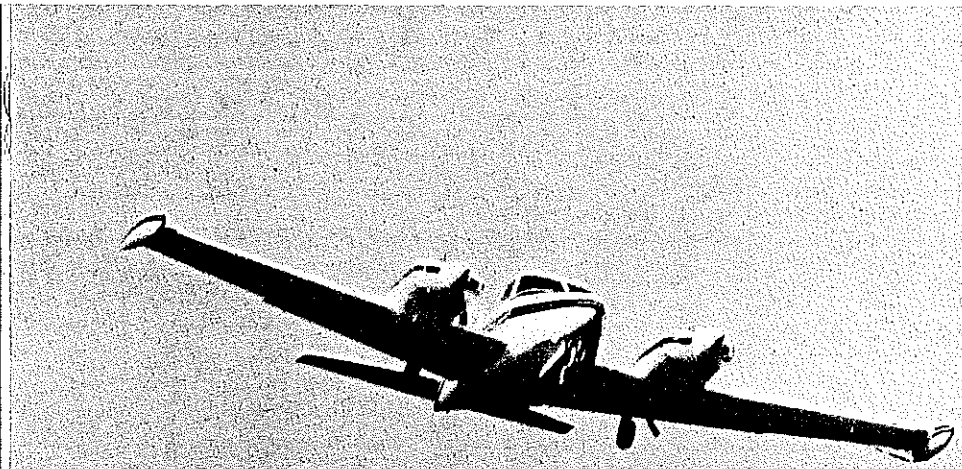
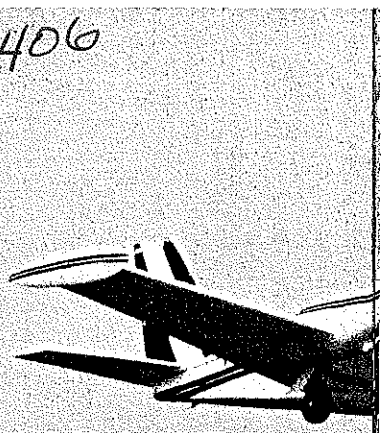
#406





TWIN CO

Do you have two .25 engines that you'd like to put to good use? Put them in this CL Sport Scale model (or add more details for CL Precision Scale), and get ready to pick up some contest "hardware."

THE PIPER TWIN COMANCHE came into being late in 1962 as a replacement for the Piper Apache when the first version of the Comanche, designated PA-30, was tested. By 1965 the Comanche was available as a six-seater which could be equipped with tip tanks and a turbo-charged option.

Becoming even more sophisticated, the Comanche was re-introduced in 1971 as the Twin Comanche, PA-39 C/R. The designation suffix was for the new counter-rotating props which counteracted the aircraft's tendency to "swing" on takeoff due to engine torque.

Counter-rotation of the propellers was achieved by reversing the direction of the starboard engine shaft. Lycoming engineers reversed several components and changed the firing order of the cylinders, thereby producing a mirror image of the port engine.

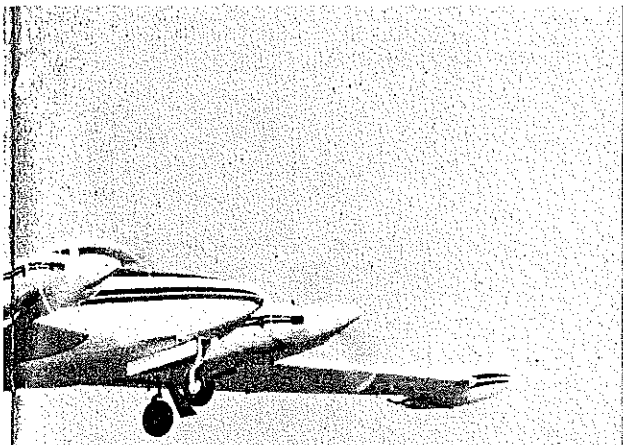
Production of the Twin Comanche was brought to a halt in 1972 by a flood at Piper's Lock Haven plant. However, during its heyday, the Twin Comanche held several speed and distance records under the able piloting of Max Conrad. It also made state-of-the-art design contributions as the first civilian aircraft with a swept fin and an all-flying stabilizer (or stabilator).

