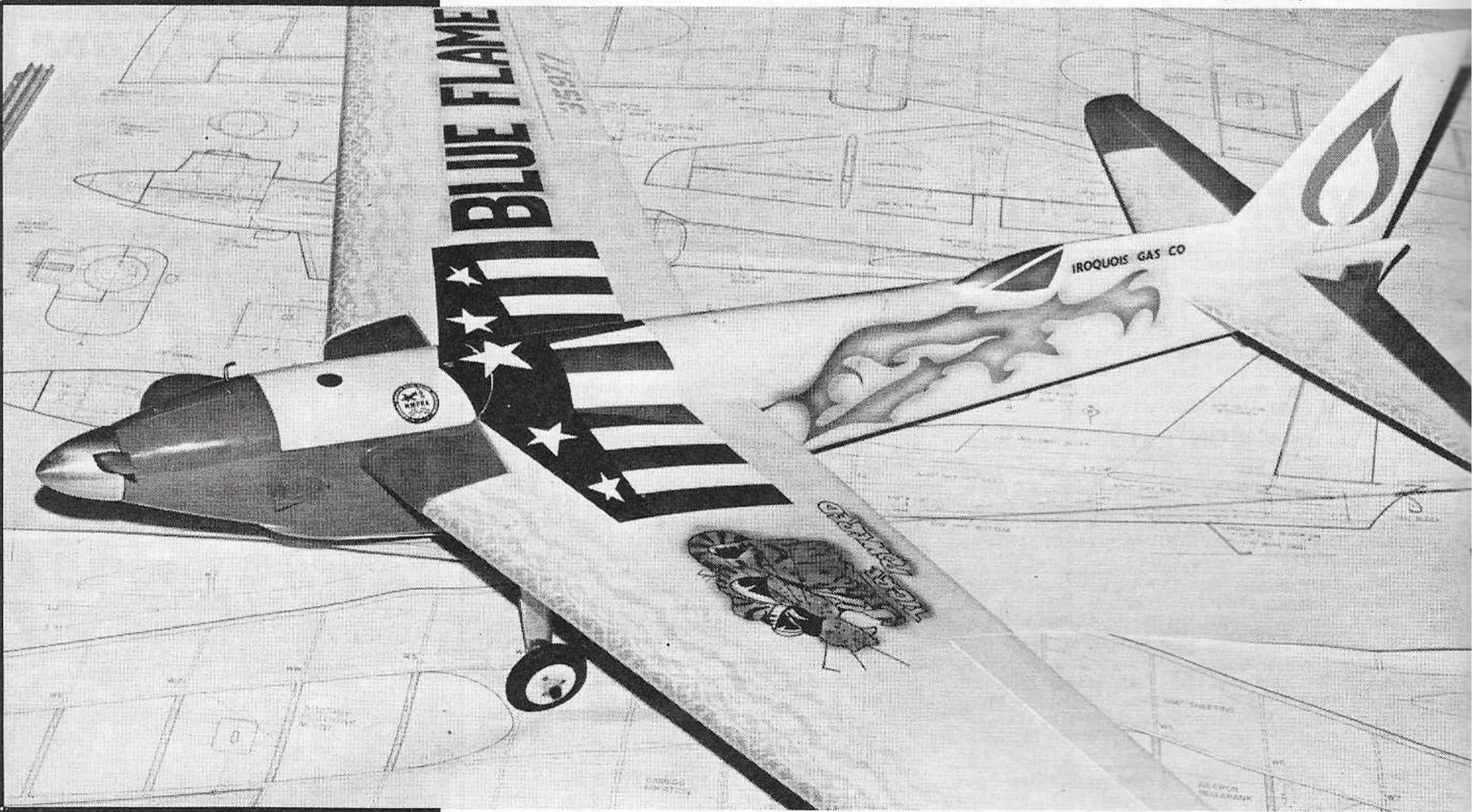
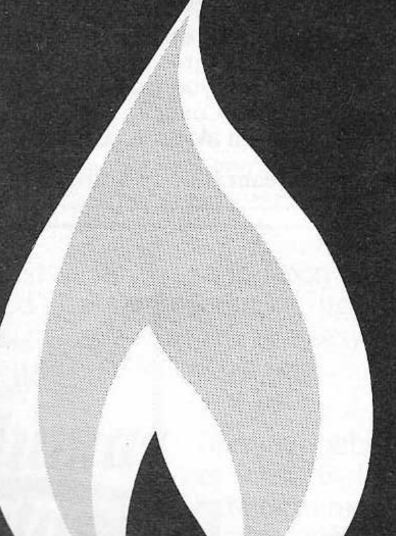
Photos by Al Mahaffey



Turn On A "Blue Flame"

by Dave Gierke



An Orbit system, a sizzling Super Tigre ABC .40, makes an able combination of ingredients for Open/Sport Pylon racing.

