
AMA 40856

Winner of the 1967 Toledo Conference Best Original Design Trophy, the Swelta will be a sure-fire hit at the local flying field. By Dr. Harry Hodel. Photographs by Reynolds.

SWELTA

SOONER or later, every long-term modeler will try his hand at designing an airplane. We all do a little of this by making minor modifications of pre-existing designs. This has resulted in the present trend of look-alikes. There comes a time however, when each of us would like a unique original design which should at least look pretty — and hopefully be able to fly well. The resulting appearance will no doubt be a culmination of his past experience and his concept of what his "dream" should look like.

Whether or not it flies well, is not of prime importance because all his other planes are able to do just that. But imagine his thrill, if it does perform well after he gets enough courage to try it out!

This is how my "Swelta" was conceived.

To begin with, this design was never intended to be just another class III contest machine because we already have so many excellent designs to choose from. What I desired was a unique plane, unlike any other, yet pleasing to the eye. I liked the appearance of Delta wings but they lacked beauty without a fuselage. They also lacked some of the favorable characteristics of the conventional designs. By the addition of a fuselage, the favorable characteristics of both types could be combined. Previously, whenever this was done, the motor was always placed aft with a pusher prop, to solve the placement of the C. G. This detracted from the appearance and also required special structural reinforcements.

I feel I have achieved my goal by solving these problems.

So what is unique about the "Swelta"? Appearance for one. It almost looks like a navy jet fighter. The way it flies is another. I have never had a model stir so much interest in spectators and modelers alike. Rarely have I seen a model hold a crowd so spellbound. What more could I ask for? It handles as easily as most class III planes, yet is able to fly much slower because of the reduced stalling speed. The Delta wing permits the model to be easily landed in a nose-high attitude without any tendency to fall off. This adds realism. Maneuvers are smooth and control response is positive at all speed ranges. Rolls are very axial and breathtaking to behold! Because of this feature, a low pass ending in a victory roll is one of the Swelta's most spectacular maneuvers.

The addition of a tail section produced another feature — namely the ability to do true tail spins. I have yet to see a Delta capable of this. Inverted stability is unexcelled since there is virtually no difference in control response. Rev up that engine and it streaks across the sky! This is fun! Sort of anti-climatic to the encouragement my fellow modelers expressed during preflight stages such as "It will never get off the ground" and "What is it?"

Where did the name come from?

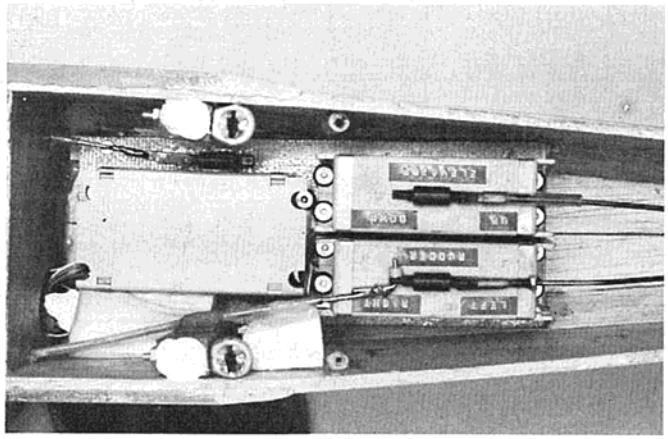
SWEpt back + deLTA = SWELTA. That is just what it is. There are several interesting design features incorporated into this plane. The wing differs markedly from most delta wings, which have one thing in common. They employ a double reflexed airfoil, which imparts a positive pitching moment, thereby creating lift. This was not necessary for the Swelta because it has a tail section. The wing, therefore, is fully symmetrical! Although it is almost 4" thick, the airfoil is still only 12%. Even though I'm an avid barn-door enthusiast, I felt that because of the reduced wing span I would need all the aileron action I could get. I therefore used full-span ailerons. They were so effective that their size had to be reduced.

