SOAR ACE

A rugged, quick building slope soarer for modelers who don't have a lot of time, or money!

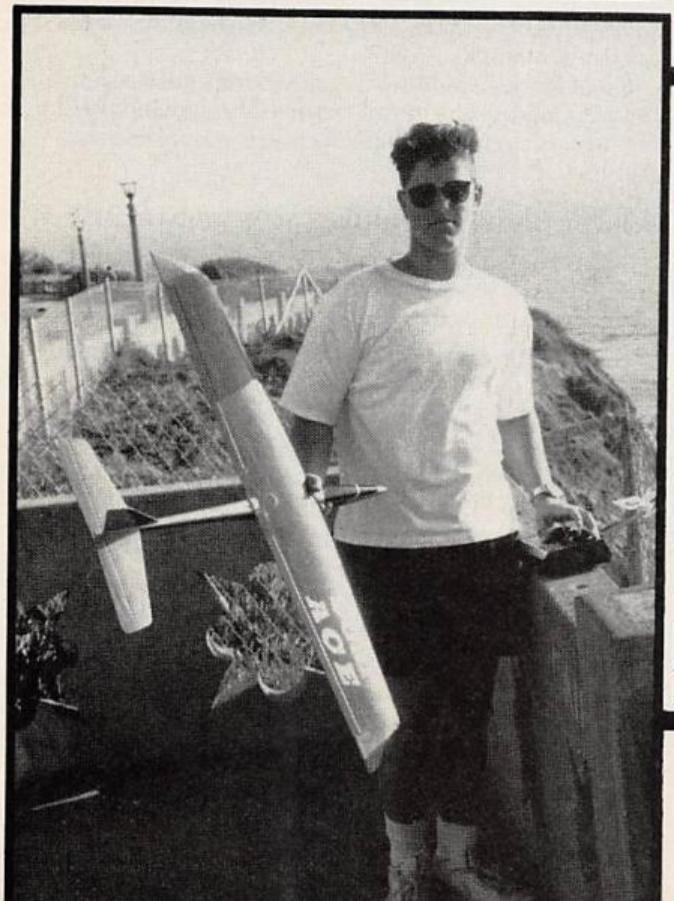
When you look at the number of slope soaring, hand launch, or high-start glider kits available, you may ask yourself why you would want to build one from scratch. After all, most of the kits now available are high quality. However, the construction difficulty of some gliders and their price can leave something to be desired. The Soar Ace is a 2-channel, multi-purpose glider that can serve as a slope soaring, hand launch, or high-start sail plane. It is inexpensive and very easy to build, looks great, and has outstanding performance.

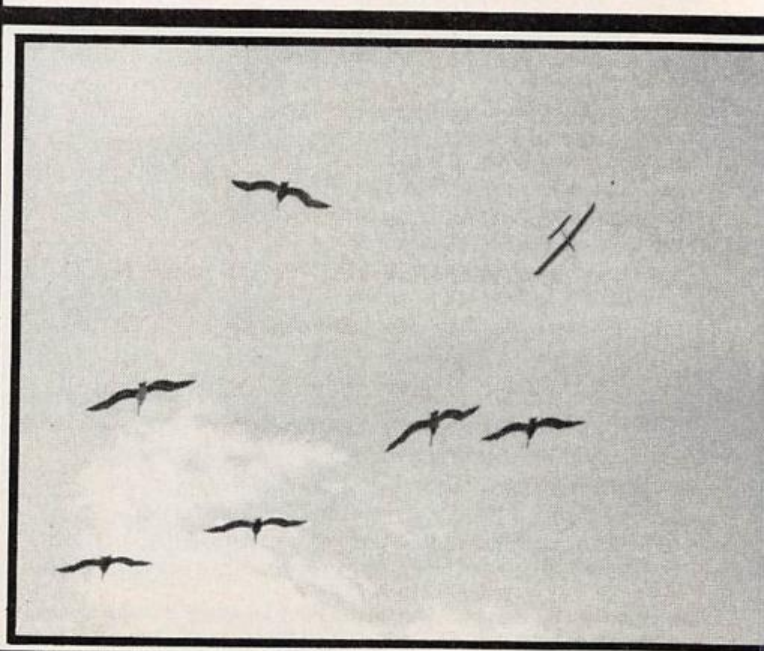
The Soar Ace can be built in a variety of ways to meet the specific tasks desired. It features a simple built-up fuselage and uses the Ace "Pacer" foam wing kit. The "Pacer" wing is excellent for general purpose models and is readily available from Ace R/C.

