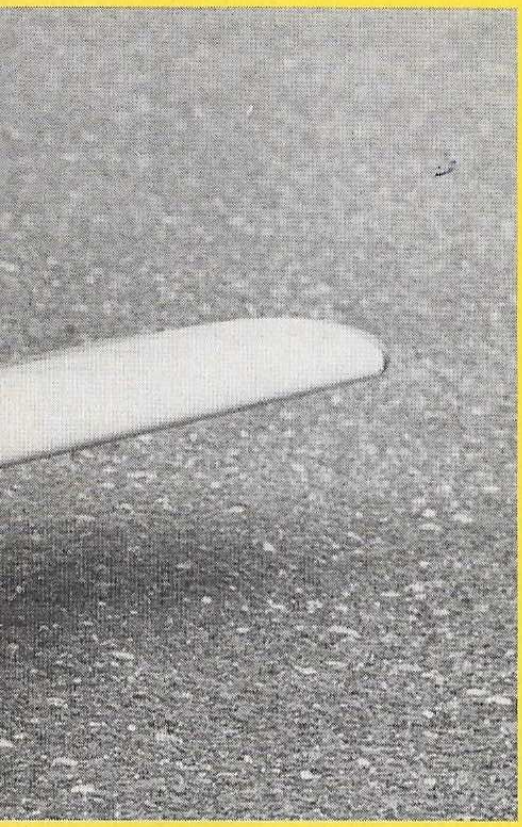
An R/C Piper Tomahawk

The T-tail makes it different but the lines keep it clean. This .19 powered R/C ship was a natural for a model/**Dick Sarpolus**

When I think of Piper, I think of the old trustworthy Piper J-3 Cub, floating lazily through the sky, resplendent in its bright yellow paint job, settling in gently on the end of a grass landing strip. Some years back I spent a lot of time under the summer sun near a small airport's single grass runway watching the Cubs and Champs float in on their landing approaches. The Piper Tomahawk is a far cry from the old J-3 Cub, with its low wing, tricycle landing gear, side-by-side seating under a bubble canopy, and that T-tail. And no yellow paint job.

The Tomahawk is 34 feet in wingspan, 23 feet long, and is powered by a standard 112 h.p. Lycoming. It's maximum speed is 113 knots, maximum range at 75% power is 400 nautical miles. The useful load is 600 pounds; fuel capacity is 30 gallons, rate of climb at sea level is 700 feet per minute and the service ceiling is 12,850 feet. I have seen it reported that Piper interviewed thousands of flight instructors across the country before

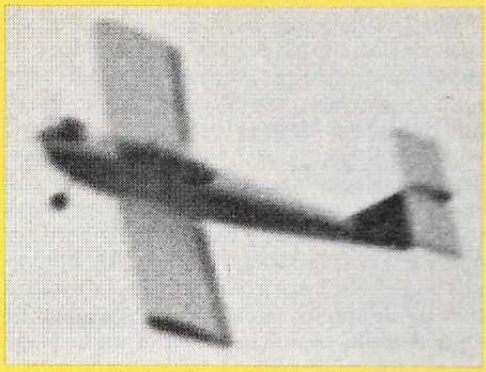


designing this completely new aircraft, which is their idea of the best possible primary trainer. Of interest is Beechcraft's new trainer, the Beech Model 77. It's description will sound familiar to Tomahawk watchers - the Beech Model 77 is low wing, tricycle gear, side-by-side seats under a bubble canopy, and T-tailed. Do aircraft designers in Florida and Kansas think that much alike?

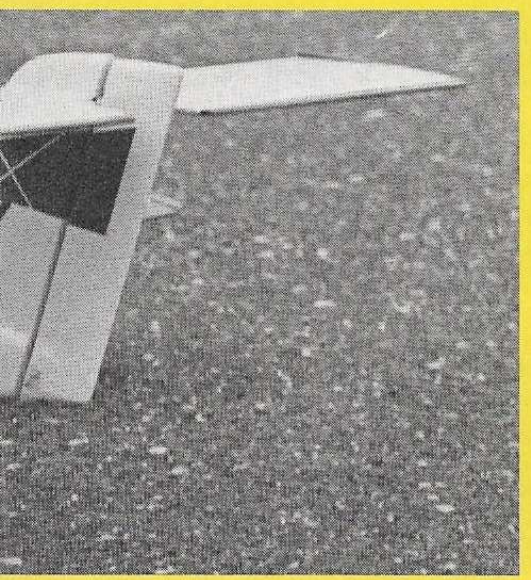
The claimed aerodynamic advantage of the T-tail design is that it enables the horizontal stabilizer to be located up out of the propeller and wing wash, resulting in a more stable, smoother flight. The horizontal stabilizer also acts as an end plate for the vertical fin and rudder, giving more positive rudder control, which will permit more precise spin training and good response for stall practice. The Tomahawk's wing airfoil is said to be an adaptation of NASA's Whitcomb supercritical airfoil, providing excellent speed and high lift because of its low drag design.

