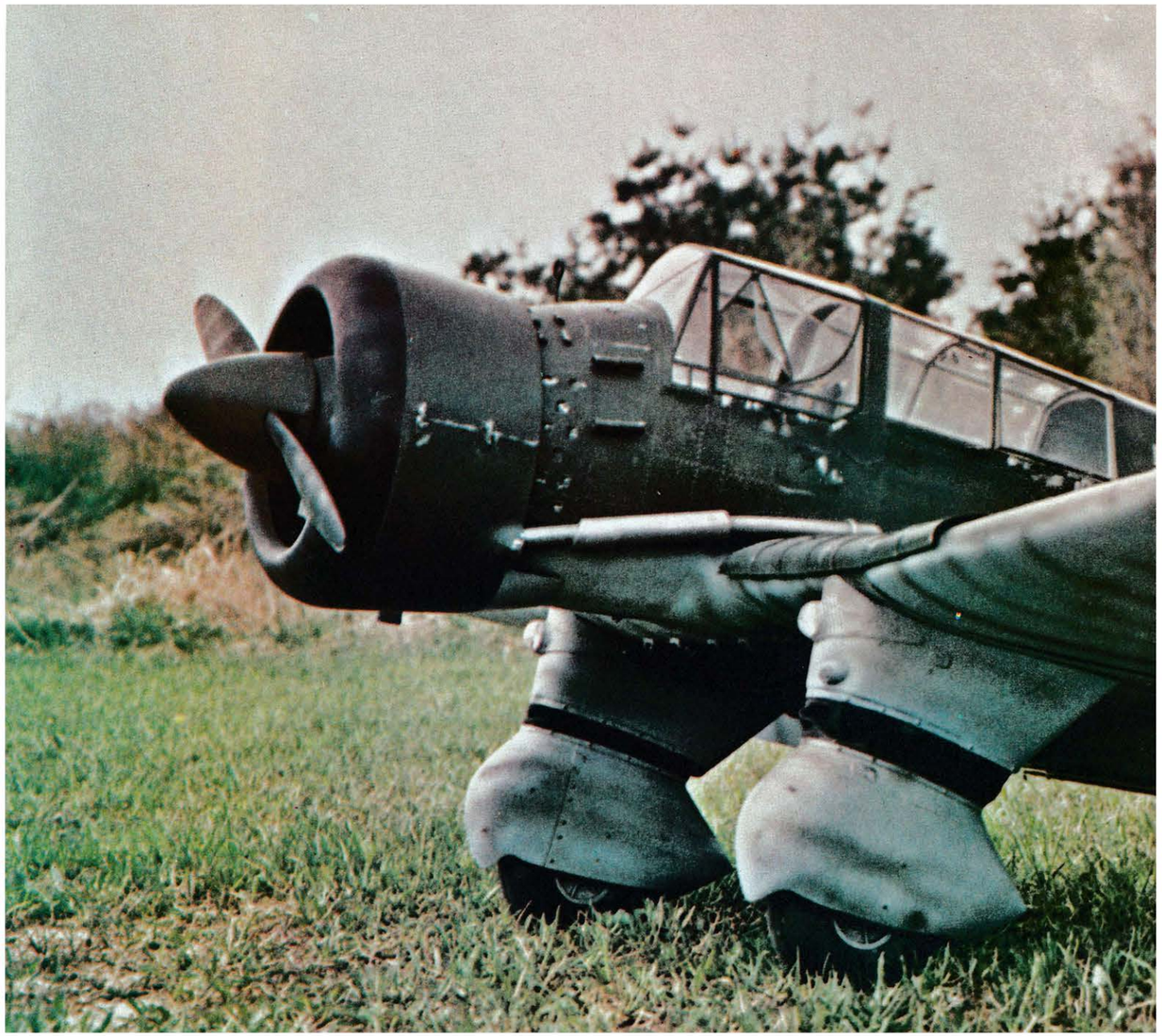
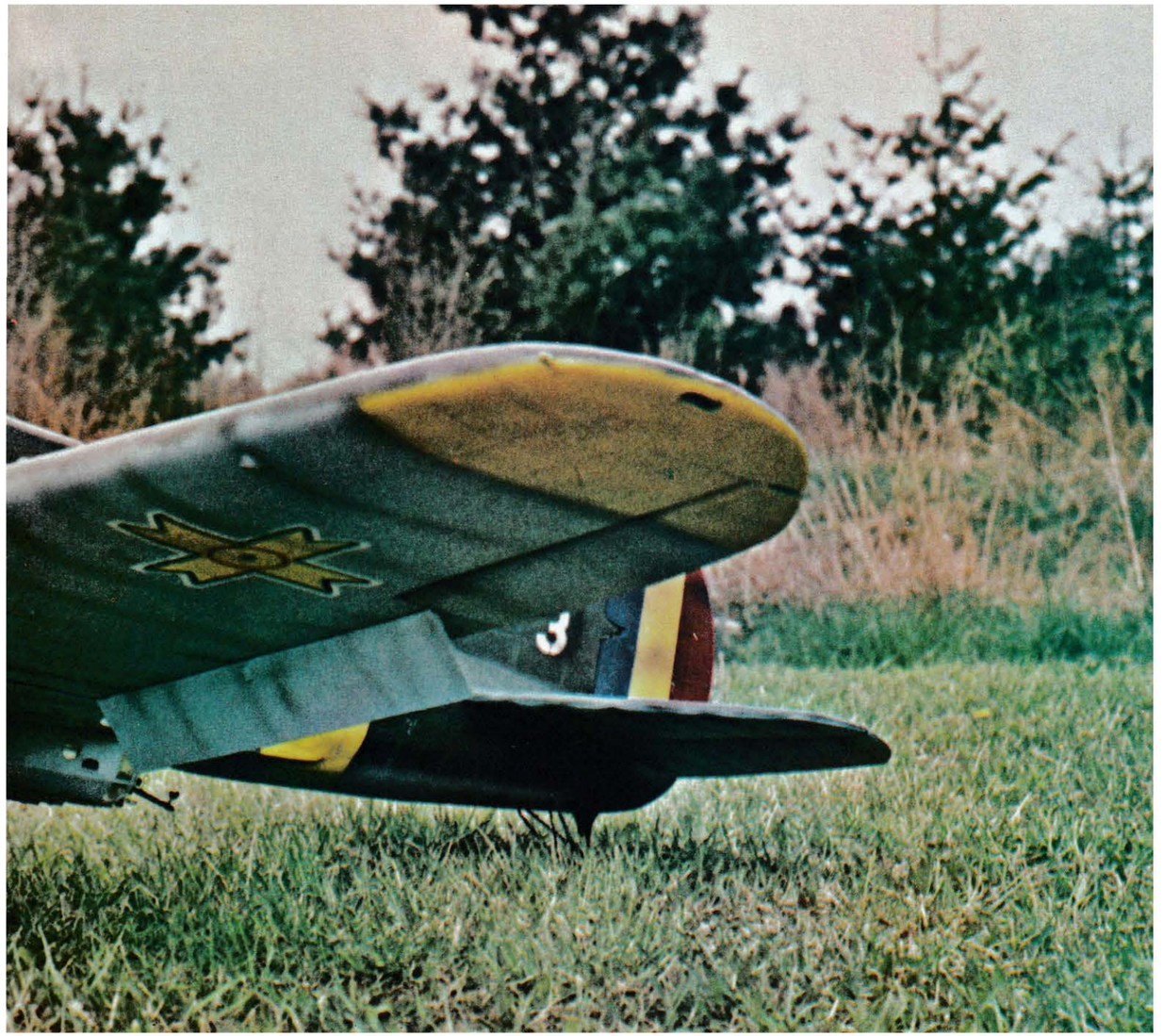




