

JEKYLL ASSEMBLY INSTRUCTIONS

INTRODUCTION

The JEKYLL is designed primarily as a competition pattern aircraft. The JEKYLL will accept any of the current 60 sized engines. The Y.S. .61 was used in the prototype. The pressurized fuel system on the Y.S. proved sufficient to pump fuel from the tank location shown on the plans. This fuel tank location produces minimum trim change with fuel burn off.

Construction of this kit should not prove difficult for anyone having previous experience with fiberglass and foam kits. If this type of construction is new to you, it is recommended that you seek the help of an experienced builder in your area. Most modelers have their own "tried and true" methods of construction; the recommendations included in the instructions are intended as guidelines, and not as the only way to get the job done. We recommend that you read through the instructions, and study the plans to familiarize yourself with the building sequence and options before starting construction. If you still feel unsure we suggest purchasing a copy of our video tape "WING SKINNING", which will show you what you need to know to build the wings.

GENERAL INSTRUCTIONS

The fiberglass parts in this kit are epoxy; only epoxy, or C.A. (Cyano Acrylate) glues should be used as an adhesive. Areas to be bonded should be thoroughly sanded with 80 or 100 grit paper to remove surface glaze, or a weak bond will result. Hobbypoxy II or an equivalent slow curing epoxy is recommended for areas where maximum strength is required.

A dremel tool with carbide bits is recommended for making cutouts in the fiberglass.

The fuselage is designed to fair into a 2 1/2" Tru-turn FAI spinner.

A polyester body filler generically referred to as Bondo is recommended for blending the seams on the fuselage and for filling surface imperfections. This filler may be applied directly to sanded epoxy or over top of primer.

For best performance the JEKYLL should be as light as possible. A finished weight of 8 pounds or less is possible with a painted fuselage and monocoated wings and stab.

Alignment aids are molded in the fuselage. A small cross-hair at the front of the fuselage and below the stab line indicates the thrust line. A line is provided at the location of the leading edge and the trailing edge of the wing. Correct side thrust is molded in the front of the fuselage for engine alignment. Wing incidence - 2 mm positive, stab incidence - 0 degrees. Stab is on thrust line. Wing dihedral - 7/16" each panel as measured at tip trailing edge. i.e. - the wing tip trailing edge would be 7/16" higher than the wing root trailing edge. The dihedral of 7/16" is precut in the wing cores.

FIREWALL AND ENGINE INSTALLATION

The firewall is 1/4" plywood and is intended to fit approximately 4-1/4" from the spinner ring. This distance may vary depending on your particular engine setup. An aluminum motor mount is recommended for hard mount installations. Note: The current trend in engine mounts is to soft mount the engine using rubber isolators. Refer to the manufacturers instructions when using this type of mount. The following instructions refer to hard-mounted engines.

1. Cut out fuselage as necessary to install motor mount and engine.
2. Sand the area where the firewall will be attached.
3. Drill and tap motor mount for your engine.
4. Place the motor mount inside the fuselage opening and install engine on mount.
5. Make up a spacer from 1/16" balsa sheet and tack glue the spacer to the back of the spinner back plate. The spacer should be the same diameter as the spinner.
6. Install the prop and spinner on the engine.
7. Hold the fuselage upright and align the spinner with the nose ring. Securely glue and /or tape the spinner in place. The assembly should be fastened firmly enough to permit turning the fuselage over and standing it on the spinner.
8. Trial fit the firewall by dropping it on the motor mount. It should lay easily on the mount without requiring any pushing. This will prevent bulges in the fuselage caused by the pressure of the firewall edges. At this time you may wish to locate and drill the holes for the throttle cable and the fuel lines.
9. Re-check the spinner alignment and rotate engine so that the glow plug will be in the center and secure engine with masking tape.
10. Tack glue the firewall in place against the motor mount with 5-minute epoxy. The firewall may now be permanently glued in place with filled epoxy or Hobbypoxy II and glass cloth.

