

Plastic Trainer-19



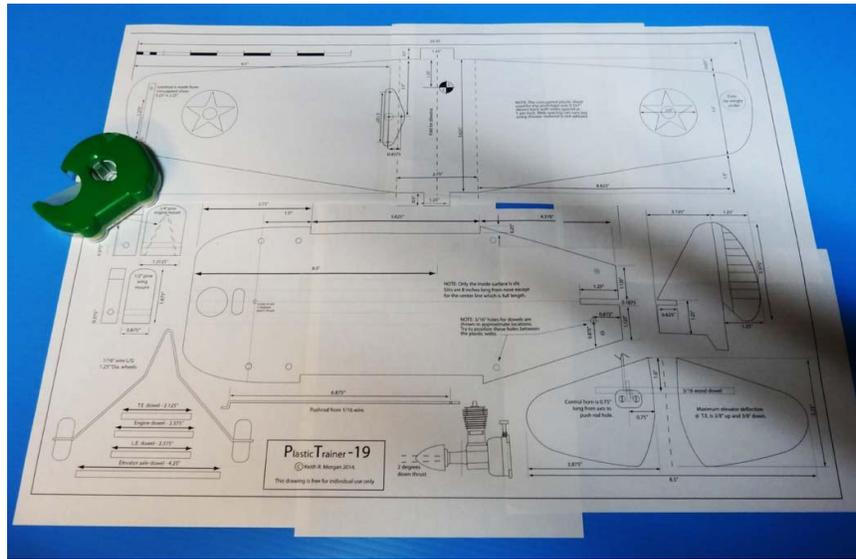
I have tried to only use materials available from the big box building centers like Home Depot, Rona (Canada) and Lowe's.

The picture above shows the prototypes with an original Cox plane. You might notice that the model in the foreground doesn't have the windshields installed. This is because the corrugated plastic sheet doesn't take glue well and since this plane will probably be crashed repeatedly, the windshields seem like a poor investment for the time involved. That's the builder's choice.

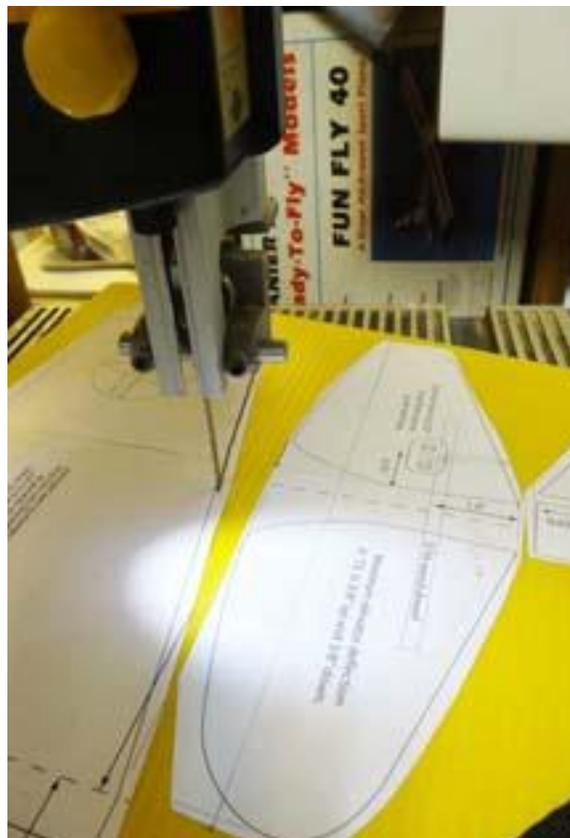
Speaking of glue, except for glue to stick the decals on, there is no need for any glue on this plane. I tested every type of glue in my shop and found that cyano is almost OK but it takes hours to set when used on this material. Contact Cement is also good but is unnecessary for anything here. Five minute epoxy is OK for the windshields if they're slotted into the fuselage and it also good for fuel proofing the pine formers.

I doubt if any experienced builder would have trouble with this project but since it's a trainer I have been very literal with the instructions.

