a F/F Rubber Scale . . .

Aeromarine Klemm

By Al Backstrom

The deficiencies of the real plane turn to advantages in the realm of stick and tissue.

During the late twenties considerable work was done on the development of low powered airplanes. These aircraft were marginal fliers, having to achieve their performance with engines that were low powered and sometimes heavy. Needless to say, they then had to lift a payload of pilot and maybe a passenger. We are fortunate because these same limitations of the full-size planes can lead to a design that is well suited for a rubber scale model.

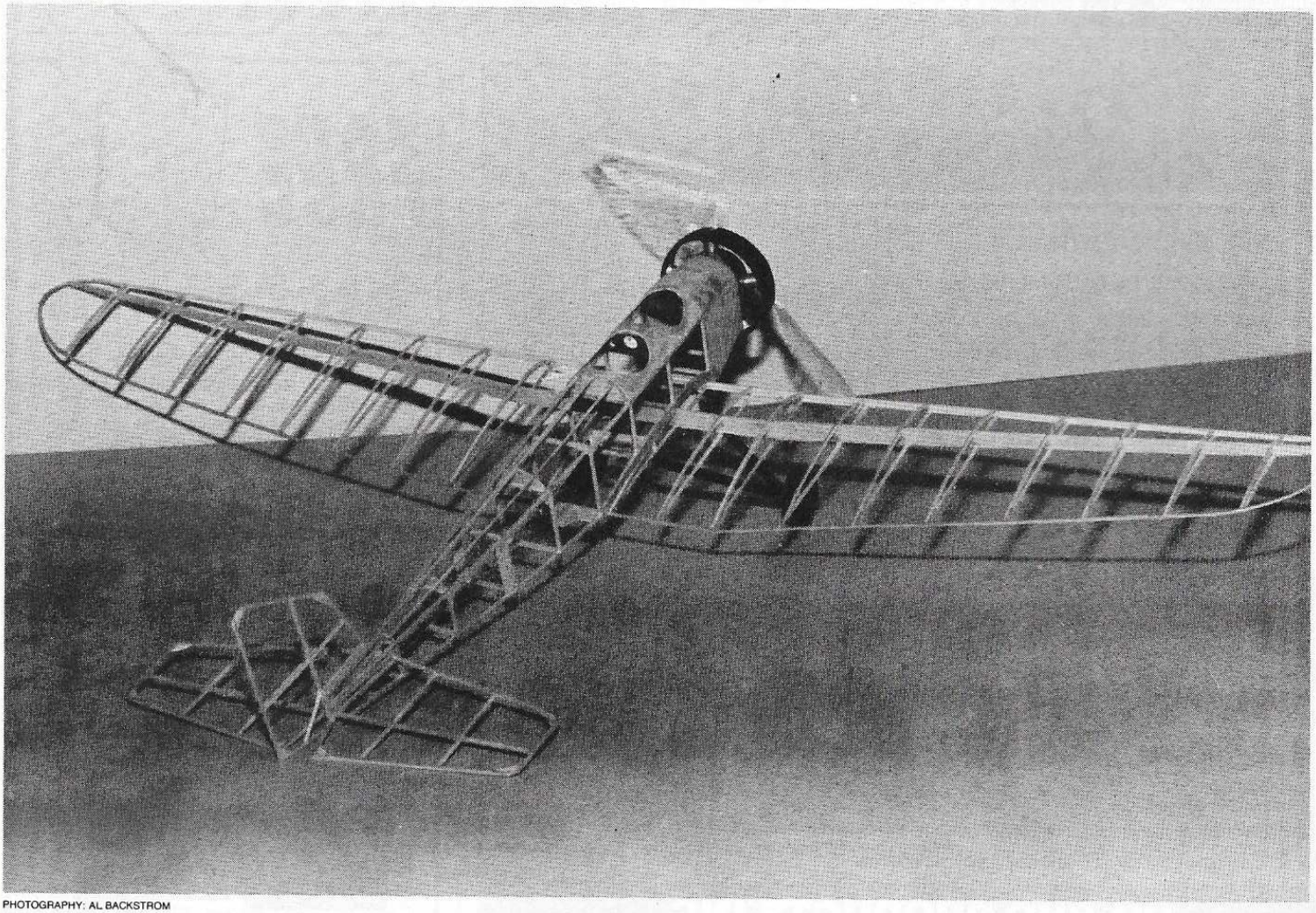
One of the most popular airplane designs of this low-power period was the Klemm series. A German design, it was built in several countries under various names as well as in its native land. The version built in the United States was done by the Aeromarine Company of Keyport, NJ. Its version of the airplane eliminated the folding wing feature that was popular in Europe, and at first used a French Salmson radial of 40 horsepower but later used the common small five cylinder American radials rated at up to 85 horsepower. You can read Jumpter's *U.S. Civil Aircraft Vol 3 and 4* for further information and photos of the airplanes. Three views of these airplanes are rare so both versions are given in small size in this article.

