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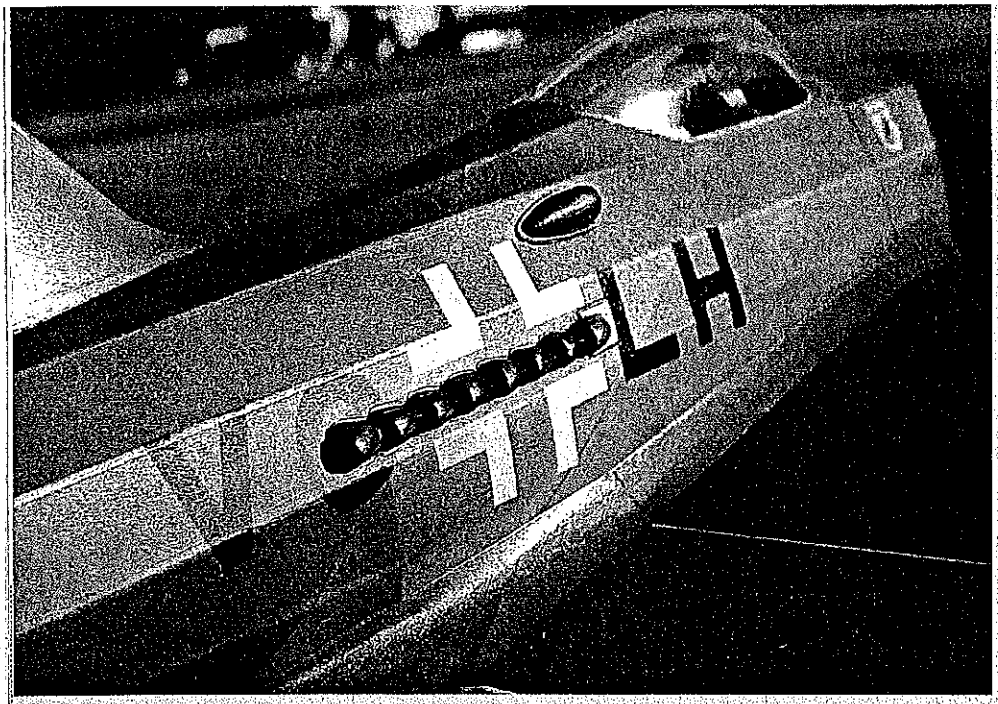
Lippisch P-13

One of the most unusual and successful Rubber Scale designs we have seen, this Nats Rubber Scale winner is a classic we know you'll enjoy. ■ Don Srull

Top: Clean lines and long fuselage make the P-13 one of the very best flying-wing subjects for Rubber Scale. Tandem engines help provide exceptional performance. Below: Our author demonstrates the secret of winding a twin motor model without help. The already-wound front prop is being held in place with a wire pin through the spinner and nose block while the rear motor is wound. A Mylar ribbon keeps the pin from being lost in the grass.

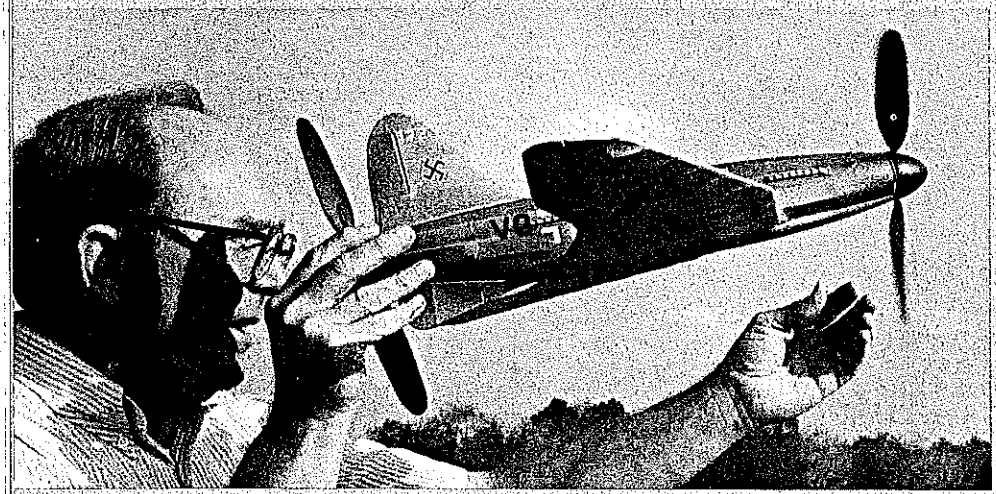
ONE OF THE ATTRACTIONS of the Flying Aces Club (FAC) Rubber Scale rules is that any legitimate, full-size aircraft design can be used, even if the design was not built and successfully flown. Many more interesting and unusual subjects are, therefore, eligible for FAC competition. The P-13 is a good example of the interesting possibilities.

