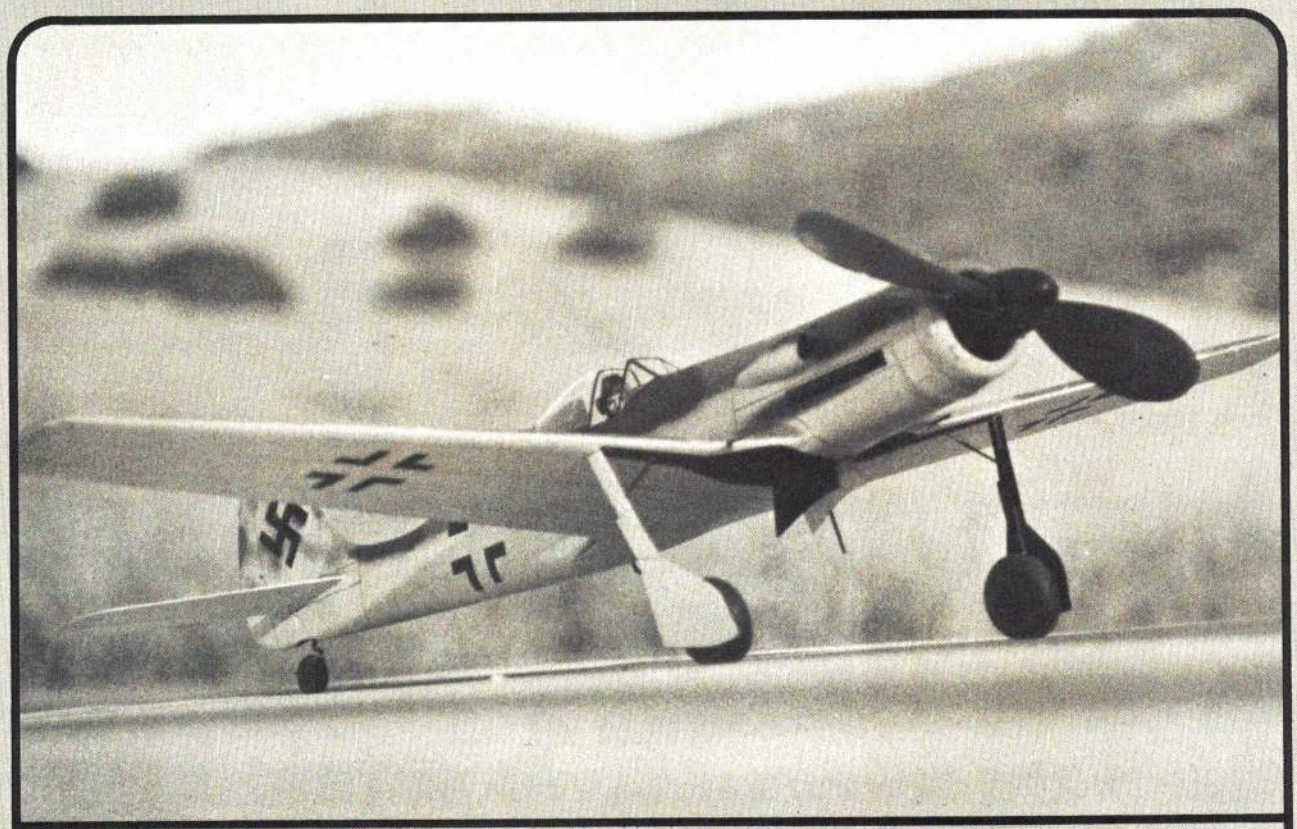
Focke-Wulf TA-152



About the only deviation from scale is the enlarged prop and the stabilizer. Even the modified Trexler wheels are unique.

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Above: Glide is quite good, a strong thermal will take it up, prop free-wheels during the glide. An OOS flight is not likely though. Right: Turnaround gears in the motor tube are made from stock Boston gear parts, ball bearings used throughout. With gears, a short motor can be used without sacrificing rubber length. CG also helped. Below: In front, the winding plug and the prop assembly. Wind up the motor, then install the whole thing in the plane for a flight. This saves the plane if the motor should blow.

For the past three years I have entered the Annual Flightmasters Jumbo Rubber Scale event. The first two years I won the meet with a semiscale Puss Moth. The plane was successful, but did not entirely fit into the spirit of the contest—it flew too well! The third year I decided to build to the other extreme. Though it did not win, it proved that this type of plane can be built and flown successfully.

