A canard's advantages include a lack of exhaust dirt—and "first-flight" engine protection.

EXPERIMENTAL CANARD

Ever had the feeling that design is in a rut, and wished you could build something just a little bit different? Here's your chance!

By ROBERT KENDALL

You probably will agree that most planes today look like a modified Taurus, Kwik-Fli, Esquire, etc. This is how I felt when I started looking for a different design.

Bob and the beast. Enya 45, Grish reverse-pitch 10-6 prop, balloon tank work well.

Going through old magazines I came across a picture of a canard—the Japanese Shinda—and later the U.S. Curtiss Ascender. They intrigued me very much and I thought, why not? This was about as different as one can get—with everything backwards, wing and motor in the rear and elevator in the front.

I started doing research on canard design but couldn't find much on the center of gravity, thrust line, decalage and such. So along with what I could find, and what I could figure out for myself, I started drawing and building.

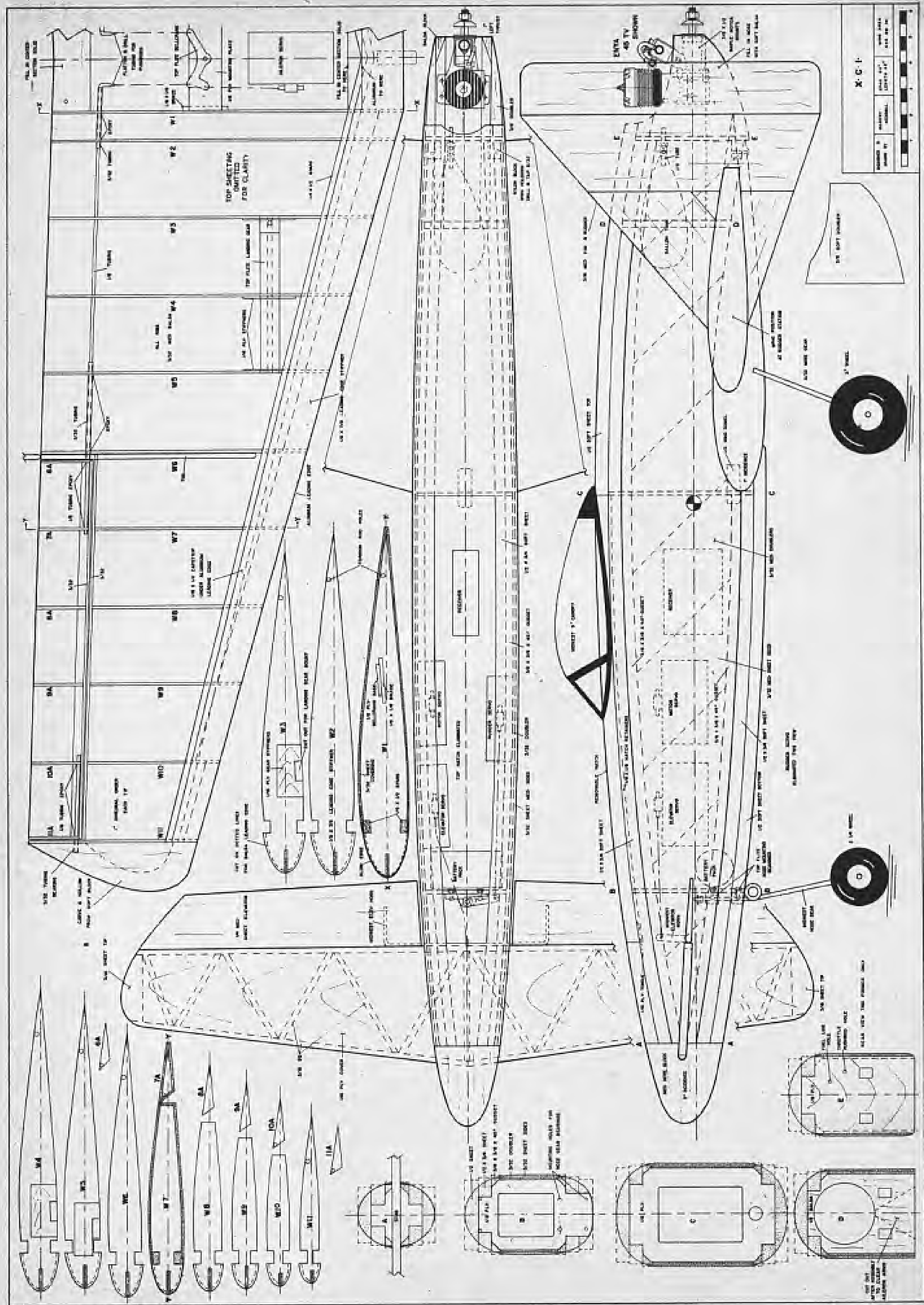
I found out there are several advantages to the canard. First and most obvious is the elimination of oil and dirt from the plane. The protection to the motor itself was one of the first things I noted—especially on the first flight! Due to insufficient fin area I would get a snap roll at lower speeds and was not able to get back to the field. I had to land in a bean field adjoining our flying site.