The *"Blue Flame"* was ugly! In fact, it was so ugly, it just had to fly, if for no other reason than mere contempt for its designer. Several individuals commented that it should have been named *"Blue Toad"* instead of *"Blue Flame."* Admittedly, it did look a bit out of place, sitting on the ready line, patiently awaiting its turn to fly in the Open Pylon event.

Over the years, I have been concerned with not only the flying characteristics of my designs, but their overall appearance as well. I couldn't tolerate a model that had a poorly shaped fin or wing tip. These were primarily the days of Controline Stunt, where the impression of the judges was most important. In fact, we often discussed the obvious advantage a combination Psychologist-Sociologist would have in the stunt event. He could analyze the people for whom he planned to perform (i.e. the Nationals utilized Navy judges until 1972) and build an airplane specifically for impression purposes. In our amateurish way, many of us attempted just that by constructing big, white military jet models with such subtle slogans as "FLY NAVY" in six-inch letters on both sides of the wing, with smaller symbolic statements on the fuselage. Of course, it was imperative that the trim of this model be red and blue with numerous stars and bars in evidence. Some enterprising contestants even elected to wear military flight suits for an official flight! Of course, the ideal ensemble was a flight suit which matched your impressionable, gleaming white machine. If you have any doubt about the validity of my comments on this subject, please don't miss the Open Stunt event at the Nationals next year (if there are any more of them) and be sure to take your camera.

When the time arrived to design models for Radio-Control racing, it suddenly seemed as though someone had removed a great burden from my head. No one really *cares* how the plane looks! This was the case with the *"Blue Flame."* It was with great enthusiasm that I began figuring and drawing this model. I had no problem locating the best visual location for a cockpit. In fact, I decided not to have a cockpit at all! Several years ago at a full-scale Hydroplane (boat) race, someone said: "They don't give any prizes to the prettiest rig." I often thought they should have because ours (Dad's and mine) generally did look the sharpest, but that's another story...

As a provisional event listed in the A.M.A. rules, there were several design parameters which had to be followed. First, however, I should say that we had decided to use a racing .40 engine for the *"Flame."* This .40 was of the same variety used in our Formula I and II racers. The dual purpose of the *"Flame"* was to race the Open event and also have a test bed for engine design changes which, if panned out, could be used in the formula ships. One example of this experimentation was our work with the mini-pipe exhaust extractor. Preliminary tuning was performed on the dynamometer, but actual operating experience was gained in the *"Flame."*

An interesting sidelight: These exhaust extractors were banned by the A.M.A. in cooperation with the N.M.P.R.A. last year because they supposedly offered an unfair advantage to individuals having knowledge as to their function and operation. In our circuit, the manager, one of the individuals responsible for the pipes ban, enforced the above edict. However, the new K&B. Schneurle engine was flown all season by the same man, even though it was not available to anyone else. Sometimes our rules tend to become confusing, to say nothing of frustrating!

For a .40 cubic inch displacement engine, the specified minimum wing area for the Open Event (now referred to as *Sport* in the rule book) is 500 square inches. The *"Blue Flame"* is 505 square inches. The wing thickness is 15% at any given chord location, which is also specified. All other factors are left up to the designer.

Of primary importance to me from the outset was having an airplane which I could bring back in one piece, flight after flight! Although this is somewhat difficult to control considering the wing loading and dead stick landings, I knew what I did NOT want! Another popular Open design was being flown in numbers in the circuit, with generally poor results. The design was fine as far as flying was concerned, but suffered considerably in hard landings on our grass fields. As a result, most of these promptly destroyed themselves, to one degree or another on landings. In contrast, the *"Blue Flame"* started, flew and finished every one of its flights last season. A look at the landing gear and general construction techniques should give you a clue as to why it held up.

I splashed down in a pond at the Buffalo race. We waded out and retrieved the model, unceremoniously dumped the water out of the radio compartment with some degree of haste, and still managed to finish the remaining heats! If there was any one feature which contributed to this model's success, it must be the durability factor.

Another important design consideration was the nose and tail moments. Obviously, a short coupled model offers less overall drag along with a generally quick pitch axis response. Our relatively long nose and tail (effective) moments were incorporated primarily for pitch performance compromise.

Yes, drag and overall weight of the model would be increased, however, the benefits include a much simpler airplane to *land* because of the inherent stability (pitch) of such an arrangement. The model also proved to be exceptionally "groovey," with no tendency to jump or hunt down the straights.

The mid-wing location was thought to offer the best solution to low frontal area drag. Notice that the "side winder" engine and cowl line up with the wing centerline. The swept-back wing locates itself close to the cowl at its root. The swept-wing proved very effective on this model, with no tip stall tendencies at low speeds in landing. The entire wing was washed out from root to tip a total of 1° which probably did the trick. Airfoil sections were taken from the 64,000 series NACA material—full symmetrical, laminar flow.

