



CESSNA SKYHAWK

Semi-Scale sport design for single channel or full-house proportional

By R. Jess Krieser



THE Cessna Skyhawk featured here began its life over five years ago, in the form of a $\frac{1}{2}$ -A semi-scale single channel Skylane that I designed and built as a single channel sport-trainer, to help me break into R/C, after hanging up my free-flight ships. After experimenting with a few small R/C designs then in vogue, without really being satisfied with them, I decided to design my own.

I wanted an easy-to-build ship, stable and tame in flight — one that would be “goof-forgiving,” so that if you made errors, you could rely on the inherent stability of the ship to get things back under control without making a jigsaw puzzle of the ship. It turned out to be mostly sheet balsa construction, with a flat-bottom wing featuring built-in washout at the tips, to safeguard against tip stalling in turns near the ground.

I believe I was successful, as every time I let Carl Goldberg fly the ship, I almost had to beg him to give the transmitter back to me. He liked it so much that it became the forerunner of his highly successful Skylane kit. Carl took the basic design, began making a few changes here and there to give it more fidelity to scale, opened up the cabin to provide real windows, instead of the ones I painted on, and before we knew it the changes began to grow and grow, until it evolved into his present Skylane.

When I decided to go multi, my $\frac{1}{2}$ -A Skylane became the basis for my Sky Squire design, which started life with a flat bottom wing. Next I tried a semi-symmetrical section, then added ailerons, and



it became the present design featured in the Midwest kit. I think that this was successful too, as every time I go over to the Midwest plant, Big Frank Garcher is out of Sky Squire kits!

About the time the Sky Squire was in its second season of existence, my son wanted to build a small multi — his first radio control project. He didn't want anything quite as big as the Sky Squire, so I decided to blow up the 1/2-A Skylane, put a semi-symmetrical wing on it, and stick 6-channel reeds in it, with a Max .15 for power. This flew just like the 1/2-A ship, but was a little faster. I took one of these to Kansas City a few years ago, while visiting the Lake Jacomo flying site of the KCRC Club. It was quite well received, and put in some fine flying — especially when Bud Atkinson was on the transmitter! He did things with that ship that I didn't know it would do.

Not long after, Cessna Aircraft broke with their introductory ad on the 1966 Cessna Skyhawk, in full color, in the aviation magazines. Here, flying out of the page at me was a beautiful all-white ship, trimmed in two-tone blue. I don't know if it was the inherent good looks of the Skyhawk, or its striking paint job that attracted me most, but I felt that I just had to build a model of it. After tinkering around with a few ideas, I trotted out the plans to the scaled up version of the 1/2-A Skylane and worked them over. I left all of the basic moments and aerodynamics of the design as they were, but altered the lines to make it look like the Skyhawk. The end result is what you see here. When I displayed this

design at the Toledo R/C conference last year, it received an excellent reception, along with its companion ship, the Aero Commander 100. I think the paint job had a lot to do with this, as I had finished it to look exactly like the one I saw in the Cessna ad.

