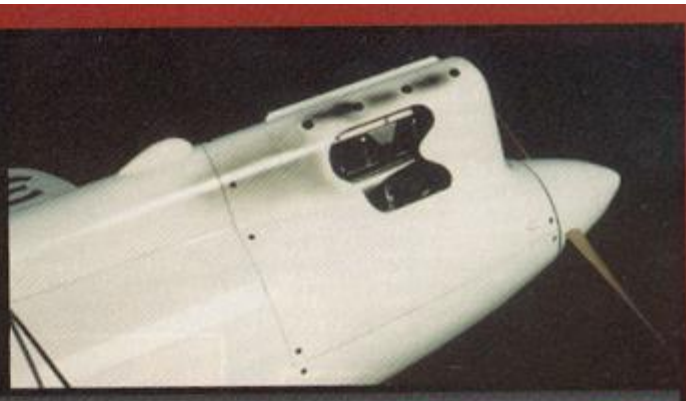
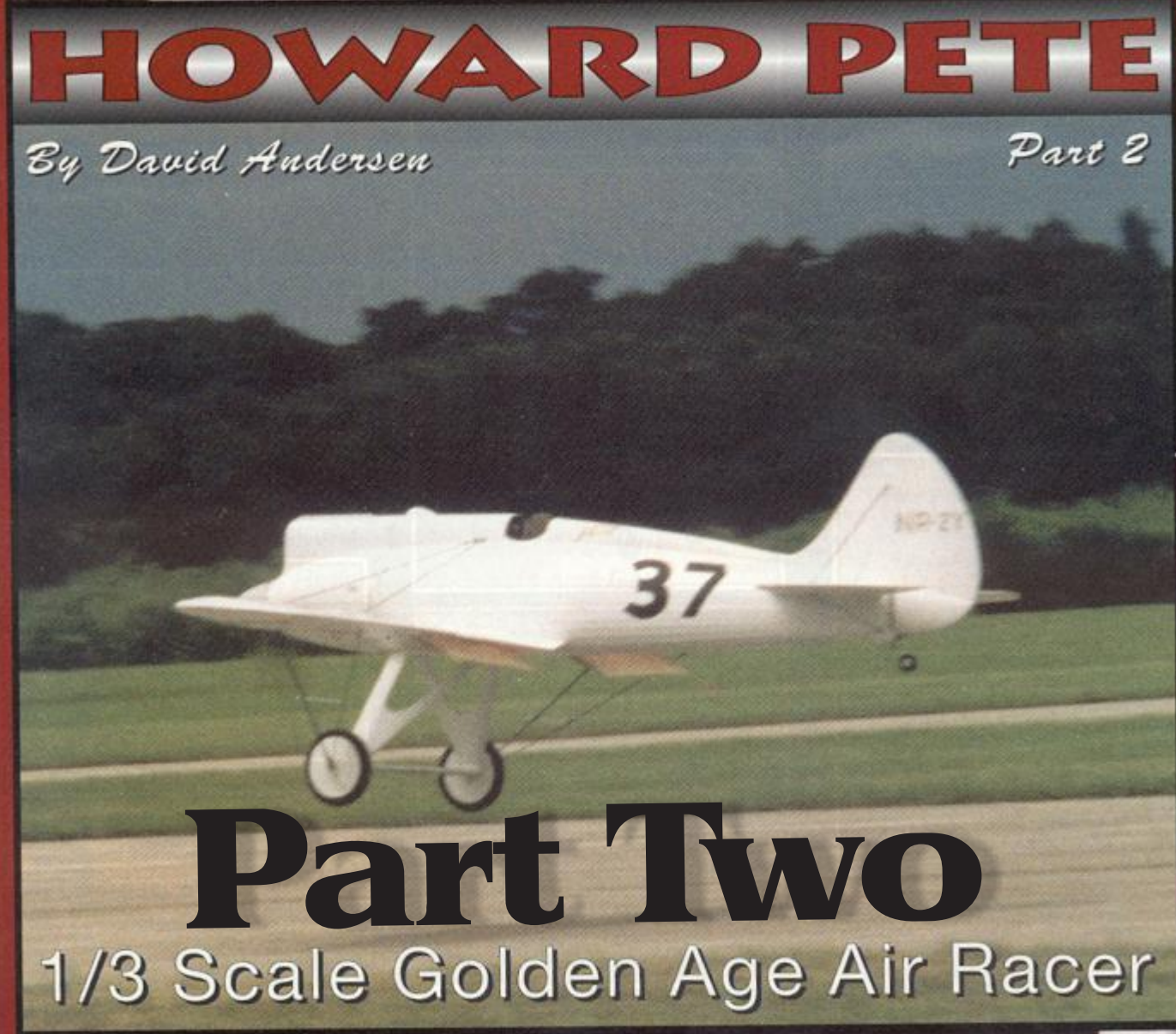


