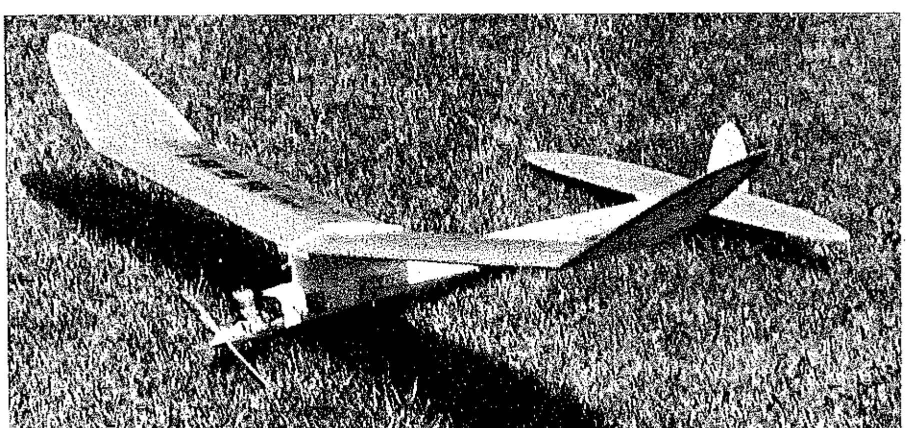
A-B Shrike

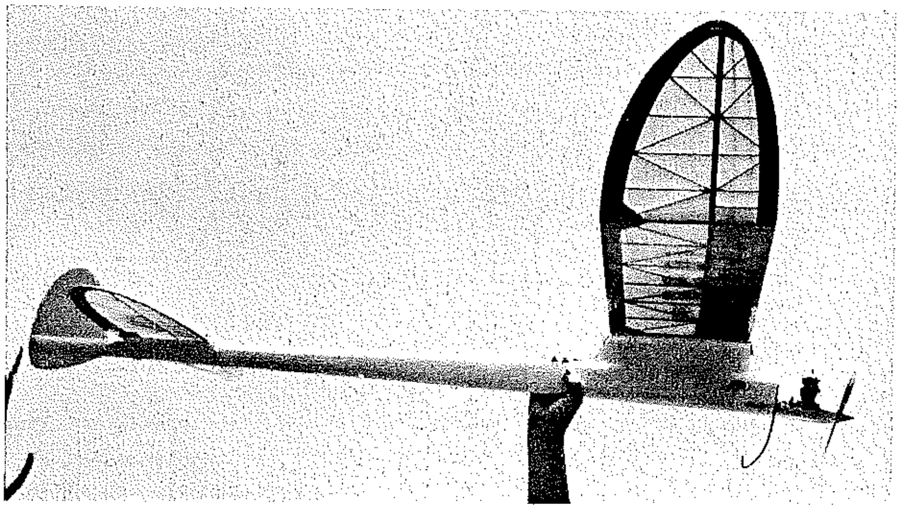
Here's a Free Flight Power model that's a consistent and extremely durable flier in widely varying flight configurations. It's been refined over the years to be very competitive in AMA Category II. ■William H. Langenberg

THIS DESIGN is a larger, modified version of my ½A Shrike previously published quite some time ago (June 1975) in *Model Builder*. Though originally designed for FAI Power, the advent of such gadgets as prop brakes and auto tail surfaces made the ½A Shrike obsolescent for that event. While these refinements have the potential to increase performance of FAI Power models, in my view their utilization requires an almost monomaniacal devotion to a single event. As a longtime skeptic of gadgets on Free Flight models, I chose to adapt the Shrike for the AMA A and B Power classes, where it has remained very competitive.

