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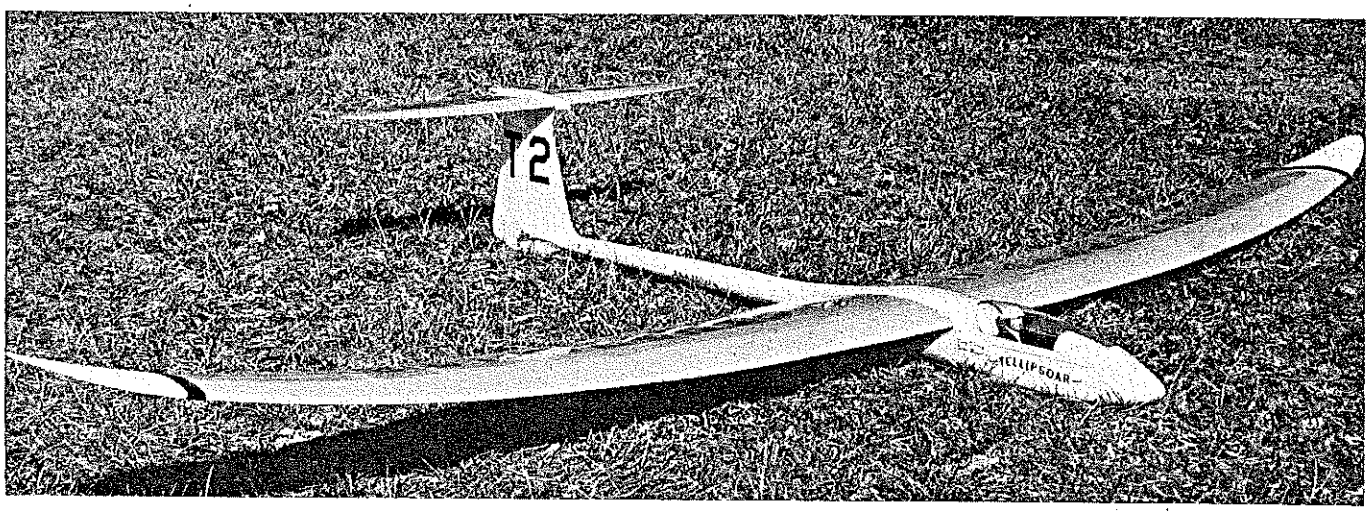
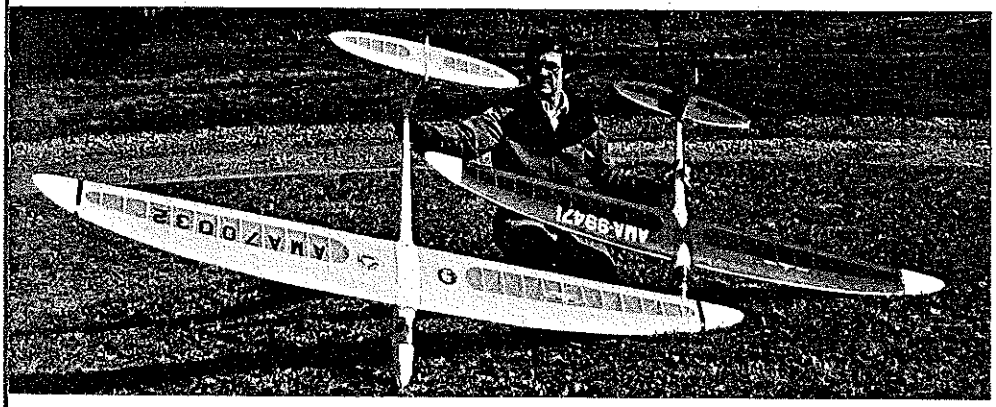
tellipsoar



Tellipsoar spreads its graceful wings with elliptical dihedral and elliptical planform, the most efficient wing configuration possible.



Earlier Ellipsoar, at right, was published in *Sailplane* in 1970. T-tailed Tellipsoar, left, resulted from seven years constant development.