The Focke-Wulf TA 152 H-O was chosen because of its good proportions. The construction technique was developed to produce a strong, light, simulated metal finish without the problems of planking a typical former and stringer structure. Its strength can best be illustrated by the pictures of the finished plane taken after it had been flown approximately 35 times and escaped two tangles with parked cars!

Construction methods will be stressed in this article, so if you have a pet plane you would like to build, all you need is a good three-view and you can build it in the same manner as the Focke-Wulf. This plane will also make an excellent ½A Gas Scale model with very little modification.

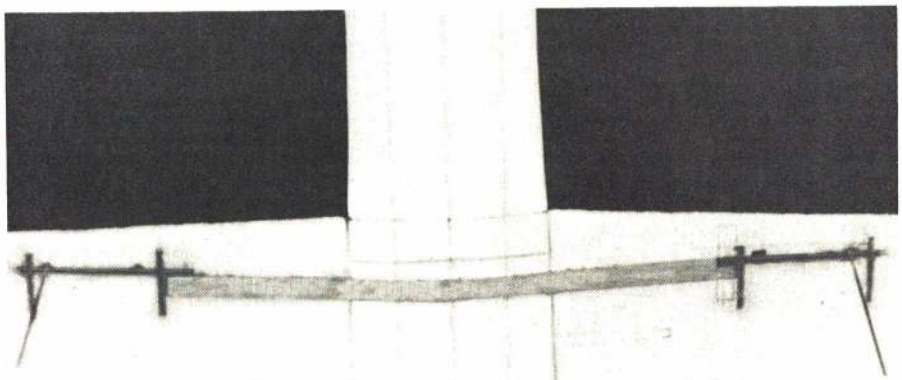
The plane has several unusual features: removeable motor tube with return gears (which keeps the rubber well forward and helps balance the plane); Trexler air wheels with modified hubs; sliding canopy; fiberglass cowl and spinner; the planked polystyrene foam fuselage and wing (the basis for the whole plane); and the pilot, complete with his custom-made leather flying helmet and coat.

Those who feel the project is a bit ambitious will be pleased to note that this is the first time I have ever hot wire-cut foam, planked foam or used return gears So don't be discouraged, just roll up your sleeves and start!