The P-13 project was one of many flying wing designs created by Dr. Alexander Lippisch's design team while at the Messerschmitt Company from 1939 to 1943. The most well-known and successful aircraft resulting from Lippisch's work at Messer-



Vacuum-formed canopy, intake scoop, and exhaust manifold add realism and very little weight. The splinter camouflage pattern is typical of German fighter aircraft of the period.

Don's two P-13 models—smaller one featured here and the larger 36-in.-span Jumbo version. Both are excellent fliers, winning the Scale and Jumbo events at the 1984 FAC Nats.



Don demonstrates the proper way to launch the tandem-powered P-13. Release the front prop first, then *gently* push the model ahead and release the rear prop in a single motion.

schmitt was the rocket-powered Me-163 Komet. The P-13 design was the work of Josef Hubert, one of Lippisch's co-workers, in November 1942. It was intended to be a single-place high-speed bomber. It had a wingspan of 12.8 meters (42 feet) and was to be powered by two 1,475-hp Daimler Benz 605b engines in tandem. The P-13 apparently never got beyond the preliminary design stage.

Hubert's original layout drawings for the P-13 are reproduced in Dr. Lippisch's book, *The Delta Wing History and Development.* Being interested in flying wing aircraft, I decided to build a model of this graceful and bird-like machine. The tandem engine arrangement and the relatively long fuselage also seemed to make it suitable as a rubber-powered subject.

A small profile test model was built to confirm that the configuration could be made to fly, and to help determine a suitable center of gravity (CG) location and the amount of wing twist needed. Two subsequent models, 26-in. span and 36-in. span, were built; they surpassed all expectations. Both proved to be very stable, quite easy to trim, and extraordinary fliers.

The models won FAC Scale and Jumbo Scale at both the 1984 FAC Nats and the 1985 Eastern Free Flight Championships. Whether you are interested in a competitive Scale model or would simply enjoy a graceful, outstanding performance flying wing, the 26-in. span P-13 presented here should fill the bill. (Plans for the Jumbo Scale, 36-in. span model can be purchased from the author for $5.00. Write: Don Srull, 941 Kimberwicke Rd., McLean, VA 22102.)

