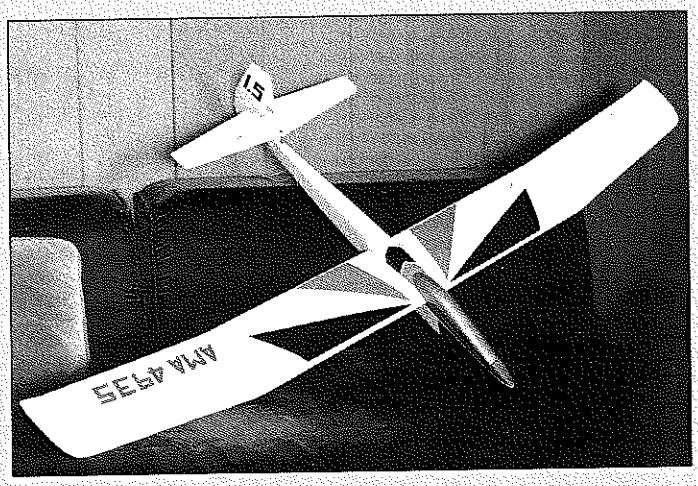
CONSTRUCTION



WIND SURFER BABY

BY JAMES N. MARTIN

Down the far pylon, a quick 180° turn at the drop of the flag and back to the near pylon. No! This is not a screaming pylon racer, but instead a 1-1/2 meter Class A hand launch glider. It was five hours into the slope soaring flight that Saturday in the middle of May when Dale Collier had completed more than five hours on the closed course. Earlier that day, 13-year-old Mathew, Dale's son, had completed more than four hours. The decision to discontinue these flights was made due to the possibility of low airborne batteries. Otherwise, the flights could have continued until dusk.

We call it Wind Surfer Baby, a scaled down version of Joe Bridi's two-meter Wind Surfer. The choice of using the Wind Surfer design was made for its simple construction and roomy interior for airborne equipment. The basic Wind Surfer design remained. Changes include an Eppler 205 airfoil and a decrease in rudder area. With these modifications and an adjustment in CG, the Wind Surfer Baby may be used for either thermaling or slope flight. Talk about versatility!

Three Wind Surfer Babies were built simultaneously for their separate tasks. All three flew well on their first flights. Number one is Dale's choice for the Class A Open, Duration and Closed Course Trials. This is a wide nose variant to hold an 800 mAH battery. Number two is Mathew's choice for the Class A Jr. Duration Trials. Again this is a wide nose variant to hold dry cells. Number three is Jim Martin's, a slim nose variant for thermal work. It is fast, agile and willing to thermal.

CONSTRUCTION

Construction is similar to the two-meter Wind Surfer. However, the following is my version of construction methods.

Jim Martin at the flying site, Poli Poli.

The choice of materials is important as to the final task of the air machine. For slope flying, an extra ounce is beneficial, but for thermal work keep it light, clean and with sufficient rudder and stabilator travel. The choice of adhesives is yours. The main construction material is balsa, other materials are called out.

RUDDER

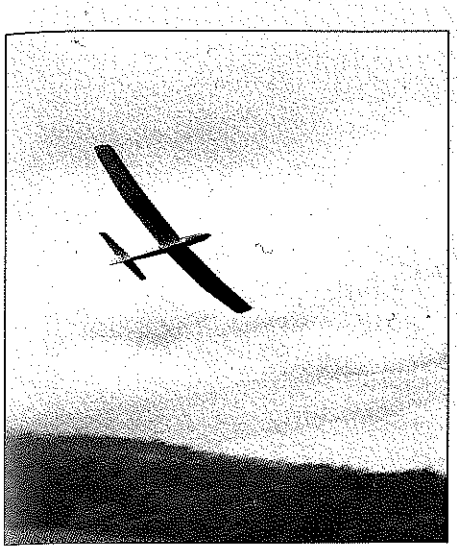
Pin the rudder post to the drawing and glue the top and bottom edges of the rudder to the rudder post. Next glue the upper and trailing edges as well as their gussets into position.

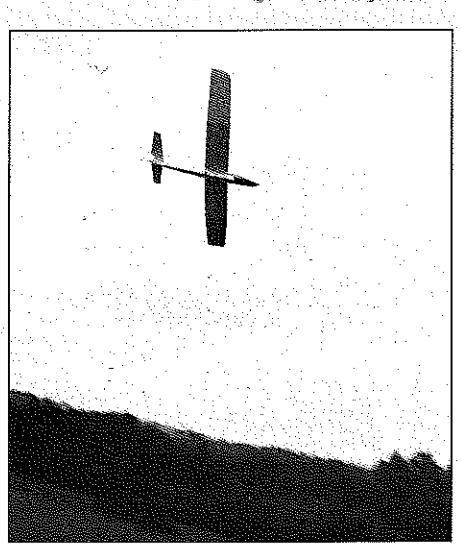
VERTICAL STABILIZER

Cut out vertical stabilizer sheet as shown on the drawing and pin it to the drawing. Glue in the leading edge and the upper and lower vertical stabilizer posts.