Anyway, we thought the Tomahawk would make an interesting R/C stand-way-off scale model. The low wing and tricycle gear are practical, the fuselage would be simple enough on a stand-off basis, and a practical T-tail construction method could be worked out. The biggest problem on a project like this is the bubble canopy. The model we built has a vacuum formed canopy we pulled, over a carved wooden plug. It wasn't too easy, and the plug is now destroyed - if we were to do it again, for a sport model, we would build up the canopy area from wooden blocks, carve to shape and paint the window areas with an airbrushed, mottled paint scheme. This canopy airbrushing technique was detailed in the September 1978 issue of FLYING MODELS.

The wingspan on this model is 49.5 inches, length is 37.5 inches. Wing area is 400 square inches, airfoil semi-symmetrical, and a .19 to .30 engine will suffice. We fly the model with a K&B .19 and it performs very well. Due to the T-tail construction, the model tends to be tail heavy so a larger engine would help the balance. The engine could be installed inverted and completely cowled in, but for sport flying we did things the easy way and mounted the engine upright. Wing flaps could be easily installed, using a torque rod linkage for inboard sections of the strip ailerons as the flaps, and using pushrod/bellcrank linkage in the wing for the outboard ailerons. This has been done on a similar size model with this airfoil section, and the flaps are quite effective.



The T-tail on the Piper Tomahawk is different and offers a striking appearance with no bad characteristics. The tricycle landing gear work well but the 2" wheels may be a little small for grass fields.



Getting into the construction of the model, as usual we recommend cutting all the parts out before beginning to build. Make you own kit so the construction can move along smoothly. The airfoil of the wing is designed with a flat bottom section from the spar to the trailing edge to enable it to be built flat on the work surface, over the plans. The ¼" square bottom spar is pinned or weighted to hold it in place, also the 1/16" by 1" trailing edge planking with the ⅛" by ¼" trailing edge glued in place. The ribs, top spar, and leading edge are added. The top leading and trailing edge planking, and capstrips, can be added before the wing panel is removed from the workbench. When it is turned over, the bottom leading edge planking and capstrips can be added; also the hardwood landing gear blocks and plywood rib doublers are epoxied in place. Wingtips, center section planking, aileron mounting and hookup, joining the two wing panels with fiberglass cloth will complete the wing.