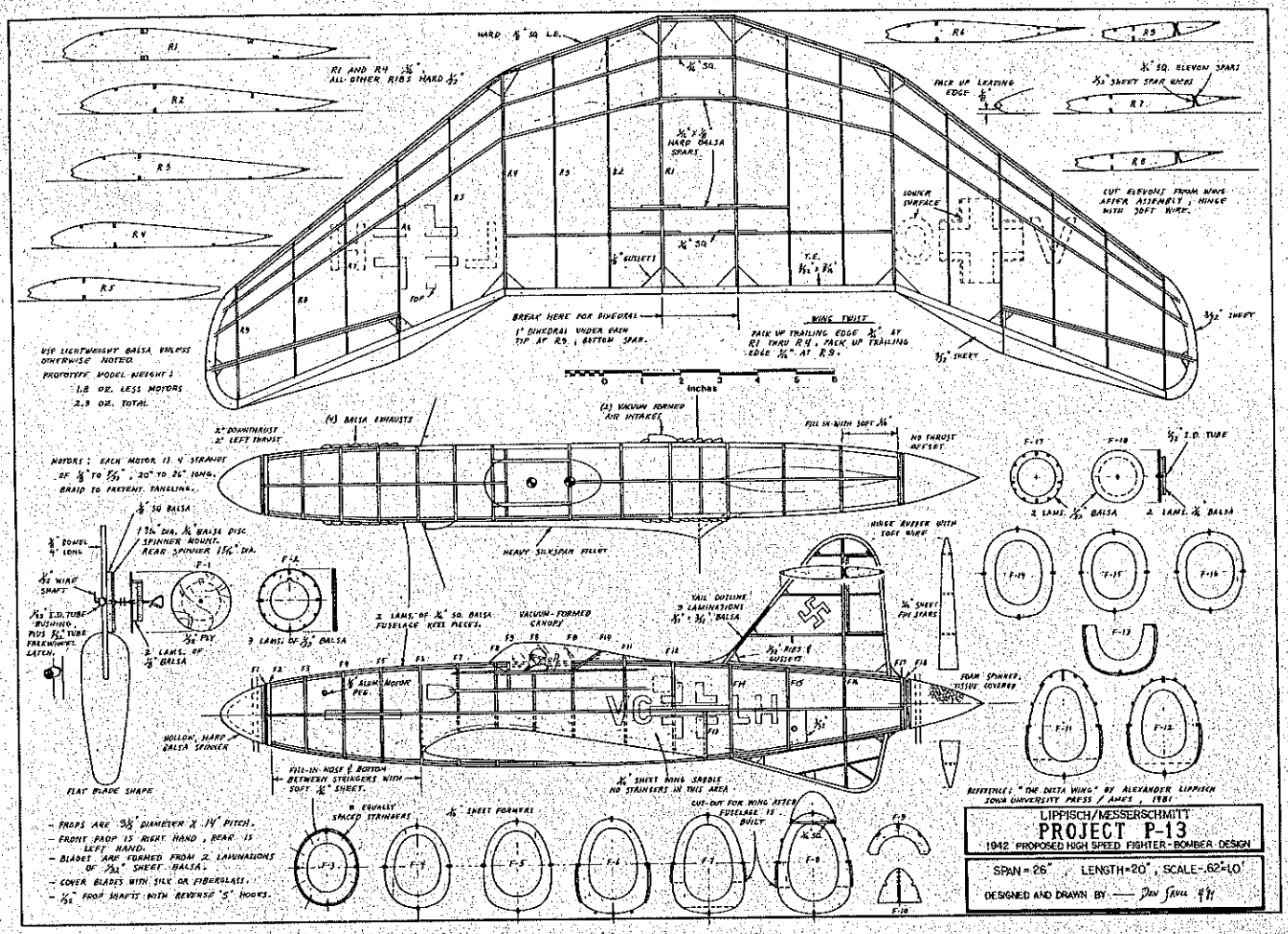
Construction. The P-13, like all rubber-powered models, should be built as light as possible to achieve its best performance potential. Unless otherwise noted, use lightweight balsa of about 5 or 6 lb. per cubic foot density. Sheet balsa of this weight can be bought from several balsa suppliers. A couple of sheets of 1/32, 1/16, 3/32, and 1/8 in. each will provide more than enough strips and sheet for several P-13-size models.

Do not beef up this model or add structural material to it, especially in the rear half. The design as shown is enormously strong and can take a good deal of sport flying and knocking around.

I use an aliphatic resin glue (such as Titebond) for general building, plus thick cyanoacrylate (CyA) glue for quick hand-held assembly. Use any adhesive you are comfortable with, but avoid epoxy. This is too heavy for small Free Flight models.

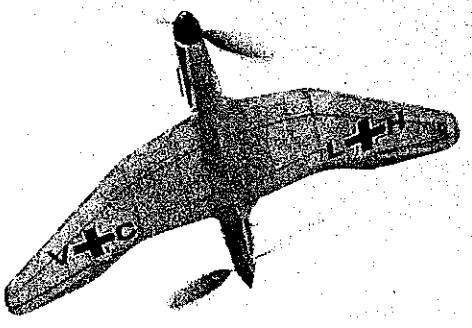
Wing. Build this first, as you will need it to finish up the fuselage. The wing has been designed to be easy to build, but you must be careful about two things. The rib shapes (which vary from root to tip) and the built-in washout (wing twist) give the P-13 its outstanding stability and flight capability. Be extra careful, therefore, to accurately reproduce the rib shapes and the wing twist.