The *"Blue Flame's"* first flight attempt was a bit discouraging. The engine was fired and the controls checked. Everything looked great! The release was made and the model roared straight down the runway. It continued to roar down the runway. As the roar disappeared down our 1500 foot strip, I was beginning to bend the stick on my transmitter and pull "up" on the box like a controline handle (I tend to revert under undue stress). Just as Kent Landefeld yelled "Kill the engine!", the plane hit a bump, broke ground, dropped a tip (and the nose) and proceeded to cartwheel three or four times. In the process, we lost the front of the fuselage from the firewall up and part of the stabilizer. The bottom of the fuselage split in two or three places but, otherwise, that was it. What a mess—and we had a race scheduled for the following day!

Kent Landefeld and I settled down at the flying site with the sad wreckage and our trusty five-minute epoxy. It was about 11:00 on the clock. By 4:00 P.M. the somewhat ruffled *"Blue Flame"* was ready to go again. Some elevator trim adjustments were made along with the addition of two ounces of tail weight. The takeoff was perfect and the model flew great with the exception of being spongy on elevator in the scatter (#1) pylon. Later, we increased the elevator area by 40% and added ½° more positive incidence to the wing. Now the *"Flame"* handled as easily as a stunt model. It doesn't drop its nose in a pylon turn, but hangs right in there.

In case you are interested, the model got its name from the land speed record car which currently holds that mark at something over 622 mph. It also is ugly. In fact, the Open racer looked somewhat like the L.S.R. car after being initially roughed in, without the canopy and turtle deck. Simply by adding the above, I solved both the name and paint scheme problem.

Incidentally, I've had a lot of fun this past season telling my racing friends that the gas company was sponsoring me. No one could quite figure why I painted the gas flame on the fin or the sponsor's name behind the canopy if this weren't true!

We were never really pressed in any of our heats with the *"Blue Flame"* this past season. In fact, we won every heat. Our best time was only 1:54 but I must add that this was flying wide most of the time. If we were ever pushed, the feeling is that it's good for about 1:40. Plenty fast for a compromise, "bring-em-back-alive" open racer.

We have retired the original model and will probably not race it again, since the objective for designing it has been accomplished, namely to accumulate a sufficient quantity of points to help win the overall circuit championship for 1972.

I am anxious to see how the *"Flame"* performs as a Sport and/or Stunt model next Spring. A good .50 or .51 should haul her along adequately. With a fair .60, the performance should be outstanding. I wonder if it will roll and spin?

Wing Construction

The ribs are cut from 3/32" medium sheet, except for W3 which is cut from ⅛" sheet. On ribs, mark center lines and portions to be removed later as shown on the drawing. Cut out holes for pushrod from servo to bellcrank. Cut two main spars from ⅛" medium stock. They should be straight with parallel edges at least 2" wide. On the L.E. and T.E., mark on rib locations. At W1 mark the center of the L.E. and T.E. At W11 on the L.E. mark the center of the spar. On the T.E. mark a point ⅛" above the centerline of the spar. Draw lines on the L.E. and T.E. connecting these points. The point ⅛" above the centerline of the spar at W11 on the T.E. will form the desired washout.

Pin the L.E. and T.E.'s on a flat building

Top left: The "Blue Flame" is a rakish beast with a potential to win, but nothing will supplant your own ability and raw-nerved control in tooling around pylons. Piloting skills come with practice. Below: Inset ailerons and a beautifully rendered color scheme. Swept wing and tailplanes.

top—there is no dihedral required. Glue ribs in place and add 1/8" sheet main spar. Glue 3/16" square spruce spars in place, then add the top sheeting. Remove wing from bench and cut out portions of ribs to be eliminated. Pin the assembly down to the building board again, inverted this time and add bottom sheeting along with reinforcing plywood around the camlock area.

Remove wing again and shape L.E. and T.E. Cut out portions of wing to be fixed to fuselage and add 1/4" plywood angle gear mount to wing. Cut out ailerons as outlined on the plans and glue in W6A and W10A plus the 1/4" sheet aileron L.E. and T.E.'s.

Install aileron horn and bellcrank platform. Add strip hinges, pushrods and servo mounting blocks.

Glue the 1/16" sheet outlet around pushrods at wing bottom surface. Add rib caps and glue on tip blocks. Now sand to finish shape.

Later, when the fuselage has been constructed, fit the wing to fuselage with locating dowel and cam-loc. When wing is fixed in position, fit the section of wing to fuselage which was cut out earlier and is contained by W2A and W3A.

Stab-Elevator-Rudder-Fin

These components should be self-explanatory by reading the drawings. Strip hinges again were incorporated. The stab-elevators were constructed on a flat building board. Notice the extended rudder drive horn which allows the exit point of the horn to be in a more usable position below the stab, for pushrod alignment purposes.