HOWARD PETE

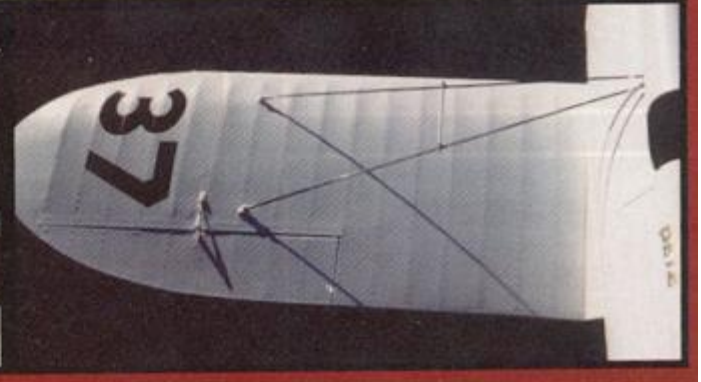
By David Andersen

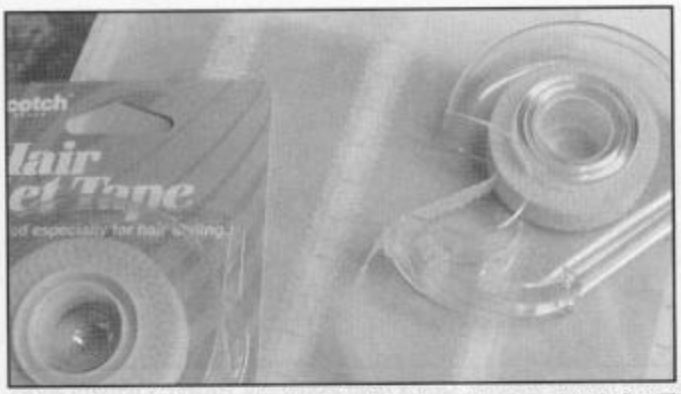
Part 2



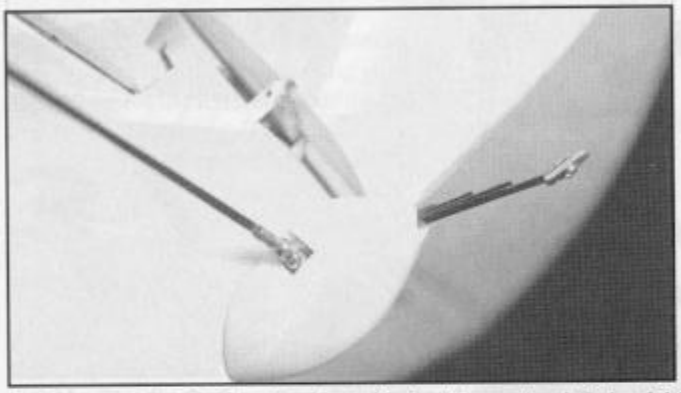
Part Two

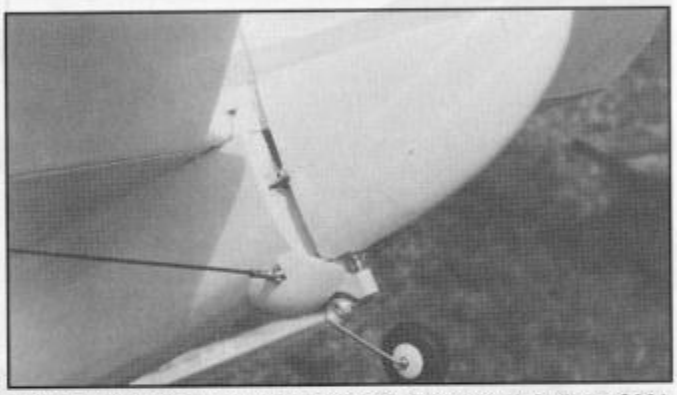
1/3 Scale Golden Age Air Racer



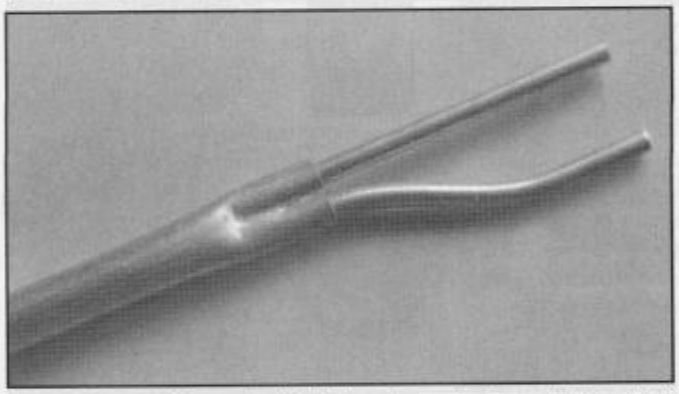


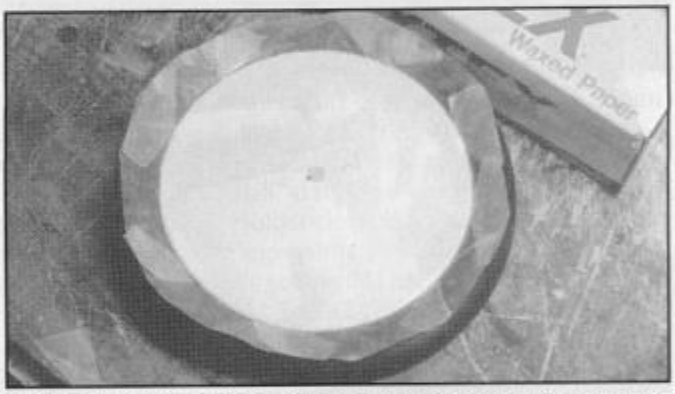
LEFT: Rib stitching is simulated with glue strips and Hair Set Tape. Five rolls required. RIGHT: Fuel cap fairing is fitted to hatch by rubbing on sandpaper, grit side up.





LEFT: Tail skid is C&G leaf spring tail wheel less wheel. Balsa fairing. RIGHT: Alternative non-scale steerable tail wheel. Sullivan S861. Interchangeable with tail skid.





LEFT: Removable scale pitot tube. Two aluminum tubes pinched inside larger tube. RIGHT: Williams Bros. 6-1/2" wheel. Hub is covered with heat-shrink fabric. Glued to inside of hub with CA. Waxed paper protects tire.

Part 1 was published in the May 2000 issue.

Covering and Painting:

Light weight is important for good flying. Horsepower overcomes weight only when going straight up.

