



PHOTOGRAPHY: ALEX MCLEOD

Its outlines hint at the famed L-19 *Birdog*, which probably inspired its title, *Observer*. This little .20 model serves well as a trainer.

# Observer

By Alex McLeod

Well, it could be scale, but this .20 size 4-stroke high wing model is really a sport plane in disguise, and was inspired by the original Bostonian version of it.

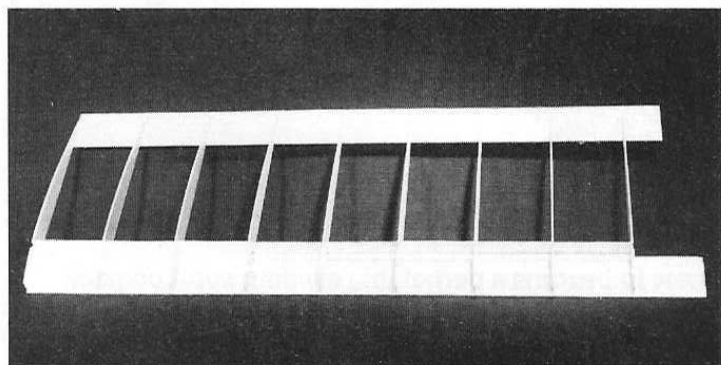
**H**ere is a 56-inch, spritely sport airplane that can nimble around the sky on a .20 four stroke engine, yet look like a WW II observation aircraft.

While looking through one of the model mags my eye happened to fall upon a set of plans for one of the cutest little rubber powered Bostonian models I had ever seen.

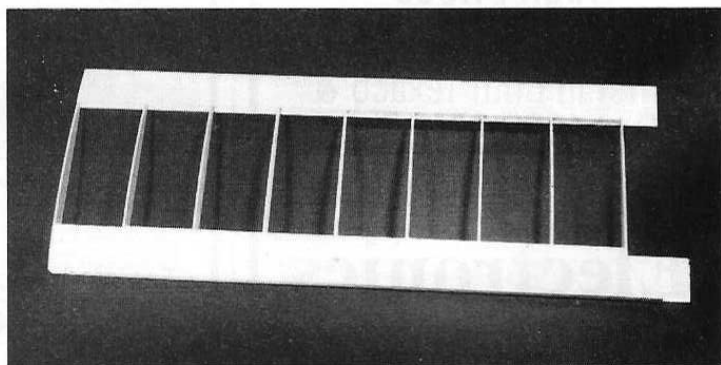
While not really legal for the Bostonian rules, it certainly was ideal, if scaled up and changed around somewhat, for the little O.S. .20 four cycle engine that I had seen one year at Toledo.

After drawing up the plans and obtaining one of the little 4-cycle jewels, I was sidetracked by another project, and, believe it or not, never built an *Observer* of

my own. I was, however, one of the few members of our club who didn't have one, when they saw how much fun the one built by Ted Sharp was. Some of the accompanying photos show two of the five built here. I did, however, build a half size one for a small VL electric geared motor, and fly it free flight. It flies well that way too. The plans for it might some day by pub-



Following conventional practice, the wing panels are built over the plans, with the bottom wing sheeting and spars laid down first, then the ribs aligned and



glued in place. This panel has just been removed (above left) minus the top sheeting which is then added (above right) before the leading edge is glued on.

lished if there is any interest shown in it.

The R/C version is a very gentle flying yet agile performer when more than regular control movement is used. Several *Observers* have been used with success as trainers and I know of one that has been flown with floats. The flat bottomed airfoil shown provides a faster model but the undercambered rib shape slows the model down for use in small fields or school yards. The combination of lots of wing area with a light airframe and a small engine that pulls well, produces an easy flier.

Even though I haven't built one, I did do the test flying of the prototype and found it to exceed my most optimistic hopes. I expect to build two of them, one with a .19 R/C P.A.W. diesel and the other with a .15 size electric motor. There is every reason to believe the design will lend itself to these two power sources as well. Certainly a .20 4-cycle is enough power for the airplane and that was proven when it was a bit overpowered with a Surpass .26 4-cycle. If some of you are heavy builders (the airplane that is) you may very well need lots of power and have to go to a .40 4-cycle, but that's up to you.