The aircraft model presented here is the last type built with a five cylinder radial engine. The Townsend speed ring was not a standard feature but they are pictured in Jumpter's books. Except for the short nose the airplane has perfect proportions for a rubber scale model with a large wing relative to the fuselage and a long tail moment. The short nose would make the design desirable for a CO_2 or electric, so both a scale landing gear for this type of power and an extended length for rubber power are shown on the drawing. My model was intended for indoor flying so I tried to keep the weight to a minimum. For outdoor flying a somewhat heavier structure may be desirable.

The model, as drawn, deviates from scale in that it has a thinner wing section and slightly more dihedral than the orignal, (don't forget the extended landing gear if rubber powered). Other dimensions are to scale.

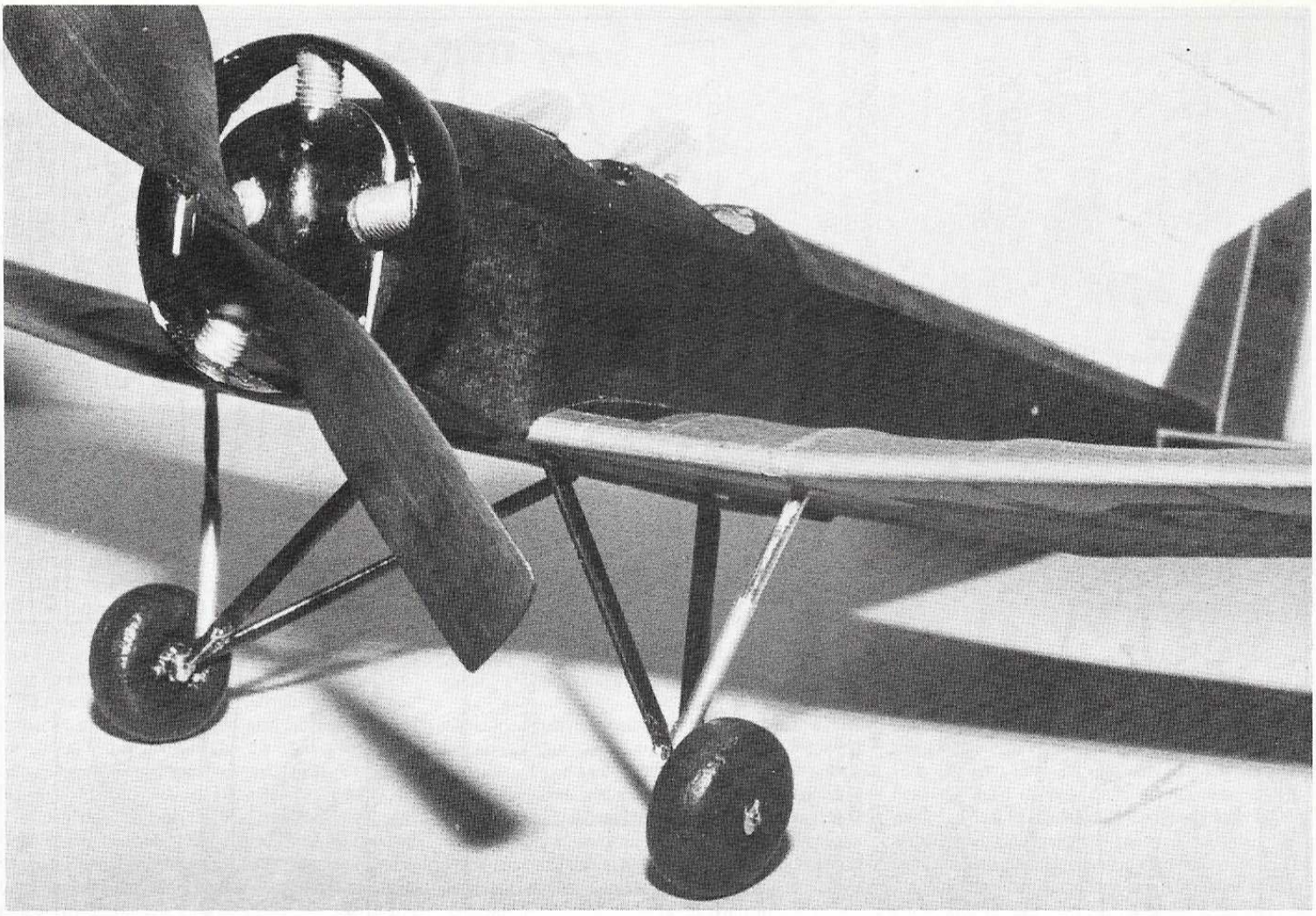
Construction

This model features typical stick and tissue construction and so should pose no special problems. The fuselage is built from 1/16 inch square stock for the longerons with a sheet cutout over the wing. The cross pieces are 1/20 inch square. If you decide to use a removable wing the cross menbers forward



PHOTOGRAPHY: AL BACKSTROM

With its characteristic large, scale wing and light-weight structure incorporated by the author, the Aeromarine Klemm is a natural for rubber power. The full-size plane, spawned during the mid-20s, relied on the large wing to compensate for the low power of the available engines of the time.

