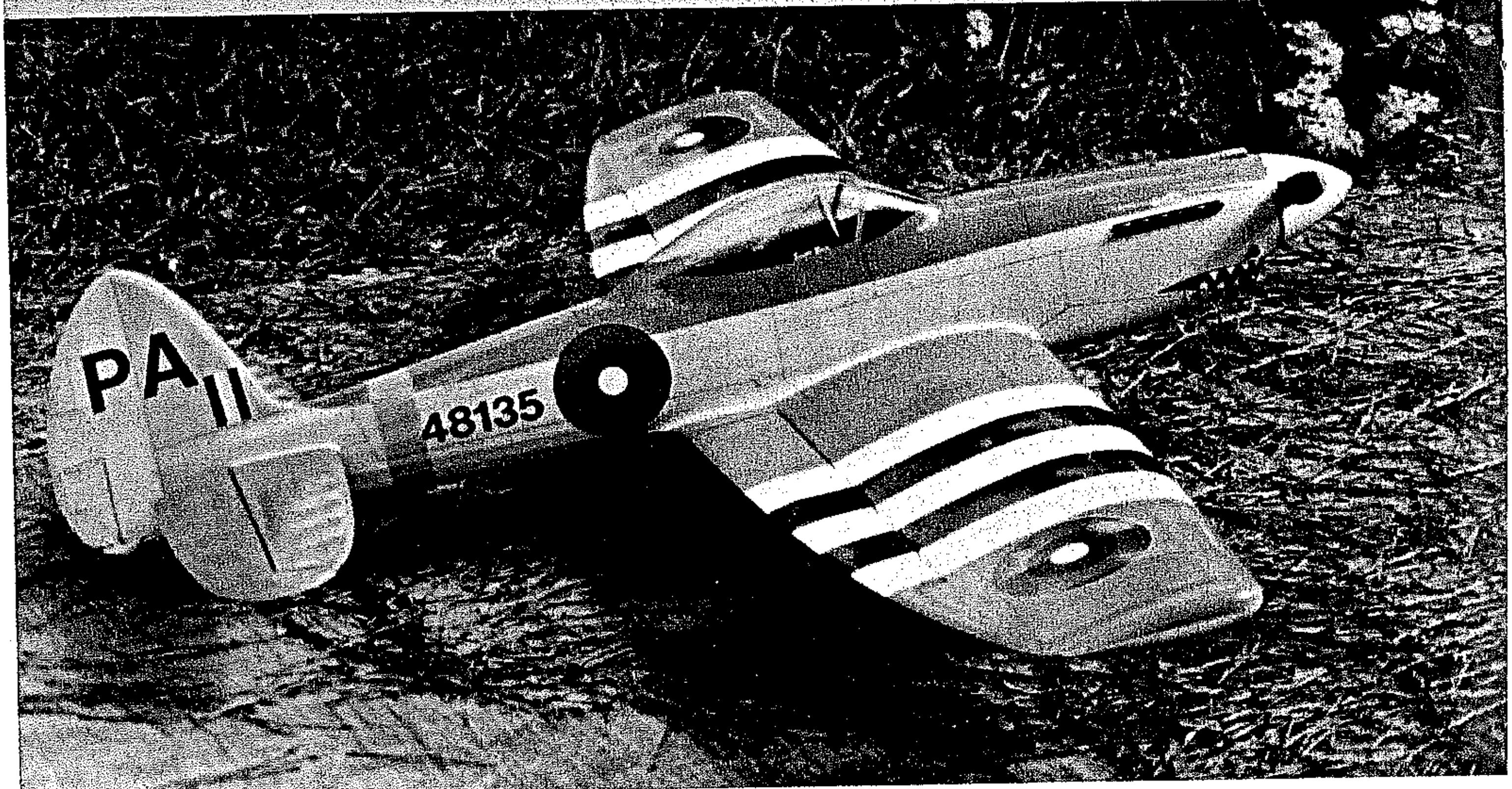
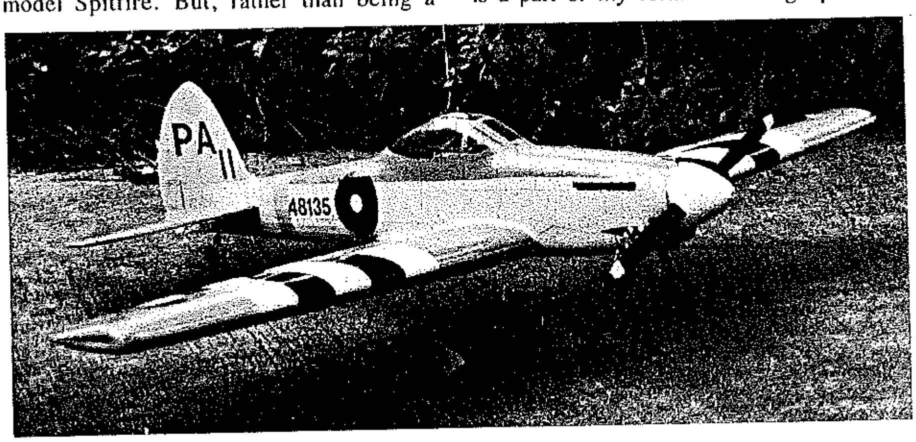
Stuntfire 60



