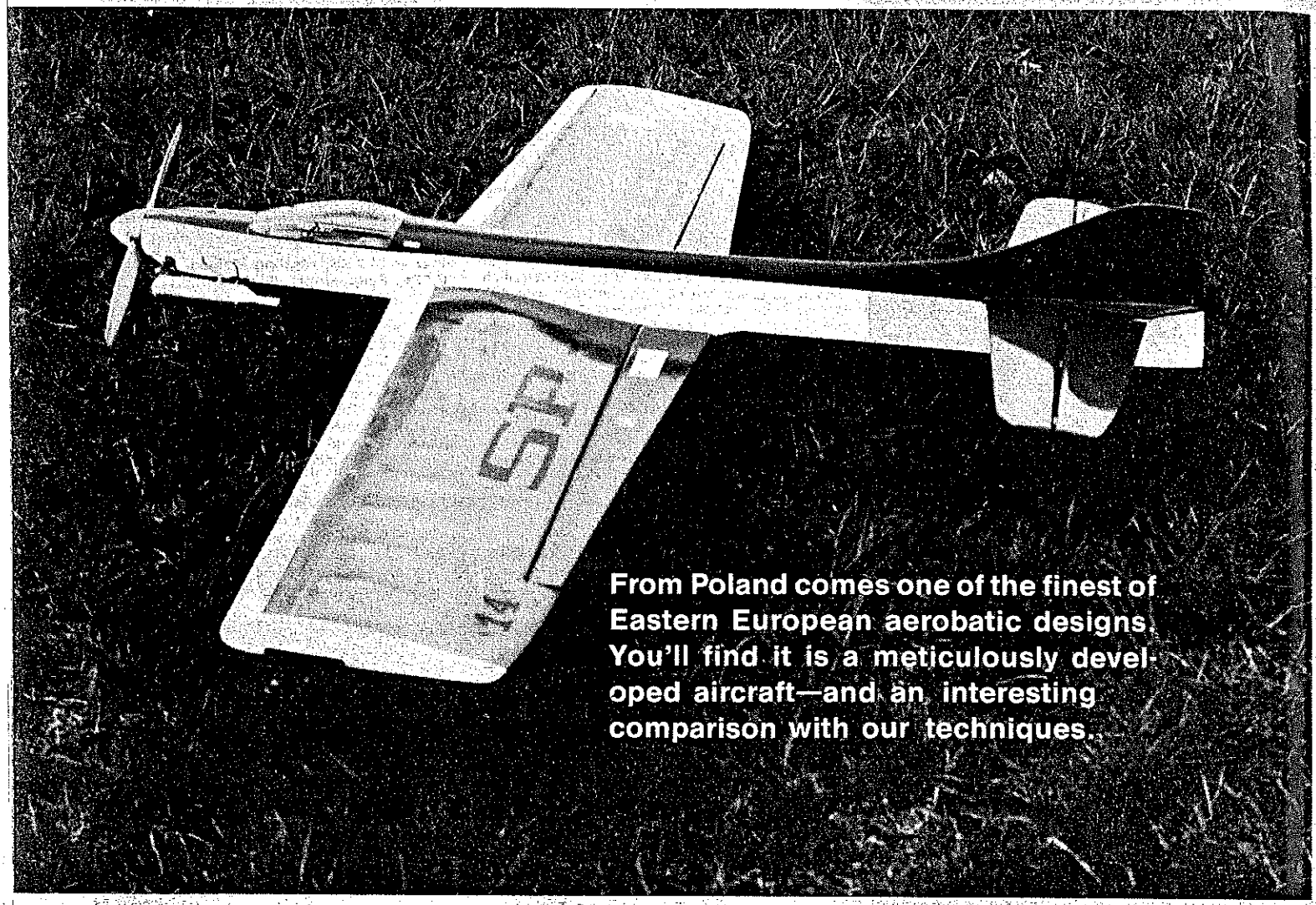
Piotr Zawada

LUCKY 14

298



From Poland comes one of the finest of Eastern European aerobatic designs. You'll find it is a meticulously developed aircraft—and an interesting comparison with our techniques.