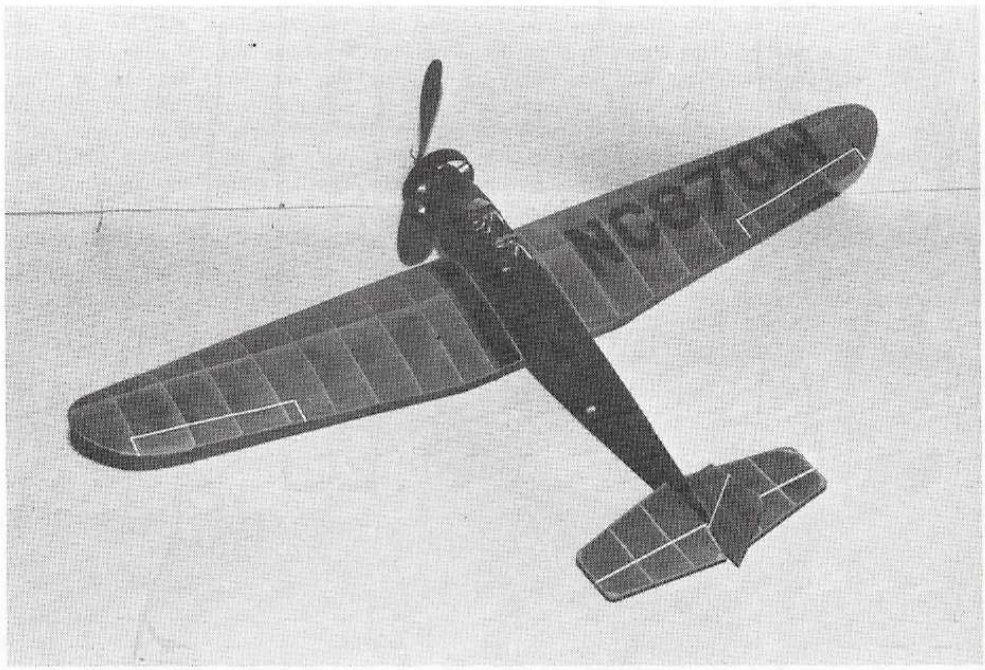


The inner "V" gear legs are the actual landing gear, while the outer "shock strut" is for scale effect. Engine cylinders are flexible straws.

and aft of the wing should be wide enough for wire hooks.

The sheet inserts at the forward end of the fuselage are optional, but anyone as ham handed as I am needs an area to hold that will take some abuse. I did the instrument panel in the rear cockpit by gluing a piece of bond paper over the number 4 upper former using a glue stick, cutting round holes in a piece of 1/64 inch sheet then marking instrument faces on the paper under the holes. Many of the airplanes of this period had a large gauge centered in the panel with two or three smaller gauges around the large one. Stain the sheet with a dark wood stain. Assemble this with some thin plastic wrap between the paper and the balsa sheet for a neat realistic panel. The front seat of inexpensive airplanes of this period would not have instruments so the number 3 former should be merely stained and left plain. Cover the upper portion of the fuselage with 1/32 and 1/64 inch sheet as shown on the drawing. This thickness of sheet can be applied dry with no problem. The basic airplane featured two cockpit cutouts and windshields that did not match so you have an easier job in this area. As I have never been able to cut a symmetrical cockpit I use sandpaper wrapped on a bottle or can of approximately the correct diameter to work the cutout. The 1/16 × 1/32 inch aft stringers are butted to the station 5 former and lay on the top of the aft formers.

The nose block should be fitted to the front opening using 1/16 × 3/16 inch strips for a tight fit in the front opening; add the Kulzer hook to the lower member if you are flying indoors. Before shaping the block to contour, locate the thrust line and drill a small hole through the block at this position. Copy the front view of the engine on a scrap of paper and attach it to front of the nose block with a glue stick. Use this as a sight gauge to drill five 1/4 inch diameter holes for the cylinders. Drill these holes to the depth of the center hole made earlier. Shape the block and hollow the inside for prop hook clearance. Then cover with tissue or color dope it, as you prefer. I made the cylinders on my model from sections of flexible drinking straws. However, I had to ballast the nose, so Williams Bros. cylinders could be used without any weight penalty. The cylinders should be at-



Trim schemes were not very flashy for this type of plane so the author resorted to a basic black fuselage (cowl included) with orange tissue for the wing and the tail surfaces. Control surface detail is inked on.