Author's model is in Royal Navy colors, though the roundels (available from Sig Mfg. Co.) actually are U.S. from WW I. Color finishing is with Aerogloss. Panel lines are ruled with drawing ink for films. A final coat of clear epoxy is applied over everything. Linkage for the operating rudder tab exits from the rear fuselage side. Round plug in the fuselage just above the flap hinge line is threaded plastic; allows control adjustment.

A super look isn't the only thing this .60-powered CL Aerobatics model has going for it. The flight performance is equally good, and it has a unique method for building the wing. ■ Scott Bair

WITH THE PUBLICATION of this model, I would like to introduce a different philosophy in Control Line Precision Aerobatics. The Stuntfire is a semi-scale Stunter with a profile and planform suggestive of a late-model Spitfire. But, rather than being a semi-scale model that is meant to approximate the performance of a conventional Stunter, the Stuntfire is an attempt to improve on the performance of the conventional Stunter. Since high parasitic drag is a part of my formula for high performance, the bulky semi-scale airframe of this model fits nicely. As a bonus, it provides an impressive appearance.



Exhaust headers are carved from ⅜ sq. balsa. They look good as well as provide a convenient hand grip for starting the Supertigre .60 engine. Prop shown is a 15-5 Rev-Up. Wheels are from Robart.

The formula: a lightweight model with high parasitic drag and a large amount of thrust available to overcome the parasitic drag. Such a model will have only a small variation in speed due to induced drag in maneuvers and from gravity in climbing and diving.

The lightness is derived from a stringer/former fuselage construction (borrowed from rubber-powered models), an open D-tube wing, and unique engine mount supports (using a balsa firewall). Drag comes from both the bulky airframe and effectively from a prop having large diameter and low pitch. This combination has produced a Stunter capable of a comfortable pattern at a speed clocked at 6.4 seconds for level laps.

The low-wing configuration gives sufficient ground clearance for a 16-in. prop without excessively long gear struts. The dihedral is then necessary to bring the wing tip up to the vertical center of gravity (CG) elevation. No flying problems are caused by the dihedral as shown on the plan. The low-wing mounting also allows the tank to be mounted at least partly over the leading edge of the wing. This reduces the CG change and resulting stability and sensitivity change as the fuel is burned. This configuration also puts the engine air intake high above the ground, reducing the possibility of it ingesting dirt.

A 4-in. bellcrank is used to reduce the force required by the control lines for turning. I feel this is an advantage in that the airplane can be made to turn well when there is very little line tension. The original bellcrank was machined from 2024-T-351 aluminum to an I-beam cross section. Nylon bushings were used at the bearing, the lead-out holes, and the pushrod hole. The shaft was made from 0-1 tool steel; then it was heat-treated. An aluminum set-screw collar retains the crank on the shaft. The bushed bellcrank weighs 5 grams; it has been pull-tested to 80 lb. (An adequate bellcrank can be made from nylon or Delrin, but it should be thicker for adequate strength.) The shaft is mounted between a pair of maple beams that are cut to match the dihedral angle and are lightened by milling to a channel-shaped cross section.