Download the PDF file and print them out full size then tape them together. The drawings have enough dimensions that it's possible to just plot the parts on the plastic then cut them out with a knife but that all takes time.



I used 3M spray adhesive to stick the drawings to the corrugated plastic sheet. I used my cheap little band saw to cut out all the parts. This works great but a knife is almost as good. The saw leaves a rough edge which sands off easily with 80 grit paper.





Cut out the wood formers by spray gluing the outline to $\frac{3}{4}$ " pine (or spruce or fir). If $\frac{1}{2}$ " wood is available then it's ideal for the trailing edge wing mount.



I used 3/16" wood dowel that I bought at Lowe's for the "pins" that hold this plane together. It is IMPORTANT to know that the pins will not be glued into the wood mounts. They need to be moveable for assembly. Drill the dowel holes for a sliding fit but size and position don't need to be critical. The following picture shows the groove for the landing gear cut into the forward face of the engine mount.



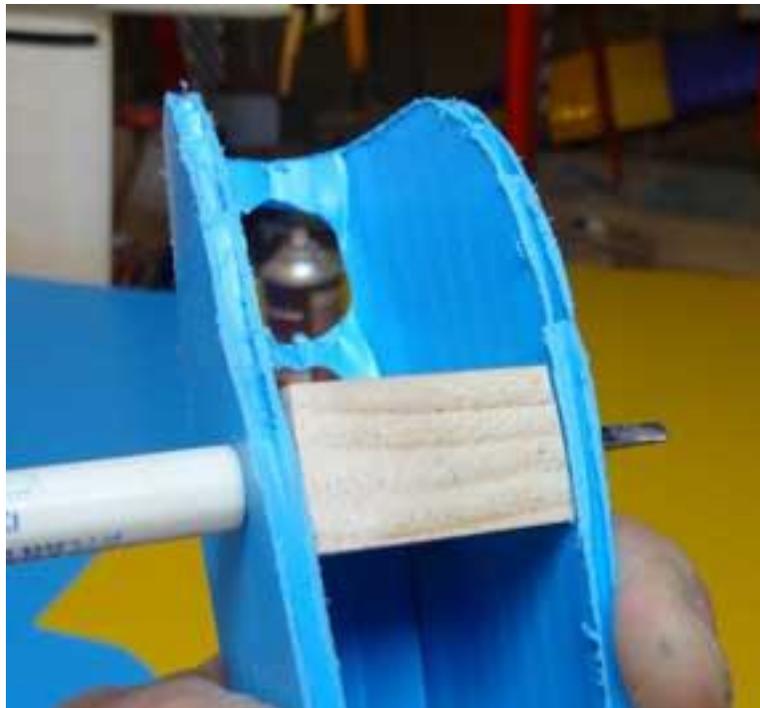
This picture shows all of the wooden parts and the elevator axle. The axle fit better into the elevator after I tapered the ends by clamping it into an electric drill and wrapping some sand paper around it. A tight fit into the plastic flutes is IMPORTANT. Be sure not to sand the center 3/4" section of the axle since it will be the "bearing" that the elevator hinges on.



Slits cut half way through the plastic's flutes. These slits are on the inside of the fuselage and are necessary to allow the plastic to bend. The center slit is full length but the slits on either side are only 8" long measured from the front of the "cowl".



NOTICE that the holes for the dowels are not made yet. This is done by carefully folding the fuselage around the pine formers and piercing through the plastic with an awl or screwdriver. This requires a strong grip but it's possible to adjust and twist the plastic edges so that they align accurately with the lower edge of the wood former. The pre-drilled hole in the wood guides the screwdriver.



Push a dowel through the punctured holes and hold the fuselage together while you do the same piercing for the trailing edge former/mount.



