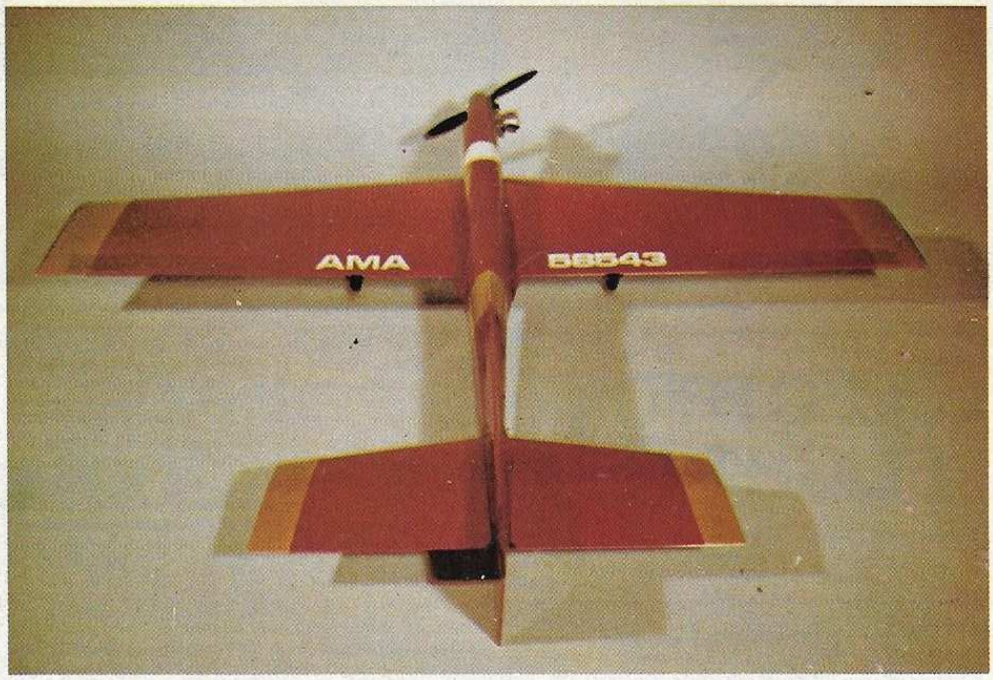
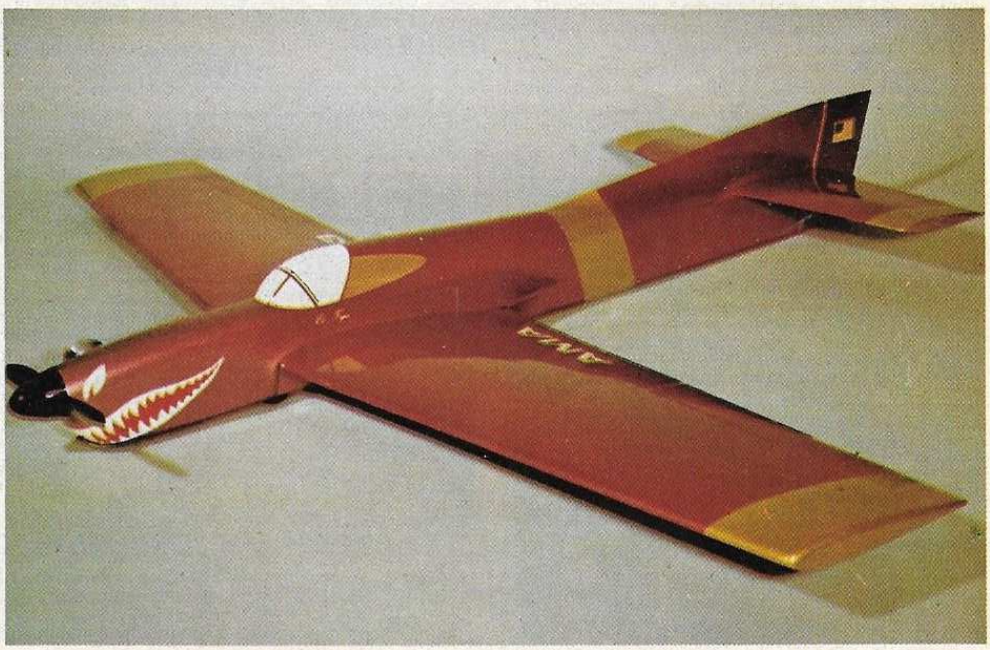
El Tigre

It's not often that pattern designs break with tradition. When they do, new ideas lead to some startling looks. You can tell this tiger by its tail. / by Dennis Donohue





The idea for El Tigre started to take shape in my mind in the fall of 1970, spurred by the fact that (for the first time in my ten years of RC flying) I finally had a good, reliable proportional set. I now wanted a good competition airplane that would do the pattern better than anything available, and that I could call original.

