# SUMMIT III ASSEMBLY INSTRUCTIONS

## INTRODUCTION

The Summit III is designed primarily as a competition pattern aircraft. The tri-cycle landing gear makes the Summit ideal for AMA competition anywhere takeoff and landing are judged. The Summit will accept any of the current 60 sized engines. The YS .61 was used in the prototype. The pressurized fuel system on the YS proved sufficient to pump fuel from the tank location shown on the plans. This fuel tank location produces minimum change with fuel burn off.

Construction of this aircraft 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 sequence and options before starting construction.

## GENERAL INSTRUCTIONS

The fiberglass parts in this kit are epoxy; only epoxy, or C.A. 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 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 the seams on the fuselage and for surface imperfections. This filler may be applied directly to sanded epoxy or over primer.
For best performance, the Summit should be as light as possible. A finished weight of 8.5 pounds or less is possible with a painted fuselage and monocoted wings and stab.
Alignment aids are molded in the fuselage. A small cross-hair at the front of the fuselage and at the stab fillet indicate the thrust line. A mark 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. The basic force setup for the Summit is as follows: 2 degrees engine right thrust, 0 degrees down thrust. Wing incidence-2 mm positive, stab incidence -0. Stab is on the thrust line. Wing dihedral- 1/8” to 3/16” measured at the wing tip. That is, the trailing edge at the wing tip should measure 1/8” to 3/16” higher than it measures at the wing root.

## FIREWALL AND ENGINE INSTALLATION

The firewall is ¼”plywood and is intended to fit approximately 4 ¼”from the spinner
This distance may vary depending on your particular engine setup. An aluminum motor mount recommended for hard mount Note: The current trend in engine mounts is to soft mount the using 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 area where the firewall will be attached.
3 Drill and tap motor mount for your engine.
4 Place the motor mount inside the fuselage 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 engine.

7. Hold the fuselage upright and align the spinner with the nose ring. Securely glue and 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 prevents bulges in the fuselage caused by the pressure of the edges. At this time you may 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 of the belly pan 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 epoxy 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. In a pinch, you can use a piece of sharpened 1/8" music wire as a drill bit.
12. Install blind nuts on back of firewall and coat exposed areas with a thin coat of epoxy.

NOSE GEAR INSTALLATION

1. Epoxy a plywood plate for the nose gear behind the as shown on the plans. Be sure to sand the fiberglass thoroughly before gluing plate in place.
2. Make up 2 plywood or hardwood blocks for the nose gear. Refer to the plans. Make the blocks of sufficient height to center the wheel the belly-pan cavity and position the gear strut 90 degrees to the thrust line when the gear is extended.
Install the header and the tuned pipe and secure the pipe with a Dave Brown Products tuned pipe mount or equivalent strap. Either the -Atlanta or Citation header will work with this installation.
Position the nose gear so as to clear header when retracted. This requires the gear to be offset to one side. Mark and drill the holes for the mounting bolts through the shim blocks and the fuselage plate. Install blind nuts.

BELLY PAN INSTALLATION

The belly pan and fuselage have the alignment pin locations marked on the fiberglass parts, however, all of these holes need not be used. It is recommended that the locations on the plans for the pins near the nose gear and at the rear of the tuned pipe be used. Due to the length of the pan it is best to secure the pan near the center with a 4-40 bolt and blind nut on each side. These bolts can be installed and accessed through the canopy. Epoxy plywood plates at locations where the locating pins and the mounting bolts will be used. Drill a hole at the required location and epoxy a brass tube or aluminum pin in the belly pan.
2. Epoxy plywood plates at the front and rear of pan and install a 4-40 bolt and blind nut in the center at these locations.
3. Install engine and nose gear.
4. Cut the cooling air intake at the front of the pan using the opening size shown on the plans, and trial fit the belly pan on the fuselage.
5. Mark and cut the opening for the nose gear and the glow plug and needle valve.

CANOPY INSTALLATION

1. Fit the canopy to the fuselage; sand or file the rough edges on the bottom of the canopy to obtain a flush fit.
2. Install ply plates at 5 locations shown on the plans; mark and drill for 1/8" alignment pins, or slot for carbon fiber or plywood blades.
3. Epoxy the pins and the blades to the canopy.
4. The canopy may be secured with a 4-40 bolt and threaded insert. Install the bolt at the top rear of the canopy as shown on the plans.