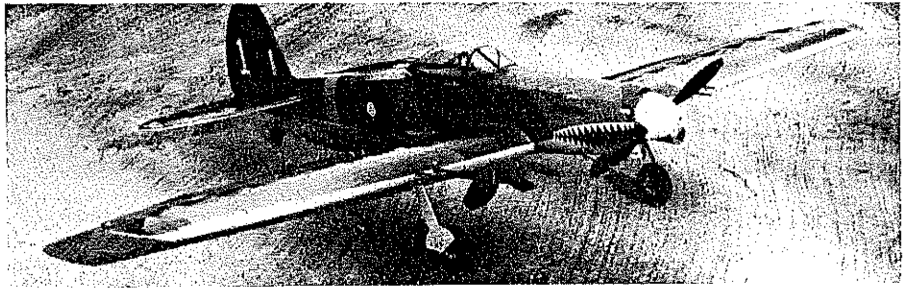
Outboard engine thrust is built in by angling the engine mounts in the fuselage formers. Balsa 1/16-in. webs connect the mounts to the formers and 3/32 skin, obviating the need for a plywood firewall.

The very wide body means that the tank design need not be compromised for fitting in a narrow fuselage. The tank features a sump which retains about a 3-sec. supply of fuel at the pickup. To save weight, the tank is permanently installed; the upright/inverted engine running characteristics are equalized by raising or lowering the venturi on 0-ring seals. If the more usual spraybar/insert type of intake is used, the tank should be made removable by means of a hatch.

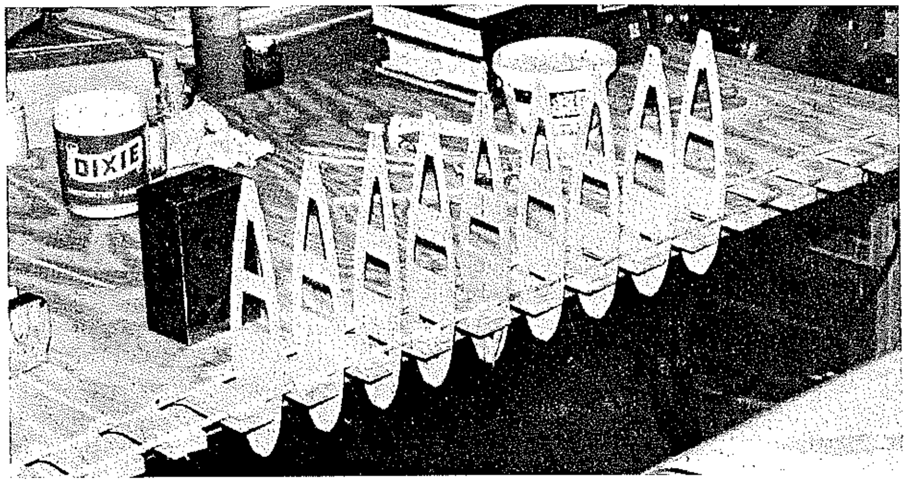
The "carb" shown on the plan uses a true venturi, unlike the spraybar-restrictor type of fuel system usually used. A technical discussion of this feature is beyond the scope of this article, but the advantages are a reduced restriction (inlet air pressure drop) for the same fuel draw. The use of a needle valve assembly with a small orifice makes the needle adjustment less sensitive. The Max .10RC assembly is particularly useful, as the fuel fitting is on the same side as the valve. With this assembly, the valve can be adjusted after starting the engine without having to reach over the airplane.

Construction. Begin by rough-cutting, stacking, and sanding 25 ribs, including the thick center rib, to shape. (The root airfoil is shown in the fuselage side view.)

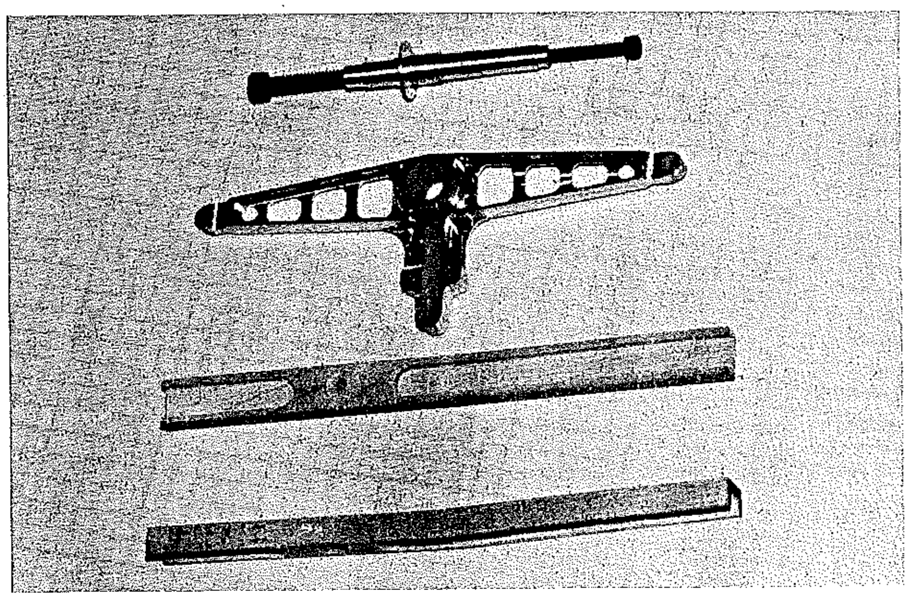
Select a very flat piece of 1/2-in. plywood the length of the wing. Cut slots into it that are 1 in. wide and 4 in. deep at each rib location. Draw two lines representing the wing center with dihedral; they should be 2½ in. from the plywood board edge at the center and 1½ in. from the edge at each tip.