PZL P-23 "KARAS" (Part I)

This rather obscure Polish recon aircraft was the "Best of Show" winner at the Toledo Expo. It's a masterpiece of Scale artistry.

By Larry Gordon

Photos by the author

The preliminary design of the P-23 was approved in late 1931, by the Polish Aviation Department. The development of the P-23 was to involve many problems and changes. The aircraft was relatively fast—but also heavy—and had to operate from small unprepared fields in the forward combat areas. The primary duties of the "Karas" were that of reconnaissance and light bomber, used usually in support of ground forces. The standard bomb load was six 100 Kg bombs, twenty-four 12.5 Kg fragmentation bombs, eight 50 Kg bombs, or a combination thereof. All bombs were carried on external wing center section racks.

The aircraft was of all-metal construction, and carried a crew of three: the pilot (with one 7.7mm fixed machine gun firing through the propeller), the observer (with detachable dual flight controls), who was also the bombardier and ventral gondola machine gunner and the rear machine gunner (with a 7.7mm Vickers machine gun).

Wingspan of the "Karas" was 45 feet 9½ inches, with an overall length of 31 feet 9½ inches. Maximum air speed for the "A" version was 192 mph and 198 mph for the "B" version. The P-23A was powered by a 570-590 hp Bristol Pegasus IIM2 engine, while the P-23B was powered by the 660-680 hp PZL Pegasus VIII, either driving a two-bladed wooden prop.

The P-23s were not put to the best use. Had they been employed in force on well co-ordinated bombing missions, they could have been very effective. Instead, they were split into small units and used for reconnaissance, and rarely on bombing missions. They fought valiantly in the Polish skies, against overwhelming odds, until 90 percent of them were lost in the hopeless battle. The few remaining planes were later taken over by the Rumanian Government, and pressed into service as reconnaissance and operational training machines. At least one P-23 was still flying in Rumania in 1946.

* * *

Having returned home from the 1983 Toledo R/C Exposition with a third place in Precision Scale with my Douglas SBD-3 Dauntless, I was determined to do better in 1984. I

reasoned that, in order to accomplish this, I would need a model that was: (1) different and unique, (2) of WWII vintage, and (3) larger than a .60-sized aircraft (to better show off the details and allow for a lighter wing loading). So with these qualifications in mind, I began scanning through my reference books and the M.A.P. Scale Drawings Catalog (available from Bob Holman).

For some reason, I kept coming back to that dropped-snout, fixed landing gear "Karas." I had never even heard of a P-23 Karas, but what an opportunity for a scale builder to show his stuff! This aircraft was loaded with garbage: three venturi tubes, an oil cooler radiator, wheel pants, ventral gondola, two Vickers machine guns, bombs, air scoops, wing slats, flaps, flare tubes, and a giant greenhouse-type canopy. No contest judge, with all of his screws in place, could overlook this aircraft. I was hooked, and immediately sent away for the scale drawings.

Having only scale line drawings without any interior details (except for the instrument panel), I had decided to build the model as stand-off scale, at a scale of 1:5.5, Dave Platt style. This scale yields a wingspan of 99 inches and a wing area of 1,460 sq. in. While in the process of drawing the plans, I decided to waste a stamp and sent a letter to the Historical Commission of the Polish National Aeroclub—addressed simply to Warsaw, Poland. Much to my surprise, about three months later I received a package of ten 5x7-inch photographs and the loan of an original copy of a Polish magazine-type publication entitled *Planey Modelarski* from Marian Krzyzan of Gora, Poland. What a break! Marian is an FAI International (F4B) judge, and he knew exactly what I needed —actual photographs and complete interior drawings. It is nice people like Marian Krzyzan all over the world who make different and unique models available for all of us to see and enjoy.

I now had the right information for a Precision Scale model, but this was September and I only had seven months before the Toledo '84 Expo to build and finish a show quality model. NO WAY! Old flying friend and master builder, Dick Barron used to tell how, on opening day of the Toledo Show, he would have his wife, Betty, drive the two-hour trip to Toledo. Dick would ride in the back of their pickup truck (with topper) putting the finishing touches on his newest creation. This process seemed to work for Dick. After finishing Second with his first entry, he took home the First Place Gold three years in a row in Stand-Off Scale.

Well, as it worked out, seven months and five hours have been just the right amount of building time. I arrived at the show at about 2:00 p.m. after spending the entire morning spraying the final paint coats on the Karas. As luck would have it, the Karas won First Place in Precision Scale, and also Best

The "A" version of the Karas, shown here, had a maximum airspeed of only 192 mph. (Photo courtesy L. Gordon)

of Show honors.