5. If more width is needed for the radio installation, the glass flanges around the canopy opening may be cut down but at least ¼" of flange should remain to provide adequate strength.
6. The canopy may be strengthened by closing the ends with 1/8" balsa sheet, and adding a couple of 1/8"x1" balsa cross braces on the bottom.

## RUDDER CONSTRUCTION

1. The rudder shown on the plans provides a very light and stiff assembly. Use 3/8" square balsa for the hinge post and 1/8" balsa for the ribs. The bottom rib should be ¼" balsa to allow shaping to blend into the fuselage.
2. Glue up the assembly C.A. glue. Shim the trailing edge on the bench to align the ribs.
3. Glue in a balsa filler block at the dowel location.
4. Sheet the rudder with 1/16" balsa and bevel the leading edge to at least 30 degrees travel in each direction.
5. Drill hole for the 3/8" dowel with a piece of sharpened brass tube and epoxy the dowel flush with the surface.
6. Drill the dowel for a 6-32 screw and epoxy the screw in place. Clip off the screw head and thread on a plastic horn for the rudder cables.
7. Cut slots for 4 hinges. Put the rudder assembly aside for now, the tail post. and rudder are not installed until the horizontal stabilizer is in place.

## HORIZONTAL STABILIZER CONSTRUCTION

The wing and the stab use the same techniques for construction. We recommend sheeting the stab first since a mistake here will be less costly to correct than on the wing. Virtually everything but epoxy and contact cements dissolve the foam. Avoid 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 ,it is very easy to add a lot of unnecessary weight if a step is not done correctly.

1. Locate a flat surface on which to sheet 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 ground metal 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 1/16" matched balsa to cover the surface of the core. Trim to be flush at the trailing edge of the foam and allow approximately 3/16" overhang at the leading edge, root, and tip.
Make up a squeegee from 1/32" plywood or use a flexible plastic body filler squeegee. File notches in the tool about ½"apart. This tool will apply the epoxy in a manner similar to floor tile cement, leaving ridges of epoxy every ½" inch.
6. Mix a small batch of epoxy resin and apply a coat of resin to 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 off 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 core goes down.
9. Make sure everything is aligned and place a piece of plywood, particle board, or 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 30 pounds will do for the stab and 80-90 pounds for the wing.

11. Inspect for bowing or twisting of the stab. Use a good metal straight edge on each side 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 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 tips
13. Using and X-acto knife or razor blade, slice ¼" off the stab trailing edge. Glue a piece of ¼" balsa on the trailing edge using epoxy or Titebond. Shape the trailing edge using a razor plane and sanding block. Don't try to get a sharp edge; a blunt 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 marker and mark an allowance for the ¼" balsa frame shown on the plans. Cut out the elevator using a bandsaw or jigsaw if possible or 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 piece of balsa to support the dowel.
16. Sand the stab and the elevator with a long sanding block and glue on the ¼" facing and the 1/16" end caps with Titebond or an equivalent glue. Insure the surfaces are straight; it may help to draw a line on the ¼" 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 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 carefully. The stab joint may be reinforced with fiberglass cloth and epoxy if desired. One layer of 2 or 4 ounce cloth is sufficient. 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 removable stab mechanism, the stab should now be ready for installation in the fuselage.