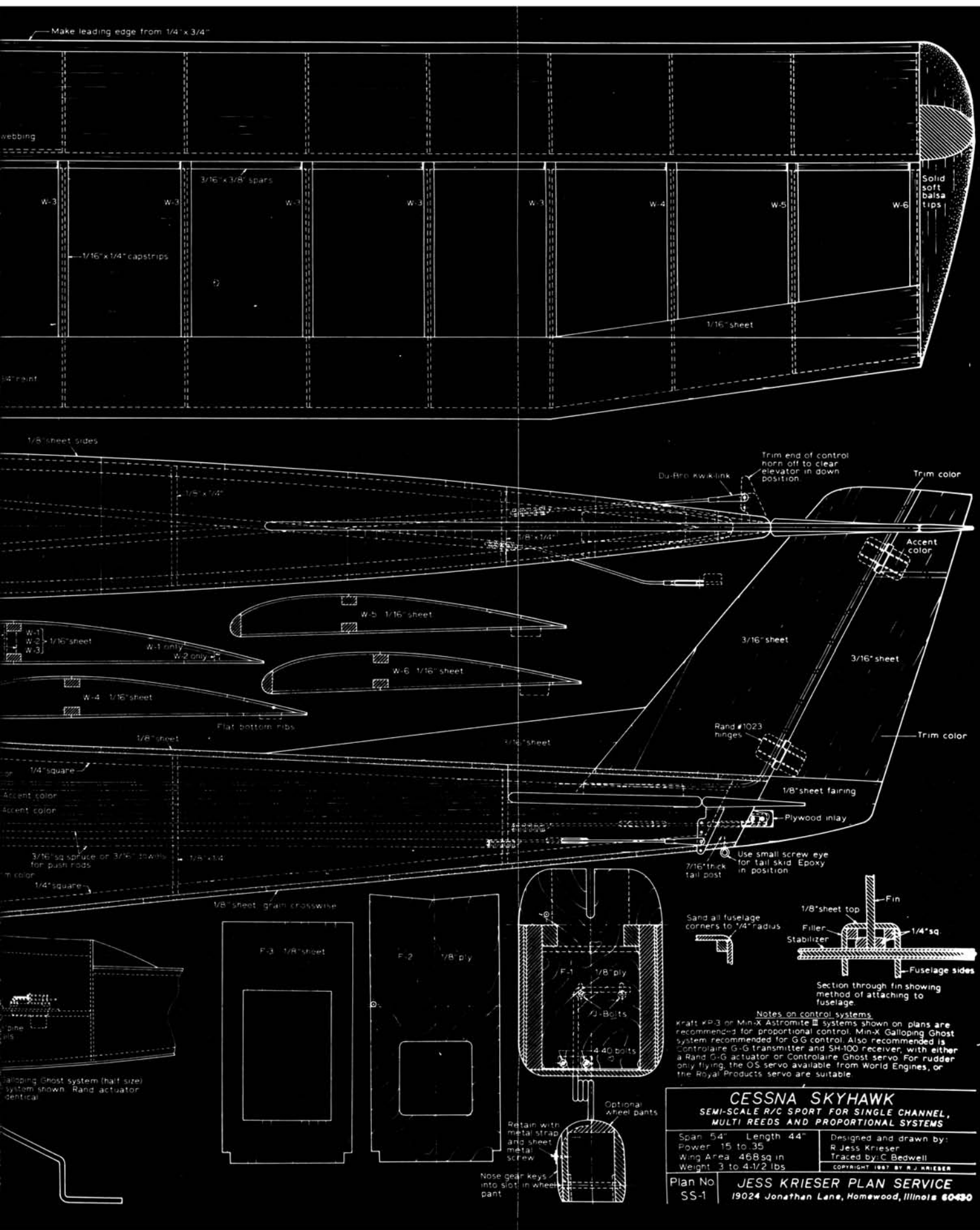
The ship is an excellent flyer, and has all of the stability and forgiving characteristics of both the 1/2-A original Skylane, and the Sky Squire, with the addition of being a top-rate stunter. The design was actually well flight tested before I had the original finished. I had been corresponding with Bill Anderson, of Hacienda Heights, California, and sent him plans for both the Skyhawk and the Aero Commander 100 as soon as they were off the drawing board. I received a number of detailed test reports in letters from him long before I got to Toledo with the prototypes! He flew both ships with an O.S. Max .30 for power, and 3 plus 1 propo gear for control.

The Skyhawk and Aero Commander 100 are identical designs, the only difference between them being that the lines of the Skyhawk were changed (once again) to make it look like the AC 100. To give you an idea of how both of these designs perform, let's let Bill Anderson tell you what his experience has been. Here are some quotes from one of his letters: "I flew the ship last week-end and it's just great. It flew right off the boards. It loops nice and easy, and rolls well too. Landings are real nice and easy, and almost automatic with very good rudder control at low speeds. One thing I'd like to recommend is with the larger

engines a heavier main gear would be better. I'm using 5/32 wire instead of the 1/8 and find it much firmer." (I took his advice, and this is noted on the plans.) "Other than that, don't change a thing!" (I took this advice too.) And from a later letter: "This plane will do just about anything a full house multi will. It spins real easy and comes right out the moment you go to neutral. Touch and go's are almost automatic."

The ship is also very rugged, as Bill unexpectedly found out: "Since my last letter I have really put it (the Skyhawk) to the test. I've been having radio troubles, and the Skyhawk has really proved how much punishment it can take and still hold together. First off I taxied to the end of the runway and gave full power to take off, and all of a sudden — nothing! Wide open it crossed the field and into the flight line, clipping a wingtip of one plane, and then into a fence, hitting an I-beam post with the wing. Just a broken leading edge. Took my radio in and they repaired the receiver. Next week, on take-off, it fail-safed at about 20 feet off the ground, and then came back in about 5 feet off the ground, and I had a good flight. But then for the rest of the day I made about eight attempts and had eight fail-safes with full loss of control each time, and into the ground it went. Only damage was to the panel in back of the nose gear.