Now, about the model. My original intention was to design a Scale model that would be built using alternative type of materials, other than high cost balsa. All of the fuselage formers are of 1/8-inch mahogany plywood door skin, with the longerons being cut from redwood that I had recently removed from a deck on the back of our house. I originally intended to use foam board for the wing ribs, etc., but when I priced out this material (about $48.00 worth) at the local drafting supply store, I quickly changed my mind and reverted back to 3/32-inch balsa. To hold the cost of the balsa down, I had my local hobby shop special-order 60 sheets of 3/32-inch "seconds." This cost about $25.00 and is sufficient for all the ribs and sheeting. You can sort through the balsa, saving the best and lightest pieces for use in critical weight areas.

My prototype was built from the pencil drawings, with corrections and changes being made during construction. I had originally planned and hoped for a ready-to-fly weight of 17 lbs. The finished weight of the prototype finally came out at 20 lbs., due primarily to several errors in the original drawings which, of course, have been corrected. The worst of these was that I had drawn the thickness of the horizintal and vertical stabilizers too thin, not allowing for the 3/32-inch sheeting. I did not catch this error until they had been sheeted and installed on the fuselage. Having read all the stories about Quadra-type aircraft being nose heavy, I simply added a second layer of 3/32-inch balsa sheeting to the stabs. . . . I know, stupid, STUPID, STUPID!

The all-metal P-23 carried a crew of three. (Photo courtesy L. Gordon)

Being somewhat cheap at heart, my second stupid mistake was that I constructed the landing gear from steel spring-loaded hatch back arms, procured from the local auto junk yard for $5.00. To these I brazed 3/32-inch cold steel brackets, and arms with steel axle bolts and nuts. I know, stupid, STUPID . . . heavy, HEAVY! But, it counter-balanced my error on the stabs. Dave Platt's 1/5-scale retract struts would be perfect here, with a great savings in weight.

On the prototype, the large cowl and wheel pants were built as "one-of-a-kind" over male molds. This causes these parts to be quite heavy, as many coats of resin are necessary to get a smooth finish. Save yourself a little weight and lots of hard work by ordering the cowl and wheel pants from: Fiberglass Master, Dept. SRC, Rt. #1, Box 460, Goodview, VA 24095. I really believe that these items, combined with the intelligent use of some carbon fiber, could yield a model in the 15-16 lb. range.

At the prototype weight of 20 lbs., and wing area of 1,460 sq. in., this still produces a wing loading of a very respectable 32 oz.-per-sq.-foot—not bad for such a highly detailed model.

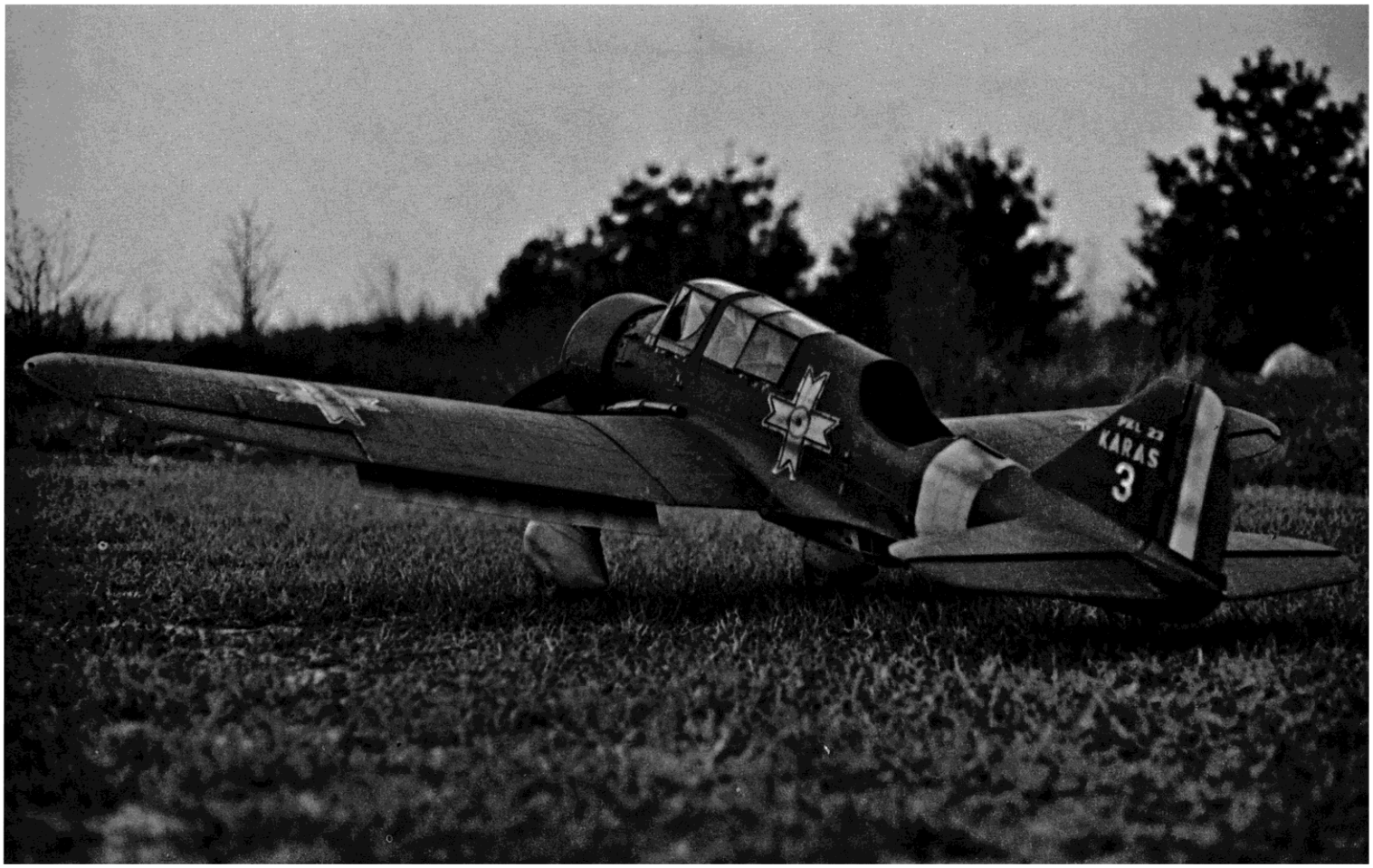
Construction of the model is straightforward, and covered in the construction manual included with the plans. The fuselage and vertical stab are built on a simple jig described in the construction manual, usig 1/8-inch plywood and 1/4 by 1/4-inch spruce longerons all sheeted with 3/32-inch balsa. I started construction of the fuselage using Tite Bond glue and, shortly thereafter, found glue joints starting to pop loose. This type of glue sets up quite quickly, with very little penetration of these harder woods. I do not recommend the use of these types of glue (Tite Bond, Elmer's, etc.) for this use. I used Hot Stuff Super T (gap filling) throughout the remainder of the construction.

