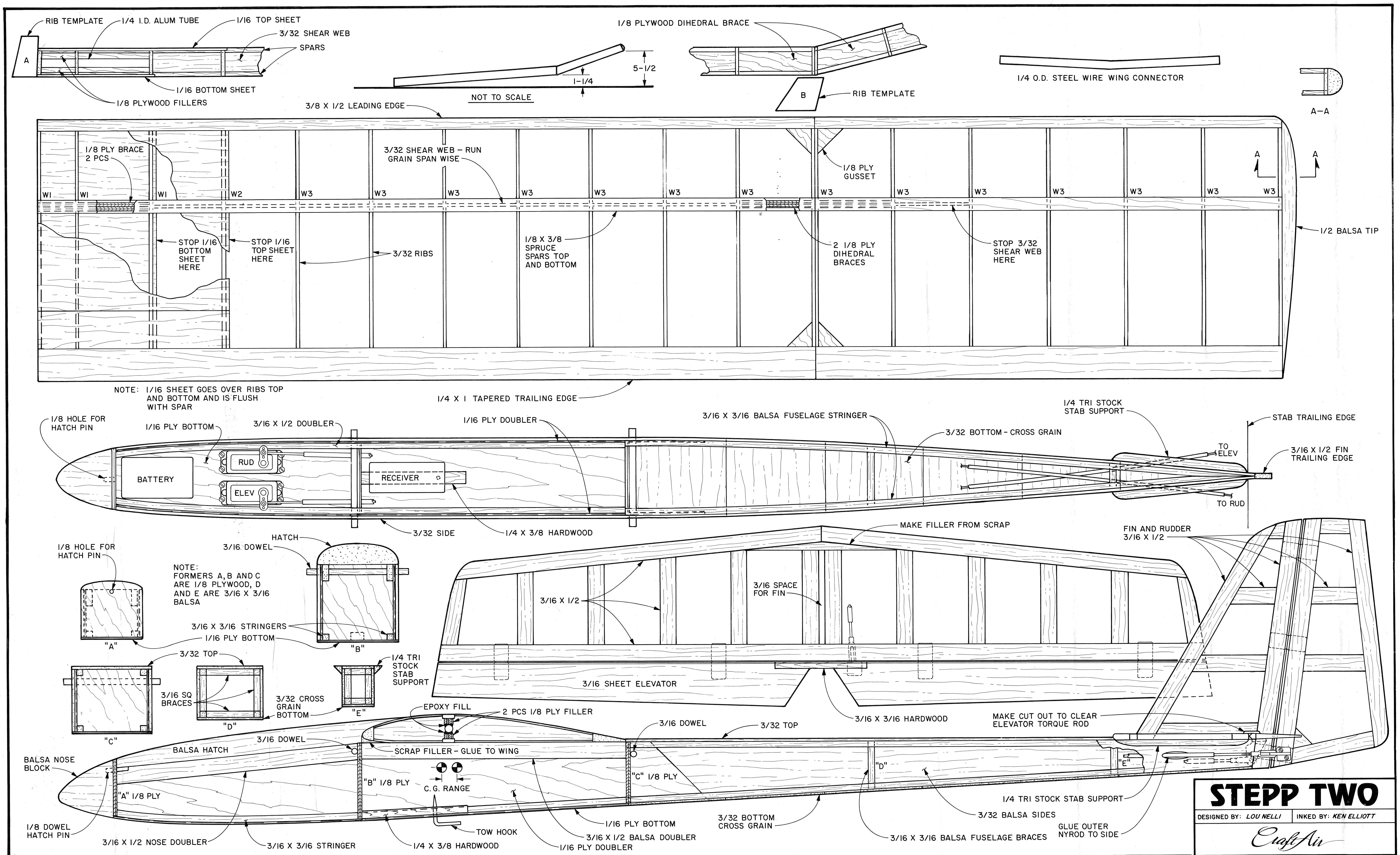


RELEASED 1985

STEPP TWO INSTRUCTIONS

Before starting your Stepp Two read thru the instructions while studying the plans. Identify the various parts as you read thru the instructions and mark them. By identifying each part now you will not make a mistake later during the building of your Stepp Two. The instructions are written in a sequence which will assure you of quick building, a straight model and proper use of the material provided. Using cyanocrylate adhesive to build your Stepp Two will speed up your building time and get you in the air faster, any area where 5 minute epoxy should be used will be noted for you. The use of a flat building board is a must to assure you of a good flying, easy to trim out Stepp Two. Start building your Stepp Two by placing the plans on your flat building surface and covering them with wax paper.

