

The Piper PA-31-350 *Chieftain* is a direct descendent of Piper's first *Navajo* twins, and differs mainly in its extended fuselage, and greater horsepower. Approximately two feet were added to the overall length, and the horsepower increased from 310 hp in the basic *Navajo* models to 350 hp in the *Chieftain* along with counter rotating engines. Three-blade, constant speed props could then rotate in opposite directions, eliminating torque.

The *Chieftain* cruises at 260-mph at 24000-ft, making it quite popular with the business world. An added feature is the baggage compartment at the rear of the nacelles, capable of carrying 150 pounds in each.

The standard *Chieftain* has four passenger seats, with two more optional. Four individual seats facing one another across foldaway tables, make up the executive version. Toilet and refreshment units could be replaced by

additional seats.

If ever you have longed to put full figure pilots in a rubber powered model, now might be the time to do it, as a twin lends itself nicely to the task by eliminating the need for motor clearance. For added detail, a full cabin interior is also feasible. Seats made of Air Mail type bond paper would add little more than a gram or two.

At first glance, it might seem that the *Chieftain* would be a poor choice for a rubber powered model, considering the close proximity of the nacelles to the fuselage, thus limiting the size of the props. However, for a 27-inch span model, two three-blade, 6-inch props move a lot of air around.

The model itself is very close to scale outline, having been photographically copied, projected, and traced, from a 3-view which appeared in *Air Enthusiast* 1973. Proportional dividers were used to double check

dimensions, so despite the model's squarish looks, it does retain the profile of the prototype.

One difference in the basic construction technique of this model bears some explanation, and that is the manner in which the fuselage and nacelles are attached to the wing. This, of course, is not imperative, and it would be a simple matter to alter the construction to suit ones own personal preference.

To explain: the fuselage frame will be notched as shown for the main spar, leading edge, and trailing edge of the wing, and fits between the root ribs. This necessitates leaving the fuselage and wing bottoms uncovered until final assembly. The same applies to the nacelles. This procedure not only simplifies mating the wing to the fuselage and nacelles, but also provides a stronger joint and more accurate alignment if care is taken.

In choosing the wood for the fuselage, try to find some medium hard sticks for the longerons. I prefer to cut my own from a suitable sheet, and in that way it's possible to get sticks more nearly alike. The rest of the fuselage can be made of lighter stock.

The fuselage frame was built one side over the other as is the usual procedure. You will note that there is no bottom longeron under FS-1. It is very important to include the gussets at station 6, to reinforce the area where the notches will be cut out. The window frames can be added during this part of construction, or later. It's best to notch FS-1 for the main spar before cutting the sides apart, but the notches for the leading edge and trailing edge will be marked and cut later.