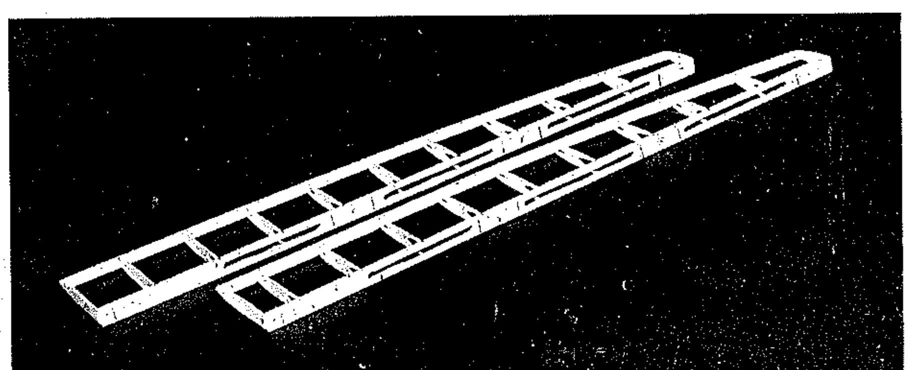
An early .46-powered version of the Stuntfire with 58-in. span and 43-oz. weight. Plans (and other pictures) are of the fifth model in the author's semi-scale series with stringer construction.



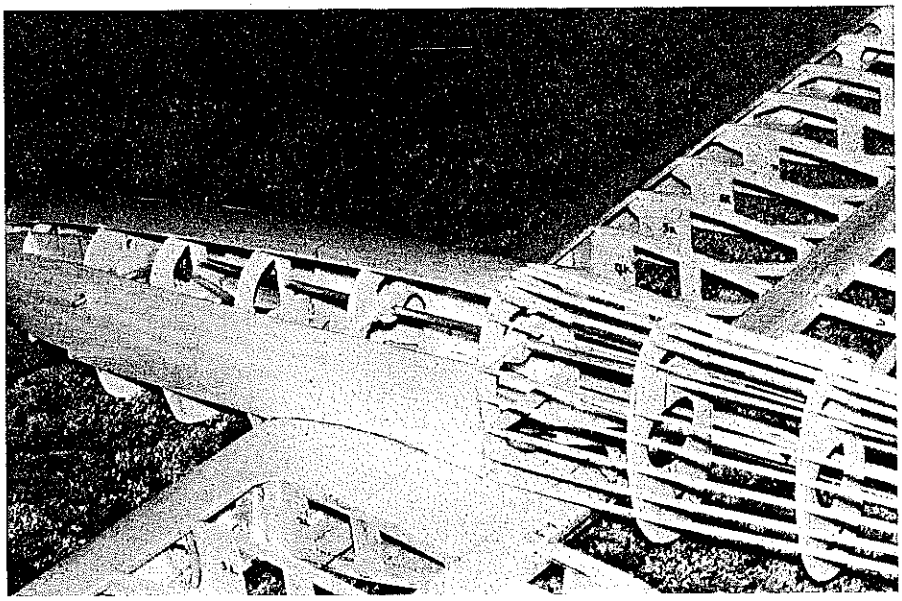
Picture shows the unique wing construction method. Spars are tacked to the building board (at the proper angle for the dihedral) which has cutouts for the ribs. This method helps to maintain alignment and permits easy access to the wing structure as work on its progresses.