11. After the glue has cured, unbolt the motor from the mount and carefully cut the spacer loose from the fuselage. Remove the engine from the fuselage and drill the mounting holes through the mount into the firewall using a long drill bit. In a pinch you can sharpen a piece a 1/8" music wire for use as a temporary drill bit.

12. Install blind nuts and coat exposed areas of the firewall with a thin coat of Hobby epoxy II. NOTE: You can reduce the viscosity of Hobby epoxy II, and also increase the set up time by warming the epoxy with a heat gun.

RUDDER AND HORIZONTAL STABILIZER CONSTRUCTION

The wing, stab, and the rudder use the same techniques for construction. We recommend sheeting the rudder first since a mistake here will be less costly to correct than on the wing or stab. Virtually everything but epoxy and some contact cements will dissolve the foam. Avoid using any thinner near the cores. If you are not familiar with the technique of sheeting cores using epoxy we recommend you enlist the aid of an experienced builder in your area, or purchase a copy of our video tape "WING SKINNING". It is very easy to add a lot of unnecessary weight if this step is not done correctly.

1. Locate a flat surface on which to sheet the cores. The bench must be capable of remaining true with 80 pounds of weight on it. Don't assume your bench is flat, check with a straight edge. The cores have been cut on a flat plate and weighted during the cutting operation. Because of the nature of the foam some bowing may occur. This bowing will disappear when the core is weighted down on a flat surface.
2. Keep the cores in the blocks from which they were cut, mark them to avoid mixing them up.
3. Lightly block sand the cores to remove the surface fuzz and vacuum the cores thoroughly.
4. Glue up sufficient matched 1/16" Balsa to cover the surface of the core. Trim sheeting to be flush at the trailing edge of the foam, and allow approximately 3/16" overhang at the leading edge, root, and tip.
5. Make up a squeegee from 1/32" plywood or use a flexible plastic body filler squeegee. File small notches in the tool about 1/2" apart. This tool will apply the epoxy in a manner similar to floor tile cement, leaving ridges of epoxy every 1/2 inch.
6. Mix a small batch of E-Z Lam epoxy resin and apply a thin coat of epoxy on the balsa only.
7. Line up the sheeting on the core and place core, and sheeting back in the original blocks.

8. Place the block on the table with the faced side down. One side of the block has been wire cut and will be smoother than the other. The smooth side goes against the bench. In the case of the wing, the dihedral is pre-cut and the bottom of the wing goes down.

9. Make sure everything is aligned and place a piece of 3/4" plywood, particle board, or 1/2" drywall slightly larger than the block on top of the stack.

10. Now add weights to the board - milk jugs filled with water, or books work nicely. Distribute the weight evenly. Approximately 15 pounds will do for the rudder, 30 pounds for the stab and 80 - 90 pounds for the wing.

11. Inspect for bowing or twisting of stab - use a good metal straight edge on each side and at the ends. Double check your work. Take your time to insure everything is straight before you leave. Playing cards or poster board shims can be used to correct areas where the sheeting is not down tight or a slight bow is evident. Sometimes redistributing the weight is necessary. Do one surface at a time until you get the hang of it.

12. Allow the assembly to cure at least 24 hours, then remove stab and trim left and right halves to exact matched size - especially the chord at the root and the tips.

13. Glue a piece of 1/4" square balsa on the trailing edge using tite-bond or epoxy. Shape the trailing edge using a razor plane and sanding block. Don't try to get a sharp edge; a blunt trailing edge, 3/32" to 1/8" thick makes for a softer feel around neutral when flying.

14. Lay out the elevator on the stab with a fine line marker and mark an allowance for the 1/4" balsa frame shown on the plans. Cut out the elevator using a bandsaw or jigsaw if possible. You can also layout the areas to be cut on both sides of the stab and cut through from each side with an X-acto knife.

15. If you are going to use the type of elevator horn shown on the plans, cut out an area of foam at this location and glue in a small piece of balsa to support the dowel.

16. Sand the stab and the elevator with a long sanding block and glue on the 1/4" facing, and the 1/16" end caps with tite-bond or an equivalent glue. Insure the surfaces are straight; it may help to draw a line on the 1/4" facing to insure the surface doesn't bow during assembly.