Slope Soaring

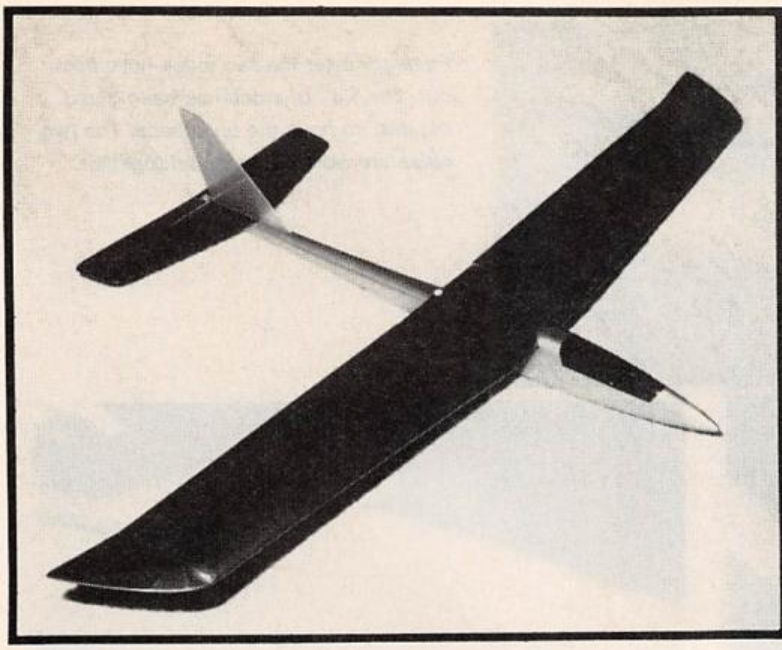
For slope soaring, the Soar Ace can be built anywhere from very lightweight to moderately heavy. This lets you tailor the plane to the wind conditions of your local soaring spots. If the wind is light or the slope shallow, build the lightweight version, and the Soar Ace can stay up with the "floaters." Using Cannon Super Micro equipment and Micafilm covering, the weight is a mere 11 ozs. Yet, due to its aerodynamic shape, it had no problem penetrating in winds up to 20 mph on a 300' cliff.

The heavier slope version is better for higher winds (although the lighter version can fly in high winds, just not as fast or as precisely). The higher wind version can do this because it is heavier and smaller, so it can penetrate more easily. It has also been strengthened to withstand its added weight and the higher winds. Ballast can also be





By James Renger



added to make the plane even heavier.

Two other ways that this plane can be flown are as a high-start or as a hand launch. Both versions are essentially the same as the light slope soaring version, with a few minor additions.

High-Start

To use this model on a high-start model, add a tow hook just behind the leading edge of the wing. Using a small Airtronics high-start, this glider can obtain launches up to 400'. It is an excellent aileron trainer and it is not a floater. When launching, be sure to launch the Soar Ace at a high angle and don't let the speed build too much or it will zoom off the line as the launch progresses. Keep the wing working, but not stalled, and you will get great launches.

Hand Launch

To turn the Soar Ace into a hand launch model, simply drill a hole to fit a 1/4'' x 2'' dowel through both sides of the fuse, just behind the second bulkhead. On my glider, the dowel was not glued in, so I could remove it for other types of flying. The glider is capable of achieving an altitude of 30 to 40 feet on a good launch, even with no real practice.

The three versions of the Soar Ace, the light slope soarer, the high-start, and hand launch models can all be made from a single glider. The glider will still fly the same as it does in all the other versions, with the added weight of just one ounce.