The prototype required no balance weight. This is attributable to weight consciousness. Be especially careful with the tail; it has a large surface which allows paint to accumulate unnecessary weight easily if you are not careful. Every unnecessary ounce of weight in the tail will require three extra ounces in the nose, for a total of four unnecessary ounces of weight.

If you **must** add nose weight, consider using a Cermark 4.5" spinner. It is twice as heavy as the Tru-Turn.

Prior to covering, prime the entire airplane with two thinned coats of nitrate dope, sanding lightly between coats.

The sheet balsa surfaces in the nose, cowl, upper fuselage, fuselage wing roots, and turtledeck are covered with silkspan applied wet and doped on with a brush using thinned nitrate dope.

Cover the rest of the airplane, including the landing gear, with Sig Koverall or other strong fabric. Attach it around the edges with nitrate dope, then shrink it tight with a hot air gun. Brush on one thinned coat of nitrate dope, scrubbing it through the cloth to soften the dope beneath.

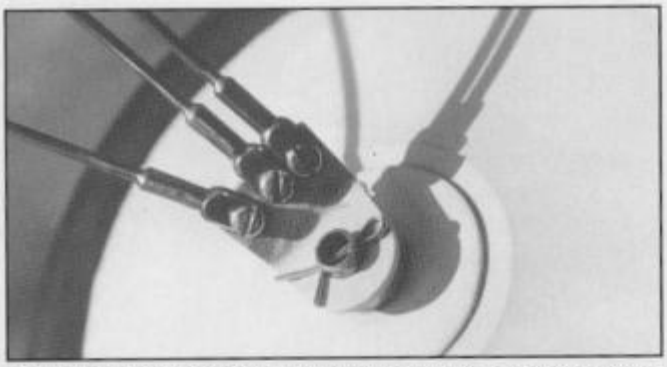
Brush three coats of Sig sanding sealer on the silkspan-covered areas, sanding between coats and blending the edges into the fabric areas.