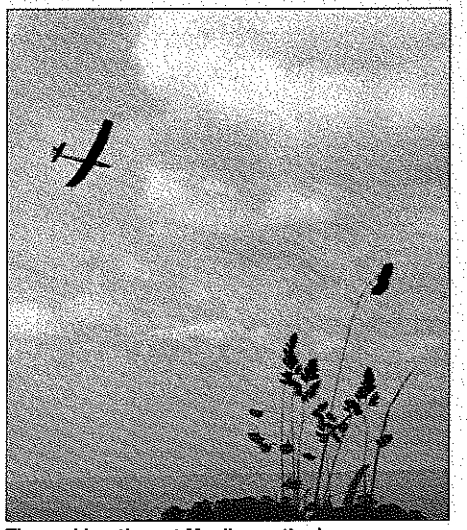
STABILATOR

Care must be taken in building up the center section of the stabilator for it is a three-ply laminate of cross grain 1/16-inch balsa sheets. The grain of the outer sheets run fore and aft, while the inner sheet grain runs spanwise. Both panels are built together. Pin the stabilator trailing edge, leading edge and tips to the drawing. Next fit and glue the tapered balsa filler block inboard and in back of the leading edge. Fit and glue the under sheet of the stabilator inner panels from the filler block to the trailing edge. Position the 1/16-inch brass tubing across both stabilator panels and





(Left and right) High speed fly-by at Poli Poli, on the slopes of Mt. Haleakala.



Thermal hunting, at Maui's south shore.

epoxy into position. Before the epoxy cures lay in the second ply of 1/16-inch sheet balsa between the tubing and trailing edge—remember that the grain runs perpendicular to the bottom sheet. Glue in the top sheet with the grain running in the same direction as the bottom sheet. Note that the top sheet will have to be grooved slightly to fit the brass tubing. The internal bracing and gussets can now be glued into place.

FUSELAGE

Start with the rear fuselage bottom. Cut pieces of 1/16-inch sheet balsa 2-3/4 inches wide and glue each on edge until the rear fuselage bottom measures 2 3/4 by 16 inches. Draw a center line down the rear fuselage bottom and at the bulkhead positions. Cut out all bulkheads as shown on drawing, and draw in the vertical center lines on all bulkheads. Glue bulkheads D, E, and F in position on the rear fuselage bottom by lining up the center lines.

Lay out the fuselage sides, left and right. Glue in 3/16-inch triangle stock from bulkhead F forward along the bottom edge, and also from bulkhead F to C on the top edge of the fuselage sides. Glue in the 1/32-inch ply doubler to the fuselage sides. Next glue in the spruce fuselage side stiffer between bulkheads A to C; note the 45° cut to receive bulkhead C.

Left to right, Dale and Matthew Collier's record holders, and Jim Martin's Wind Surfer Baby.

Fit, set, and glue the fuselage sides to the rear fuselage bottom starting at bulkhead F and working forward. Draw a center line on the forward fuselage bottom piece (1/16-inch ply). Line up the forward and rear fuselage bottom to center lines and glue. Note that bulkhead C is 1/8-inch ply; glue 1/4-inch triangle stock to the bottom edge of the bulkhead to aid in alignment (see drawing). Glue in bulkheads C, A and then B to the fuselage sides, then glue the fuselage bottom.

Install the nose block. Install the vertical stabilizer. Be sure to check for alignment. Glue 1/4-inch triangle stock at the junction of the fuselage sides and the vertical stabilizer, extending 1/4-inch ahead of the vertical stabilizer. Now glue the fuselage bottom aft of bulkhead F.

Rough sand the fuselage bottom flush with the fuselage sides. Contour sand the nose block with the fuselage on the sides and bottom only.

Install the push rods using flexible Sullivan Gold-N-Rod (red sheaths). Lightly sand the sheath for good glue adhesion. Drilling through bulkheads and fuselage sides can best be done using a 3/16-inch brass tubing as a drill bit chucked to an electric drill motor. Sharpen the cutting edge. Install the antenna sheathing at this time also.

Sheet the top rear fuselage from the vertical stabilizer to bulkhead D with cross grain 1/16-inch sheet balsa.

The fuselage wing rod block is made of two pieces of hardwood. Groove one face of each down the center. Glue the grooved faces together. Drill the grooved hole to 5/32-inch diameter. Shave one side to 45*0* to give more room in the radio compartment. The ends of the fuselage wing rod block are notched to fit around the stabilator and rudder control rod sheathing. Fit and glue the fuselage wing rod support to the upper front of bulkhead C.