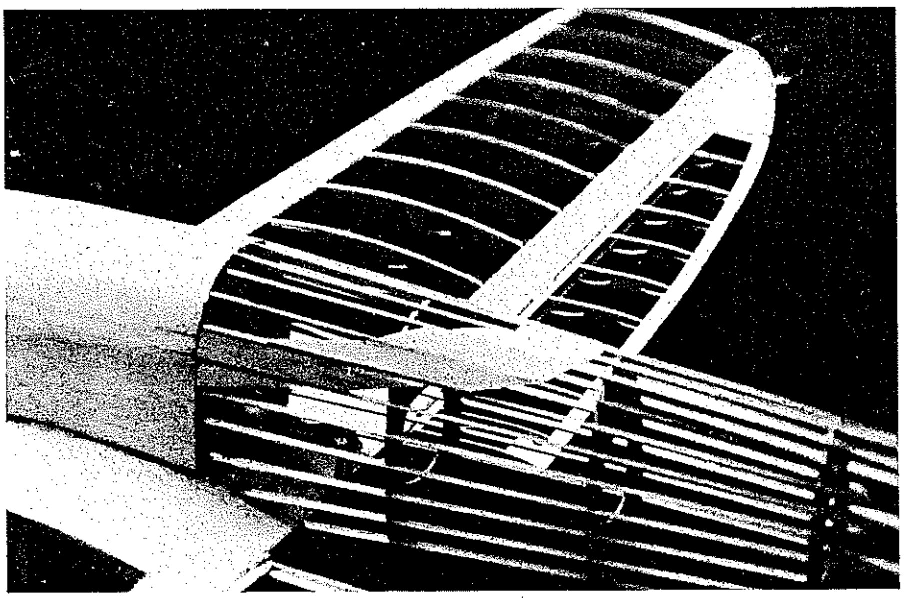
Bellcrank spans 4 in. between the lead-out wires. Nylon inserts are evident in the wear points. Bellcrank mounts made from maple engine mount material. Mounts help brace wing center section.



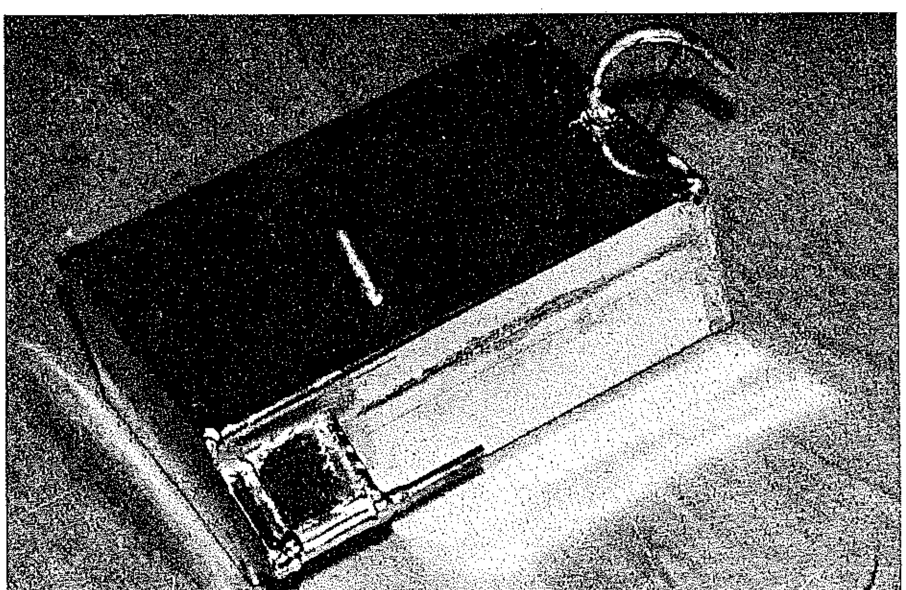
Assembled flaps show that they are of lightweight construction. Spars are cut to a channel cross section, and the trailing edge is hollow. Spar openings are closed with a 1/16-in. cap.

