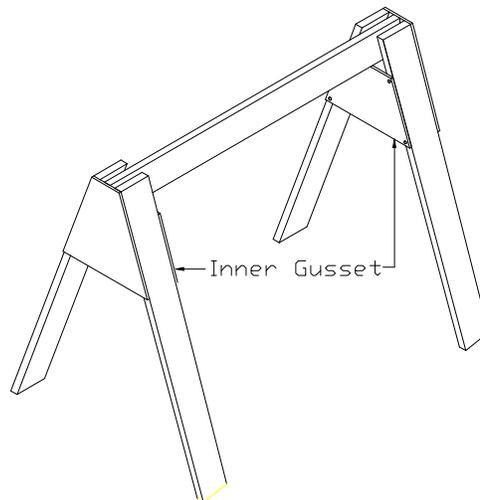


Step 4. Glue and nail the lower caps to the outer gussets and legs.



Step 5. Attach the main web.

Apply glue to the main web where it meets the outer gussets and lower caps. Nail the outer gussets to the ends of the web. Screw the web to the lower caps, using drywall screws.

**Step 6. Give and nail the inner gussets to the legs and lower caps.**

B. WING JIG RIB ASSEMBLY**DESCRIPTION:**

Before the wing can be worked on, it must be supported in a jig. The wing jig consists of four ribs the contour of the upper wing skin. These are attached to the wing sawhorses, which are then aligned and glued to the floor. The templates provided are used to cut and drill the ribs to shape. The ribs are good for the left and right wing jigs, so only one set of 4 is required.

MATERIALS:

Description.	Part No.	Qty.
Wing Jig Rib 1 Template	111-19-001	1
Wing Jig Rib 2 Template	111-19-002	1
Wing Jig Rib 3 Template	111-19-003	1
Wing Jig Rib 4 Template	111-19-004	1
3/4" Plywood, 4'x 5'1 minimum		
Adhesive Spray		
Sand Paper		

TOOLS:

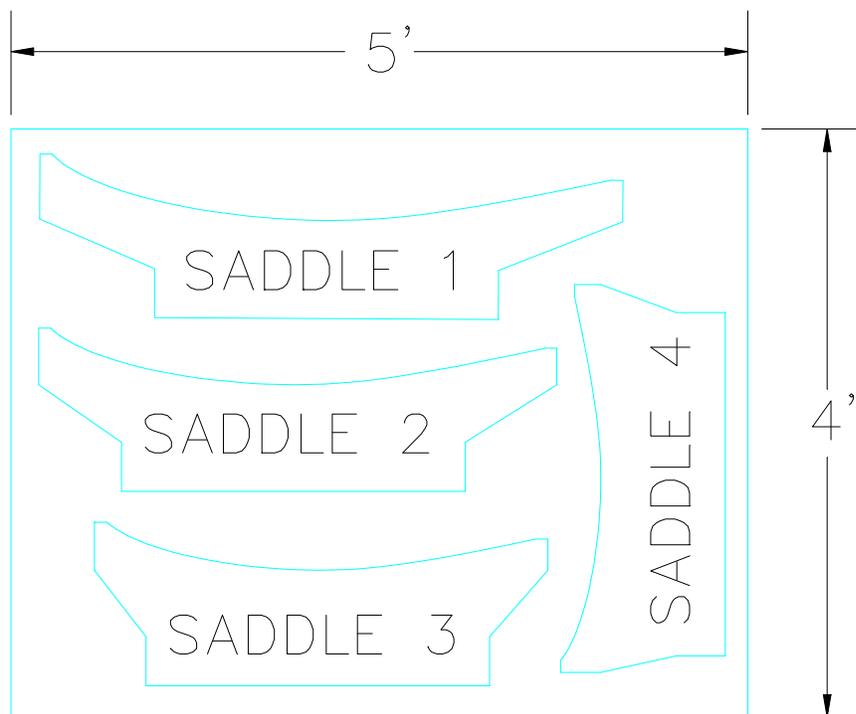
Jigsaw or Band saw
Drill Motor
Drill Bit 1/4"

PROCEDURE:

Step 1. Cut out each template approximately 1/2" outside the lines.

Step 2. Arrange the templates on the plywood.

Arrange them so the least amount of wood is wasted, but so each template is accessible with the saw. If using a 4'x 51 sheet of plywood, use the suggested layout in the illustration.



LAYOUT OF TEMPLATES ON PLYWOOD

Step3. Attach the templates.

Spray adhesive spray on the plywood for one rib, and on back of one template, and let it get tacky to the touch. Attach the template to the plywood. Repeat for each rib.