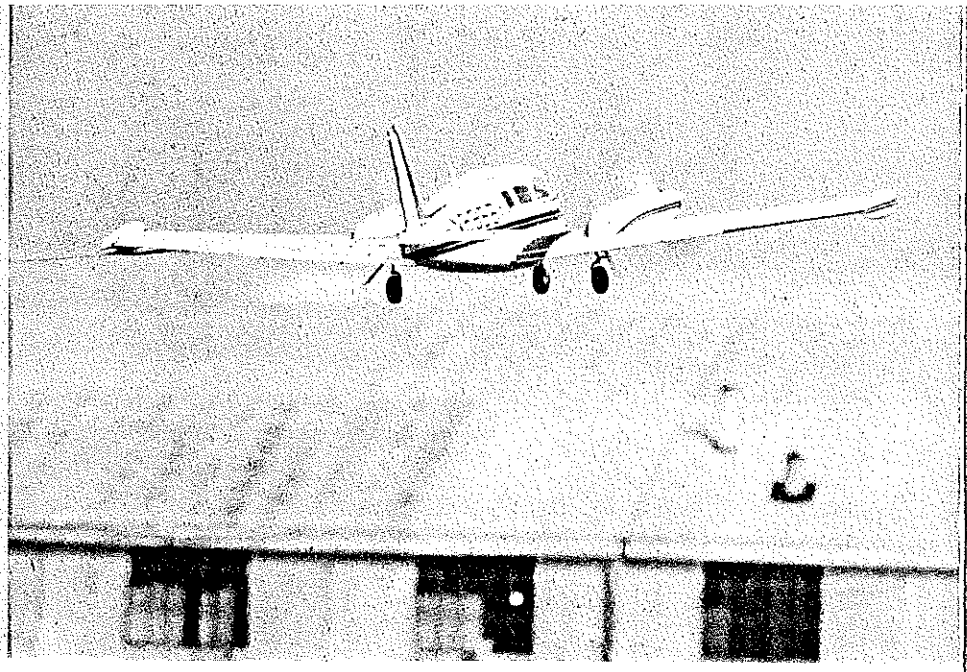
Jeff Perez, a member of the 1982 U.S. Control Line Scale World Championships Team, chose the Twin Comanche as a Scale modeling subject for its aesthetic appeal and because it would earn him more points in judging than a single-engined craft. It just so happened, also, that a Twin Comanche was based at Larned, KS, Jeff's home town, and it was owned by Reed Peters, a friend of Jeff's. Sometimes it's convenience rather than necessity that's the mother of invention!

Jeff's Sport Scale Twin Comanche, pre-

Photos by Larry Kruse and Mike Gretz

The designer, Jeff Perez, holds up the plane for us. It is only the second Scale plane he has built, and it was a real success, functioning as a stepping-stone for Jeff's becoming a U.S. team member.





MANCHE

Design by Jeff Perez
Text by Larry Kruse

The three flight shots across the top are by Mike Gretz. The Comanche is very realistic and quite stable at all flight altitudes.

sented in the plans, came into being about four months after his initial decision to build. The Precision Scale Twin Comanche took another three months to complete. Both flew for the first time at the 1978 Nats where the Precision Scale ship was 4th and the Sport Scale plane was 2nd.

For Jeff, the two planes represented a real milestone in modeling. The two, respectively, were only the second and third Scale ships he had ever built! To score that well so early in a modeling career is almost unheard of. And, to carry Jeff's story one step beyond the current subject, his 1982 U.S. Scale Team entry, a B-17, placed 8th in the World Championships, the highest place of any U.S. team member. It takes a moment for it to fully sink in that Jeff has accomplished all of this after having built only four Scale airplanes in his entire life.

To return to the subject at hand, it is obvious that the Twin Comanche is a good ship for anyone wanting to enter the world of CL Scale flying. It features easy construction, eye appeal for the judges, and the automatic bonus points of a twin-engined aircraft.

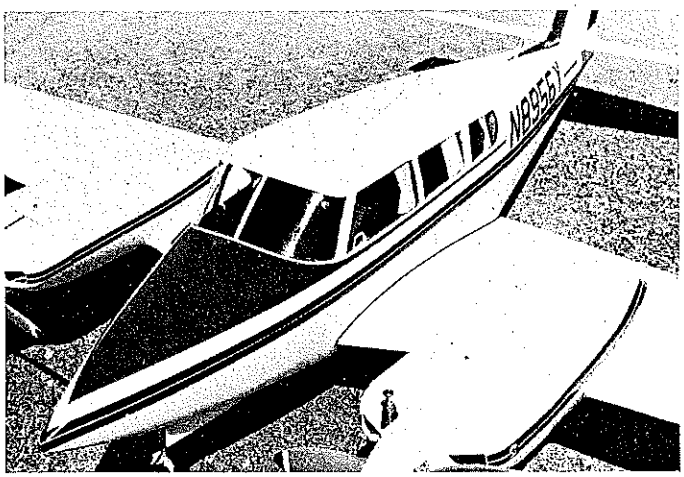
Construction will be hastened considerably by "pre-kitting" as much of the plane as possible. Cut out all ribs, formers, spars, and plywood pieces prior to beginning the "Glue Part A to Part B" sequence.