FIN

1. Locate the 3/16 x 1/2 x 36 balsa fin stock. Cut the fin trailing edge to length, note that the trailing edge goes to the bottom of the fuselage. Pin the trailing edge over the plans.
2. Cut the fin leading edge, note that the leading edge goes thru the stabilizer into the space provided between the first two stabilizer ribs. Pin the leading edge over the plans.
3. Cut the four fin "ribs" from the remaining fin stock. Cut the bottom "rib" first, working towards the top, note that the bottom "rib" goes thru the stabilizer into the space provided between the first two stabilizer ribs.
4. Do not cut out the elevator torque notch at this time. Glue the four ribs to the leading and trailing edge.

RUDDER

1. Locate the 3/16 x 1/2 x 36 balsa rudder stock. Cut the rudder leading edge to length. Pin the leading edge over the plans.
2. Cut the rudder trailing edge to length. Pin the trailing edge over the plans.
3. Cut the four rudder "ribs" from the remaining rudder stock.
4. Cut the bottom "rib" first, working towards the top. Glue the four rudder ribs to the leading and trailing edge.
5. Make the gusset between the leading edge and the bottom "rib" from the scrap stock and glue in place.
6. Remove both the fin and rudder from the plans. Lightly sand both sides of the fin and rudder; be sure to use a sanding block to do this.
7. Holding the fin and rudder together, sand the top of each to the shape shown on the plans. Sand the bottom of the rudder at the trailing edge to the shape shown on the plans.
8. Draw a center line down the rear of the fin trailing edge and the front of the rudder edge. Slot the fin trailing edge and the rudder leading edge for the three hinges as shown on the plans.
9. Sand or cut a "V" shape to the rudder leading edge. This completes both the fin and rudder for now.

STABILIZER

1. Locate the three pieces of 3/16 x 1/2 x 36 balsa stabilizer stock. Cut the stabilizer trailing edge to length. Pin the trailing edge over the plans. Be sure the stabilizer plan is covered with wax paper.
2. Make the left side leading edge with the remaining piece of 3/16 x 1/2 stock. Pin over the plans.
3. Using the second piece of 3/16 x 1/2 x 36 stock cut the right stabilizer leading edge; place over the plans and fit the two leading edges at the center.
4. Make the center filler from the 3/16 x 1/2 fin scrap. When these three pieces fit properly mix a small amount of 5 minute epoxy and epoxy them together as shown on the plans. Pin the parts down over the plans while the epoxy dries.
5. Using the rest of the second 3/16 x 1/2 and the third 3/16 x 1/2 piece, cut to length all the stabilizer "ribs'. Use the fin to properly space the two inner ribs apart.
6. Glue all the stabilizer "ribs" between the leading and trailing edge. After the glue has dried remove the stabilizer from the building board. Lightly sand both sides of the stabilizer using the sanding block.
7. Shape the stabilizer tips to the shape shown on the plans. Draw a center line down the length of the stabilizer trailing edge.
8. Using the plans as a guide slot the trialing edge for the four hinges as shown. This completes the stabilizer for now.

ELEVATOR

1. Locate the two preshaped 3/16 balsa elevators. Locate the 3/16 x 3/16 x 2-3/4 hardwood elevator connector. Place the elevators over the plans. Using the elevator connector as a template cut a notch in the elevator leading edge for the elevator connector. Pin the elevators over the plans, making sure the hinge line (leading edge) is straight. Mix a small batch of epoxy and epoxy the elevator connector between the two elevators.
2. After the elevator connector has dried remove the elevators from the plans.
3. Draw a center line all the way around each elevator. Taper the elevator trailing edge as shown on the plans. Remove only a small amount from the top and bottom of each elevator. Use a sanding block. The trailing edge of the elevators must be straight.
4. When the elevators are properly tapered hold the elevators up to the stabilizer and mark the location of the hinge slots that have been cut. Slot the elevators to match those in the stabilizer.
5. Next sand or cut a "V" in the leading edge of the elevators. This completes the elevators.