17. Glue on and shape the leading edges and the tip blocks. Trim and sand the facings. Bevel the elevator leading edge to allow at least 15 degrees of travel each side of center. Use a long block for sanding.

18. Glue the stab halves together with 5 minute epoxy; check alignment carefully. The stab joint should be reinforced with light fiberglass cloth and epoxy if desired. One layer of 2 or 4 ounce cloth is sufficient. Note: Fiberglass reinforcement is not necessary if a removable stab is to be used.

19. Mark and slot the hinge locations, use 4 hinges per surface.

20. If you are not using the adjustable stab mechanism the stab should now be ready for installation in the fuselage.

WING CORE PREPERATION

1. Cut two 1/8" balsa or lite-ply root ribs as shown on the plans. Carry the leading edge of the ribs to a point to aid in aligning the ribs with the marks on the fuselage. The extra material will be cut off later. The lightning holes shown on the plans should only be used on the lite-ply ribs.

2. Make up two 1/8" lite ply false ribs which are located at the outboard end of the cardboard tube. The best way to do this is to start with an oversize piece of ply with a hole that will fit over the cardboard tube. Slide the plate into the slot and push the tube through the hole. With everything in place, trace along the foam marking the ply rib. Remove the rib and cut to final size.

3. Open up and sand the tube holes in the fuselage to allow a slip fit for the aluminum tube.

4. Refer to detail A on the plans. Make up the cardboard tube and ply plate assembly shown and trial fit in the fuselage. Do not glue this assembly until final alignment checks have been made.

5. Slide the aluminum tube into the fuselage and center the tube.

6. Glue a 1/8" ply plate at the anti-rotation pin locations on the wing root rib and drill the rib for the anti-rotation pins.

7. Slide the cardboard tubes on the aluminum tube and insure the cardboard tube fits square to the fuselage side. Slide the root rib over the cardboard tube and align with the marks on the fuselage. Tack glue the root rib to the fuselage with C.A. glue.

8. Drill a 1/4" hole in the fuselage at the anti-rotation pin locations using the root rib as a guide. Epoxy a 1/8" ply plate to the inside of the fuselage at the pin location and drill through for the anti-rotation pin. You are remembering to rough up the fiberglass before gluing, I hope.

9. You should now have the fuselage with the tube in place, root ribs and cardboard tubes installed, and the anti-rotation pin holes drilled. Break the root ribs loose from the fuselage and glue the anti-rotation pins to the root rib. The pins may be 1/4" brass tube with a wood dowel epoxied inside, carbon fiber rod, or aluminum rod. Avoid using wood dowels, they will wear quickly.

10. Reinstall the root ribs and cardboard tubes on the fuselage, and slide the wings and false ribs over the tubes. Remember to mark the cores so they go back in the blocks the way they were shipped.

11. Block the fuse level and check that the dihedral is 7/16" as measured at the trailing edge. That is, the wing tip trailing edge should be 7/16" higher than the root trailing edge. Also insure the root end of the foam fits squarely against the ply root rib. You will have to cut out the foam to accommodate the plates for the anti-rotation pins.

12. While the wings are in place check the alignment of the wings to the fuselage. Measure from the wing tips to the tip of the vertical fin and the base of the vertical fin. Make sure the wing tips are the same distance from the bench with the fin held vertical with a square. Take your time and get the alignment right, get back and sight the setup from a distance. Sometimes your eyes are the best tool.

NOTE: Before completing the next step, clean the aluminum tube with steel wool and apply several coats of a good car wax to prevent any epoxy from permanently sticking to the tube. Also place a piece of wax paper between the root rib and the fuselage for the same reason.

13. When you are satisfied the alignment is correct, glue the cardboard tubes in the wing core and attach the cardboard tube to the foam ribs with Hobbyepoxy Formula II. If you have an excessive amount of gap between the foam and the tube, add micro-balloons to the epoxy. It is not necessary to slop the glue in the socket, use as little glue as possible. Slide the wing back and forth on the tube to distribute the epoxy. Block everything up, check the alignment one more time, and let the glue cure overnight.