The wing should be built first. Attach the nacelles for easier alignment when the wing and fuselage are glued together. Build one wing panel at a time (the dihedral spar and sheeting will be glued on later).

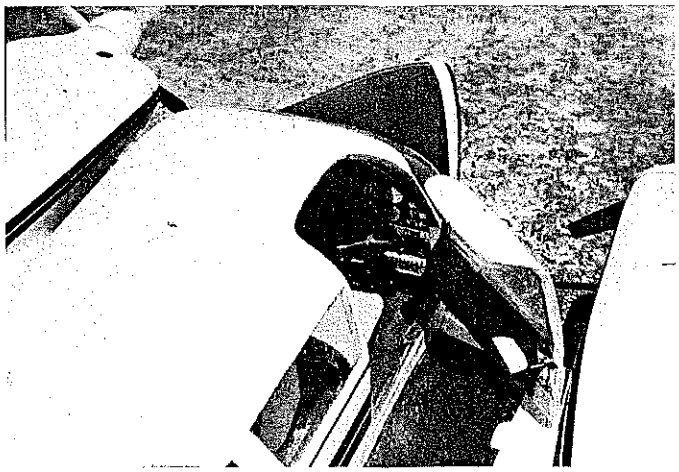
Pin down the main wing spars over the plan, and slip the wing ribs into position. Use a small cardboard triangle to make sure

Paint scheme is simple, easy to execute, and very attractive. Jeff's plane was done in white with green trim and black lettering.

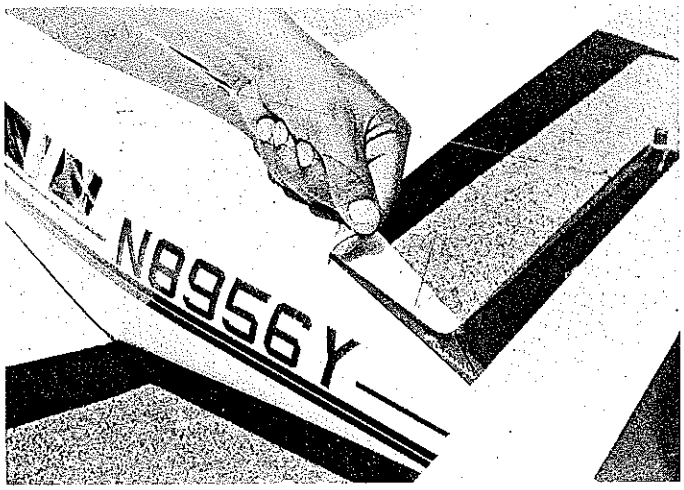
Except for the needle valves sticking up, it's hard to tell the model from its full-size counterpart. Engines are well-hidden by the cowlings in this view, but they still have ample cooling.



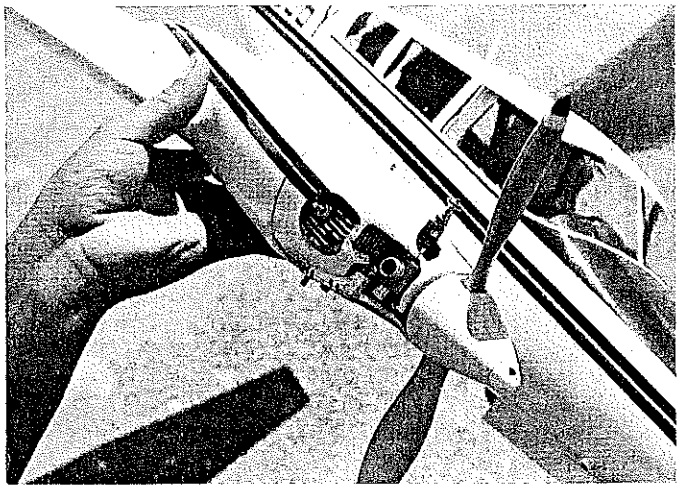
Cabin area detail shows here. The windshield can be molded from heavy-gauge celluloid. Side curtains are made from paper towels.