### Construction

I like to use spruce in my models because I can cut down on the size of the wood and, therefore, also the weight. It's easier to handle a model built of spruce (or other harder woods if you cut your own) since it is less likely to crunch when you handle it.

The plan shows balsa construction with sheet sides on the fuselage and  $\frac{1}{8}$  square inside for rigidity, but if you wish to build an open frame work from  $\frac{3}{16}$  square spruce and no sheet in the fuselage behind the trailing edge of the wing, it will work fine.

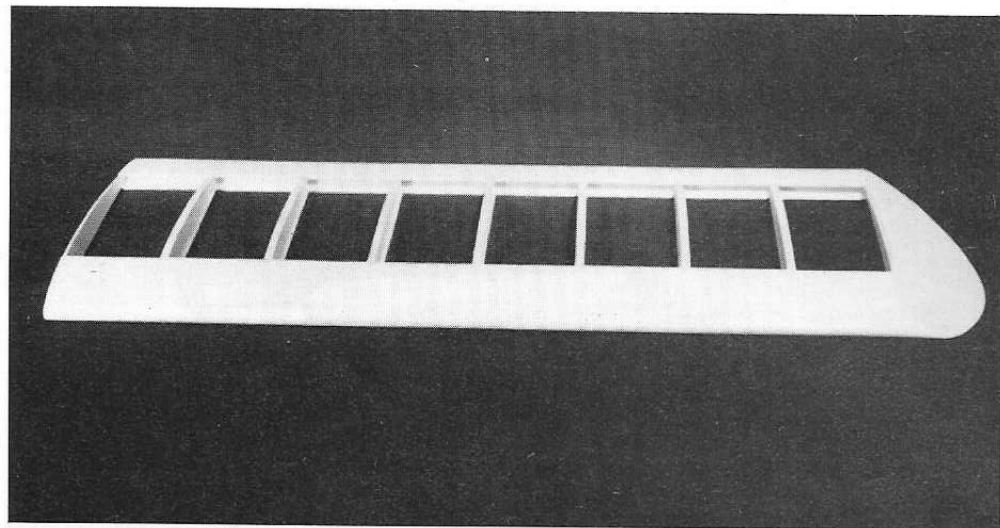
They have been built both ways, and even with other variations. They all fly well.

### Fuselage

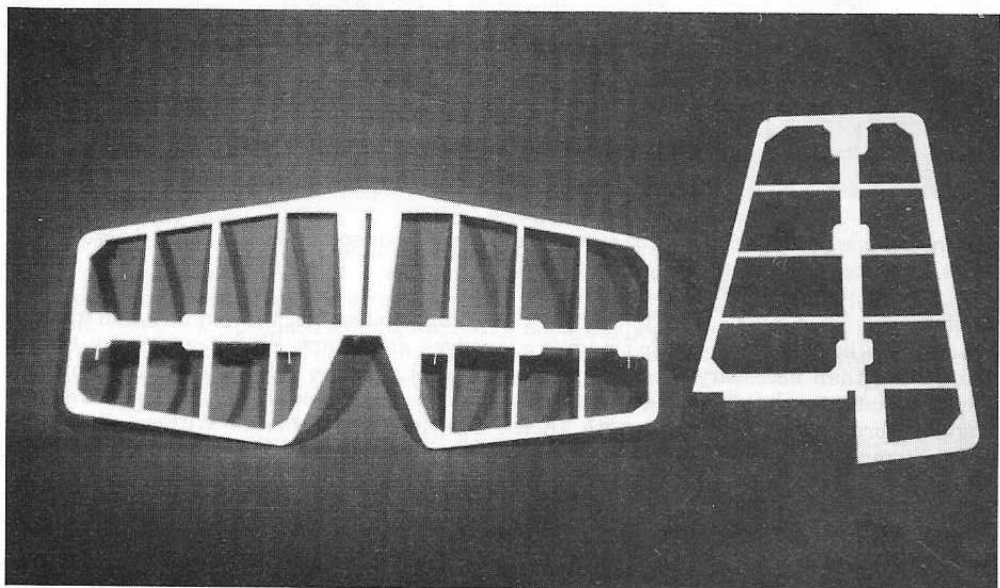
Start by building two sides as shown on the plan or of  $\frac{3}{16}$  square spruce or whatever wood, then join the sides in the center section of the fuselage with the two  $\frac{1}{8}$  ply formers E and F making sure everything is perfectly square. When this is done, bring the tail together and cement it.