Full-Size Plans Available . . . See Page 164

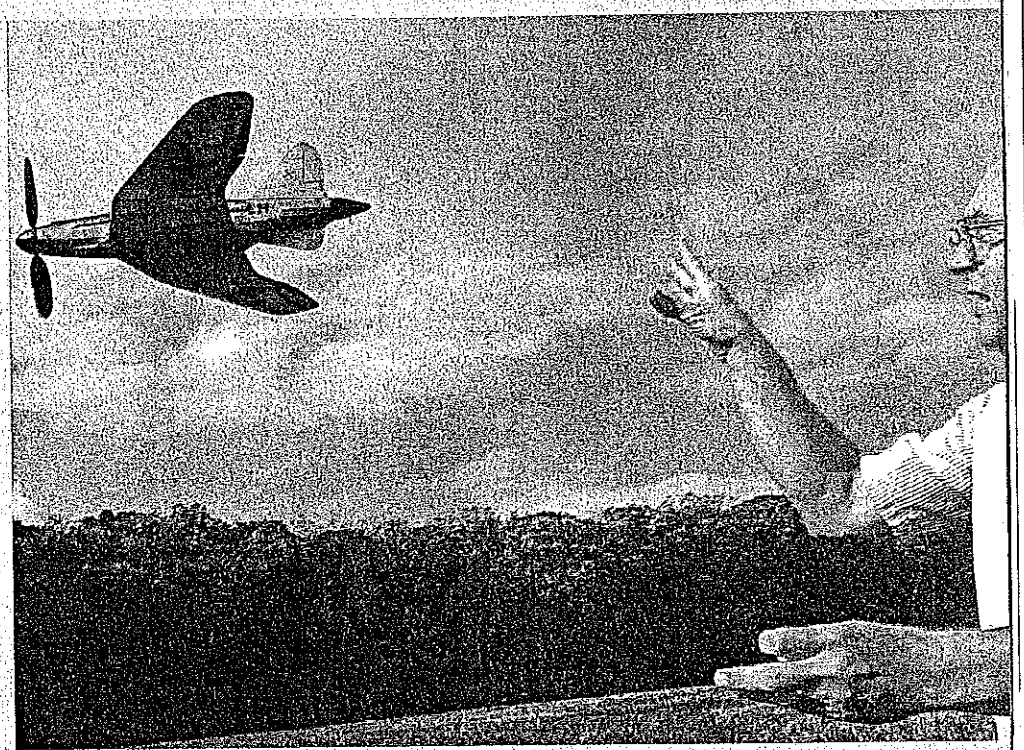


The easiest way to transfer all those ribs (and formers) to balsa is to Xerox the parts and stick them to balsa sheet using a low-tack spray contact cement, such as 3M Spray Mount. After cutting out the parts, the paper pattern easily pulls off. Make sure you get the parts copied on a "100% copier" rather than the usual copying machine which reduces by about 3% to 4%. If you do not notice this small reduction, it can create real havoc. Almost all copying shops will use a machine to produce exact 100%-size copies—if you ask.