14. It is best to do the above procedure one wing at a time. It is much easier to get the wing off by having the tube sticking out the other side of the fuselage. If some epoxy sticks to the tube, you can twist the tube to break it loose.

15. Epoxy the gear plates to the foam, flush with the surface of the foam. Of course, you may have your own techniques for the landing gear. There are many variations - rails, plywood box, carbon fiber angles, etc.

WING SKINNING

NOTE: With the exception of the tube installation and the landing gear, the wing construction uses the same techniques for sheeting, and framing the control surfaces as the rudder and stab. Therefore, we will not repeat the instructions for the sheeting process.

1. Sheet the wing, frame the ailerons, install the leading edge and the wing tips using the same procedures as for the rudder, and stab.
2. Cut out a recess for the aileron servo on the bottom of each wing, glue in the mounting rails, and install the aileron servo so that the control wheel just protrudes above the surface. Section B-B on the plans should make this clear. The opening may be covered with monocote or a thin plywood hatch as desired.
3. Cut out the sheeting covering the landing gear plate as required to allow installation of the retract mechanism.
4. If desired, the wheel wells may be lined with 1/16" balsa.
5. Tunnels for the aileron wires and the landing gear linkage or air lines may be made by heating a length of music wire. Place the wing half back in the lower block. Cut 2 pieces of scrap wood to the height you want the hole and space them a short distance from the wing root. The blocks will support the wire and keep the hole parallel with the bench. Heat the end of the wire with a candle and carefully melt a hole to the desired location. Reheat the wire as necessary.
6. The wings may be secured to the fuselage with a wire hook on each root rib and a couple of rubber bands stretched between them, or by drilling and tapping a hole in the tube for a 6-32 machine screw on the bottom side of the wing. If you use a screw to hold the wing, be sure to place the screw at the outer end of the tube where the load is the least. There have been cases of tube failure on other airplanes when the hole was drilled near the root. While we're on the subject don't replace the wing tube with anything other than 6061 T-6 or 2024 T-3 grade aluminum. There is a vast difference in the strength of some alloys, and the hardware store stock will buckle at very low loading.
7. Harden the end of the cardboard tube at the root rib with thin C.A. glue. Apply a small amount of glue to the first 1/2" of tube, and lightly sand with 320 paper for a good fit with the tube. This step will make it easier to insert the aluminum tube, and prevent fraying the cardboard tube.

ADJUSTABLE STAB MECHANISM

The advantage of this unit is the ability to remove the stab for shipping or transportation. Adjustment is seldom necessary if the stab is built and installed correctly. If you don't travel long distances to contests, or have the need to crate your airplane you may decide the 6 + hours to add this option is not worth it.

1. Cut a slot on the bottom side of the stab at the location shown on the plans. Make the slot wide enough to accept the phenolic sleeve. Cut a slot in the foam deep enough to center the sleeve in the stab.
2. Make temporary layout lines on the stab outlining where the stab will be cut off. This will aid in showing where to glue the sleeve.
3. Cut the phenolic tube to length and glue the sleeve in the slot. Do not glue the tube at the stab center section as this portion of the tube will be cut off and used later. Fill the remaining slot opening with soft balsa and trim, and sand to the contour of the stab. A look at the cross section of the stab shown on the plans should make this clear.
4. Refer to the plans for the location to cut the stab to match the fuselage sides. Layout the cut lines and cut the left and right stab halves loose from the center section.
5. Make up a 1/16" balsa root rib and a beveled 1/8" lite-ply plate for the adjuster. Slot the ply plate and the root rib to allow +/- 1/16" adjustment travel. Install adjuster and glue the root rib and the adjuster to stab. Note: You will have to remove a small amount of foam where the ply plate and the adjuster will be inset into the stab. Open a small hole in the bottom of the stab to access the adjustment screw.
6. Repeat the above step for the other stab half. The adjustment screw opening should be on the bottom of the stab.
7. Using the dremel tool, open a hole for the tube on the fuselage stab fillet.
8. Refer to detail C on the plans. Make up two lite-ply plates to reinforce the fuselage at the tube location. Using the section of phenolic sleeve you salvaged from the center section, cut the sleeve to span the distance inside the fuselage.
9. Spread the rear of the fuselage at the rudder line as required to allow installing the tube and plates.
10. Slide the aluminum tube through the fuselage and trial fit the stab. When you are satisfied with the stab alignment, epoxy or CA glue the sleeve and ply plates in permanently.
11. Glue the forward ply plates for the brass tube in the fuselage. Reinstall the stab and mark the location for the brass tube on the stab fillet. Drill the hole for the brass tube in the stab fillet.
12. The stab halves may be held in place by a 4-40 machine screw or equivalent sheet metal screw installed approximately halfway out the tube on the bottom side of each stab half.