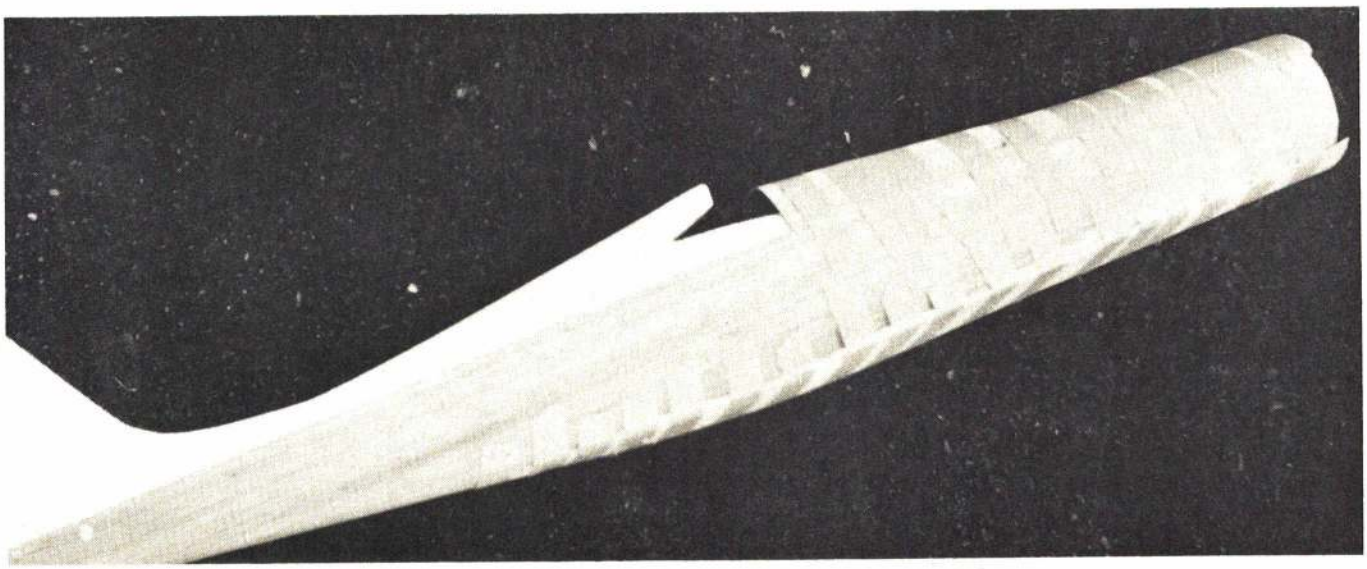
Construction

Fuselage: Obtain two in. thick polystyrene one lb. per cu. ft. bead board. (I found it at the local builders' supply.) Place two layers together and push an 1/8" dowel in through the tail and nose to keep the halves together while you carve. Trace the top view and side view on the block. Cut to shape on a band saw or with a hacksaw blade. Make cardboard templates for the various fuselage station cross sections. Carve to rough shape using a sharp X-acto carving blade or similar knife. Make sawing motions with the knife in order to keep from tearing up the foam. As you carve, use the X section templates as a guide. When you get near the proper X section, use very coarse sandpaper and file off the excess material. 320 grit sandpaper will give a smooth final finish.

When the outer surface is finished, pull out the dowels and separate the



Above: Wing and fuselage fitted prior to sheeting. Lines on fuselage are from laminations of foam which help in carving the sides for smooth and equal shape. Left: Wing has one dihedral spar. Landing gear is a torsion action system with side brace. Note that its stresses are distributed fore-and-aft in the wing and to the dihedral brace. Below: 1/32 soft light balsa skins are made by soaking in water and ammonia solution, then taping to foam form until dry. They are then bonded to the foam.



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fuselage halves. Hollow out the fuselage with a hot wire. I did it in the following manner: Form a half loop of wire about three in. in diameter out of .032 wire; hook up to a Variac and set at a position just hot enough to melt the foam (5-10 on a full-scale 140). Now with the hot wire just scoop out the foam until you have about 1/4" wall left. The TA 152 foam fuselage weighed 1.35 oz. when finished. Other methods for heating wire could employ a DC power supply, automobile battery or an auto battery charger.

With the foam fuselage all hollowed out and the outer surface finished, glue the two halves together using Titebond or a water-base rubber cement. (Do not use any solvent-base cements or your foam will disappear rapidly!)

Planking is the next step. Select light, straight grain 1/32 balsa three in. wide. Soak the wood in a water-ammonia mixture approximately 1-5% for about 15 min. The wood will appear to darken up as it wets; remove and rinse thoroughly. Place the three in. wide strip on the side of the fuselage with the bottom edge slightly below the wing rib base. Trim off the excess wood and, using one in. wide masking tape, secure the wood in place with a gentle but firm pull. Don't be afraid to use lots of tape—about every two in. You will be surprised how much the wood can be formed.

Allow to dry for several hours. Heat may be used to speed up the drying process, but don't go to more than about 120°F or the foam may melt or distort. When dry, remove the tape carefully to avoid tearing the wood. Trim off excess wood on the top and bottom of the rear end. Remove the formed sheet from the foam fuselage; then form the other side in a similar manner. Before trimming off excess wood, place the first half on the form and line up the area to be trimmed to match in areas where the two sheets overlap. Next, glue one side on at a time. Spread on even but thin film of Titebond on all wood surfaces. Place on the form (foam), position carefully and tape in place using masking tape. When dry, remove tape and bond on the second side after making sure it matches all joints with the first half.

The top and bottom planking on the nose are done in a similar manner using sheets four to five in. wide. Splice this sheet by placing the seam down the center of the top and bottom. Be careful when water soaking—excessive soaking can cause the seam to come apart.