"Took my radio back and they replaced the parts that would cause that problem. Back to the field this time with a full fail-safe about a quarter-mile away, landing in

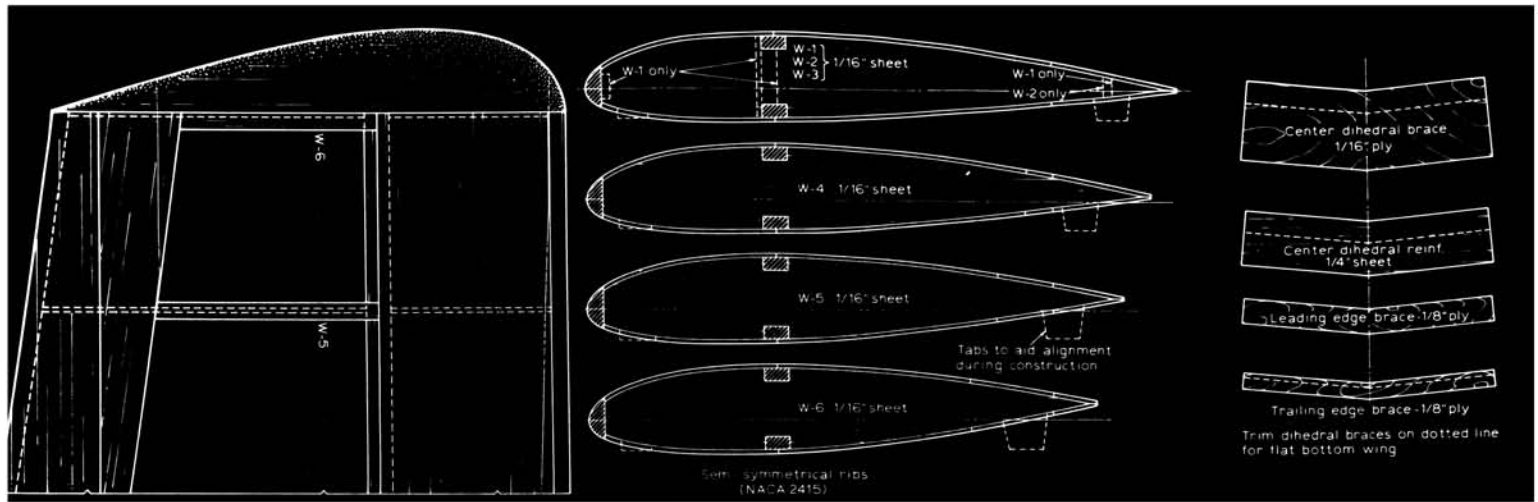


Notes on control systems
 Kraft #P-3 or Min-X Astromite II systems shown on plans are recommended for proportional control. Min-X Galloping Ghost system recommended for O-G control. Also recommended is Controilaire G-G transmitter and SH-100 receiver, with either a Rand G-G actuator or Controilaire Ghost servo. For rudder only flying, the OS servo available from World Engines, or the Royal Products servo are suitable.

CESSNA SKYHAWK
 SEMI-SCALE R/C SPORT FOR SINGLE CHANNEL,
 MULTI REEDS AND PROPORTIONAL SYSTEMS

Span 54"	Length 44"	Designed and drawn by: R Jess Krieser Traced by: C Bedwell COPYRIGHT 1967 BY R J KRIESER
Power 15 to 35		
Wing Area 468sq in	Weight 3 to 4-1/2 lbs	

Plan No SS-1 **JESS KRIESER PLAN SERVICE**
 19024 Jonathan Lane, Homewood, Illinois 60430



a soft (dry) river bed, with no damage. Back to the radio manufacturer (they know me by first name now). Then last Sunday I flew with no problems at all. The Skyhawk still looks as good as the first flight, and handles perfect. It does everything from power spins to 4-point rolls, and when I throttle back, it's as forgiving as a single channel ship."

I wish I could say that I was getting the same kind of flying enjoyment out of these two ships as Bill Anderson, but I can't. Herb Abrams, the Rand man, who designs some mighty fine single channel G-G and pulse proportional systems, is a top-notch salesman as well as a good engineer. He went to work on me, to sell me on the fact that since he was so busy designing and manufacturing R/C gear, he didn't get much time to build, and that those two ships could be put to excellent use if he had them, so what would I take for them? Well, being a persuasive salesman, he sold me, and now I have some fine reports on how the Skyhawk flies on his new Dual-Pak system. He hasn't flown the Aero Commander 100 yet, but it should fly just as well.

