



Laser 200

By PIOTR ZAWADA. . . The '86 Polish Nats Champ is back again, this time with an aerobatic control line ship with a .46 for power. This semi-scale stunt model won all the marbles for Piotr. It's a good flyer.

• For a few years I have thought about a control line full-scale model. Of course, it should be a model of a real aerobatic airplane, because I am a control line aerobatic pilot, and I do not like to fly with heavy bombers. Unfortunately, I cannot find good documentation; if I have a good drawing, I have not good photos; or if I have good photos, the drawing of this plane is not so good for me and for judges, of course. I have a book by Robert C. Morrison, *Aerobatic Airplanes* with a number of plans of aerobatic planes. Some of them were very interesting for me; i.e., Laser 200, Stephens Acro, and Super Star.

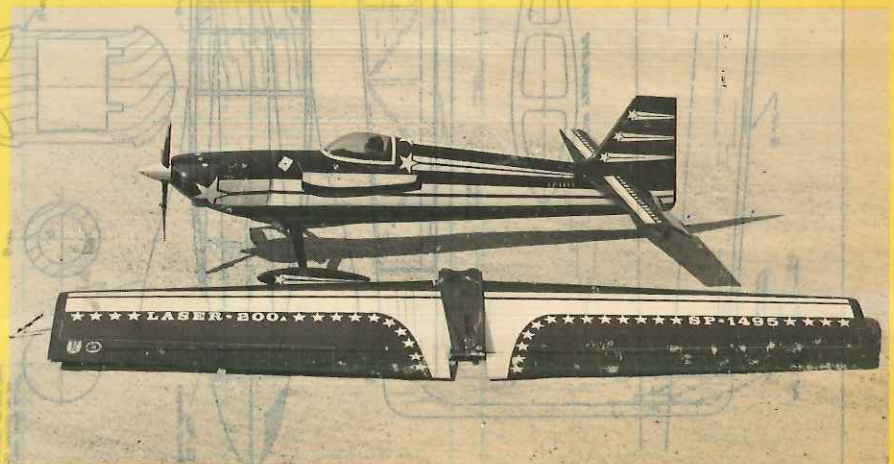
Fortunately, I have a nice friend, Claus Maikis, who lives in West Germany; and he is a competitive aerobatic flyer. He wrote to me two years ago that he is an enthusiast of Laser's semi-scale competitive stunt models and sent me a photograph of his model. If I cannot do a full-scale model, I decided to make semi-scale stunt model. Realistic control line aerobatic ships turn me on. This is a way I made up my mind the Laser 200 is my stunt ship for the 1985 season.

Many good aerobatic pilots do "flying cigars" with wing and tailplane for aerobatic

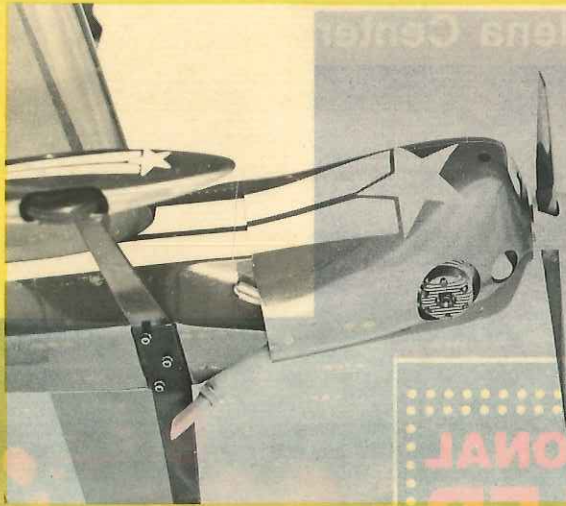
program only. They look like jet airplanes to me. I did it too, of course! Look at my Voyager published in *Model Builder* February 1986. They fly well, but look bad in the air. Aerobatic models should look like really aerobatic planes. My Laser 200 looks like a really aerobatic airplane and flies

well too. I won first place at Polish Nats in 1986 and got second place at the famous Nograd Cup F2B—85 with this model. Also I took many prizes at less important contests in F2B class (CL aerobatic in FAL rules).