To put the wing rod holes in the fuselage sides, use a pin to prick the fuselage side in a line with the hole in the fuselage wing rod block then ream with a #11 blade. In locating the hole on the other side of the fuselage, simply drill a 5/32-inch hole through the fuselage wing rod support into the other fuselage side. This completes the major construction of the fuselage until final finishing.

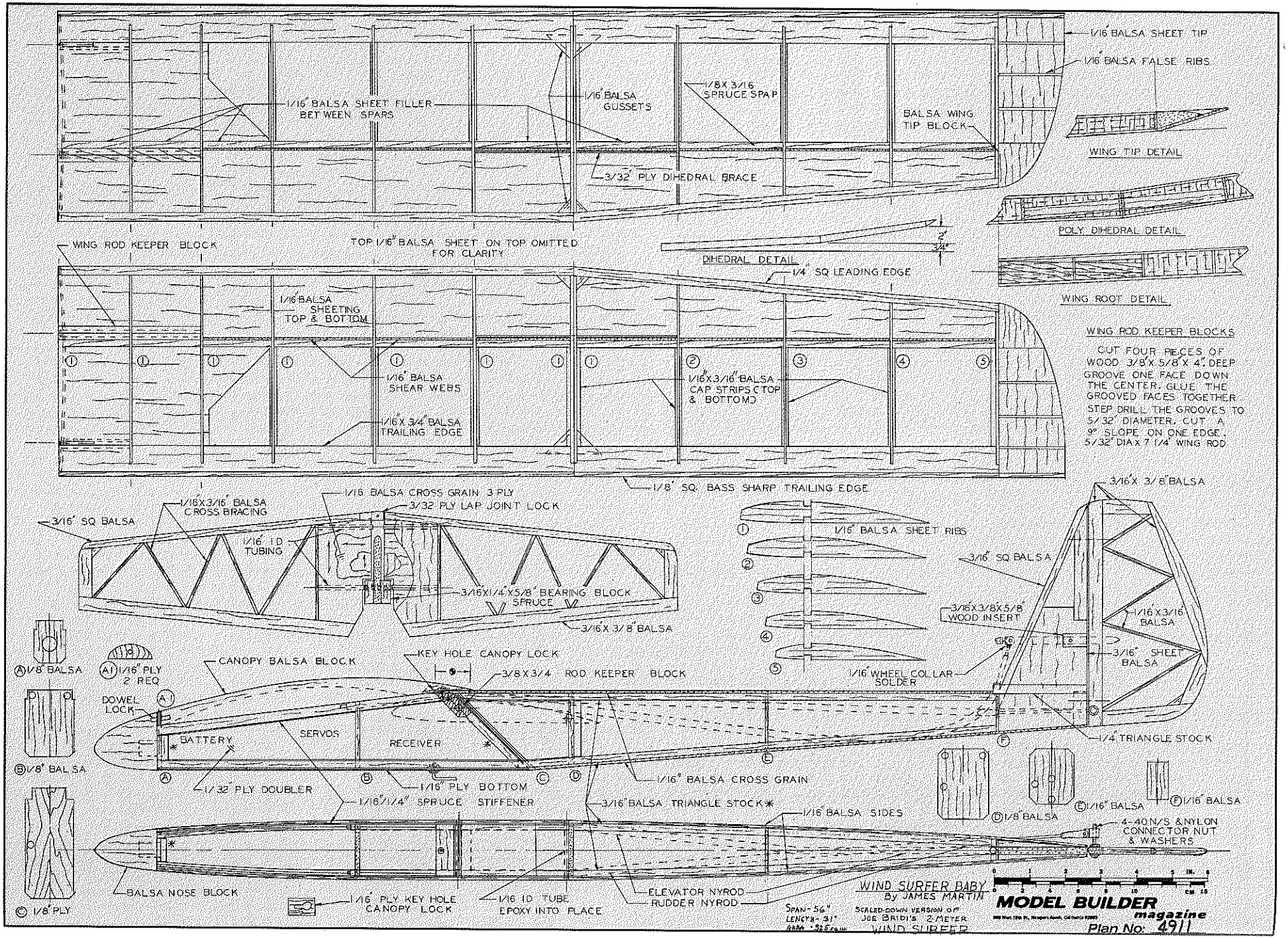
WING

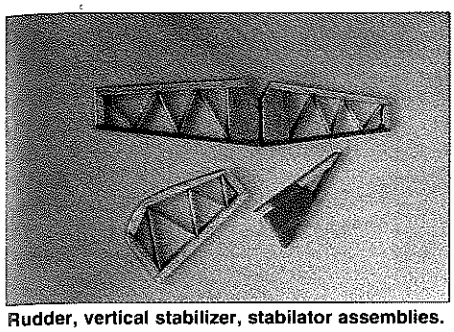
Wing construction methods are typical, however, the following building sequence will facilitate wing assembly.