Cockpit and canopy construction are quite different than what we are normally accustomed to. The actual inside surfaces of the structure and fuse sheeting are grain filled and

painted to form the cockpit interior —just like the real thing. The canopy frame is constructed from 3/32-inch square brass, soldered and then covered with .030-inch clear butyrate plastic. Both of these procedures are quite simple to accomplish, and produce results which are stunning in their realism.

The wing is built in three sections. On the prototype, I opted to permanently install the wing center section (with landing gear) to the fuselage. This makes the model a bit more difficult to transport, but simplifies construction and gives better results with regard to radio installation and wing fillet construction. The outer wing panels measure 37 inches each and plug into the center sections with a carbon fiber reinforced arm, held in flying position with two wood screws, one in each of the spars. The aileron and flap servos are located in the outer wing panels, and can be hooked directly to the control surfaces, if desired. I installed troque

The author and his prize-winning aircraft. The model won "Best of Show" at Toledo, which is about the highest recognition a modeler can get. If that weren't enough, the plane also took first place in Precision Scale.



That cockpit area just cries out for detailing, and you can be sure that the author made it 100 percent scale.

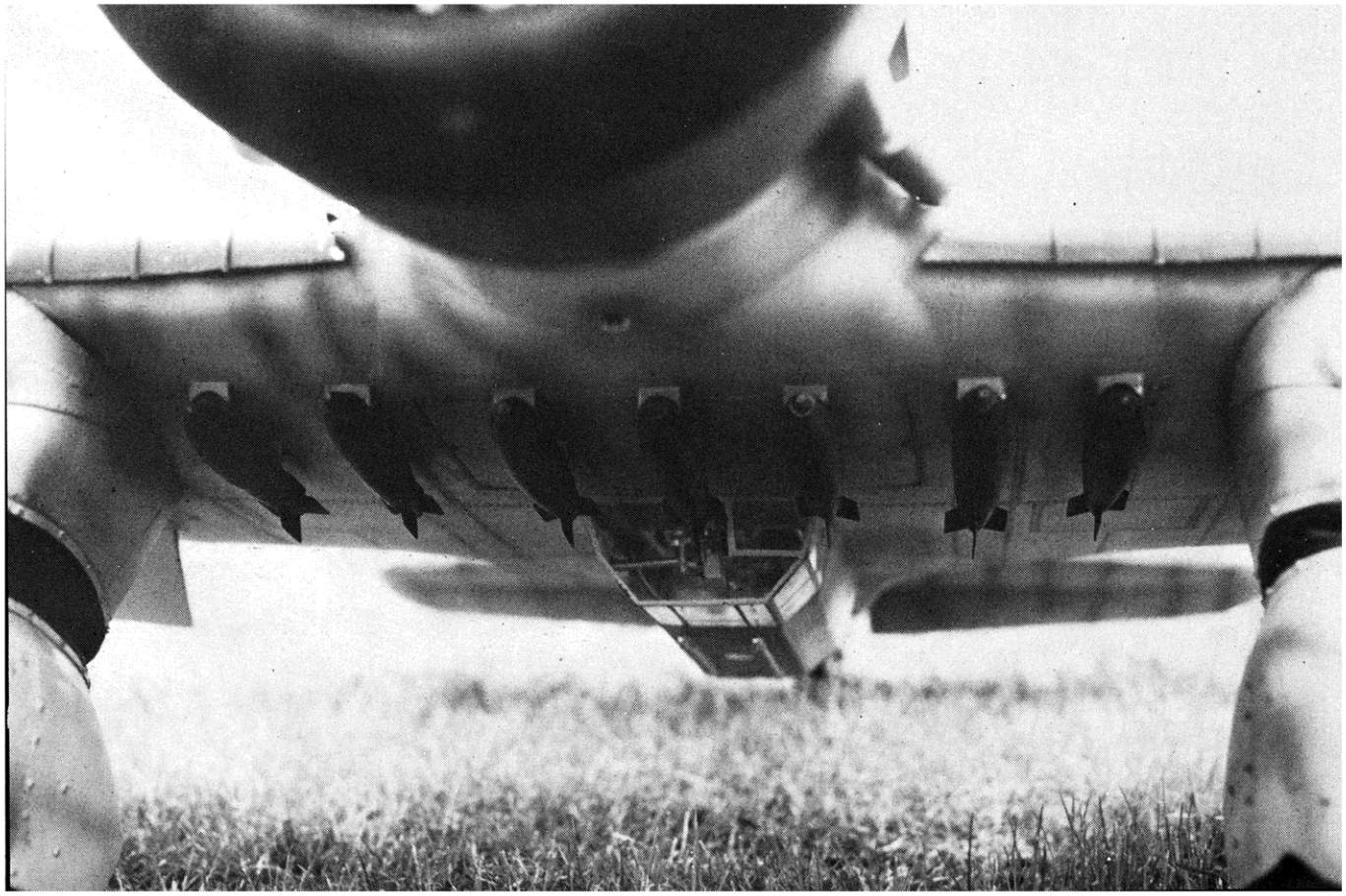
tubes for the ailerons and hooked up the flaps directly. Using this method does not require concrete block-sized servos. Regular servos are quite sufficient, if properly hooked up, without slop.