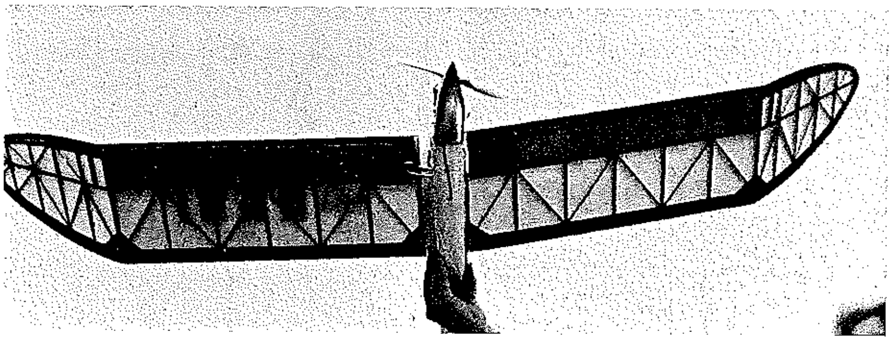
During the past 20 years, I have lived and flown Free flight in California, Arizona, Texas, and surrounding states. At least from a modeler's standpoint, these regions show marked differences in altitude, terrain, climate, and wind patterns. Probably the most meaningful evaluation I can make of the Shrike and its forebears of the same general design is that they have demonstrated consistency and durability in competing under these widely varying conditions. Originally flown under the 20-second en-



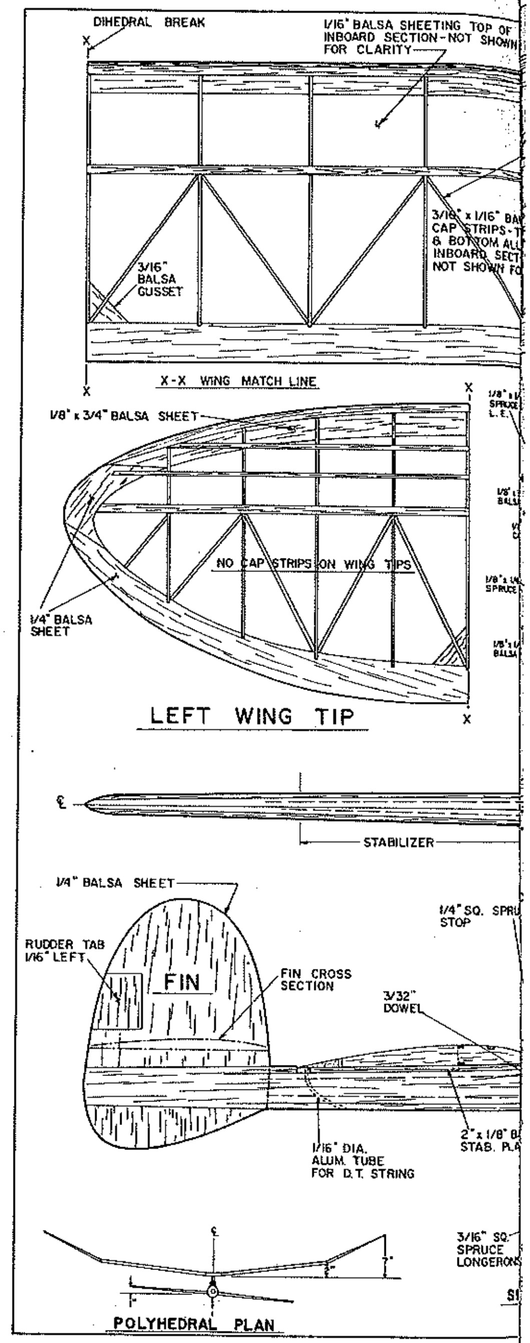
Top picture: Shrike completed and ready to go. The relatively small rudder well aft of the stabilizer is clearly visible in this photo. Above: Left side front view showing the engine and dethermalizer timers. The generous wing dihedral greatly aids stability in windy weather flying.



This striking right profile perspective shot shows off the model's sleek lines. The wire landing skid is necessary to prevent damage that could result from DT landings on hard surfaces.



This bottom view shows the warp-resistant structural details of the wing. The elliptical wing and stabilizer planforms give the airplane a pleasing appearance. Left thrust, obvious in this photo, is necessary in order to eliminate a tendency to swoop to the right after hand launch.