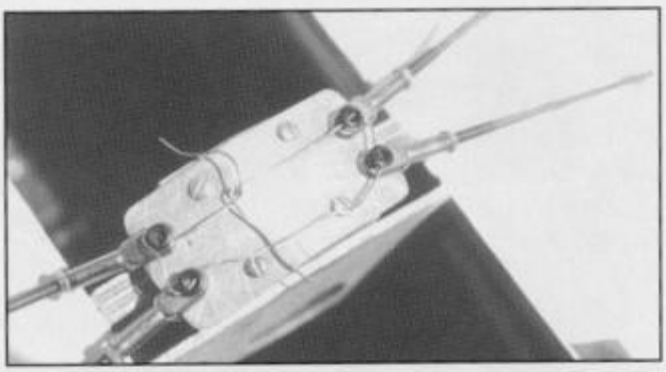
Add rib stitches on the wings and tail with glue drops every 1/2". Cover each rib, leading and trailing edges with Scotch brand Hair Set Tape. You will need five rolls.

If the clerk in the drug store asks you why you need so much hair set tape, stand there in your greasy overalls and tell her with wild eyes that you are trying to win the Thompson Trophy race!

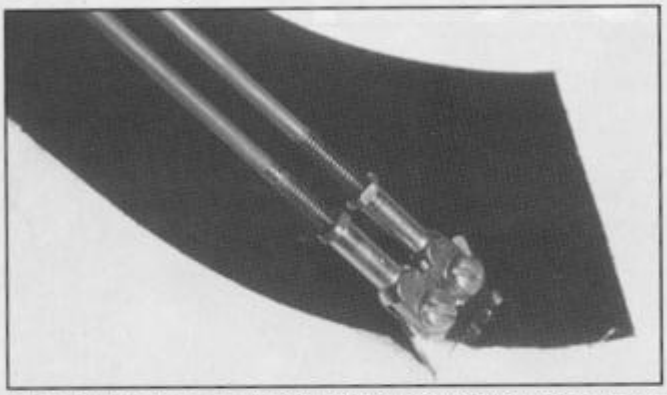
Cover each stringer on the fuselage with hair set tape also, no stitches. For more details on rib stitching and taping, see *Scale Rib Stitching -- Six Easy Methods,* in the May 1998 issue of *RCM*.

Brush a coat of nitrate dope on the tape to seal it to the surface and sand off the fuzz.

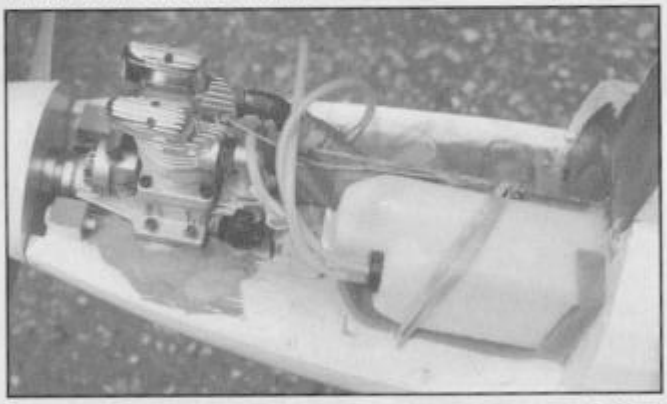


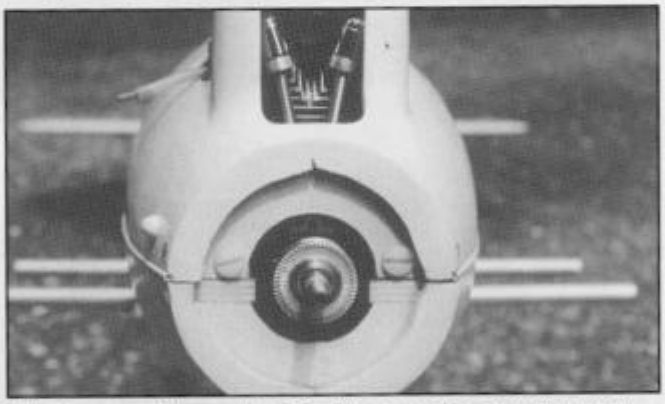


LEFT: Lift wires attached to axle with cotter pin. Spacer is wheel collar and fender washer. Quick field assembly. RIGHT: Landing wires secured to fuselage under hatch with 4-40 cap screws. Secured with copper safety wire. Quick field assembly.