WING

1. Before starting construction of the wing. Cover wing plans with wax paper. Mark ribs with ball point pen W-1, W-2 and W-3 before removing them from die cut sheets. All W-3 ribs are on the die cut sheet with six ribs. The W-1 and W-2 ribs are on the die cut sheet with four ribs, the W-2 rib is the rib at one end of the sheet by itself. Cut wing dihedral templates carefully from the plans.
2. Start construction of the right inner panel by locating the 1/16 x 3 x 36 center section sheeting. Cut three pieces from the 1/16 x 3 to 3-3/4 inches long. These are the bottom center section sheets.
3. Locate the spruce spars and pin the inner panel bottom spar over the plans.
4. Remove eight W-3 ribs, one W-2 rib and three W-1 ribs from the die cut rib sheets.
5. Place a W-3 type rib at each end of the inner panel and one at the seventh rib position. Do NOT glue. Use these three ribs to locate the leading and tapered trailing edge. Pin the 3/8 x 1/2 x 24 leading over the plans using the three ribs as a placement guide. Pin the 1/4 x 1 x 24 tapered trailing edge over the plans using the three as a placement guide.
6. Place W-2 and all W-3 ribs in position over the plans; be sure these ribs are 90° to the building board. Push all ribs down against the building board.
7. Glue W-2 and eight W-3 ribs to the leading edge, trailing edge and the bottom spar.
8. Remove the W-3 rib from the root position. Place one of the 1/16 x 3 x 3-3/4 bottom center sheets against the rear of the bottom spar. Pin the sheet down to the building board. Cut one of the 1/16 x 3 x 3-3/4 bottom sheets to fill in between the first sheet and the trailing edge. Glue the rear bottom sheets to the spar, trailing edge and each other. Cut the third 1/16 x 3 x 3-3/4 bottom sheet to fit between the front of the bottom spar and the leading edge. Glue only to the spar.
9. Place the three W-1 ribs on the bottom sheet. Use "A" template for the proper angle of the root rib. The top of the root rib slants in towards the second rib. Press down and glue the W-1 ribs to the bottom sheet from the spar to the trailing edge. Cut a small shim from scrap, force the shim between the building board and the bottom center section sheet at the leading edge. Raise the bottom sheet, using the shim, until it contacts the bottom of the three W-1 ribs. Glue the bottom sheet to the W-1 ribs and the leading edge.
10. Locate the 3/32 x 5/8 x 24 shear web. Cut the shear web to length. Note that the shear web does not go between the ribs of the first two wing bays and last wing bay. Glue the shear web in place.
11. Locate and glue the 1/8 plywood gussets in place at the polyhedral rib.
12. Locate the eight 1/8 plywood fillers for the wing connector tube. Epoxy the 1/8 plywood filler together in sets of two; this will make all four fillers. Locate the 1/4 tube that the wing wire connector slips into. Mix a small amount of epoxy. Epoxy together on the flat building board the bottom filler, 1/4 I.D. tube and top filler. This assembly is shown on the side view of the plans between the spars. Using the filler assembly as a guide, notch out the first two W-1 ribs between the spar notches to accept the filler assembly. Trial fit, but do not glue, the top spar to the ribs. The top of the top spar should be flush with the top of W-3 ribs when properly fitted. Remove the top spar. Trial fit the filler assembly. The filler assembly fits correctly when the top spar goes over the assembly, and the top of the top spar is 1/16 above the top of both W-1 and W-2 ribs. If it is necessary to remove any material from the filler assembly, remove equal amounts from both sides. This will keep the 1/4 I.D. tube in the center of the assembly. When the right panel filler fits properly between the spars, sand the left panel filler to match. This will assure proper wing alignment later. Be sure to mark the filler so the "bottom" of the filler goes against the bottom spar.
13. Locate the 1/8 plywood polydihedral braces and remove two from the die cut sheet. Mix a small amount of epoxy and epoxy them together. Trial fit this assembly to the outer end rib, W-3, of the inner panel. Cut a notch in the end rib between the spars, the same as W-1. The fit is correct when the top of the spar is flush with the top of the W-3 end rib when the polydihedral brace is in place. (DO NOT GLUE)
14. Mix a small batch of epoxy. Glue the filler assembly to the bottom spar and the third W-1 rib. Spread some epoxy on top of the filler assembly and install the top spar. Glue the top spar to all the ribs and the shear web. Do not glue the polydihedral brace in place at this time.
15. Locate the 1/16 x 3 x 36 sheet used to cut the bottom center sheeting from. Cut three pieces 6 inches long from the sheet. Fit and glue two of the 6 inch pieces between the rear of the top spar and the front of the trailing edge. Cut the third piece between the front of the top spar and the lead edge. Glue the front sheet in place.
16. This completes the right inner panel. Remove the panel from the building board.
17. Start building the right outer panel by first cutting out the "B" rib template.
18. Locate the bottom 1/8 x 3/8 spruce spar. Pin the spar over the plans. Place a W-3 type rib at the root and tip of the outer panel; do not glue. Using the two W-3 type ribs, locate and pin in position the leading and trailing edge of the outer panel. Place the balance of the W-3 ribs on the outer panel bottom spar; do not glue.
19. Using the "B" template adjust the angle of the root rib to match. The top of the root rib slants in towards the second rib. Glue the W-3 ribs to the leading edge, spar and trailing edge.
20. Locate the 3/32 x 1/8 shear web; cut one piece of shear web to fit between the second and third rib. Glue shear web to bottom spar and the second and third rib.
21. Locate the 1/8 plywood gusset. Glue them into the root rib, leading edge and trailing edge after checking the angle of the root rib using template "B". Cut a notch in the root rib between the spar, the same as W-3 on the inner panel.
22. Fit the top spar; do not glue. With the top spar in place fit the polydihedral brace; do not glue. Remove the polydihedral brace; glue the top spar to the W-3 ribs and the shear web. Remove the outer panel from the building board.
23. Locate the wing tip block. Glue the block to the tip rib. Carve and sand the tip block to the shape shown on the plans.
24. Sand the leading and trailing edge ends of the root rib to the same angles as the root rib.
25. Pin the right inner panel over the plans. Put the plywood polydihedral brace in place on the end of the inner panel. Put the right outer panel on the plywood polydihedral brace. Sand the root rib of the outer panel and the brace for a perfect fit between the two panels. Measure the distance from the building board to the tip of the outer panel; it should measure 4-1/4 inches. Epoxy the polydihedral brace in place. Epoxy the inner panel to the outer panel.
26. This completes the right wing panel.

