

IRON DOG

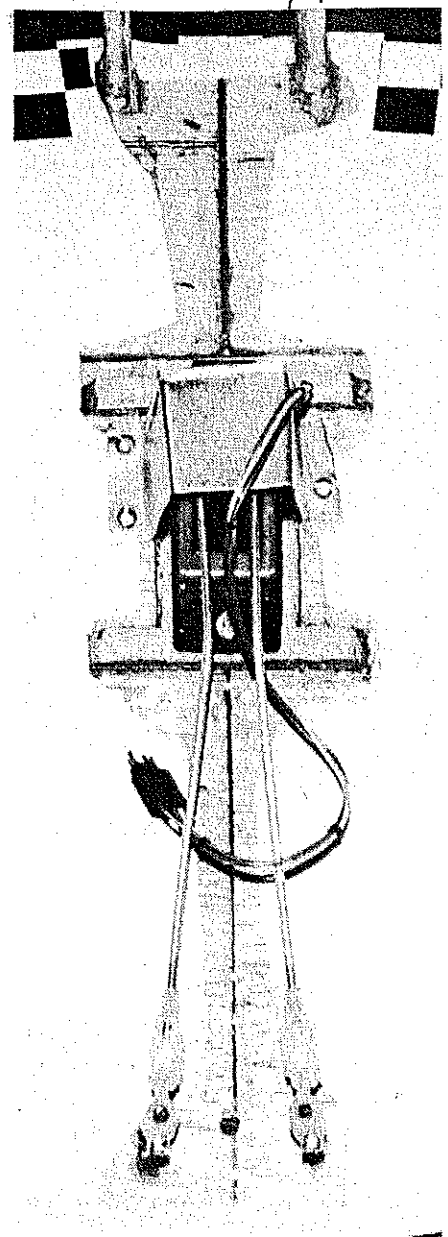
Kent E. Thomas

FOR THE P-39 Airacobra, "The Iron Dog" was not a complimentary name for such a clean, beautifully proportioned airplane. This sleek, streamlined shape, the absence of cheek cowl or large airscoops, makes it a good subject for a quarter-midget racer. The full-scale plane was raced with great success just after WW II, so it does qualify as an eligible design.

As a quarter-midget racer, it has been in development for about three years and for the past 24 months has brought home more trophies than any other quarter midget in Southern California.

To Start: I always choose the lightest wood I can find. A light airplane, as close to 2½ lbs. as possible, is desirable. Strength has been no problem. I use aliphatic resin glue and five-minute epoxy for all construction, except gluing wing sheeting together and sheeting the wing. Zap or Hot Stuff will speed up fuselage construction if you are pressed for time.

Fuselage: Lay out and cut identical right and left sides on ¼" balsa. Firmly mark L.E. and T.E. formers, firewall, and thrust-line locations on inside of each. Glue on ½" triangles, ⅛" wing saddle doublers, and ⅛" nose doublers. While this is drying, cut out 3/16" balsa L.E. and T.E. formers and ¼" plywood firewall. Mark vertical centerline on all three and also mark thrust line on firewall. I usually mark front and rear of all the above. Cut out L.E. former for tank cradle and epoxy 1/16" plywood doubler across the bottom to support wing dowels. Tank cradle is cut so centerline of tank is ¼" below thrust line. I use a 4-ounce slant Sullivan tank. Using the centerlines previously drawn on the firewall, locate Tatone mount, drill holes and insert 6-32 blind nuts. Mount the Tatone mount with 6-32 screws. Bend ⅛" music wire for nose gear. Drill firewall below Tatone mount and J-bolt the nose gear to the firewall.