1. Pin down the bottom trailing edge sheeting and bottom leading edge sheeting to the drawing. Glue in position the bottom rib cap strips and wing under sheeting of the inner wing panels. Glue in the lower spar caps and the back edge of the bottom leading edge sheeting. Fit and glue ribs in position from the lower spar caps and back. Do not glue in the double ribs at the polyhedral joint, wing root, and first inboard rib.

Glue in the filler web on the lower spar cap from the root rib position to the second inboard rib. Shim the front edge of the bottom leading edge sheet with 1/8-inch balsa shims to bring the sheet in contact with the ribs for all wing panels then glue the front portions of the ribs to the leading edge sheet. Fit and glue the top spar caps to the ribs. Fit and glue the leading edge.

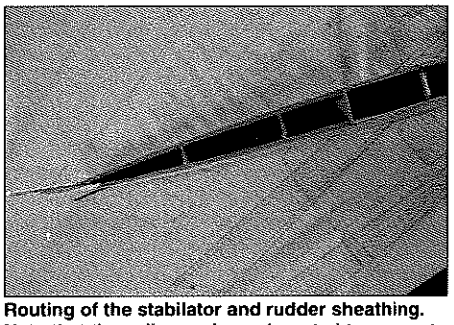
Wing rod supports are made of four pieces of hardwood. Groove one face the full length down the center. Glue the grooved faces


1/16" BALSA SHEET TIP
1/16" BALSA FALSE RIBS
1/16" BALSA SHEET FILLER BET WEEN SPARS
1/16" BALSA GUSSETS
1/8 X 3/16 SPRUCE SPAR
BALSA WING TIP BLOCK
3/32" PLY DIHEDRAL BRACE
WING TIP DETAIL
POLY DIHEDRAL DETAIL
WING ROD KEEPER BLOCK
TOP 1/16" BALSA SHEET ON TOP OMITTED FOR CLARITY
DIHEDRAL DETAIL
1/4" SQ LEADING EDGE
WING ROOT DETAIL
1/16" BALSA SHEETING TOP & BOTTOM
1/16" BALSA SHEAR WEBS
1/16 X 3/4" BALSA TRAILING EDGE
1/16 X 3/16" BALSA CAP STRIPS (TOP & BOTTOM)
1/8" SQ. BASS SHARP TRAILING EDGE
WING ROD KEEPER BLOCKS
CUT FOUR PIECES OF WOOD 3/8" X 5/8" X 4" DEEP GROOVE ONE FACE DOWN THE CENTER, GLUE THE GROOVED FACES TOGETHER STEP DRILL THE GROOVES TO 5/32" DIAMETER, CUT A 9° SLOPE ON ONE EDGE, 5/32" DIA X 7 1/4" WING ROD
1/16 BALSA CROSS GRAIN 3 PLY
3/32 PLY LAP JOINT LOCK
1/16X3/16" BALSA CROSS BRACING
3/16" SQ BALSA
1/16" ID TUBING
3/16X1/4"X5/8" BEARING BLOCK SPRUCE
3/16X 3/8" BALSA
1/16" BALSA SHEET RIBS
3/16" SQ BALSA
3/16X3/8X5/8" WOOD INSERT
3/16X 3/8" BALSA
1/16 X 3/16 BALSA
3/16" SHEET BALSA
1/16" WHEEL COLLAR SOLDER
1/4" TRIANGLE STOCK
A 1/8" BALSA
A1 1/16" PLY 2 REQ
CANOPY BALSA BLOCK
KEY HOLE CANOPY LOCK
3/8X3/4 ROD KEEPER BLOCK
DOWEL LOCK
BATTERY
SERVOS
RECEIVER
B 1/8" BALSA
1/32" PLY DOUBLER
1/16" PLY BOTTOM
1/16" BALSA CROSS GRAIN
1/16"/1/4" SPRUCE STIFFENER
3/16" BALSA TRIANGLE STOCK*
1/16" BALSA SIDES
D 1/8" BALSA
E 1/16" BALSA
F 1/16" BALSA
4-40 N/S & NYLON CONNECTOR NUT & WASHERS
C 1/8" PLY
BALSA NOSE BLOCK
1/16 PLY KEY HOLE CANOPY LOCK
1/16 ID TUBE EPOXY INTO PLACE
ELEVATOR NYROD
RUDDER NYROD
WIND SURFER BABY
By JAMES MARTIN
SPAN - 56"
LENGTH - 31"
AMA - 525 sq in
SCALED-DOWN VERSION OF JOE BRIDI'S 2-METER WIND SURFER
MODEL BUILDER magazine
Plan No: 491

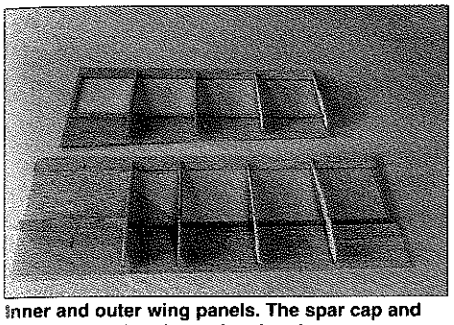


Rudder, vertical stabilizer, stabilator assemblies.