LEFT: Du-Bro threaded 4-40 clevises secured to underside of wing. Medium-strength Loctite holds screws from vibrating loose. RIGHT: Non-scale hidden flaps slow descent for landing. Fabric covers hinges. Flaps disappear when retracted.





LEFT: Saito 150 engine. Stock muffler shown. 24-ounce tank. Heat shield between muffler and tank doubles as engine mount support. RIGHT: Two 1/4" nylon bolts hold front of cowl. Two dowels hold rear to bulkhead. Fuel fill accessible through scale opening on right side.

Brush a couple of coats of clear butyrate dope over the entire airplane and sand the tape again. Leave some of the weave in the fabric. We don't want to fill it completely.

Spray the dummy engine with silver dope mixed with black. This gives it an oily steel look.

Cover the rims of the Williams Bros. wheels with Sig Koverall. Do this by inserting waxed paper between the tire and the rim. Cut a circle of fabric about 1/2" greater diameter than the hub. Squeeze the hub and tuck the fabric behind the hub, gluing it to the inside of the hub with CA glue. Waxed paper protects the tire from the CA. Then shrink the fabric with a hot air gun.

Cover the remainder of the tire with paper and masking tape. Dope and paint the fabric per the rest of the airplane.

The oil line on top of the cowl is 1/4" aluminum tubing.

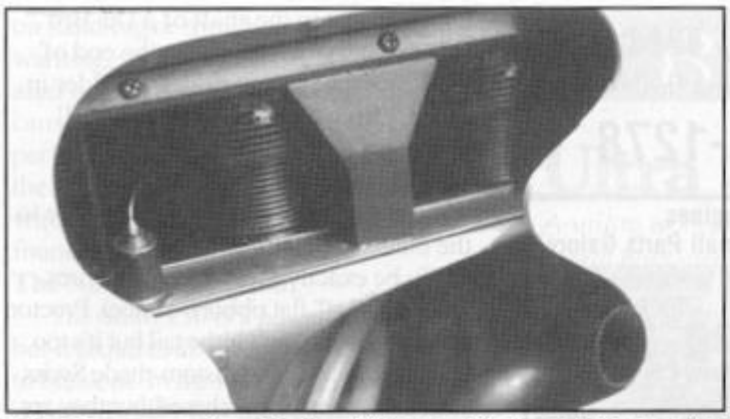
The piano hinge on the bottom edges of the cowl is 1/8" styrene model railroad tubing cut partially through every 1/4" with a razor saw.

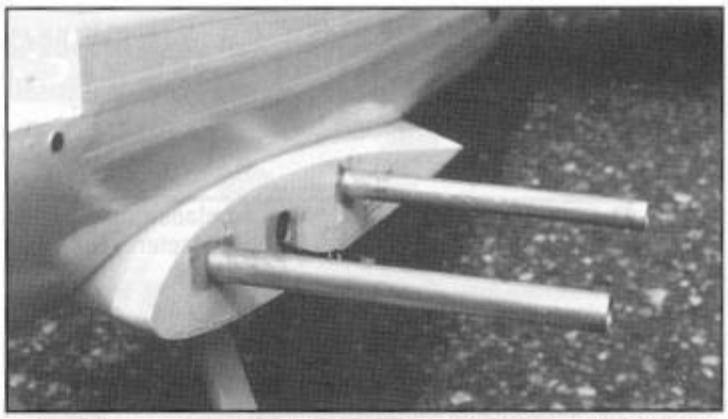
Spray the entire airplane with white automobile acrylic lacquer.

Rub on "Wright Gipsy" (it was misspelled on the original Pete) on the cowl from 1/4" dry transfer lettering available in art stores. Seal with clear dope.

Spray the entire airplane with a wet coat of clear butyrate dope, thinned with retarder. Try to get a glossy shine.