This Standard class sailplane has frequently demonstrated its superiority over first-class competition.

George Durney

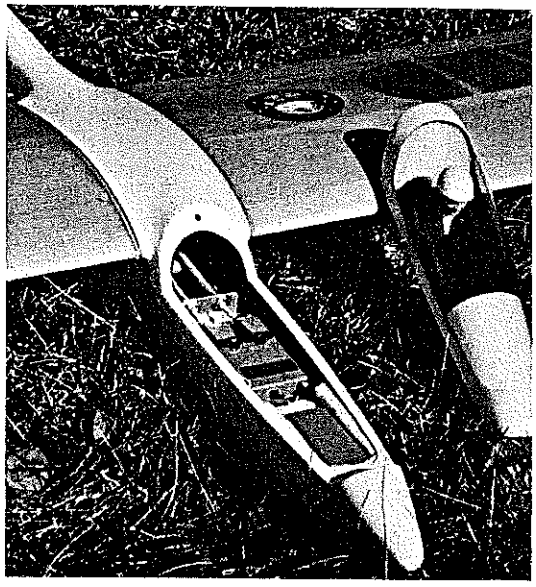
THE TELLIPSOAR is a high-performance, Standard Class RC sailplane that is rugged and gentle enough for the beginner. It was not an overnight dream, but was developed over a period of seven years.

The original design was called the Ellipsoar and was published in *Sailplane* in 1970. The name came from the wing and stab design. The wing and stab were elliptical in planform, and the wing had elliptical dihedral. In 1969 the elliptical dihedral was very rare, but several years later Hobie Alter realized the performance advantages and incorporated elliptical dihedral in the Hobie Hawk.

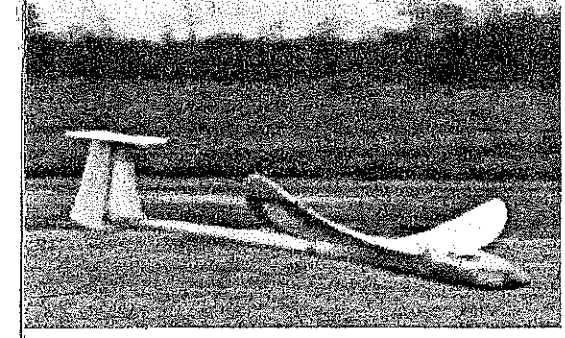
During the first four years I changed the airfoil and span every year. The original design had a 7-ft. wing span with an Eppler E-387 airfoil. I won several contests with this design and finished the year in fifth place in ECSS. During the next three years I tried a 9-ft. wing with an Eppler E-385, a 9-ft. wing with an Eppler E-387, and an 11-ft. wing with a flat-bottom Eppler 385. My eleven-year-old son Doug built a fuselage, and he always had second choice on one of the four wings. During this period of time we won 28 trophies, and I managed to finish every year in the top ten in ECSS.

In the spring of 1974 I started the drawings for a new design called the Tellipsoar because of the T-tail configuration, but I had no intention of completing the aircraft until the fall. Several weeks prior to the York, PA. contest that year, I was holding a local contest to practice for the FAI Glider Contest which I had been asked to C.D. at the Aerolympics. My son Doug was flying the Ellipsoar with the original wing, and at the end of the first two events was so far ahead of the field that it was embarrassing. The speed event was the same story, as he came through the final gate two feet off the ground , four seconds ahead of the field. However, in his jubilation, he turned right instead of left, and took on a goal post at about 40 mph. Needless to say, the goal post won.

That evening he begged me to help him build a Tellipsoar before the York contest. I had already carved the plug for the fuse-



Right: Canopy removed to show the installation of Kraft brick. Although fuselage construction is up to the builder, glass pod, boom and fin, canopy outline, commercially available.



Hitting the spot is like falling off a log. A positive control response exists even downwind at low speed. Stability is enough for novice.