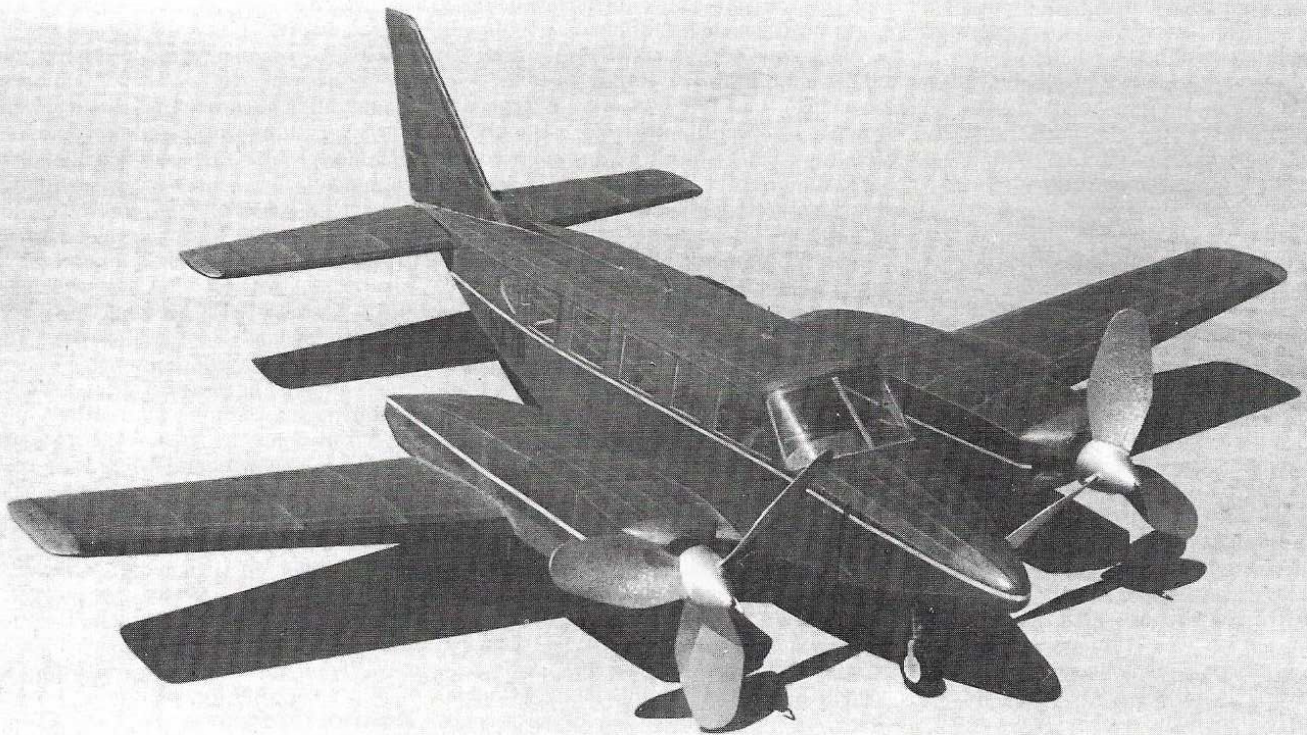
In forming the fuselage box, note that the sides taper slightly from the center longeron (window bottoms) to the top longerons from stations 4 to 10. This is to give the fuselage a

a Freeflight Rubber Scale...

Chieftain

By Richard Howard

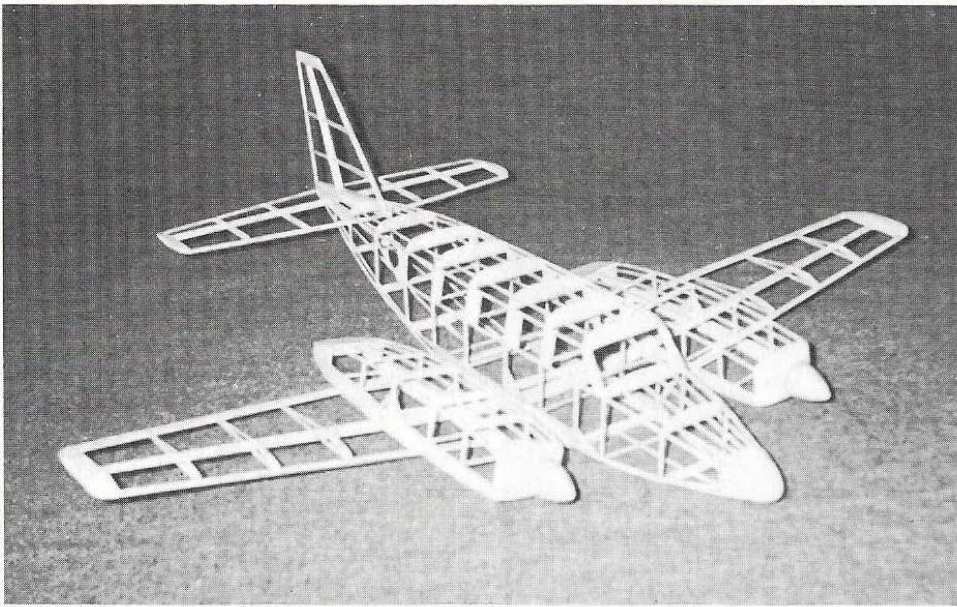
Descended from Piper's *Navajo* series, this later model's long nacelles suit rubber power nicely.