Install the other cross pieces, firewall and the remaining formers. Install the pushrods and throttle linkage, then the fuel system and sheet in the nose. Be sure to epoxy the blind nuts for the motor mount behind the firewall.

Side or inverted mounted motors both work well and depend on how you want the nose shape to look. Upright mounting, I



Cap strips and wing tip are finally added to the panel (above), and everything carved/sanded to shape. After the tail feathers have been framed, extra  $\frac{1}{4}$  inch blocks are added to serve as hinge pockets (below).



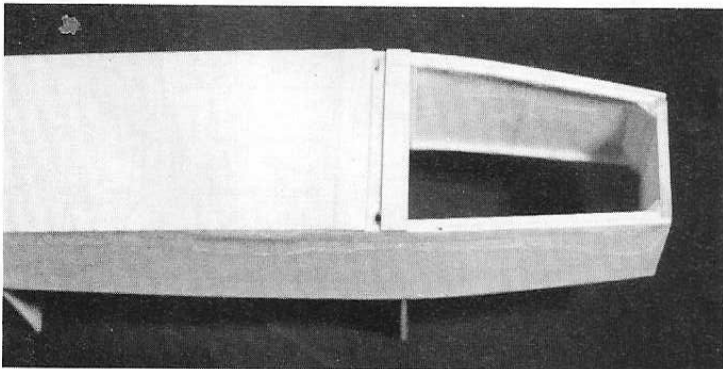
think, would destroy the illusion of the full-sized airplane but do what you like here. A thin ply sheet wrapped over the inverted motor works well and is simple while the same sheet can cover the curved top of the nose, or use  $\frac{3}{32}$  sheet balsa as shown.

Be sure to glue in the ply and blocks for the torsion type landing gear. This is a very light, strong arrangement that takes a lot of punishment.

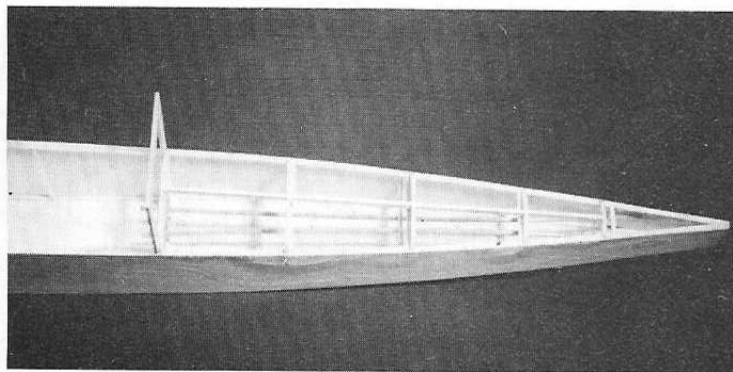
One of the weakest places on the model is the wing mount on top of the cabin. This can be strengthened by cutting a wing saddle from  $\frac{1}{8}$  ply and gluing it to the top of formers E and F with gusset blocks and  $\frac{1}{4}$  ply

wing hold down, bolt threaded blocks for  $\frac{1}{4}$ -20 bolts. If you use the undercambered airfoil be sure to glue matching blocks on the wing saddle to fill the gaps.

Bend the two identical landing gears from  $\frac{5}{32}$  music wire. Drill  $\frac{3}{32}$  holes in the trunion blocks in the fuselage and use metal landing gear straps over the two side-by-side wires in the  $\frac{5}{16} \times \frac{5}{32}$  trough. Fairings for the wire gear can be made from  $\frac{3}{16}$  sheet balsa glued in place and  $\frac{1}{2}$  heat shrink tubing shrunk into place over them. A steerable tailwheel is very useful at a busy flying field and helps to maintain the illusion of a real airplane.