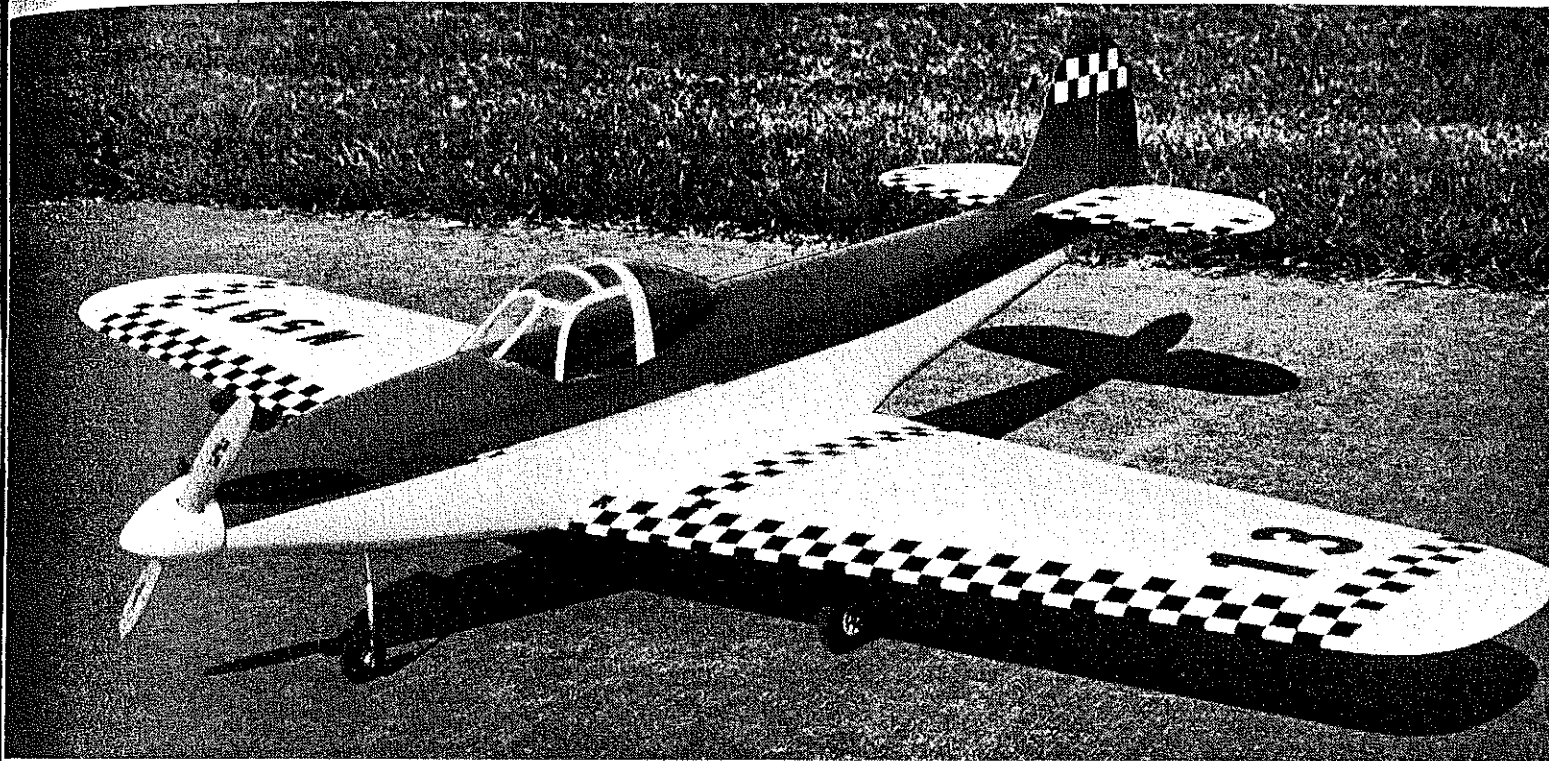
Top, L: One picture better than a thousand words—the installation. Note wing hold-down point. Above: Conventional aileron linkage—aluminum shroud shields the servo from any foul ups. Decorative scheme is individualistic and stand out well in the air.