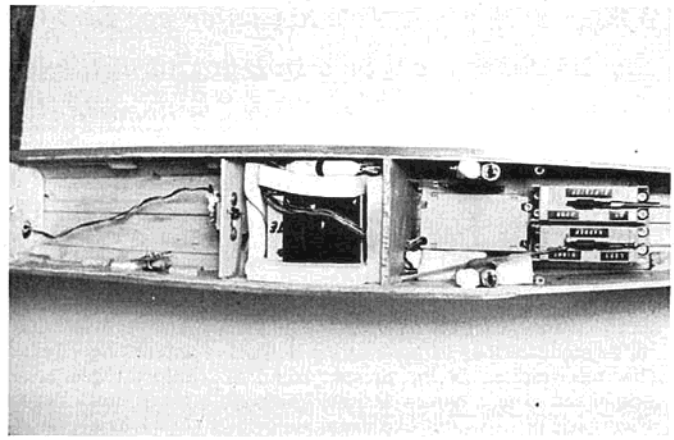
One major problem was the fuselage length, since this is mainly dictated by the chord section at the center of the wing, plus eight inches of length which are required in front for the engine, tank and nose-wheel. Adding this to the tail moment, which I established by preference, results in a long body. My final plans are smaller than the originals. When you have a heavy engine and a full 12 oz. tank a long distance ahead of the C. G. there must be some compensation in weight distribution to keep the balance point where it is desired. This was accomplished by placing the servos just in front of the stabilizer. (Yes — the push-rods are very short). I felt that it was virtually impossible to build a tail-heavy "Swelta" so I compensated wherever I could. Much to my amazement I overdid it a little. After the first flight I had to move the batteries ahead somewhat — only eighteen inches. What an improvement! By the time I made all the necessary trim adjustments, many unimpressive flights were logged.

The tail-section was easily decided upon, since a standard percentage of the wing was used for the fin and stabilizer. This results in a large fin but appropriate for the type of airplane. The fact that the elevators also sweep back, does not pose a problem, since complex linkage is unnecessary to connect both sides. I simply used heavy Speedometer cable, which permits no torque, yet easily flexes around the angle to connect both halves. (See Detail.)

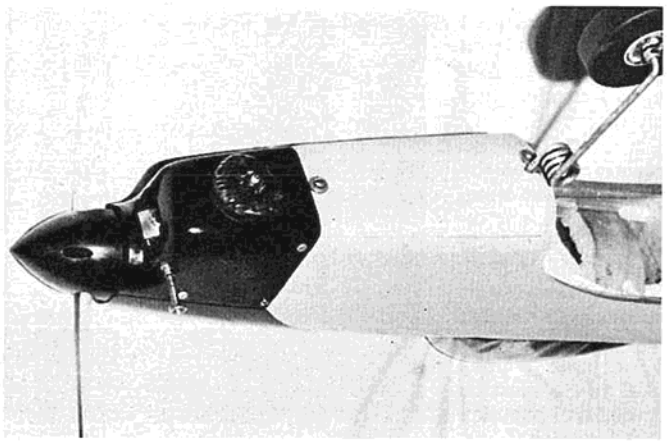
Construction is actually simple since the fuselage is built upside down á la Kwik-Fli style. This greatly simplifies building and saves time. We'll start with the wing so that the fuselage can be "custom fit" to the wing more precisely. Keep everything as light as possible. The first time, I built everything as strong as possible. I also added my special "2-inch thick" finish resulting in a ten-pounder.

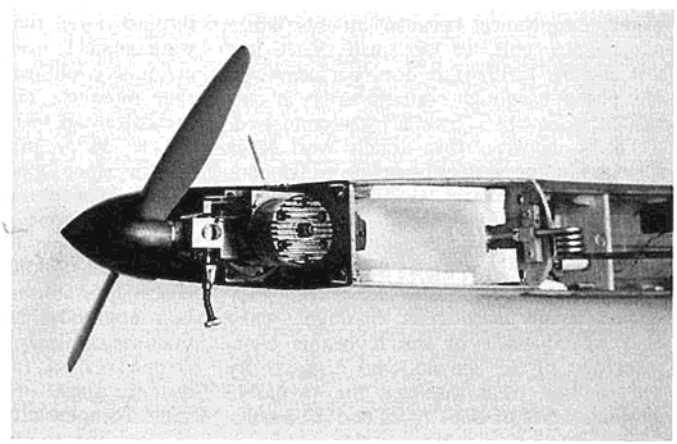
WING CONSTRUCTION: I constructed my wing using styrofoam techniques. This makes for a true wing and eliminates the necessity for cutting various sized ribs. The





Hatches and wing are removed to demonstrate details of servos, receiver, cam-locks and pushrods. Note hatch dowels behind cam-locks.