CONSTRUCTION

Now that all of the configurations have been discussed, it's time to go into the construction detail of the two basic glider versions. The wing is basically built to the Ace Pacer's plans.

Slope Soaring Wings

There are several modifications which should be made. If you are planning to build the light slope-soaring, hand launch, high-start model, you should build wingtips to increase wing area and effective dihedral. This improves both the stability and the lift-to-weight ratio.

For the maximum slope version, the ailerons that come with the wings are too small (only 3/4''), and it's a good idea to replace them with larger 1¼'' ones. This change will give you really exciting roll capability. If you are an advanced flier, it would also be a good idea to put the larger ailerons on the lighter weight version, if you do not mind the slight increase in weight.

High Wind Slope Soaring Wings

The assembly of the wing for the heavier, high wind slope soarer is different. First of all, the dihedral that is built into the Ace foam wings needs to be removed. This is accomplished by sanding the wings at their roots, before assembly, until the dihedral left in the wings leaves the top surface flat. The wing should no longer have an upward-angled appearance. There should be no added wingtips in this version, the plane will not need the extra lift in high winds and the wingtips would just produce drag and hinder the speed and roll rate. The larger ailerons mentioned earlier are mandatory for this model. If not used, the glider would not have enough control to be exciting.

To take the added stress of higher winds and a heavier fuselage, the wing must be reinforced. To strengthen the wing, apply fiberglass to it. Once the wing has been assembled, lay a strip of 4 oz., 1'' fiberglass tape onto the top of wingspan-wise, just in back of the balsa spar. Tip to tip after measuring, remove the strip, and cut to desired length. Then use a spray glue to make the foam surface of the wing tacky, in the area where the tape will be applied. After this is done, lay the glass cloth in position. Then, use UFO thin adhesive (only use this brand of CA or else the foam wings will dissolve!) to bond the fiberglass to the wing. Repeat this process on the bottom of the wing. The combination of fiberglass applied to both sides of the wing stiffens it greatly.

Finally, for both versions, install the 1/4'' dowel and the 1/32'' piece of ply to the wing as specified in the plans. Then drill a 3/16'' diameter hole in the wing through the ply for the wing mount screw.

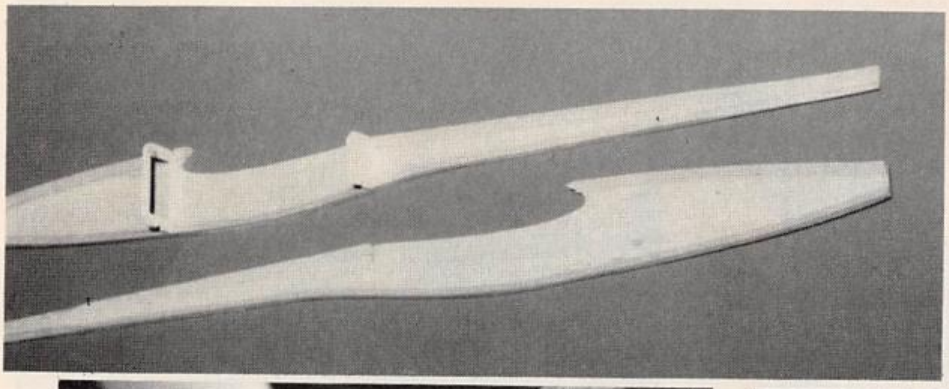
Fuselage

The fuselage is very easy to build. First, cut out the three 1/8'' plywood bulkheads and the 1/8'' balsa sides.