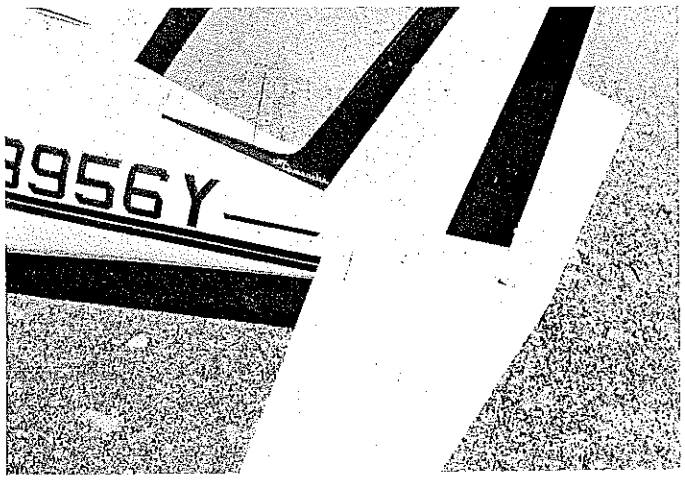
Cabin interior is complete on this Precision Scale version. There's no need for such extensive detailing on a Sport Scale model.



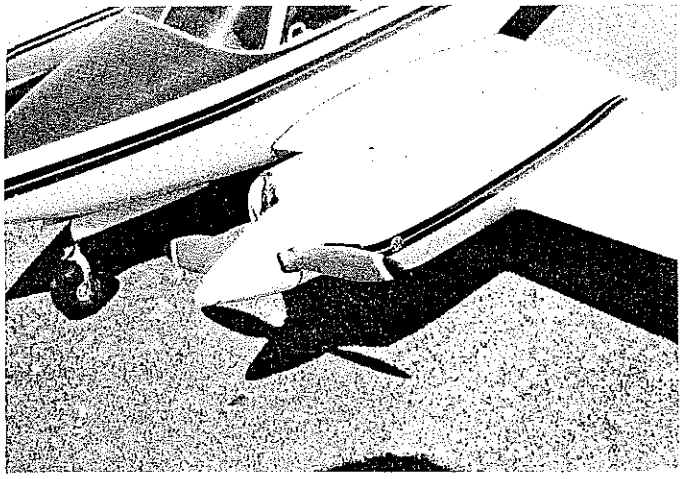
Jeff molded the antennas from white silicone rubber. Rigid ones need constant repairing due to the frequent damage they suffer.



Cowling is made of fiberglass. Cutouts for engine cooling and operation are made on the outside (from the flight circle) of each nacelle.

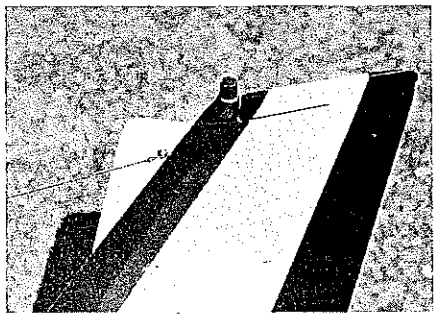


A full-flying stabilizer is unique for a Scale ship. All control horns and pushrods are internal, so they don't spoil the scale lines of the plane.



A stock manufactured spinner looks realistic on this model. The prop is a wooden 9-5 Y&O painted to simulate aluminum.

the ribs are 90° to the spar, and then tack-glue them into place for right now with just a drop of one of the thicker cyanoacrylate (CyA) glues (such as Super Jet, Super T, and Zap-A-Gap). Slip the trailing edge spar into the notches at the back of the rib, and glue it in place. Note that the spar laps over itself at Rib Station 6. The leading edge piece is next.



Rudder warning light is a simple detail that adds much to the overall good effect.

Constantly check alignment during these early construction phases. If you need to pop a rib off of the wing spars in order to align it perfectly, by all means do so. Twisted wings fly funny—or not at all. When you are satisfied with the rib adjustment, glue all ribs in permanently with CyA.

The tapered trailing edge pieces can be added next, and then finally the tip blocks. Use the tip rib as a template to gouge out an opening in each wing tank block before carv-