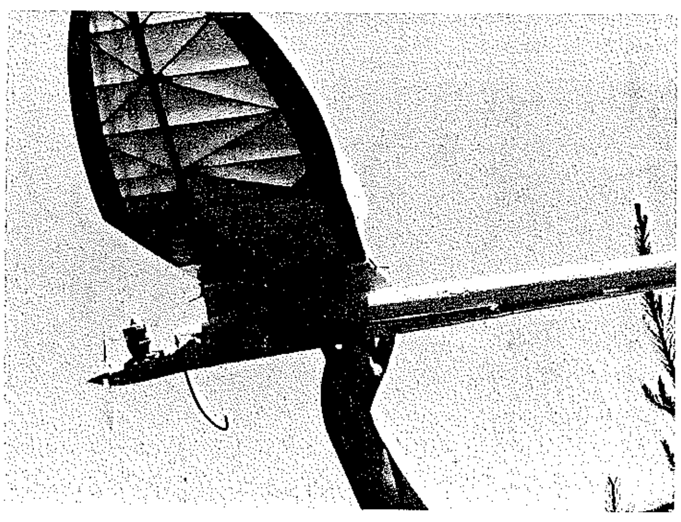


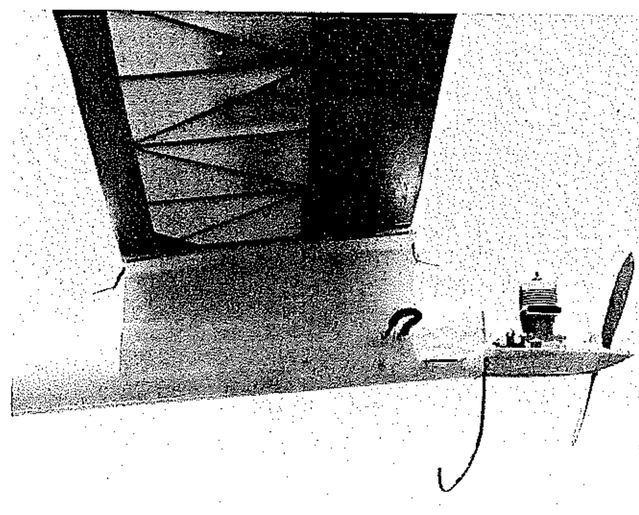
gine run, five-minute max rules, the Shrike has been refined over the years to be competitive in the 9-to-12-second power pattern and three-minute maxes which seem to predominate today.

The shrike, for the curious, is a predatory bird which impales its prey on thorns. Flying fields bristle with all sorts of hazards just lying in wait for vulnerable Free Flight ships, and many a model has met its doom impaled on spears of wheat stubble or spikes of barbed wire fences. The Shrike is of a tougher order. When built as shown on the plans and flown intelligently, this rugged airplane should outlast its lighter weight competitors and survive many contest seasons. If the design appeals to your aesthetic tastes, and you seek a consistent, highly durable A or B model that cuts down on your (re)building time while expanding your competition time, the Shrike may be the answer.

Construction

Stabilizer. Beginning construction with the





Left: This view shows some details the geodetic wing structure and silhouettes the downthrust engine. No variable-incidence tail, autorudder, or other gadgets are used in Shrike. Refer to the text for the author's reasoning. Right: Close-up view of the right side showing some of the fuel system details and the rather hefty landing skid. The engine operates off crankcase pressure for steady fuel flow and maximum rpm.