Tellipsoar

lage, and a good friend said he would take the molds and furnish the fuselage pieces. I agreed to build the stab and assemble the fuselage if Doug would build the wing. Well, to make a long story short, we finished the airplane the day before the York contest and managed to get in one test flight prior to the meet.

The day of the York contest arrived. We were flying task IIA with the scale runway, and believe it or not, Doug won with a perfect score—15 minutes on the nose and three perfect 100-point landings. This performance left Otto Heithecker, Don Goughnour, and Kelly Pike with their mouths open and convinced me that the Tellipsoar was a real winner.

During the next year I discovered the real secret to this success story. The Tellipsoar is a very high-performance sailplane that will do everything you want it to do when you want it to happen. It has very positive control, but is stable enough for the real novice. I have flown several complete flights including launch without touching the transmitter, but when you ask it to change flight altitudes, it never hesitates, even down wind at slow speeds.

Please don't let the wing and stab design scare you. Once you have the building jig, you can build the wing in less time than any other sailplane wing you have built. All you need to make the jig is some scrap plywood or paneling. Cut the shaped supports from ½-in. ply or ¾-in. board. Cut the building surface from ¼-in. ply or wall paneling. After you have nailed the jig together, you can build the wing anywhere your wife can spare four feet of area. If you have building space for the entire 100 in. jig, I suggest you build two halves and bolt them together at the center. This way you can build the entire wing in two evenings.

After you have completed the jig, line up the plans on the board. Next, cut and glue the entire bottom sheeting including cap strips and center section in place. The next operation is to attach the three bottom ¼ × 3/16″ spars to the sheeting. Then you can install the ribs, sub-leading edge and primary top spar. After you have installed the brass tubing, install the secondary top spars and all of the spar webs, making sure to use plywood or vertical grain balsa as shown on plans. The final operation before removing the wing from

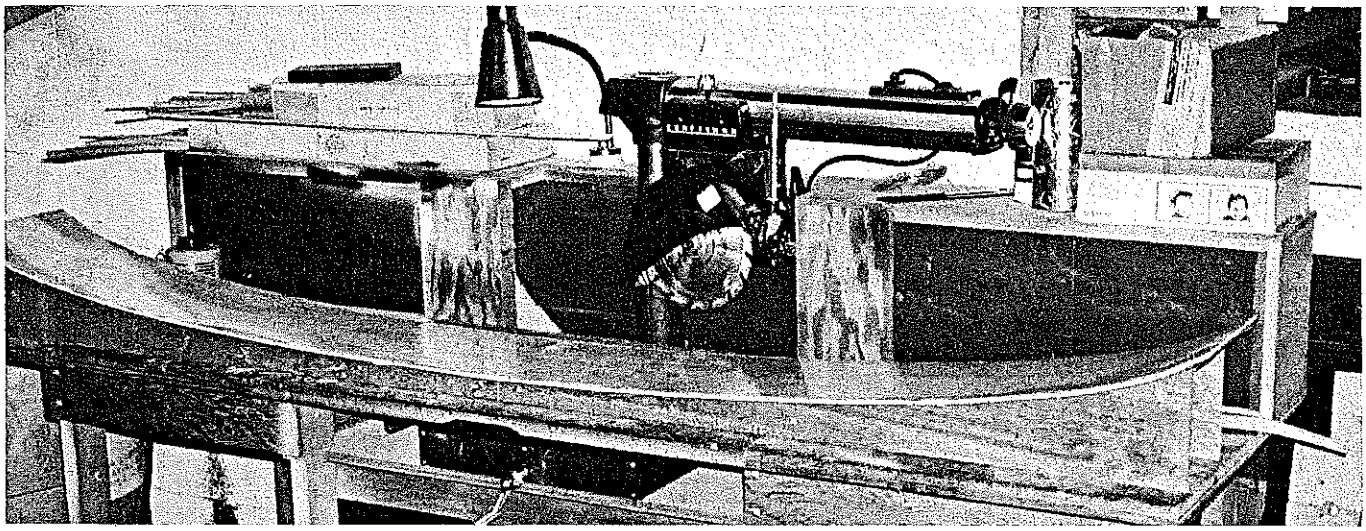
the plans is to install the top sheeting.