LUCKY 14 is my approach to precision aerobatics with a control-line model. The year 1978 was a very good season for me and my Model 14. I had with it the most victories in all important contests in Poland and I was the best stunter in the Polish team at the international competition in Czestochowa / Champs of Socialist Countries and in the Cup of Sofia / Bulgaria/. Only in the Poland National Championships I got a second place—vice-champion of Poland 1978. Thus, after this lucky '78 season I named my Model 14 as "Lucky 14."

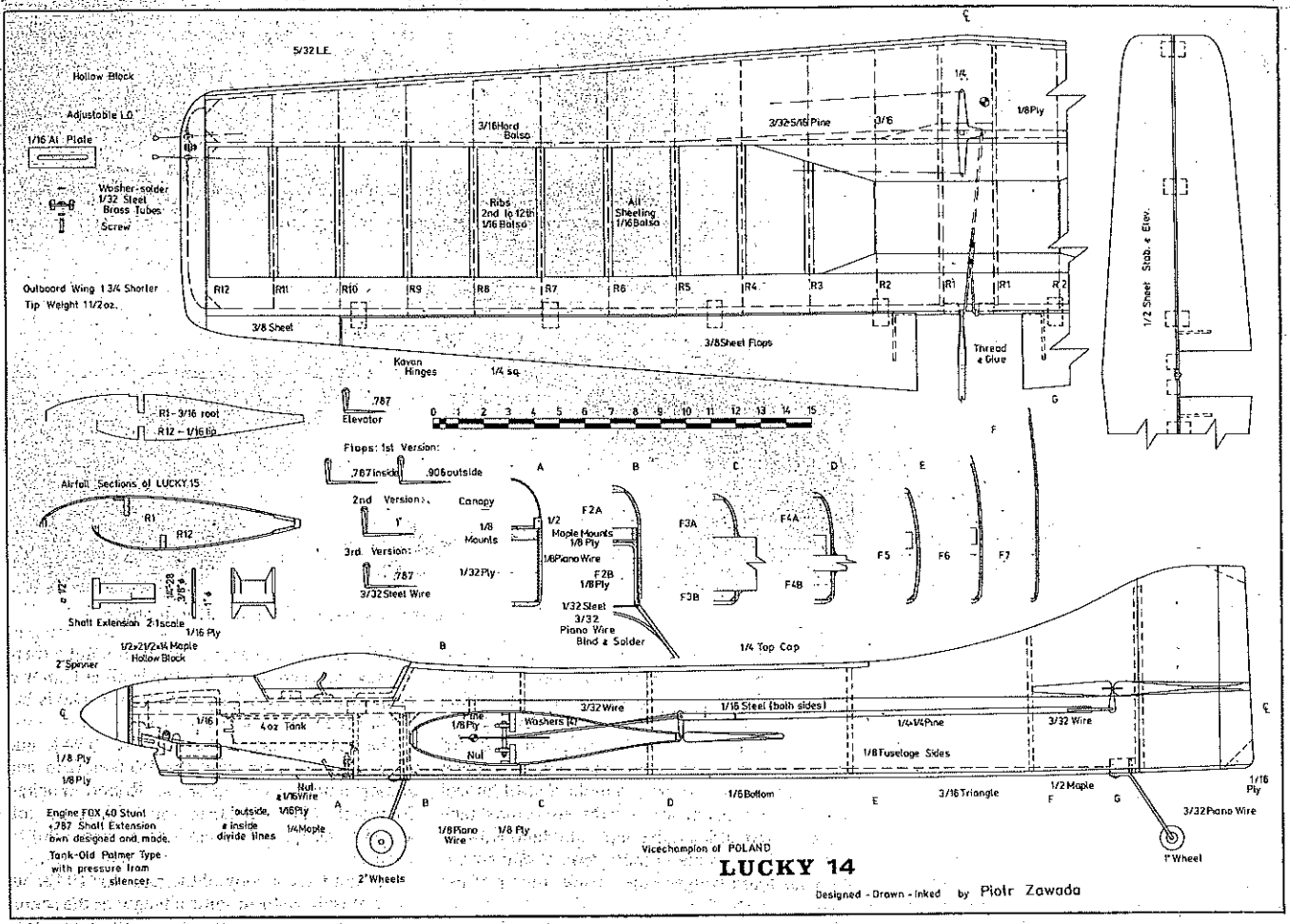
Designing: After the 1977 season in which I got the third place in Nats of Poland, I started to design my new model for 1978—the 14th of the series. Model 13 had, in my opinion, too large a wing area—about 750 sq. in.—for my old Fox 40 Stunt, so I reduced the wing size to about 700 sq. in. This model would have a maximum weight of about 50 ounces complete, because my Fox 40, a very good engine, was already very old and not as powerful as a new one.