I do not use a steerable nose gear. Take-offs are started from full throttle and rudder steering is very positive without creating an over control. The plane is usually ahead of the pack going into the #1 pylon after takeoff due to superior ground handling (even though you have to go and get the plane after landing, the advantage more than offsets this).

Draw a centerline end to end on the 3/16 X 3" balsa fuselage top. Do this on both sides. Pin top to a flat surface and accurately mark position of firewall, L.E. and T.E. formers. Epoxy L.E. and T.E. formers to top using an L square for accurate alignment. Lay out the sides and using an X-acto saw, make about four cuts through the ½" triangle just behind T.E.

When you have something good going for you, you're going to smile—Kent and 'Iron Dog.' Long nose results from fact that real ship had an amidships engine location with an extension shaft running under cockpit to prop.

High point winner for 1975, QMRC, Southern California, and of 22 trophies this P-39 Airacobra is one of the better Quarter Midgets in the nation.



Not restricted to Goodyear types, Quarter Midget rules allow wide variety of racing planes such as the P-39. 'Cobras flew in post-war races. Thanks to engine location on real ship a very clean nose results on model.

former position. Cut through the triangle, but not into the $\frac{1}{8}$ " sides. Do this at the top and bottom triangle. Also, make about six cuts just ahead of the L.E. former at top and bottom. These cuts allow the fuselage sides to bend around the formers. Epoxy sides together at the tail post, being certain that it is square and will not create a twist in the fuselage when sides are glued to the top. (I usually do this by pinning sides to T.E. former, lining marks on sides with former, pull rear together over centerline, pin and epoxy).

Now you are about ready to put the parts together. Get out at least one large C clamp (large enough to use across the width of the fuselage), scrap pieces of plywood, glue and pins. Before proceeding, try fuselage sides for proper fit and alignment with formers. Using a liberal amount of glue (thin with water if necessary), glue and pin fuselage sides to top and to formers. Using C clamps padded with scrap plywood, pull in sides ahead of the leading edge until they are pressing against firewall sides. The firewall, coated with glue, is pressed back against nose doublers to assure no down- or up-thrust is built in. By sighting down along Tatone mount and aligning with centerline on top, you can assure no side-thrust being built in. Be sure centerline of firewall is aligned with centerline of top. When everything is lined up, pin solid, double check, and leave over-

night to dry. Use of aliphatic glue allows working time for alignment. Using care your fuselage will come out straight and true. We'll come back to the fuselage later.

Tail: Cut out stabilizer, fin, rudder, and elevator from $\frac{3}{16}$ " balsa. Complete elevator; R and L is cut in one piece, marking but not cutting out, Vee in the center. With a razor-plane and sandpaper, taper rudder and elevator to shape. At the L.E. of the elevator, cut a $\frac{3}{16}$ by 3" notch. Epoxy $\frac{3}{16}$ " square hardwood in notch. When epoxy has cured, cut out Vee to separate R and L elevator. This assures alignment of elevators.

Wing: Cut core in a conventional manner with no washout. When a core is cut as thin as this one, a great amount of care is necessary to prevent warps and twists being built in during the skinning process. The core at the tip is about $\frac{1}{8}$ " thick and almost transparent. You say you can't cut foam wings? Buy a Jack Stafford P-51 quarter-midget wing kit. Then proceed as follows: First, epoxy in landing gear boards as marked on plan, then cut $\frac{1}{2}$ " off at L.E. of core for balsa L.E. and 1" off at T.E. for balsa T.E. With top part of foam block secured to a flat table and core pinned to block, epoxy $\frac{1}{32}$ " plywood to tip. Use wax paper so plywood won't adhere to block. When epoxy has cured, in-

sert a row of pins next to the plywood, pinning core tip to block. Angle-pin root to core. All other pins will be removed. Core should be in exact spot it was cut from block.