PHOTOGRAPHY: DICK HOWARD

One of general aviation's workhorses, the Piper *Navajo Chieftain* translates to a nice flying, 27-inch span rubber-powered model.

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The basic fuselage of the *Chieftain* is a box of "sticks" with sub-formers top and bottom for the cabin area. Note the nacelle ribs, NS-1, which attach the nacelle to the wing spar.

rounded look, and is quite effective. I chose to put the wide pieces in first, and then pull the sides in at the top, to fit the narrower cross pieces. Add the remaining cross pieces and formers. Top stringers can be added but the bottom stringers must be left out until the wing is in place.

The nacelles are just like two small fuselages, and should present no problems. Here again, the nacelle sides should be notched for the main spar before being separated. In shaping the nose blocks for the nacelles, notice in particular how they taper toward the spinner. This is a distinctive feature of the *Chieftain*, and should be retained.

The wing was built using the "cracked rib" method, as I find it to be the easiest way to go, especially on a tapered wing. Or maybe it's because I'm a creature of habit, having used nothing else for the past 30 years except for a couple of kit models built some time ago.

First notch the trailing edge for the rib bottoms, then cut the main spar to shape and notch for the rib tops. Pin down the trailing edge first. Glue the rib bottoms into the notches, being sure that they are seated properly. I find that it's best to leave the ribs slightly over sized until the glue dries, then trim to size for the leading edge. Add the leading edge, and the main spar, making every effort to see that the spar is in the correct position, and 90° to the rib bottoms. Taper the rib tops so that they form a good fit at the trailing edge. Crack at the main spar, and glue in place. Do not glue in the root rib tops at this time.

When the right and left wing halves are built to this point, join them at the center, with 2-inch dihedral, measured at each wing tip. Reinforce the joints with small pieces of 1/16 scrap balsa.

This done, place the fuselage on the wing so that the main spar is in the notches of FS-1, and mark for the leading edge and trailing edge notches. Cut the notches, and return the fuselage to the wing and check for proper fit. The fuselage bottom should be flush with the rib bottom. Now notch the spar for the root rib top and glue it in place, being certain that it doesn't get glued to the fuselage as well.

With the root ribs in place, and the wing out of its saddle, the wing can be finished up.

Add the 1/16 sheet contour pieces to the front of the rib tops, and sand in the airfoil shape. Notch for the turbulator spar and glue it in place from the root rib to the wing tip. Add the soft balsa wing tips and sand to shape. Remove the turbulator spar section at the nacelle location, and with the nacelle in position over the main spar, mark for the leading edge and trailing edge notches. Cut the notches and check for fit. The bottom of the nacelles should be flush with the bottom of the wing.

The vertical tail is made up of sizes shown on the plan. Place 1/32-inch scrap pieces under the trailing edge, to center on the ribs. Sand to airfoil shape, and taper toward the top.

The horizontal stabilizer is built from material shown and sanded to shape.

Now would be a good time to consider the interior. Even if it is decided not to include

seats and pilots, it would be wise to spray the fuselage to the color of the finished model. There's lots of window area, and bare balsa frames would really stand out. There is an alternative to all of this, and that would be to use black tissue to represent the windows.

The windows on my model are a continuous strip of thin acetate, glued to the frame with R/C-56 or similar adhesive. The window material was obtained from a note book page protector, purchased from the local variety store. Individual windows could be glazed in the frames but again, I chose the easy way.

