

Phony Folkerts

The next time you get fooled on the FAI circuit, it could be by a real phony. Although its looks are somewhat fake, its speed around the course is for real. / by Bob Root



The other half of the Root racing team, Kathy, with the Phony Folkerts. (Photo by Ron Reed)

In deciding to build a competitive new FAI racer, the design requirements seemed to suggest a minimum sized "thing" configuration. However, I have always felt that model racers should look like full-scale airplanes. The model presented here as the Phony Folkerts represents a compromise between these extremes. Although the model retains some of the basic outlines of the Folkerts SK-2, and SK-3, it cannot be suggested that it is stand-off scale, unless one stands off 400 feet to watch it race.

However, racing is what this design does best. It has been quite competitive in the Northwest in FAI, and finished well at the 1973 NATS, with Jim Booker and Bob Root placing third and fifth respectively.

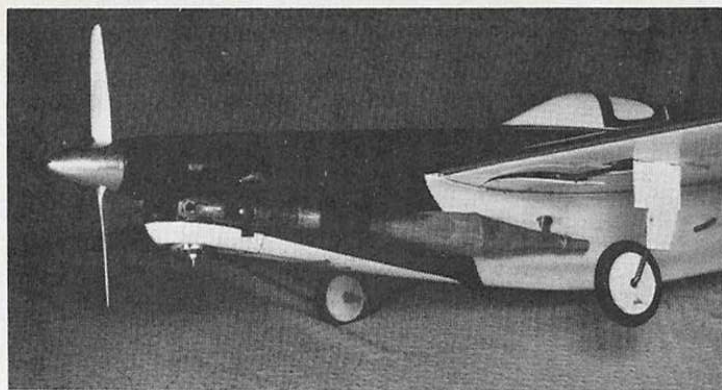
The Phony Folkerts fuselage cross section was minimized for low drag by designing the basic fuselage to be just large enough for the necessary equipment. The FAI width and height requirements were then faired into the small cockpit area as smoothly as possible. A fiberglass fuselage was incorporated to minimize structural volume, while allowing complex curvature and rapid construction. Although this type of construction deviates from the author's usual methods of wood construction, the results have proven worthwhile. A high quality, lightweight, fiberglass fuselage is now readily available.

While the design and construction of the original plug, mold, and model took all winter, the second one was built in

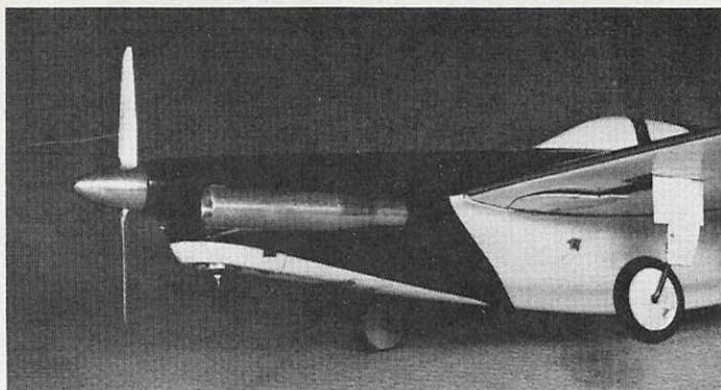
two weeks by fellow competitor Jim Booker. The fiberglass work and much of the original plug and mold building techniques were supplied by Tony Howard. He has been producing high quality, limited production, fiberglass kits for several years. Either a glass fuselage, or a complete kit, is available from Miniature Aircraft Designs. See details at the end of this article.

A few notes are included for those who may be interested in building a wooden version, but the equipment room or the cross-sectional area will have to be compromised. The complex fuselage shape does not lend itself well to wood construction.

Construction is shown for four separate types of landing gear. Violet Aero



Although prohibited for World Championships and FAI International Contests, the tuned pipe is interchangeable with . . .



an "effective silencer," i.e., a Mac's muffler.

Modeling Corp. retracts were used on the original model. Although this plane weighed less than 4-3/4 lb., very careful building was required. A separate article on installation of the retracts, with details of the full wheel doors, appears in this issue of AAM.

Jim Booker built his model with belly mounted wheels and "outrigger" stabilizing skids. This landing gear is simpler and lighter than retracts, but not as realistic. Jim has successfully flown this model without the skids, but the minimum skid length required for reliable takeoffs has not been determined. They shouldn't be too long, or they will cause excessive drag during takeoff.

Typical balsa fuselage cross sections are included on the plans as an aid to wood construction. A sketch of one possible building method is also shown. The curved upper and lower parts of the fuselage can use planked construction or formed balsa blocks. Form the engine compartment with balsa blocks or epoxy and fiberglass covered foam blocks.