Using model cement, glue your $\frac{1}{16}$ " balsa sheeting together before skinning the wing. Using any one of the available adhesives, glue sheeting to core. Place other half of block on top of section just sheeted and weight down while you work on the other panel. When both panels are sheeted on one side (sheet the bottom first), remove from block and trim sheeting. Nail the other half of block to the table, pin core down as before, and sheet second side. Weight as before. Remove later and trim. Pin cores back on to blocks and glue leading and trailing edge balsa to core using epoxy or aliphatic glue. When glue is dry, remove cores from the blocks, cut off $\frac{1}{32}$ " plywood from tips, trim tips to end of sheeting. Match the lengths of R and L panels by trimming tips.

Reinstall templates used in cutting cores and mark center of leading and trailing edges at both ends. Use straightedge and draw a line root to tip on L.E. and T.E. Get out the trusty razor-plane and rough shape using reference lines just drawn as a guide. Starting to look like a wing, isn't it? Finally, glue on tip block, plane and sand to top and bottom curve. Cut rounded

Iron Dog

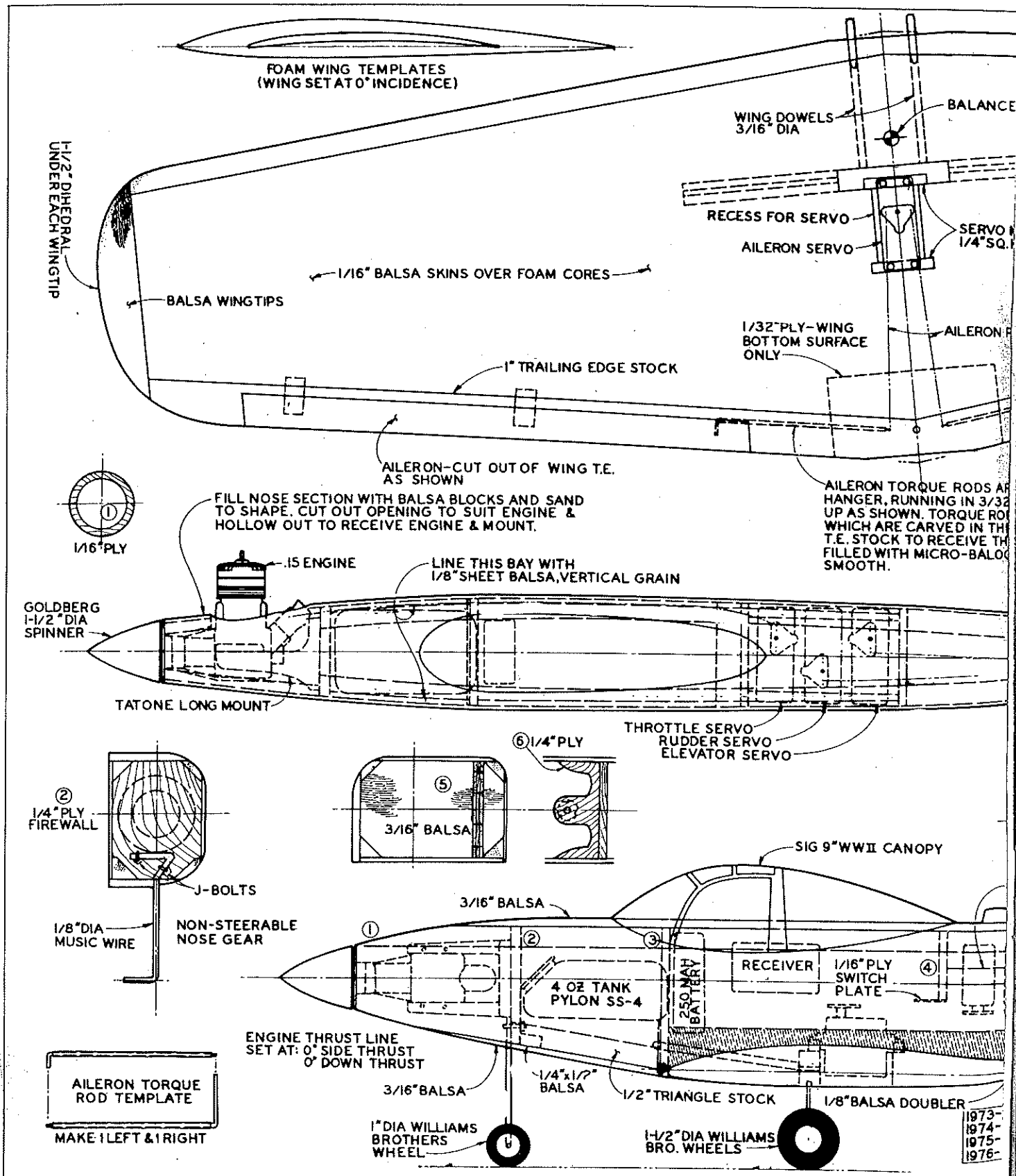
tips with knife and sand tips to final shape.