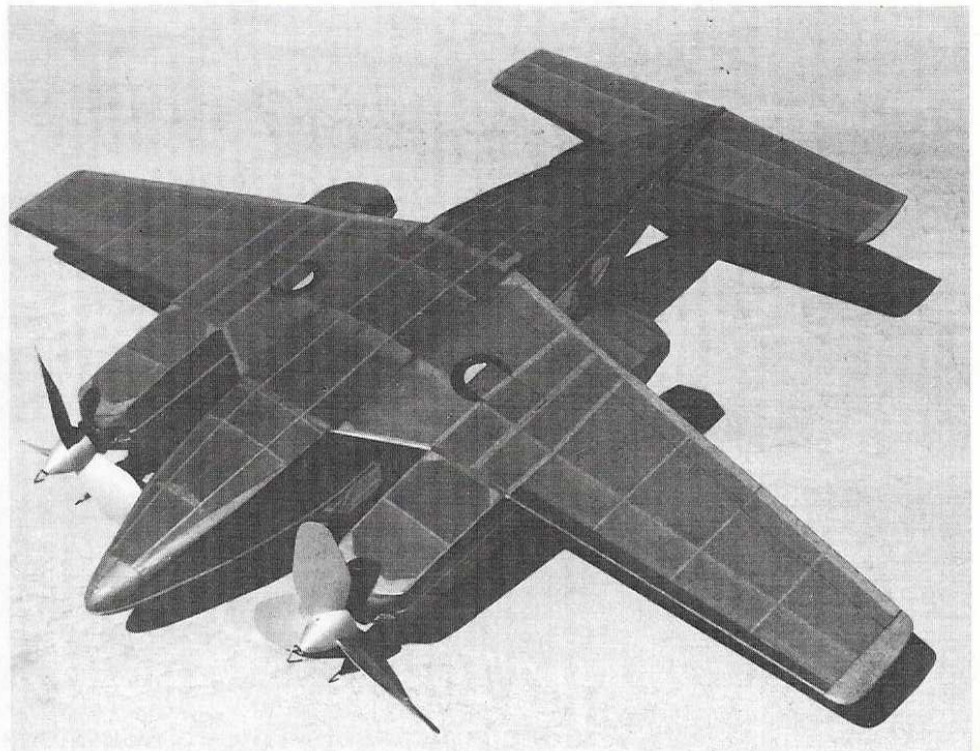
The fuselage was covered with Jap tissue cut to fit one side at a time. I used thinned Titebond as an adhesive. Do not apply adhesive to the window frames at this time. With the tissue in place, carefully trim the tissue away from the windows with a very sharp blade. A piece of double edge razor blade broken off to a point and glued to a balsa handle with cyano, is a good tool for this. Now with a small brush loaded with lacquer thinner, or M.E.K., apply to the tissue around the windows.

If acetate was used for the windows, the tissue will adhere to it. If by chance, another type of plastic was used, and the lacquer thinner has no effect on it, I would suggest using R/C-56, thinned slightly with water or alcohol, and brushed under the tissue. Any excess can be cleaned off with water if done right away. The top of the fuselage can now be covered, but not the bottom.

Cover the top of the wing, leaving space for the nacelles. Cover the nacelles, sides and tops, but do not water shrink any of the parts (wing and nacelles). The model should now be ready for assembly.

First, be sure that the fuselage nests well between the root ribs, then remove and apply adhesive to the ribs. I prefer R/C-56 for this as well, but Titebond would be a close second choice. Clamp the ribs to the fuselage sides (FS-1), being certain that everything is in the right place.

When the glue has dried, "hot-stuff"



The *Chieftain* flies without landing gear but you can use some black tissue to simulate the retracted wheels in their wells. For static display, you can add some small trunnion blocks for plug-in gear.

around any voids left by the R/C-56, to complete the joint. Bottom stringers can now be added.

The nacelles are attached in much the same manner, being certain that the nacelle bottoms are flush with the rib bottoms before clamping.