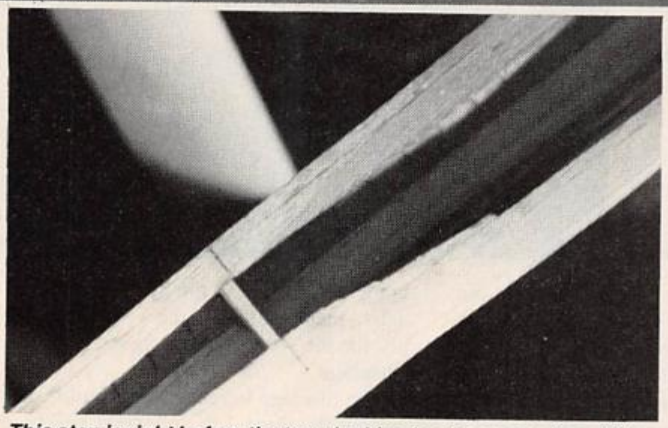
To get two perfect sides, cut out a rough outline of each, then using two small drops of thin CA, or some double stick tape (to the fore and aft sections), glue the two pieces together. The final cuts can now be made in unison, and the two side pieces will be identical. Once the final cut and sanding to exact shape are done, use an X-Acto knife to free the two sides. Then, using 1/4'' balsa triangular stock, glue it to the 1/8'' balsa sides where shown on the plans. To make the tri-stock follow the curves easier, cut slits with a razor saw from the inside edge of the tri-stock out, but be sure not to cut all the way through it. This should especially be done on the front area of the fuselage and the S-curve area on the bottom at the wing trailing edge. Also, be sure when gluing the tri-stock to the fuselage (with thin CA) to keep in mind that there needs to be a left and right side to the fuselage, not just two of one side.

Shaping The Fuselage

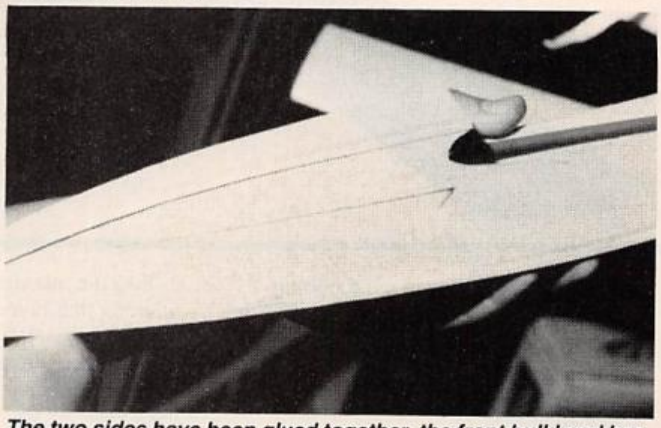
After the tri-stock has been glued on, taper it at the aft end inside, starting about 6'' from the back, down to about 1/8'' at the end of the fuselage tail. This is to allow for the fuselage to be a thin width in the rear when it is finally assembled. Now align the sides on the plans and mark the lines where bulkheads B and C go. If the bulkheads do not fit perfectly, some sanding must be done to insure that they do fit snugly. Then, use a right triangle and thick CA to glue the bulkheads into place exactly perpendicular to one of the sides. Next glue the bulkheads to the other side of the fuselage so that the two sides are joined. Now sand and fit bulkhead A if needed, and glue it into place while holding it between the fuselage sides. Glue the tail end together, then using thin



Fuselage after the two sides have been cut. The 1/4" tri-stock has been glued on, and so have the bulkheads. The two sides are ready to be glued together.