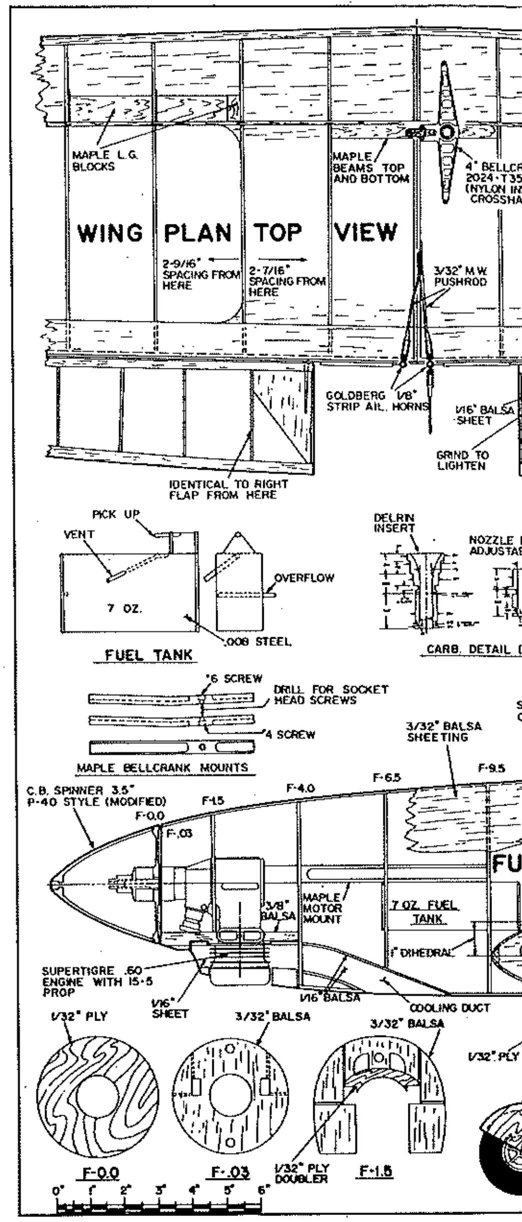


Fuselage is constructed on ¼-in. jig tubes visible here. You can also see the silicone tube connecting the fuel tank vent with a feed-through in the fuselage skin.



Fuselage jig tubes have been removed at this point, and inset 1/16 planking has been added in the canopy area. Careful selection of balsa will pay off in improved flight performance. Use 6-8 lb./cu. ft. balsa for the stringers, 6 lb. for ribs and formers, and 4 lb. for all sheeting.





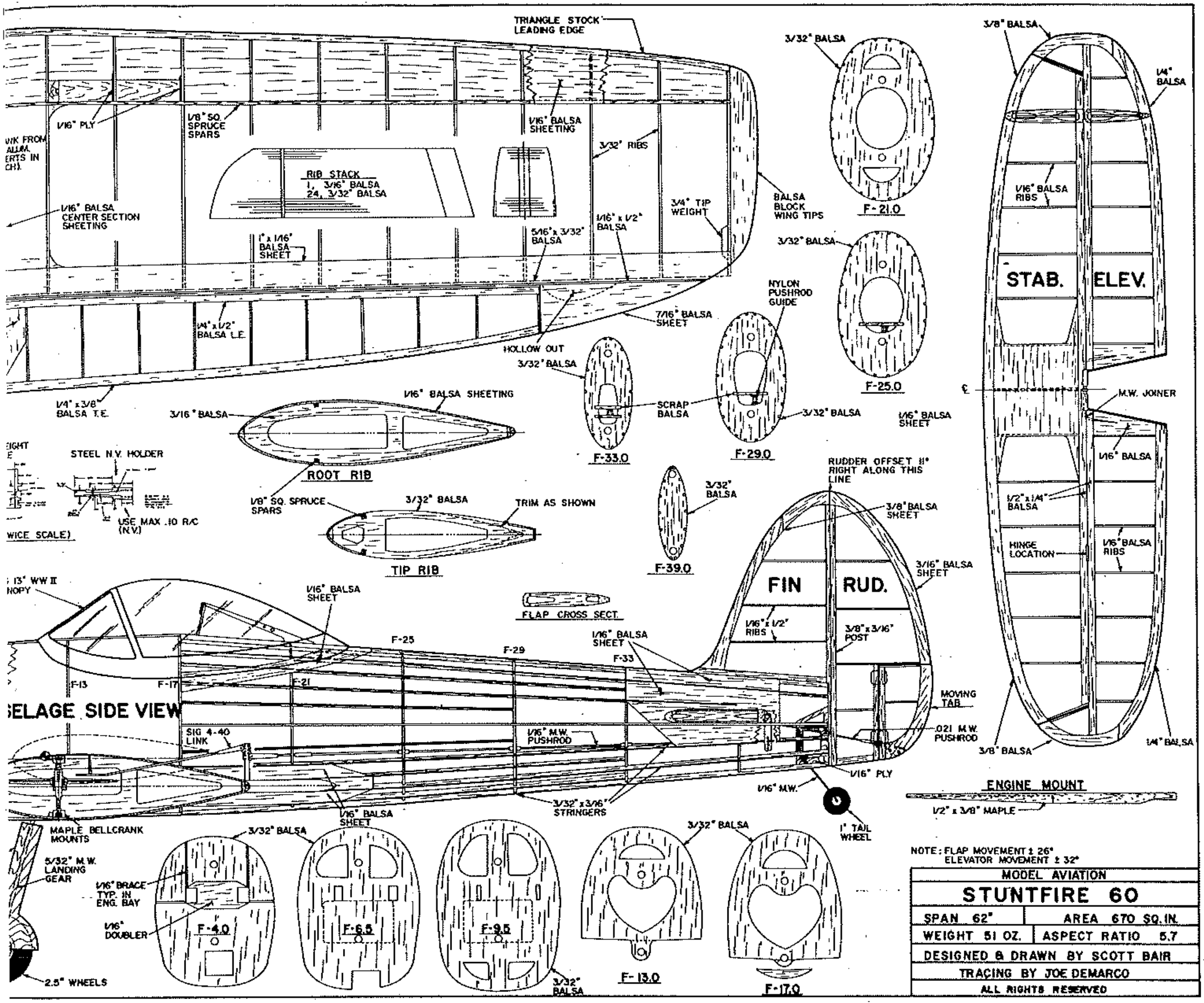
Temporarily glue the top and bottom spars to the board with them equally spaced about the centerline just drawn. For accuracy, measure the spacing from your rib stack.