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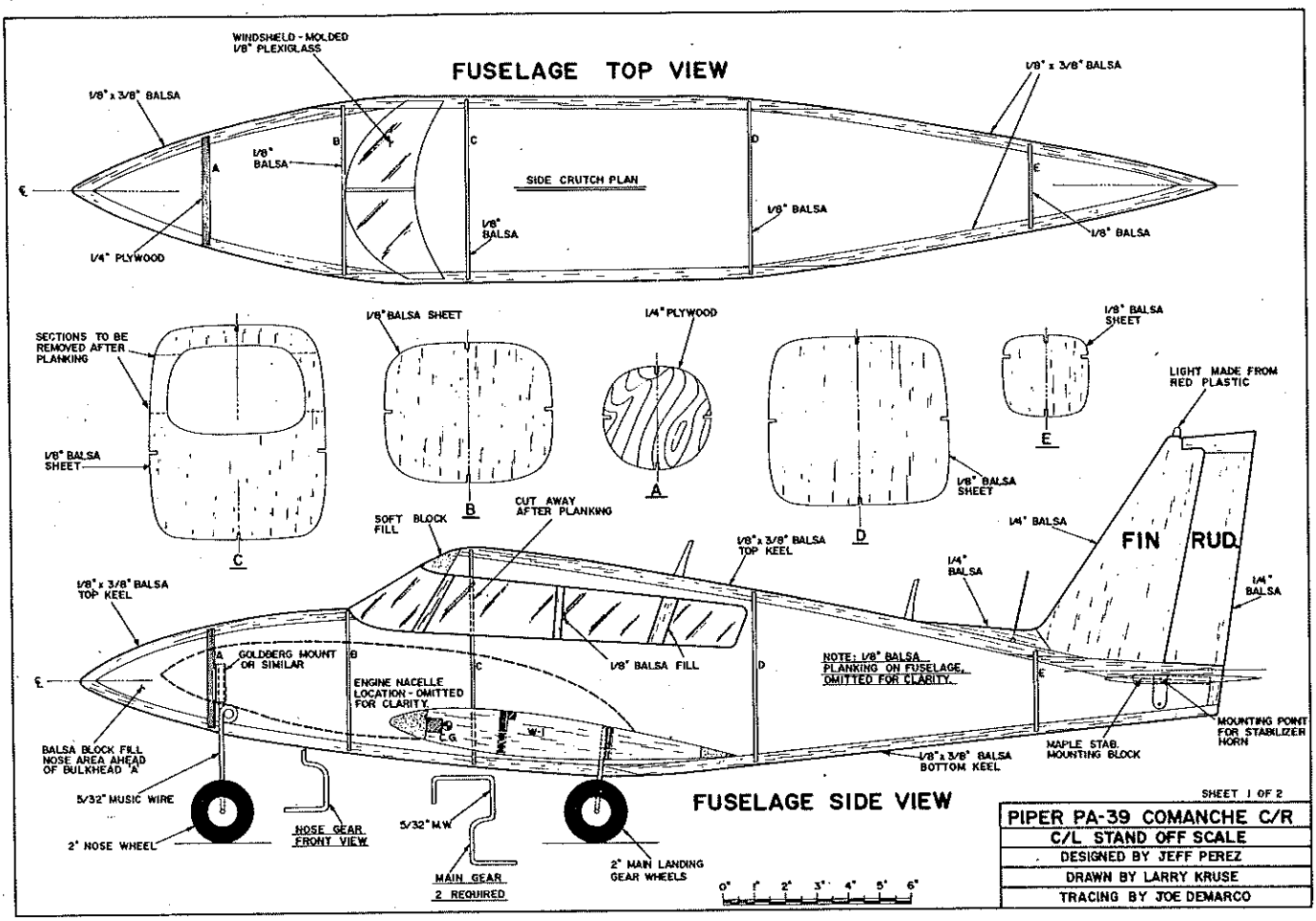
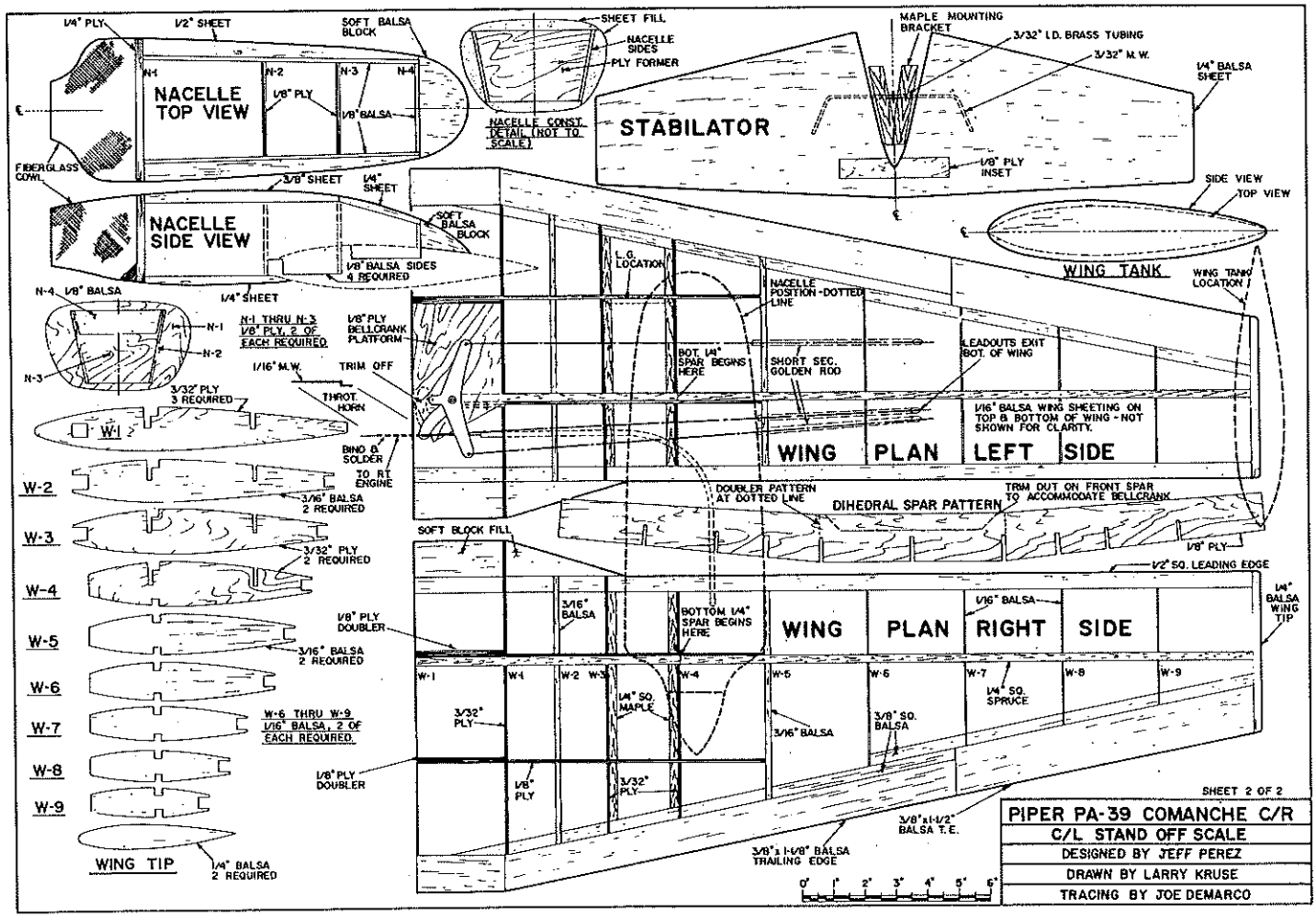