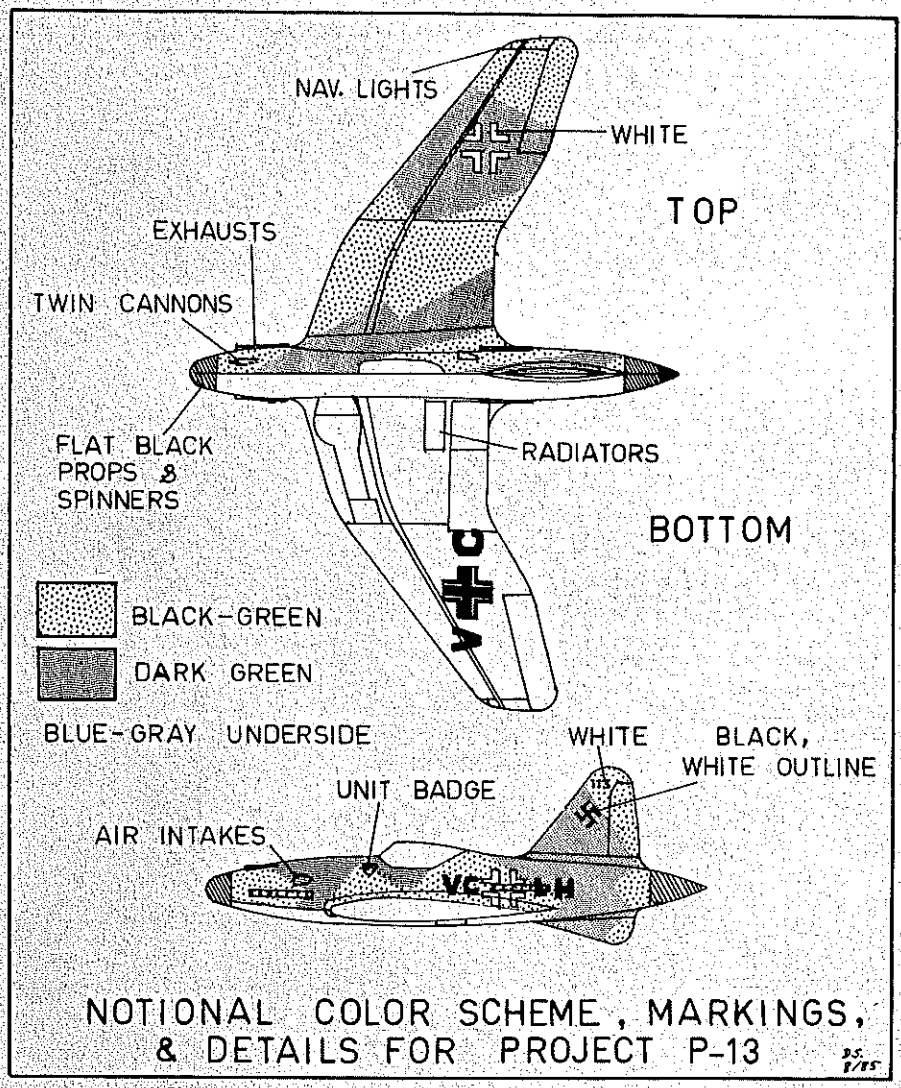
One additional building tip that will help ensure a straight and accurate wing: as you add ribs and spars to the wing structure, make sure the pieces "drop in" with no need for a force fit. Use sandpaper or a sharp razor to get a good slip-fit. A somewhat loose fit is much better than a tight one. A non-shrinking glue like Titebond will fill any small gaps or loose joints with no loss in strength. Tight, forced joints will result in built-in stresses and will lead to those annoying warps that show up later.



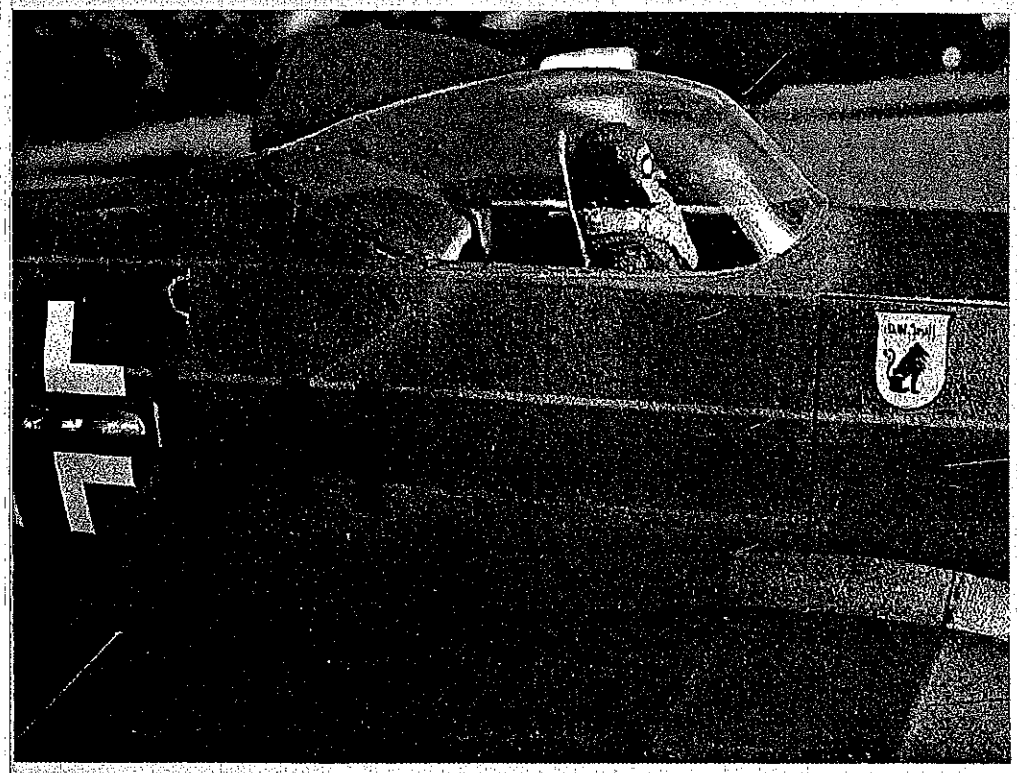
Here is what the Lippisch P-13 does best! Don't let the unusual configuration fool you; it's very stable and relatively easy to trim. Don shares all of his secrets in the text.