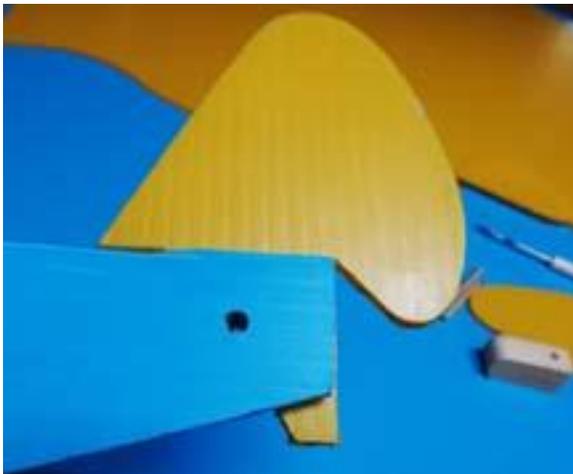
The only hard part of building this plane is making the elevator hinge. It isn't all that difficult but it needs care.

The next picture shows how the rudder is positioned in its slot when drilling the 3/16" hole. Squash the fuselage sides and rudder flat and drill slowly for a nice clean hole. With a little care it's possible to drill between the flutes of the fuse sides and the rudder. The exact position of the hole isn't critical.

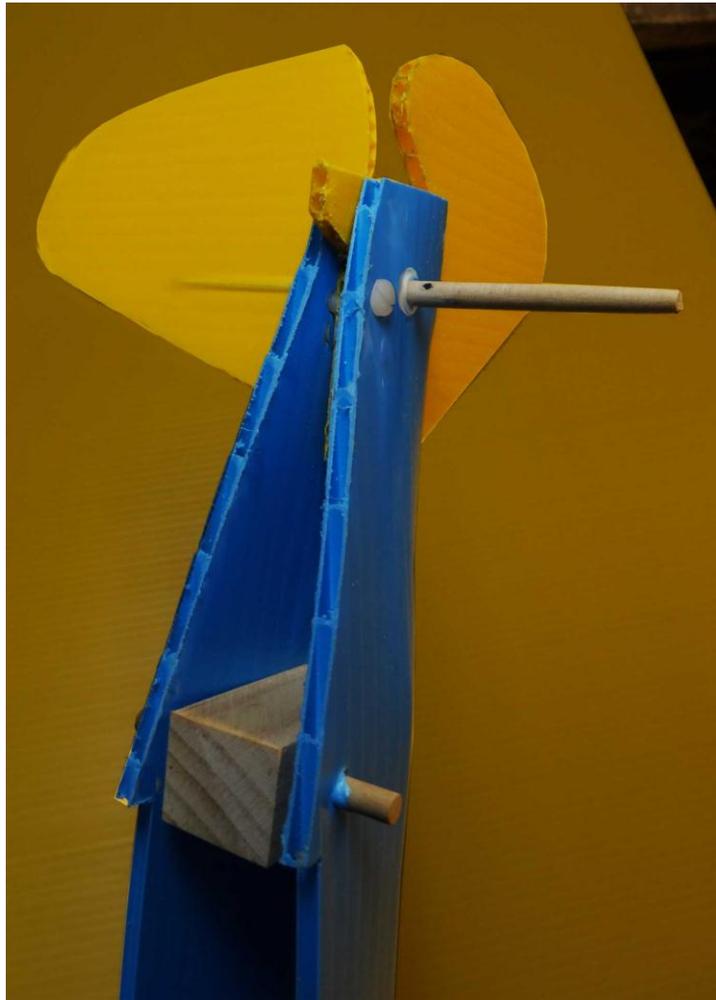
This "bearing" has worked well on all three of my prototypes. BTW, this is also a good time to drill the holes for the leading edge dowel. Position the holes where the plans show it.