Now we're almost ready to join wing halves. Before we do, cut a slot in the top of the wing directly over the landing gear

block. Cut slot down to the L.G. block and of a size to accept the $\frac{3}{8} \times \frac{1}{2} \times 2\frac{1}{2}$ " hardwood joiner. Also, cut out servo opening. Block up each wing tip $1\frac{1}{2}$ " and epoxy wing together. When epoxy is set, epoxy joiner in top of wing. Cut out $\frac{3}{4} \times 12$ " aileron from T.E.

Steal a wire clothes hanger from your wife, one of the cheapies made of thinner wire, about .080 thick. With $\frac{1}{8}$ " aluminum tubing and clothes hanger wire, make up aileron linkage to fit application. This method of making up the linkage allows you to get a custom linkage and not have

FULL - SIZE PLANS AVAILABLE . . . SEE PAGE 96



to use a compromise size. Slot bottom of wing to install the linkage and epoxy. Inset and epoxy $1/32 \times 2 \times 4$ " plywood into bottom of wing, partially covering the aileron linkage and reinforcing rear wing hold down. Fill remainder of slot with micro-balloons and resin. I do not glass

the center section and have never had any trouble as a result. Leave it off and save the weight. The main landing gear is bent from $3/32$ " music wire and secured in L.G. blocks with wood screws (two small wood screws per side).

Back to the fuselage: Remove this weird looking thing from the table. Ahead of the firewall, glue doublers to inside of nose on the top, bottom and sides. When dry, cut out right side and bolt in engine. Cover engine with Saran Wrap, cut nose to length, install prop and spinner, marking around outside of spinner to get a reference line. Remove prop and spinner and, with the razor-plane, cut nose down to the reference mark. Cut out $1/16$ " or $1/32$ " plywood to fit between spinner and nose of fuselage. Epoxy plywood to nose. Be sure to allow clearance between spinner and plywood.

Remove the engine and we're ready to make this thing look like a fuselage. Razor-plane to the desired shape. If you feel the need for templates, use them. (I eyeball it.) Glue on stab and fin. Line up fin on the centerline that you drew on the fuselage top.