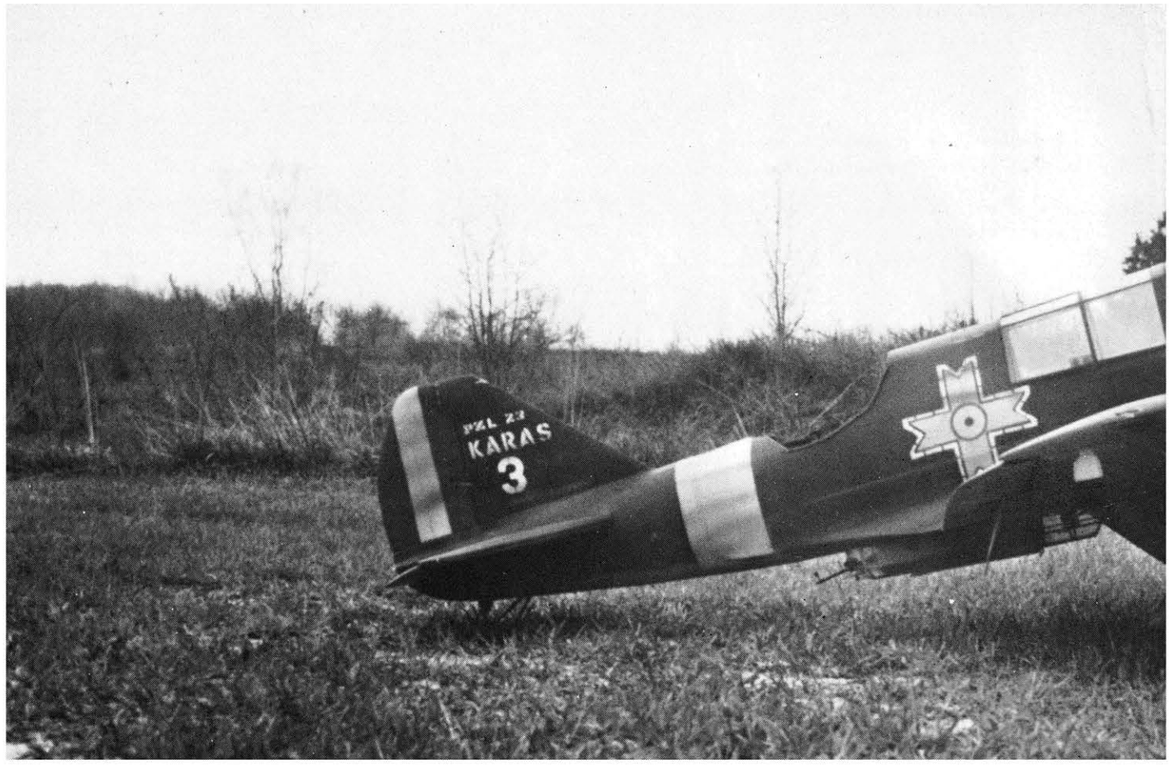
The elevator, rudder, throttle and bomb release servos are installed in a radio box built into the wing center sections, as the fuselage is all cockpit with no room for radio gear whatsoever.

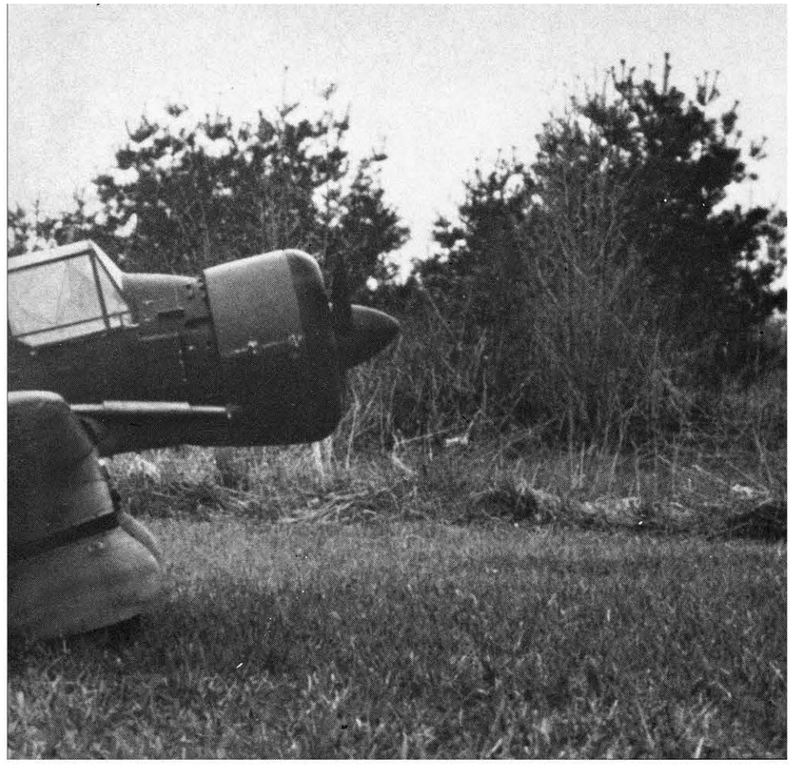
One of the nice things about the great Toledo R/C show are the awards that are presented to First, Second and Third places in every classification. Having won a new Airtronics Championship Series radio (complete with 554 servos), I could hardly wait to get home and pull out my old 1978 vintage radio. What a shock . . . where have I been? With these new radios, you only have to cut open the box and they install themselves. Sure, I've read all the

The Karas is designed around a Quadra. The span is 99 inches.

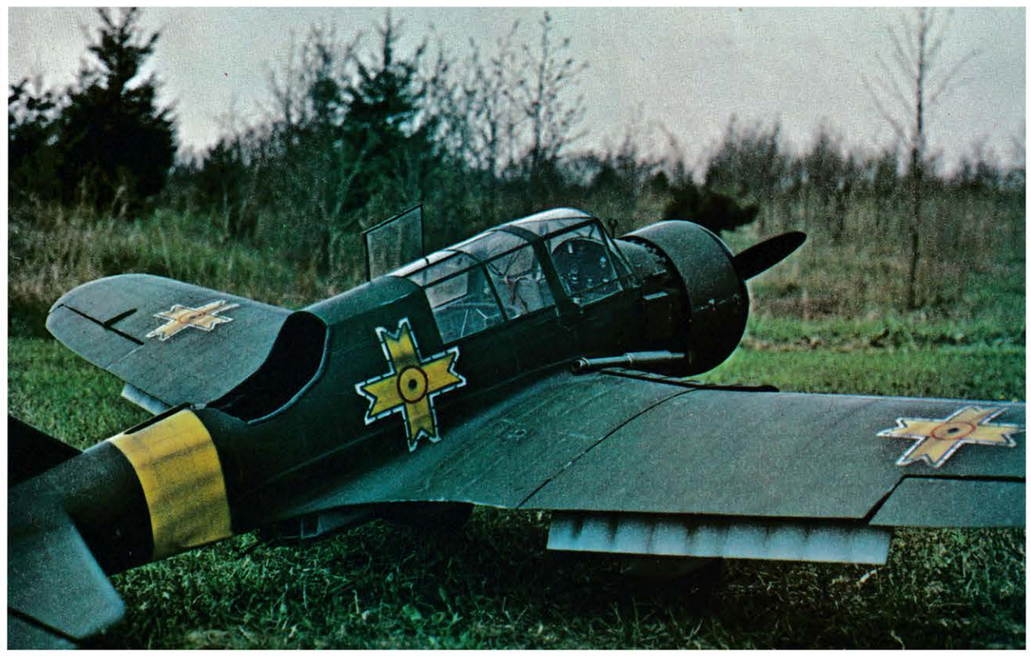
Lots of ordnance to play around with in a contest. The PZL-23 served as both a recon aircraft and a light bomber.