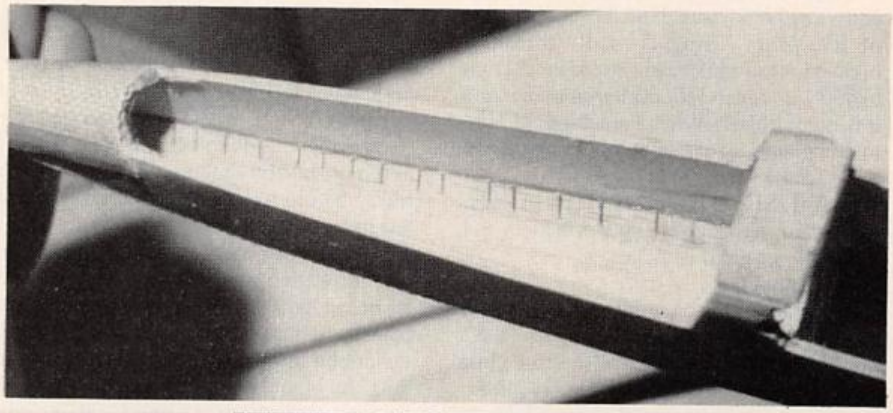


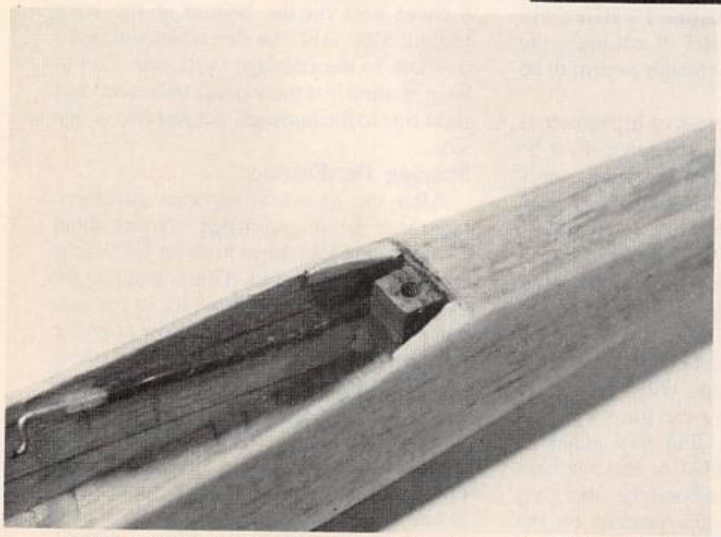
This step is right before the top planking has been glued on. Note the tri-stock has been cut away inside the wing mount area to allow clearance for the controls.

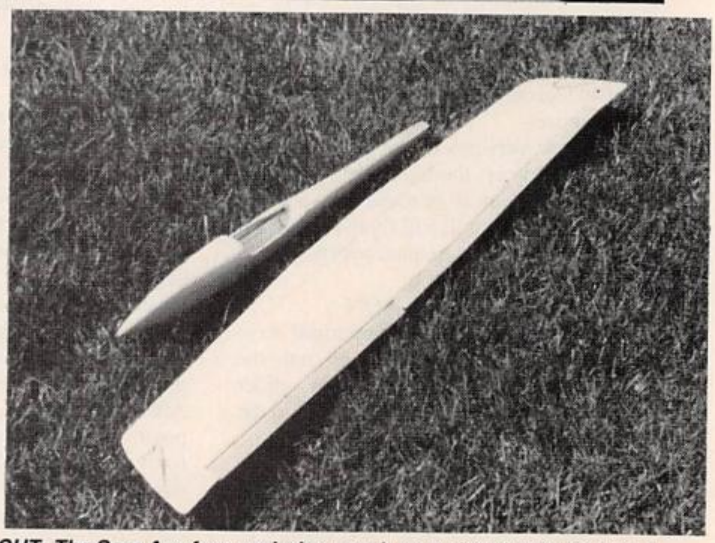


The two sides have been glued together, the front bulkhead has been set in place, and the planking has been glued on.

Fuselage has already been shaped and the hatch has been cut out. Note the cuts in the tri-stock to allow it to conform to the shape of the fuse. Note: This Soar Ace was built as the high performance slope soaring version, hence the heavy fiberglass applied to the nose which extends along the bottom as well.