Step 4. Cut out each template using a jigsaw. Cut as close as possible to the lines, leaving all lines visible.

Step5. Sand the ribs.

Sand the edges that meet the wing skin, so that the edge is on the line of the template, and no dips or bumps can be felt in the rib.

Step 6. Drill the holes located on each template, using a 1/4" drill bit.

Leave the template on the rib, even after cut out, because the information printed on the template will be needed later.

C. LEFT WING JIG ASSEMBLY**DESCRIPTION:**

After the wing jig ribs are completed, they are attached to the wing sawhorses. The sawhorses are then located and attached to the floor.

MATERIALS:

Description.	Part No.	Qty
Wing Sawhorse Assembly	Builder Supplied	4
Wing Jig Rib 1	111-19-001	1
Wing Jig Rib 2	111-19-002	1
Wing Jig Rib 3	111-19-003	1
Wing Jig Rib 4	111-19-004	1
Upper Wing Assy, Left	111-11-050-01	1
Bolt, 1/4 -20 x 2	Builder Supplied	8
Washer 1/4"	Builder Supplied	8
Nut, 1411-20	Builder Supplied	8
Hot Glue	Builder Supplied	
Wood Blocks	Builder Supplied	

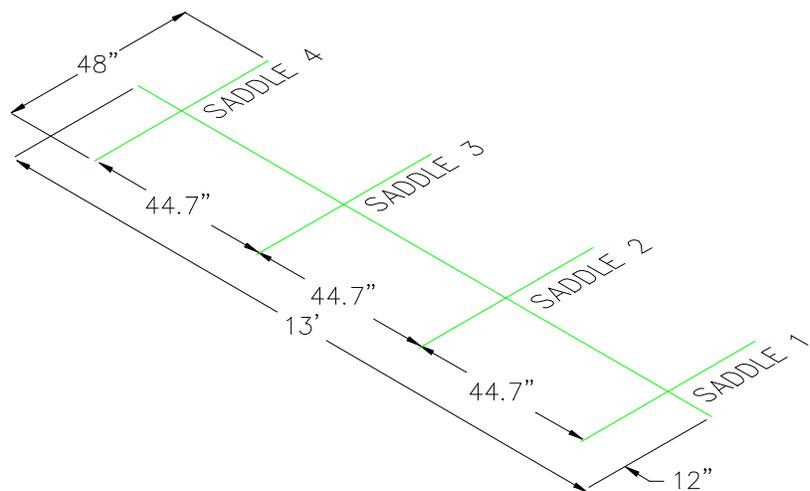
TOOLS:

Chalk Line
 Marker
 Masking Tape
 Tape Measure
 2' Carpenters Square
 Spring Clamp (2)
 Plumb Bob
 Hot Glue Gun
 Drill Motor
 Drill Bit 1/4"
 Carpenters Level
 Wrench 7/16 (2)

Step 1. Draw location lines on floor.

Snap a 13-foot lone chalk line on the floor to represent the main spar centerline. Allow at least 3-foot clearance from each end of the line to any wall. Also allow 41 clearance to either side of the line. Starting 12" In from one end of the line make four marks along the centerline with a marker. spaced 44.7" apart. Label then rib I through rib 4 consecutively, with rib I being the Inboard rib.

Using a 21 carpenters square and a marker. Make four 41 lines perpendicular to the centerline through the rib location marks. These are the location lines for the ribs, which you will use to align the sawhorses, so mark then visibly. Also make a mark on each 41 line where the spar centerline Intersects. These marks will be used later for the right wing, since the chalk line will be faded.



Step 2. Attach rib I to sawhorse.