FUSELAGE TOP VIEW
WINDSHIELD - MOLDED 1/8" PLEXIGLASS
1/8" x 3/8" BALSA
1/8" BALSA
1/4" PLYWOOD
SIDE CRUTCH PLAN
SECTIONS TO BE REMOVED AFTER PLANKING
1/8" BALSA SHEET
1/8" BALSA SHEET
1/4" PLYWOOD
1/8" BALSA SHEET
LIGHT MADE FROM RED PLASTIC
SOFT BLOCK FILL
CUT AWAY AFTER PLANKING
1/8" x 3/8" BALSA TOP KEEL
1/4" BALSA
FIN
RUD
GOLDBERG MOUNT OR SIMILAR
ENGINE NACELLE LOCATION - OMITTED FOR CLARITY
1/8" BALSA FILL
NOTE: 1/8" BALSA PLANKING ON FUSELAGE OMITTED FOR CLARITY.
BALSA BLOCK FILL NOSE AREA AHEAD OF BULKHEAD 'A'
5/32" MUSIC WIRE
2" NOSE WHEEL
NOSE GEAR FRONT VIEW
5/32" M.W.
MAIN GEAR 2 REQUIRED
2" MAIN LANDING GEAR WHEELS
1/8" x 3/8" BALSA BOTTOM KEEL
MAPLE STAB. MOUNTING BLOCK
MOUNTING POINT FOR STABILIZER HORN
FUSELAGE SIDE VIEW
SHEET 1 OF 2
PIPER PA-39 COMANCHE C/R
C/L STAND OFF SCALE
DESIGNED BY JEFF PEREZ
DRAWN BY LARRY KRUSE
TRACING BY JOE DEMARCO


NACELLE TOP VIEW
NACELLE SIDE VIEW
NACELLE CONST. DETAIL (NOT TO SCALE)
STABILATOR
WING TANK
WING PLAN LEFT SIDE
WING PLAN RIGHT SIDE
DIHEDRAL SPAR PATTERN
WING TIP
W-1
W-2
W-3
W-4
W-5
W-6
W-7
W-8
W-9
SHEET 2 OF 2
PIPER PA-39 COMANCHE C/R
C/L STAND OFF SCALE
DESIGNED BY JEFF PEREZ
DRAWN BY LARRY KRUSE
TRACING BY JOE DEMARCO

on the top view. They are, however, mounted in a more conventional location on the wing. The flaps are also mixed to provide aileron action.

Both the PIRANHA and GAMMA have foam wings, wood sheeting, and EconoKote covering, and the workmanship is flawless. More about these birds as information comes in.