If the above is not too clear, it is suggested that the reader refer to the author's Firecracker FAI racer article in the January 1972 issue of AAM. A complete discussion of a wooden fuselage is included. If a fuselage is constructed from scratch, it is important to note that the minimum width and height (occurring at the cockpit on this model) must be 3-3/8" and 6-15/16". The basic fuselage is 2-1/4" wide, with the extra

width occurring only in the fairing above the wing.

CONSTRUCTION

If a fiberglass fuselage is used, the first step is to file a Tatone No. 3 mount to fit. The front end must be filed somewhat to fit within the fuselage. Depending on the engine, the engine lugs may also have to be narrowed. An H.P. will fit with a minimum amount of material removal. The ST G-40 requires quite a bit of filing.

For maximum adhesion, polyester resin should be used to bond the firewall and bulkheads to the fuselage. Use a fillet of glass matt or micro-balloons, mixed in resin for reinforcement. The front wing mount bulkhead should be drilled for the 1/4" hold-down dowels before it is installed in the fuselage. The mating 1/4" ply plate, which is later glued to the front of the wing, should also be drilled at this time, to insure that the holes match.

However, the aft wing mount should not be drilled and tapped until the wing is completed. Note that the rear wing hold-down is bonded and screwed to the aft bulkhead before installation in the fuselage. A layer of fiberglass cloth on each side of this hold-down will insure that the tapped hole will be durable. If a fuselage mounted landing gear is used, it should be constructed at this time.

The fitted cowl can be held in place with a dowel and nylon bolt, or Cam-Loc. For engines with a large fin diameter, such as the ST G-40, the cowl

sides will have to be cut away and re-faired near the head. This can easily be done by covering the cylinder with thin cardboard for clearance, and magic mending tape or plastic wrap for protection. A new wall can then be formed over this, using fiberglass, micro-balloons, and resin.

Form the air intake by cutting the outline of the hole in the top of the fuselage, except for a small amount at the front. Push in the aft end of this piece to form the bottom of the intake, and fill the sidewall area with micro-balloons and resin. Carve to shape with a hand grinder, allowing space for the engine crankcase.

The foam wing construction is different from normal, in that the trailing edge is formed by epoxying a layer of glass cloth between the 1/16" balsa wing skins. The balsa can then be sanded to a thin, strong trailing edge, using the fiberglass as a reference line.

The wing skins should be bonded to the foam with a good grade water base contact cement, such as Southern Sorgham, except in the area of the trailing edge, where epoxy is used. Mark the line separating the cement, and apply epoxy on both the foam and the skin. The epoxy should be applied to the balsa after the contact cement has air dried, per package instructions. Stick one skin to the foam, using care in alignment.

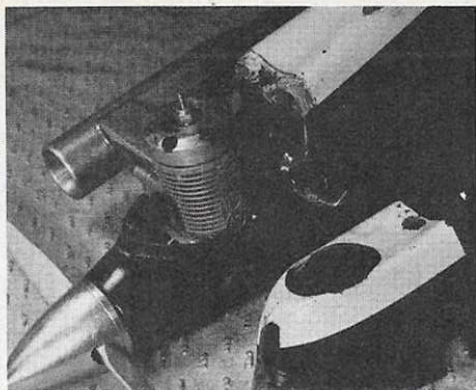
Next, lay the 6 oz. glass cloth TE reinforcement on the foam and skin, and rub to insure that it is wet with epoxy. Add additional epoxy to any dry

The author identifies his racer. White underside gives good contrasting visibility to the black topside. You can really see this bird on the course.

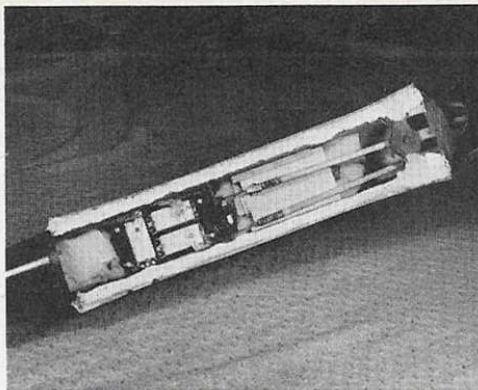


Phony isn't the word for it! The Folkerts bears only a passing resemblance to the short-spanned, long-fuselaged racers which flew to a first and third in the 1937 Greve Trophy races.

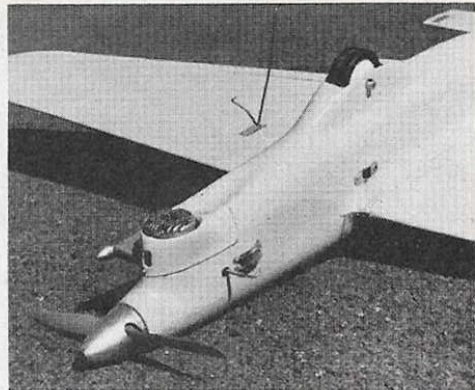




Snugly nestled in the front end is the HP 40. This engine is very popular for FAI racing, especially in England.