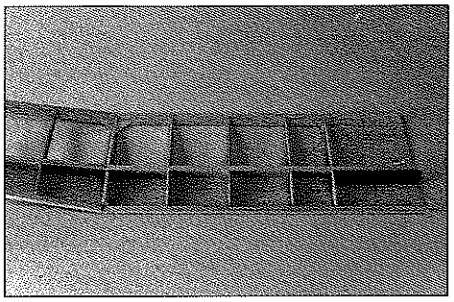
Fuselage sides glue to aft fuselage bottom.



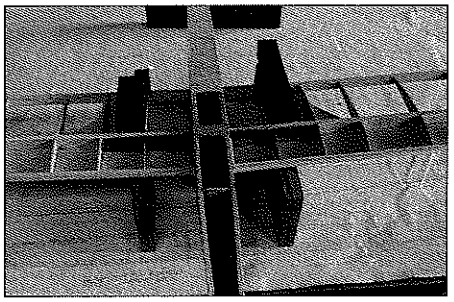
Routing of the stabilator and rudder sheathing. Note that the yellow rods are inserted to prevent buckling of red sheathing.



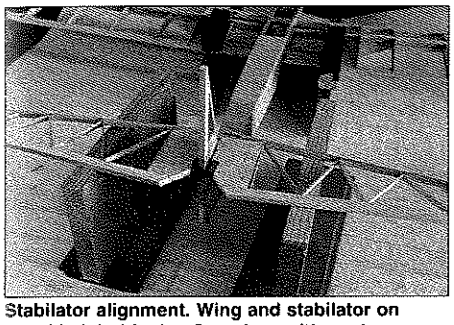
Inner and outer wing panels. The spar cap and ribs are glued to the under sheeting.



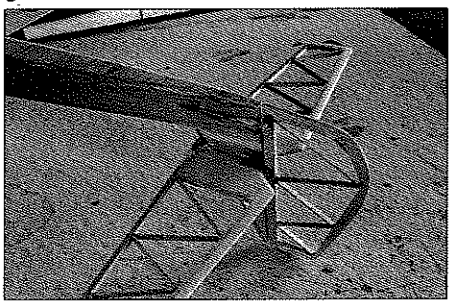
Polydehedral joint and wing rod support. Note the root rib and the first inner board ribs and not glued in.



Mating of wing panels to fuselage. Equal height blocks with weights to maintain equal wing panel incidence when gluing rear wing rods.



Stabilator alignment. Wing and stabilator on equal height blocks. Once in position, glue bearing blocks.



Rudder and stabilator control hook up.

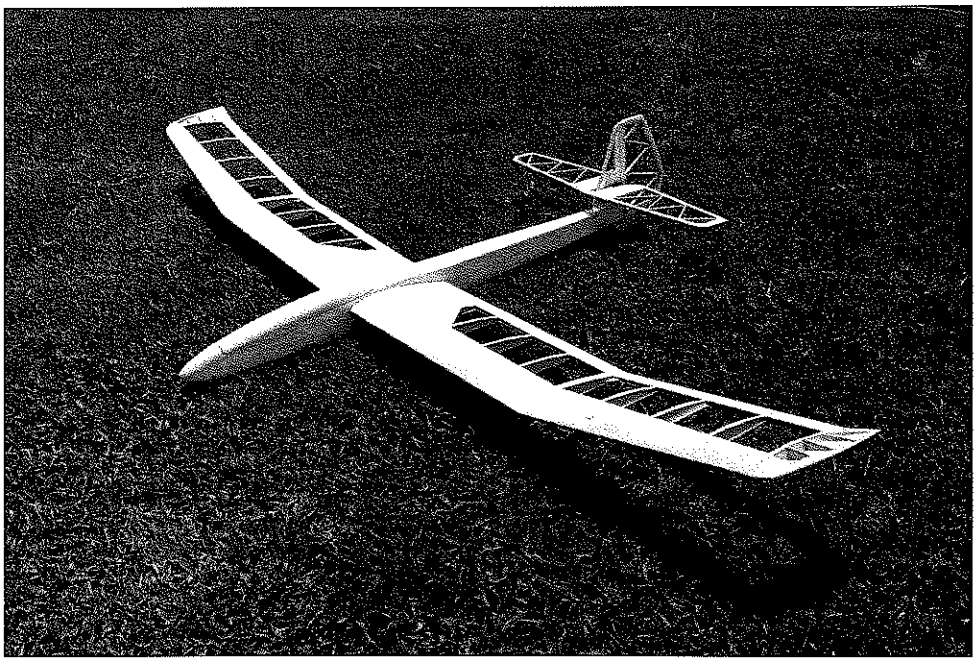
Underside structure detail.