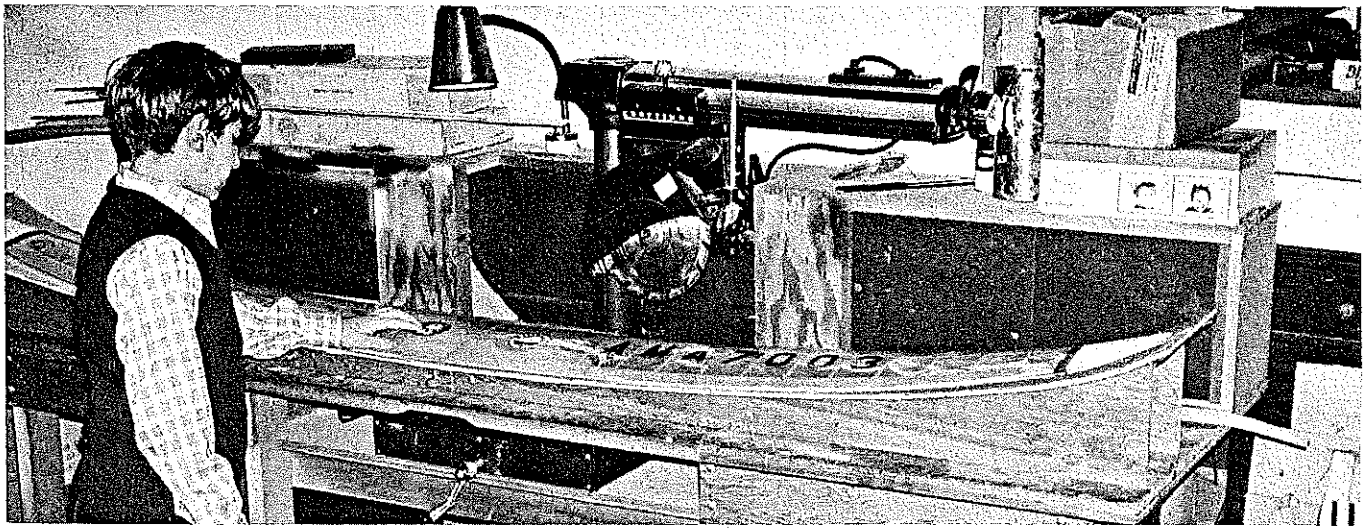
After the wing is removed from the building jig, trim the top and bottom sheeting and attach the leading edge. Then shape the leading edge and attach the plywood center-section ribs. Before leaving the wing, I have several comments. First, make sure the bottom sheeting and spars stay down on the building jig during assembly. This will present no problem if you use balsa spars and spruce is absolutely unnecessary. Second, attach tips with several pieces of plastic tape. You will be amazed how much shock they will absorb without doing any damage to wing or tip.

Building the full-flying horizontal stab is not difficult and requires little explanation. Glue spar in place on lower sheeting. Then secure sheeting to building board under the inboard end of spar. Next, prop up the leading and trailing edges of 3/16 in. sheeting. Glue ribs and brass tubes in place and then attach top sheeting. This method will insure a straight assembly without warp. After the assembly has dried, remove from building board, shape leading and trailing edges, and attach plywood center ribs.

All of the Tellipsoars built to date have incorporated a fiberglass fuselage as shown on the plans. Fiberglass provides a light tough fuselage, but that is no real reason the fuselage could not be molded balsa, built up balsa, balsa and plywood, or even foam, if you so desire. I recommend that you either carve a plug, pour molds and make a fiberglass fuselage, or better yet, buy the fiberglass parts ready for assembly. The assembled pod, a one-piece boom with no seam, canopy frame, vertical fin, weight compartment tube and cover are all available for $30 from Mr. Thomas Townsend,

The author about to make a test flight with an early Tellipsoar. Although it has a very high performance, he has made several hops including launch without touching transmitter.