I decided that I would use tried and proven moments and airfoils, so that I couldn't go too far wrong. El Tigre's airfoil is basically a modified Kirkland (Triton) airfoil, which combines good penetration and speed with the stability advantages of a constant radius leading edge. From here, I departed from common methods and decided to add some of my own aerodynamic ideas, most of which came from the "sounds good" school of engineering.

It is apparent, when looking at our present pattern, that a clean rolling airplane is a must, as almost half of the pattern requires axial movement. So my first set of criteria dictated that I try to get the lateral area evenly distributed above and below the roll axis (longitudinal center of wing). Ideally, this would mean a mid-wing configuration, but I don't care for the look or the hatch problems of this arrangement. I selected a compromise semi-mid-wing configuration.

To this, I added the unusual looking tail, which was a conglomeration of some pet theories. Since an effective rudder is a must with our pattern, and rudder area below the stab is more effective than above, this arrangement now placed half the rudder area below the stab. This setup gives me no roll effect when rudder is applied, and makes it very effective for spins, stall turns, etc. I also reasoned that, with equal lateral area above and below the horizontal stabilizer, it would give me a very axial roll, with no tendency to porpoise, as often happens with high vertical fins. As an added bonus I felt that it would tend to eliminate the effect of propwash on the yaw axis during the takeoff run.

My next effort was toward aerodynamic cleanliness and speed, which I felt was an asset to our pattern by decreasing the effect of wind on the flight path of the ship. Therefore, I built the fuselage just wide enough to house all the necessary equipment, with no wasted space. Although it is wide enough to house all presently manufactured equipment, the fuselage is only 2¾" at the

widest point. I then added the scoop type lower nose to facilitate retract gear and tank placement, but I rounded the front of it to reduce drag.

By spring, the Number 1 prototype was ready to fly—and fly it did. Not only did all of my efforts prove out, but it was also the fastest ship that I (or anybody in my area) had ever seen. This took some getting used to because the ship was always a little ahead of me as I discovered when I very skillfully managed to bury it six inches in the ground. At the time, I was in the middle of three rolls when I inadvertantly pulled up elevator at the wrong time. But the prototype had proven all my theories. The roll was very clean and very axial. The rudder was very effective with no roll effect. The takeoffs were straight and true, with virtually no rudder necessary; and, due to its exceptional speed, it didn't even notice the wind.

I can honestly say that I consider this ship to be as good, or better, than any pattern ship now available. In the right hands, it could easily be a world champion. When you build it, you can be sure that you have a winner.

Before you start construction, let me emphasize a couple of points that are very important to achieving a contest caliber ship. First, carefully select very light wood for everything, except the fuselage sides, which are medium sheet. Build light, especially in the tail. I strongly recommend that you build the entire airplane using Hobbypoxy Formula 2, since it gives much better penetration (thus stronger joints) than the five-minute glues. Secondly, go to every extreme to ensure a perfectly aligned and true airplane—don't settle for *almost* perfect. A little more time spent in the shop can save a lot of time and frustration on the field, trying to find out why the ship won't track properly in a certain maneuver. I do not recommend building this ship without retracts, as it seriously impairs its performance. There are also the important aesthetic reasons. Another must is a good, hot 60. The hotter the engine, the better the craft "planes," and the nearer to perfect are the maneuvers. This was proven to me when I took out my hot Webra and installed a prototype of Lou Ross's new 60—this is, in my opinion, the hottest engine on the market. It was like a different airplane; the maneuvers were a lot cleaner and a lot easier to do.

No, he's not Col. William Chenault, but he sure has a flying Tigre.