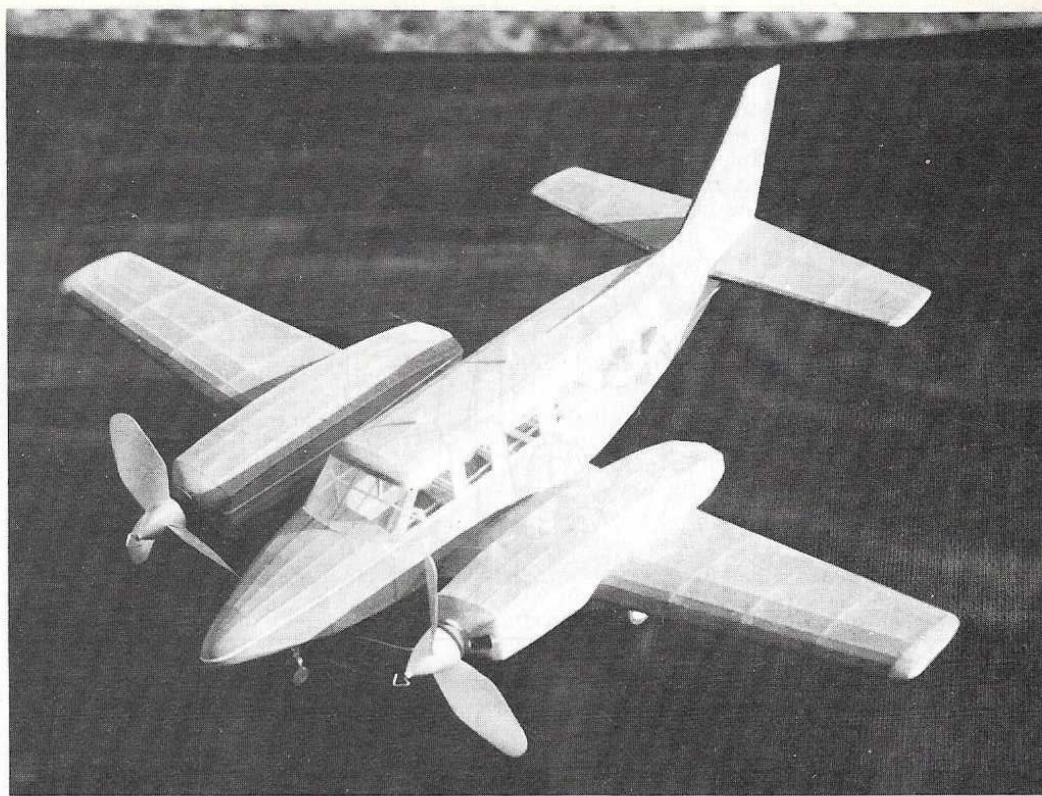
When all the glue has set, complete the covering, and water-shrink the tissue. I chose this time to warp in $\frac{3}{16}$ inch washout in each wing. The washout is necessary, but it could be done later. Finish the model by applying two or three coats of thinned, plasticized dope.

Control hinge lines were drawn using a "Sharpie" permanent marker, and black tissue was used on the leading edges of the wing, fin, and stabilizer.

For trim on my model (white over red) I used double sided carpet tape (Tuck) and white Jap tissue. The carpet tape has an opaque adhesive and makes the white tissue show up well over red.

Color schemes for the *Chieftain* are varied, and a good example might be found at the local airport. I did mine in all red with white trim stripes, to represent N7XB, as pictured in Gunston's book on *Commercial Aircraft*. However, at the time I failed to count the windows on N7XB and ended up with the wrong documentation at the model's first contest. Actually, N7XB had five windows, but the 3-view showed six, which was quickly pointed out to me by the scale judge. Not only that, but when applying the tissue numerals to the model, I inadvertently transposed the 7 and the X, making it NX7B. Another few points lost to carelessness.

Props for my model are 3-blade, 6-inch contra rotating, with blades cut from a plastic cottage cheese container. Blade patterns were placed on the container 15° off vertical, to the left for the normal rotating propeller, and to the right for the opposite prop rota-



tion. Spinners were shaped on a Moto-Tool hand grinder, using sandpaper as a cutting tool. Blades were then "hot stuffed" into the spinners at 45°, right or left depending on the rotation. A complete description on this procedure appeared in *Model Builder* magazine February 1986.

There is no reason why commercial props could not be used as well, but it would necessitate further trim adjustments. Lots of twins are flying with commercial props.