The Skyhawk, and its companion Aero Commander have been flown by a number of modelers, with everything from single channel, Galloping Ghost, multi reeds, to digital proportional systems, all with good results. I had three channels of a Kraft KP-4 in the Skyhawk, with a Min-X Astromite III in the Aero Commander. Because I had set up both of these ships for digital proportional flying, I used the larger elevators shown on the plans. This turned out to be the only criticism Herb Abrams had of the Skyhawk. The large elevators are really too much for Galloping Ghost or Dual Pak systems, as these actuators do not put out near as much "muscle" as a digital servo. Moving the hinge line back $\frac{3}{4}$ -inch

as shown on the plans, reduces the elevators nicely, and brings them down to the proper size for these systems. Other than the elevator size, Herb found the ship very enjoyable to fly with the Dual-Pak system, reporting that it was very acrobatic and responsive to the controls, yet an exceptionally smooth flying airplane. He's using an O.S. 30 for power, and says it can easily handle more with no problems. Although I haven't actually flown the Skyhawk with the Rand Dual-Pak system, it undoubtedly should be great for this ship, as I did fly a small edition of the Sky Squire that Herb has with a Dual-Pak in it, and I'm pleasantly surprised at how positive and smooth this system is. I really couldn't tell any difference from a digital system when in flight. This should be a hot single channel control system.

I'm satisfied enough with the performance of the Skyhawk, and its companion Aero Commander 100, that I'm now at work on a third ship in this series—a 54-inch span Aermacchi-Lockheed "Santa Maria." You've guessed it—I'm taking the Skyhawk set-up, and simply changing the lines to make it look like the Aermacchi. The wing will be identical to the Skyhawk. (With this line-changing act, I wonder how far I really can stretch this basic design?)

Since Don Dewey asked me to write a short article, I'll comply with his wishes by keeping the construction details to a minimum. Most scratch builders usually have some experience at building anyway, before tackling a project such as this, so providing full details to them is often like the proverbial "carrying coals to Newcastle." Anyway, I've tried to make the plans super-detailed, with all construction noted as clearly as possible.

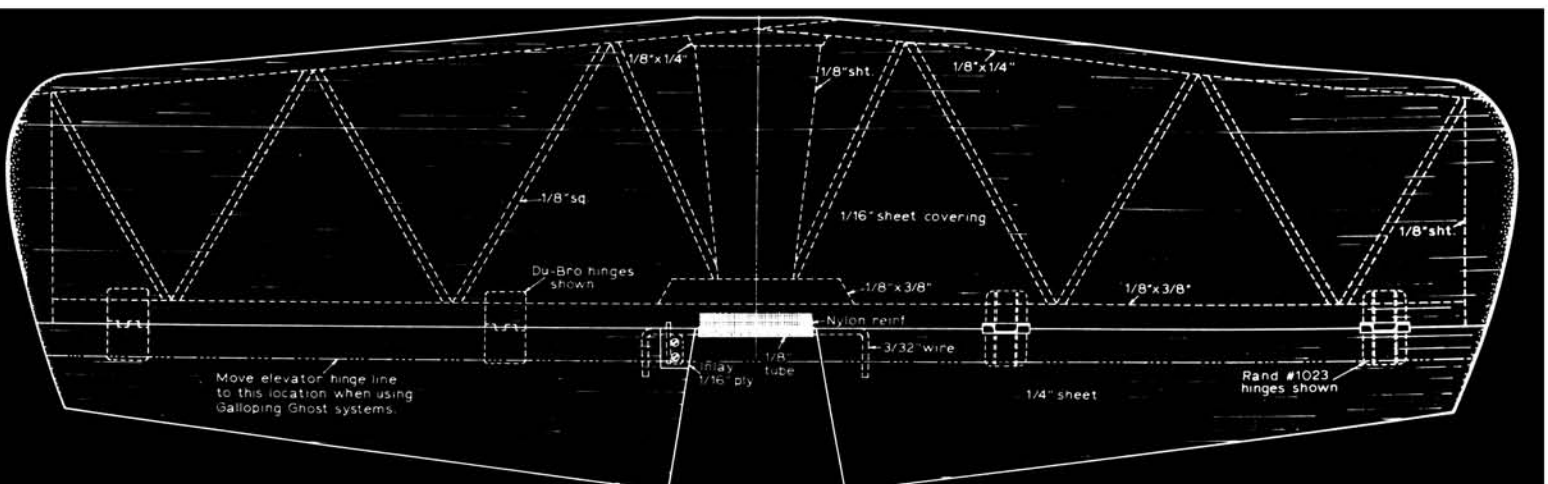
The wing construction is quite simple. You can build it in one piece, or in two

halves, joining them after completion and adding dihedral braces and gussets. Just make sure your center joints are well-glued, and strong. I prefer to build the wing in one piece. To do this, you can either construct a jig, or join two flat boards at the center, and prop up the tips to form the correct dihedral angle. The tabs on the ribs help keep things in proper alignment when building on flat boards. All sheeting and capstrips are glued in place on the top surface before removing it from the board or jig. The tabs get cut off the ribs after this stage is completed, and the bottom sheeting and capstrips are then installed. Tips are solid blocks of light balsa, carved to shape.