Cut stencils from Frisket film (also available at art stores) of the markings as shown on the plans. The "Pete" photo from Banka's photo set is exactly the





LEFT: Dummy engine of balsa, Williams cylinders. Coil is flashlight bulb. Cooling air exit below gives access to fuel lines and glow plug. RIGHT: Removable aluminum tube wing rods. Aileron and flap servo cables dangle out.

right size. Trace it onto stencil material as is. Spray Sig gold dope and Sig jet black dope for the lettering. Outline the smaller gold lettering, "Pete" and "NR-2Y" with an extra fine Sharpie pen.

Apply exhaust residue to the cowl area with black dope thinned 10:1 with an airbrush. Spray some grime underneath the fuselage too.

Cut the fabric to release the flaps after the paint has cured. Cut only three sides, leaving the fabric over the hinges to fold when the flaps are lowered. Always store the wing with the flaps up and clamped shut so that the fabric over the hinges will not shrink with time. The result is flaps that are nearly invisible when up.

The aluminum Tru-Turn spinner should be painted white. The paint must adhere well enough to survive attacks from a Sullivan starter. Here's how the folks at Tru-Turn advise how to do it.

Do not sand the spinner; we want its pores to be open. Instead, wash the spinner in hot water and dish-washing detergent. Use a brand that is free of hand lotion. Get it totally clean. Don't touch its outer surface. Dry the spinner with a hair dryer and immediately spray white auto primer. Do so within a few minutes, before oxidation occurs. If done properly, the paint will survive many seasons of electric starter abuse.

Cardboard box carrying case for wings. Prevents damage to wing wires while in transit.

For static display, a scale prop and spinner must be made. Cut down a 24" Zinger high-pitch prop and paint it per the scale drawings. An exactly scale spinner can be made by cutting a wooden plug on a lathe per the outline on the plans and vacuum forming a plastic static display spinner. If you're not equipped for this, plastic static spinners can be obtained from Jim Sandquist (see the references in Part 1).

Wing Wires:

The wing wires are functional -- the wing tubes by themselves will not support the airplane, nor will the tail structure survive without wire bracing.

Pete was designed for 10 G turns. This equates to a force of over 100 pounds on each set of lift wires, so you must do a good job of building the wing wires. Silver solder is preferred. If you are unsure of your soldering skills, learn to do it well before proceeding.

The tail bracing wires are Proctor 1/8" flat wires with Du-Bro 4-40 solder clevises on each end. Their approximate lengths from screw hole to screw hole are:

Top: 12-5/8"

Bottom: 9-1/2"

Your lengths may vary. Measure as you work.

Cut a slot in the shaft of a Du-Bro solder clevis, tin and insert the end of the Proctor wire into the slot. Solder in place. Using a wheel collar as a drill guide, drill a small hole through the shaft. Insert a length of tinned music wire and re-solder. This pins the wire to the clevis. Cut and trim.

To be exactly scale, the wing wires should be 1/4" flat ribbons of steel. Proctor ribbon wire is okay for the tail but it's too brittle for the wings. Custom-made Swiss steel cables can be purchased, but they are too expensive for this impoverished modeler. So we use Du-Bro pushrod wire because it is inexpensive, readily available, and effective.

The approximate lengths of the wing wires are:

Landing (top wires): 24-1/4" (make 4)
Front lift (bottom): 16-3/4" (make 4)
Rear lift (bottom): 20" (make 2).

Cut Du-Bro 4-40 wire to length and solder a Du-Bro 4-40 solder clevis at one end. Screw a Du-Bro 4-40 threaded clevis with jam nut onto the other end. A drop of medium strength Loctite on the threads will prevent the jam nut from vibrating loose.

The solder clevises should be on the lower end while the adjustable clevises should be on the upper end. This tends to hide the jam nuts.

Install the tail and wing wires after the airplane is painted. Adjust tension on the tail wires with the bolts that attach them to the stab. The javelins are 3/16" dowels, painted white. Attach them to the wing wires with fish string and CA glue.

The wings are attached to the fuselage at the field by slipping them onto the wing tubes, connecting the flap and aileron servos and snugging the wing panels up to the wing root. Attach the upper ends of the landing wires to the fuselage cable anchor with four socket-head screws drilled for safety wiring (see the references). Secure them with copper safety wire. Slip the lift strut brackets onto the axles and secure with cotter pins. It will be necessary to push down on a wingtip to relieve some of the tension on the bracket before inserting the cotter pin. Use fresh cotter pins and safety wire at each flying session.