Tellipsoar

R.D. #3, Box 589, Milford, DE 19963. These are high-quality cloth-reinforced polyester resin parts that can be finished with almost any choice of paint. I prefer refrigerator enamel, but dope, lacquer, polyurethane or epoxy all work fine.

As for the assembly of the fuselage, I prefer to install the nyrod and linkage in

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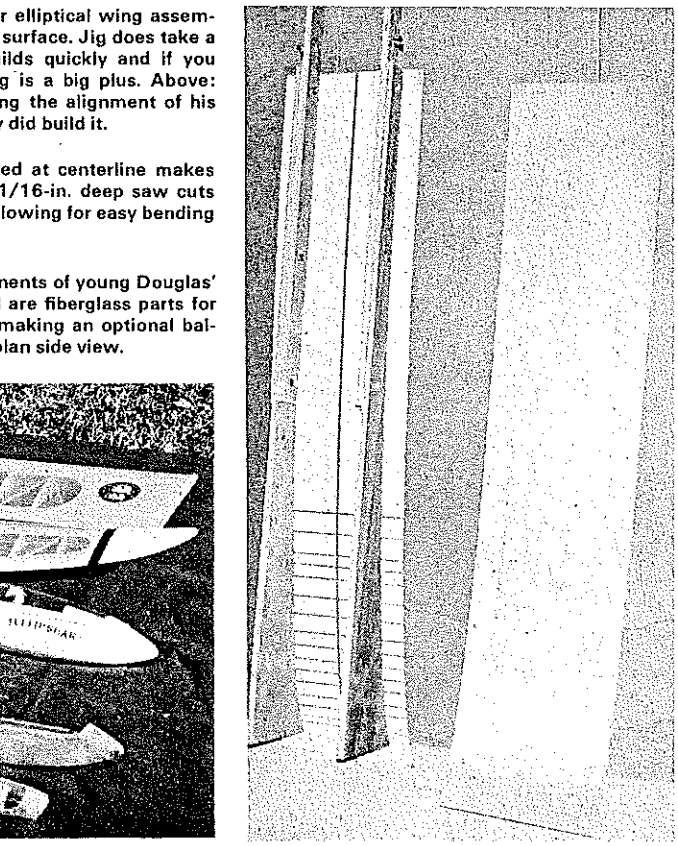
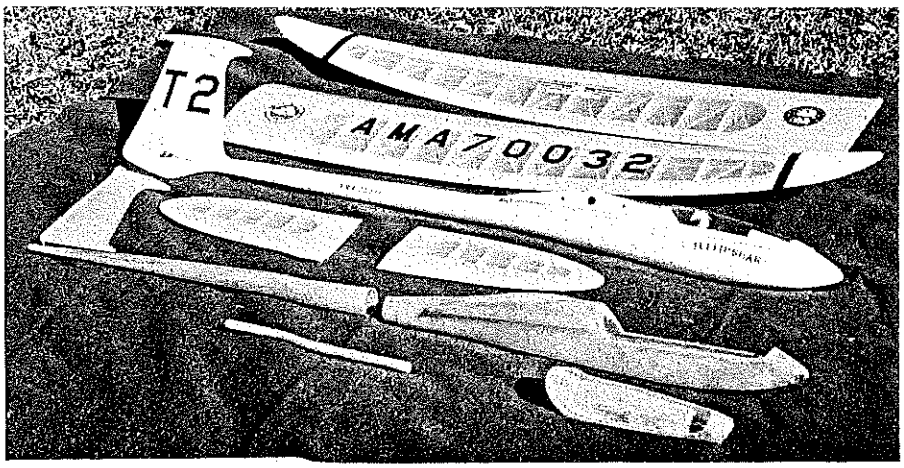
Top: The building jig for elliptical wing assembled and located on flat surface. Jig does take a little time but wing builds quickly and if you build more than one, jig is a big plus. Above: Douglas Durney checking the alignment of his finished wing. Yes, a boy did build it.