I fly the *Chieftain* with single loops of $\frac{3}{16}$ -inch FAI Tan rubber, 20 inches in length, and between 1,000 and 1,500 turns. Average flight times are around 50 seconds, with a

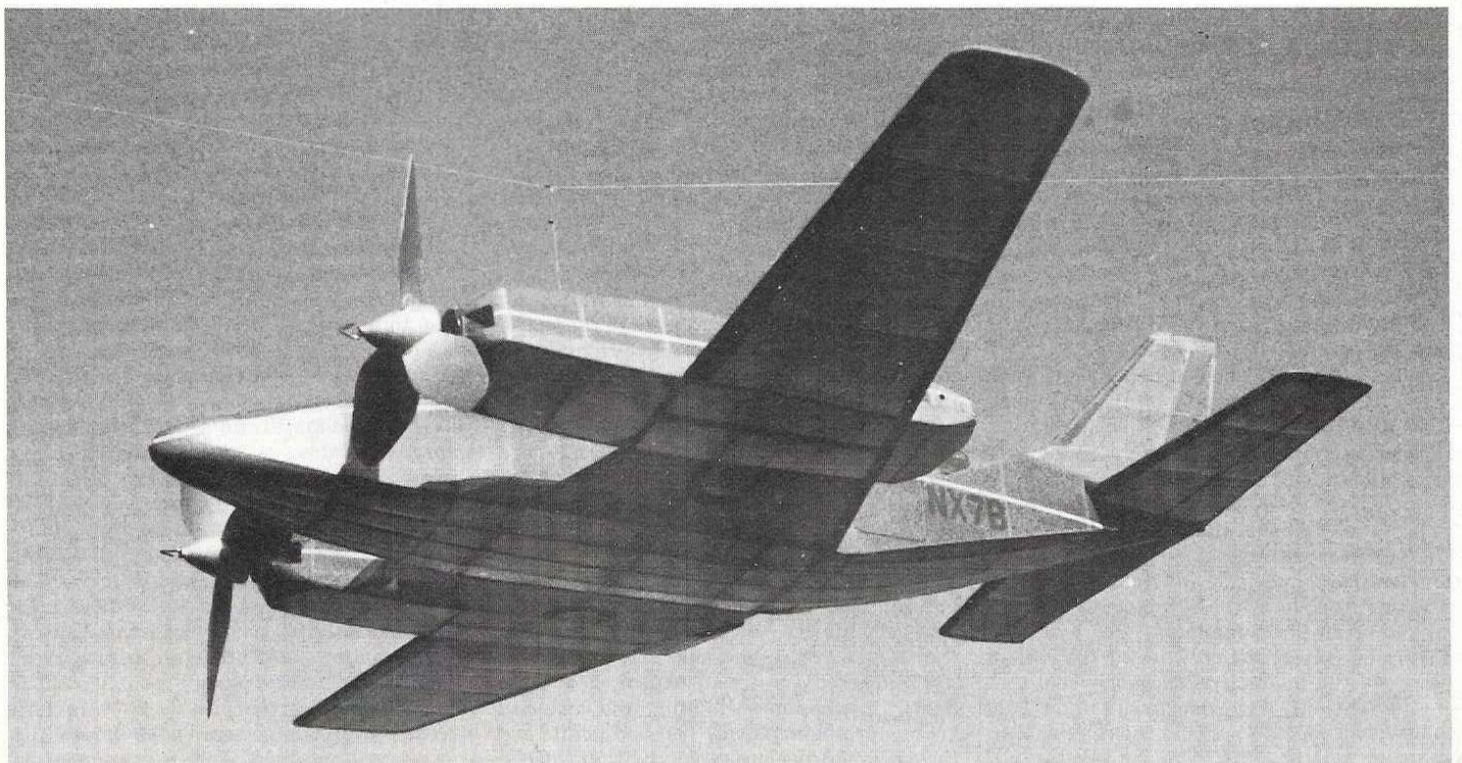
few over a minute.

My model, complete with props, but excluding rubber motors, weighs 55 grams.

It's true, twins are twice as much trouble, but also, they are twice as much fun! Habit forming too.

Balance point for my model is slightly ahead of the main spar, and is quite stable with that set-up.

For static display and or picture taking, I "hot stuffed" short lengths of $\frac{1}{16}$ -inch O.D. aluminum tubing at all landing gear strut locations to receive the $\frac{1}{32}$ -inch wire struts. I would not recommend flying this model with landing gear extended!



The nacelles are big enough to hold $\frac{3}{16}$ inch FAI tan rubber, 20 inches long, to fly the model, on average, for 50 seconds.