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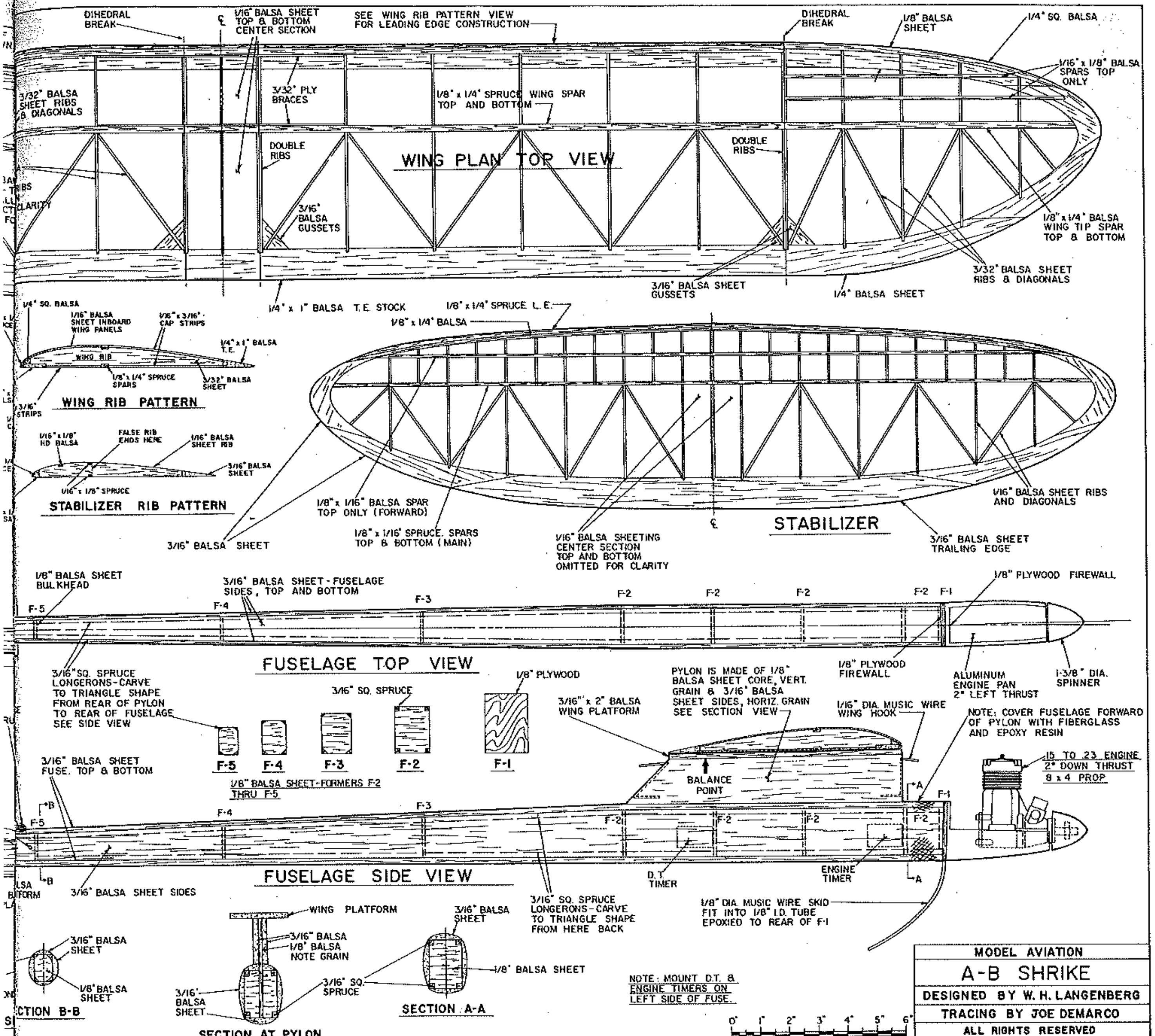

stabilizer allows that part to be covered, doped, and cured before test flying the model. To withstand the rigors of dethermalizer (DT) landings and enhance durability, spruce is used for the spars and the leading

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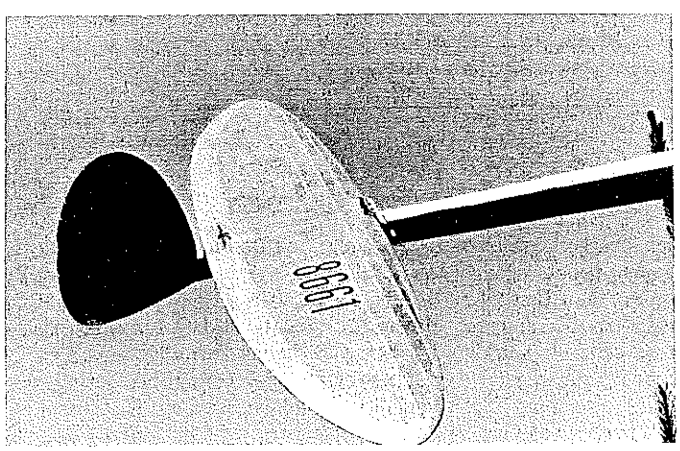