After these two pieces are formed, carefully trim to fit and bond in place. The turtle deck and rudder can be formed next. Soak the sheet as before, overlap the side sheeting slightly and trim to approximate shape. Using mask-

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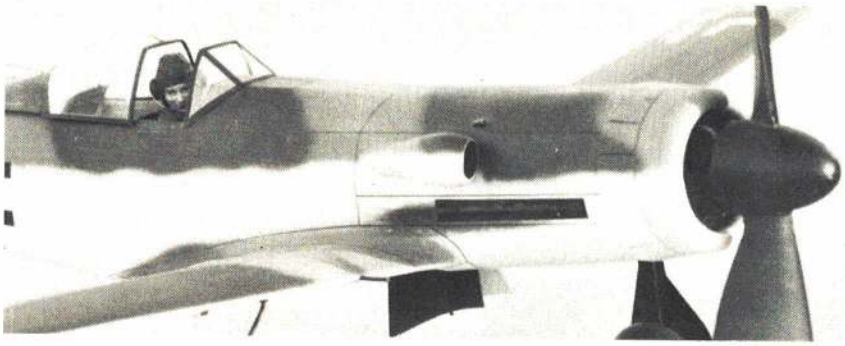
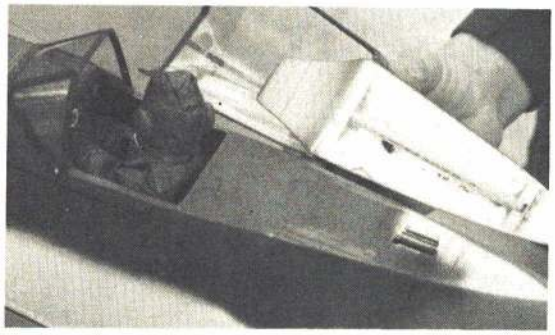
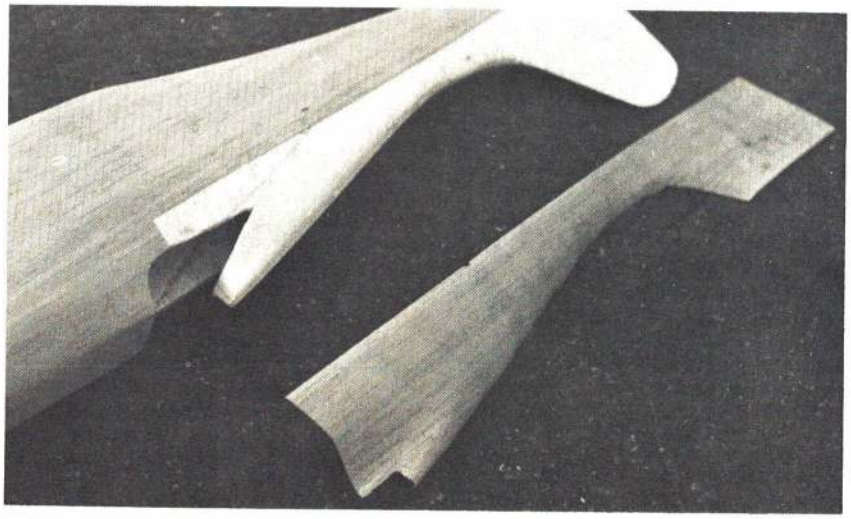




Above: Careful air-brush painting and detail marking give the shape its military look. It makes really beautiful takeoffs. Left: Would you believe the pilot has a custom-made leather flying helmet and jacket! Rear canopy section is removeable and slides aft on rails. Below: Partial assembly of the fuselage. Top right rear decking about to be attached. Author used Titebond throughout, moisture escapes easily through the thin balsa.



Data Sheet on TA-152 H-O No. 150005

Scale: 1.02" = 1'
Full-size plane: 47' 6½" = 48"

Sources

Photographs:
1. William Green, *War Planes of the Third Reich* (New York, Doubleday & Co.,), pp. 236-7. Library of Congress No. 88-29673.
2. *Focke-Wulf 190 & TA 152 Series 1, No. 9 Technical Manual* (Australia, Kookaburra Technical Publications), pp. 27-29. (North American Distributor: J.W.C. Publications, Sun Valley, Calif.)
3. *Profile No. 94 Focke-Wulf FW 190/TA 152 Series* (Windsor, Berkshire, England, Profile Publications Ltd.), pp. 9-12.

Three-Views:
Op. Cit., Green, *War Planes of the Third Reich*, pp. 235 and 237.
Op. Cit., Focke-Wulf 190 & TA 152, centerfold. **(Note:** These three-views are inaccurate and should only be used for general fuselage cross section.)

Color Scheme:
Op. Cit., Focke-Wulf FW 190 & TA 152, p. 27. (I also based my color choice on several comments that the two-tone brown was prevalent on these planes at the end of the war.)
Approximate colors are shown in *Focke-Wulf FW 190 & TA 152*, p. 24.