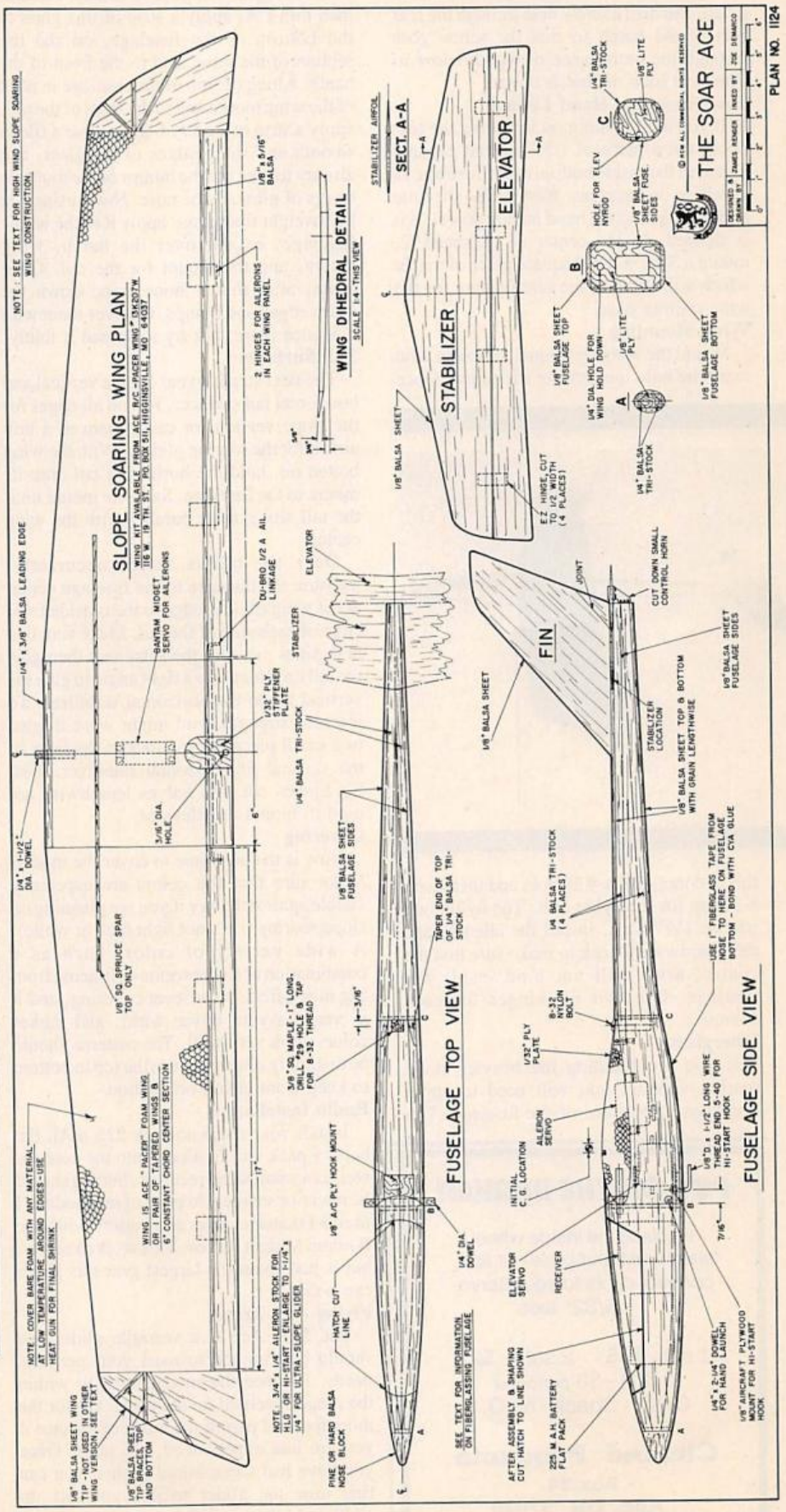


LEFT: Wing hold-down block and elevator pushrod glued in place. RIGHT: The Soar Ace fuse and wing nearly completed. Note the wing tips added to the Ace R/C Pacer wing kit. These gave additional area to the wings and, therefore, provide more lift that is needed to fly in light winds. This wing also uses the ailerons supplied in the kit. All versions of the glider used the added wing tips and supplied ailerons except the high performance version which does not need the wing tips, and it utilizes larger ailerons.

CA, apply the 1/8'' sheeting to the top and bottom of the fuselage, but not over the wing mount or the area to which the tail will be mounted. The grain should run lengthwise. Cut off the excess balsa and use a razor plane and sandpaper to shape to the desired contour, but be careful not to shave it too thin.