HORIZONTAL STAB INSTALLATION

These instructions only apply if you are installing a fixed (non-removable stab).

1. Using a 1/2 of the stab as a template, mark the outline of the stab (less the elevators) on the centerline marked on the fuse. Using a dremal tool, grind out the area on the fuselage for the stab. Note: Extend the scribe line on the fuselage so you will have a reference to align the stab to.
2. At this point you should have a completed stab and an opening in the fuselage. The rudder post should be temporarily installed and held with masking tape.
3. Slide the stab in position, block the fuselage level, and check stab alignment by measuring from the stab tips to the wing tips, from the stab tips to the bench, and by using your trusty eyeballs. Be sure the stab is set at 0 degrees to the thrust line.
4. When your satisfied the alignment is correct, tack glue the stab to the fuselage with dabs of 5 minute epoxy. I'm sure you roughed up the glass both on the inside and the outside of the fuselage.
5. Remove the rudder post and glue the stab in place permanently with epoxy. Don't get carried away with the glue unless you think you need a lot of tail weight. Strips of fiberglass cloth and epoxy on the inside of the fuselage will yield the strongest joint. Blend the fuselage into the stab using Bondo, or 5 minute epoxy and micro-balloons.

RUDDER INSTALLATION

1. Epoxy the 1/2" square balsa tail post to the fuselage, hold assembly in place with strips of masking tape until the glue has cured.
2. Glue in a 1/8" balsa rib to close the opening above the rudder.
3. Hinge the rudder to the tail post and fair in the balsa skins and the lower rib with a sanding block.

EQUIPMENT INSTALLATION

1. Size the fuel tank to your particular requirements, a 12 ounce tank is sufficient for the current FAI or AMA pattern. For sport or practice flying you may want to use a larger tank. To place the tank as far back as shown on the plans, it will be necessary to use an engine with a built in pump, or pressure system, or add a Perry fuel pump.
2. Sullivan cables were used for the rudder linkage on the prototypes.
3. The elevator pushrod, is a fiberglass arrow shaft captured by a slip fit brass tube installed in the rudder post. This set-up prevents side motion and makes for a extremely firm elevator. Refer to the plans for the details.

4. The receiver and the battery pack location is dependent on center of gravity requirements. Normal battery pack location is in front of the fuel tank.

5. Use an extension on the rear of the tuned pipe to route the exhaust away from the fuselage.

FINISHING

1. Prepare the fuselage for paint by cleaning the fiberglass parts with prep-sol, acryli-clean, or a similar solvent. These cleaners are available at automotive paint supply stores. Wet sand the fuselage thoroughly with 320 grit sandpaper to remove the gloss. Scotch-brite pads are useful for getting at hard to sand areas. Fill imperfections in the glass and blend the seams where necessary with a polyester body filler. Clean the fuselage again with solvent before applying primer.

2. K&B Superpoxy primer is recommended as a base for painting. Add a small amount of K&B black paint to the primer. This will produce a light grey color, making it easy to see any areas that need additional work.

3. After priming, fill any small defects, pinholes, etc. with Dap filler or equivalent. Dap is a water based filler designed for patching walls - the original Dap filler works better than the newer product called "One-step" for this purpose. To fill pinholes, apply the filler with your finger using a circular motion.