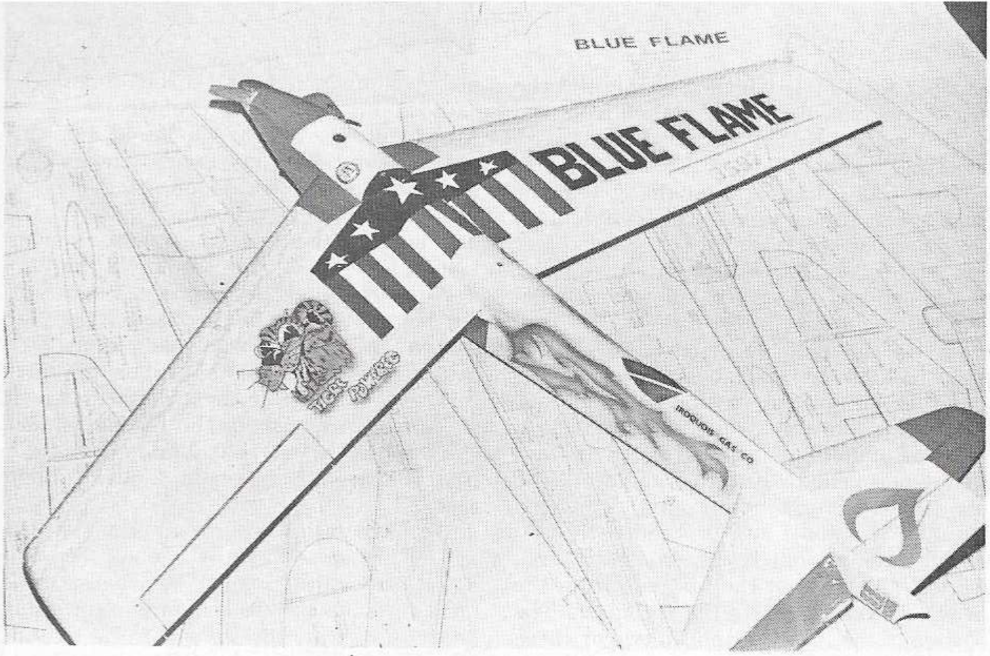
The Fuselage

Notice that the fuselage is constructed using five formers (F1-5). Formers F1 (1/4" firewall), F2 and F3 combine with the 3/32" plywood, forward fuselage sides to make up the bulk of the front end. Formers F4, F5 and the tailblock combine to complete the basic fuselage configuration.

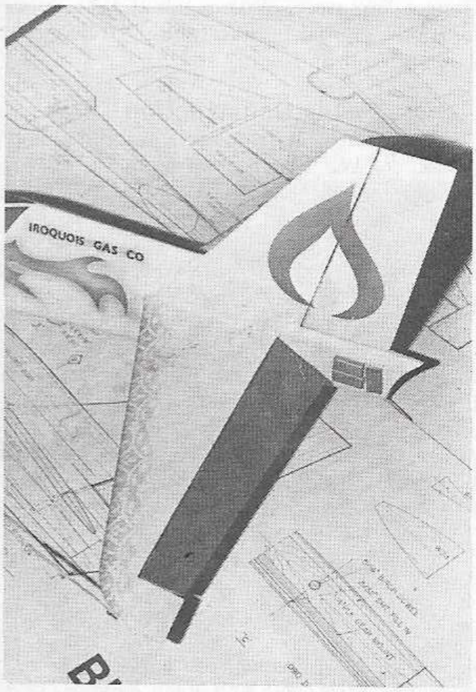
The fore and aft fuselage sides are first joined (cemented) together with the 3/32" sheet splice. Be sure to make a *left* and a *right* fuselage side, when gluing the splice plate into place. Cut the 1/4" formers from plywood (F1 and F2). Cut former F3 from 1/8" plywood. At this time, locate your engine mount (I used the Tatone pylon mount) on the firewall (F1) and drill the mount holes. Depending on what type of mount you use, either epoxy blind nuts to the back of the firewall or use the mount plate as supplied by Tatone.

Carefully drill and tap your motor mount to accept the engine of your choice. Be certain to calculate the distance from the firewall to the spinner backplate accurately when locating your engine on the mount. Now remove the mount from the firewall.