Remove the plans from the building board and turn them over. Cover the plan with paper. Now build the left wing panel with the plans turned over. Follow the right wing panel instruction to build left panels.

FUSELAGE

Before starting construction of the fuselage, place the two sides on the building board. Place the sides so the top, (wing side) of the sides are next to each other. Mark the sides left and right; this will prevent making two left or right sides.

1. Start construction by mixing epoxy and epoxying the 1/16 plywood doublers to the 3/32 balsa sides. Pin the sides and doubler to the flat building surface while the epoxy dries.
2. Using the plans as a guide, mark the location of the formers B, C and the 3/16 x 3/16 upright brace at D and E. The formers and braces are 90° to the top of the fuselage side; use a 90° right triangle to mark both sides. Note the former A goes on the front of the fuselage sides, NOT between them.
3. With the sides pinned to the building board, glue the 3/16 x 3/16 bottom stringer in place. The bottom stringer goes from the nose to the tail. Glue the top 3/16 x 3/16 stringer in place. The top stringer goes from the rear of former C to the tail. Glue the 3/16 x 1/2 balsa doublers in the nose and under the wing in place. The nose doubler goes from the front of the side to in front of former B; wing doubler goes from the front of former B to the rear of former C. Cut the 3/16 x 3/16 upright for D and E to length. Glue both upright D and E between the top and bottom stringer.
4. Pin the right side down to the building board. Glue formers B and C in place; make sure both formers are 90° to the right side. Remove the right side from the building board. Place the right side back on the building board with the top side (wing side) on the building board. Make sure the side is 90° on the building board. Place the left side on the building board (wing side) against the board, and glue it to former B and C. Make sure the left side is 90° to the building board and in the proper location for former B and C.
5. Use the fuselage top view as a guide to cut the top and bottom stringers at the tail to the angle shown on the plans. Where these two sides meet as shown on the plans, epoxy the tail ends of the fuselage sides together. Make sure the top of the fuselage sides (wing side) are against the building board and the sides are 90° to the building board. Draw a center line down former A and the 1/16 plywood bottom. Mark the center of former C. Epoxy former A to the front of the fuselage side, NOT between the sides. Use the center line drawn on the 1/16 plywood bottom and line up the center of former A and C with the center line on the bottom. Glue the 1/16 plywood bottom in place. Cut the 3/16 x 3/16 cross braces for D and E to length, using the plans as a guide. Place the cross braces in place; DO NOT glue. Pin the 3/32 preshaped top over the plans. Place the fuselage on the top (wing side down) and glue in place. Notice that the top goes over former C and does not go all the way to the tail. Make sure the sides line up with the preshaped top; adjust D and E cross braces if necessary. Make sure the sides are 90° to the building board. Glue D and E cross braces in place. Remove the fuselage from the building board.
6. Mark the location of the two 3/16 dowels on the fuselage side. Drill a 3/16 hole in the sides. Push the dowels thru the fuselage so that an equal amount of dowel sticks out each side of the fuselage. Epoxy the dowels in place.
7. Glue the 1/4 tri-stock stab support to the side of the fuselage as shown on the side view of the plans. Note that the tri-stock lines up with the top of the side NOT the 3/32 top.
8. Mount the rudder and elevator servos in the location shown on the plans. Mount the servos as instructed in the radio manufacturers instruction booklet. If your transmitter has reverse switches skip the next section; if not, make sure you know which side of the servos wheel to hook to the push rod for proper control. As drawn on the plans, left rudder requires the rudder servo to pull and the up elevator requires the servo to push. With the servos mounted, mark the location of the rudder and elevator push rod exits on former B. Notice that the servos are on opposite sides of their respective control horns. The push rods cross each other at D and exit on the proper side. Be sure to miss both the wing dowel and the 3/16 x 1/2 balsa doubler with the push rods. Mark former C at the same locations for the push rods as former B. Drill holes in former B and C large enough to push the outer push rod tube thru. Using the plans as a guide, temporarily mount the rudder and elevator horns. Pin or hold the stabilizer elevator assembly in place along with the fin and rudder assembly. Mark on the fuselage sides the location of the push rod exits using the pinned in place stabilizer and fin assembly as a guide. Cut the slots in the rear of the fuselage where the push rods outer tubes exit. Put both the elevator and rudder outer push rod guides in place, starting at approximately 1" in front of former B, crossing over each other at position D and exiting the rear of the fuselage. Glue the outer push rod tubes in place. Use some scrap balsa to support the push rods at position D. Remove the pinned in place stabilizer and fin assemblies.
9. Cut the 3/32 bottom sheet to length; remember the bottom sheet is cross grain, not length wise. Glue the bottom sheet in place.
10. Epoxy the nose block to the front of former A. Carve and sand the nose block to the shape of former A.
11. Epoxy the 1/8 dowel hatch pin to the bottom front of the hatch. Drill a 1/8 hole in former A for the hatch pin. Join the wing half using the pre-bent wing connector and place the wing on the fuselage. Fit the hatch to former A and over the leading edge of the wing as shown on the plans side view. Carve and sand the hatch to shape. The front of the hatch should mate with former A; the rear shape as shown on the plans; see former B cross section. This completes the fuselage.