Fidelity to Scale:
All items (dihedral, rudder area, landing gear length, etc.) are scale; only the stabilizer and prop are modified in size.

Construction:
The wing and fuselage are carved out of polystyrene closed cell bead board, then planked with 1/32 sheet; the stabilizer is 3/32 sheet. These materials were used to best simulate the surface of the full-size aircraft. The construction required no ribs, formers, spars or stringers.

FOCKE-WULF

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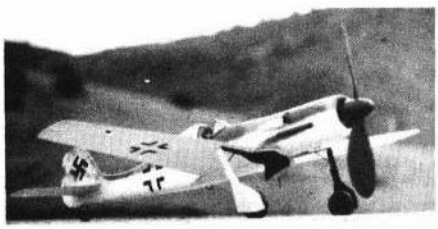

ing tape to hold in place, start forming the turtle deck sheet immediately in front of the rudder. You will note the sheet will pull up in back. If there is not enough overlap you will have to fill a gap at a later time. Carefully tape the rest of the sheet down and allow to dry. Remove the tape and trim the bottom of the sheet to match the already attached side sheet. Also trim the top so it has a straight seam down the top.

Repeat this operation on the other side but don't trim the upper seam. Bond on the first side and when dry locate the second side in place and trim the top to match the already installed side. Form the remaining exposed rudder in a similar manner. When the rudder sheeting is bonded and dry, trim off 1/8" all around and sand flat. Using four layers of 1/32 sheet 1/4" wide, laminate the strips around the outline and hold in place with tape. Sand to proper shape when dry.

The motor tube is formed around a 1½ in. dia. dowel. It is done like the fuselage sheet except it is soaked in straight water. If gears are not going to be used, make the motor tube 20 in. long and only 1½" in diameter instead of the oval shape. Cut out the nose and rear plywood former (No. 7 & 8). Cut out the appropriate openings in each of them as required (return gear or straight tube).

Sand the nose flat and add the plywood former No. 7. Shape the foam to match the rear plywood former and glue in place with Titebond. All fitting and gluing will have to be done through to cockpit opening.

Place the motor tube in the fuselage and install the interior cabin sheeting. The cabin floor will sit on the motor tube but will only be glued to the back former and side sheet.

Spinner and Cowl: The spinner and cowl may be made from block balsa or molded out of fiberglass as used on the featured TA 152. If fiberglass is chosen, proceed as follows: turn or carve the spinner and cowl out of balsa; sand smooth; coat with polyester resin and finish to a high polish. Thoroughly paste wax the mold and lay up three layers of the lightweight Sig glass cloth. Sand smooth and finish with an extra coat of resin. If you used the wax correctly they should remove very easily from the molds. If you're really ambitious you can make a female plaster or silicone mold from the wood molds and come right out of the mold with a smooth finish. Having done it that way myself I don't feel it is worth all the extra work!

At this point further work can be done to the motor tube. Cut out all the plywood formers and glue in the rear and front formers. Cut out the 1/4" hard balsa upper and lower nose plugs (1A and 2A); trim to fit the tube and glue these in place on the removeable plywood nose plugs (1 and 2). Cut out one 1/4" plywood disk 1/2" in diameter and glue on the outside of the upper nose plug. Then drill a .065 hole. Install the two eyelets making sure they are in line. If eyelets are not available, .020 brass sheet can be used, but be sure to bend over the corners and push into the wood. Then epoxy in place.

Glue in the two 1/4" plywood gear tube retainers (6) and notch to fit the gear assembly. The motor tube slips into the fuselage and drops into the two retainers. The two 1/4" plywood retainers (4A) should be glued in place and accurately aligned using the propeller shaft as a center with reference to the cowl. If this is not properly installed, your prop will not run true to the cowl.

Gears: Standard Boston gears were used 7/8" dia. (28) teeth. They were thinned to .080 wide and lightened considerably. The gears are mounted in a hard aluminum tube (arrow shafts work well) with ball bearings thrust washers. A loop is necessary on the backside of the gears shaft so they can be locked with a rod while winding the motors. The rubber hook shape used is an "S" hook. It is difficult to form, but the motors will tend to run much truer than on most other hook configurations.