Make a cardboard box with airfoil-shaped slots in it to transport and store the wings. This prevents the wires from getting bent. Otherwise, repeated bending of the wires will eventually cause them to break. Murphy's Law predicts this will happen at the worst possible time.

The wing wires are redundant, so one broken wire will have very little effect on handling or trim. You will have no warning, so ... check the wing wires after or before each flight. Landings cause the greatest stress, so don't perform touch-and-go maneuvers for the first dozen or so flying sessions. If a wire loses tension, don't fly until you've found out why.

The Notion for Motion:

The Saito 150 is a powerful engine, but it requires about four gallons of fuel to break in. In the meantime, peak power is considerably less than its full potential. If you use Pete to break in your Saito 150, you may not be able to perform very big loops or tall stall turns initially. This will improve as the engine breaks in. Meanwhile, have fun learning the less vertical maneuvers.

I have also found that the Saito 150 is fussy about fuel quality. Old fuel that will run other engines well causes the Saito to run unreliably. You should always use fresh fuel anyway. And use a foam-resistant fuel such as Cool Power.

Assemble the airplane at the field, attaching the wings with four bolts and two cotter pins. I'm not absolutely certain that the safety wire on the bolts is necessary, but I'm not about to find out.

Fill the tank with 15% Cool Power and tie down the tail. Do the radio check and make sure the flaps are **up** or else you will have a wild ride during the take-off. Close the hatch by lifting it against its rubber band hold-downs, rotate it into position, and drop it in place.

Completely close the carb with the throttle trim and crank the engine. Even a 20-year-old Sullivan starter on 24 volts does the job very well. This draws fuel into the lines and primes the engine -- the choke is unnecessary.

Crack open the throttle to fast idle. Insert a Du-Bro #338 Kwik Klip glow plug connector into the exit hole in the right side of the cowl to engage the remote Headlock. Start the engine with your ancient Sullivan starter. Do a complete radio check under power.

Taxi to the end of the runway. It is not necessary to hold up-elevator because there is no tendency to nose over even in high grass. Steering is positive even in a 15 mph crosswind due to the large rudder and forward gear position.

Elect to fly off grass, if possible. The original Pete never saw a paved runway. Your Pete will handle better on grass too. If you must fly off a paved surface, use the steerable tail wheel option -- the tail skid will allow ground loops on a smooth surface.

Although Pete is famous for winning air races, it was flown more often in

airshows. Today your Pete is performing in your local sport scale contest. Your scale documentation is only the Paul Matt 5-view drawing, supplemented, perhaps, with a B&W photo of the original Pete to show weathering.

You have memorized your sequence of maneuvers, practiced them in a variety of wind conditions. You and Pete are ready to put on a show.

Come to a complete stop at the end of the runway and note the wind direction. Announce to the judges, "Take-off starting now." Advance the throttle slowly while steering with the rudder. Lift off after full throttle is reached and more than enough airspeed has been gathered. Continue a shallow and straight climb-out, steering with rudder and using ailerons to hold the wings level. Level off at altitude, reduce power and start a rectangular pattern. Adjust the elevator trim for level flight at one-third throttle.

Approach the field from far downwind, dropping down to 15 feet of altitude. Make course corrections and reduce speed to one-third throttle. When heading and speed are established, say "Fly-past starting now" and just watch as Pete cruises by. It's all in the set-up.

The AMA Figure Eight is easy to do but difficult to do well. It is a measure of your ability to compensate for wind drift.

Climb to a higher altitude and approach the field from downwind again at half throttle this time, setting up for the mandatory Figure Eight. At a distance of a circle radius from the judges, announce the maneuver and begin a 90-degree turn away from the flight line. Don't be fooled by the drop in engine pitch. This is the Doppler Effect. If you throttle up now, Pete may balloon in the next turn.

Aim for a crossover point exactly in front of you. When you can sight down the fuselage from behind, slowly roll the wings in the opposite direction to begin an up-wind 360 degree circle. Adjust bank angle very gradually to obtain a smooth rate of turn, adjusting for the wind while re-adjusting the throttle to maintain constant ground speed and altitude. Returning to the original crossover point, roll the wings in the opposite direction to complete the remaining 270 degrees of the other circle of the Figure Eight. Say "Complete" as Pete passes in front of the judges. Because of her short wing, Pete does not need a kick in the rudder for these turns, aileron control is enough.