Details of the engine, tank and nose wheel with and without cowl.

dimensions for the root and tip ribs are shown. These are constructed of plywood or more preferably aluminum. Mark the numbers as shown to facilitate cutting. They are positioned proportionately so that the wing remains true. If you are unable to obtain four-inch styrofoam, simply spot glue two sheets of two-inch together and cut the wing from this piece. Core out the wing if you want it lighter. If you are unable to cut wings yourself, you must find an obliging friend or a commercial source. You could, conceivably, build a conventional wing with ribs.

Make the cutouts for the landing gear blocks and plywood inserts for the Cam-Locks. Epoxy glue these in place. Cut a groove in the bottom surface for the aileron cable. You will find that the use of bicycle brake cable, plus nylon tubing for housing, eliminates many alignment problems as well as the necessity for 90° bellcranks. This linkage has less play and slop and has the added advantage of being easily installed. Bring the cable through the surface two inches from the trailing edge at the bottom. Now sheet both wing panels with 1/16" balsa and make the cut-out for the servo compartment. Make certain the dihedral cuts are correct to fit as described below, then glue both wing halves together with epoxy glue. This is done by placing the panels on a flat surface and keeping the bottom surfaces flat at the trailing edges. The result is a slight dihedral. No dihedral braces are required. Wax paper will keep the wing from becoming a permanent fixture on your table top. Use a truly flat surface so you will have a true wing.

Cut off the front tip as shown on the plans and add the 1/8" plywood front-plate and dowels using epoxy glue. Now fiberglass the center section using fine cloth on the undersurface and a heavy 3" strip on top (this will be hidden by the fuselage).

Plug the nylon tubing with wooden toothpicks for finishing the wing the way you desire. Add the ailerons using nylon hinges. Use the nylon control horns backwards as shown to provide differential in aileron throw. Check the plans for this. Add the Cam-Locks as shown on the plans.

Fuselage Construction Begin with the top block. The additional piece is glued at the tail-end. Make the cut-out for the stabilizer. Draw a straight centerline on the bottom (inside) surface and mark the position of the bulkheads. The bulkheads have a matching centerline, which is placed on the line of the top-block and glued. The 1/2" triangular longerons are also glued in place (pins hold everything down). The motor mounts are epoxy-glued to the 3/16" sides and these are then glued to the entire framework. Let everything dry. Locate the blind mounting nuts for the motor, then add the filler blocks at the nose. Shape the nose to the spinner and round the top-block of the entire fuselage. Sand smooth. Glue the stabilizer in place and add the fin. Fiberglass the nose-section and construct the fiberglass cowl. If you cannot make a fiberglass cowl you may have to make the fuselage sides longer.

The hatches are constructed with the grain of the balsa going tranversely. The inset pieces have the grain running longitudinally. 4-40 bolts are screwed into dowels which have been drilled, tapped and glued to the fuselage sides, to hold the hatches down.

After fitting the wing, drill matching holes for the wing dowels. Fasten the Cam-Locks and finish the structure to your own taste. Equipment is installed in the areas shown. There is adequate room for anything! The elevator and rudder are attached with nylon hinges. The elevator horn is constructed of standard speedometer cable using solder as shown. Do not run the solder along the entire length or the cable cannot flex. This works extremely free, yet permits no twisting between both sides.

I used an Enya 60 which provides adequate power, but any hot .61 would really make this baby move out. Bicycle brake cable is also used for the motor control.