Aeromarine Klemm

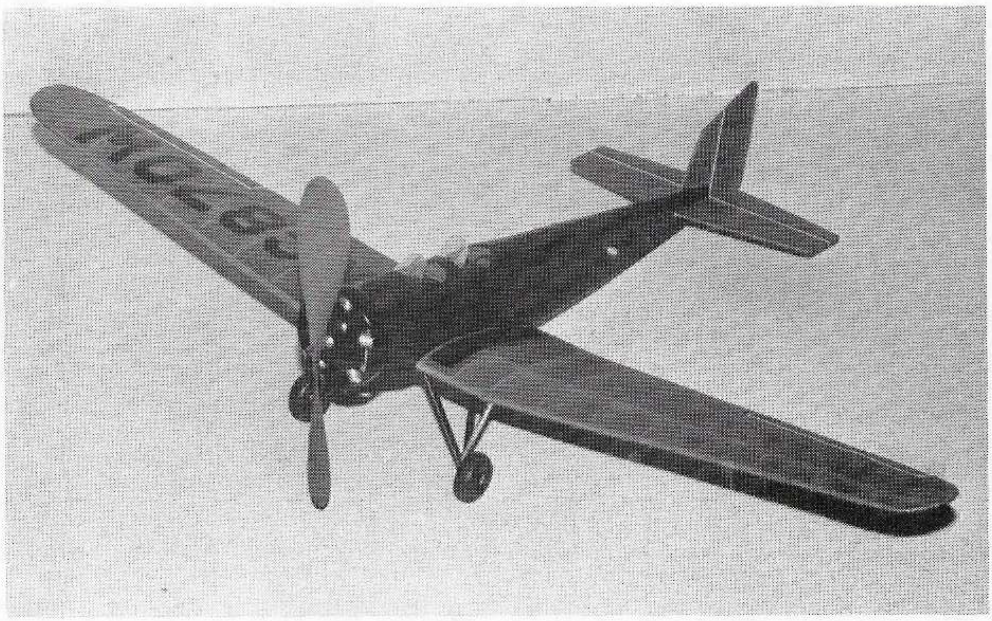
tached using R/C-56 as it will develop a good bond to the plastic and dry flexible so the parts are less likely to come off if the model comes to grief.

Most of these airplanes did not have cowlings so if you like making dummy engines you should obtain details of the small five cylinder radials of the period and finish off the cylinder heads etc. The aerodynamicist in me hates uncowled engines so I suggest you build the cowled version.

The cowling is made by soaking two strips of 1/32 × 1/2 × 6 inch strips of medium grade balsa in water until it sinks. They are then wrapped around a cylinder approximately two inches in diameter and left to dry. Use a spiral wrap. Trim the excess length so that the two strips can be glued together using white glue to the correct diameter as shown on the front view. Sand the exterior shape to conform to the side view. If you have a problem with the sheets buckling on the interior fill the depressions with plastic balsa. Finish the cowl as desired; you will probably want it the same as the nose block. Attach the cowl ring to the tops of the cylinders with R/C-56.

The tail is built from 1/20 inch balsa of the lightest grade your nerve and ability will allow. The wing is built using strip ribs. The wing tips should be formed from 1/20 inch square hinoki wood (available from Old Timer Model Supply) or 1/32 inch square bamboo. If the hinoki is used it should be soaked in water until it sinks and then bent around a cardboard form and left to dry. The leading edges are light 3/32 × 3/16 inch balsa; taper the outer panel sections to 3/32 square before starting to assemble the wing. Pin down the outlines making sure the leading edges are vertical. Note that the wing tips slope up so that the top of the wing is straight. This not only makes the wing easier to cover but also adds about one degree of effective dihedral that is not obvious. Add 1/20 inch square strips for the lower ribs. Make the spar from medium 1/32 inch balsa; you can make it undersize so the upper rib strips lay over the spar but a superior method is to notch the spar for these ribs so that the spar will form a turbulation strip. Do not forget to put in the short sections of 1/20 inch sheet for the landing gear mounts and for the upper end of the dummy shock struts. The upper rib strips should be cut from medium 1/32 inch sheet except those at the fuselage sides, and at the dihedral break which should be 1/20 inch. Assemble the wing flat but do not add the caps at the dihedral break. In trimming the upper rib caps to length, trim the excess from the aft end. When dry, lift the tips to obtain the indicated dihedral and add the doublers at the break point; then install the 1/20 caps. When dry remove from the board and carefully sand the leading edges to contour. Sand the upper and lower rib caps so that they are in line and no lumps or bumps are present, especially at the junctures to the leading and trailing edges.

The landing gear is built intergal with the wing and you should have added the 1/20 inch sheet mount as part of the center section across the fuselage. Bend the .020 inch wire sections and use CyA to glue it to the gear mounts. The basic landing gear is made from balsa. The front of the struts are hard and the rear are light. The vee sections should be fabricated and sanded to a streamline cross



The propeller used on the model was a six inch Tern plastic prop from Peck Polymers. With CO_2 or electric power, a smaller prop can be used along with the optional shorter scale landing gear on the plans.