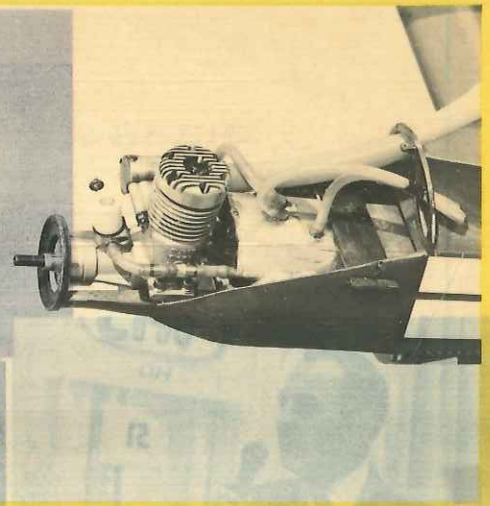
In England at Europa Championships '85



The wing of the Laser 200 is detachable for transportation, but it does make the model a bit heavier. The ST46 engine used by the author has enough gusto to carry it through the air.



Piotr used a large Sig plastic cowl as a mold for one made of fiberglass cloth and 24-hour epoxy. It came out light, just two ounces.



Laser's ST46 with author's lightweight aluminum silencer(muffler). Key to aerobatic performance is having a good tank and prop.

I did not do well with my Laser 200. I have had much problems with my ST46 engine, so I did not do a full aerobatic program there. But everyone was impressed with my Laser. It was the most beautiful stunt model at these Europa Champs and you can read about it in *Aeromodeller*, October '85 or *Modelar* 10/85 (Czechoslovakian model magazine). Mr. Otskar Safek put a photograph of my Laser 200 on the cover of this magazine.

LASER DESIGN

Of course, my Laser 200 is not a full-scale model. Thus the wing and tailplane proportions and dimensions are done like my older stunt ships with not too much difference to the scale model. But fuselage side view and, of course, painting scheme is almost the same as in real Laser planes. Thus, everyone thinks it is semi-scale Laser 200. Yes, it looks like it.

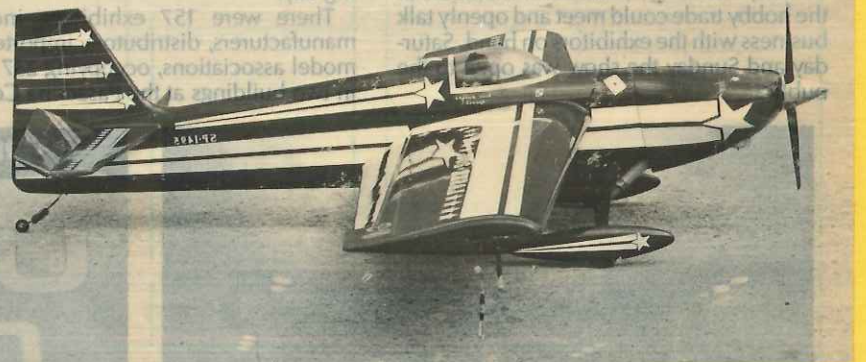
The control system is made like in Voyager with 1:1 ratio as the best. The pushrod is made from light 1/4-inch hard aluminium tube and horns from 1/16 brass plate soldered to hard 3/32 steel wire. All control systems must move easily without any slop in the bellcrank and flap horn with a little slop in elevator horn. This control system is not adjustable. I had many experiences with other ratios and found the 1:1 ra-

tio is the best in aerobatic model.

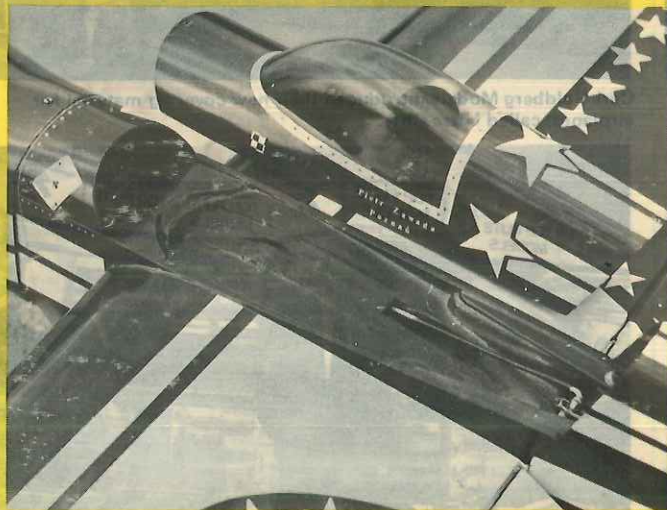
The wing is detachable for easy shipping and transporting to contests. The model with detachable wing is, of course, a bit heavier—about two to three ounces, because the fuselage in this case must be made stronger with long pay doubler. Thus, if someone will do this model in one piece it should be better, as the model will be lighter and easier to do. Weight of my Laser

is about 59 ozs., so it is a bit too heavy for ST46, but, as I told you above, it flies as well as looks.