The P-13 off on another smooth, long flight. A motor run of over 1 min. assures flight times of 1 to 2 min. consistently. The twin motors make a big contribution to its winning tradition.



Photos by Tom Schmitt



A few scale details really make the model: a foam pilot is a *must;* the relatively large wing fillet made of silkspan is detailed in the text. Note personalized fighter squadron crest.

To build the wing, pack up the leading edge (LE) and trailing edge (TE) as shown, and add the ribs. Note that the outboard TE is jigged up more at the tip than at the root. A triangular wedge of ⅛-in. sheet balsa should be used to accurately hold this washout as the wing is built. Use fairly hard and straight pieces of balsa for the LE and spar. After the upper spars are added to the outboard panels, the dihedral can be put in and the center section spars completed. Finally, add the lower spars, and cut the ailerons free.

The fuselage is built by the usual "half-shell" method. For the P-13, the upper and lower vertical fins are built as part of the fuselage. After adding the 1/16 sq. stringers, fill in the nose section with very soft 1/16 sheet. Reinforce the motor peg positions with hard 3/32 sheet.

To facilitate covering the areas where the fins blend into the fuselage, add small fillets of soft 1/32 sheet from the bottom fin ribs to the adjacent fuselage stringers. Small strips of bond paper would be a suitable substitute. Carefully carve and sand the wing saddle to get a good and accurate fit to the wing.

Propeller assemblies. To eliminate torque problems on the P-13, counter-rotating propellers are used. In front we use a conventional right-hand prop and in the rear a left-hand prop. Both were made by molding balsa blades over a gallon jug.

The balsa blades are laminated from two layers of firm 1/32 sheet. Make sure the grain of the two laminations does *not* line up exactly; if one grain crosses the other at a small angle of about 10°, the blades will be much stiffer and less likely to split. Propeller hubs are made from lengths of ⅛-in. dowel.

Carved props would look much nicer. If you want to go this route, lay out the blocks to yield 9½-in. diameter and 14-in. pitch.

The nose assemblies and spinners have been designed to keep the rear prop assembly as light as possible. Only the front nose block is thick and sturdy enough to use for thrust adjustments. Also, the front spinner has to be pretty tough, so it is laminated from hard balsa. The rear spinner is carved from lightweight foam and covered with tissue and white glue.

I found that even the fragile white beaded foam can be turned in a ¼-in. drill if you use a Dremel sanding drum turning at high speed to shape it. Simply glue a ⅛-in. dowel into a block of foam; when dry, chuck it up in your ¼-in. drill. Turn it on, and carve away with the Dremel until the correct spinner shape is achieved. Be careful, though. The Dremel cuts so easy and fast that you can quickly make the foam disappear. By the way, wear a dust mask whenever you sand or shape foam plastic.

Note that the front nose block has 2° down and 2° left (that is correct, *left*) thrust built in. Also be sure to use reverse "S" hooks on both the front and rear prop shafts.

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calls from out-of-towners looking for a cheap place to stay (your place, preferably) or additional meet information. Local tourist groups sometimes have information about motels and sites that you can send out with the meet information. If there is an inexpensive motel near the flying site, you might talk to the manager about a special rate for modelers. Don't be generous and put your money up for a deposit or you'll be sorry.

As far as running the meet, you'll need to have circles and pit areas done well in advance of the first arrivals. There's something tacky about having the field set up around you. Don't forget an *accurate* line-length-checking area and stopwatches and a bull horn for dealing with difficult pilots. Sacrifice and get out there at the crack of dawn unless you can get the local Park & Rec people to do it—but then, you might get some strange circles!