The tail assembly is simple, with the fin and rudder made from sheet balsa. The stab can be built up and sheeted with $\frac{1}{16}$ balsa on both sides, as shown on the plans, or you can save a bit of time and make it from $\frac{1}{4}$ " sheet. Whichever method you choose is immaterial; it's simply a matter of which you prefer to build.

The fuselage is made from 6-inch wide $\frac{1}{8}$ sheet balsa. If you can't get 6-inch wide stock, you can join narrower sheets. The $\frac{1}{16}$ sheet doublers are laminated to the sides with Hobbypoxy No. 2, as are the $\frac{3}{8}$ sheet triplers. The plywood gussets to locate and retain the top shanks of the main landing gear struts are epoxied to the inside surfaces of the sides in their correct position before assembling the sides. The longerons and uprights are also added before assembly. I usually install the hardwood motor bearers, too, before assembling the sides. Join the two sides by gluing formers F-1, F-2, and F-3 in place, then add the plywood cross pieces for the landing gear on the bottom of the fuselage. Sheet the bottom of the cabin area at this

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time, as this helps keep the entire assembly in squared alignment when you pull the sides together and glue them at the rear.

After adding the cross pieces to the rear of the cabin, top and bottom, you can sheet the top and bottom all the way to the tail. Then you can return to the nose area, box off the fuel tank compartment, add the nose gear as shown, or your favorite steerable nose gear, and box off the battery compartment. Then sheet the bottom forward of the landing gear cross pieces, add the nose blocks, cowl blocks, windshield and turtleback blocks, and when dry, start carving and sanding to shape.

When the fuselage structure has been shaped and sanded, install the stab and fin, with the fairing pieces to close off the fuselage at the stabilizer joint. Carve and sand this to shape, and you're just about finished, ready for covering.

Before covering, make certain that the entire ship is shaped properly, and sanded very smooth. Coat the fuel tank and engine compartment area with fiberglass resin to provide fuel proofing, and then give the entire ship two coats of clear butyrate,

sanding with very fine paper between coats. Cover the entire ship with silk.

There are many ways to finish a ship, and a number of articles have been written on this subject, so what you do from here on depends on what you have adopted as your favorite method of finishing. I'm a bit lazy on finishing, and don't believe in hand rubbing numerous coats as though I was out to win a finish trophy. I only want the ships to look good and be fuel proof. The finest finish job in the world can get washed out in seconds when you commit pilot error. Briefly, here's the method I use: after silking, apply three coats of thinned out clear dope, sanding lightly between coats with 400 wet or dry paper. Then apply three coats of thinned out clear dope with talcum powder added, and put the ship aside for at least three days to allow the butyrate to dry thoroughly. Then sand with 400 paper until smooth and slick. Top this with one more coat of thinned out clear, and sand very lightly when dry.

Now you're ready to apply color, spraying on two or three coats. When well dried, wet sand with 400 paper, then wash thoroughly to remove all sanding residue. Spray on several finish coats until you're satisfied with the color and depth of coverage. Mask off trim areas, and apply trim colors. When completed, top the entire ship with two coats of thinned out clear Aero Gloss. These final coats help add uniform lustre to the entire ship, and level off the edges of the trim where the tape was installed. The trick all of the way through this procedure is to get a good looking finish with as few coats of dope as possible. This method works well for me.

As for test flying, simply be sure the angles of attack for the wing and tail are as specified on the plans, and thrust line is as indicated. Make sure all is in proper alignment, with no warps. If anything is warped, remove the warps before flying. Be sure the C.G. is properly located. If you're an experienced flyer, you'll have no problems from this point on. If inexperienced, get an expert to do the test flying for you until it is properly trimmed out.

From here on, you're on your own, with nothing to do but have fun flying the ship. And I hope that if you build it, you'll get as much fun and enjoyment out of it as have the modelers who have built it to date during its development stages.