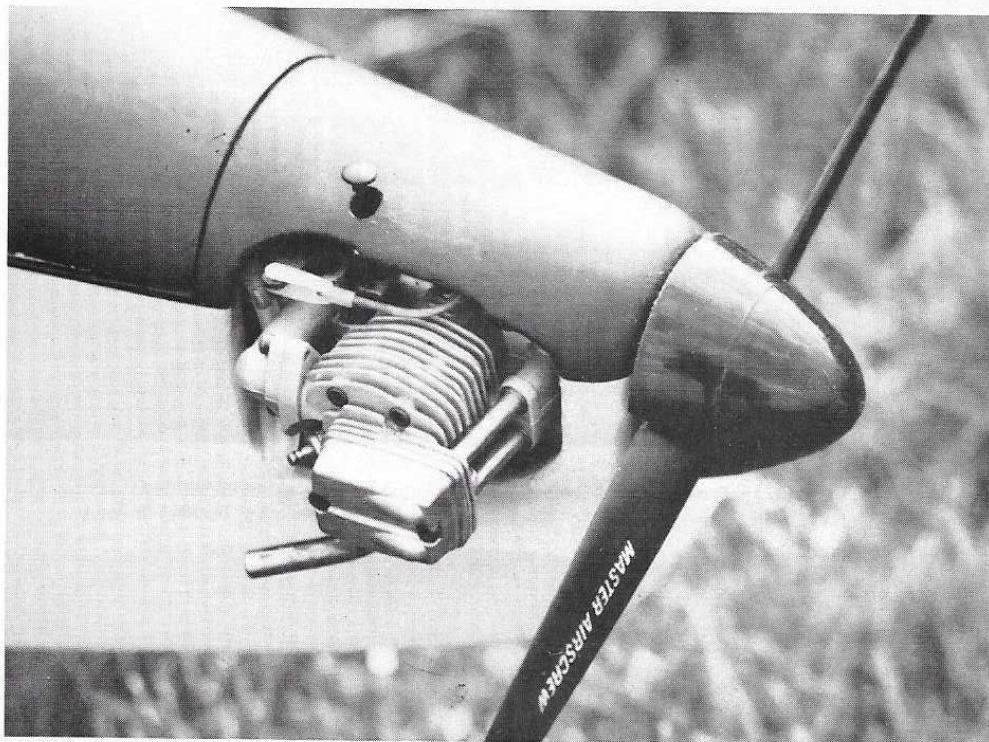


The landing gear legs nest in a slot cut in the ply plate glued to the fuselage bottom (above left). Note the triangular stock used to reinforce the firewall. After



the fuselage sides are glued together with formers in place (above right), the bottom sheeting is added, then the formers and longeron for the turtledeck.

# Observer



The character, weight and performance of the *Observer* are best suited for a .20 size four stroke like the O.S. above. If you want to use a 2-cycle, try a .15 size engine.

## Tail

Lightness is important so don't add anything more than necessary. The tail pieces are built flat over the plans. Add small triangular corner gussets for strength then sand them round. Use light weight but

stringy balsa for the leading and trailing edges and spars. Slit them for the type of hinges you like before doing any finishing and be sure the  $\frac{1}{4}$  sheet balsa pads are there for the control horns. Without them, the wood gets crushed, creating control slop.

## Wing

Some people hate cutting out wing ribs and others really like it. If you don't have a way that works well for you, try what I do. Simply cut the rib shape from scrap aluminum house siding begged from construction sites. When the rib template is carefully shaped including all notches for spars, I punch two jagged holes in it, which serve to hold it on the  $\frac{1}{16}$ th sheet balsa while I go around the shape with a model knife, then use a sanding block to bring it to the exact shape of the template. Each rib is done that way and is extremely accurate. It doesn't take too long to do this for all 19 ribs whether flat bottomed or undercambered.

The wing is built directly over the plan. Prop up the tips for the indicated dihedral and add the dihedral brace at the center being sure to relieve the center ribs to allow the brace to be thoroughly glued to the main spar as shown. Remove from the plan and add the  $\frac{1}{16}$  leading edge and center section sheets and the  $\frac{1}{16} \times \frac{1}{4}$  cap strips. The plan shows a  $\frac{1}{16}$  sheet V trailing edge and  $\frac{1}{8}$  sheet sub leading edge, to which the leading edge is glued. When all sheeting is in place, add the  $\frac{1}{4}$  sheet balsa leading edge and the sheet balsa wing tip.

