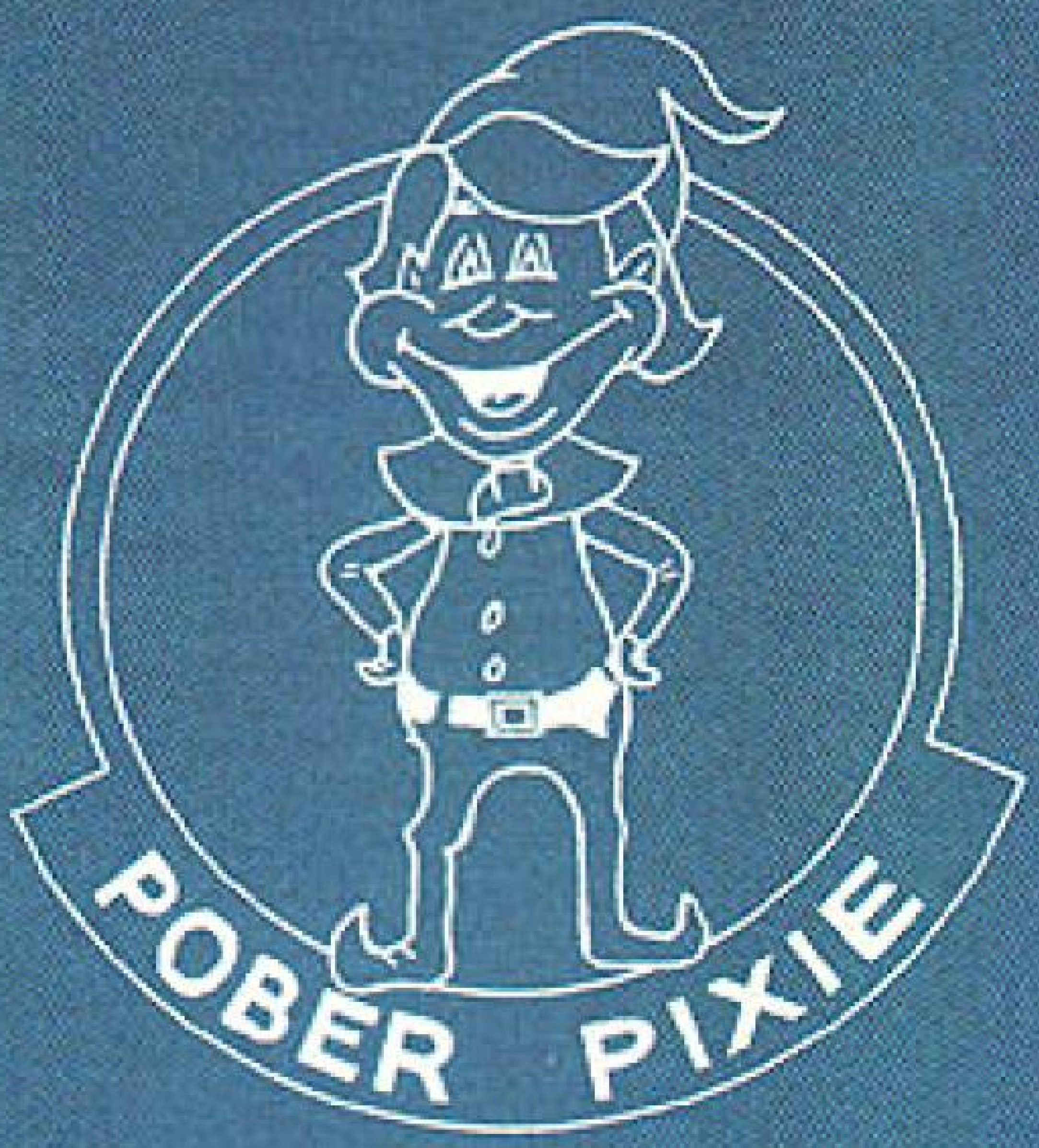
Bob Wischer

pober pixie

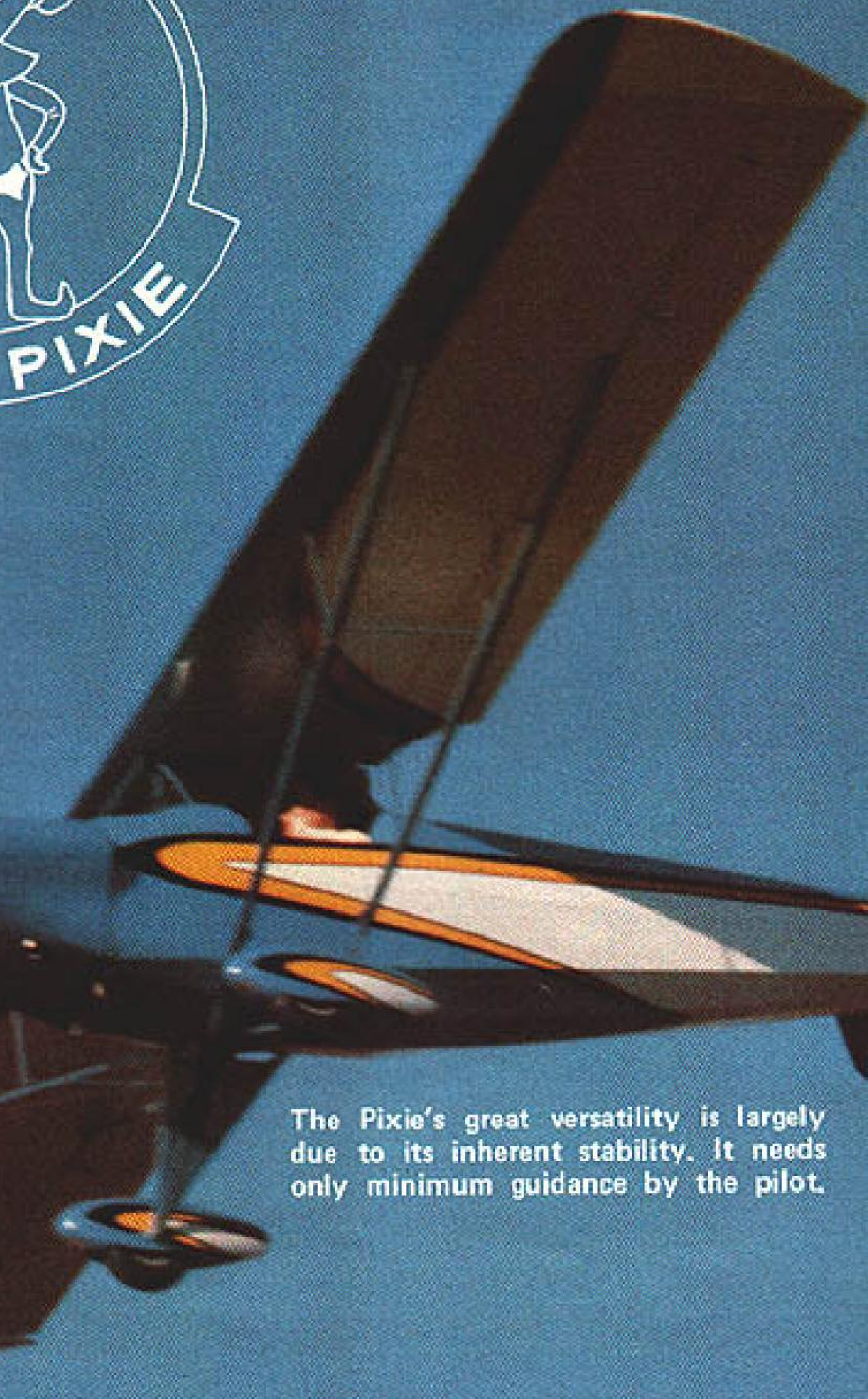
Depending upon your interests and skills, this model could simply be a great sport flier. But it is very much at home in competitions—either in RC Sport Scale or Precision Scale—depending upon your abilities. Power it with current .40s or mild .60s. Four-channel controls.

IN THE EARLY 1930 era, the Heath Parasol was a popular home-built airplane, designed by Ed Heath. Construction drawings could be purchased, and parts and assemblies were marketed in kit form in the original Heathkits. The Pober Pixie traces its ancestry to the Heath LNB-4 Parasol of 1931. Paul Poberezny, president of the Experimental Aircraft Association (EAA), designed the Pixie using the Heath as the basis for most dimensions. The Pixie uses a Piper Cub-type landing gear and a Volkswagen-derived Limbach engine of 64 hp. Its wing has a wrapped aluminum leading edge in place of nose ribs. Except for these modifications it is very similar to a Heath Parasol, having identical surface areas, Clark Y airfoil and tail moment.

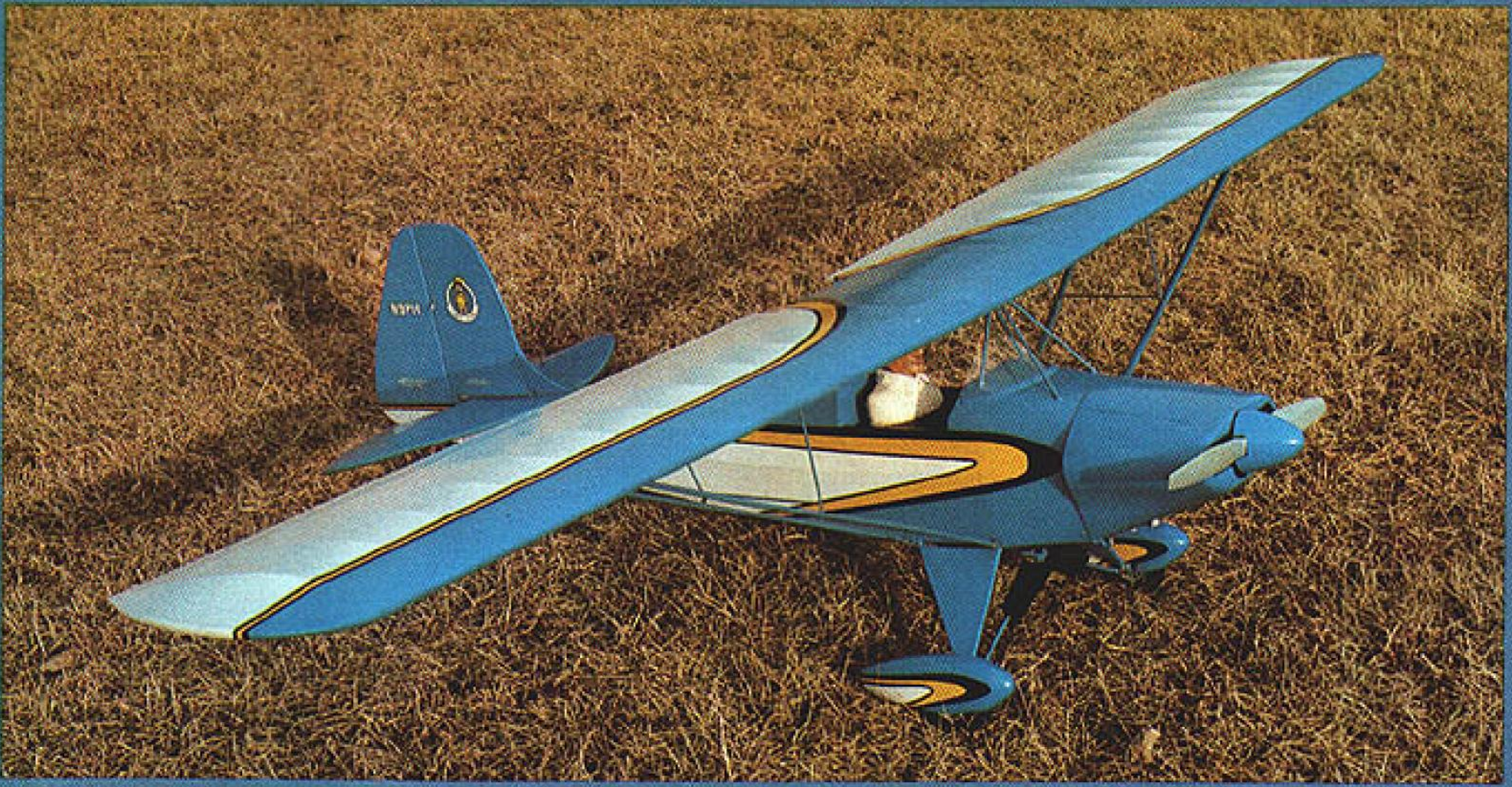


Paul revived the design concept and gave it new life in his Pixie. Many of the little, single-place lightplanes are under construction

Bob Wischer—author, builder, and designer of this model. Many times member of the U.S. RC Scale World Championships Team, he is a former World Champ and MA's contributing editor for RC Scale. With the Pixie, he took third in Sport Scale at the 1975 Nats.