The next step is to glue and clamp the fuselage sides to the firewall. Place the firewall flat on the workbench, front side down. Using either epoxy or white glue, apply and accurately position the fuselage sides on the firewall. The sides are, as you probably imagined, extending straight upwards toward the ceiling. I use a parallel clamp to ensure good clamping contact. I also employ a square to each side of the assembly for proper alignment. The rear of the two fuselage sides may be joined together with the tailblock at this time. Before allowing to dry, glue the pine beveled

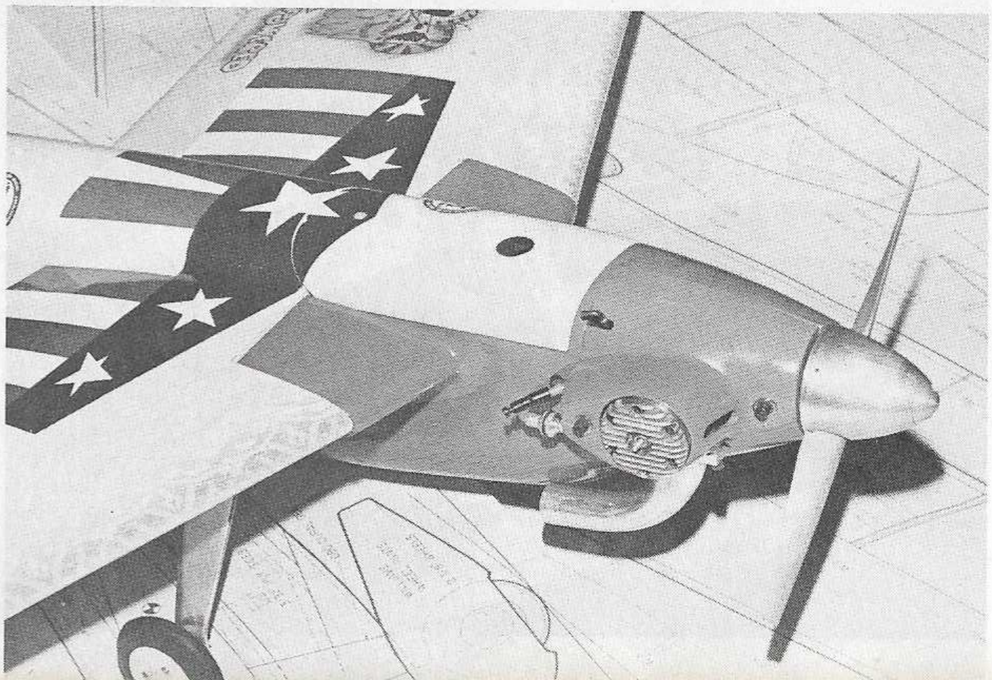


From dream to flying machine. Designs start with an idea, a trace upon the paper. It rises from a plan to test your thoughts on flight. An idea, a concept is what it's all about. A fine ship!

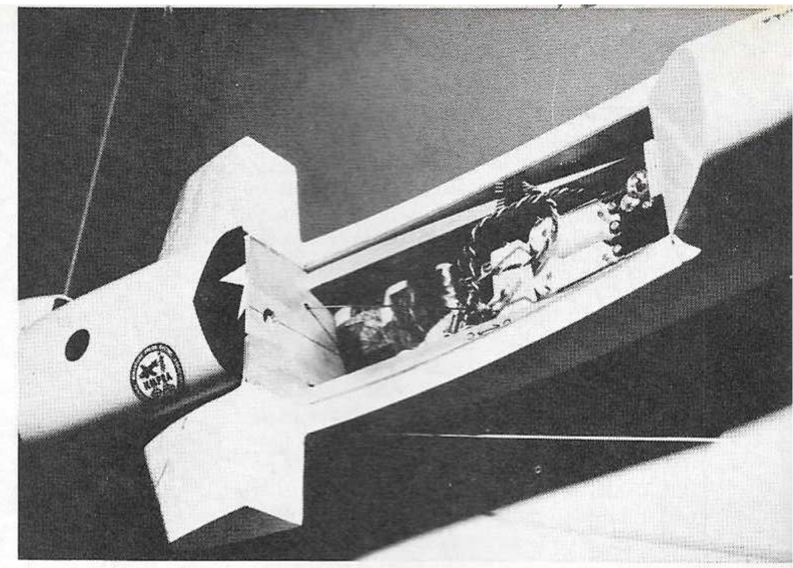


Note the "stick-on" weights which were used to achieve initial balance trim for the first few flights. Ample fin and rudder for fine control.

A background photo of the "Blue Flame" car (to left of fuselage) provided all the inspiration. Below: Well sculptured cowl is the focal point.



Dave examines hangar rash. Or is that his "don't take my airplane" look? Design is lean in line, distinctive and sculptured for forward flight.



The Orbit electronics nestle in nicely, easy access. Wing root shoulders are built in. It simplifies the filleting and the forward wing tie-down.

stock into place between the firewall (F1) and the plywood fuselage sides.

When this assembly has dried thoroughly, remove the clamps and install former F3 using reference lines from the plan. It should be noted that the ¼"x⅜" maple rails must be glued and clamped into place also at this time. Formers F4 and F5 may be added at any time after the last plywood former is in place. Again, please use reference lines from the drawing in order to achieve proper placement and alignment. Be certain to glue ⅛"x¼" balsa upper and lower aft fuselage longerons into place before installing formers F3, 4 and 5.