Glue the ribs to the spars with the forward ends down, then add the trailing edge cap. Sheet the trailing edge. Remove the wing, and turn it over on the board (the ribs should now be nose-up). Bend and attach a wet triangular leading edge to the nose of the ribs. Sheet the leading edge.

Add the bellcrank and landing gear blocks. (The Sig blocks allow the landing gear to be removed.) Next, sheet the wing center section. Warps can be removed at this point by twisting the wing as each piece of center sheeting is added.

Build the flaps, and attach them to the wing. Add the bellcrank-to-flap pushrod and horns. (Two ordinary horns can be cut to use in place of those shown on the plan.) At this point, the wing should weigh 6-7 oz.

Uniflow-type fuel tank holds 7 to 7½ oz., and is made from .008-in. tin-plated steel. A sump at the pick-up tube retains a supply of fuel in maneuvers, helping achieve consistent runs.



Bolt the engine with spinner to the mounts after drilling the mounts and adding blind nuts. Glue Formers FO to F9.5 in place on the mounts, aligning FO with the spinner backplate. Remove the engine, and slide ¼-in. O.D. aluminum tubes through all the formers (the number of the former is the position in inches behind FO). Add the top and side sheeting (wet) from F0 to F17. Add the top and side stringers. Note that the fin spar is actually the last former, so be sure to extend the stringers far enough past F37 to reach the fin spar.

If the fuel tank is to be permanent, it should be added at this stage. Align and epoxy the fuselage to the wing. No special reinforcement has been necessary for the

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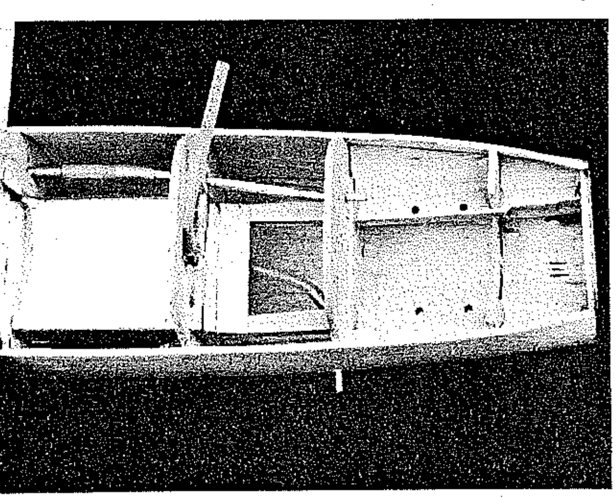
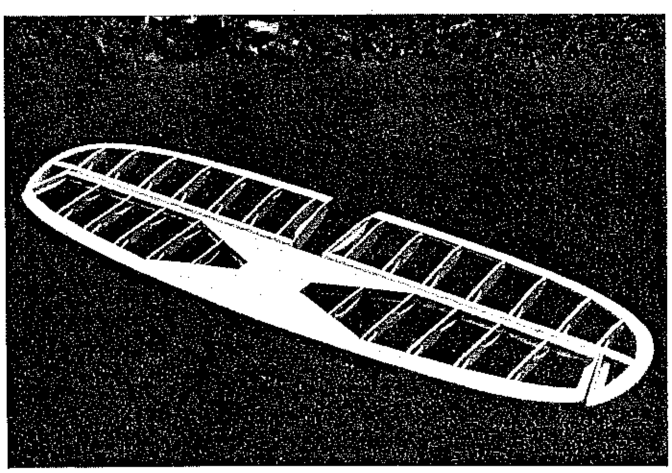