The tank compartment is large enough to fit a 12 oz. square plastic tank. The

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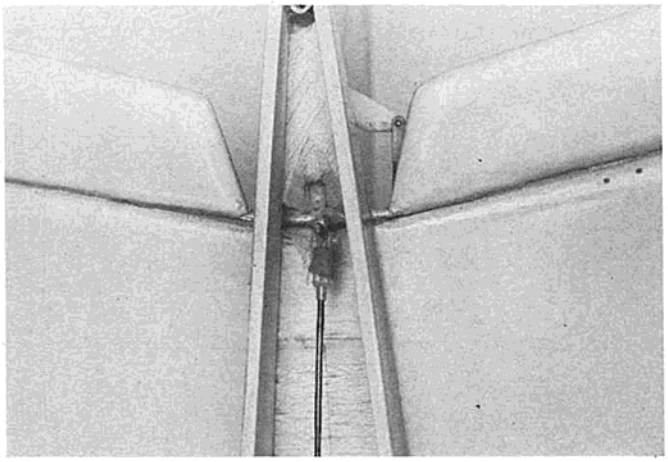
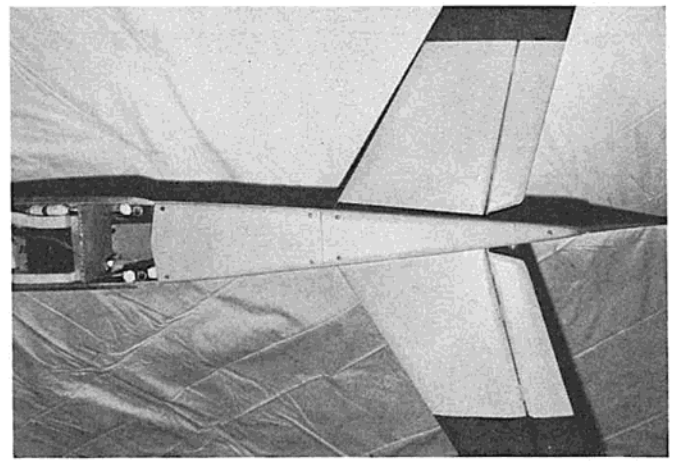
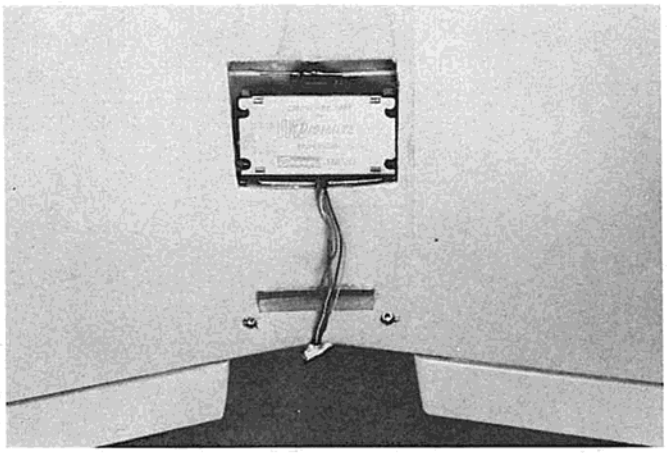
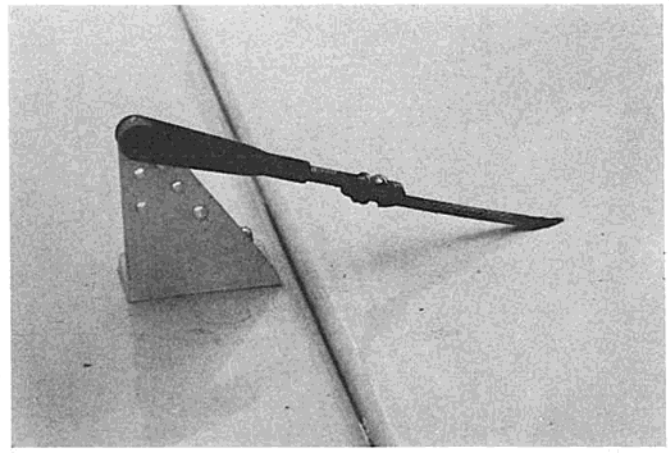