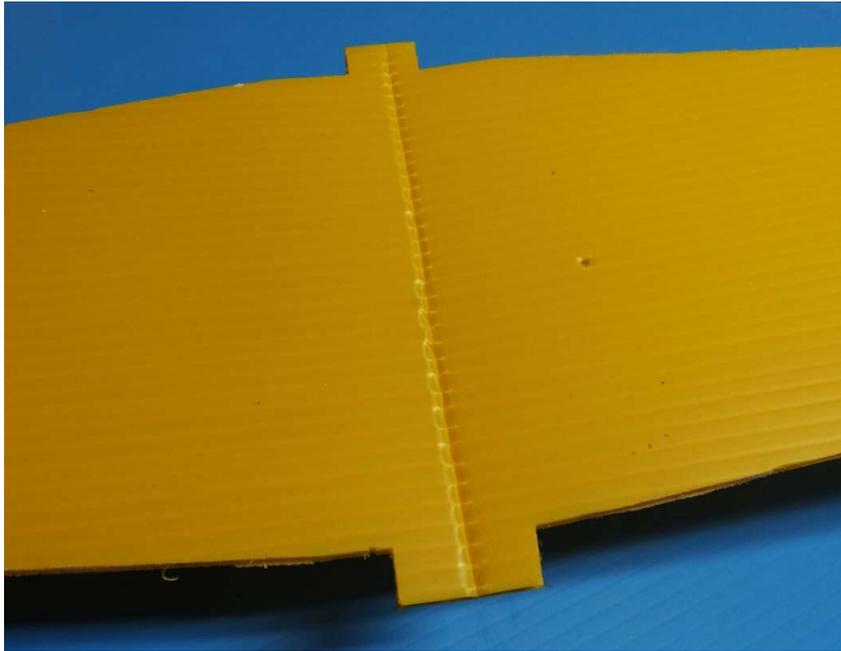
A nice clean hole! A 3/16" Forstner bit works well, but a regular, and sharp, drill bit works OK if you cut slowly.



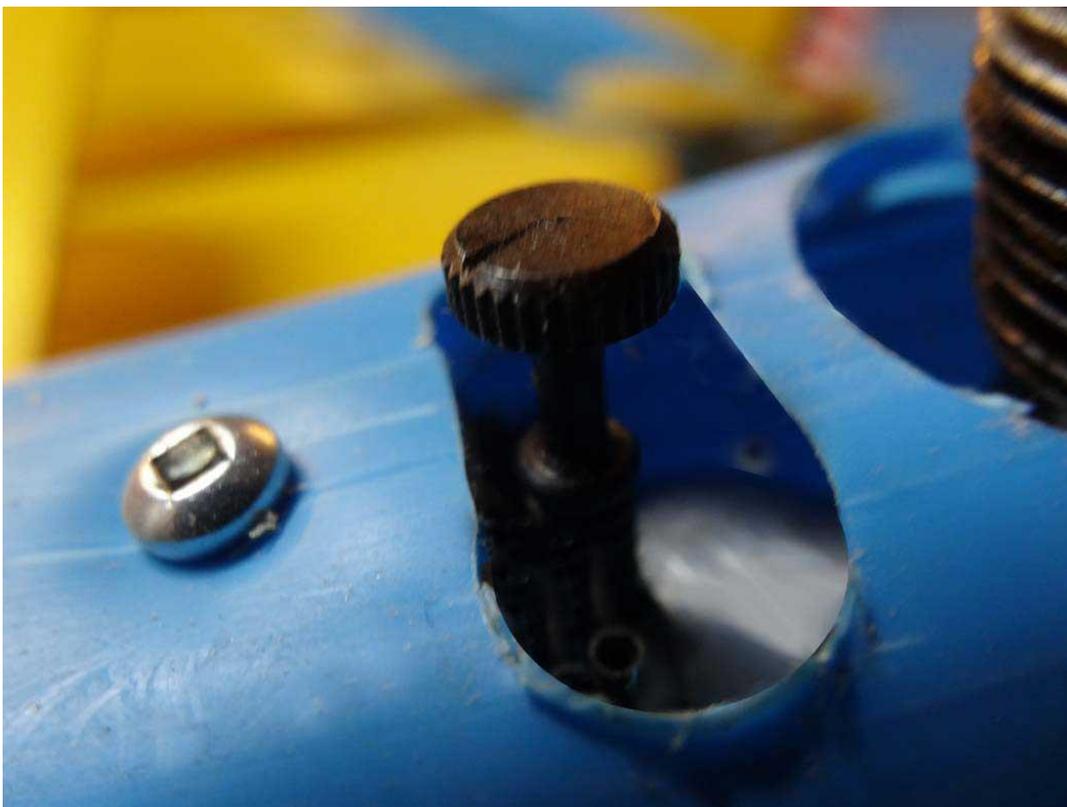
This picture shows the elevator inserted, ready for the other elevator to be pressed onto the dowel. NOTICE that I've added a plastic washer between the fuselage and the elevator. It's just to give things a little clearance. The plastic bolt that holds the tail together needs to be positioned exactly as shown on the plans (directly under the axle) so that it doesn't foul the elevator movement.