together. Drill the grooved hole to a 5/32-inch diameter. Cut a 90° slope on one side of each wing rod support block. Fit and glue the wing rod supports as shown. Double check that the large end of the wing rod support faces inboard.

Fit and glue in the spar shear webs—do not glue the spar shear webs at the polyhedral. Cut out of 3/16-inch sheet the filler block for the polyhedral joint. Take the dimension from the polyhedral detail on the drawing. Pin down the inner wing panels to the work board. Elevate the wing tips and butt-join the outer wing panel to the inner wing panel. Carefully fit the polyhedral by sanding the upper spar cap until a good fit is obtained with the polyhedral. Block into position, then glue. Glue the shear webs in place at the polyhedral joint and also glue the 1/16-inch ply polyhedral doubler in place. Fit and glue the double rib halves at the polyhedral joint at front and back.

Place the wing rod into the fuselage and insert the wing panels onto the wing rod. With wing panels and fuselage together place the wing on equal height parallel blocks under the second inboard rib. Shim the rear fuselage with blocks to set the wing incidence. Mark the position of the rear wing aligning tube on the wing and fuselage. This should be flush with the front face of bulkhead D. Make holes in the fuselage sides and insert the 1/16-inch I.D. brass tubing through the fuselage and 3/4-inch into each wing panel. Seal each end of the tubing to prevent epoxy from entering. Place weights on each wing panel above the equal height blocks, to insure equal incidence for

continued on page 94



Structure detail. Note the built-up wing tips.

forming materials, it might be worth writing to Composite Structures Technology for their product list. They have vacuum equipment and all manner of materials such as carbon fiber, kevlar, glass cloth, epoxies and related supplies. Write them at P.O. Box 4615, Lancaster, CA 93539.

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A listing of product news wouldn't seem to be complete without some news from Tom Dixon, the ever-busy supplier of stunt and other CL products. Tom says he is now shipping kits of his Charisma stunter, and he provided a three-view sketch prepared by Steve Buso. At the same time, he is now producing a replica of the 1957 "green box" Nobler with some updating of construction techniques. Tom also sent along a photo of the Black Tiger kit prototype, which came out weighing 33 ounces with a Fox 35 engine. It has won the Nostalgia stunt divisions at its first two outings, in Anniston, Alabama and Marietta, Georgia. Decals on the plane are by Major Decals and the numbers are by Vinylwrite. The wing is covered with Japanese tissue and Sig dope; the fuselage with fiberglass cloth and epoxy.

Just to show that it's not all SSF (serious stunt flying) for Tom, he passes along the Sig Deweybird flown by his six-year-old son, Steven. It's powered by a Cox Black Widow and is very quick on 35-foot lines so they fly it on 42-footers. The plane is covered with nitrate dope and Formula U, with lettering by Vinylwrite.

Then again, stunt is never far away for the SSF (serious stunt flier). Tom says the Deweybird does the entire AMA pattern. Tom has built in a little dihedral to get the leadouts to the proper height. Coming next for Steven is a Sig Skyray (1/2A version), and a sheet-wing Tomahawk with a K&B .20 engine.

Sounds like a logical progression of planes for a young flier. We won't be surprised if we see young Steven winning the junior Nats in a few years. People interested in more information about Tom's product line should write for his brochure: Tom Dixon, Ste. 401, 1938 Peachtree Road, Atlanta, GA 30309.

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There's even more CL news in the "in" basket but space is running out, so we'll finish with one serious and important note, which comes to us via Mike Keville, editor of the Precision Aerobatics Model Pilots Association's *Stunt News:*

"You all know Doug Taffinder (owner of the Carolina-Taffinder fuel and fuel tank business). He gives freely of his time and income as a Nats judge and contest sponsor. Now he has a need, and I think you'll agree that it's far more important than any model airplane.

"Doug and Mick's youngest son, David, a victim of cystic fibrosis, is a candidate for double lung transplant. Unfortunately, the Taffinders' insurance won't cover the expense, currently to be $350,000.

"Some folks have sent `extra payment' with fuel and tank orders but this becomes taxable income to Doug. Here is an address that will accept and mark your tax-deductible contribution for Taff's son: Sprayberry Lung Fund, 4 Carriage Lane, Suite 304, Charleston, SC 29407. Annotate your checks for David Taffinder.'