Also note on the drawings that there are ¼" triangle balsa strips on the bottom front fuselage sides affording the 1½" bottom block some gluing area which may be added at this point.

The wing may now be positioned in the open wing saddle for accurate placement of ¼" plywood former F-2. Place a piece of waxed paper between the front of the wing and former F-2 which has been glued liberally. Clamp F-2 securely between the fuselage sides and remove the wing with its 5/16" dia. aligning dowel. At this time glue the pine beveled stock to the front side of former F2 which acts to reinforce this critical joint.

When dry, replace the wing and locate the cam-loc position as shown in the drawing. Note the plywood plate behind the cam-loc segment in the fuselage. It is built up until it matches the exact vertical position of the cam-screw head in the wing. On my model, this distance happened to be 5/16". After the wing has been firmly affixed to the fuselage, the front root wing sections may be accurately aligned and cemented in place to the plywood sides.

Now the stabilizer/elevator assembly may be fitted to the fuselage.

The best way I have found to locate the pushrods from their horns to the servos is to actually mount the servo tray to the maple rails as shown on the plan and plot the intersections through the formers (F-3, 4, 5). This procedure will prevent much grief later. Locate and cut the holes for the elevator pushrod, in the formers and pre-fit the assembly. Cement and align the stab/elevator assembly into place with pushrod in its final location. A clevis was used at the elevator horn for adjustment purposes from the inside of the radio compartment (remember this is an enclosed elevator horn).

Position and locate the fin/rudder assembly with its pushrod and former holes, much the same as with the stab/elevator procedure. When complete, carefully align and cement into position on the stabilizer.

Now the upper and lower block work may begin. Notice that all blocks have been hollowed in order to save weight. This is especially important for aft sections where tail heaviness may become a problem. Follow this general procedure:

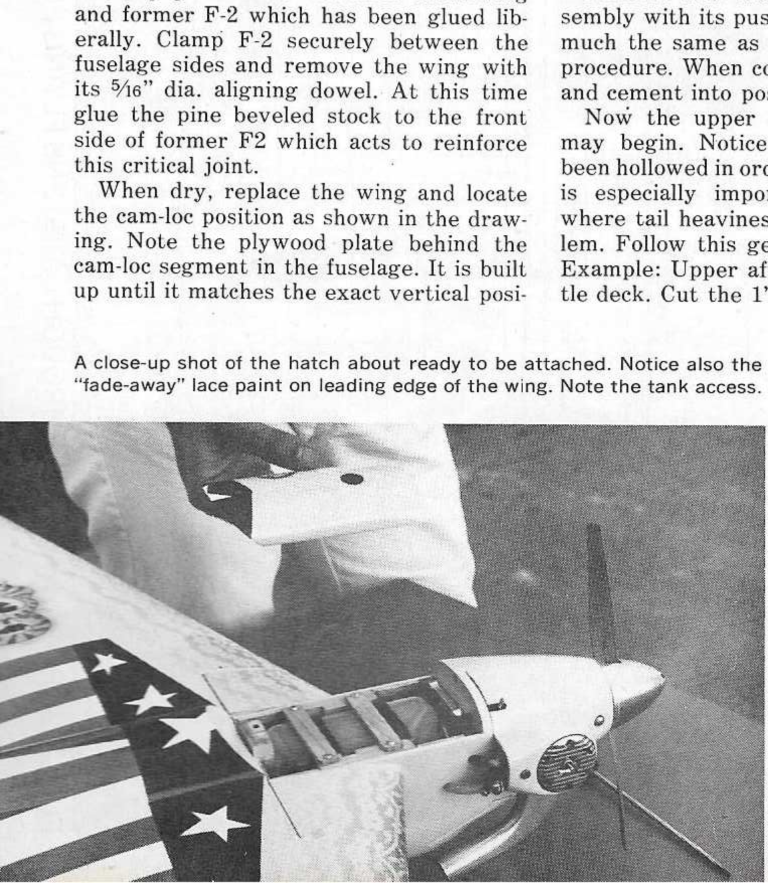
Example: Upper aft deck and canopy-turtle deck. Cut the 1" block to the top view of the plan and fit over the stab and elevator area. Tack glue this block in place to the fuselage with a cellulose cement, about every 4" all the way around. Now cut the 1½" canopy block to the outline of the top view and fit to the fin. Tack glue this block in place as before.

When the glue has dried sufficiently, carve the assembly to the desired contour. If you wish, you may use templates cut from cardboard to ensure accuracy from left to right side. Sand the entire assembly to its finished condition and then (using a long blade) carefully break the blocks from the fuselage sides; stab/elevator; fin/rudder. Now, using gouge chisels and/or grinder, hollow the insides of these blocks to within 3/32-⅛" thickness, as indicated in the drawings. Reposition the finished blocks and cement them in place using pins and/or masking tape to hold them in place.