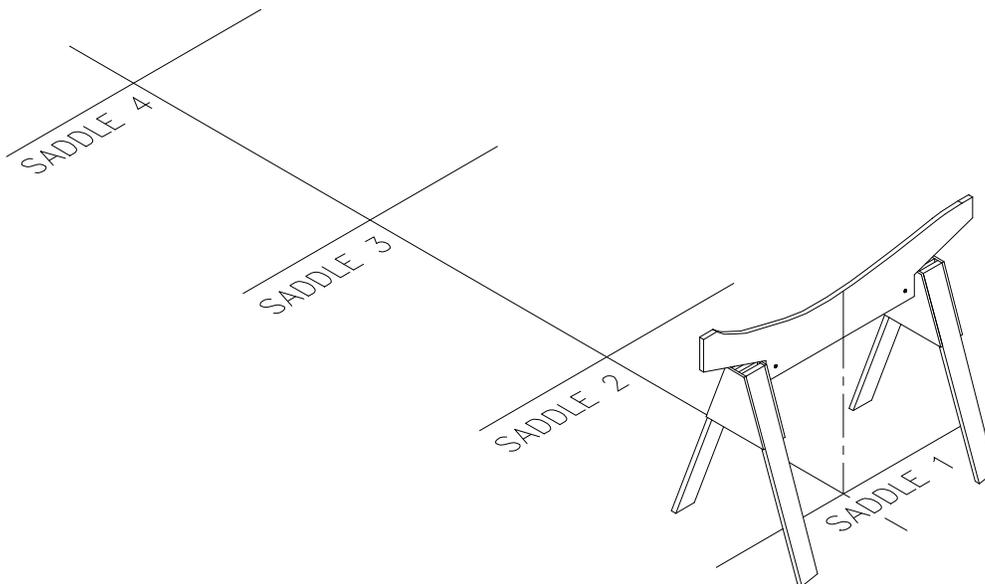
Take rib 1 and one sawhorse. Center the rib approximately on the sawhorse web with the template side out. Allow the bottom of the rib to hang 1/2" below the bottom of the web. Using 2 spring clamps, clamp rib 1 to the sawhorse web, leaving clearance to drill the holes.

Drill one of the 1/4" holes through the rib hole, and into the sawhorse web. Attach finger tight with a bolt, washer, and nut.

Step 3. Place rib 1 on location lines.

Spring clamp the plumb bob string to the spar centerline marked on the template, letting the plumb bob hang to the floor. Locate the rib and sawhorse parallel to the rib 1 location line, so the plumb bob is at the rib 1 mark. The rib should be on the side of the sawhorse web away from the other rib lines.

Line up the rib with the rib I location line by checking with the plumb bob at different points. When the rib and sawhorse are aligned, hot glue the sawhorse legs to the floor. To prevent accidental kicks that may loosen a sawhorse leg, hot glue some small scraps of wood such as 1 x 2 up against each leg.



Step 4. Level and tighten rib 1.

Make one more check with the level on the bottom edge of the rib. If it is not level, loosen the spring clamp, adjust, and re-clamp. Drill the second hole through the rib hole and into the sawhorse web. Attach with bolt, washer, and nut, and tighten both nuts securely with a wrench.

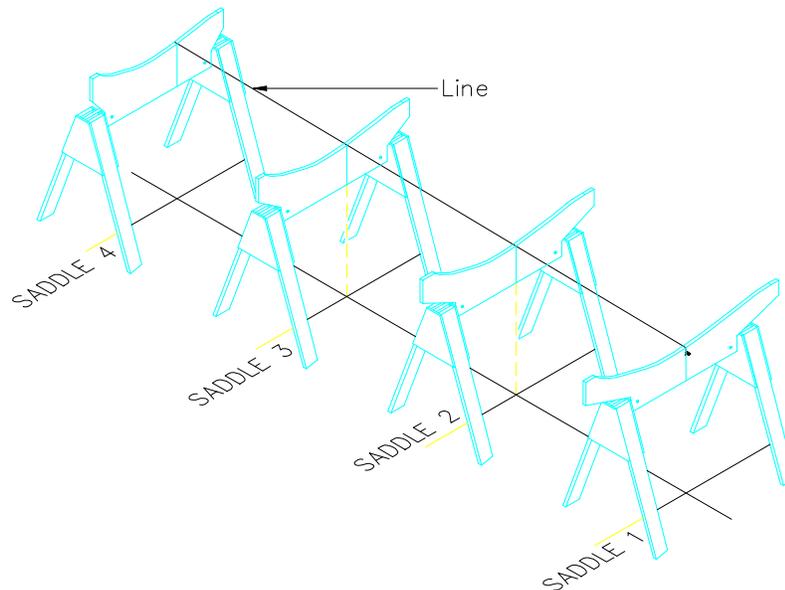
Step 5. Repeat steps 2 through 4 for rib 4.

Make sure that the rib is mounted on the same side of the sawhorse as rib 1, and that the leading edge is at the same end.

Step 6. Locate rib 2 and 3 sawhorses.

Take rib 2 and one sawhorse. Center the rib approximately on the sawhorse web with the template side out. Allow the bottom of the rib to hang 1/2" below the bottom of the web. Using 2 spring clamps, clamp rib 2 to the sawhorse web. Spring clamp the plumb bob string to the spar centerline marked on the template, letting the plumb bob hang to the floor. Locate the rib and sawhorse parallel to the rib 2, location line, so the plumb bob is at the rib 2 mark. The rib should be on the side of the sawhorse web away from the other rib lines.