"Expect to hear and read more on this. We would like to help ease the burden by soliciting donations to this fund in David Taffinder's name. Please help spread the word in your newsletter, on ModelNet, at club meetings, contests, etc. There will be a special Taffinder fund-raising effort throughout the weekend of Vintage Stunt Championships III in Arizona in March. Let's see if we can put a dent in that total, and show the Taffinders we care."

As always, club and contest news, photos, technical tips and other control line news is welcomed. Write John Thompson, 326 No. K St., Cottage Grove, OR 97424. ***MB***

PYLON *Continued from page 63*

this point, or after use, loosen up one Detail "F" and move it over slightly to remove the bind. This is important to keep more than one card from being flipped at a time.

The remaining assembly is fairly simple. Cut out Details "B," and screw them into place and drill a clearance hole for the eye bolt. The modification shown to the eye bolt is necessary for hanging this system on Cyclone-type fencing. If this system is not to be used on this type fencing, other mounting methods can be utilized. The bolt through Detail "B" will keep the assembly upright and the bolt needs to be either bent outward so the center of the hook is outside of the assembly or the mounting hole through Detail "B" can be drilled on an angle so that the hook ends up outside the assembly. Your choice.

Paint lane numbers on the front of Detail "H" plus any other painting needed on the rest of the assembly.

This entire assembly takes some time to complete, however, when finished, will service you well for many years. It is very easy to use and setup is quick. Just hang them on your lap cage and you're ready to go. ***MB***

SURFER *Continued from page 67*

each wing panel.

Glue in the front and back parts of the first inboard ribs. Fit the root ribs against the fuselage sides and glue the root ribs to the wing panel undersheeting only. Add false spars between the root rib and first inboard rib on each side of the brass tubing. Epoxy the brass tubing to the wing panels between the false spars.

Remove the fuselage and wing from the blocks. Cut the brass tubing between the root ribs and fuselage sides. Sand the wing panels to receive the trailing and leading edge sheeting. Glue in the trailing edge sheet. Fit the leading edge sheet and glue from the leading edge back to the spar. Glue

in the wing top sheet and also the rib caps in place.

The wing tips are built up. Glue the wing tip block to the wing tip sheet—make sure that there is a right and left wing tip. Attach the wing tips to the wing panels. Add the three false ribs as shown. Sand the wing tips to shape. Glue a strip of 1/8 x 3/16-inch bass or other soft wood to the trailing edge of the wing panels. Sand to a sharp trailing edge from root rib to wing tip. Sand the leading edge to the contour shown on the drawing.

STABILATOR ALIGNMENT

Cut out the notch in the vertical stabilizer for the hardwood insert. Drill a 3/32-inch hole in the insert as shown on the drawing. Fit and glue the insert to the vertical stabilizer.

Assemble the wing panels to the fuselage and set the model on equal height parallel under each wing panel. Fit a 3/4-inch long piece of 1/16-inch I.D. brass tubing into the hardwood insert. Assemble the stabilator panels to the vertical stabilizer. Place equal height parallel blocks under each stabilator panel. Once the stabilator is level and in line with the wing and perpendicular to the vertical stabilizer, glue the bearing blocks to the hardwood insert.

STABILATOR LAP JOINT LOCK

The purpose of the stabilator lap joint lock is to keep the stabilator halves from sliding off in flight. Make identical step cuts into both stabilator panels at the inner ends of the leading edge 3/32-inch deep and 1/4-inch long. Glue a 1/4 x 3/8 inch piece of 3/32-inch ply into the step cutout. Set the stabilator panels together with the 1/16-inch wire inserted. Shape the ply lap joint to contour with the leading edge of the stabilator. Drill a small hole through the lap joint. Use a fine wire through the hole, bend over to lock.

CANOPY

The canopy can be fabricated by using a solid or a laminated balsa block. Shape two A1 formers of 1/16-inch ply and drill a 1/8-inch hole as shown on the drawing. Glue one former on the back of the nose block and the other to one end of the canopy block. Using the 1/8-inch hole as a guide, drill a 1/8-inch hole in the canopy block. Glue a 1/8-inch dowel into the 1/8-inch hole in the canopy block. Next glue a pine block to the top of the fuselage wing rod support. Trim the pine block flush with the fuselage top. In the center position drill a 1/16-inch hole and screw in a #2 sheet metal screw. On the underside of the canopy block in respective position of the #2 sheet metal screw recess the canopy to receive the 1/16-inch ply key hole canopy block. Glue in the canopy lock such that the large hole faces forward. Install the canopy on the fuselage and check for fit. Shape and contour the canopy and nose block top to the fuselage.