Late items. Ted Davey, the gent who has been producing the DSC retrieval system, has a new winch on the market called POW'RTOW. The photo shows its low-slung look. Dave claims it can not only launch ther lightest Two-Meter ship but can also haul that 11-lb. cross-country bird into the air with ease. The winch features a solenoid-protected foot switch, 1,800 ft. of 115-lb.-test line with a parachute, ball bearing line swivel, and welded frame and line drum. The low profile measures only 23.5 × 12 × 9 in. The weight, less battery, is 40 lb. For further information write to Davey Systems Corp., One Wood Lane, Malvern, PA 19355; phone (215) 644-0692.

Two-Meter World Cup. The fourth running of the 2MWC will be hosted by the Modesto Radio Control Club. Five identical winches have been fashioned for the event, and as in the past, this will be a man-on-man event. Entry forms will be mailed out May 1, 1983 and entries will close May 31, 1983. The event is scheduled for June 11-12, 1983. For further information contact Mr. Ed Slobod, 9626 Jellico Ave., Northridge, CA 91325; phone: (213) 349-4758.

Good Lift.

Dan Pruss, 131 E. Pennington Ln., Plainfield, IL 60544.

Comanche/Perez-Kruse

Continued from page 67

ing it to shape.

When both panels are complete to this stage, join them with the dihedral spar liberally epoxied in place. The main landing gear legs are bent from 5/32-in. wire and then J-bolted to the spar at the locations shown. Tweak them a bit if necessary to make sure the wheels track in a parallel fashion.

The Sport Scale gear is shown on the plans for the sake of simplicity; however, Jeff chose to machine the front landing gear fork for the Precision Scale ship from key stock and attach it with a setscrew. The two L-shaped brackets for the main gear were done in the same fashion.

After the main frame of the wing is put together, place each nacelle assembly directly over the leading edge and main spar so that a good glue bond can be obtained between the pieces, particularly at the leading edge. Epoxy the nacelles to the wing, all the while checking carefully (and adjusting as necessary) to assure alignment as the assembly cures.

Notice that Jeff didn't find it necessary to use engine thrust offset in order to keep the plane out on the lines. Drill the necessary mounting holes, and temporarily mount the engines and tanks in position.

Now the bellcrank platform can be epoxied in place and the Roberts upright bellcrank bolted on. Route a braided cable Gold 'N Rod with its plastic casing through the wing rib and spar structure and and each nacelle for dual throttle controls. A 1/16-in. music wire pushrod wrapped and soldered to the braided cable attaches to the throttle arm of the bellcrank. It will be necessary to drill a hole just to the inside of the original third line location in order to attach the pushrod.

Since both engines are operating from the same throttle cable, the carburetor control horns will have to be placed opposite each other. Otherwise, the high setting of one engine will be the low setting of the other. Check the assembly several times to make sure it's not binding or hanging up at any point. Be particularly conscious of the possibility of the muffler interfering with the carburetor control horn and pushrod in the "up" position.

After all three lead-outs are strung from the bellcrank, sheet the lifting surfaces of the wing with 1/16 balsa. The nacelle areas will need to be planked, and some filling-in with small balsa blocks will probably be necessary. Cowls for both engines can be laid up with fiberglass over a carved form using the "balloon" method of molding.

The stabilizer and rudder are both cut from ¼-in. sheet and sanded to airfoil shape. The stabilizer presents a special case because it must be mounted in the fuselage as a unit along with its maple bearing block. Reinforce the weak spot at the rear of the stab as shown with inset plywood doublers.

The mounting block can be drilled out for a 5/32-in. I.D. brass tube which will serve as a bushing for the 5/32-in. music wire control horn. You will need to solder the horn itself to the music wire, slip the wire through the maple block bushing, and then bend the

"arms" of the horn to the approximate shape shown on the plans. The bottom of the stab should be slotted to accept the control horn wire and then filled in with microballoons and epoxy for strength. When completed, the stab assembly can be set aside until needed for the fuselage.

The rudder will require little more than sanding to shape; however, the rudder light does enhance the plane's scale effect considerably. The simulated light can be filed to shape from red Lucite plastic and then fitted with an aluminum tube ring at its base.

The fuselage is probably the most important and most difficult construction phase of this aircraft. Since it is a keel, crutch, and former assembly, it would be well worth your time to first construct a simple jig to aid in construction. The jig should have a base of ¼-in. or ½-in. plywood approximately as long as the fuselage and about 6 in. wide.

Scribe lines where each of the fuselage formers would be located along the jig base, and then glue or nail vertical pieces of ¼ × 6 × 6 plywood to the base. These vertical pieces will serve to hold the formers at the correct angle for insertion of the keel and crutch. It's probably best to cut a vertical slot about ½-in. wide at the center of each former holder to allow clearance for the keel. The nose gear should be mounted to Former A before commencing the installation of the keel and crutch.