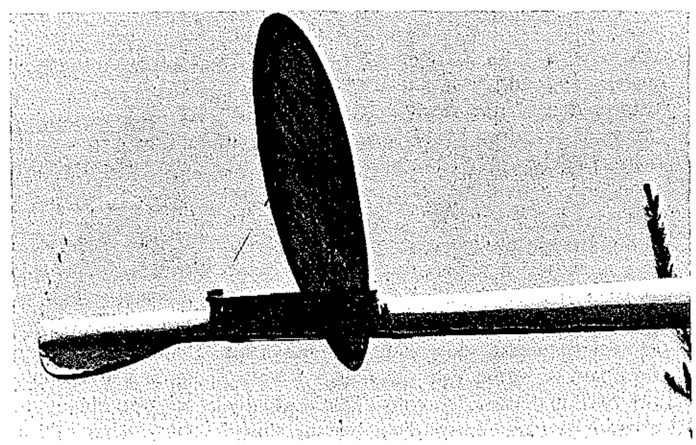

Left: Construction details of the stabilizer can be seen in this photo. Note the warp resisting diagonals. The author used spruce spars and leading edge for strength and durability. Right: This shot shows the stabilizer in its dethermalized position. The stabilizer is designed to pop up to about 45 degrees when the dethermalizer timer releases it. The model will then descend rapidly from thermals or an inconvenient distance.

best flight in the third round, but it was not enough, as Nagy was unable to improve.

The Hungarians continue to favor their wide-chord, thick-section, rock maple single-bladed propellers over the thin, carbon-fiber blades used by most other competitors.

As holder of the 2.5cc FAI world record, the U.K.'s Paul Eisner is one person who knows that he can get around the pylon at speeds approaching 320 kph. However, without the use of line ties his FAI model (F2A) is somewhat slower. His second-round speed was close to a personal best and was good for the conditions.

Paul was the first flier in the third round. When he took off there was just a light hint of rain, but within 10 seconds there was a downpour, and his model visibly slowed as the water density increased. Sweden's Stjarnesund suffered a similar fate, at which point the flying was suspended for an hour and the first two fliers allowed reflights.

Dick McGladdery had the reverse situation to Eisner and was plagued throughout the event with an engine that was suddenly being uncooperative, together with a model that was showing that its best flying qualities were not to be had in windy weather. Much hard practice eventually yielded a flight of 279.5 kph in the second round, his third-round (and slower) flight being disallowed because of handle-to-pylon problems. McGladdery, like many competitors, did not reach his full potential here.

Poland fielded a full team which was headed by the ever-polite and charming Andrezej Rachwal, who was joined by his young son Tomasz. Andrezej produced a nicely built and finished model which was powered by his reworked Rossi MK3 fitted to his own cast aluminum alloy pan and his own spun-aluminum, "fat boy" large-volume tuned pipe. Rachwal's Rossi had a steel sleeve in the rear bearing housing for better alignment and to permit use of a standard-size rear bearing. Needle rollers were used for the big end. Andrezej reversed the Breitenbach finishing order and just managed to pip McGladdery at this event. There's a little bit of friendly rivalry developing here.

Young Tomasz Rachwal, as would be expected, used a setup similar to his father's. He flew sensibly, considering the wind and his slight stature, choosing to enter the pylon early and let the model wind up. There is much more speed to come from Tomasz's equipment when he is a little stronger and can develop his flying technique.

The third member of the Polish team, Chojnacki, had managed 286 kph at the '86 world champs but was unable to attain this earlier form.

The Rachwals flew wide-chord, thick-section, single-bladed carbon fiber replicas of the maplewood props they had used in previous years. Chojnacki stayed with wood.

All of the Italian team flew with OPS power this year, and as stated earlier they practiced harder and longer than anyone else, but unfortunately their efforts were not to be fully rewarded. Fuel richening during flight seemed to be the problem, with the engines coming near to flooding off.

Frenchman Jean Magne suffered a similar fate to the Italians. In uncharacteristic manner he was unable to record a timed run with his Moki-powered model (which used a large-volume Moki tuned pipe).

After a first-round crash which literally broke everything in half, French teammate Desloges fared much better to record 273.42 in the third round. It was good to see this gentleman at the champs, as one of the organizers commented that as a youngster he remembers reading about Monsieur Desloges competing in Speed at the 1953 Belgian Internationals. That's 36 years of Speed flying!

The Bulgarians suffered from the early-good-laps-and-later-bad-laps syndrome and will surely go much faster in the future when the remedy to this problem is found.

The Swedes, Stjarnesund and Fallgren, used their own machined-steel pipes (as did the Italians). Along with fellow team member Kjellberg they used a variety of engines (Rossi, Moki, and Picco) and had strong runs with plenty of revs—but unfortunately not with speed to match. Like the Bulgarians they are sure to progress quickly in the near future.