COVERING

Cover the wing panels with one of the film materials such as MonoKote. After covering the wings, check both panels carefully for warps or twists. Any warps or twists can be removed by holding the wing panel straight and reheating the cover material. Cover the rudder and elevators; check them as you did the wing for warps. Install the elevator and rudder horn. Glue the hinges in the rudder and elevator. It is possible to cover the fin, stabilizer and fuselage separate or after they are glued together. Whichever is easier for you is the best way. Either way you choose you must first make the cut out in the bottom of the fin to clear the elevator torque rod. Slip the elevator onto the stabilizer easing the hinges into the elevator trailing edge hinge slots. Place the fin in the slot between the first two elevator ribs. Notch the bottom fin rib so that the elevator can move up 3/8 to 1/2 inch. With the fin still in place, place the assembly on the rear of the fuselage and cut away a portion of the fuselage so the elevator can move down 3/8 to 1/2 inch. Now cover the remaining parts or glue the tail assembly on the fuselage.

ALIGNMENT

If the parts are covered or not the alignment and glueing of the tail to the fuselage is the same. Align the stabilizer by marking the middle of the trailing edge; this mark lines up with the center of the fuselage at the rear. Measure from the center line on former A to the tip of the stabilizer at the trailing edge; both sides must be the same. Glue the stabilizer in place. Remember to remove any film material where there is glue,; only glue wood to wood. Glue the elevator hinges into the stabilizer if the stabilizer is covered; if not covered, cover it first then glue elevator on. Glue the fin between the first two elevator ribs and to rear of the fuselage. Make sure the fin is at 90° to the stabilizer; use a 90° right triangle. Complete the covering if the STEPP TWO is not covered. If the STEPP TWO is covered glue the rudder hinges into the fin.

RADIO

Install the radio per the manufacturers recommendations. Wrap foam around the battery and receiver. Mount the switch on the side of the fuselage. Make up the inner push rods and install. Adjust the rudder throw for one inch left and right. Adjust the elevator throw for 3/8 up and down. You may change the throws after a few flights but these are a good place to start.