The new airfoil sections would be about 20% thick, without flaps at tip and root, with the maximum wing thickness point about 35% of chord without flaps. I based my work on three airfoils: NACA 0018, Saftig, and Epler, and designed my own airfoil sections, varying from root to tip with blunt leading edges. I like it when my model flies slowly and softly. I designed the fuselage as long as in my old Model 13—the model with the long fuselage is less "nervous" in windy weather.

Top: Superficially, or at least to the non-stunt flier's eye, such machines appear more or less standard. But the really good ones embody special variations on a conceptual theme, permitting fine-tuned performance to meet exacting demands. Author, above, with son, gets that across in simple, feeling language.

Construction: Construction is quite simple. It is assumed that those who are interested in building the Lucky 14 are competent modelers, so detailed instructions are not needed. Do your own thing and build what assembly you like first. I always build the control system first—bellcrank, horns, pushrods and leadout wires. This work must be done precisely. The control system must work very easily without any gaps between control surfaces and fixed areas.

On the plan you will see three versions of flap horns. I flew with the first version of these horns from March to April in 1978. When I damaged the Lucky 14 in a test flight I changed the flap horns so as not to be differential (second version), but my model twisted very heavily in square maneuvers, and I changed this horn once more as a 1 : 1 ratio (third version). Thus, I found this ratio to be the best one. In this case, the maximum



FULL-SIZE PLANS AVAILABLE . . SEE PAGE 128

angles of bellcrank, flaps and elevator are equal to 40 degrees each.

As always I cut the bellcrank from 1/16 steel with a 1 : 2 proportion. When I have the control system, I can build the wing.

The wing is simple, and many modelers have written about this type in their descriptions of models. One thing is always very important: the mounting of the bellcrank inside of the wing, because the whole model "hangs" on it during its flight—and in pull-tests. The mounting of bellcrank must be done very exactly and strongly.

Later, I make the stabilizer, mount the horns and join the stab and wing horns with the pushrod. To make the fuselage, I first cut the mounting sheet for the engine from one piece of ½ X 2½ maple about 14 inches long. I use about 3 degrees of engine right-thrust.

The fuselage sides are laminated with the 1/32 X 3 X 14" plywood doublers and glued to form one piece as side views, left and right. For the fuselage sides I use a wet molding technique to get an oval section. The sides are soaked in warm water and then, when sufficiently pliable, they are fastened to a molding board and left for a few days to thoroughly dry out. Then the fuselage sides are permanently shaped for assembly.