The Pixie's great versatility is largely due to its inherent stability. It needs only minimum guidance by the pilot.



Large wing area and reasonably light weight give the plane easy flight handling so desirable in a Scale model. Vast area visible here helps to reduce the wing loading to about 20 oz./sq. ft. Unexpected stalls don't occur with a light loading.

since drawings were made available in 1974, and a number of completed Pixies are appearing at fly-ins. Life of the design has spanned a half century. Construction drawings for the full-size Pixie are sold for $60, or an information kit for $5, from Aero Sport, Inc., P.O. Box 462, Hales Corners, WI 53130.

As a model, I found no reason to make any changes. It is built to 1/5-scale for a wingspan of 72 in. Stabilizer area is not increased.

Wide full-span ailerons are effective but not extremely sensitive. Differential movement with more up travel than down contributes to smooth flying.

The wing's lower surface is parallel with the top longeron of the fuselage, as is the stabilizer—convenient for checking alignment. This produces the 2° angle of incidence measured to the Clark Y airfoil's mean chord line, as on the prototype.

The model was designed and built from EAA drawings, with several supplemental trips to the

This photo of the full-size Pixie shows the appearance change resulting from omission of the spinner. At one time, its Limbach engine was converted to use methanol—same as the model. Ross Twin looks good in the model.

Fiberglass cowl of the Pixie model is copied from the fiberglass nose bowl on the prototype.

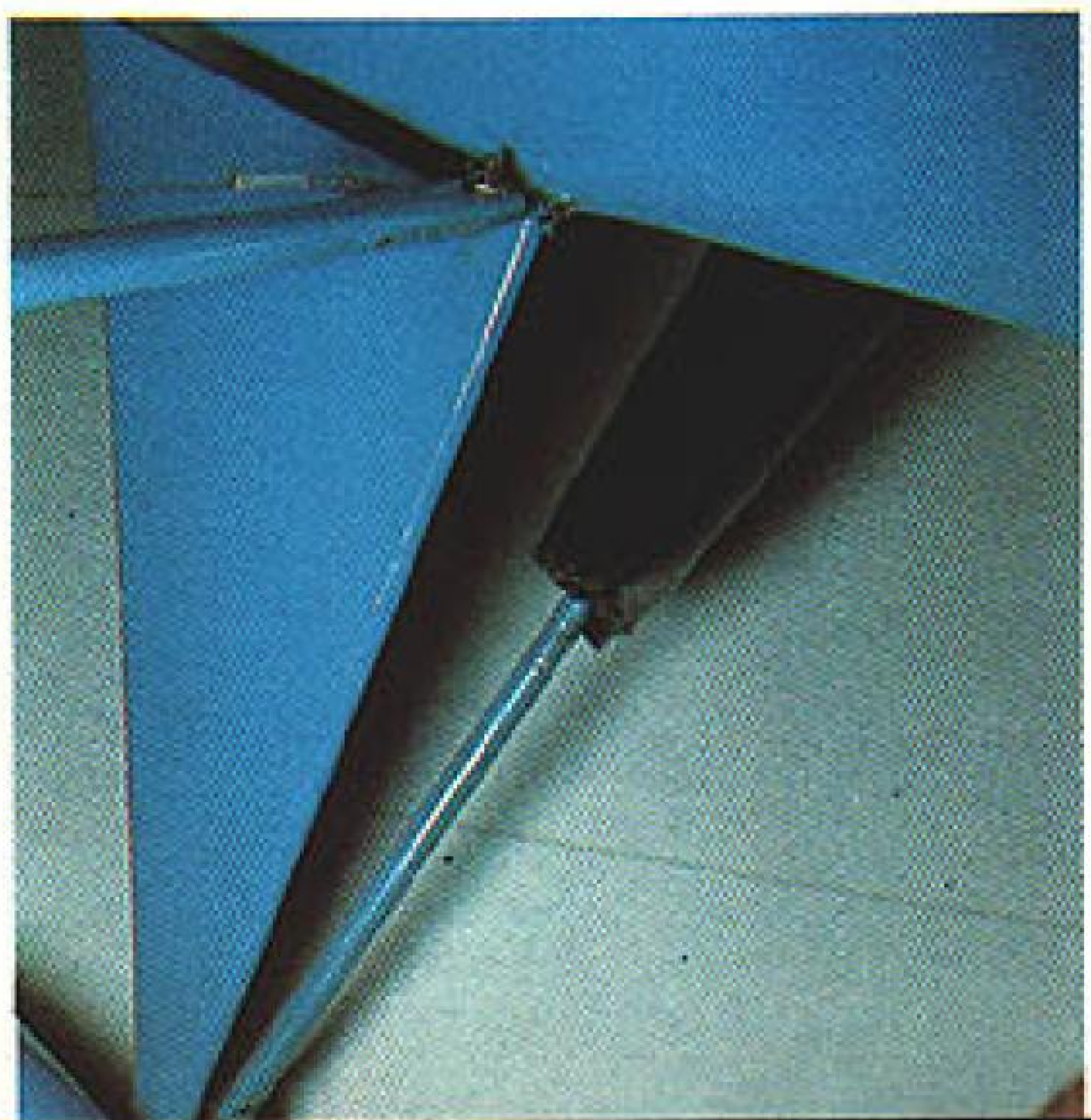
The full-size Pixie has fiberglass whell pants. On the model they are balsa with a fiberglass cloth covering to help them withstand abuse.

Head and chest of the carved balsa dummy pilot rest on a plywood platform fastened to rails in cockpit. Chin to head top is about 2 in.

Wing struts on the model Pixie are a necessity because cabane struts are the pylon type. Jury struts are also functional.

Steel wire cabane struts are anchored securely into fuselage, as they are the main load-carrying members. Note leather-covered headrest.

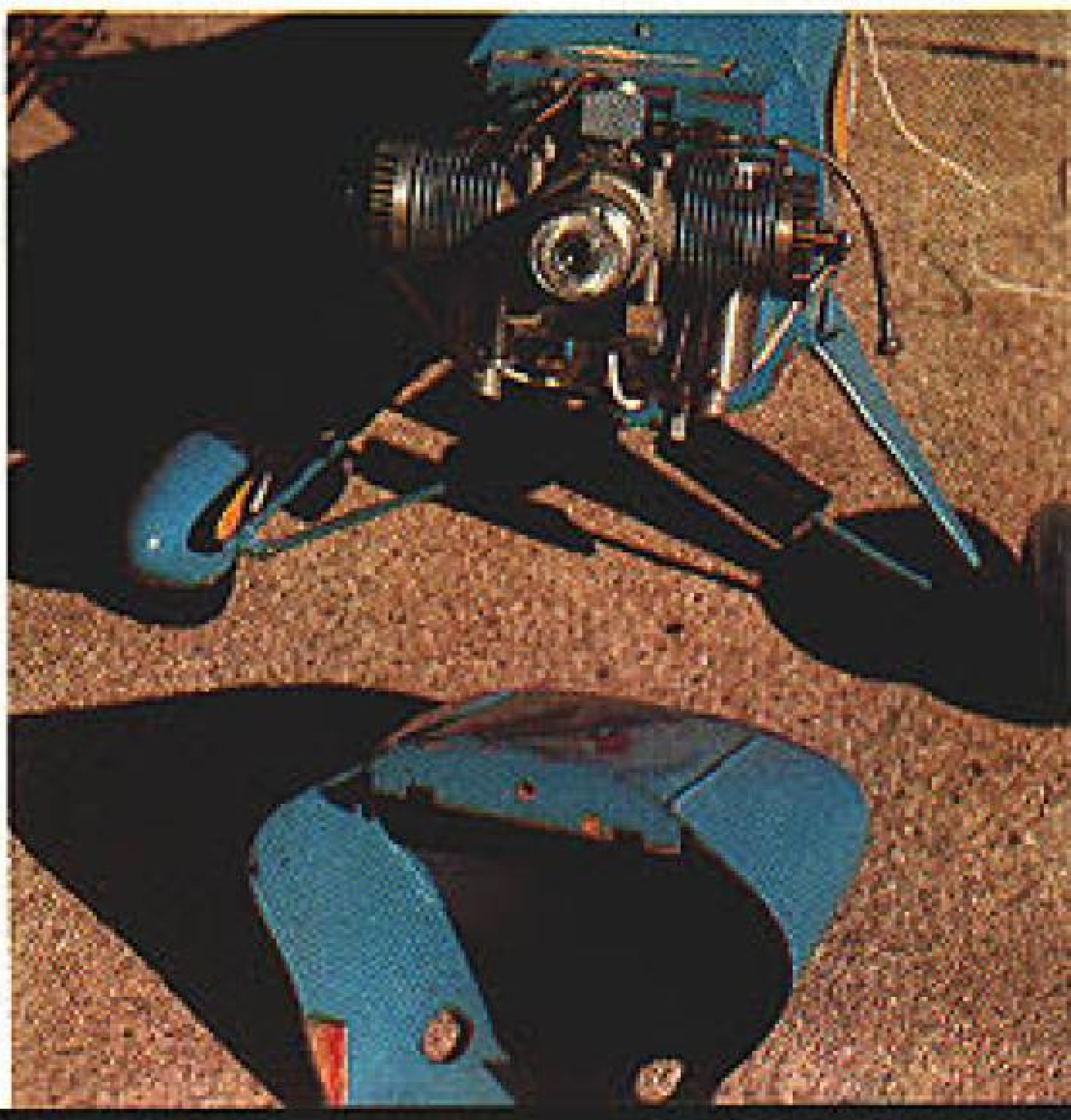
Tail surfaces are wire-braced on the model as on the original. Pixie logo was hand painted in oil colors on blank decal paper.



◀ Wing struts are fastened to fuselage brackets with 2-56 hex-head screws as on the prototype. For transportation screws are removed, aileron clevises are disconnected, and wing pin is extracted from the cabane struts.