Right: Wing jig separated at centerline makes for easy storage. Note 1/16-in. deep saw cuts on bottom of paneling allowing for easy bending to the elliptical shape.

Below: Finished components of young Douglas' sailplane. In foreground are fiberglass parts for dad's ship. Tube is for making an optional ballast compartment. See plan side view.





CL Racing *(continued)*

to shut down their TR activity since Texas is not one of your TR hotbeds. All during '73 and '74 they raced Goodyear. Late in '74 they decided to make an effort for the '75 Team Trials and began scratching together a new plane and engine. They had a significant problem in that the nearest suitable practice site was a 200-mile one-way trip. Believe it or not, in the entire 14 months of preparation for the Trials in Lake Charles, they had to drive that 200 miles to either the Fort Worth or Dallas flying sites every time they wanted to practice or try-out anything new.

The Plaunts' preparations for the World Champs can best be summed up by quoting a part of a letter from Jim to me.

"Our main concern is just a place to fly. We probably will not make many, if any, changes for the Champs for several reasons. One is that we may not be able to practice with no place to fly! Also, as you will find out, Sue and I are absolute beginners in TR compared with the rest of the Team. . . . Going out on a limb with a bunch of new stuff would only foul us up. We actually have a lot more experience with Goodyear than in TR so we will stick with the stuff we know. Also, our lack of a flying site severely impairs our ability to try new things."

The third-place team is composed of Bill Wright and Jim Dunkin of Kansas City, MO. This is not the first time on the U.S. team for Bill and Jim. They represented us in 1968, 1970, and 1972. Bill is 41 years old, married, with two children. He is an advertising graphics designer. Bill has been flying model airplanes since he was five years old, getting into Control Line in 1949, flying, of all things, a 60 Speed job at the Olathe Nats. He has been mostly in Control Line with a small amount of Free Flight.

Bill started into Team Race in 1962 when he teamed up with Jim Dunkin. Their first contest was the 10th KOI in December 1963 where they took first place.

Jim is 36, single, and works for the Missouri State Highway Department as an inspector. He started flying in the late 50's, mostly in Control Line but, at one time, did own an Indoor hand-launch glider record. Jim tells the story of how the '75 qualifying and Nats was a near disaster: "We creamed our best plane and Rossi in a contest in St. Louis two weeks or so before the trials. We had two other planes almost done but we didn't expect to have to use them. We had moved the shut-off refueler valve up to make it a little more accessible. In so doing, we also moved it back behind the motor plate. Unknown to us at that time, that put the filler tube for the tank in a low pressure area and caused us to run the engine much richer in order to draw against the slight vacuum. This cost us a bunch of laps and some speed. That was our main trouble at the Nats, coupled with a rebuilt engine (that was creamed in St. Louis) where the piston and sleeve were wearing out. We lucked out and made the team but adding some hot stuff to the fuel for some extra speed (but still short on laps) accelerated the demise of the engine until it was shot by Nats time. We spent most of the next two months trying to find the problem. Finally figured it out and moved the valves forward even with the leading edge of the wing on both planes. The laps came right back though the speed was down due to the engine not being as good.

"At least the 'system' was back to normal and we could concentrate on the engine, prop, fuel combination and be able to tell what was going on."

(My address is: 3533 Tamarisk Lane, Missouri City, TX 77459.)

Tellipsoar/Durney

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the vertical fin before attaching it to the boom. At this point you should attach the horizontal stab to the fin and make sure that it is aligned in both planes before securing the rear fin post in place. Also, make sure the stab linkage is good and free without too much play in the action. Next assemble the fin to the boom and reinforce the sides. Then I recommend that you attach the rudder and the rudder nyrod. Now you can set the boom assembly aside and install the weight compartment and brass tubes for the wing wires.