Approach the field from downwind again but at an even higher altitude. Throttle up to full power and push some down elevator to create a shallow dive. Announce "Single inside loop" and pull up-elevator as Pete passes in front of the judges. If there is a crosswind, yaw into the wind and continue to do so throughout the loop while holding the wings level.

We want the loop to be as big as possible without stalling at the top. This is where practice has shown you how much altitude can be achieved from your Pete. Correct heading changes with rudder, always keeping the wings level with ailerons. Release the up-elevator at the top in order to stretch the inverted phase of the maneuver. Reduce power to fast idle as the nose drops into an inverted dive. Add power after pulling out at the original altitude.

Now procedure-turn around upwind, giving plenty of room to line up for a downwind slow roll.

At full throttle and a slight climb, add about 1/8th left aileron or less. In an aileron roll, aileron is not as critical as elevator. Prevent a turn by slowly feeding in down-elevator, then hold the nose up with more down-elevator as Pete rolls inverted. Top rudder is not needed. Ease off the elevator as Pete rolls upright. Control the exit heading with elevator -- release early to turn right, hold it longer to turn left.

Pete's long landing gear has a pendulum effect in a slow roll. The weight of the landing gear tends to resist the initial roll to inverted only to accelerate the final roll to upright. To accomplish a constant roll rate, we must compensate for this by reducing aileron throw during the second half of the roll. Practice makes perfect.

Now climb to a really high altitude for a 5-turn tail spin. When nearly overhead, throttle back to a fast idle and gradually apply up elevator to hold Pete's nose up. Airspeed will decrease and nearly stop. When she stalls, yank full up elevator and full left rudder. Pete will drop into a spin to the left. Because of Pete's large rudder and elevator, spins are reliable and predictable. After 4-1/2 revolutions, neutralize the controls. Pete will rotate another half turn and stop in a nearly vertical dive. Let Pete drop to regain flying speed. Then level off and apply power. A danger here is pulling out too soon, for this may cause Pete to return to the spin. Practice spins with plenty of altitude at first.

Approach the field from downwind again for a Chandelle. Roar into a shallow dive at full throttle. Come in low and fast. Pull up immediately in front of the judges and bank at the same time, executing a 180 degree climbing turn. Augment with rudder at the top. This is a great wind maneuver -- the windier the better. Pete's short wingspan and big tail make it relatively insensitive to being upset by the turbulence of wind.

Another good wind maneuver is the split-S. To be spectacular, start at a rather high altitude into the wind, roll inverted, reduce power and let Pete's nose drop into an inverted dive. Let Pete drop, building up speed. Pull out low and fast in front of the judges. The engine doesn't make much sound. One can hear the windmilling of the prop and the whistling of the wing wires as Pete whizzes by.

Prepare for landing by flying a rectangular approach. Throttle back and transition into a gliding descent. Lowering the flaps will bring Pete's nose up. Compensate for this with about one-third down-elevator trim. Or use automatic flap-elevator mixing from your computer radio if you have one.

Always lower flaps at altitude. This allows room to recover if a flap malfunction occurs.

Now Pete is in a steep descent, but speed is slow because the flaps increase both lift and drag. This makes the field an easy target to hit. Pete remains stable at low airspeed because of her large tail.

Steepen the glide further, if needed, with down-elevator. Speed will not increase much due to the drag of the flaps. To stretch the glide, use throttle, not elevator. Always keep the nose down when flying with fully deployed flaps. If you must go around, raise the flaps first.

Flare just before touchdown. As the wheels touch, pull the flaps up to kill lift. This kills bounce too. The full-size Pete didn't have flaps so we hope that the judges didn't notice. Steer with rudder to a complete stop.

Taxi to the winner's circle.

Like the original, my Pete has won its share of prizes. I am especially proud of the ACRC Realism In Flight Award. But contest flying is only a part of my Pete's activities. Pete is my everyday sport flying airplane, too. She is a delight to fly anytime and anywhere. I hope she will delight you, too.

If you wish to return to the Golden Age of aviation by building a Pete, write to me in care of RCM. I will attempt to answer every question.

Go fast and turn left!

✈