Use rubber cement to attach the formers to the jig assembly, and then reposition the formers as necessary to align them with the keel and crutch as installation proceeds. The entire fuselage is covered with ⅛ × ⅜ balsa planking; however, wider pieces of balsa can be used on the fuselage top and bottom where the area is nearly flat. It may be helpful to soak the planking strips in hot water liberally laced with ammonia to make them pliable enough to negotiate the curves of the fuselage, particularly toward the nose area.

Plank the fuselage using alternating strips of balsa (first one side, and then directly opposite) in order to avoid pulling the fuselage off center or causing it to develop a torsional twist. As with the wing, constantly check the alignment. As planking progresses, cut away the areas necessary to mount both the stabilizer and wing as soon as the fuselage is strong enough to permit handling it without excessive bending or possible misalignment.

Epoxy the wing and the stabilizer in place, checking the position of both relative to each other and to the fuselage. Hook up the stab pushrod, and adjust its length to achieve a neutral stab setting when the bellcrank is neutral.

After the planking is complete, window areas can be cut out and temporarily fitted with celluloid. Temporarily install a soft balsa block in the windshield area; carve it to shape, and then use it as a form for molding the actual windshield. Sig's heavy-gauge clear plastic can be used to form the windshield. Heating a large piece of the plastic

over an electric stove (with gloved hands, please) until it begins to smoke will make it pliable enough to jam down over the balsa windshield form to make a good compound curve. It may take several tries to get an acceptable windshield, so do be patient.

Finishing and detailing. Sand the entire airplane carefully. Fillets can be made with Sig Epoxolite or—as Jeff did—with polyester resin and microballoons. Pits, dings, dents, and cracks between the planking strips can also be filled with a resin/microballoon mixture or a vinyl spackling compound such as DAP.

Apply a thin coat of Hobbypoxy Quick Prep Resin, and let it cure. Scuff-sand the first coat, and then apply a second thin coat. Apply a heavy grade of silkspan or silk while the second coat is still wet, pulling out all the wrinkles. All surfaces should be covered with either silk or silkspan. Jeff used a combination of the two for the sake of economy—silk in areas needing extra strength, and silkspan on the large flat surfaces.

Tack down all edges that may have come unstuck, and let the second coat of resin cure. Now, without sanding, brush on a third coat of resin using a full brush; attempt to "flow" on the resin as smoothly as you can. It probably won't be *too* smooth, so wet-sand it carefully with 150 to 200-grit paper. Add a fourth coat of resin. By this time a definite glassy sheen should be evident. Wet-sand this last coat with 320-grit paper, and then spray on a light coat of primer.

Jeff used automotive enamel for the color coats; consequently, he used automotive primer as the base coat. If you choose Hobbypoxy or K&B Super Poxy as an alternative, use their respective primers to assure compatibility. Wet-sand the primer coat with 400-grit, and then spray on the white base coat with as many light applications as necessary to create a good surface for the trim color.

If you use masking tape to mask off the trim lines, be very careful when you remove it. The underlying resin is prone to let go of the paint if you pull the tape off too hard or too sharply.

Rub out the final finish with a good commercial grade of rubbing compound, and apply several coats of automotive wax to protect all of your hard work. The windows, windshield, landing gear doors, and other bits and pieces of trim can be added now. To keep the various antennas from breaking off, Jeff molded them from silicone rubber and then attached them to the fuselage. (See the CL Scale column of the October 1978 *Model Aviation* for details.) Side curtains for the windows were made from folded paper towels. Logos were hand-painted, and press type letters (from an art supply store) spelled out the "No Step" warnings.

Flying. If the plane has been built as per the plans and instructions it will be very light and easy to manage in the air. However, single-engine performance is marginal at best, so be certain both engines are synchronized as nearly as possible by ear as you prepare for that first flight.

Twin-engine airplanes are a little like biplanes in that they carry with them definite magical properties in the air. The sound of those twinis singing in unison around the circle will automatically gather a crowd every time you fly. Good luck with your version of the Twin Comanche.

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Jane's *All The World's Aircraft 1972-73*, John R. Taylor, ed., McGraw-Hill Book Company, New York, NY, p. 406.

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CL Aerobatics/Paul

Continued from page 68

sembly, substituting Allen-head screws for the head and backplate, and modifying the engine to take a Fox Stunt Special muffler with a strap connection that will not distort the crankcase. Price of Stage I, which includes a new engine, is $30 plus $2.50 for shipping.

Stage II includes all of Stage I, plus a fully-balanced crankshaft for lower vibration and smoother operation. Price for Stage II, which includes a new Fox .35 engine, is $35 plus $2.50 for