Schedule a realistic starting time, something like 10:00 a.m. if it is a two-event meet or 11:00 a.m. if it's only one event. *But, start when you say you will!* The fliers will grump around (camels are more pleasant in the morning), but you've got to set the pace right off or you'll be flying the second round at dark.

The first three or four rounds should go as fast as you can run them. Some people will use as much time as you give them. Experience will guide you as to waiting or pushing it. I would prefer running the round as fast as possible and then taking a break between rounds to let everyone get themselves back together.

Fast Combat can generally be run quicker than the five-minute match, thanks to some 10-second kills and midairs. Slow Combat can drag because contestants often refuel and fly to the eight or nine-minute mark. The "run-off" area really helps speed things up. ½A Combat tends to take even more time than FAI with its multiple everything. If you want a golden rule, it would be to never fly FAI at your first meet.

Before helping at your first meet, be sure to read the AMA rule book a few dozen times! If you think you've got everything down pat, then just wait until about the fifth match when something out of the ordinary happens. Discuss contest procedures at the pilots' meeting, but make other decisions without the help of a dozen fliers.

Good luck.

Charlie Johnson, 3716 Ingraham St., San Diego, CA 92109.

Lippisch P-13/Srull

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Covering and finishing. Sand the framework, and cover the wing and fuselage with lightweight tissue. Use either nitrate dope or diluted white glue for attaching the tissue. Shrink the wing covering by brushing rubbing alcohol on half of the wing at a time—pinning that panel to your building board until dry. Shrinking the tissue in this manner will reduce the chances of warping to a minimum.

Next, brush on three to four coats of thinned low-shrink dope, such as Sig Lite-Coat. Apply several coats of sanding sealer to the prop assemblies, and sand them until smooth. Glue on the wing, and cut out the wing fillets from heavy silkspan. If you wet the silkspan and use white glue for adhesion, this otherwise tough and horrible job becomes almost fun. Try it and see.

As for painting, since the P-13 never entered active service, any post-1942 German attack aircraft paint scheme is OK. I used a splinter camouflage pattern and markings modeled after the Dornier 335, the only tandem-engine German WW II combat aircraft. Use an airbrush to keep the painted finish as light as possible.

The exhausts, air intakes, armament, and other surface details are also modeled after the Do 335.

Vacuum-form or draw-form a canopy and attach it (after adding an appropriate foam pilot figure and an instrument panel).

Flying. Make up two test motors, each consisting of a 40-in. loop of ⅛-in. rubber. When folded in half, the motors have four strands 20 in. long. Before installing, "braid" each motor to take up the slack and to prevent tangling inside the fuselage. To "braid," take each 40-in. loop of lubricated rubber and put in about 100 turns. Fold the motor in half, smooth out the lumps, and install in the model.

Make sure there are no warps in the wing, and add ballast as necessary to get the CG within the range shown on the plans. Put in 1/16-in. of left rudder, and try some hand glides over a soft, grassy area. Use the hinged ailerons for elevator trim and roll trim to achieve a rather fast descending glide with just a hint of left turn. The glide

will not look impressive from hand tests due to the enormous drag of the two freewheeling props.

Start power tests with about 150 turns. Try for a very shallow climb slightly to the left—using rudder and a little aileron if necessary. When you get up above 300 turns, only use the front prop thrust adjustments to achieve a smooth, steady climb to the left. Under higher power, the P-13 will want to turn *right*—not due to torque, of course, but due to the spiraling prop wash from the front prop. This is why you may even need a little more *left* thrust as you increase power.

When the model is flying well on the test motors (if your model weighs 1¾ oz. or less without rubber, it should do over 1 min. on these tests), make up some longer motors with greater cross sections. For high-climbing, spectacular flights, I have used four strands of 3/32-in. FAI rubber 26 in. long. Be sure to braid these longer motors to remove the slack and prevent tangling. Stretch-winding should yield 1½- to 2-min. flights of the prettiest Rubber model you have seen. Good luck with your P-13!

Place to Fly/Fink

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The administrative responsibility for the model airport was placed in the hands of the superintendent of the nearby Raccoon State

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