Wing: The foam core balsa sheeted wing is constructed in a very straightforward manner. Use the same type foam used in the fuselage. The foam cutter used was a very simple setup. It was made from 3/4" plywood 30 in. long and one in. wide with four in. arms on each side. The wire is attached to the eyebolts mounted in each end. A wing nut is used on one of the eyebolts so the wire can be tightened as required. .020 nichrome wire was used, but .032 piano wire will work as well. Use a Variac or auto battery for power. The wire need only be hot enough to cut the foam with light pressure. Higher temperatures will be of no additional benefit.

The actual foam cutting is accomplished as follows: Mount the two template ribs one on each end of a foam block which is one in. longer than needed for each half of the foam wing core. Make sure the centerlines of the ribs are parallel. Next, take the cutter and, with a helper at the other end, turn on the power and start to cut into the foam with very light pressure. As the person handling the foam cutter on the large rib end guides the cutter over the rib, he (or she) will call out the wire's position on the rib, one, two, three, four, etc. (as the wire passes these points). At the same time, the other person matches that position with the end of the cutter. Perform this operation as slowly and as smoothly as possible, for starts and stops result in corrugations in the foam surface. After both halves are cut, smooth out the airfoil by sanding as required.

Cut out the plywood landing gear mounts and install the wire as shown on the plans. With a sharp knife, cut out the foam and insert the landing gear assembly. Glue in place using epoxy. Then install the dihedral spar in a similar manner making sure the space between the two halves is less than the fuselage width.

Next, cut a notch in the fuselage to fit the wing spar. Then fit the wing assembly into the fuselage by trimming off the excess foam in the center.

Sheeting the wing: For the sake of economy, splice six sheets of 1/32 together forming a sheet 36 x 18". Now lay out the panels so a minimum of wood is wasted. As on the fuselage, use as light a wood as possible because weight adds up quickly! Sheet the top first, use a flat piece of plywood on which to work. Drill a hole in it to allow the landing gear wire to pass through when working on the top surfaces. After trimming to approximate outline, coat the sheet with a thin even layer of Titebond. Place on the foam. Tape the leading and trailing edges of the sheet to the table and place weights on the sheet to make sure it is flat against the foam. Allow to dry overnight before removing.

Sheet the bottom in a similar manner. Once both sides are sheeted, excess material can be trimmed from the leading and trailing edges. Then install the 1/8 x 1/4" leading and trailing edges and tip blocks. Shape them to the airfoil and refit the wing to the fuselage making sure the bottom wing sheet is flush with the fuselage bottom sheeting. Remove from fuselage and coat the spar and wing ends with Titebond, then reposition on the fuselage.

Fill in the wing dihedral slot in the fuselage with 1/32 sheet. Add the 1/8 x 1/4" leading edge of the front wing fillet, and plank with 1/16" sheet. Feather edge the portion of the sheet that blends into main wing sheeting, so a smooth transition is obtained. When dry, sand to correct shape. The aft wing fillet is made from soft 1/16 straight grained 1/16 sheet. Cut to shape and feather edge all sides. Soak in water for a few minutes to soften. Wipe off all excess moisture. Bond in place with Titebond and hold in position during drying with masking tape and pins.

Stab: The stab is cut out of light 1/8 sheet, sanded to a streamlined airfoil. Cut a slot in the fuselage as shown on the plans; slip the stab in and glue in place.

Sliding Canopy: If a sliding canopy is to be used, carefully cut off the sliding headrest portion of the fuselage. Trim 1/32" off both the fuselage and the sliding headrest, and sand flat. Then plank both surfaces with 1/32 sheet. Align the upper portion (headrest) with the fuselage, trim off excess 1/32 sheet and sand to the correct fuselage contour.

The slide is made by epoxying a 3/16 dowel in the hollow headrest. The dowel should be parallel to the bottom surface and mounted up in the hollowed out headrest section approximately 1/4 in. from the bottom surface. The clip is made from aluminum (.020). It is epoxied to the fuselage so the clip holds the headrest tight against the fuselage.

Prop: The prop is carved from a hard balsa block, 1½ x 2 x 14". After carving and sanding, mount the freewheeling mechanism as shown. Then cover the entire prop assembly with two layers of lightweight glass cloth and resin.