FULL SIZE PLANS AVAILABLE SEE PAGE 231

SOAR ACE
Designed By:
James Renger
TYPE AIRCRAFT
Slope Soaring Sailplane
WINGSPAN
46 Inches (w/Tips)
39½ Inches (w/o Tips)
WING CHORD
5¼ Inches (Avg.)
TOTAL WING AREA
253 Sq. In. (w/Tips)
207 Sq. In. (w/o Tips)
WING LOCATION
Top of Fuselage
AIRFOIL
Semi-Symmetrical
WING PLANFORM
Tapered L.E.
DIHEDRAL, EACH TIP
1⅜ Inch
OVERALL FUSELAGE LENGTH
27⅞ Inches
RADIO COMPARTMENT SIZE
(L) 10'' x (W) 1⅜'' x (H) 1¾''
STABILIZER SPAN
16 Inches
STABILIZER CHORD (incl. elev.)
3-1/16 Inches (Avg.)
STABILIZER AREA
50 Sq. Inches
STAB AIRFOIL SECTION
Flat
STABILIZER LOCATION
Top of Fuselage
VERTICAL FIN HEIGHT
4⅝ Inches
VERTICAL FIN WIDTH (incl. rud.)
3¼ Inches (Avg.)
ENGINE SIZE
NA
FUEL TANK SIZE
NA
LANDING GEAR
NA
REC. NO. OF CHANNELS
2
CONTROL FUNCTIONS
Elevator & Ailerons
BASIC MATERIALS USED IN CONSTRUCTION
Fuselage ..... Balsa & Fiberglass
Wing ..... Foam/Glass Tape/Spruce/Balsa
Empennage ..... Balsa
Wt. Ready To Fly ..... 12-20 Ozs.
Wing Loading ..... 6.8-13.9 Oz./Sq. Ft.



Hatch

Once the fuselage is shaped, glue a small piece of hard balsa or hardwood to the nose and shape it to the outline shown on the plans. Now use a razor saw and X-Acto to cut out the hatch. Glue a small piece of wood underneath the front of the hatch so that it protrudes about 3/8'' out. This will

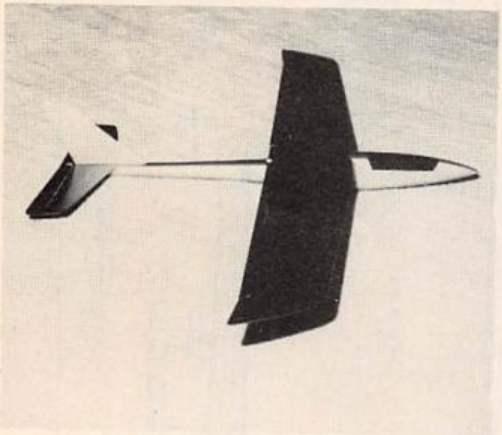
slide under the top part of the fuselage to seat the hatch properly. Next, mount a small piece of plywood that will stick out about 1/4'' just in front of bulkhead B. Mount the hatch, and drill a screw hole through the rear part of the hatch so that the screw goes through the extra piece of wood below it. This will lock the hatch down.

Tow Hook and Hand Launch

If you are planning on installing the tow hook, cut a piece of 1/8'' aircraft ply and glue it to the inside bottom of the fuselage as specified on the plans. Now is also the time to drill holes for the hand launch dowel, if it is desired. In the center of bulkhead C, mount a 3/8'' x 1½'' square piece of maple which will serve as the screwmount for the wing trailing edge.

Wing Mounting

Mount the wing and align it properly, and mark the hole location for the screw. Once



this is done, drill a #29 hole and then use a 8-32 tap for the nylon bolt. The nylon bolt will be 1½'' long. Install the ailerons and their hardware; check to make sure that the control arms will not bind inside the fuselage. Use two EZ hinges for each aileron.