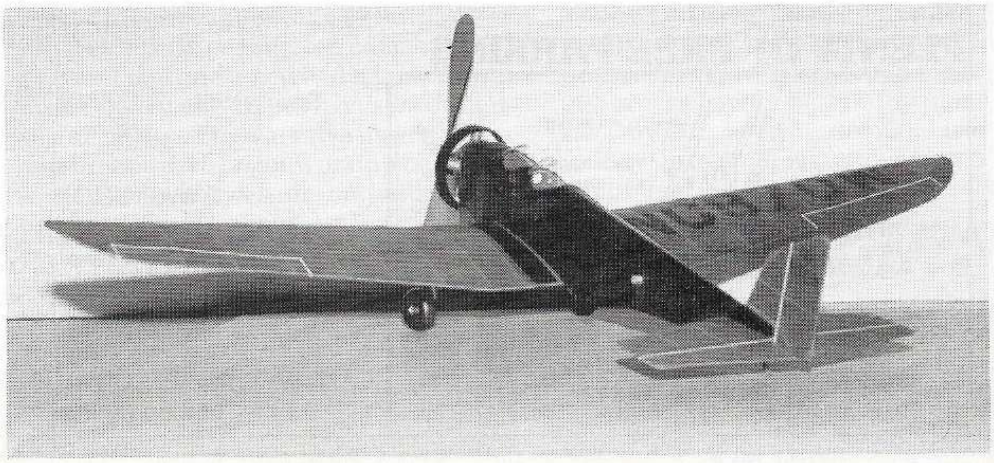
section. Holes should be made to allow the wire sections to be inserted in the forward section of the vee struts. The dummy shock strut sections are made from 1/8 inch plastic tubes for the lower sections and paper tubes for the upper section. My upper tube sections were made from silver gift wrap paper so no additional finish was required. These tubes should be a loose slide fit in the plastic tubes and long enough so that the strut stays straight looking. The landing gear is not installed until the wing is covered. The vee struts should be CyA'd to the wire sections; the dummy shock struts are attached with R/C-56. The wheels are one inch balsa balloon types available from Old Timer Model Supply. These should be sanded and given a couple of coats of dope so the fuzz can be sanded smooth. Polly S Oily Black will give a realistic tire color. If you have trouble getting this material to flow out, thin it with alcohol; if this is not adequate then add a very small drop of liquid dish washing detergent. After adding this, stir, do not shake! The wheels should be attached to the vee sections using common straight pins as axles.

The model should be covered using Japanese tissue. I personally use glue stick to attach the paper and wrap it over one of the members so that the tissue is attached to two sides of each member. I water shrink the tissue using a cold cycle vaporizer. With this the tissue can be wet to any degree desired. It is always best to use too little water the first try and then repeat as necessary. Any pesky small spots can be treated with heavy applications of water from a brush. This takes some practice so be careful.

Coloring and detailing are a matter of personal preference. I did my model, using colored tissue with colored dope on the wood areas. The color scheme is black fuselage, cowl, landing gear struts, and numbers. The remainder is orange. To keep the engine and landing gear from being blobs of black I used silver for the engine cylinders and the lower shock struts even though these parts would normally be black. Any solid color would be typical of the era but remember that this was an inexpensive airplane so that very little trim would have been used.

The fun part of modeling to me is in getting the models to fly as desired. This model was particularly frustrating because I had both a problem with getting a suitable propeller and making it stay in a turn. The best propeller has been a 6 inch Tern Aero available from Peck. Although small for a rubber scale model of this size it flies the model very well, and also might allow the use of closer to the scale length landing gear.