Models with upright engines and centrifugal fuel switches were used by only two contestants: Luis Parramon (Spain) and Gunter Rosenhan (Federal Republic of Germany). Rosenhan has recently been testing his Moki fitted with an Irvine pipe and reported impressive gains in rpm in excess of 1,000. Unfortunately a lack of time to develop the setup meant that the potential of speeds approaching 280 kph could not be realized.

Rosenhan admitted to being in a "Catch 22" situation with his longtime CFS setup since, due to lack of competitions and flying partners in Germany, he is unable to undertake the extensive test flying required to develop a new suction fuel system.

And so the competition came to a close with the top two places being settled much as forecast, albeit at lower speeds than expected with Kalmykov becoming the reigning European Champion in addition to being World Champion. Peter Halman's superlative efforts on the Irvine .15, which he uses in essentially standard form, were rewarded with a third place, showing that this production engine can easily live in the company of the hand-built Soviet specials.

Next year's world champs are to be held in France near Metz, and the competition should be fierce! See you there.

(Editor's note: A more detailed listing of the results of the European CL Championships' Speed event will be found in the "Competition Newsletter" section of this magazine. RMcM)

AB Shrike/Langenberg

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edge. If minimizing weight is your ultimate building criterion, you may substitute balsa, although this is not recommended.

The stabilizer should be covered with tissue and given at least three coats of thinned dope. I generally prefer nitrate to butyrate dope because it appears less susceptible to moisture changes in the air. If nitrate dope is used, a coat of fuel-proofer must be applied as the final step.

See that the stabilizer is absolutely free of warps, and ensure that it remains so by strapping it with rubberbands to a flat board for storage.

Wing. With the relatively straightforward building techniques, simplified by the flat-bottomed airfoil, you have few problems. Balsa may be substituted for the spruce shown on the plans, though again it isn't recommended. Select the wood for the wing tips with care, as they should be kept as light as possible. For the two inboard wing panels, ribs should be cut from 3/32 quarter-grained stock. The trailing edges are preferably carved from 1/4-in. sheet balsa with similar grain.

Assemble the wing panels to the polyhedral dimensions indicated, liberally gluing all joints. Install plywood gussets and triangular reinforcements as shown. Sand the entire completed structure carefully to ensure an attractive covering job.

I recommend covering the inboard wing panels with GM silkspan or silk over tissue. If the latter method is used, first water shrink the tissue and apply one coat of dope before covering with silk. This permits the silk to be stretched tight and dramatically reduces the amount of dope which it absorbs. The result is a very taut double covering, relatively impervious to changes in temperature or moisture, which enhances torsional rigidity of the wing.

The wing tips should be tissue covered.

As on the stabilizer, apply at least three coats of nitrate dope on the wing plus fuelproofer on the inboard panels. Set the wing aside and allow it to cure thoroughly. The right inboard wing panel should have ⅛ in. of washin.

Fin. Cut this part from ¼-in. soft balsa sheet to the outline shown on the plan. Carve and sand it to a streamlined shape as indicated.

Fuselage. Select four 3/16 x 3/16 straight-grained spruce strips for the longerons. Carve them to triangular shape starting about 3 in. aft of Section A as indicated on the plan. Cut two fuselage sides from 3/16 soft sheet balsa. Pin one side over the plan, and glue on the longerons. Insert ⅛-in. balsa bulkheads just forward and aft of the pylon, spacing them as shown on the plan.

Remove the first fuselage side from the plan, and glue the shaped longerons to the second side. When the longerons are dry, attach this side to the bulkheads, making sure in doing so that the entire fuselage is properly aligned.

Select a sheet of medium 3/16 balsa for the fuselage bottom. Sand smooth the bottom of the two fuselage sides, longerons, and connecting bulkheads, and then glue the entire assembly to the bottom sheet. Pin this entire structure to a flat surface if desired.

Cut the pylon, very accurately, from hard ⅛-in. sheet balsa, notch it for the bulkheads, and glue it firmly in place. Ensure that it is perfectly vertical. Sand smooth the fuselage top, and attach the 3/16 cover sheet along its entire length. Glue the 3/16 soft sheet pylon sides in place. Prepare the wing and stabilizer platforms as shown on the plan.