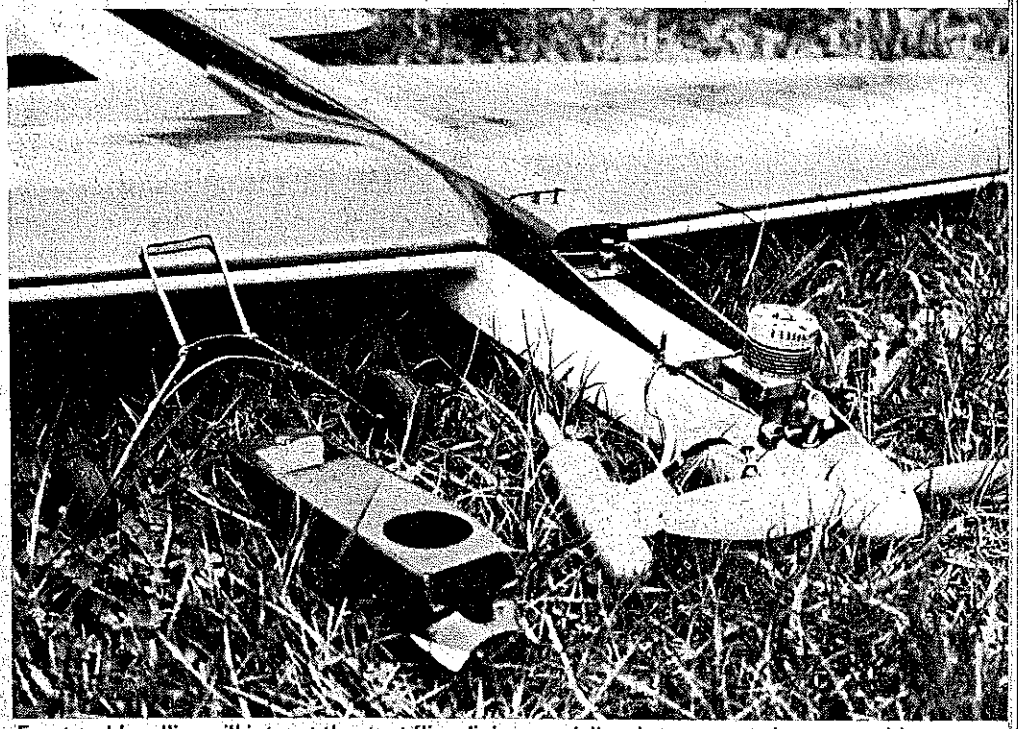
Now I cut the holes for wing and stab and mount the model as one piece, glue on a top and bottom, the nose-ring hollow block, and add the cockpit details and the canopy. The rest of the work is very simple. The aircraft is now ready to finish. You can use any type of finish you like.

I cover the entire plane with two coats of clear dope, sand it, and then coat the plane with Japanese tissue. On the wing I double cover. Finally, I cover it with four to five coats of clear dope, allowing 24 hours drying time between each coat. Of course, I sand each coat of dope, using number 280 for the first, to 400 for the last covering coat.

For paint, I prefer the polyurethane semi-matte lacquers, but they are a little bit too heavy and hard to obtain. I do not like too glossy a covering on my models—the real airplanes don't have too much gloss. Do not hurry the painting. Work slowly but exactly. Nobody likes even a good model, when it is not painted as well as it could be.

Engine and Fuel Tank: My Lucky 14 is powered by old Fox 40 Stunt with 11½ X 4½ or 11 X 5 props of my own design and make. This is a good and light engine for stunt models and runs very

Continued on page 108



Front end handling will interest the stunt-flier clinic—especially what appears to be a removable gear. Zawada transfers his well-used Fox 40 from ship to ship, turning 11½ x 4½, or by 5, homemade props—even 12 in. diameters. The 4-oz. Palmer-type tank is muffler pressurized.

shell skin was of varying thickness, being thicker at the front where landing gear, wing and engine imposed large loads. The assembled shells were reinforced with internal rings and longitudinals all joined together to produce a light, strong, and efficient fuselage.

A good fuselage shell could be molded in the same way but would require far too much work in making the mold and then reinforcing the shells. Planking is our most reasonable choice. We will do it a bit differently, however, relying less on thick balsa than on technique.

We will start by repeating some of the shell techniques steps already described.

The first step is to produce a side view and accurate cross sections at each stress location such as wing spar, firewall, landing gear attachment stations. Other intermediate cross sections will be needed to produce a good form and perhaps reinforce the hand-launching grip zone.

Set up top and bottom outline strips on the drawing and erect half bulkheads, just as was done for the sheet shell assembly. Again, be accurate so that the bulkhead edges will meet and join when the shells are mated together.

Since both halves should be identical, we will use fairing strips to find where contour changes or corrections are needed on the half bulkheads on the first half shell and we will then correct the other halves to match. Now lay a single ¼ X 1/16 stringer from front to rear along the horizontal outer belt line. It should in a notch flush with the bulkheads.

One problem in planking a fuselage or boat hull is that the planks must be narrower as they get to smaller sections. The boat builder has a technique he calls "spiling"—used to establish the taper necessary. Spiling would be very difficult and tedious for model work so we tackle the problem another way.

We need to make long gently-curved taper planks to allow for the change in fuselage circumference and we will cut these curves with a straightedge.