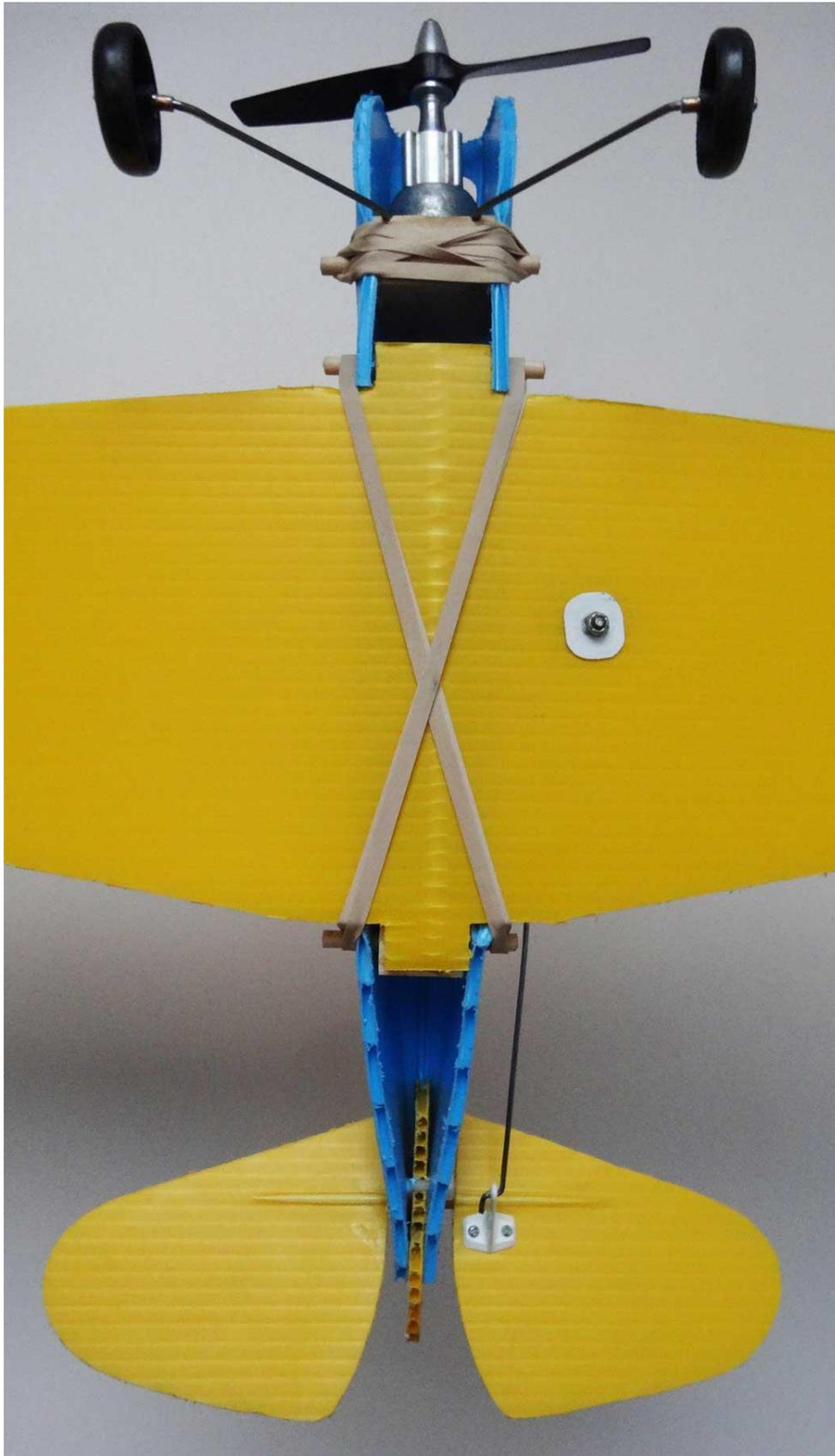
Picture showing the wing with the dihedral bent into it. This actually works well. Mark the center line of the wing, then place it upside down over a sharp edge of a table. Hold the wing down with a straight piece of wood and bend it down until it creases. The plastic is strong enough that it doesn't make the wing too weak and it stays bent nicely.