Remove the fuselage assembly from the plan when dry. Cut and drill the ⅛-in. plywood firewall to fit one of the commercially available aluminum engine pans. Install blind mounting nuts, and epoxy the firewall to the fuselage forward bulkhead as shown on the plan. File, carve, and sand the forward fuselage into a smooth configuration to ensure a clean junction with the engine mount. Cover this entire area with fiberglass and epoxy resin.

Sand the balance of the fuselage smooth, then add the wing and stabilizer platforms. Slot the fuselage for the fin, insert it as shown on the plan, check alignment, and glue it in place. Add the 3/32 spruce dowel for the DT bands, then the tubing for the external DT string.

Bend the wing hooks from 1/16 wire as shown on the plan, and epoxy them firmly in place. Sand smooth the entire fuselage and apply two coats of clear dope. Install the engine and DT timers.

I normally apply two coats of epoxy paint as a fuselage finish, primarily because it is durable and absolutely fuel-proof. If desired, however, the fuselage can be tissue covered and doped. Ensure that adequate fuel-proofing is applied if the latter procedure is used.

The original A-B Shrike used a pressure fuel system which is illustrated in the plans and photographs. A pen bladder pressure system can be used if preferred. Install a hot .15-.23 size engine of your choice, and prepare the model for flight testing.

Flight testing. For a hot A-B model like the Shrike, the first few test flights are usually the most critical. If the airplane passes that crucible without mishap, the remaining flights become easier.

Before attempting the first test flight, check the model carefully for proper alignment, center-of-gravity location, and freedom from warps. Do a test glide, and adjust the plane as necessary by small increments of packing under the leading or trailing edge of the stabilizer. Hand glides should reveal a slight right turn, produced by adjusting the stab tilt.

Once the glide is satisfactory, the ship is ready for its first power flight. Set the engine timer for not more than a three-second run, start the engine, and hand launch the model gently into the wind at about a 45° elevation. Climb should be straight out at the angle of launch and into a slight right spiral. If you observe any tendency to veer leftward in the climb, correct it immediately; it's generally a fatal condition.

On subsequent test flights, increase the length of engine run as flight pattern and safety (not to mention your intestinal fortitude) permit. All of my models of this general design have required about 3/32 in. of left rudder tab to keep the tail down during climbout. The ⅛ in. of washin in the right inboard wing panel helps keep the latter up during ascent.

One word of caution: If using the Shrike interchangeably in classes A and B, repeat the test procedure upon switching engines. Nothing affects the Shrike's climb pattern more drastically than major changes in power (ergo speed). Unless you are absolutely certain that your A and B engines have equal power output, it's prudent to do a few short test flights after changing engines.

With a full 9-to-12-second engine run, this model should make one or two full turns to the right during climb and enter its glide pattern with no stall or loss in altitude. If the airplane is built according to the plans, flight patterns automatically will be right-right.

Competition durability. When built as shown, ready-to-fly weight is about 24 to 26 ounces. In my opinion, assuming that a hot engine is used, this extra weight won't noticeably reduce performance—and the rugged construction will carry the model through several contest seasons. Modelers with limited building time, or who simply prefer competing to building, will find the Shrike's longevity a great advantage.

At the risk of being an iconoclast, I offer one suggestion to enhance the model's durability even further: minimize unnecessary testing. Once the wing and stabilizer have aged, the model is properly adjusted, and it has proven competition-worthy, little additional testing is necessary. Probably two or three short DT flights before a contest should suffice. If those who question this philosophy will take a moment to recall how many folded wings, damaged models, or lost Free Flight ships have, in their experience, been traceable to superfluous test flights, I think they'll concede my point.

Battery Box/Render

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wires, and strip ½ in. of insulation from the end of one of them. Placing the spring plate equidistant between the lines on the box bottom, mark the mounting holes through to the wood with a sharp pencil. (One of the photos shows the spring plate position.) Notice that the uncut side opposite the spring fingers is approximately flush with the edge of the wood.

Drill pilot holes using a 1/16 drill at a slight angle so that the screw does not split the wood (see drawing). Mount the spring plate with the screws trapping the bared lamp cord under the plate. It's a good idea,