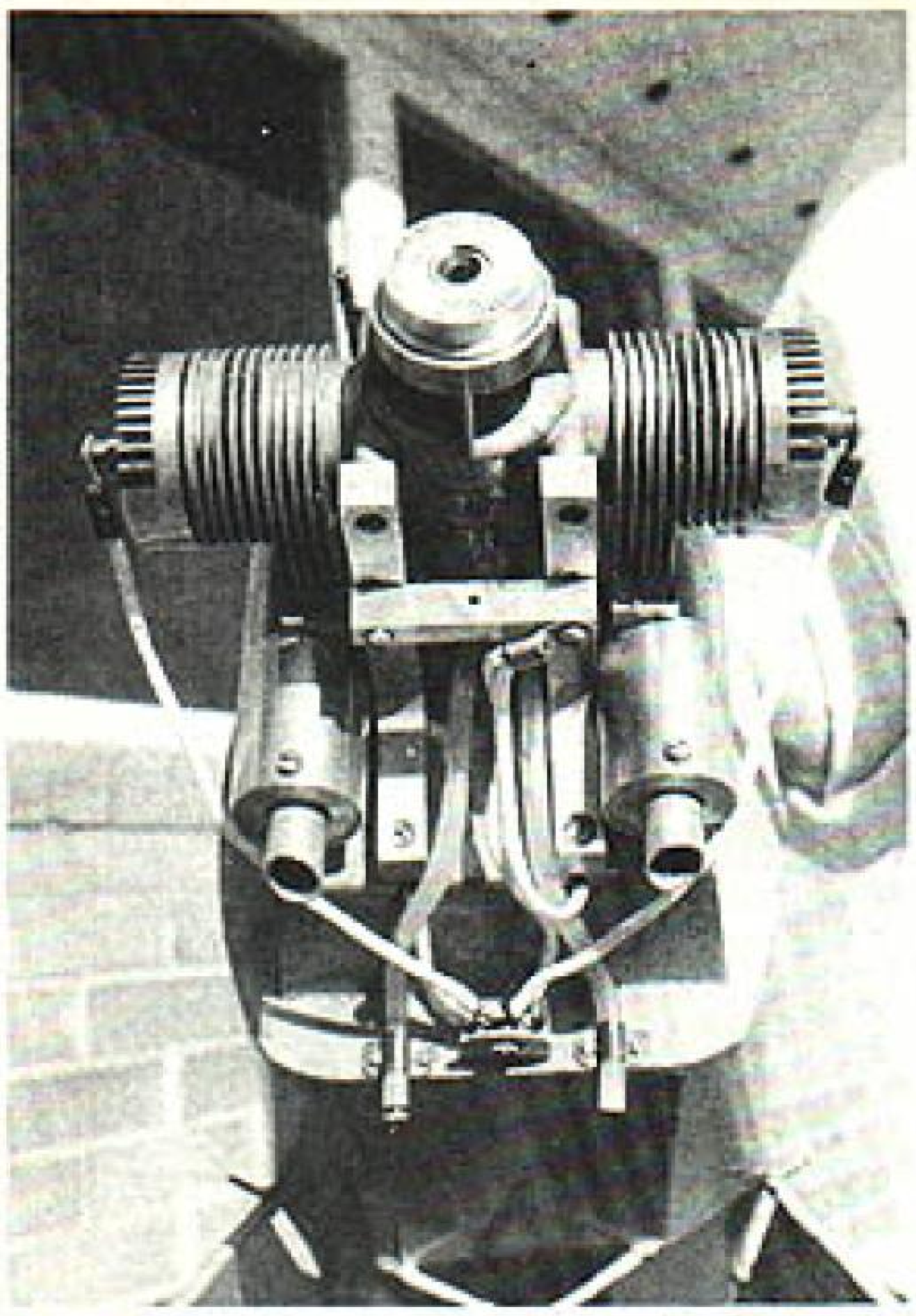
museum workshop at Hales Corners, WI, where the prototype was built, and to the Burlington Airport after it reached flying status with the Limbach engine. On these visits the odd parts not shown on drawings were measured. Dimensions were taken from the aluminum engine cowl and nose bowl, wheel pants,

Engine cowl is made from fiberglass cloth laid in epoxy resin over a foam core. Foam is removed later, and bulkheads cememted inside. ▶

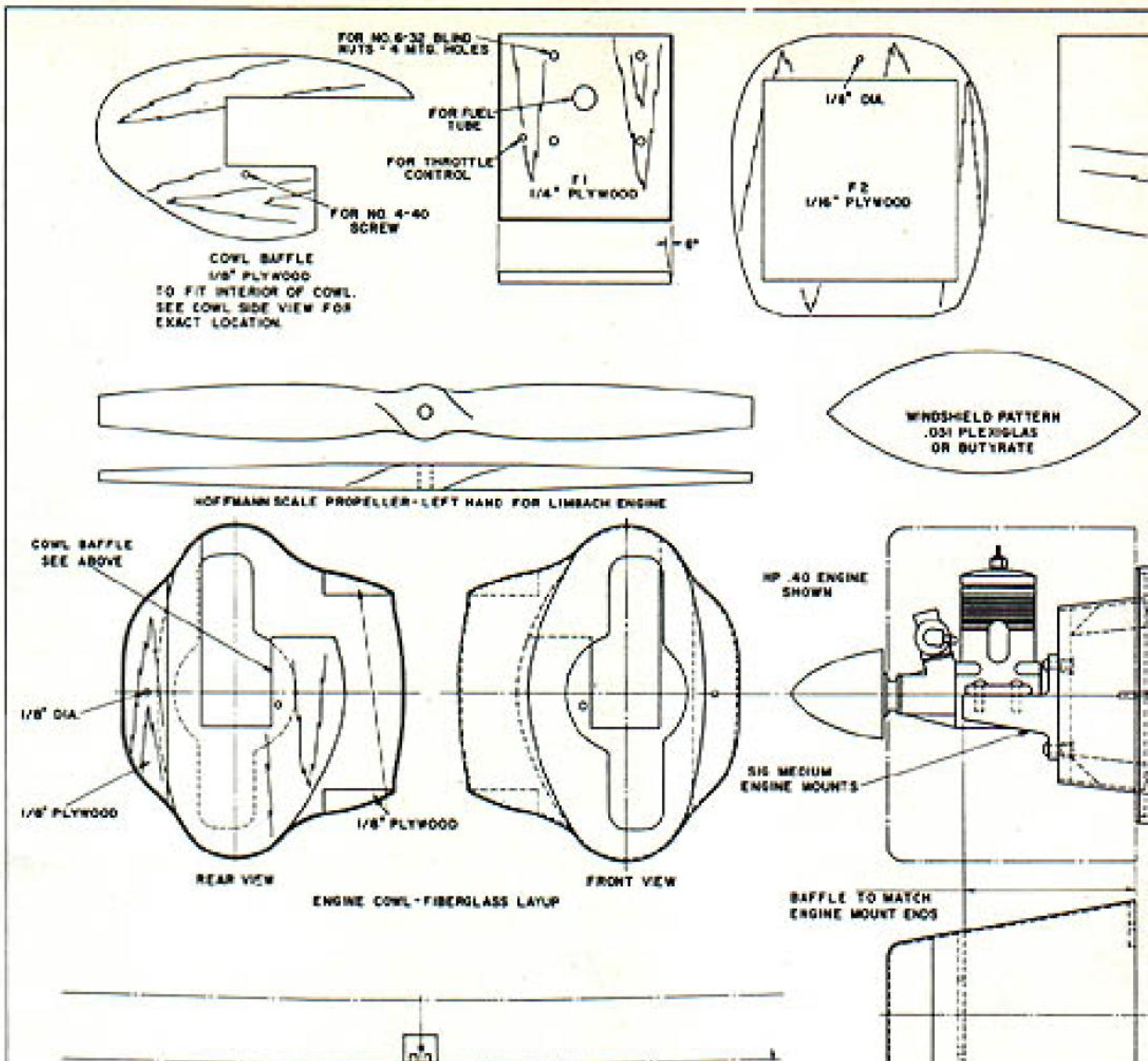


OF HIS COBWEB TO SEE ME OFF TO INDIA! I'M ON A PROVING FLIGHT IN OUR NEW LONG RANGE CITATION 3!
CLEAR DOPE OUTA' MY HEAD FROM THE TRAVELAIRE! 20 COATS OF IT!
TAKE A LOOK AT ALL THAT JEWELRY UP FRONT! IT'LL DAZZLE YOU MORE'N DOPE!
WHAT A MESS OF PANELS!! YOU KNOW HOW TO READ ALL THIS?
GEEZ - I MEAN I CAN'T READ HALF THE 150'S PANEL!
'DOPE' IS SHOWING - COURSE I KNOW! THESE AVIONICS STEER ME TO COORDINATES IN EUROPE ONLY 1/2 MI. FROM MY INPUT!
ALL I DO THEN IS DESIGN UP R/C IDEAS!
COORDINATES? MY OMNI GETS ME 10 MILES EAST OF ALBANY IF I DON'T KEEP MY WINDSHIELD CLEAN!

3/32" STIFFENERS
1/8" FAIRING
1/4" X 9/32" HARD BALSA OR SPRUCE POSTS
3/32"X 3/16" BALSA OR SPRUCE DECK STRINGERS
3/32" SHEET BALSA IN CORE OF TAIL SURFACES
3/32" SQ. RIBS ALL TAIL
1/16" SHEET EDGES TOP BOTTOM
1/4" X 9/32" HARD SPARS
ELEVATOR HORN WIRE TO ELEVATORS
RUDDER STEERED WHEEL BRACKET-SPRINGS ASSEM.
3/16" SQ. SPRUCE LONGERONS AND BRACES
3/32" X 3/8" FAIRLEAD FORWARD TO F 4
1/4" X 9/16" BEVEL OVER AIL. GAP
ROBART HINGE POINT (8)
1/8" X 1/4" HARD T.E. AND AIL T.E.
W 1 3/32" SHEET WINGTIP
1/8" BALSA EDGE
3/16" SHEET BALSA TOP/BOTTOM L.E.
1/4" X 11/16" HARD REAR SPAR
1/2" SQ. BALSA LEADING EDGE
3/32" BALSA ALL RIBS
1/4" SQ. HARD BALSA SPARS TOP, BOTTOM
.032 ALUMINUM LIFT BRACKET (COULD EXTEND UP OVER SPAR TOP (HC)
HARDWOOD STRIPS WIRE BRACED WITH ATTACH FITTINGS IN ENDS
.032 BRASS TUBING JURY STRUTS WITH FLAT ENDS
1/8" PLY RUDDER 'BAR'
AILERON BELLCRANK .032 BRASS ON 5/32" BRASS TUBE TO FWD SERVO LINK ARM
1/8" BALSA PANTS
2 3/4" DIA. WHEELS
5/32" M. WIRE
.031 BRASS L.G. CLIP TO PANTS
1/4" BALSA BOTTOM TO F 5
.032 BRASS FITTING
3/16" BALSA FILL GLASSED OVER
1/8" MUSIC WIRE
F 3 1/16" PLYWOOD INNER SIDE BACK TO F 5
1/4" PLYWOOD FIREWALL
1/8" PLYWOOD COWL BAFFLE
4-40 SCREW TO ENGINE BEARER ARM SECURES COWL
.40 ENGINE ON SIG MEDIUM MOUNT
FIBERGLASS LAY UP COWL
1/8" STEEL PIN ANCHOR AT COWL REAR
1/8" BALSA COWLING
1/16" PLYWOOD CABANE DECK
1/8" M. WIRE ALL CABANE
W 6 1/8" PLYWOOD SPAR JOINERS
3/32" SHEET CENTER SECTION ONLY
5/32" O.D. TUBING GUIDES WING PIN
5/8" SQ AILERON SPAR
1/8" FILLETS
W 7 1/8" PLYWOOD SPAR JOINER
AILERON LINKAGE



Plastic fill and vent tubes from the fuel tank are clamped to the firewall. White wires from Ross Twin's two glow plugs connect to a mini phone jack for an external glow battery. Other wires go from jack to engine mount.