CONSTRUCTION

Fuselage: The nice feature of construction in the fuselage is the fact that the bottom is a straight line, parallel to the thrust line, so it's a simple matter to draw a line on your building board and let the sheet sides form their own jig. Start by taking the side sheets, and make sure that the bottom edges are straight. Then trace the outline of the wing and stab saddles, as well as the rear angle, and cut these areas out. Do the same with all doublers. Do not cut the nose outline. This assures perfect incidence and thrust line references. At this point, you can adjust the length of the engine compartment to suit your engine and mount. Then accurately trace the bulkhead former positions on both the sides and doublers.

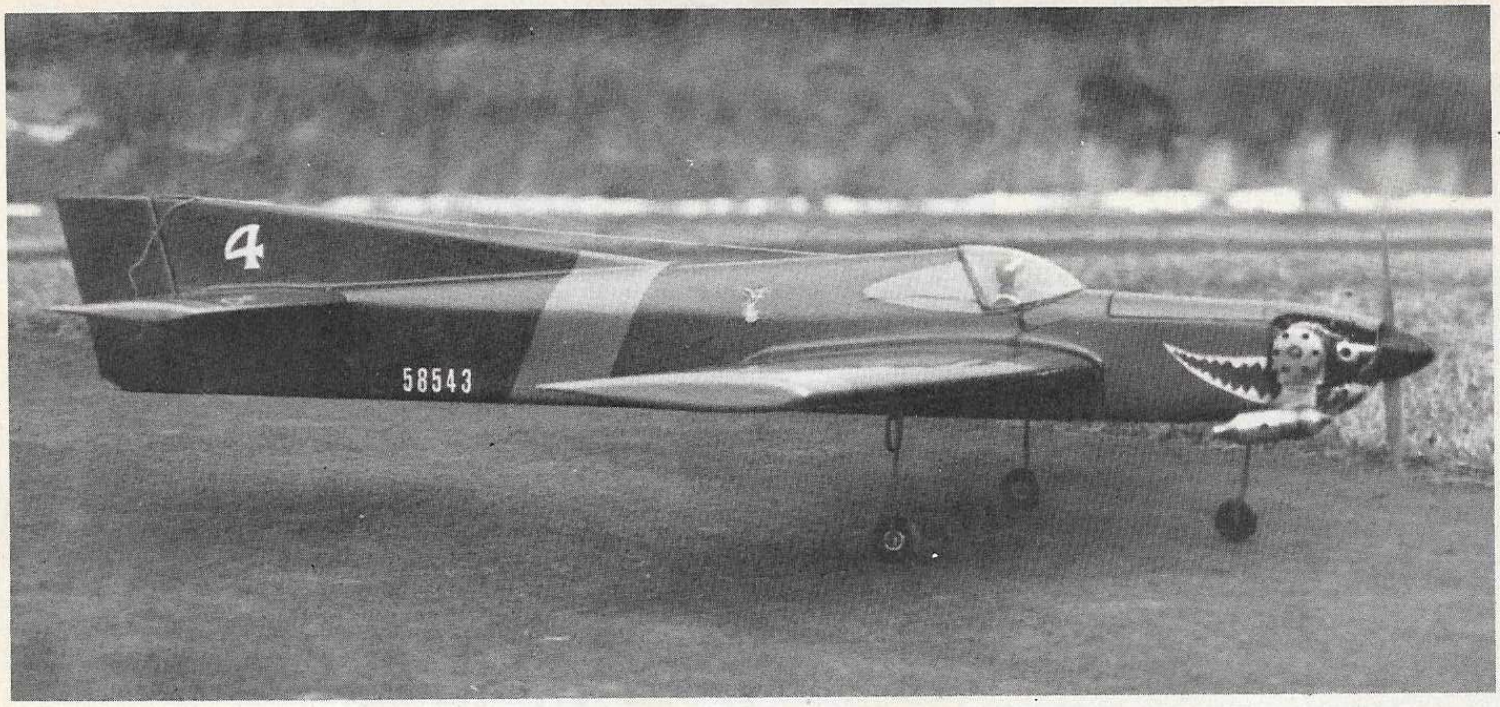
Now contact cement all doublers to the sides (be sure to make a right and a left) and glue on the quarter square longerons, rear triangular stock, and rear stiffeners. While this is drying, cut out all formers, marking the centerline on each one, and drill holes to install blind nuts in firewall for the engine mount and nose gear.