The fuselage-wing mounting system must be done strong and exact without any gaps. It did mean the fuselage was almost ready with bottom sheet. The wing was ready for painting. Then I glued the mounting system



"Realistic control line aerobatic ships turn me on," opines the author. It's easy to see why he waxes rhapsodically over this sleek model.



Top of fuselage was constructed of balsa sheet and formers, rather than hollowing balsa blocks. Text explains reasoning for doing so.



Piotr is so proud of his homemade cowl that he asked that we show it just one more time. Three-bladed 11-6 wood prop works best.

of the wing; pieces of 1/8 ply or fuselage sides and (pieces of fuse sides on wing) and small balsa blocks as reinforcement. When the work was done I glued the stabilizer into the fuselage and put in the pushrod. Zero error alignment is a must to assure a contest winner. So epoxy and check one more.

Most interesting is the engine cowl in this model. I have got a Sig large plastic cowl from my American friend. It looked very nice, so I decided to use it on my Laser, but it was a bit too heavy in my opinion—about four ozs. Thus, I used this cowl as a form and made a new one from glass cloth and 24-hour epoxy. This new cowl was much lighter—two ozs. only. The mounting of this cowl to the front of my Laser is very simple. It is based on nose ring and F3 former without any gaps and kept with two small bolts to this former. Thanks to this cowl my model looks very impressive, and I put a silencer into it. Of course, first I did the cowl, later the F3 former passed to cowl and later designed the rest of fuselage to the cowl and plan of Laser plane. My new model for 1987 season will be designed to its cowl too! It looks very impressive in a CL aerobatic ship. Of course, the silencer must be very small—I made it from aluminum tube about three quarters of an inch in diameter.

The fuselage was made without any block on top. Everything was made from balsa sheets to make it lighter and faster.

Hollowing of blocks need much work, and it is hard to keep equal wall thickness in whole block. Almost everyone does wall thickness more than 1/8 inch because he is afraid to cut out the block. It is not hard work to do the top of fuselage from balsa sheets. You have to do top parts of fuselage formers exactly and exactly glue them to good positions. Place thick paper over formers, draw and cut the top shape from balsa sheet. You have to do this sheet about 1/4 inch larger each side. Wet this sheet with water, bend around formers and wait for it to dry. After it the sheet will be a bit smaller. Now you can pass it to the fuselage exactly and glue on proper position.

WING

The wing is simple. I cut a foam core with templates made from 1/16 plywood. Then covered the core with 1/16 balsa sheets and cut lighting holes. Both panels are equal. The complete wing ready to paint without flaps was about ten ounces.

Flaps and elevators have triangle sections and were made from very light balsa. All movable parts of an aerobatic model should be done strong but light as possible. Heavy flaps, elevators, bellcrank, horns, and pushrods will give you a large inertial moment, which is very bad for the model, which should turn very easy and fast.

My Laser 200 is powered by an ST46 engine; light and powerful. The real key to top performance is to have a good fuel tank and choose a good prop for an aerobatic model. I always use simple uniflow tank with baffle about 1/4 of the length from the rear, and the pickup tube ends just short of the baffle. The baffle is perforated with six 1/8-diameter holes with a triangle hole in the

edge of the wedge. Pressure from silencer is necessary. Much more problem with props. If you put the same engine and tank on another model you will probably look for other props. I tried many props on my Laser; i.e., from two blades 10-6 extra wide, to 12.5-6 narrow, and a few three-bladed props of my own make. I have found three-bladed 11-6 wood, a very light prop is the best for my Laser. Maybe your Laser will need another prop. Selecting the best prop for model and engine set takes much time, but it is very important to get almost constant speed during maneuvers, particularly in windy weather.

FLYING

My Laser flies well with 62-foot lines. The lap time is about 5.3 to 5.4 seconds per lap. My handle spacing is 4-3/4 inches. During the first few flights I do two things: first, tweak the flaps, if needed, to get the wings parallel to the ground; and second, adjust the leadouts so the model is flying with the lines perpendicular to the fuselage. Next, I start to do square corners. Triangle maneuvers are the best in my opinion, and add nose weight or tail weight—much worse because the inertia moment becomes too large.

Of course, every practice-adjust flight I do with my friend who looks at the model during flights and tells me what he notices. To get good tip weight I do hourglasses. The up corner of this maneuver tells me much about tip weight. If the outboard wing drops on these hard corners when the line's tension is very little, I should take out some tip weight; if it is not dropping, I try to add some tip weight.

If you should run into a snag, or have a few comments about the Laser 200, I would be most interested in hearing from you. Piotr Zawada, Osiedle Przyjazni 22 N m.141, 61-680 Poznan, Poland. •