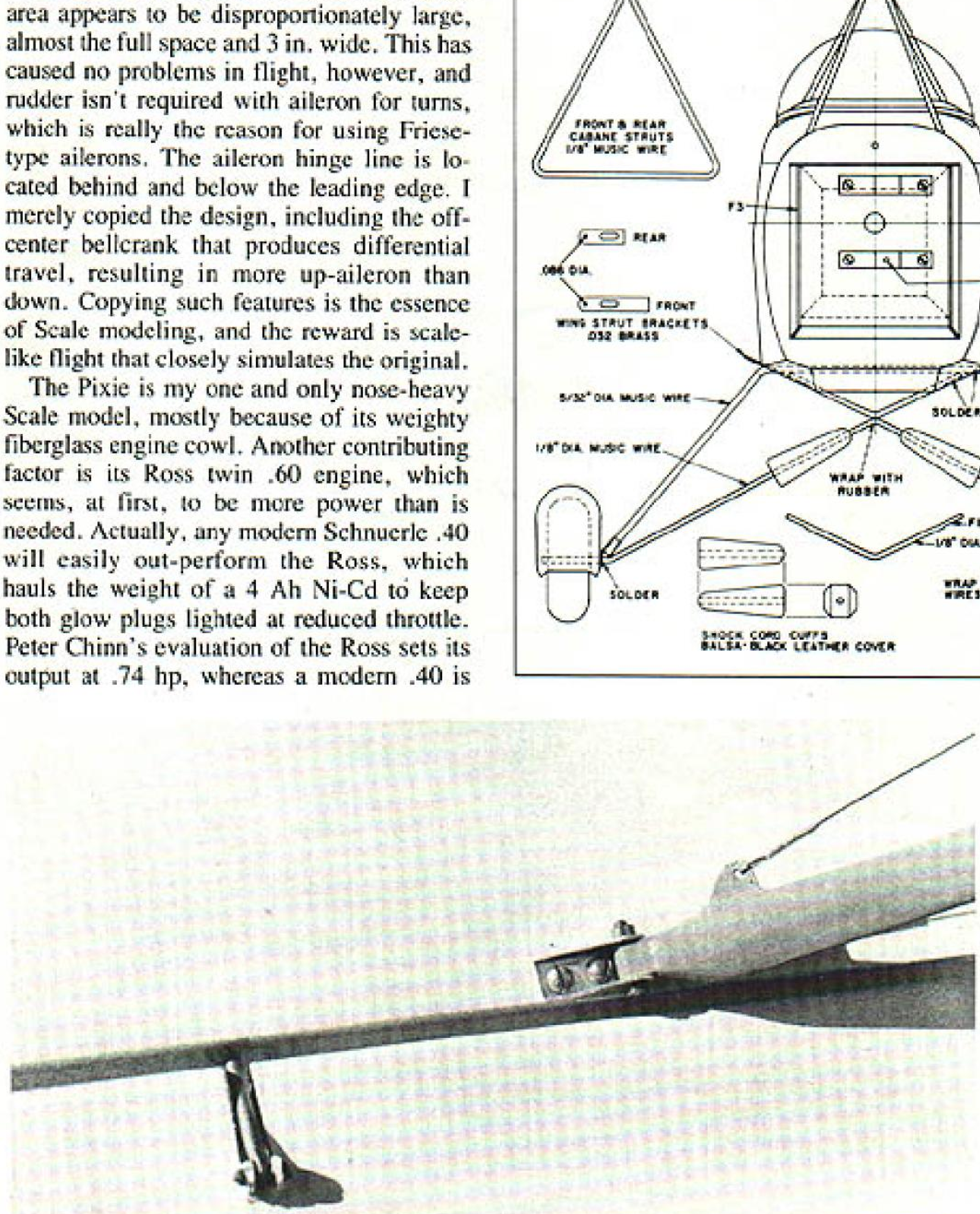


propeller and spinner, windshield, headrest, tail wheel, and control surface travel.

At first assessment, the model's aileron area appears to be disproportionately large, almost the full space and 3 in. wide. This has caused no problems in flight, however, and rudder isn't required with aileron for turns, which is really the reason for using Friese-type ailerons. The aileron hinge line is located behind and below the leading edge. I merely copied the design, including the off-center bellcrank that produces differential travel, resulting in more up-aileron than down. Copying such features is the essence of Scale modeling, and the reward is scale-like flight that closely simulates the original.

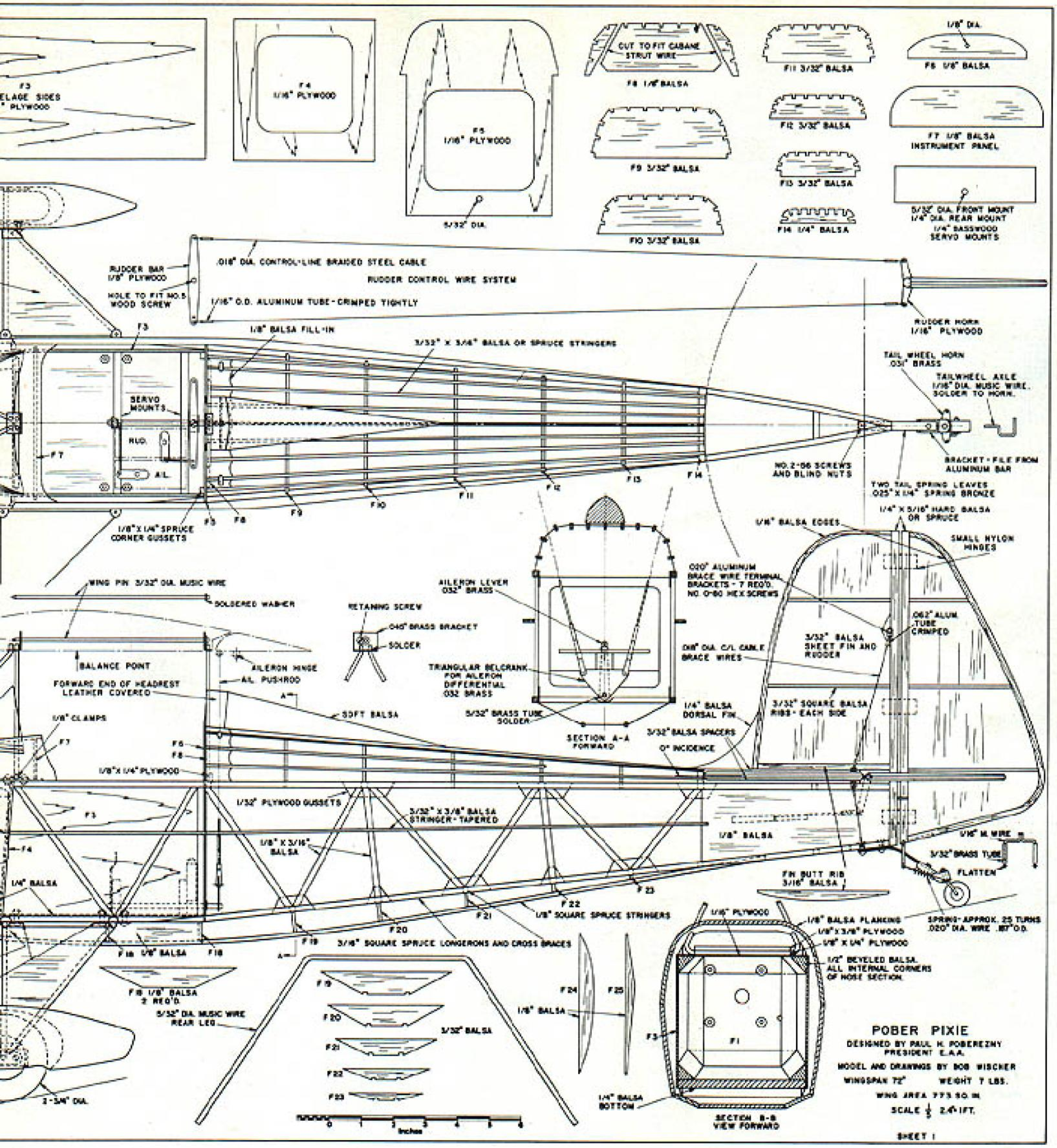
The Pixie is my one and only nose-heavy Scale model, mostly because of its weighty fiberglass engine cowl. Another contributing factor is its Ross twin .60 engine, which seems, at first, to be more power than is needed. Actually, any modern Schnuerle .40 will easily out-perform the Ross, which hauls the weight of a 4 Ah Ni-Cd to keep both glow plugs lighted at reduced throttle. Peter Chinn's evaluation of the Ross sets its output at .74 hp, whereas a modern .40 is over 1.00 hp. Any .40 or one of the older .60 engines will fly the Pixie with power to spare. The Ross may not be a ball-of-fire engine, but it certainly looks pretty inside the cowl.

The addition of 3 oz. of bar brass bolted into the fuselage bottom just forward of the tail wheel for balance has brought the Pixie's weight to 7 lb. The 773 sq. in. wing area



Wing struts are fastened to spars with brackets and wood screws. Cable bracing between struts copies full-scale practice and is non-functional on the model. Handmade aileron hinges are copied from the prototype, but are better made with Robart Hinge Points.

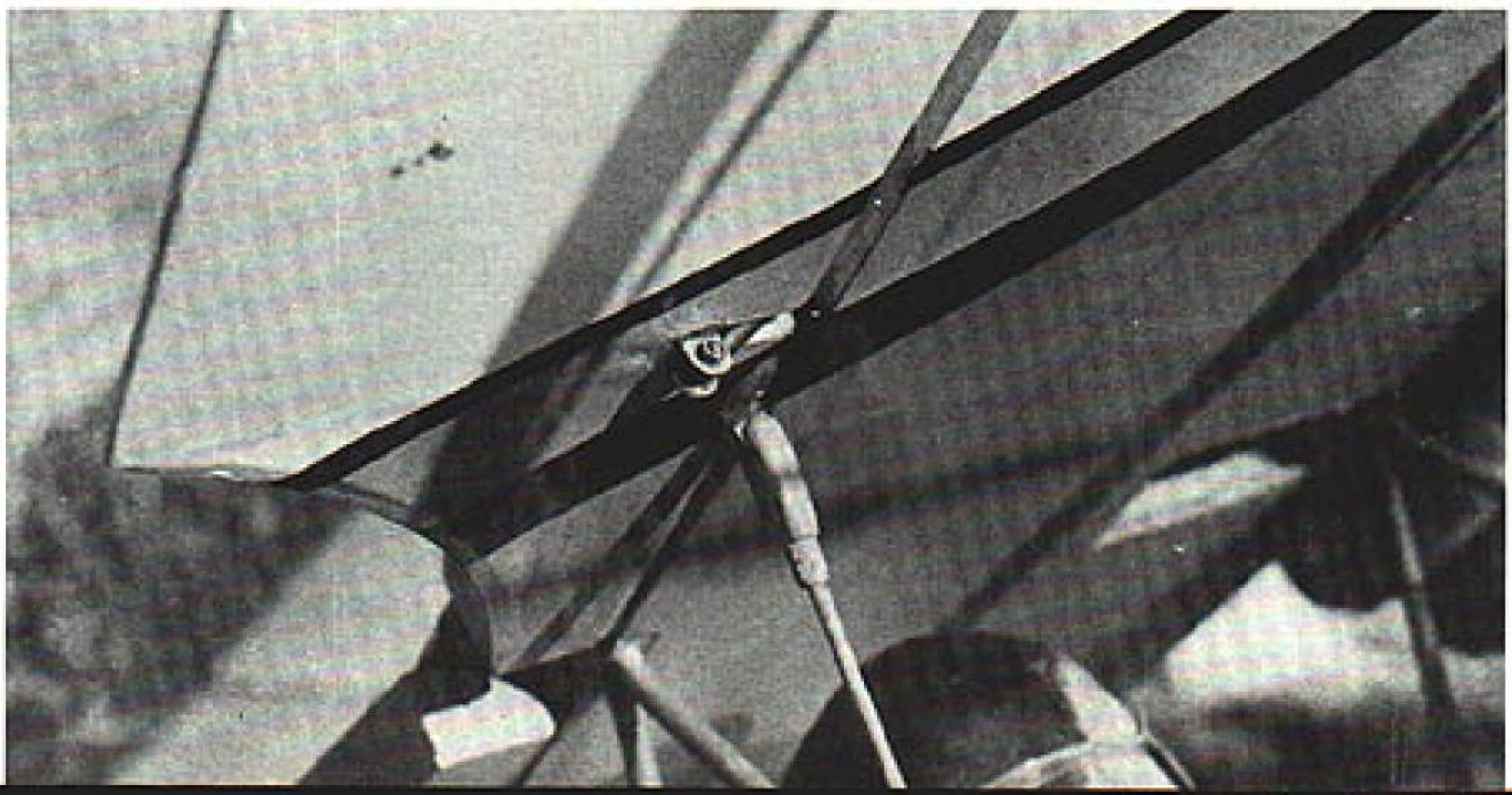
FULL-SIZE PLANS AVAILABLE...SEE PAGE 164