WING CONSTRUCTION

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 stab. Therefore, we will not repeat the instructions for the sheeting process.
1. Cut two 1/8" lite ply or balsa 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 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 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. Using a hacksaw blade, cut a slot through the foam core at the location shown on the plans. 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 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 ¼” hole in the fuselage at the anti-rotation pin locations using the root rib as a guide. Epoxy a 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 brass tube with a wood dowel inside, carbon fiber rod, or aluminum. Avoid using wood dowels, they 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 the go back in the blocks the way they were shipped.
11. Block the fuse level and check that the dihedral is 1/8”to 3/16"as measured at the trailing edge. That is, the wing tip trailing edge should be 1/8” to 3/16" higher than the root 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 at 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, 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. 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 core and attach the cardboard tube to the foam ribs with Hobbypoxy 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. Remove the wings from the fuselage and make a recess in the foam for .the plywood landing gear plates. 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.
16. Sheet the wing, frame the ailerons, install the leading edge and the wing using the same procedures as the stab.
17. Cut out a recess for the aileron servo on the bottom of each wing, glue in the mounting rails, and install the 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.
18.Cut out the sheeting covering the landing gear plate as required to allow installation of the retract mechanism.
19. With the wings on the fuselage and all retracts installed, adjust length of the gear wires so that the fuselage sits level as measured at the thrust line. Allow 1¼”to 1½” prop clearance.
20. Remove the wings and cut out the wheel wells. Allow at least ¼” of clearance between the wheel and the wheel well. If desired, the wheel well may be lined with balsa.
21. 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 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.

22. The wing 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 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 hole at the outer end of the tube where the load is 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 tube with other than 6061T-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.
23. 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 ½' of tube, and lightly sand with 320 paper for a good fit with the tube. This step will make it easier to insert the tube, and prevent fraying the 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 is not worth it.
3. 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. 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 the fuselage stab fillet. 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 +/- 1/16" adjustment travel. Install adjuster and glue the root rib and the adjuster to stab. Note: You have to remove a small amount of foam where the 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 step for the other stab half. The adjustment screw opening should be on the bottom of the stab.
7. Using a dremel tool, open a hole for the tube on the fuselage stab fillet. A cross-hair is molded in the location for the tube hole.
8. Refer to detail C on the plans. Make up two lite-ply plates to reinforce the stab Using the section of phenolic sleeve you salvaged from the center section, cut the sleeve to span the distance between the fillets 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 apply if you are installing a fixed non-removable stab.

1. Using a Dremel tool, grind out the flat area on the fuselage stab fillets. Note: Extend the scribe line on the fuselage fillet 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 fillet. The rudder post should be temporarily installed and held in place 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 and from the stab tips to the bench, and by using your trusty eyeballs. Be sure the set at 0 degrees to the thrust line.
4. When you're 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 weight. Strips of fiberglass cloth and epoxy on the inside of the fillet will yield the strongest joint. Blend the molded fillet on the fuselage into the stab using Bondo or epoxy and micro-balloons.

RUDDER INSTALLATION

1. Epoxy the ½" square balsa 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

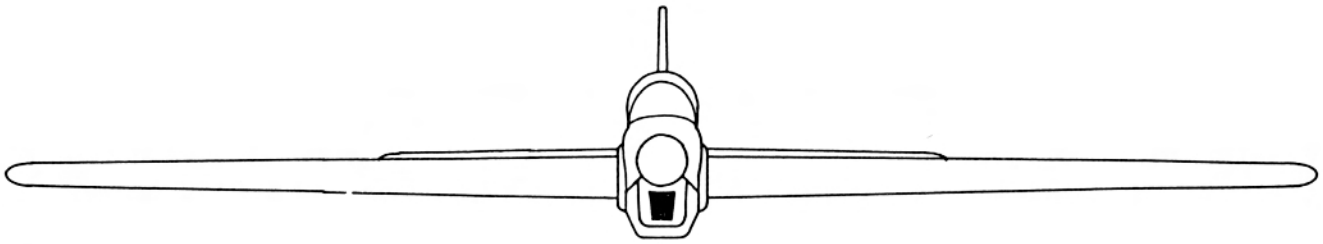
Size the fuel tank to your particular requirements, a 12 ounce tank is sufficient for the current FAI or AMA pattern. For sport or practice flying you may want to use a larger tank. To place the tank as far back as shown on the plans, it will be necessary to use an engine with a built in pump or pressure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