SANDING AND COVERING

Sanding is an important phase in model building. Care and time are the key words here. Sanding files such as Perma Grit can speed up the operation along with 120-grit production paper and the finer sandpaper

grits. The filling of cracks and depressions can be done with vinyl spackling.

Be sure the structure is dust free before covering with your favorite covering material.

FLYING

The Wind Surfer Baby has a wide CG range. If there is a yawing tendency the CG is too far back. Keep the flying speed up and go looking for thermals. For slope soaring, load it up with weight to move the CG forward. In light slope, it performs like a fighter aircraft.

I would like to thank Joe Bridi for his support. I'll say no more. It is your turn to fly one of these Babies.

By the way, we just got the word from AMA Headquarters of these new records:

• Dale Collier: Class A Open, Duration Slope: 5 hrs. 5 min. 40 sec. Distance: Closed Course: 120 km (74.6 mi).

• Matthew Collier: Class A Jr, Duration Slope: 4 hrs. 2 min. 49 sec. ***MB***

ENFORCER *Continued from page 71*

The canted engine on the Enforcer is very strange. It easily allows the electric starter to engage the starter cone. Like the Concept, Enforcer still has a large diameter starter cone. It works fine with starters that have a starter cup that fits aircraft spinners. But it could be improved by tapering the cone so modelers can use those long starting shafts with smaller cups for starting 60-size helicopters. With the long starting extension, it's easier to start the engine without needing to remove the canopy. I removed the plastic starting cone that came with the kit and replaced it with an aluminum cone from Century Import for the Enforcer ($12.95). Their phone number is (406) 436-1025. This metal cone fits both Enforcer and Concept, but when ordering, make sure you ask for the one that fits the Enforcer because that's the one which fits the 60-size heli starters and regular aircraft starters. Vortex Precision in Anaheim, California, (714) 220-2112, also sells a turned-down aluminum cone that fits the Concept and Enforcer.

The Enforcer's engine location with the cooling fan facing up and forward makes it very easy to draw in air. Concept has its cooling air intake from the back. In forward flight the region behind the fuselage is a low pressure region. Hence, it is not optimal to have the cooling fan opening to the back. As not too many Concept owners reported overheating problems, the centrifugal cooling fan is probably adequate for the job. However, the Enforcer cooling system seems more efficient because the same Century Import Mini Tuned Pipe had more discoloring on the Concept than on the Enforcer.

The Enforcer engine location does make the glow plug very difficult to reach. You need an 8mm socket wrench with long handle. A conventional Ni-Starter cannot reach the glow plug on the Enforcer. A power panel with a twist-and-lock type of glow plug connector is useful. But the canopy must be removed to connect the glow driver. Surprisingly, the kit does not include a remote glow plug connector, either. I bought a McDaniel remote connector and fixed it to the side of the frame. Now the engine can be started without removing the canopy. This remote extension is highly recommended. But the Enforcer kit did come with a nice fuel line filter and a fuel cut-off "squeezy."

FUEL SYSTEM

The fuel tank fitting on the Enforcer is kind of wimpy. It uses a rubber grommet to seal the fuel vent and pick up nipples. This is a very convenient invention, and works flawlessly, too. But it just looks gimmicky. The tank location is definitely better than Concept's. The tank is located close to the model's center of gravity and the fuel level can be seen easily from either side or behind at ten feet away. This tank location is excellent! There is enough fuel to hover for 15 minutes. Very nice. But the tank is just a tad low. The top of the tank is not quite at the same level as the carburetor opening. On a full tank, the engine tends to run rich. When the tank is 2/3 empty, the engine becomes lean. If you had set the engine close to the lean side when the tank was full, you might risk having the engine lean out, overheat and quit! Enforcer is not the type of helicopter with which you would want to have a surprise autorotation because the blades are relatively lightweight for you to stretch a glide. Furthermore, the soft flapping head design is prone to allow a tail boom strike on autos. To prevent the engine from leaning out toward the end, adding a one or two ounce feeder tank may be a good idea. Because of the higher oil content in the 30% Magna fuel, the flight time is shorter as compared to typical lower nitro fuel on the market.

EQUIPMENT

The servo tray and servo pushrod linkage design set this model apart from others. As the pictures show, all the pushrods on Enforcer are straight. This is quite a design achievement. Some of the molded plastic bellcranks are custom designed to have non-90-degree bellcrank arm angle so the pushrod will be perpendicular to the bellcrank arm. Nice job. The entire servo tray can be removed as a module by loosening just four screws. This provides access to the engine and makes the Enforcer engine just as easy to service as Concept (As an exercise, it took me 25 minutes to remove the engine from the Enforcer.) A conventional aircraft style muffler works very well on the Enforcer. The exhaust exits cleanly away down the bottom. The pictures show that we used a Century Import (408-436-