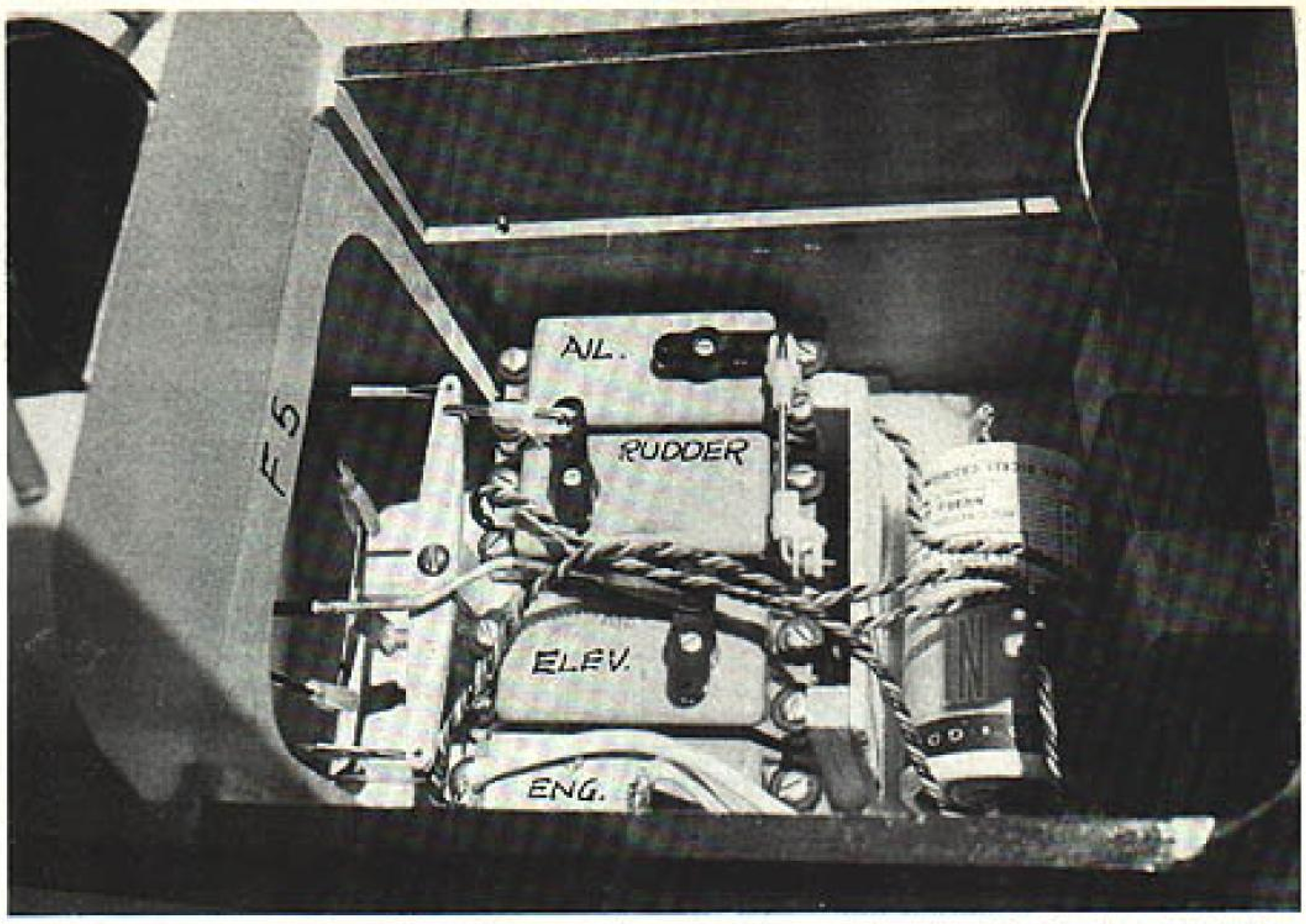
carries the weight easily at a loading of 21 oz. per sq. ft. With a .40 for power and a less weighty cowl, the model shouldn't exceed 6 lb. (18 oz. per sq. ft. loading).

When the model was built, the prototype was using a Hoffmann left-hand propeller with a spinner. It is currently using a varnished wood prop and no spinner. The model would be authentic with or without a spinner.

In some respects my model is different



Aileron pushrods are Goldberg Mini Snap Links and Rods connected to a bracket forward of the aileron hinges. The aileron linkage shown is in the true scale location.

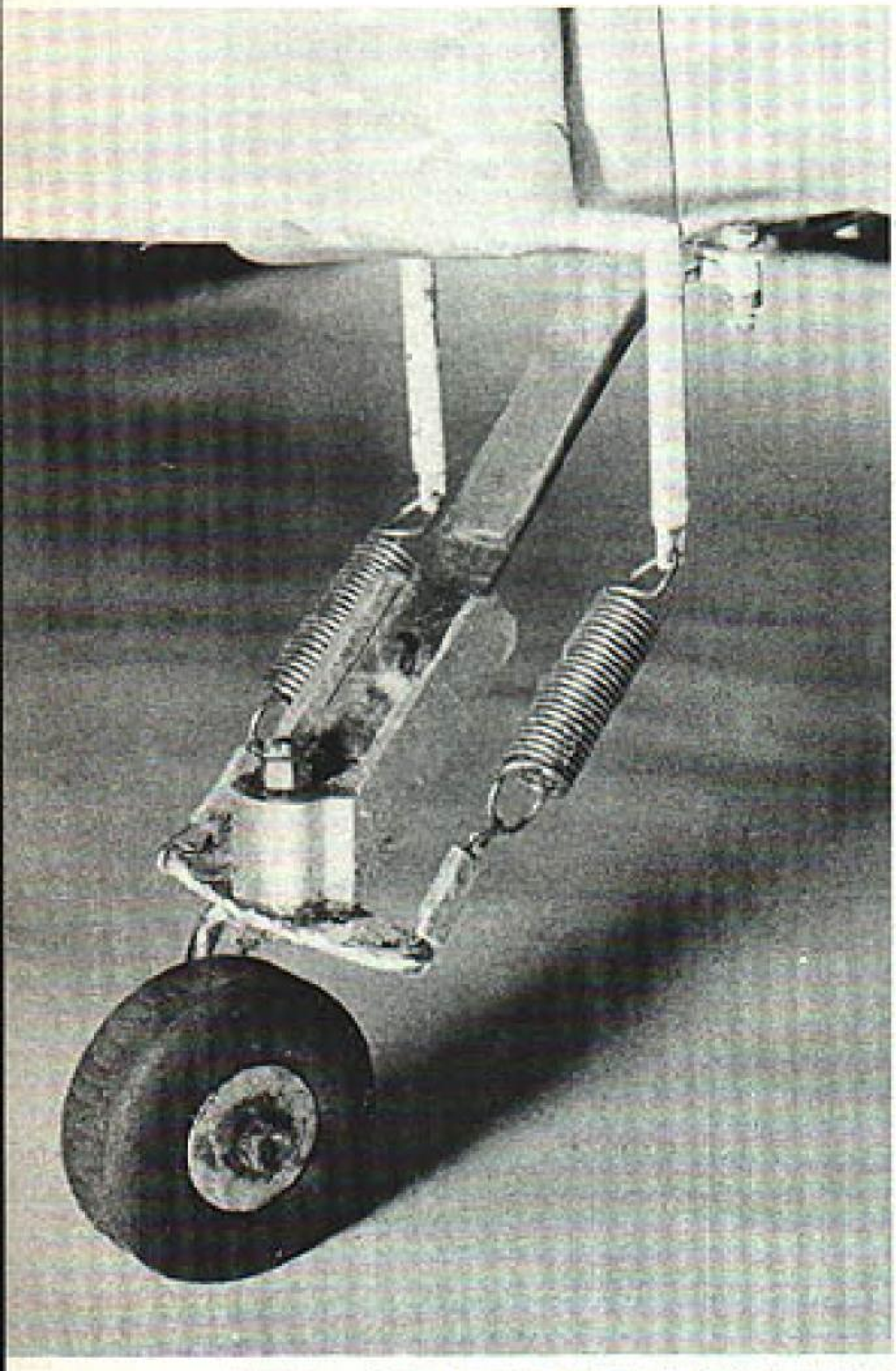


Servos, top to bottom, are for aileron, rudder, elevator, and throttle. Rudder bar at left has wire cables to a horn on the rudder. Offset bellcrank for aileron is behind Sta. F5. Large 4Ah Ni-Cd (for glow heat) is controlled by a micro switch mounted above throttle servo at bottom.