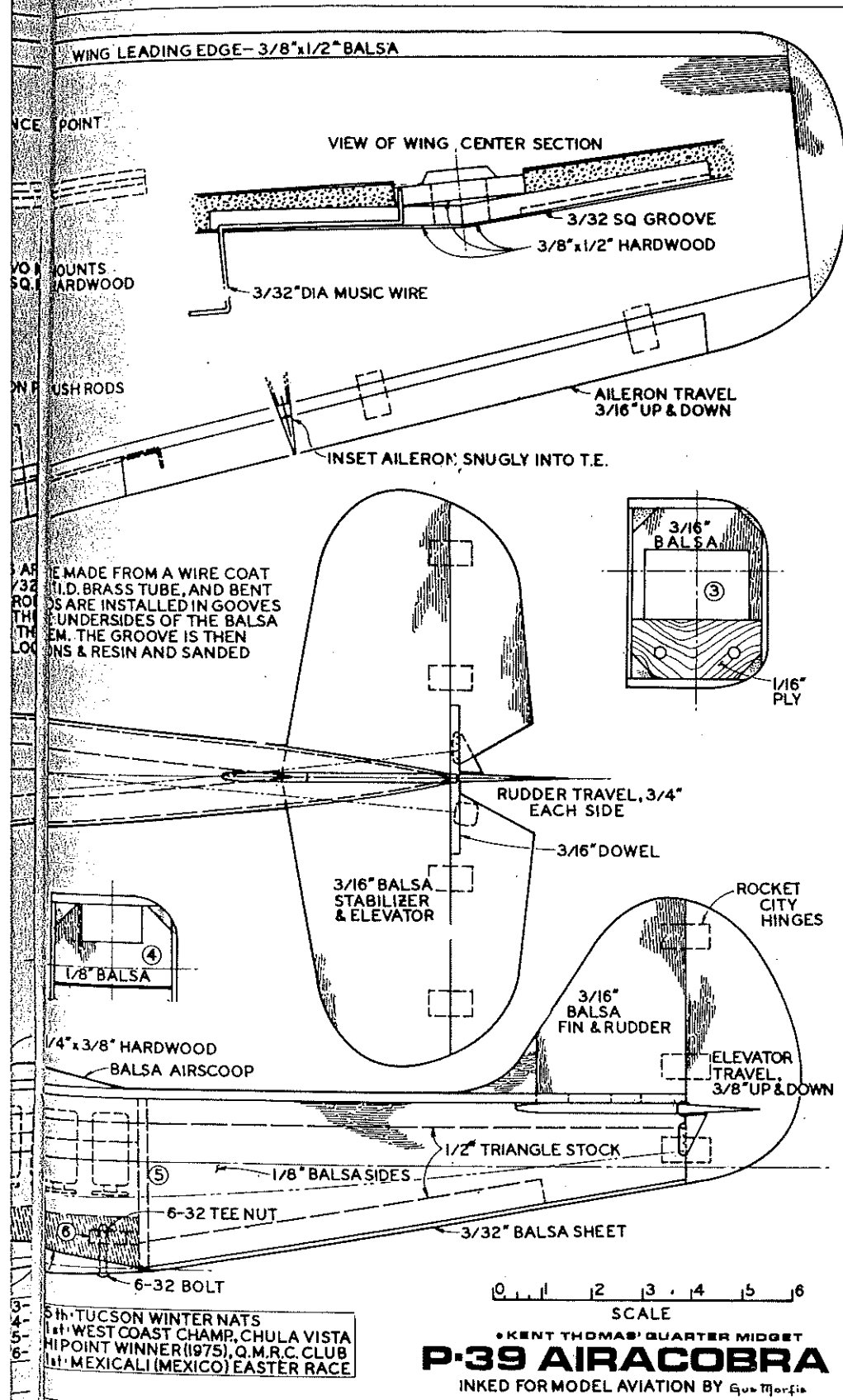
Epoxy $3/16$ " dowels in wing leading edge. Mark and drill holes in L.E. former (see why the $1/16$ " plywood doubler?). Check your incidence very carefully. Wing and stab should both be zero degrees. When you are happy with the incidence, epoxy in the $1/4$ " plywood rear wing hold-down (6-32 blind nut was installed prior to installing in plane). Drill hole at wing T.E. in line with blind nut to accept 6-32 bolt.

Epoxy $1/4 \times 3/8$ " hardwood servo mounting boards to fuselage sides; these also strengthen fuselage. Epoxy $3/16$ " balsa across fuselage at front of servo mounting boards. Epoxy $1/32$ " plywood switch mount on top of $3/16$ " balsa just installed.