Four 1/16" high jigging blocks will be cemented to your cutting board. When a 5/16 X 1/16 strip is forced into the curve by these blocks, a straight line cut will become a curve when the strip is allowed to unbend. If this straight cut is made with the blade several degrees off vertical, there will be a bevel edge on the curved edge, which can assist in getting a good edge joint. Fig. 1 shows a layout of jigging blocks which were used for this 1/12 scale Lockheed Vega.

If the largest semi-circumference of the fuselage is, for example, 5 in. and we expect to use ¼-wide planks, there will be 20 planks required. However, if the small end has a semi-circumference of 1¼ in., then the planks must taper to 1/16 wide at that end.

This arithmetic is useful but accuracy in this size is not up to producing perfect matching. You will *still* have to make an adjustment on the last one or two planks.

Proceed from the center line of the belt line stringer, making sure there is no cement squeeze-out to interfere with the next plank. Add a plank on each side of the belt line, alternating above it and below, watching progress in covering the shell fore and aft. It will probably be necessary to change the block spacing of the cutting jig to adjust the plank taper. If the final plank does not perfectly fill the remaining gap at the top and bottom stringer, don't worry. With more than three-quarters of the skin in place, the shell can be lifted off the board and a tailored plank can be placed.

Lucky 14/Zawada

continued from page 39

well with large propellers, even 11 or 12 inches in diameter. I use an old type Palmer 4-ounce tank with pressure from the silencer—the orifice about 1/16. The tank is one inch deep with the fuel pick in the center, but it is mounted about 1/16 in. above the spray bar of the engine. Thanks to this, the engine runs a little faster in inverted flight. This helps a little in some maneuvers.

Flying: The first few flights should be made in calm or only light wind. I regulate the height of fuel-tank placement to spray bar of the engine, and the speed of model in straight flight and in the maneuvers with different props. My model must fly slowly with lap times around 5.6 seconds on 67-ft. lines, and with lap times in inverted flight at around 5.4 seconds.

The engine runs must be maximum when the model flies upward (two cycle) and it must change the runs quickly to four cycles when the model flies downward. Then I regulate the lead-out lines to the best point for me during the square maneuvers.

My Future Plans: Of course, the 1980 World Championships in Poland! My next model, the Lucky 15 for the 1979 season, I hope will be luckier still. It is being made to similar dimensions as the Lucky 14, but with new airfoil sections—my own design with greater maximum thickness, because this model will be powered by the ST46. I include these airfoil sections on the plan.

The tail plane will be made like the tail plane of the Stiletto 660 by Les McDonald, but with the stab covered with 1/16 balsa.

If you should have any questions or ideas about the Lucky 14 feel free to write to me in care of the editor.

CL Aerobatics/Paul

continued from page 40

founding father of the Aero Modelers Association of Northern California (which later became WAM—Western Associated Modelers) wrote up a new set of rules for Stunt which were basically the same rules then being used in Northern California. This occurred in the fall of 1948 or early 1949. According to correspondence with Roy Mayes, he is a little foggy on dates and much of his correspondence and records from the '40s was destroyed in a fire.

Regardless of whether the new pattern was first used in 1948 or '49, Roy introduced some new ideas: (1) the eight-minute time limit, (2) three attempts to make two official flights, (3) that old controversial item, appearance points, (4) flight pattern points. WAM appearance points were quite heavy and could amount to something like 25% of total score. Roy explained appearance points in one of his letters: "After seeing how the old time free flight gas models changed from semi-realistic models into 'thingies' and the same thing happening to Round-the-Pole race cars, I was determined to keep the same thing from happening to control line."

The 1949 rules included the following sequence: starting and takeoff, level flight, climb, dive, wingover, five consecutive inside loops, five consecutive outside loops, inverted flight, three horizontal figure eights, vertical figure eight, overhead figure eight, square loop, special maneuver (must be described in detail to judges prior to flight), landing. Appearance points were 8 to 80!

In 1951, the special maneuver was dropped from the pattern. Otherwise, the pattern was the same for '51 and '52. The '51-'52 pattern is the one used most of the time for "old time stunt."

According to the rule book, the 1953 pattern