For the next step, Formula 2 epoxy is necessary to give more working time for proper alignment. Draw a straight line on a level spot on your workbench and draw another one perpendicular to it at one end. Now glue all the formers to both sides at the spots previously marked, and place the assembly over the datum line on the workbench. Line up the centerline of the formers with the line on the bench. Line up the front edge of the sides with the perpendicular line. Then clamp the sides to the formers in this position and allow the glue to set. The rest of the fuselage construction is conventional and straightforward. One alternative method of construction for the vertical fin is to laminate it out of 1/8" sheet and two 1/16" sheets to avoid warping.

Wing: You need a very accurately cut set of foam cores. If you skimp here by trying to hack them out yourself without experience, then you might end up with a warped wing, which is useless for precision aerobatics. For one of the most beautiful foam cutting jobs you've seen, you can order a set of El Tigre cores from Control Specialties Co., 110 Egel Avenue, Middlesex, N.J. 08846. This is my source for cores, so I can vouch for their precision.

My method of installing the landing gear, bellcrank plates and wheel wells is to take a sheet of 1/16" aluminum, and cut a template to the exact dimension

No, it's not a takeoff or landing—just a nice slow fly-by with the gear hanging out.



The Tigre's streamline "flaired" look gives it the appearance of really traveling, even when at rest. For those with an eye for totally unobstructed lines, an inverted engine installation would clean things up.

required for each cutout. Mount a 4-40 bolt and nut through the middle (to form a handle) and, holding it with a pair of pliers, heat it over the stove until it is hot enough. You can test it on a piece of scrap foam. Sink it to the desired depth at the previously marked position in the foam. This method is quick and simple, and results in a very clean and accurate hole.

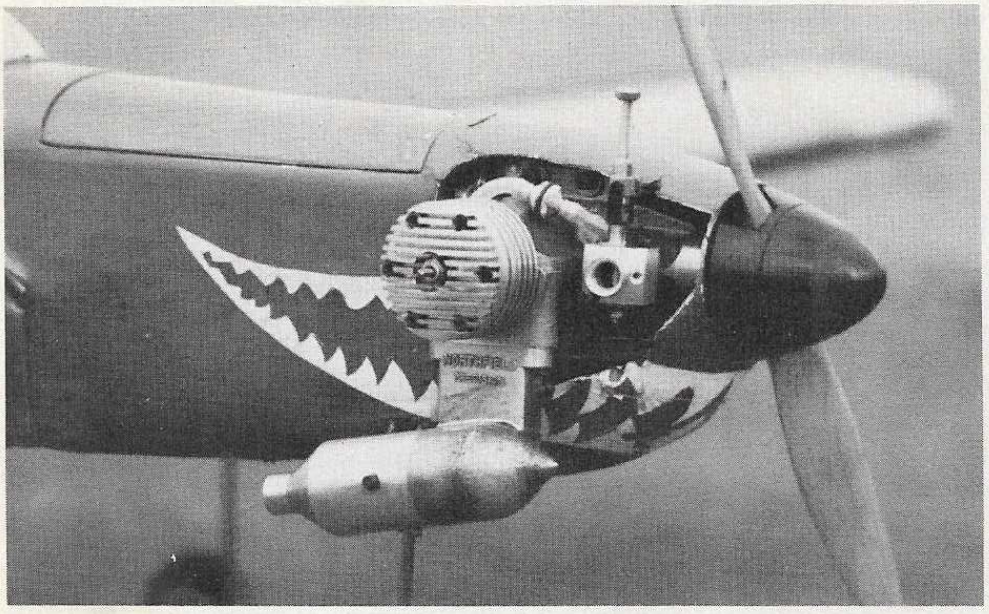
Pushrod holes can be melted by heating the end of a piece of 1/16" wire and dropping it through the core. Install all linkage before sheeting the wing. After the wing halves are joined, be sure to fiberglass the center section. Be careful during the cutting and fitting of the ailerons, in order to keep them perfectly true. The remainder of the wing construction is self-explanatory on the plans.

After finishing the airplane with your favorite finishing technique, mount the equipment, being sure that there is no slop in the linkages. Very carefully trammel and align the ship one last time, being sure it is *absolutely perfect*—don't settle for any less.