Temporarily install elevator, rudder, and throttle servos across fuselage, fastening to mounting boards. Mark positions and install Nyrod as shown for elevator and rudder pull wires. While you're at it, install plastic tubing and cable or $1/32$ " music wire for throttle control. Remove servos and glue $3/32$ " balsa on bottom of rear fuselage. Also glue $3/16$ " balsa on bottom of front fuselage to close in front. Install wing, razor-plane and sand lower fuselage to shape. Remove wing and you're ready for final sanding and finishing.

Hinge all of your control surfaces in your usual manner, bearing in mind that a fine, minimum clearance gap is desirable.

Finishing: Use your own method, but here is mine for your consideration. On fuselage, fin, and rudder, fill dings with polyester resin and micro-balloons. I use K&B or Francis, but any good brand is okay. After sanding out micro-balloons, I then wipe on two coats of polyester resin, sanding the first coat to about 180 grit paper, and second coat to about 220 grit. Be careful about sanding through to bare balsa. Spray on lacquer primer and, when dry, sand most of it off with 220-grit paper. The primer fills pin holes and other imperfections not noticed before. Use a tack rag to clean off dust, and spray with K&B Super Poxy, just enough to get a good color. On wings and stab I use one of the plas-

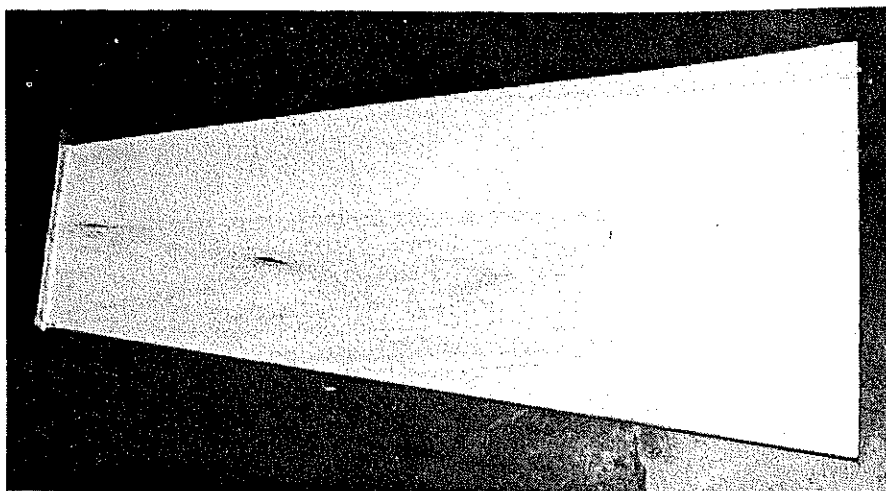


5th TUCSON WINTER NATS
1st WEST COAST CHAMP. CHULA VISTA
1st HI POINT WINNER (1975), Q.M.R.C. CLUB
1st MEXICALI (MEXICO) EASTER RACE

KENT THOMAS' QUARTER MIDGET
P-39 AIRACOBRA
INKED FOR MODEL AVIATION BY Equi-Mor-fis

tic films because it is quick and light. I also use plastic trim sheets for easy trimming of the plane. With camel-hair brush, coat edges of film with clear urethane varnish to prevent fuel creeping under the edges. All done!

Canopy Used: 9" Sig WW II. Final height of fuselage including canopy should be 5". Since the canopy must be cut down to fit the fuselage, cut it down sufficiently to bring the final height of fuselage including canopy, to the minimum of 5". Using strips of sticky Monokote, glue windshield and canopy brace lines to inside of canopy. Canopy can then be glued down with epoxy or Zap.