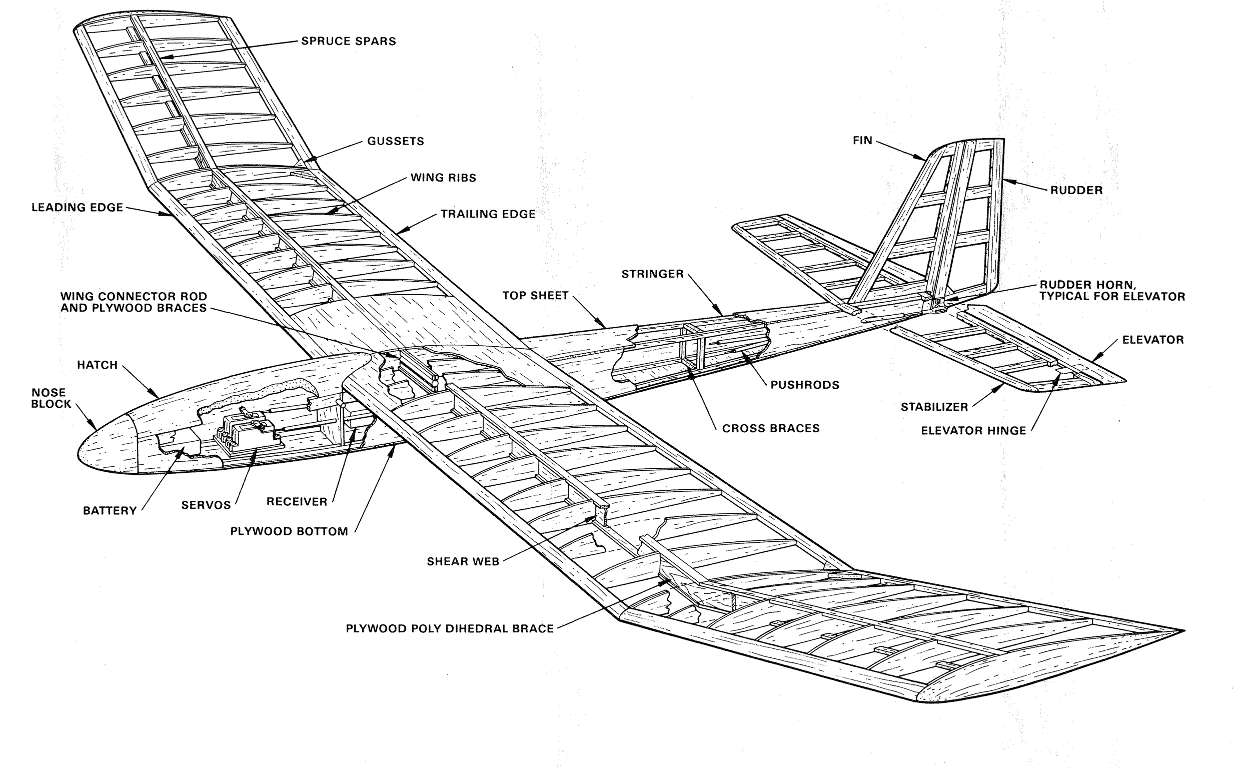
CG

With the STEPP TWO assembled, hold it just forward of the wing spars next to the fuselage balanced on your index fingers. The nose should be just slightly down; add weight to either the nose or tail to achieve this balance.

TEST FLY

Before going to the flying field check again for any warps or twists and take them out by reheating the covering material. Turn on the transmitter and receiver and stand behind the STEPP TWO and make sure left is left, right is right and up and down are correct. Use a clear open field to test glide your STEPP TWO. With the radio turned on, throw the STEPP TWO at a spot 50 yards in front of you. Throw it in a slight nose down attitude into the wind. DO NOT throw it nose up. Watch the glide and make any necessary trim changes to achieve a straight slow descent; do not apply much up elevator, if any, this will cause a stall and crash. When you are satisfied with the test glide the STEPP TWO can be used with a Hi-Start or slope soar. If used for slope soaring remember to take some extra weight for the nose; add weight as wind conditions call for.

HAPPY FLYING

STEPP TWO MATERIAL LIST

		QTY.
RUDDER	3/16 x 1/2 x 26 Balsa	1
FIN	3/16 x 1/2 x 25 Balsa	1