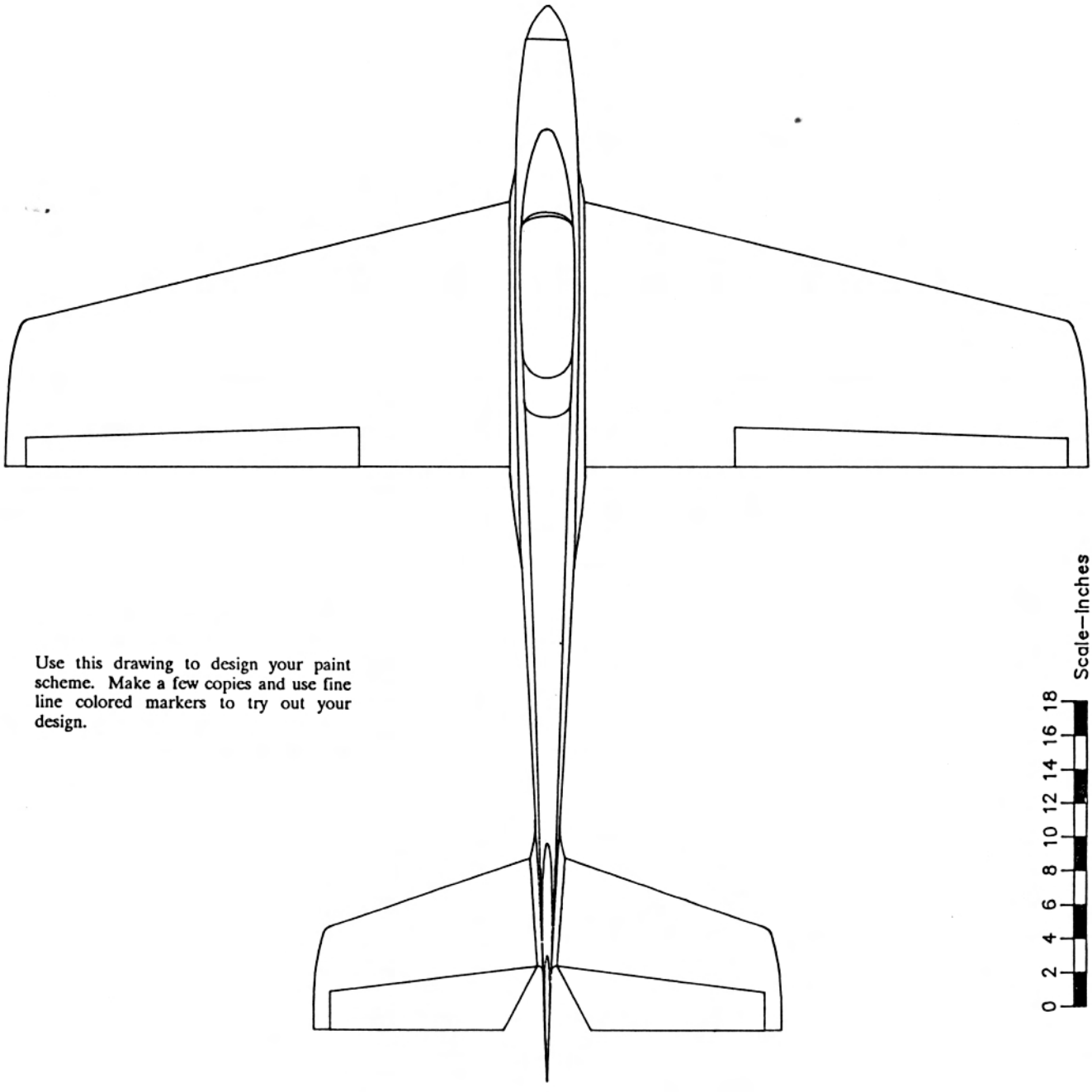
FINISHING

1. Prepare the fuselage for 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 to see any areas that need work.
3. After priming, fill any defects, pinholes, etc. with Dap or equivalent. Dap is a water based filler designed for patching walls-the original Dap works better than the newer product called "One-step*' for our purpose. To fill pinholes, apply the filler with your finger a circular motion.
4. Spot prime and re-sand the fiberglass parts. Remove as much primer as -possible to reduce weight. Apply the base and trim colors following the manufacturer's 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 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.
After the painting is completed, wipe a thin coat of clear silicone on the canopy and belly pan 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 incidence or adjust the wings independently to correct a trim problem.
4. If you're 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!





Use this drawing to design your paint scheme. Make a few copies and use fine line colored markers to try out your design.