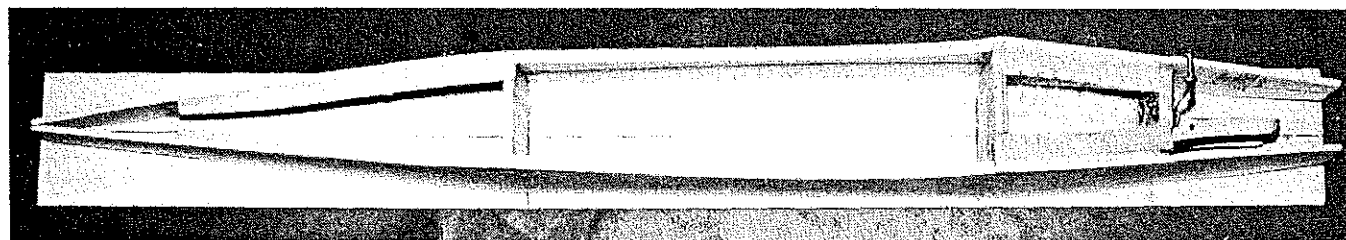
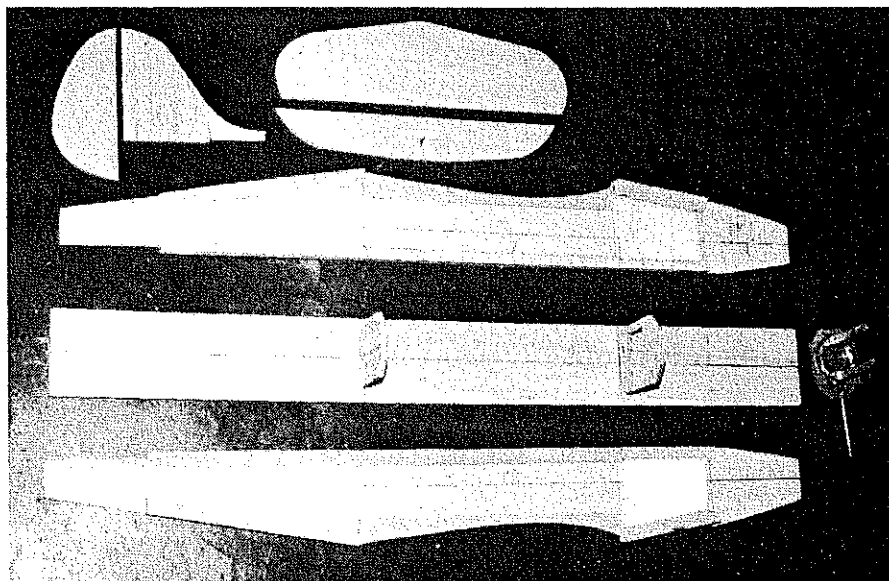


Below: Tail surfaces, fuselages sides and top and firewall ready for assembly. Motor mount and nose-gear strut mount as shown on the plywood. Powerful rudder avoids steerable strut.

Iron Dog

Install Radio: Adjust aileron throw to $3/16$ " up and $3/16$ " down. Elevator throw to $3/8$ " up, $3/8$ " down. Rudder throw $3/4$ " R, and $3/4$ " L. Set CG as shown on plan. All-up weight should be very close to $2\frac{1}{2}$ lbs. If you build light, you may have to add weight to reach the $2\frac{1}{2}$ lbs. minimum.

Moment of truth: Radio range checked, all surfaces neutral, engine idles—you're ready. Takeoff will require a little right rudder to offset torque. Ground acceleration is fast, and when speed is reached, slight up elevator and she flies. The ship flies easily, tracks true, and has no bad flight characteristics. In my opinion a racing plane should fly this way so you can concentrate on pylon polishing. All trimmed, it should take very little. Try a few power stalls just to learn how plane might react on landing—nice, no snap, just drops her nose.



Above: Here the completed sides are attached to the fuselage top and the formers. To pull sides in to the firewall the author uses big C-Clamps padded with pieces of plywood.

Right: The nose has been blocked in and top of fuselage rounded as well by use of razor-plane. Bottom sheeting not completed in this photo in order to show the Nyrods for the rudder and elevator pull wires.