The beans were about 2 ft. high and even after passing through about 6 ft. of them the motor was still running. This alone could be worth the effort of building a canard if you fly like I do and quite often land in chin-high weeds, corn, beans, etc. With the motor still running it is much easier finding the model.

Also, the canard is the easiest on stalls of any plane you will ever see. When pulled up into a stall, instead of dropping off sharply and going into a dive, the nose just sort of mushes down to level, and off it goes again. This is due to the extreme decalage between the elevator and wing, causing the elevator to stall out first while you still have lift with the wing—which is the main lifting force on the plane. The canard is smoother flying and much easier in the maneuvers. It doesn't zip around, dipping, diving, and looking more or less like a controlled crash about to happen.

There are several possibilities with the canard design. With a swept, constant-chord wing the model will be more stable, but not nearly as pretty. Also a delta configuration, such as the B-70, would work very well. This will be my next project. True, the canard will never be a contest ship, but will fly more like a real plane. I have put mine through all the maneuvers except the spin.

After reading that the United States gave up work on the Ascender because it was almost impossible to recover from a spin, I didn't have nerve enough to try it with mine! As long as I was going this far, I decided I would try some other ideas. The torsion rod principle on the ailerons, using brass tubing instead of wire, worked out better than expected. I had tried music wire before, (*Continued on page* 49)



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but got too much flexing. The tubing eliminated this.

Always having trouble covering leading edges on my wings, I thought I would try aluminum edges. Here is something I think the model industry should look into, and do something about. I used 18 gauge for mine but 22 or 24 gauge would be better. This would be superior to the balsa leading edges with but very little difference in the weight.

I started bending mine over a form I made out of hardwood. But as they kept springing back, I ended up working them by hand without too much trouble. If you will bend them slightly more than the leading edge radius, they will have a clamping action, helping to keep them tight while the epoxy is setting.

Originally, I had the rudders connected but the rudder servo is too far forward to maintain balance. I had to use pushrods back to the wing, then 45-degree bellcranks to pushrods in the wing. With all this linkage they didn't work well, so I disconnected them, leaving the servo for the steerable nose wheel only. As the rudders are used very little in actual flying, this is no problem. It is a good idea to make the rudders moveable by using either copper wire or aluminum hinges; then be used for trim.

As most people building the canard will be experienced, I won't go into much building detail. Some of you no doubt will want to work in some of your own ideas.

To begin with, it isn't as hard to build as it looks. First, cut out the 3/32 sides and glue the ⅜ x ⅜ x 45 gussets on the inside of each half. Contact cement the 3/32 doublers between the gussets. The ½ x ¾ sheet strips for top and bottom are better cut to the top view shape; when glued to top and bottom they will form the sides to proper shape. The ½ sheet

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top and bottom is made from soft material and is prebent to more of a curve than needed. I do this by running hot water on the sheets for a couple of minutes, then blocking up both ends and putting weight in the middle. Wait till the next day for it to dry and it will retain its shape.

Putting in the motor mounts, formers and such is standard procedure. The fuel tank is different than normally used. I bought a 39¢ balloon punching bag in the dime store. Insert a 2-in. length of brass tubing in the neck and wrap with rubber bands. When using, draw out all the air, then fuel up. Insert just enough fuel to fill out balloon. You don't need to build up pressure. When flying, no matter what altitude the plane is, the engine will always draw, as there is no air in the tank.

The elevators are built standard with 3/16 square with the exception of the 1/16 plywood covering top and bottom. The first elevator I built was covered with balsa, but being out front, it is susceptible to any thing you might hit, even heavy weeds—which broke off my first one. Since covering with the plywood I have had no trouble. The extra weight also helps to get the center of gravity ahead of the wing.

The wing is built as you would any other, except for the torsion rods to the ailerons, and the aluminum leading edges. If you have any doubts as to "noise" caused by tubing affecting the receiver, you can use nylon blocks for the bearings instead of the 5/32 tubing. I experienced no trouble with my Bonner Digimite 4.

I always construct my wings in one piece on a jig with the dihedral built in. This is the best way because the wing will come out straight, without warps. You can use styrofoam instead of balsa to fill in the front and rear of the center section, if you wish. Styrofoam will be easier to work.

The largest pusher prop readily available is a 10-6. If you wish to use a larger prop, a left-hand shaft is available for the Enya 45. A standard prop of any size can then be used. One thing you want to remember is that, with the elevator in the front, be sure the elevator goes up for down and down for up.

I guarantee you will get a lot of attention at the field and plenty of comments, such as, "It won't fly," "You must be crazy," and other endearing remarks that will make you know they love you.