The P-23 isn't exactly a beauty, but it has a certain appeal in its angular lines.

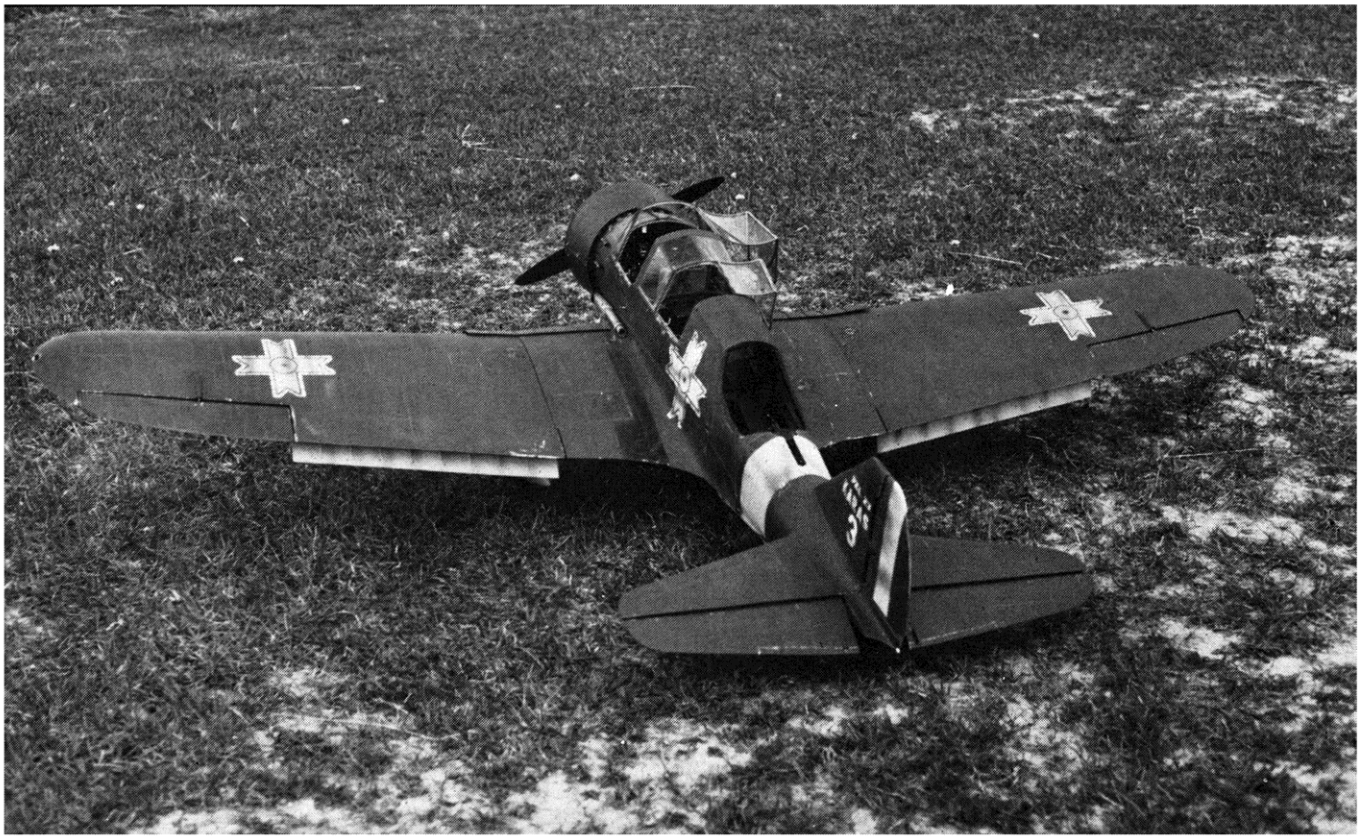


magazine articles, but I had this radio in my hands and I was astonished! It has linear or exponential rates, dual rate adjustment, end point servo adjustment, total throw adjustment, servo reversing, aileron/rudder coupler and direct servo control. The 554 servos are ball bearing, with high torque (77 in/oz), zero slop, isolated potentiometer, coreless motor and are waterproof.

When I read about these things in the magazine I thought they were just gingerbread and lace. Who needs them? Comparing the old radio to the new one is like comparing the Wright "Flyer" to an F-15 fighter. All these new features make building, installing and flying easier and—most importantly—better.

Although designed for the Quadra or Quadra-type engine, many engine combinations should work just fine. Discussing the "Karas" with Dave Platt, he felt that a better choice would be one of the new Supertigre 2000 (1.2) or 2500 (1.5) series glo engines, to get away from what Dave calls the "Putt, Putts." An Me-109 the "Karas" is not, as its maximum airspeed was only 192 mph. If using other than a gasoline engine, consideration must be given to the fuel tank location, which is shown in the wing center section. Glo engines would require a pumping arrangement.

Because of space limitations, we will have to continue this article in the April issue. The second installment will be dedicated to all of the little "secrets" I used to make the scale details on this show-winning model. □



Functional canopies and split flaps are just two of the many operational features of the Karas.

In the first installment (December, 1984 issue) we discussed the history of the PZL P-23 "Karas," as well as some of the general characteristics of the model. I was very proud to have won "Best of Show" at Toledo, and I hope that some of the hints and ideas I'm going to pass along in this installment will help you to produce a show-winning model.