Sand everything well, then resin, epoxy or ZAP some fiberglass over the sheet joints on top and bottom at the center section. Note that before sheeting the center section of the wing, I've suggested that polyester resin be poured into the trailing sheeting to strengthen it for the wing hold down bolts; also install blocks at the leading edge for the front bolts.

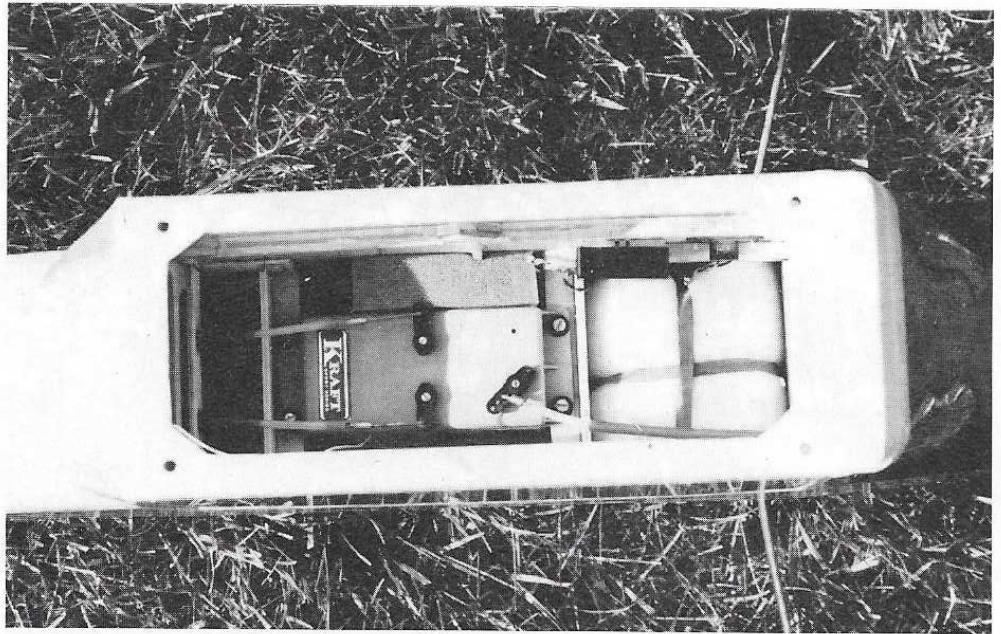
## Finishing

Be sure the structure is well sanded and all the dings are filled with Model Magic, Polyfilla or what ever. Cover the model with your favorite covering, whether it is fabric, or plastic film, but be sure the covering is as light as possible. It must be fastened securely to the underside of each wing rib if you use the undercambered airfoil. The models in the photographs were finished with Sig Koveral and butyrate dope. Others not shown had olive drab MonoKote. They all fly well. Just keep it light or performance will suffer.

The flat sheets of clear acetate that formed the "glassed" in parts of the cabin are perhaps the most conspicuous feature of the *Observer* and therefore should be applied with care. Cut out paper patterns first that fit well, then transfer them to .025 acetate or butyrate clear sheet. Glue them in place with R/C-56 glue or some such craft glue that dries clear. Coverite Graphic stripes help to dress up the model and Sig sticky stars and bars and USAF letters help.

## Flying

Since I test flew the prototype and some of the others that were built, I can give you a few clues about flying the *Observer*. As always, get plenty of flying speed up before giving up elevator for take off. The model will track straight on the ground but will accept course changes happily. If it is built light, about 64 to 70 ounces, then it will for-



The old Kraft 3-in-1 brick servo easily sits inside the narrow fuselage cabin. Ahead of it are the receiver and battery. Smaller mini or micro servos would fit most easily in the cabin. Note four bolt holes for the wing mount.

give mistakes and even fly in a stall attitude. A .20 4-cycle engine doesn't give it the ability to do vertical rolls but it can snap roll, spin, and, best of all, fly straight and level at very slow speeds. Landings are a joy. When the approach is set up on a calm day, you can almost put the transmitter

down and watch it land since ground effect helps it round out. One problem is that it wants to float across the field at almost knee height so be firm with it. One of our members, Paul Neale likes his so much he is building a low wing version and is calling it the *Scout*. C



The *Observer* serves many R/C roles. It can train, it can simply putter, or it can easily take a pair of floats for some nautical runways.