Line up the rib with the rib 2-location line by checking with the plumb bob at different points. When the rib and sawhorse are aligned, hot glue the sawhorse legs to the floor. Now remove the clamped rib. Repeat for rib 3.



Step 7. Place upper wing skin on ribs 1 and 4.

Place a strip of electrical tape on the edge of rib 1 and 4 where the wing skin will make contact to prevent scratches.

To locate the wing skin on the jig, you will use the center of the main spar, and the rib G location line. To find the rib location lines, a reference line is scribed at BL 36 (buttock line 36), from which you will measure a given distance. Take all measurements along the center of the top spar cap. To find BL 36 measure 33.84" from the inboard end of the main spar, and label it with masking tape and a marker. To find the rib G location centerline, measure 131.96" outboard from BL 36 and label it also.

With at least one person at each end, invert the left upper wing skin and place it in the jig. The center of the main spar should line up with the main spar centerlines on ribs 1 and 4. The rib G location line should line up directly above rib 4.

Step 8. Attach ribs 2 and 3.

Place a strip of electrical tape on the edge of rib 2. Get under the wing skin and position rib 2 in place. Slide it along the wing skin until the most contact is made, put a slight amount of upward pressure on it, and clamp it in place. The lower edge should be approximately level.

Drill both holes through the rib holes and into the sawhorse web. Attach with bolt, washer, and nut and tighten both nuts securely with a wrench. Repeat for rib 3.

D. RIGHT WING JIG ASSEMBLY**DESCRIPTION:**

When the left wing is completed and stored out of the way, the left wing jig can be modified for the right wing, the ribs can remain bolted to the sawhorses. The sawhorses must be pried from the floor and relocated. Also, the level of each rib must be checked, and corrected if necessary.

PROCEDURE:**Step 1. Remove the sawhorses.**

Pry the sawhorses from the floor. Label the location lines on the floor in the opposite direction. (ie. rib 1 becomes rib 4; rib 2 becomes rib 3, etc.)

Step 2. Locate rib 1.

Take rib I and its sawhorse. Spring clamp the plumb bob to the spar centerline marked on the template, letting the plumb bob hang to the floor. Locate the rib and sawhorse parallel to the rib 1 location line, so the plumb bob is at the 1 mark. The rib should be on the side of the sawhorse web toward the other rib lines.

Line up the rib with the rib 1 location line by checking with the plumb bob at different points. When the rib and sawhorse are aligned, hot glue the sawhorse legs to the floor.

Step 3. Level and tighten rib 1.

Check with the level on the bottom edge of the rib. If it is not level, loosen the bolts, removing one bolt completely. Level the bottom edge of the rib, and clamp in place.

Drill a 1/4" hole through the rib and sawhorse web, approximately 1" in from the obsolete hole. Attach with a bolt, washer, and nut, and tighten both nuts securely with a wrench.

Step 4. Repeat steps 2 and 3 for rib 4.

Make sure that the rib is mounted on the same side of the sawhorse as rib 1, and that the leading edge is at the same end.

Step 5. Locate rib 2 and 3.

Take rib 2 and its attached sawhorse. Spring clamp the plumb bob string to the spar centerline marked on the template, letting the plumb bob hang to the floor. Locate the rib and sawhorse parallel to the rib 2 location line, so the plumb bob is at the rib 2 mark.

Line up the rib with the rib 2 location line by checking with the plumb bob at different points. When the rib and sawhorse are aligned, hot glue the sawhorse legs to the floor. Remove the clamped rib from the sawhorse. Repeat for rib 3.

Step 6. Place upper wing skin on ribs 1 and 4.

To locate the wing skin on the jig, you will use the center of the main spar, and the rib G location line. A reference line is scribed on the spar cap at BL 36. To find BL 36, measure approximately 33.75" from the inboard end of the main spar, and label it with masking tape and a marker. To find the rib G location centerline, measure approximately 132" outboard from BL 36 and label it also.

With at least one person at each end, invert the left upper wing skin and place it in the jig. The center of the main spar should line up with the main spar centerlines on ribs 1 and 4. The rib G location line should line up directly above rib 4.

Step 7. Attach ribs 2 and 3.

Get under the wing skin and place rib 2 in place. Slide it along the wing skin until the most contact is made, put a slight amount of upward pressure on it, and clamp it in place. The lower edge should be approximately level.

Drill 2 holes approximately 1" in toward the center from the existing holes, through the rib and Sawhorse web. Attach with bolt, washer, and nut, and tighten both nuts securely with a wrench. Repeat for rib 3.