STAB	3/16 x 1/2 x 25 Balsa	2
	3/16 x 1/2 x 36 Balsa	1
ELEVATORS	3/16 Sheet Balsa	2
	3/16 x 3/16 x 2-3/4 Hardwood Connector	1
WING	3/8 x 1/2 x 24 Leading Edge, Center Balsa	2
	3/8 x 1/2 x 14-1/2 Leading Edge, Outer Balsa	2
	1/8 x 3/8 x 24 Spar, Center, Spruce	4
	1/8 x 3/8 x 14-1/2 Spar, Outer, Spruce	4
	3/32 x 36 Shear Web, Balsa	2
	1/4 x 1 x 24 Trailing Edge, Center, Balsa	2
	1/4 x 1 x 14-1/2 Trailing Edge, Outer, Balsa	2
	3/32 Ribs W-1 Balsa	6
	3/32 Ribs W-2 Balsa	2
	3/32 Ribs W-3 Balsa	30
	1/8 Plywood Joiner Braces	8
	1/8 Plywood Outer Dihedral Braces	4
	1/8 Plywood Outer Gusset	8
	1/16 x 3 x 36 Center Section Sheeting	1
	1/16 x 3 x 18 Center Section Sheeting	1
FUSE	3/32 Sides, Balsa	2
	3/32 Top, Balsa	1
	1/16 Plywood Fuse Doubler	2
	1/16 x 2-1/2 x 16 Bottom, Plywood	1
	3/32 x 3 x 18 Bottom, Balsa	1
	3/16 x 3/16 x 36 Stringers, Balsa	4
	3/16 x 1/2 x 36 Nose Doubler, Balsa	1
	Hatch, Balsa	1
	Nose Block, Balsa	1
	3/16 Dowel, Wing Hold Down, 3" Long	2
	1/4 x 3/8 x 3-1/4 Hook Brace, Hardwood	1
	1/8 Dowel, Hatch Hold Down, 3/4" Long	1
	Former A, B and C, 1/8 Plywood	1 ea.
	1/4 Tri-Stock Stab Support, 9" Long	1
MECHANICAL	Tow Hook	1
	Rudder and Elevator Horn with Screws	2
	1/4 Steel Wing Connector	1
	1/4 Wing Connector Tube	2
HINGES		7
CLEVICES		2