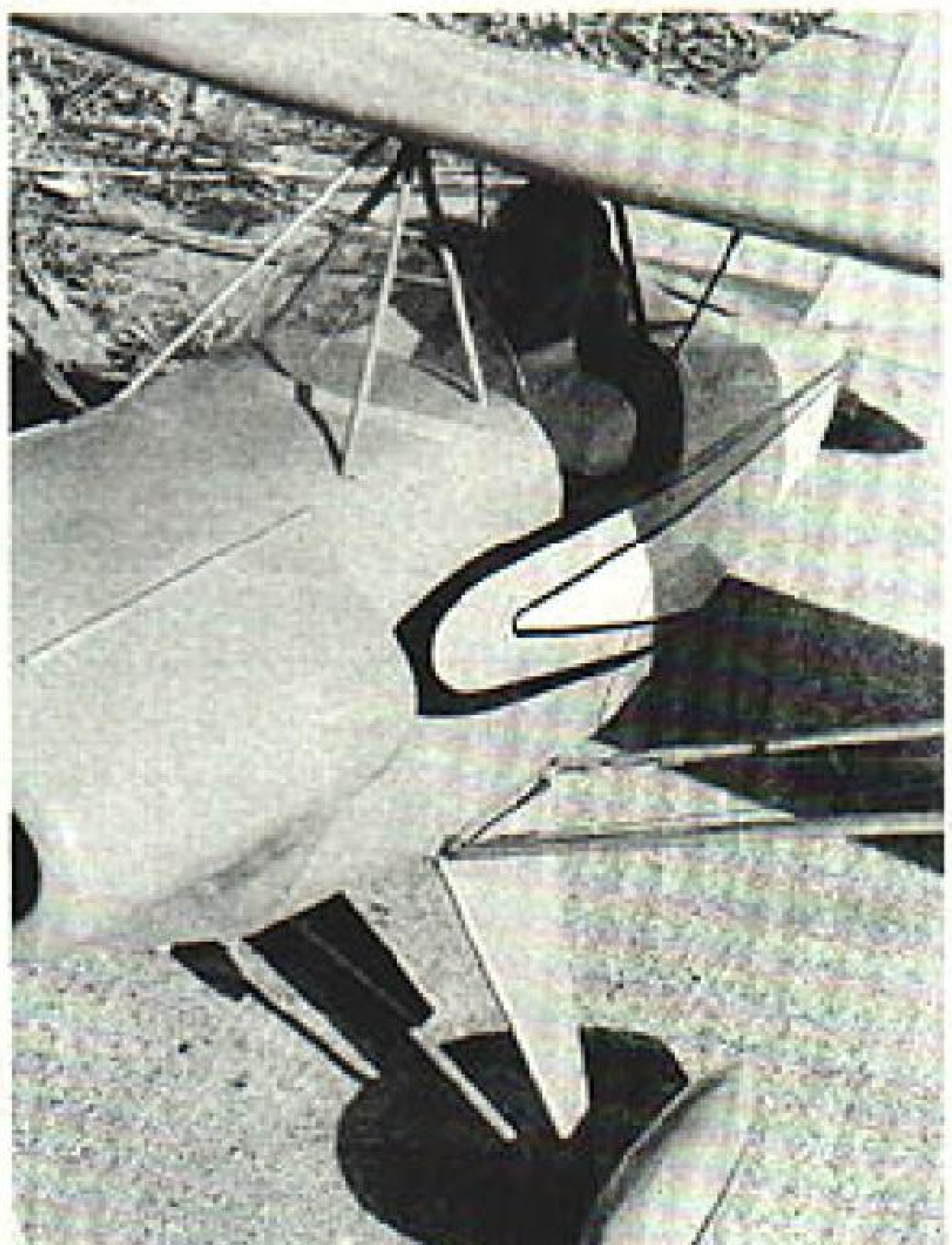
from the drawings. It was initially intended that the model should be disassembled to fit a shipping box for easy transport to overseas contests. For minimum crate size, the tail surfaces had to be removable from the fuselage. For this purpose I used hex-head bolts of scale size and location for fastening. The bolts pass through the stabilizer leading edge into a cross member. This means that there is a ⅛-in. gap under the stabilizer and also between fin and stab, duplicating the gaps on the full-size Pixie. The drawings show the gaps filled with balsa spacers.

My Pixie was never used in world competition. It served as back-up model for the Beryl and Emeraude. The model also has bungee-type rubber shock absorbers under its landing gear cuffs. With a weight of 7 lb., it is doubtful whether the shock cords were ever extended on a bad landing. I consider the feature a needless complication.

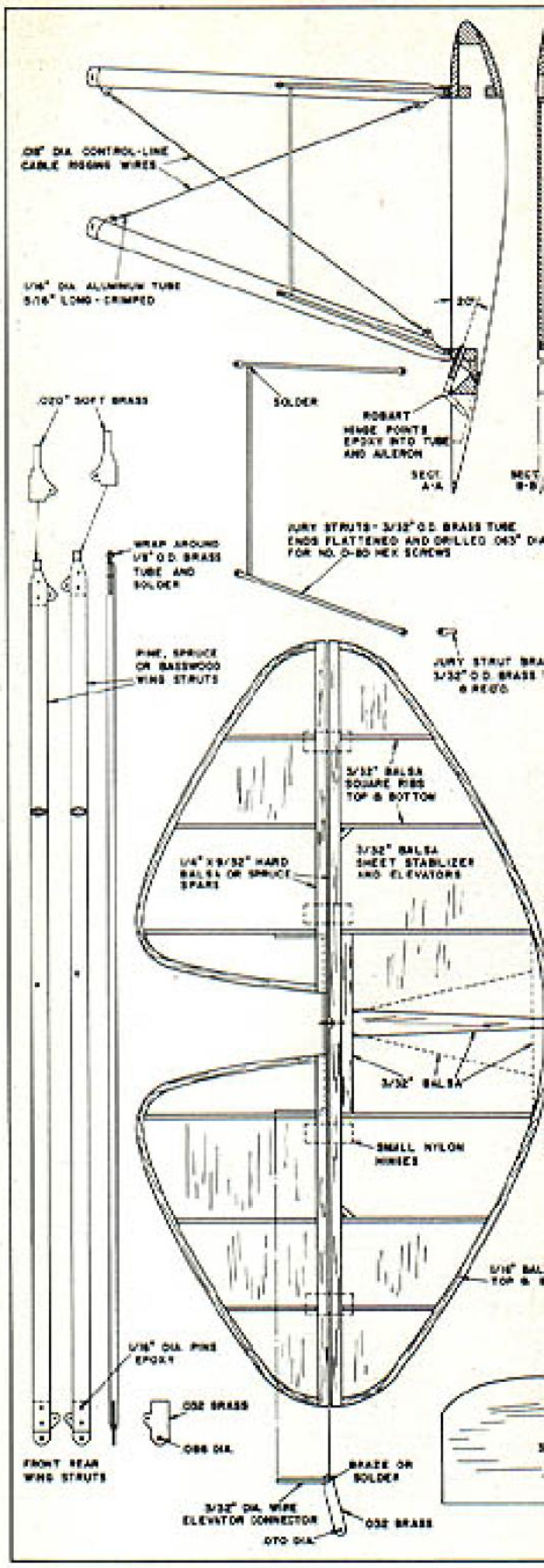
Servos are mounted, four in a row, across the fuselage bottom. These are large Kraft 15 size, and there is room to spare. Smaller servos would suffice. On the full-size Pixie,



Flattened tread on the tail wheel is accomplished by holding coarse sandpaper against the tire while spinning it in a lathe or electric drill. Hardware store springs absorb ground shocks to avoid servo damage.



The full-size Pixie uses round steel tubes in its cabane struts, not streamlined tubes as on the wing. Wide cowl provides excellent cooling of the model's engine.

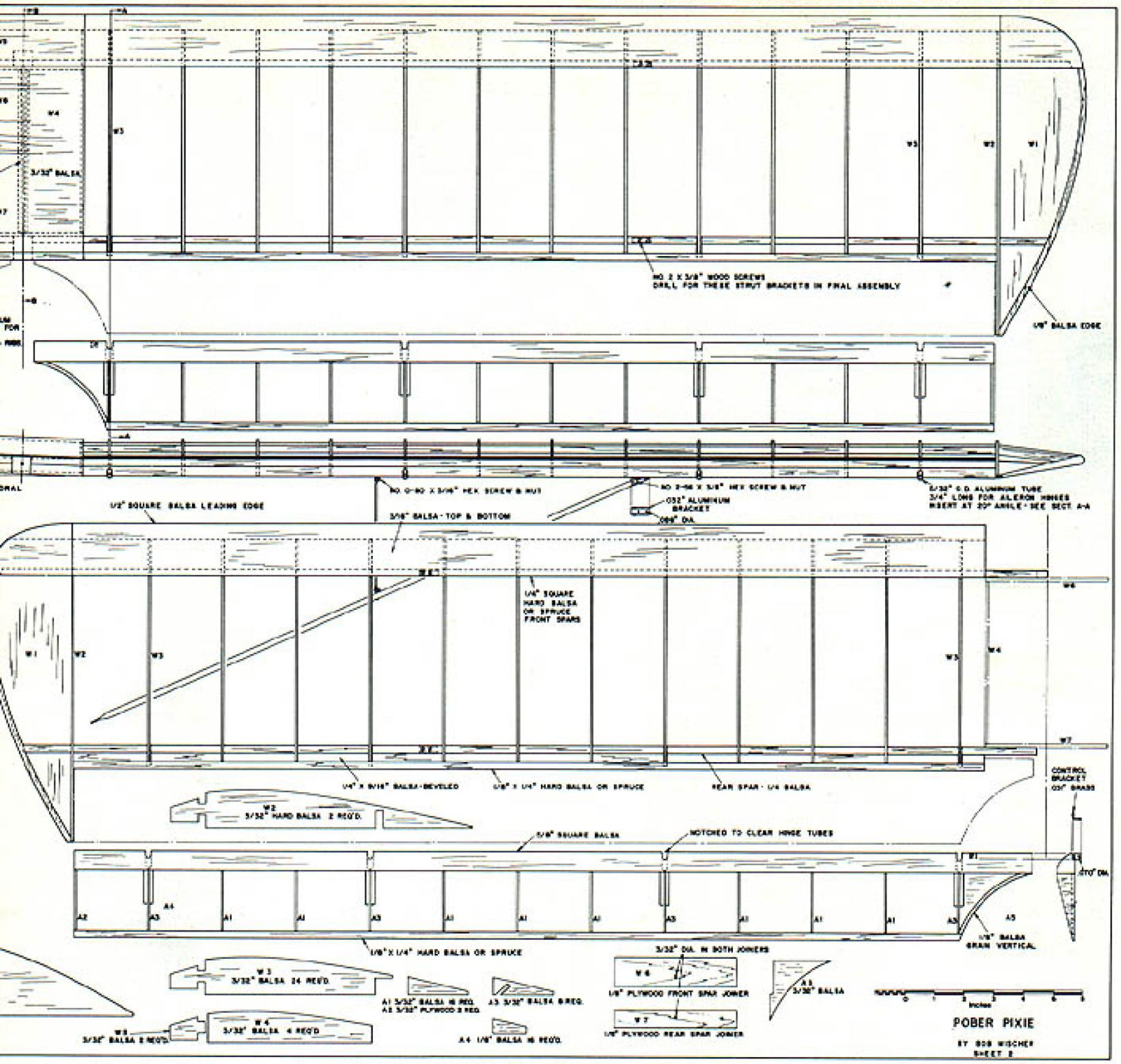


ailerons are controlled by a rotating tube that passes beneath the pilot's seat to an offset bellcrank in the rear. Vertical pushrods operate the ailerons. The bellcrank provides aileron differential, measured on the prototype as 3 in. up and 2 in. down. On the model this is ⅝ in. up and ⅜ in. down, with linkage copied from the EAA drawings. Exposed pushrods that are functional add to scale realism. Ailerons could also have been operated from a servo mounted in the wing center section. Elevator travel is 1 in. and rudder 1-⅞ in. each side of center.

Construction. I prefer building the wing first to simplify fitting cabane struts to spars. The flat-bottomed wing halves can be built directly over the drawing. I use a hollow-core door for a flat building surface. The door was purchased at a local lumber yard for only $7 because it had minor edge damage.