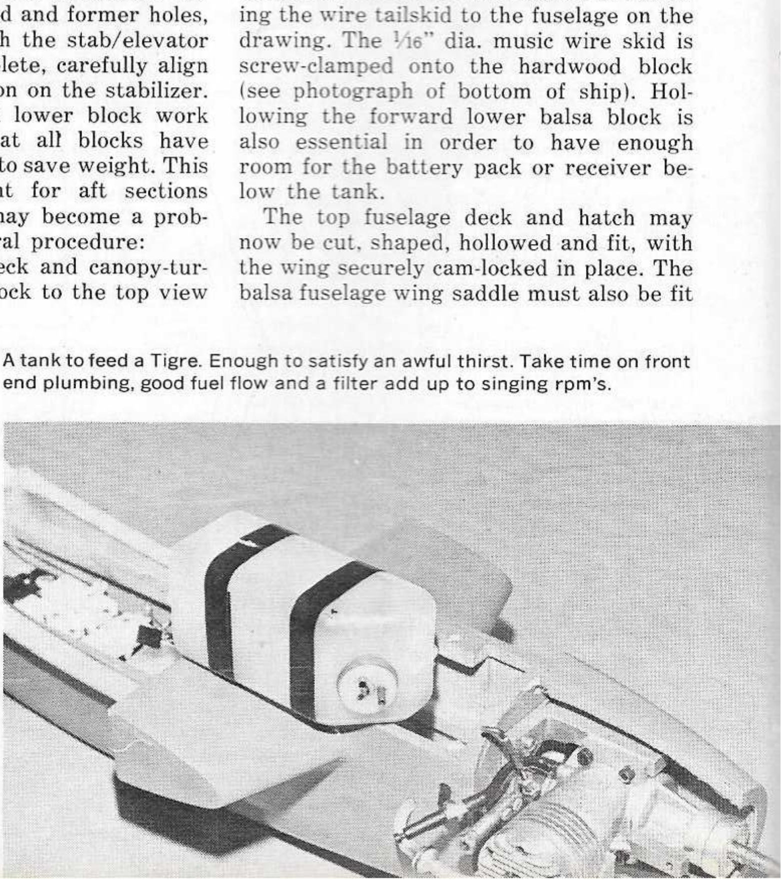
The same general procedure is used for the bottom forward 1½" block and the ⅜" bottom sheet. Notice the method of retaining the wire tailskid to the fuselage on the drawing. The 1/16" dia. music wire skid is screw-clamped onto the hardwood block (see photograph of bottom of ship). Hollowing the forward lower balsa block is also essential in order to have enough room for the battery pack or receiver below the tank.

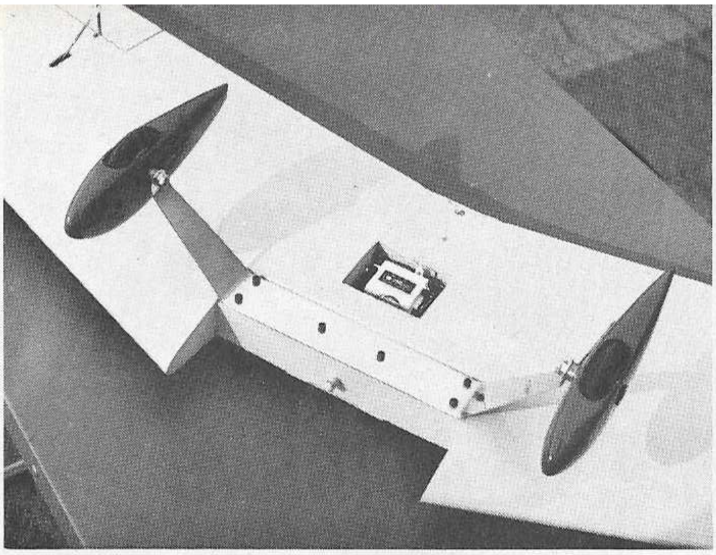
The top fuselage deck and hatch may now be cut, shaped, hollowed and fit, with the wing securely cam-locked in place. The balsa fuselage wing saddle must also be fit

A close-up shot of the hatch about ready to be attached. Notice also the "fade-away" lace paint on leading edge of the wing. Note the tank access.