The Karas is a large model, spanning 99 inches, and it is designed around a Quadra or comparable engine. The prototype came out at 20 pounds, which is quite respectable, considering that the interior is exact scale, and there are numerous operational scale features. The plans, which are available from me, detail the interior of the airplane, so that you can duplicate some of the intricate detailing I have put on my model. By the way, the wing loading computes to only 32 ounces-per-square-foot, which is exceptional for such a highly detailed model.

After the first installment had gone to press, I received word that my Karas had been selected as the recipient of the 1984 AMA National Scale Award. In essence, the award is to signify the most outstanding scale model by an AMA member during the year. That's quite a flattering achievement!

Rather than bore you with a "glue Part A to Part B," description, lets look at some of the scale details and how they are built.

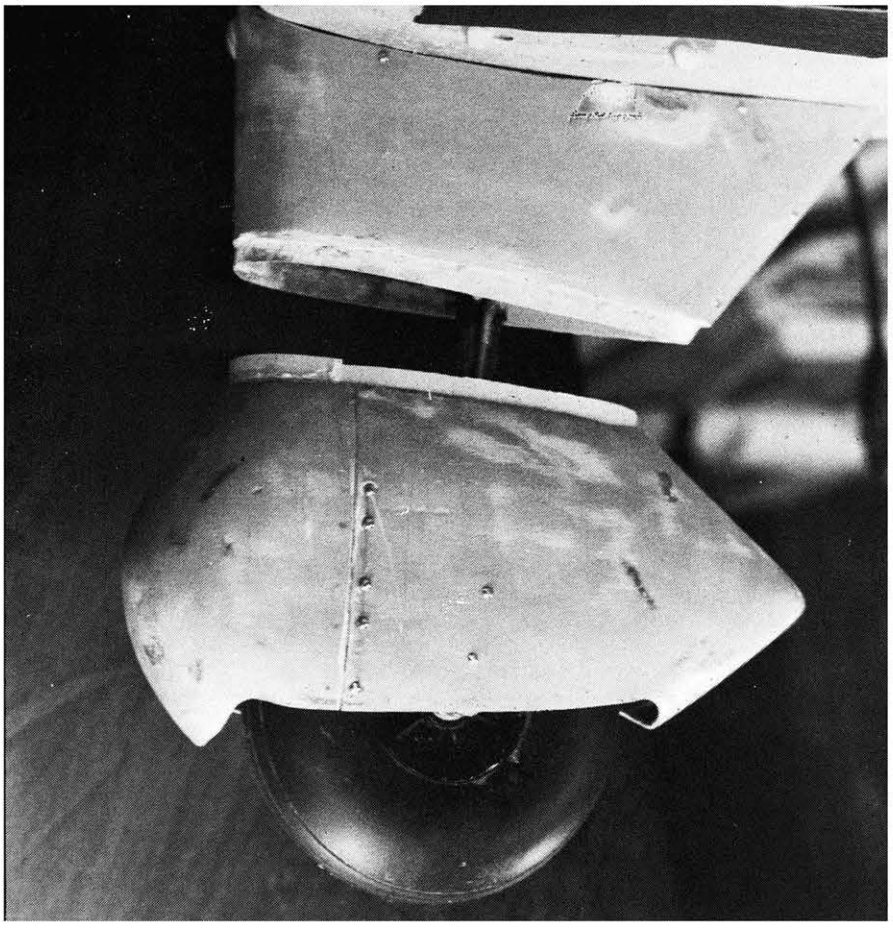
LANDING LIGHTS

The landing lights are made from two cheap flashlights (K-Mart at 99¢ or a comparable unit.

PZL KARAS (Part 2)

In the concluding part, the author tells how he achieved the super detailing which made this airplane the Toledo Expo "Best of Show" winner.

By Larry Gordon **Photos by the author**



The wheel spats are not joined to the strut member, so that they can flex under loads.

(A) Remove the bulb and bulb assembly.

(C) Cut the bulb assembly reflector (usually plastic) down to a 1¼-inch diameter.

(C) Re-install the bulb, and solder wire leads to the bulb and bulb receptacle.

(D) Cut a 1¼-inch hole in the landing gear leg fairings in the location of the landing lights and install the bulb assembly. Route the lead wire through the wing to the desired switch location.

(E) Install the type of switch desired and hook-up to a Nicad battery pack of from 1.5 to 4.8 Volts. A nice installation is to hook a microswitch to a flap servo, so that the landing lights turn on with full down flaps.

(F) The lens is made by pulling a piece of heated clear plastic over a round mold, such as a ping pong ball.

SIGNAL LIGHT

The air-to-ground signal light is built in the same fashion as the landing lights, except that the entire reflector must be removed from the bulb assembly. A flasher circuit adds a nice touch to the signal light.

The author displays the model which was awarded the 1984 AMA National Scale Award.

PZL KARAS (Continued from page 28)

The Karas is a large model, spanning 99 inches, yet the wing loading is only 32 ounces-per-square-foot.

MISCELLANEOUS DETAIL PARTS

Set the aircraft aside for now, and proceed with the construction of miscellaneous parts.

(A) Venturi Tubes are built by lightly driving the flared shank of a punch into a piece of ¼-inch aluminum tubing. The tubing is held in a plumber's flaring tool during this process. The venturi brackets are built by flattening a 3/32-inch aluminum tube in a vise, then wrapping the flattened tube around a ¼-inch shank (drill bit). Pean as necessary, remove the shank, cut to length and Hot Stuff to the venturi tube. This bracket procedure can be used to make gondola antenna brackets, muffler brackets, control stick brackets, etc.

(B) Scale modelers must be experts at substituting look-alikes to simulate the real part being modeled. Tooth paste tube caps become oil or fuel filler caps, etc. I have several junk boxes to save all these items for future use. Especially useful are dials switches and electronic parts from old radios or other electronic appliances.

(C) Instrument Knobs: Determine the number of knobs required. With a Dremel head No. 125, cut holes in a piece of scrap wood, noting that the depth of the hole will determine the size of the knob. Fine sand the holes and apply mold release. Fill the holes with resin and allow to cure. Split open the mold and remove the knobs. To install in the instrument panel, simply drill a matching diameter hole in the proper location and Hot Stuff in place.