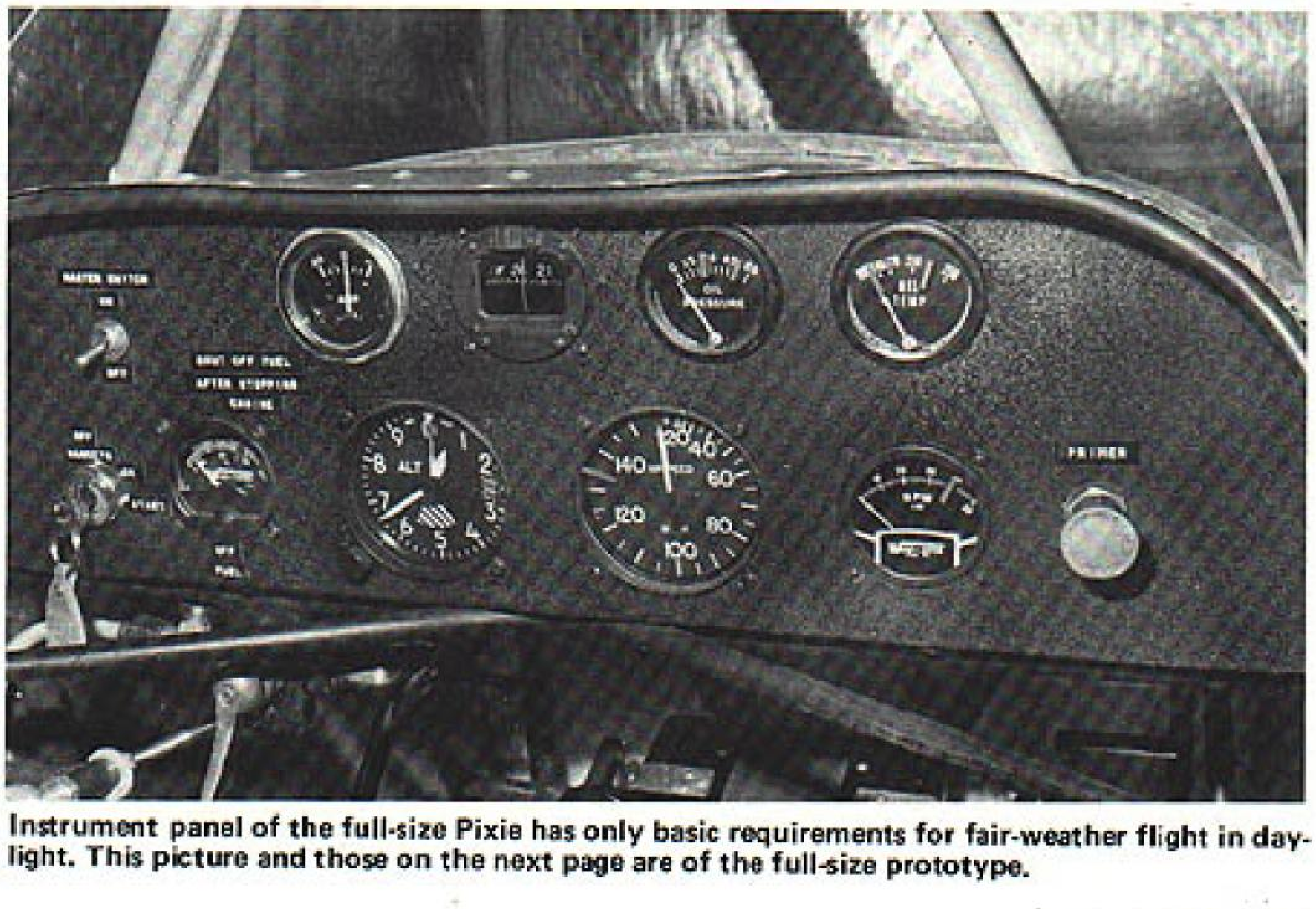
Front spars can be either hard balsa or

FULL-SIZE PLANS AVAILABLE...SEE PAGE 164

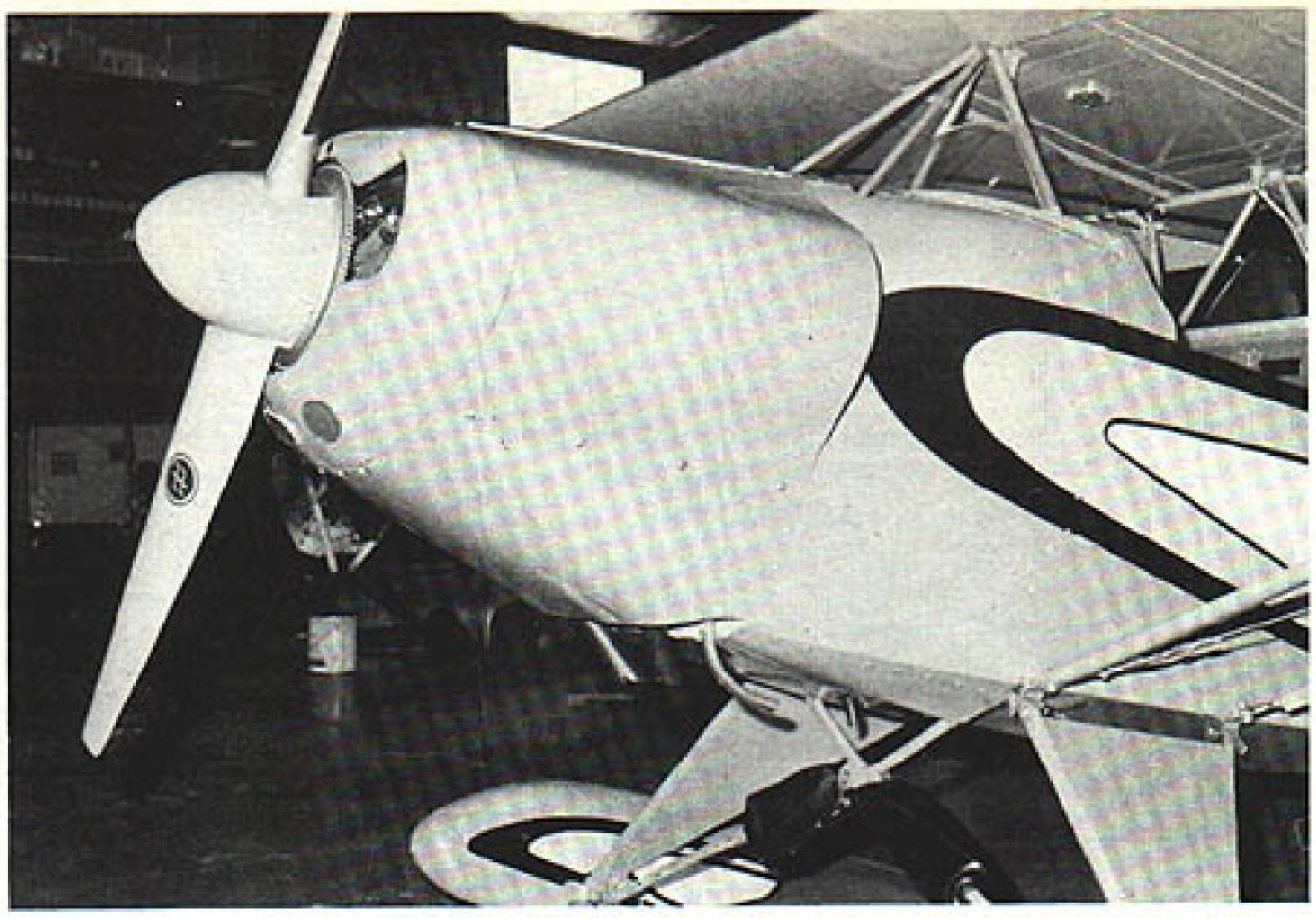


spruce. Note that the upper spar is beveled for a good fit with the balsa leading edge sheet. For scratch builders who have a table saw, set the blade at 17°. The ½ sq. balsa leading edge is cut at the same angle on its upper surface. The beveled balsa filler strip along the trailing edge is cut at 23°. None of these angles is critical, and the cuts can be made by carving with an X-acto blade and a bit of sanding.

The wind halves are connected with plywood joiners. On the full-size Pixie, the center section is the fuel tank, covered with an aluminum sheet that is flat, viewed from the front. Location of the 3/32-in. diameter holes in the joiners, relative to the wing lower surface, is quite critical as it determines the wing incidence angle. With the smaller joiner laid on top of the larger, lower edges aligned exactly, drill through both at one time, making certain that the drill is vertical. An aluminum tube, trapped between two center-section ribs, is a guide for



Instrument panel of the full-size Pixie has only basic requirements for fair-weather flight in daylight. This picture and those on the next page are of the full-size prototype.

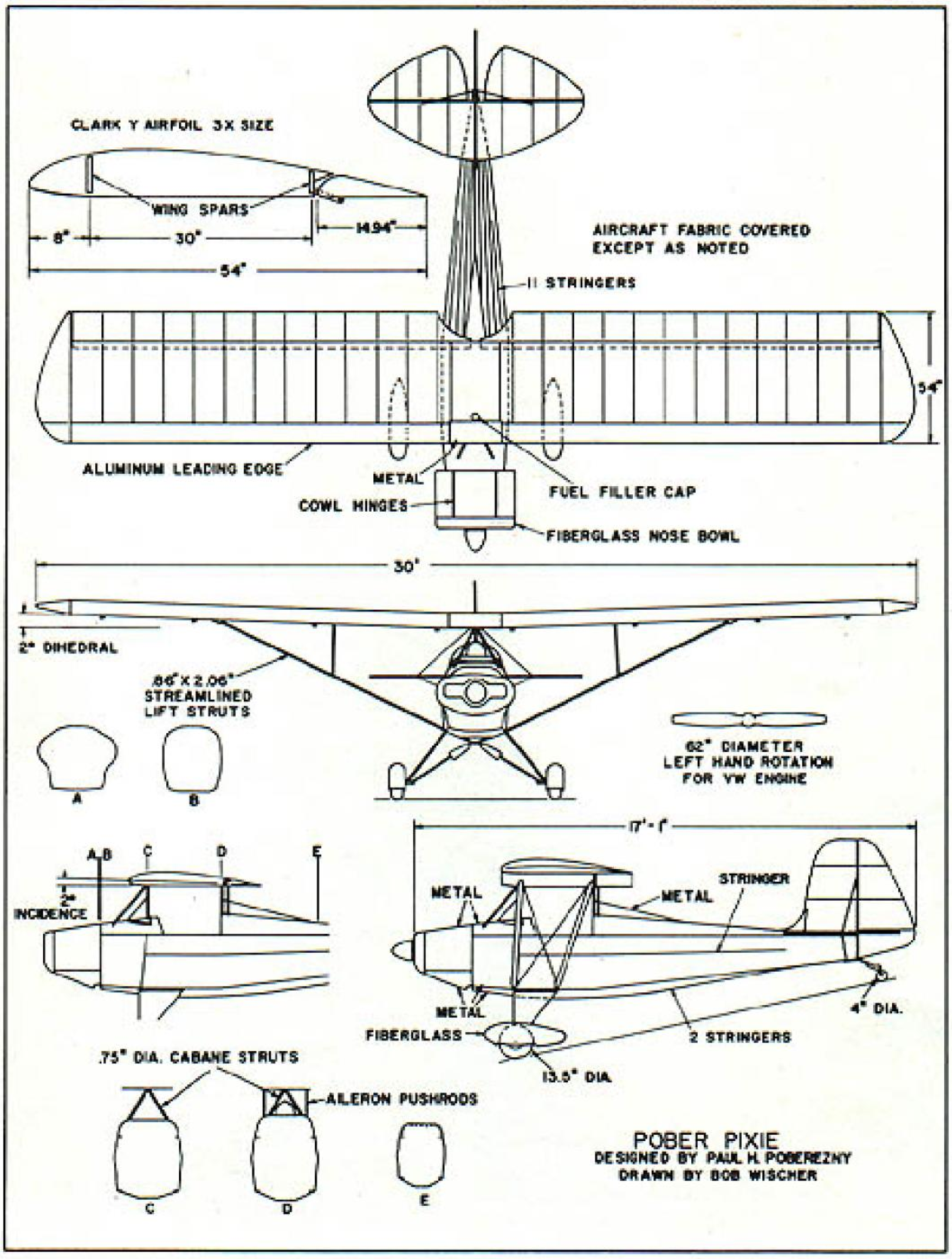


Fiberglass nose bowl and formed aluminum sheet are components of Pixie engine cowl. Note step in fuselage bottom where aluminum sheet meets fabric at landing gear attachment point.

inserting the wing pin, an assembly operation that could be difficult without the tube.