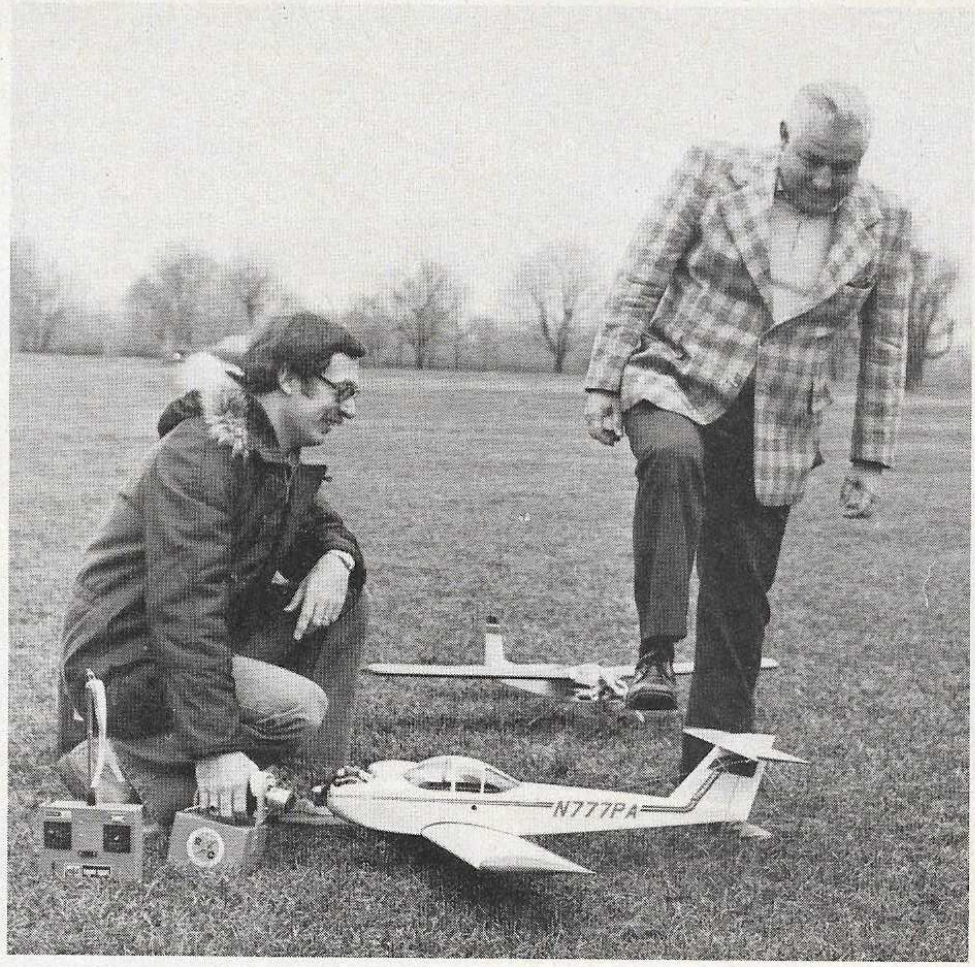
The T-tail does require some unusual construction in the fin to accommodate the elevator linkage. 1/16" plywood is used on each side of the fin for strength. and the elevator horn, vertical pushrod and 90 degree bellcrank are located between the plywood fin sides. The fin is shown separately on the plans to facilitate its construction, the 90 degree bellcrank and vertical pushrod must be installed before the horizontal stabilizer and elevator are added. A special elevator horn must be made, not a difficult job, but be sure it is well brazed together. We joined the fin and horizontal stabilizer and then added that assembly to the fuselage.

The fuselage is a basic box construction, with thicker top blocks and triangle stock in the corners to permit it to be rounded off for a good appearance. The plywood nose doublers and triangle stock are glued to the sides first, which are then joined with the bulkheads. The top blocks are added along with the cockpit floor. If a formed plastic canopy is not to be used, the canopy shape can be built up and carved from balsa blocks. The engine cowling is built up from sheet balsa around the engine and its radial mount. An inverted engine could be enclosed for a more scale appearance, but the upright engine offers ease of adjustment, good cooling, etc.

The roomy fuselage makes for an easy radio installation. The battery pack will be located as far forward as possible, under the fuel tank. The aileron servo should be located as deep as possible in the wing and could be side mounted to provide more clearance from the gear in the fuselage. The steerable nose gear linkage runs back to the rudder servo, and a flexible cable installation will handle the engine throttle. A four or six ounce fuel tank is used. The original did require several ounces of lead in the nose to balance correctly. If you do need nose weight, it should be located in the engine cowling as far forward as possible, to keep the added weight to a minimum.

Our model's wing was covered with Silkspun Coverite. The fuselage and tail surfaces were filled and primed with acrylic lacquer primer, and the plane was painted with acrylic lacquer. In a rush, the painter did not use a plasticizer in the lacquer - as a result, the particular paint used turned out to be very brittle and chips easily. Every modeler seems to have his own favorite finishing method, so use what you feel most comfortable with. For a scale paint job, the originals we have seen don't offer any striking color combinations - all white with a few narrow blue stripes and "Tomahawk" on the fin. For sport flying of course a more original, interesting paint scheme could be used.

Flying the model brings no surprises, it handles like any sport type low wing aircraft.



The author, Dick Sarpolus, above kneeling, is getting a little (very little) help from genial Joe Corneille. Joe either vehemently objects to the T-tail or is in a hurry for martini time somewhere.

The elevator surface is large, so control throw should be kept to a minimum, the elevators are effective. The first flight attempt did end up in a nose-over due to small wheels in tall grass. Second attempt was successful, and on that flight we did rolls, loops, flew inverted, and managed a beautiful landing. It does not fly too fast, but its speed is more than adequate with the K&B .19, and it is extremely realistic.

For a sport stand-off scale project which is realistic, quick and easy to build, small and convenient in size, try this Piper Tomahawk.