Picture #14 shows the #4 x ½" wood screw that holds the engine mount at about 2 degrees down thrust. Mount the engine to the wood ,high enough for the needle valve to project through the cowling. Stretch the rubber band onto the dowel like you would for flight then "eyeball" a little down angle into the engine's thrust line. Drive the screw through the plastic. Not very scientific but it works.



Here's the underside of the assembled plane. The controls are installed in this picture. Notice the plastic pad under the bell crank that's cut from a "Gift Card".

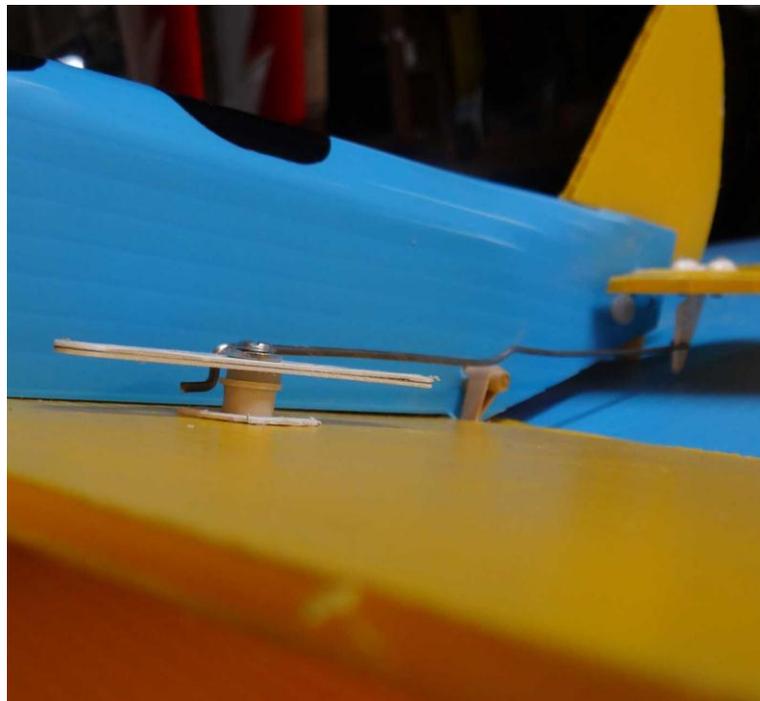


It's best to use a commercially available ½ A bell crank and control horn (Carl Goldberg, Dubro, Sullivan, etc.) but if they are not available it's OK to make your own. The bell crank shown is made from two layers of "Gift Card" sanded and glued together with cyano, then cut to the dimensions shown on the drawing. An "L" horn can be made from metal or plastic packaging.

To set the controls at neutral, drill the bell crank mounting hole through the wing after assembling the push rod, control horn and bell crank.



Here are the finished controls. Notice that the bell crank is on top of a stack of plastic washers about 3/8" high. The pivot bolt is a #4-40 with a "Nylock" nut.



The lead out guides are just a 1/4" wide strip of the wing plastic glued with cyano. Use the flutes that let the nose hang low when the plane is suspended by the lead outs. A nickel makes a good tip weight.

It might be necessary to work the elevator axle bearing until it loosens up. A drop of oil helps. Smooth control action is always a good thing.

The prototypes were flown on 40 foot spectra lines with 3 inches of handle spacing. I run my Cox engines on 30% nitro fuel with 25% Synthetic/Castor oil. Depending on the engine, loops and inverted flight are reasonable but predictable and steady flight is what this plane does best. It also bounces off of mistakes pretty well.

Cheers!