I made aileron hinges from brass tube, with brackets, in close simulation of full-size practice. The drawing shows Robart Hinge Point hinges, which greatly simplify construction. However, the Robart hinges need to be lengthened by inserting their forward ends into short stubs of aluminum tube extending from the rear spar. The drawing specifies the tube angle as 20°. The exact angle isn't critical, but it is necessary to get all of the tube angles alike. For this purpose, make a simple fixture such as a hardwood block drilled at 20°. Hold the block against the rear spar while drilling each 5/32-in. diameter hole through the fixture for perfect alignment of angles as well as hole locations above the spar edge.

On my Pixie, the holes were drilled in the finished wing using the aileron as a hole location template. Working carefully, the holes could have been drilled in the spar before assembly. It will be important for the slotted ribs in the ailerons to be aligned with the tubes for free operation afterward. The Robart hinges are epoxied into the tubes with all hinge points in line. Epoxy or cyanoacrylate cement (CyA) can be used to fasten the tubes into the spar.



The fuselage is best made in two sections. The stick portion aft of the cockpit has diagonal bracing that duplicates the structure of the prototype. Refering to Section A-A, note that all bracing members are of thinner dimensions than the longerons to avoid the problem of the covering material adhering to the bracing. This means that right and left sides are different, with bracing offset to the inside. The basic structure of the fuselage aft end is built first.

The forward fuselage sides of 1/16 plywood will need to be bent rather sharply at Former F4. This can be done by soaking

Continued on page 134

Tail surfaces have round wire bracing with turnbuckles at the lower end. Note large gap between fin and stabilizer upper surface.

issue (the portion about George Clapp) was misleading when it said: "He has 71 appeals." That should have said: "He has appeals on the Fairchild 71s."

Serious correction! Recall the two cartoons which showed the artwork used by the Texas Sailplaners to intimidate those Arkansas guys? We had noted that if the Alamo had a back door, there would be no Texas. (I'm an honorary Razorback.) Here's Don Chancey.

"This is just a short note to give proper credit to those 'priceless Rembrandts' in your earlier column," sez Don. "Our resident commercial artist and current VP is Monte Miller, alias Killer Miller. Monte did the two cartoons you printed and several others.

"Oh, yes, the Alamo did, indeed, have a back door. Those who used it ran off and hid to the northeast in the swampland that is known today as Arkansas. Those guys are like that, you know!"

Aeromodeling gets so technical. We quail.

Bill Winter, 4426 Altura Ct., Fairfax, VA 22030.

Pober Pixie/Wischer

Continued from page 38

with ammonia and holding in the bent position until dry. Keeping in mind that there will be some spring-back, the sides should be over-bent about 50%. An alternative is to score the outer ply along the F4 former line and then crack the plywood. Epoxy will heal the wound. Assemble the forward box section with Formers F1, F4, ¼ balsa bottoms, and the ½-in. beveled balsa gussets. Add the 1/16 plywood top. Splice the fuselage aft end to the box section, and then add Formers F5 and F2.

To the assembled basic fuselage structure, temporarily fasten the formed wire cabane struts and soldered brass brackets. The distance between brackets must match the dimension over the outside surfaces of the wing spar joiners, which is the reason for building the wing first. The dimension is in the vicinity of 5.75 in. With the wing pin inserted into its holes in the brackets, the pin should be exactly parallel with the top surface of the fuselage. Re-melt the solder if necessary to bring the pin into alignment. This adjustment controls wing incidence.

The pin should also be exactly on the fuselage center line so that the wing will be at right angles to the fuselage. The cabane struts can be shifted sideways slightly for this alignment. While holding the cabane struts in alignment, add Former F8 and the plywood block at its base, using epoxy. The front cabane is then bolted to the 1/16 plywood fuselage top with ⅛-in. landing gear clamps. The diagonal cabane is blocked in with ⅛ ply strips behind Former F6, with epoxy. Before the epoxy hardens, check the pin alignment once more, and re-check the spacing between the brackets. The Pixie cabane struts are round tubes, not streamlined.

Landing gear wire and brass parts should be completely soldered together before bolting the assembly to the fuselage bottom. Keep the proper sequence in mind while soldering. For example, the wing strut brackets must be in place before soldering the lower landing gear brackets.

To form the brackets from .031-in. hard brass, it will be necessary to anneal the metal. Heat it with a torch, or over the burner of a kitchen stove. Quench in water and the brass will be softened for bending. If the brass work-hardens before the bends are completed, re-anneal as before. An electric stove heat element will do the same job. Lay the part to be softened directly on the stove element; heat until it changes color, then quench in water. After assembling the landing gear to the fuselage bottom, all fuselage formers, stringers and planking can be added.

Tail surfaces are of conventional construction with a base of sheet balsa. Ribs and edges are cemented on to add shape. The sheet balsa need not be extremely lightweight. If too light, wrinkles will eventually appear in the covering material, as happened to my Pixie, and it could have used the extra tail weight.

Miscellaneous. Having made fiberglass engine cowls for a number of planes, I have found the quickest method to be a lay-up over a foam core. The blue insulation foam is best for carving and sanding to shape. Its disadvantage is that the foam will dissolve in polyester resin, so the glass cloth must be laid in epoxy resin. Carve and sand the foam block to the cowl shape, making it slightly undersize (about 1/32-in.), which will be the approximate thickness of glass cloth. A layer or two of 6-oz. cloth is followed by a top layer of 1½-oz. cloth for ease of finishing. The foam core is easily chipped out after the epoxy hardens. Any residue can be melted away with dope thinner or acetone.

The internal plywood baffle in the cowl serves two purposes. It directs incoming air over the engine, and it is also used to hold the cowl in place by means of a single 4-40 machine screw threaded into the front of the lower engine mount. The baffle needs to be carefully fitted into the cowl to be certain that it is at the proper level. The cowl is kept secure by the ply bulkhead and dowel near the top.

Wheel pants are made from two blocks of ¾-in. balsa, tack-cemented together. After carving and sanding the outside shape, split the blocks apart, and hollow the inside to accommodate the wheels. I used Robart scale wheels. Permanently cement the halves, and cover the outside with 1½-oz. glass cloth and resin.

Preferred windshield material is .031-in. acrylic (Plexiglas) or butyrate sheet. Shape the windshield by draping the material over an aluminum form in the kitchen oven at 250° F. A sheet of aluminum litho-plate is bent into a half cylinder. The plastic is balanced on top of the curved surface, and a few minuets in the oven will soften it, enabling it to conform to the metal shape. When cool, it retains the shape. If the first attempt doesn't result in the proper shape, change the curve in the form, and try again with the same piece of plastic. Repeat until a shape is obtained that will fit the fuselage top without having to stress the plastic. Epoxy will hold the windshield in place.

Wing struts are functional on the model Pixie. The metal strut ends must be securely fastened into slots in the wood, using pins and epoxy. To wrap the outer end brass fitting around the tube will require soft material or annealing as described earlier. Struts are fitted to the airplane by a simple procedure to assure that the wing and fuselage are properly aligned. The wing pin is inserted to join the wing and fuselage while the wing is inverted and the fuselage is blocked up to a level position.

The struts are assembled to the fuselage and the mounting brackets at their outer ends. Center-punch the wing spars, using the bracket holes as a template, making certain that the wing is not warped or bent while marking the spars. Use blocks to support the center section. Drill 1/16-in. diameter holes ¼-deep in the spars for No. 2 wood screws.

My preference for covering and finishing is silk and dope, because the prototype Pixie has a fabric cover with dope finish. However, any material can be applied. Sig Koverall takes dope well and would be a satisfactory heat-shrink substitute for silk.

All surfaces that will touch silk are given three heavy brushed coats of dope. The silk is applied wet overall, except for the fiberglass cowl and landing gear legs. It is given four or five brushed coats of clear dope, using only enough thinner to flow well. On those areas of silk that cover balsa, such as the planked areas of the fuselage and the wing leading edge, a filler is needed to prevent balsa grain from showing through the covering. I use a mixture of talc (unscented), dope, and thinner for filling balsa grain. The mixture should contain more thinner than dope for ease of sanding. Too much talc will cause cracking of the surface. It may require two coats to fill deep balsa grain. Sand with No. 150 open-coat aluminum oxide paper, being careful not to penetrate into the silk. The complete plane is then given two more coats of brushed clear dope, quite thin, to seal the talc. At this point the finish should be smooth. Color coats should not be expected to mask any blemishes. Spray only enough color to cover the silk. Color dope in copious quantities only adds weight.

Flying. Determine the center of gravity (CG) location by balancing at the point shown on the drawing. If tail-heavy, an unlikely situation, the batteries can be shifted forward beneath the fuel tank. The balance point shouldn't be more than about ¼ in. fore or aft of the point shown for easy flight handling.

Make certain that the wheels are free-rolling inside the wheel pants, and that the model tracks straight. Using a bit of up-elevator to keep the tail wheel on the runway, open the throttle. When the tail becomes light, relax the up-elevator to avoid early lift-off. Rudder steering while on the ground is very effective. Once in the air, begin using aileron, and forget the rudder. The large ailerons are effective as soon as flying speed is attained. Rudder is only useful at or near the stall point.

The Pixie is surprisingly aerobatic, although the prototype wasn't intended to be. It will do axial rolls, but a barrel roll is more realistic. Spins are possible, but they require more than the recommended 1 in. of up-elevator travel. As Scale models go, the Pixie is one of the easiest to fly. Enjoy yours.

AMA Building/Mankowski

Continued from page 40

tic Richfield Co. AT&T, The J.E. Baker Co., BankAmerica Foundation, Barber-Colman Company, Beatrice Foods Co., Bernd Brecher & Assoc., Inc., The Boeing Company, Brakeley, John Price Jones, Inc., Brown Group, Inc., Brunswick Corporation, Bucyrus-Erie Company, Bunge Corporation, Butler Manufacturing Company.

Carter Hawley Hale Stores, Inc., Caterpillar Tractor Co., Celanese Corporation, The Chase Manhattan Bank, N.A., Chemical Bank, Chubb & Son, Inc., Citicorp & Citibank, Cities Service Company, The Coca-Cola Company, COMSAT, Connecticut General Corporation, Consolidated Foods Corporation, Continental Group, Inc., Continental Illinois National Bank & Trust Co., Frederick W. Cook & Co., Inc., Cooper Industries, Inc., Corning Glass Works Inc., CPC International Corp., Dart & Kraft, Inc., Del Monte, Deluxe Check Printers, Inc., Digital Equipment Corporation, Emhart Corporation, Ensign-Bickford Indus-