4. Spot prime and re-sand the fiberglass parts. Remove as much primer as possible to reduce weight. Apply the paint base coat, and trim colors following the manufacturers recommendations.

5. Use 3-M fine line tape for outlining the trim colors. This tape produces a sharp paint line and will conform to almost any shape. This product is available from automotive paint supply stores.

6. To keep the weight down, it is recommended that the wings, the stab, and the rudder be covered with monocote or equivalent film.

7. Seal the gap on the ailerons with monocote or tape applied to the lower surface.

8. After the painting is completed, wipe a thin coat of clear silicone on the radio hatch flanges. This will eliminate vibration and chaffing.

FLYING

1. Check the balance point is where the plans show. After a few flights you can experiment by moving the center of gravity and adjusting the control throws to suit your flying style.

2. Be sure to check the lateral balance. If one wing is heavy, add clay to the other wing and see what happens. Once you have the airplane flying right, you can add the weight permanently inside the wing tip.

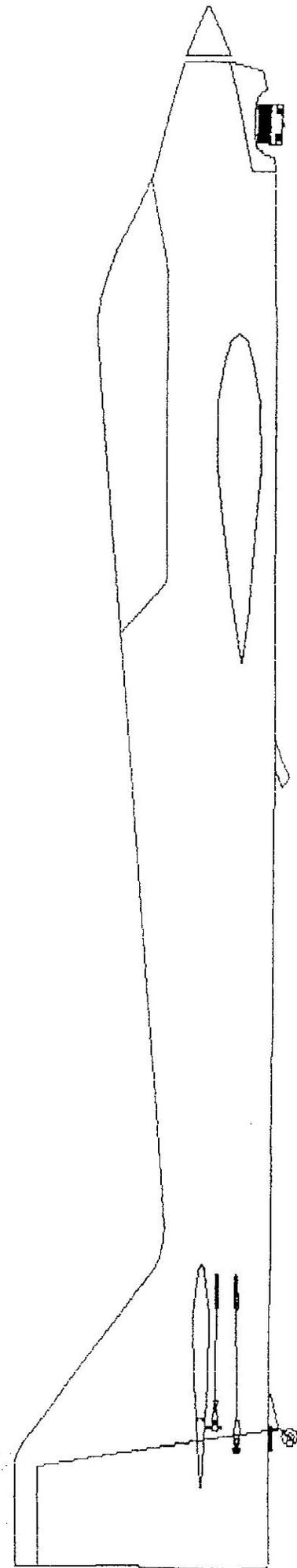
3. It will typically take many flights to trim the plane out perfectly. Remember, with a little work, you can change the wing incidence or adjust the wings independently to correct a trim problem.