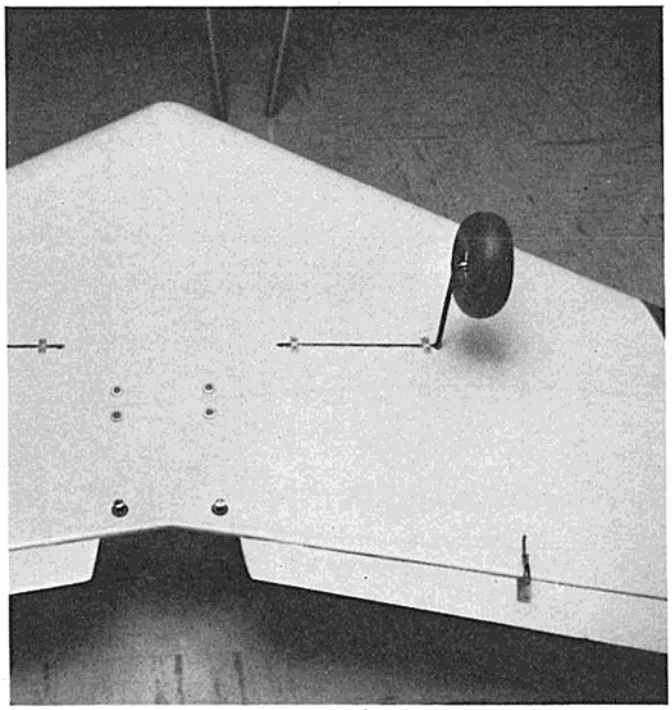


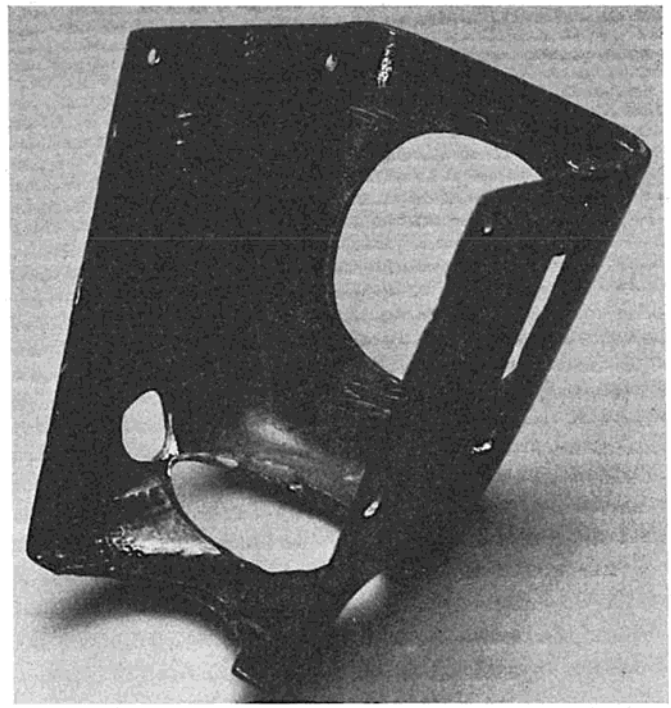
Rear hatches with positions of hold down bolts. Hatch is removed at left to show details of special "cable elevator horn" and hook-up.