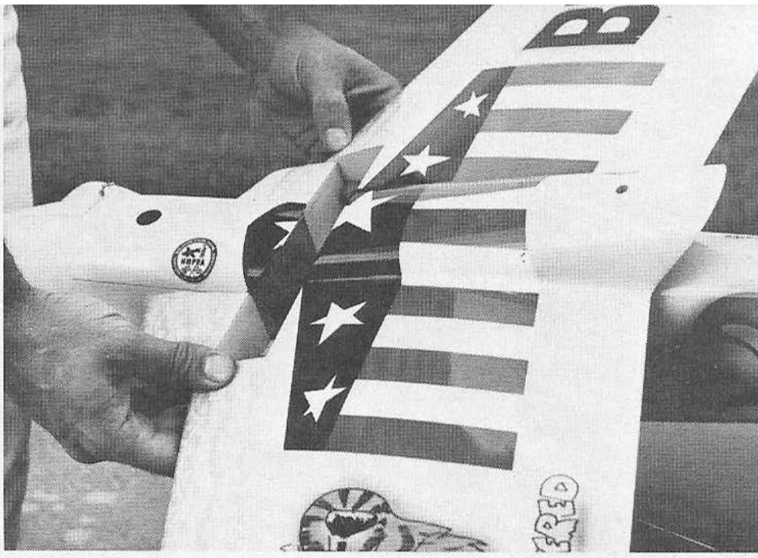


A tank to feed a Tigre. Enough to satisfy an awful thirst. Take time on front end plumbing, good fuel flow and a filter add up to singing rpm's.





The landing gear bolt pattern can be plainly seen here. Note the aileron servo compartment, camloc, wing cut-out, and the torsion bar wheelpants.



A wing slips into position. It's easier to mate the spar-like surface. A dowel holds all, bolt secure the rear. Structurally stressed for flight.

while the wing is securely in place. The simplest method to form these saddles is to band-saw them from a sheet of ½" balsa as seen from the side view of the fuselage. Bevel this saddle with a carving blade (off the model) and final sand it to shape, referring also to its top view. Believe it or not, contact cement works beautifully for attaching these wing saddles to the fuselage. Do this while the wing is in place, in order to achieve the best possible fit.

The balsa wood portion of the engine cowling is glued up from blocks and fit around the engine/spinner assembly which has been securely attached to the beforementioned engine mount. The block assembly is carved and sanded to a smooth contour with the spinner as shown clearly in the drawings (front, top view and Section A).

The actual engine cowling was made from a female mold and consists of glass reinforced polyester resin (fibreglass). This cowl requires a considerable amount of time to fabricate (especially if only one cowl is planned) and may be impractical for most people to contemplate. I like glass cowls because they are thin-walled, tough, rigid products. With a little effort, you can duplicate this cowl from balsa blocks and reinforce the finished product with glass cloth and resin. This requires about half the working time of making a model of the cowl, casting an impression in plaster, and "laying up" the finished product from this mold.

Finishing

Obviously, there are as many finishing techniques as there are modelers. Few people finish their models alike. There is one over-riding consideration which must be taken into account with any racer which uses high nitro fuel: *A fuel-proof finish.* There are several ways to go in order to achieve a fuel-proof finish, but they all have their disadvantages. Usually, if a finish is highly fuel-proof, it probably is difficult to apply or rough to use trim colors with. I'm referring to the epoxy and enamel finishes which offer the greatest fuel-proof ability.

The *"Blue Flame"* was finished in dope and fuel-proofed with one coat of clear Acrylic enamel as manufactured by the Sherwin-Williams Company. The clear was used with the curing catalyst to afford the greatest fuel-proof protection. If you try this finishing procedure, be sure to allow at least one week of drying for the dope before applying the clear top coat of acrylic. Otherwise, the clear may not bond to the dope and thus peel very easily.

Of course, my reasoning for the dope-acrylic finish stems from the realization that we can use the best qualities of both materials in achieving our goal—a sharp, easy to apply, fuel-proof finish.

From my experience, I find that dope is the simplest material with which to trim. Techniques such as "lace painting," paper stencil work and free hand cartoon work (the Tiger's head), using the airbrush, india ink, and dry transfers, all give excellent results in dope. Most of these techniques are impossible, or at best, extremely difficult to achieve using epoxy or acrylic colors.

Unfortunately, dope is not fuel-proof above about 15% nitro content. However, here is where the acrylic enamel clear comes in. This material is virtually 100% fuel-proof and is very tough and abrasion resistant. If applied properly over dope, it will enhance the finished product with super protection and a great gloss. Like all enamels, a certain amount of "orange peel" must be tolerated. Rubbing compound may be incorporated to the finish after curing, but the net result is a reduced gloss in payment for removing the orange peel. I have found that it is best to leave the acrylic clear alone.

Pre-Flight Preparation

Unfueled, the ready to fly model should balance no more than ½" forward of the center of gravity location on the drawings. If you are using a heavy engine such as the Super Tigre G-40, you may have to shift your battery pack back and place the receiver beneath the tank in order to achieve proper balance. Stick-on lead weights may be a last resort, but in any event, better than an out-of-balance "crash."

Be certain your control surfaces are neutralized and, of course, check the radio's operation with the engine running. The rest is quite straight forward.

A side mounted Super Tigre sits in silence on Tatone engine mount. Brass cowl tie-down and tube for rear tie-down. Fuel and pressure lines seen.

Cowled engine close-up. The engine is fitted with a mini pipe, which is legal for the Open Pylon event. Tight bonnet shows ukie speed influence.