At this point you are ready to make final assembly between the pod and boom. Attach the stab to the vertical fin and the wing to the pod. This provides a good reference for correct alignment. Rough up the inside of the boom and the outside of the pod and epoxy the two together, checking alignment between wing and stab and making sure the angle between pod and boom are as shown on drawing. Also make sure pod and boom are in a straight line in the vertical plane.

Finishing the model from this point is rather straightforward and presents little problem. I prefer Monokote on the wing and stab but silk and dope, or any other covering will work. My preference is transparent Monokote because of the excellent visibility it provides, and the fact that it is a lot easier on the lungs.

Almost any radio can be installed in the Tellipsoar. It will accommodate any of the popular bricks or servo trays. Mount the battery as far forward as possible and use styrofoam to make sure it stays there. In my opinion, the battery should always be mounted ahead of the receiver or servos because it is the heaviest part of the airborne pack and could do a lot of damage to the rest of the radio in the event of a crash.

Add lead shot to the nose-weight com-

partment to balance the model as shown on the plans. If the builder doesn't get carried away with paint or covering on the stab and fin, the model will balance with one or two ounces of tare weight.

Hand glide the model to check the trim and then you are ready to try your first launch. I recommend that you locate the tow hook approximately one in. ahead of the CG for the first several launches and then move it back ¼ in. at a time until you are approximately 1 in. behind the CG. The further back you can move the tow hook without the sailplane becoming too unstable during the tow, the higher launch you can obtain. If you are using an electric winch, keep the speed down and you will use up less line.

In 0-10 knot winds I prefer to fly the airplane without additional weight. Above 10 knots you can add up to one lb. of lead in the weight compartment. If you are using one 4-oz. slug, place it in the third tube back from the front. If you want 8 oz. additional weight, place the lead slugs in the second and fourth holes. If you want 12 oz., use the back three holes. These arrangements will maintain the CG location. For very windy conditions or slope soaring, place the fourth weight in the front tube, and this will shift the CG slightly forward for better handling.

Good luck and send me photographs of the trophies.

CL Speed/Bussell

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made out of ½ in. thick bass and the overall length will be approximately 19½ in. long. This is the approximate length of the Harter's pan after the pan is cut to match the diameter of the Supertigre .29 spinner and the engine is mounted. Let's make our wing from ⅜ in. thick hard (6 lb. and 8 lb.) "C" grain balsa. We can save a little weight over a bass wing and this is very important in a big airframe. The wing will be 25 in. long with a 6 in. root and a 4 in. tip chord. Use a ⅜ × 3" bass or maple spar to mount your control system and tie down bolts. Our wing leading edge is straight and all the wing taper is from the trailing edge. Our airfoil is symmetrical with a 30% high point.

Stab: Our stab is going to measure 39 sq. in. in area and should be made from 3/16 in. hard balsa. The root chord is 3 in. and the tip chord is 2½ in. and the overall length is 13 in.

The rest of the design is very similar to construction techniques on any speed ship. The cowl height and shape depends on the engine used and personal preference. The fuselage top should be made from hard balsa and, again, our wing location is found as it was on our 90 sq. in. design by pre-assembling all the component parts of our airframe and moving the wing fore and aft until the C/G is located right on the line outlet. Allow about a 7° to 10° nose drop to allow for paint and then permanently attach the wing to the top of the crutch. When carving a wing always leave a flat section on the bottom wide enough to mount the wing to the crutch and, when it comes time to permanently mount the wing to the top of the crutch, you don't have to measure wing alignment. You know your wing is mounted at 0° angle of attack. It is very important that your wing and stab are mounted at 0° angle of attack with the engine thrust line.

Finish: The finish on a big airframe is very important and care should be given or your bird will be overweight. After your airframe is assembled, finished, sanded and all bad spots puttied, I recommend that you cover all balsa parts with clear dope and tissue and then one coat of primer and one coat of epoxy color should give you a good light finish.

In our next column, we will discuss engines, props, fuel and limited rework procedures.

(My address is: 4803 Fallon Pl., Dallas, TX 75227.)

Safe Flying Is No Accident!