Miscellaneous Details: The *Super Charger* air scoop is carved from soft balsa and hollowed out. It is finished by applying one coat of resin and sanded smooth.

The *exhaust stacks* are made from 5/32 aluminum tubes which have been bent 30° and sawed off diagonally across the bend. Then the exhaust exit is bent to a square configuration (see drawing).

The *wheels* are made using No. 6 Trexlers for the main wheels and No. 1 Trexlers for the tail-wheel. Remove the tire portion from the wood hub and saw off both ends making sure it is at right angles to the axle (otherwise the wheels will wobble). Cut out four 1½ in. dia. and two 3/4 in. dia. 1/32 plywood disks. Then drill 1/16 holes in the center of each. Glue one on the hub. When dry, place the rubber tire on the hub and glue the second disk in place. When dry these can be inflated and handle just like normal Trexler wheels.

The *cockpit step* is formed from 1/32 ID aluminum tubing with rubber tubing over the step.

The *antenna* is made from a piece of 1/8" shrink tubing which was shrunk over a tapered rod, then removed and reheated until it was soft then pressed flat to obtain a streamlined section. This is then epoxied in place after painting. It looks like the real thing but it won't break, it just bends!

To construct the *landing gear support leg*, a 1/16 hole is drilled in the landing gear support plywood. It is elongated to accept a piece of 1/16 piano wire doubled over. Bend the wire as shown on the plans, epoxying into the wing and wire wrapping and soldering to the main gear.

The *wheel covers* are made from 1/32 plywood and mounted to the gear using a brass shim stock collar.

Finishing: Sand the entire airplane to remove all fuzz. Apply one coat of sanding sealer (Sealette). Resand and cover all wood surfaces with tissue, then apply three coats of a 50/50 mixture of dope/thinner, lightly sand between each coat. Now epoxy the cowl in place.

Painting: The paint scheme is essentially whatever you want. The various reference books (listed below) show paint jobs from two-tone grey to two-toned green or brown. The actual paint used on the author's plane was Pactra flat enamel dark earth and light earth with an aero blue bottom. (You will find an air brush produces the best results.) Spray the bottom of the entire plane the color desired. When dry, paint the lighter of the two upper colors on the entire top of the wings and stab and part way down on the fuselage. When the light color is dry, paint the dark color. Use your imagination on the outlines. The markings are painted flat white and black. For masking, Magic Mending Scotch Tape works well and produces sharp, clean lines.

The various moveable surface and panel lines may be applied with a straightedge and a felt tip black pen, or a lettering pen and india ink (if used, spray with flat clear, otherwise it is water soluble).

After the nose assembly work is completed and works correctly, epoxy the spinner on the prop and paint flat black along with everything that shows inside the cowl.

Canopy: The sliding portion is made from a Sig No. 9 canopy and the fixed (front portion) is bent from .015 celluloid. Both items are bonded to the plane with epoxy. The window framing is made from .003 aluminum (lithograph plate). The channels are formed by bending over a piece of .032 aluminum which has square corners. This bend is accomplished by clamping the .003 aluminum between the .032 aluminum and a block of hardwood. The thin aluminum is formed over the thick aluminum by bending using a block of hardwood. Proceed to the second bend by holding the thick aluminum in place over the thin aluminum on a flat surface while making sure the first bend is snug against the thick aluminum's lower edge. The second right angle bend is made by folding the thin sheet over the thick sheet using a straight, smooth hardwood block.

Any necessary trimming can be accomplished while the channel is still over .032 aluminum by using a straightedge and an X-acto knife. This technique gives sharp square corners. After removing from the .032 aluminum, squeeze the channel almost closed so it fits tightly on the canopy. After the canopy frame channel is correctly fitted, remove, paint, and epoxy in place using a minimum amount of adhesive.

Motor Makeup: Twelve strands of Pirelli are used for the motor(s) slightly longer than the distance between hooks after braiding. This is about 15 in. on the geared setup. Adjust the tension device so it stops the prop shaft with a few winds while the motor is still tight.

Flying

Balance the airplane as shown. After making sure all surfaces are straight, hand glide (use trim tabs to obtain a fast flat wide left turn). Put a few (about 100-150) hand turns in, launch and if it tends to stall and fall off to one side, add downthrust. The power pattern should be straight or wide left with a fast flat climb. The author's plane needed down and rightthrust in order to obtain a wide open left-left pattern.