Start your trimming by making a motor

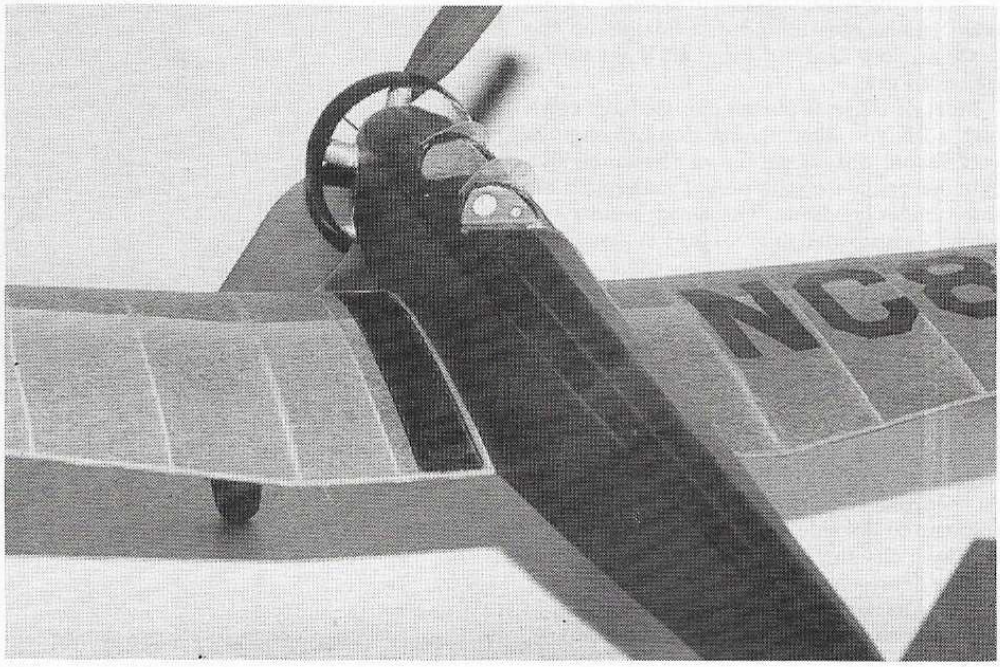


Aeromarine Klemm

from 1/8 inch rubber twice the length between the prop hook and the rear peg. Install this doubled so that you have a four strands. Now start test gliding over the longest grass and the calmest wind conditions you can get. When you have a glide that is smooth and straight or, preferably, with a consistent turn, remove the motor and install it using only a single loop. Wind about 150 turns and launch to check for changes in the extended glide. Increase the turns gradually and make corrections as required.

Low power or glide turn adjustments should be made using vertical tail offset; this can be facilitated by just tack gluing the vertical tail to the rear post of the fuselage and then using a spot of glue from a glue stick at the juncture of the leading edge and fuselage. To revise the adjustment, use a small drop of water to dissolve the joint from the glue stick and reset the vertical tail as desired. Trim under power should be made using thrustline adjustments. My model has done well with no down or right thrust. Being individuals, small models can not necessarily be expected to act like their full-size look alikes. For scale models I make initial thrust line adjustments by shimming the nose block to check the effect. When satisfied with the adjustment I break the thrust button loose and glue it in position to provide the desired offset.

This model had a characteristic that led to several mishaps before the problem was corrected. The model was flown indoors and it would make two or three turns to the left, but as the torque decreased the model would reverse the turn direction and invariably find a wall. The flight would have been interesting and acceptable outdoors but that wasn't what I wanted. The cure was to add a Gurney type drag flap to the left wing tip area to keep the model in a turn. This type of flap is installed 90 degrees to the bottom of the wing. If increased lift is desired add them below the trailing edge; for decreased lift they should be above the trailing edge. Make the flap from clear plastic sheet so that it does not detract from the lines of the model.



Cockpit detail is minimal since the real aircraft hardly had any at all. The front passenger cockpit was usually just a plain wood panel while only a few instruments were installed in the pilot's cockpit.