Fiberglass

If you are building the heavier slope soaring version, you will need to apply fiberglass to portions of the fuselage. The first fiberglass to be used is a heavy industrial glass ''tape'' that weighs about 8 oz./yd. A lighter weight can be used if desired. Again using spray contact cement, then thin CA, apply a strip of this glass to the bottom of the fuselage, on the top section of the nose, and to the front of the hatch. Along the top of the fuselage in back of the wing mount and to the front of the tail, apply a strip of 2 oz./yd. glass. Use a file to smooth any sharp edges of the glass, and also try to take out the bumps of the multiple layers of glass on the nose. Now, using Sig lightweight fiberglass, apply it to the whole fuselage, except over the hatch, wing mount, and the mount for the tail. Once again, after this is done, sand down the sharp edges and bumps. Go over them with CA once more, but try to spread it thinly.

Tail Surfaces

The next step is to cut out the vertical and horizontal tail surfaces. Round all edges for the slope version, or carve them to a thin airfoil for the soaring gliders. With the wing bolted on, hold the horizontal tail onto its mount to the fuselage. Sand the mount until the tail sits exactly parallel with the wing center.

Once the tail is seated accurately, measure the distance to the fuselage center at the wing trailing edge to the outside front edge of each side of the tail. Make sure that both sides measure the same and then glue the tail on. Next, use a right angle to glue the vertical fin to the horizontal stabilizer. To increase strength, you might want to glue two small pieces of tri-stock to the base of the vertical fin/horizontal stabilizer. Two EZ hinges cut into halves lengthwise are used to mount the elevator.

Covering

Now is the best time to cover the model. Make sure that the colors are especially visible against the sky if you are planning on slope soaring (i.e., not light blue or white). A wide variety of colors such as a combination of fluorescents (Ultracote from Sig now offers fluorescent covering, and it is very easy to cover with), and darker colors work very well. The patterns should be distinctly different from the top to bottom to keep from losing orientation.

Radio Installation

Install your radio now. A 225 mAh flat battery pack will fit nicely into the nose, as well as a small sized receiver. Servos should be micro or smaller. In most of my models, I used a Futaba receiver and battery with Ace Bantam Midget servos. This worked nicely, but is just about the largest gear this glider can hold.

Flying And Trim

The Soar Ace is a versatile glider and should be trimmed to meet your personal needs. Balance the model initially within the range specified on the plans. Go for the more forward part of the range of balance if you are less experienced: it's safer. Once you have had some initial flights, you can fine tune the glider to suit yourself. In addition to fore and aft balance, use pins or nails in the wingtips to ensure that the model balances exactly on the centerline laterally.

Once you have the model flying well, and the control trims and sensitivities set to your liking, it is time to fine tune the model to get the ultimate performance possible. Start with the balance point. I like to trim the glider for a smooth flat glide well below the stall point. Then, with lots of altitude, push it over into a dive, then let the controls go neutral. If the glider is balanced correctly, it will pull out of the dive, but only very slowly. If it pops right up and then starts galloping, it is nose-heavy. If it continues to dive, or even ''tucks-under'' it is tail-heavy. (*Editor's Note: This works because you are testing the model for speed sensitivity. A nose-heavy model needs up elevator trim to fly level. When airspeed increases, as in a dive, the elevator power becomes excessive and the model pops up suddenly. When your model is balanced ''just right'', the trim stays* ***almost*** *the same regardless of speed.)* As with any model, shift equipment to move the balance point if possible, but use ballast if required. Once you have moved the C.G., try the dive test again. Then reset the trims and sensitivities to suit you with the new C.G. A couple of sessions of this should get the glider really cooking for you.

The dive test is also good for checking for warps in the wing. If the model flies straight at glide speed, and always turns one way in a dive, you have a warp in that direction.

Flying Your Glider

I have crashed these gliders several times while testing them. One thing I've noticed, whether the glider hit a steel pole or was rolled on landing, it's always been easy to fix. All you have to do is glue it back together, and it will fly as it did before. It's just a very sturdy and simple glider! It can be built by and for a beginner or it can be tailored for an expert. The people who have seen our Soar Aces fly have been impressed enough to be anxious to build their own. So now it's up to you. Have Fun!

Note: The wing kit is available from Ace R/C Inc., 116 W. 19th Street, Higginsville, Missouri 64037, (816) 584-7121. Stock #13E207W, Machnone/Pacer wing kit $5.25. □