(D) Pointer Type Dial Knobs: Pointer type knobs are built in a similar manner, using several carbide cutting discs (thickness is varied by the number of discs) to cut a partial semi-circle in the wood. With a Dremel No. 923 or similar bit, cut the knob center body. Sand smooth and apply mold release before filling with resin. A straight pin placed in the knob center body will help in removal, and the knob can be pinned into position on the instrument panel.

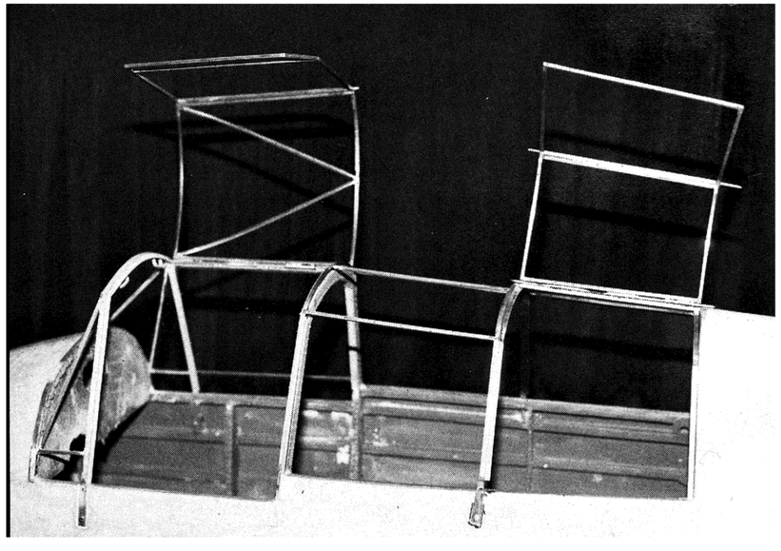
(E) Throttle and Control Arms: Control arms can be constructed by inserting the proper sized round head pin or bulletin board tack into a piece of aluminum tubing. Hot Stuff the parts together and flatten the aluminum tubing in a vise, if required, and bend to shape.

PAINTING AND FINISHING

Having tried many of the paints available on the market (usually with poor results), I use only Aero Gloss Dope over K & B Primer. To the dope you should add Dave Brown Products' Flex-All Plasticizer, to prevent shrinkage and cracking. Use only Aero Gloss thinner for thinning the paint, and use acetone for clean up.

It is not necessary to have a $200 spray gun or airbrush outfit to achieve excellent results. I use the small Badger spray gun (about $10) and a small portable air compressor. The best pressure for general spraying is about 40-45 P.S.I. For spraying gun smoke, exhaust and other

Decked out with everything from a full cockpit, to functional landing lights, the PZL P-23 weighs only 20 pounds.



The canopy frames are metal, bent to shape and soldered together.

add-on weathering, a pressure of about 20 P.S.I. produces less overspray.

Any gloss color can be flattened by adding purified talc (available at most drug stores) at about one teaspoon per 3½ oz. bottle of dope. Mix the colors according to your scale documentation, and flatten with talc as necessary. Add thinner to spraying consistency, usually about 25 to 40 percent. I like to spray my paint quite dry, and seldom thin more than 25 percent.

Here are the steps to follow:

(A) Spray the entire model with a base coat of Silver Aluminum, and light sand with #600 when dry.

(B) Remove the 1/32-inch panel line tape. The tape may separate and leave stick-um on the model. This should be removed by rubbing with a soft cloth that has been moistened with regular paint thinner or rubbing alcohol (not lacquer thinner or acetone).

(C) Spray Light Blue/Grey undersurfaces.

(D) Spray Olive Green upper surfaces.

(E) Spray flat black on engine exhaust collector ring (forward 1½-inch of cowling) and propeller. Note: the scale size prop is 22 inches, with clockwise rotation, as viewed from the front.

(F) Spray the left side wing walk with flat black, with micro balloons added for texture.

(G) Spray markings, numbers and insignia.

(H) Weathering: Using #400 light (wet), lightly sand and scratch off the top color down to the aluminum base coat, as desired.

(I) Weathering: Using Silver Aluminum paint and a small brush, added aluminum paint in areas of heavy wear, such as steps, fuel caps, wing leading edge (directly under the slats), and around any movable parts.

(J) Rivets: Lightly sand all rivet lines until they are accentuated.

(K) Dirt: Spray a dirty overspray, consisting of three parts flat clear dope mixed with ½ part of dirty gray and/or dirty brownish gray), thinned about 50-60 percent. Imagine the aircraft in flight, and spray this mixture onto the structure as if the aircraft had just flown through a burning oil or rubber factory. To simulate wet oil or fuel, use gloss clear dope in place of the flat clear. If you spray too much dirt, simply spray a mist of primary base color over the excess.

(L) Oil and fuel spills around filler caps can be simulated using the above gloss clear mixture. Simply apply a drop of paint with a toothpick and, by mouth, blow the droplet aft in the direction of air flow.

(M) Bullet holes: As careful as we all try to be, you may still end up with a smudge of glue or a scratch on the canopy glass. In which case you have three choices: (1) leave it, (2) rebuild it, (3) cover it up. Smudges can be covered up by installing bullet holes over them. Simply and quickly place a small drop of Hot Stuff Super T (gap filling) over the smudge and, with an X-Acto blade, pull several lines from the droplet outward. Spray *lightly* with acelerator and, finally, drill a small hole through the center of the droplet.

FLYING

Bad weather and the preparation of this article have prevented actual flying of the model. However, I do not expect anything out of the ordinary. The "Karas" should be relatively slow, but responsive to the controls, because of good moments and large control surfaces. The rudder is not overly large and should require lots of travel, probably about 30 degrees in each direction. The real aircraft was used as a trainer, and the model should retain the same flying characteristics.

Well, it's raining again today, maybe I'll start the drawings for next year's model . . . □

FULL-SIZE PLANS AVAILABLE, ON FOUR LARGE SHEETS, FROM: LARRY GORDON, 2460 GOLDEN SHORES CT., FENTON, MI 48430. PRICE $35.00 (POSTPAID), INCLUDES COMPLETE CONSTRUCTION MANUAL.