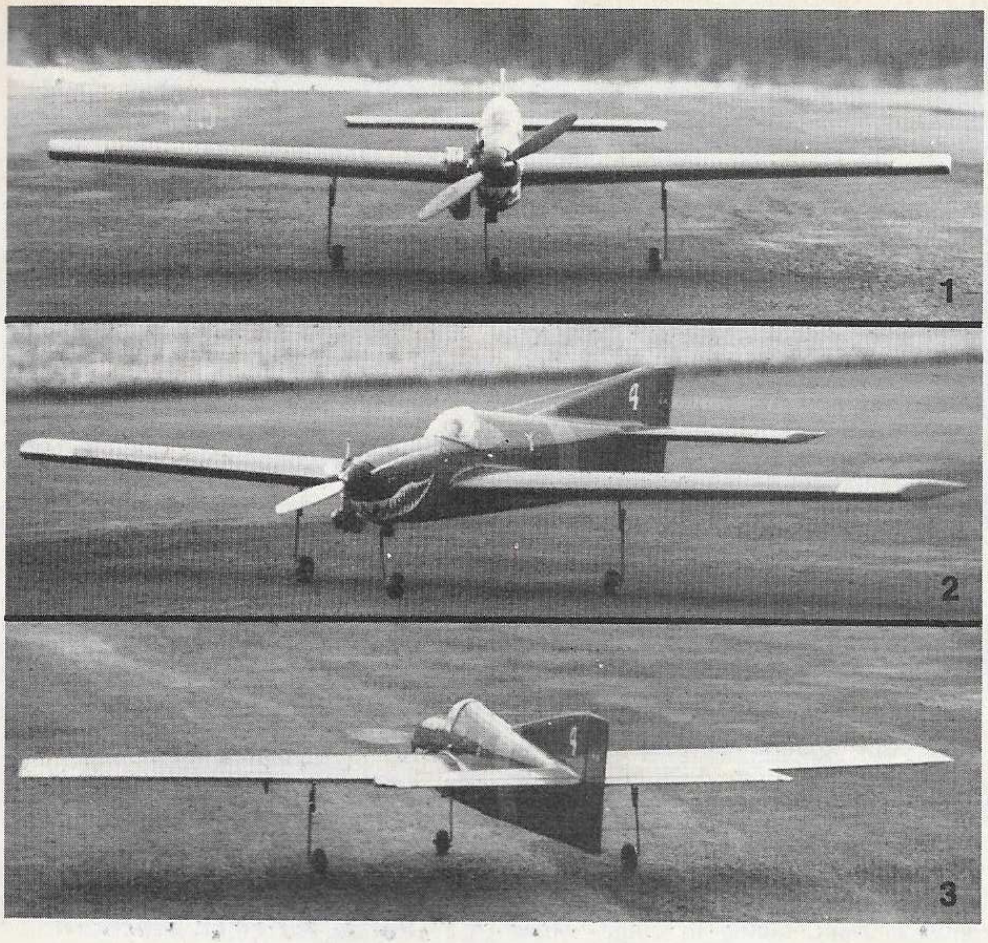
FLYING

If you have done all your homework properly, you should be able to fly right off the deck, with no problems. Due to the fact that this is a very fast and clean ship, you will have to work a little harder at slowing it down for landings. You have to start bleeding off air speed a little further out. However, after a few times, you will be able to slow it to a crawl for some beautiful landings. Now comes the hard work. You should be prepared to spend a month or so just trimming the ship. Get it to fly perfectly in every maneuver, so that you will not have to fight the airplane at a contest. Then go out and practice, practice and win, win, win.

If you decide to build El Tigre, drop me a line and let me know how you make out. Write to Denis Donohue, 35 Arlington Ave., Bergenfield, N.J. 07621. Peace, and may you have true wings.



With a snout like that, who needs Durante! Model was the first to fly the super-powerful Ross engine. Over 100 gallons through the prototype, and it is still pulling strong.



ABOVE: The top planform illustrates some very conventional moment arms and area distributions. The wing design is a descendent of Jim Kirkland's Triton. Nos. 1, 2 and 3: This "walk-around" view of El Tigre gives a good total impact to its unusual features. Fast pattern ships come from clean aerodynamics. With a front profile like this, the air doesn't even know it's been disturbed. Remember the days when cars had vertical fins on the rear fenders? Wonder if Dennis ever owned a '55 Chrysler?