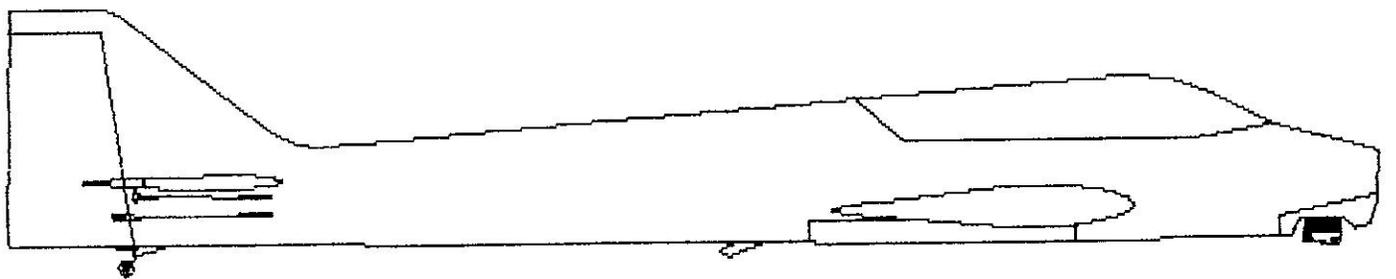
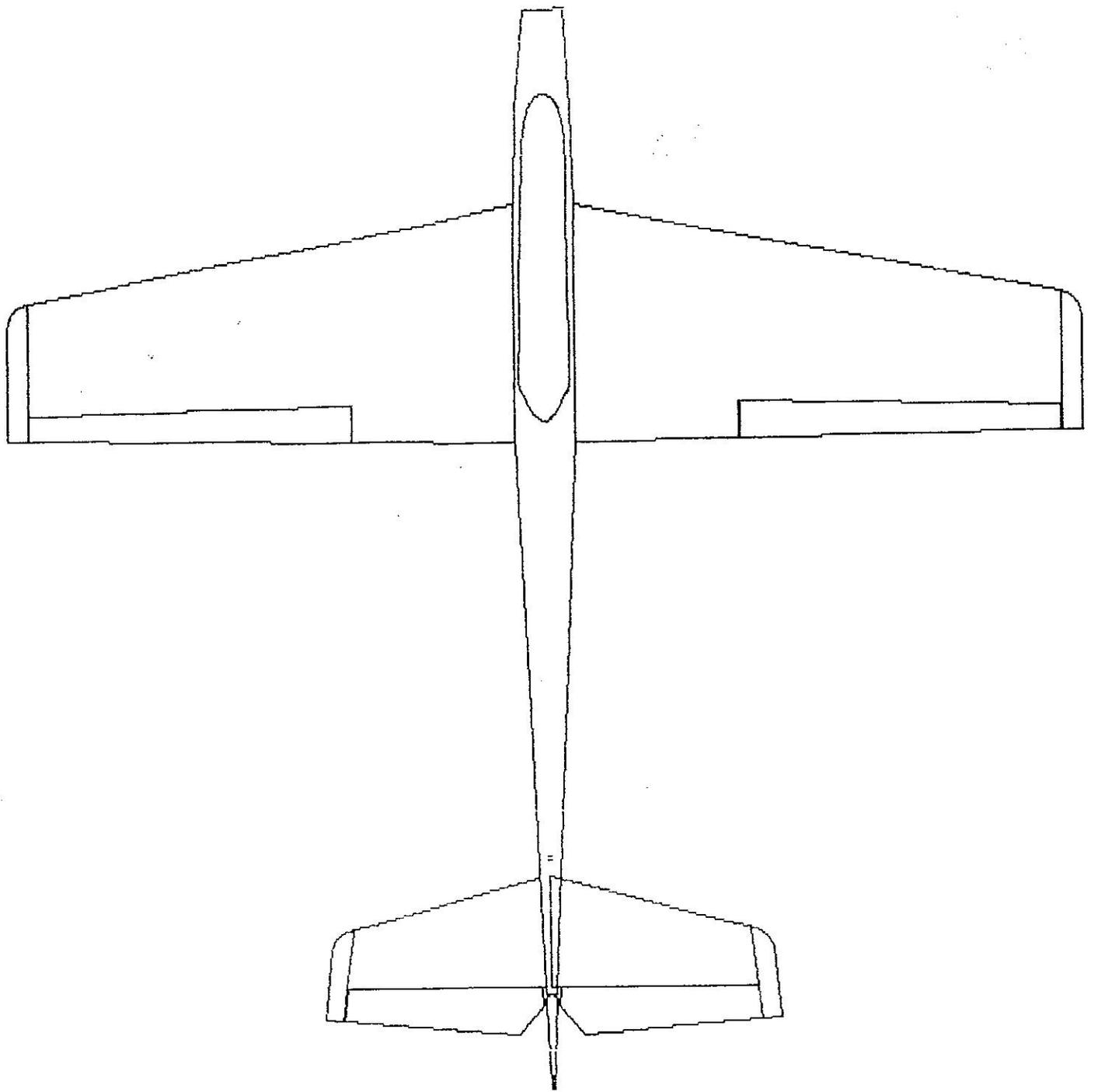
4. If your new at this game, hopefully you'll have an experienced flyer to assist you. If not, read some of the magazine articles on trimming a new airplane and experiment. Above all, have fun!

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