Fuel tank and plumbing installed in the fuselage front end. Within the engine compartment, ¹⁄₁₆-in. webs connect mounts and outside skin.



Stabilizer uses the same lightweight construction as the flaps. Elevator tips extend in front of the hinge line to aerodynamically reduce the amount of force required to deflect the elevator. It's a thoughtful design.

Spectator safety was not compromised at any time during the event.

At the end of the 1980 season, the originating group got together to discuss the future of Quarter Scale Formula I Pylon Racing. To expand the event, everyone felt the need for other versions of Formula I aircraft to be in the race—without jeopardizing the competitive use of the Cosmic Wind Great Planes (Bridi kit) aircraft. This was resolved by requiring the scale of the outline drawings to be at least that of the Cosmic Wind kit. This turned out to be ¼-scale plus 10% (3.3 in. to the foot.)

It was also apparent that we would have to limit what versions of Formula I aircraft could be used. This was accomplished by stating that only the planes that had competed against the Cosmic Wind from 1947 through 1951 were acceptable. There are now six outline drawings approved and available for use in this event: Shoestring, Bonzo, Rivets (standard stabilizer), Swee Pea, Midget Mustang, and Loving Special. The models can have greater dimensions than shown on the plans, but not smaller.

At the end of the 1981 season, we realized that a method of limiting engine noise without increasing speeds or detracting from the appearance of the aircraft was needed. A proposal was made to design a muffler to fill these requirements. A local machinist-modeler, Mr. Bill Kucharik (WPK Enterprise), donated his time and equipment to develop the unit. Thanks to Bill, these mufflers were made available to anyone who became a member of the Quarter Scale Pylon Racing Association at a cost no greater than a standard muffler. At the end of the season everyone agreed that this muffler was the answer.

Another great boost for the future development of Quarter Scale Formula I Pylon Racing was the added sponsorship for the 1982 season of Kraft Systems, Loctite Company, and Great Planes Models.

The 1982 season was great. The QSPRA is now an official organization complete with an executive committee. The committee has reviewed and refined the rules and regulations. We now have racing model designs that are easy to fly and, due to the muffler, can be flown without disturbing anyone at the club field.

The success of this new approach to Formula I Pylon Racing, which the Cleveland area has witnessed, should lay the groundwork for a similar races throughout the country. Details are available by contacting Bernie Oldenburgh, 27191 Shirley Avenue, Euclid, OH 44132.

Special thanks are in order to Tony Izzi and his RAMS Club for support at each semi-final race and the championship event. Additional thanks go to Circus-Circus for support during the 1980 season.

Any organization looking for an exciting and safe event to promote model aviation should consider Quarter Scale Formula I Pylon Racing.

Stuntfire/Bair

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wing-fuselage joint. Add 1/16 sheet flanges between the stringers at the canopy position and wing joint as shown on the plan.

Build the fin and stabilizer, and glue them to the fuselage. F37 must be cut as shown. Add flanges at the fin and stabilizer. Install the pushrod and guides. Build the cooling outlet, and sheet the bottom of the forward fuselage.

Reinstall the engine, and carve a cowling to fit around it. The engine cooling fins should be closely shrouded for best cooling. I like a cooling duct with a minimum of leakage to the rest of the engine compartment. The compartment is ventilated by the scoop on the fuselage top. At this point the airplane should weigh 15-18 oz. without the engine and canopy.

The wing panels are covered with medium silkspan. The rest is covered with 00 silkspan. Keep paint to a minimum.

Flying. The airplane was designed around the ST .60BB engine. Provided the model is lightweight (51 oz.) it will perform best with a narrow 15-5 prop. Stuntfires tend to come out nose-heavy, so add tail weight until it turns easily. The small moment of inertia and large stabilizer volume produce a well-damped turn. An operating rudder tab (shown on the plan) is helpful in correcting the precession of the large prop, but it is not absolutely necessary.