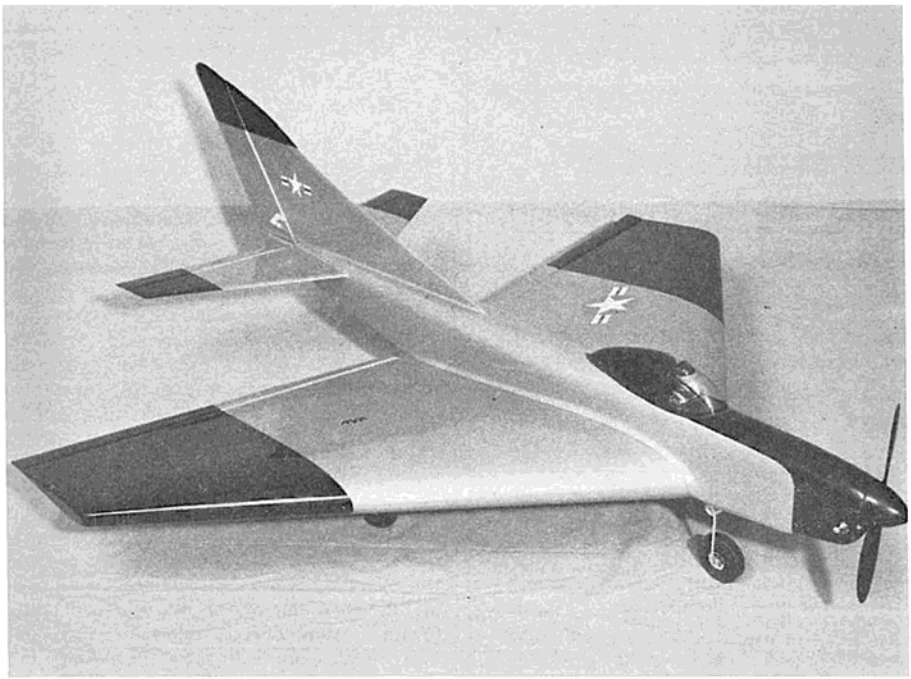


Aileron servo and cam locks shown in detail. Note nylon cable. Hook up is soldered to cable. Right: Aileron horn shown in detail. A 2-56 bolt is soldered to the cable coming from the wing. Note the Kwik-link hooked to the sloping surface of the nylon horn. Extra holes are drilled on this side. Reversal of the nylon horn provides differential throw to ensure axial rolls.





Under surface of wing showing wheels, cam locks servo mounting bolts and aileron horns. Right: Cowl shown from inside.



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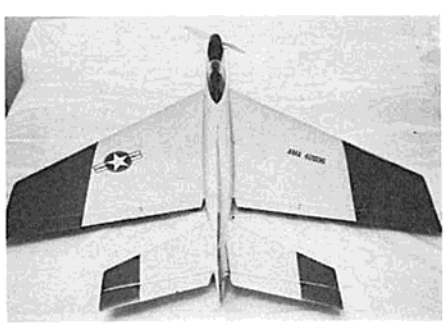
"A culmination of past experience and his concept of a dream . . ."

center of the tank will correspond to the level of the needle valve so that fuel draw will be excellent.

Use Low-Bounce Du-Bro tires for the main wheels and a solid rubber wheel for the nose gear. I used the nose gear from a Tatone motor mount because this has a larger diameter wire and is therefore more sturdy. If you have wheel brakes, add them, by all means. The possibility of retractable gear is appealing, since the wing is thick enough to hide anything. Use brake cable for the steerable nose-wheel.

I believe you should use fillets between the wing and fuselage and the fin and stabilizer. The easiest and cheapest method I know is as follows. Tape Saran-Wrap over the wing making certain it is smooth. Attach the wing to the fuselage. Now mix Hobby Poxy formula II with all the white flour it will take until you have a thick paste. Wipe this paste into the "corner" between the two adjoining surfaces, with your finger so that the radius is round and smooth. Let this cure overnight and in the morning you will realize that the Saran Wrap prevented the wing from being permanently affixed to the fuselage. This material is easily sanded smooth by using a dowel wrapped with sandpaper. The thin excess edges are simply trimmed away with a knife. Now you should be ready for the paint. I used Hobby Poxy paint — platinum for the main color with all tips being red. The nose section is black. (See photographs.)



Just a few more hints. Place the receiver in the separate compartment as indicated. Locate the switch ahead of this point so that the batteries can be moved over a wide range on both sides of the center of gravity. This way you will not have to add weight for ballast, yet obtain adjustment if necessary.

The completed model must have a positive incidence when standing on the ground. The leading edge center of the wing should measure ¾" higher than the trailing edge center.

Pretty, isn't it? It will fly like that too, but the first flight can be rough if it is drastically out of trim. If all the surfaces are set at zero and the center of gravity is correctly located, there should be no problem since adjustments will be within the range of the transmitter trim buttons. Proportional is almost a must. It is also preferable to have a well broken-in motor so that you will have all the available power for the first flights. For the first landings you need not reduce power completely. The model will slow down adequately by simply pulling back a little on the elevator stick.

If you are going to taxi around a little before your first flight, be careful to keep the speed down because I was fooled this way and it took off three times — bounced, that is. It will actually lift off at taxi speeds. After you grab altitude, slow it down a bit to get acquainted with the way it handles. You will appreciate this experience for the first landing.

Good Luck!