Fuselage is spacious enough to make even pattern fliers envious. The third servo is for in-flight mixture control.



Jim Booker's Folkerts goes the whole ten yards in an attempt to maximize the FAI rules.

spots, then carefully join the second wing skin, checking alignment to insure no overlap of epoxy and contact cement.

To insure an accurate wing, the skins should be bonded to the foam while it rests in the block from which it was cut. Clamp the wing skins where they overhang the foam block. Use two straight pieces of 1/4 or 3/8 balsa taped together on one side, and pinned through the TE on the other. Set weights on the foam blocks to hold the epoxy joint until it has set. Check that the TE is straight.

If wing mounted landing gear or skids are used, the mounts should be added before attaching the skins. Also note the extra three inches of wing skin at the tip. Cut the tip outline from 1/16" ply, feather it near the trailing edge, and bond it between the wing skins outboard of the foam core. Also add the leading edge.

After shaping the leading and trailing edges, cut the ailerons from the wing panels and face them with balsa. A groove should be cut in the bottom wing skins to mount the aileron torque rods. Once these are in place, the balsa which was removed from the bottom can be replaced. The wing panels can now be joined. Remember to add the 1/16" joiner near the leading edge.

Attach the 1/32" ply fuselage wing saddle, using the wing (covered with plastic wrap) to achieve the proper shape. Fill the area between the 1/32" ply and the inside of the fuselage with a

resin/micro-balloon fillet. Next, mount the 1/4" ply front wing plate against the front fuselage hold-down bulkhead with short 1/4" dowel stubs, which do not protrude into the wing area. Do not use any glue.

The aft 1/8" ply doubler should be added to the wing in the area of the hold-down bolt. Then carefully position the wing and epoxy it to the front ply plate. Without moving it, drill the wing and aft mount so that it can be tapped for a 1/4-20 nylon bolt.

When the epoxy is dry, the wing can be removed and 1/4" diameter holes drilled in the wing and the 1/16" ply joiner, using the pre-drilled 1/4" ply plate (now glued to the wing) as a jig. Fiberglass the wing center section, including the landing gear area if retracts are used. When this is dry, the 1/4" hold-down dowels can be glued in place. The rear hold-down hole can now be enlarged, and the required aileron and retract servo cutouts and mounts can be added.

Mount the wing, and cut a hole in the fuselage fairing to allow screwdriver access to the rear bolt. The fairing can then be bonded to the wing with silicone rubber, while checking alignment with the basic fuselage. Some trimming of this part will probably be required in order to get a good fit.

The tail surfaces should be carved from stiff, but light, 1/4" balsa. The surfaces can be tapered spanwise to minimize weight. Bond 3/32" balsa inside

the fuselage, to provide a larger surface for the stabilizer fuselage joint. Glue the stabilizer and vertical tail in place, using the wing as an alignment reference. The required stabilizer position is marked on the fiberglass fuselage for zero degree angular difference. Note that this doesn't coincide with the fuselage joint. It is always a good idea to check the angular difference between the tail and wing. Next, hinge the elevator, and glue the fixed root pieces to the fuselage. Micro-balloons and resin or epoxy can then be used for the fillets.

It should be pointed out that none of the polyester resins will harden properly over most epoxy. The exception is that some resin will harden over Devcon five-minute epoxy. Keep this in mind when bonding parts. Don't use epoxy if resin will be used over the joint later. This means that, if surfacing resin is used for finishing, the wing and the fiberglass TE is best put together with Devcon five-minute epoxy. If regular epoxy is used, care must be taken not to expose it when sanding the TE.

This completes the basic construction. Solarfilm was used to cover all the flying surfaces of the original model with retracts, in order to reduce weight. Various finishing techniques have been used on later models with fixed gear, while still maintaining minimum weight. No unusual flying characteristics have been noted in any of the Phony Folkerts. With the CG located properly, this is a smooth flying configuration.

For anyone interested in building this competitive airplane, fiberglass fuselages and kits are available from Miniature Aircraft Designs, 1318 144th, SE, Bellevue, Wash., 98007. A high quality, 11 oz. joined fiberglass fuselage with fitted cowl and wing fairing is available at \$31.50 plus \$2.00 postage. The construction kit, including fiberglass fuselage, 1/4" ply bulkheads (four), precision cut foam wing cores, six oz. glass cloth, machined 1/4" balsa tail surfaces, and rolled plans, is priced at \$49.50 plus \$3.00 postage.

The Phony Folkerts took first and second in FAI at Mexico City, Mexico, over the Easter weekend.

A pair of Folkerts. Jim Booker's (left) looks like a completely different bird than the author's.

