Scratchbuilding in 1/72 scale

BOEING'S 314 FLYING BOAT

Fiberglass and acrylic merge in Pan Am's majestic Yankee Clipper

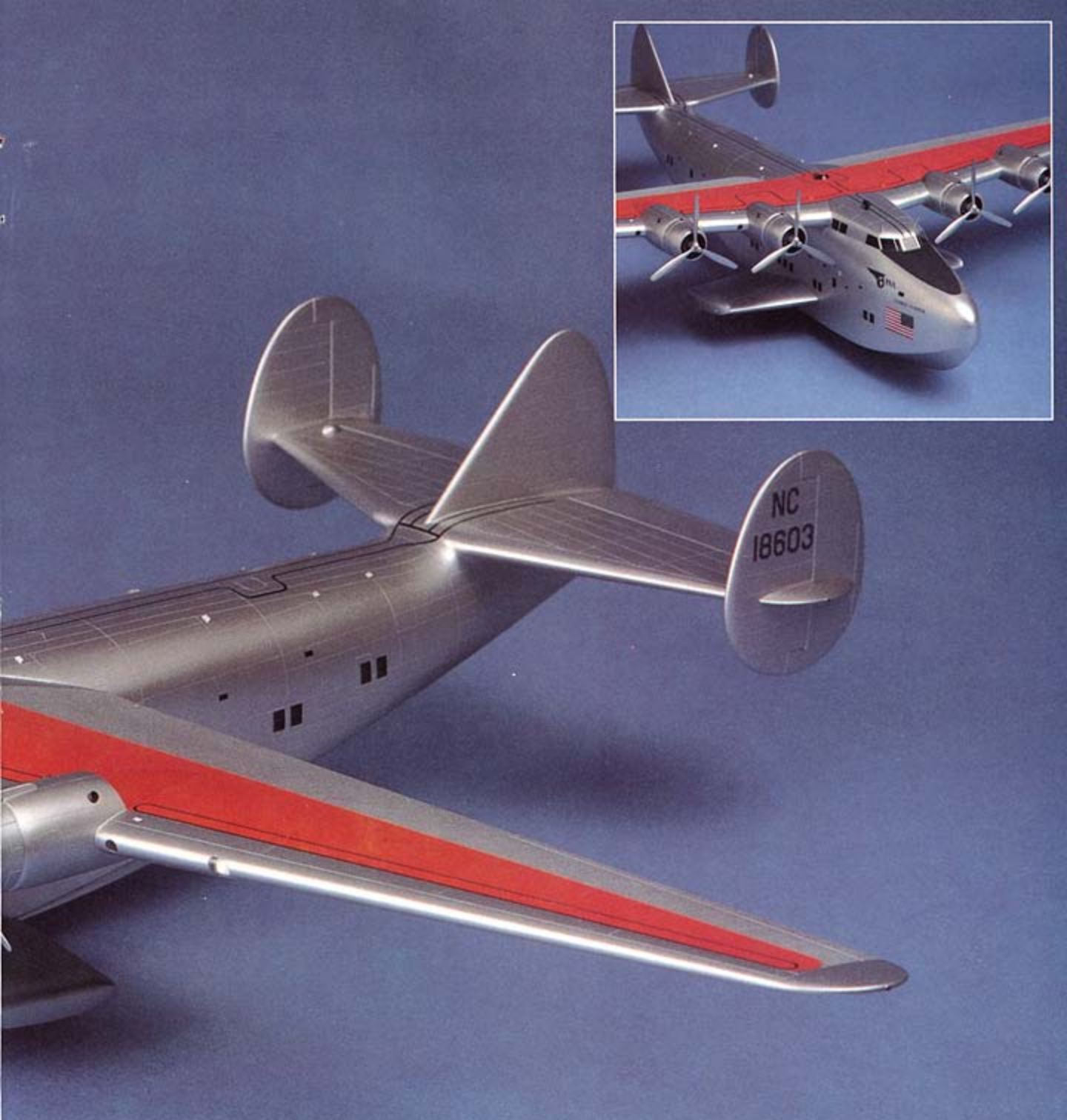
BY PAUL BUDZIK

BOEING'S MODEL 314 was the first and the last of its kind. In 1939 the venerable clipper flew the first scheduled airline service between the U. S. and Europe; it was also the last successful commercial flying boat. Pan Am placed nine clippers in transatlantic and transpacific routes during the 314's heyday.

The huge aircraft was based on Boeing's XB-15 wing, and it was powered by four Wright R-2600 Double Cyclone engines. The use of Hamilton Standard full-feathering propellers was also the first on an airliner. The Boeing 314's cruising speed was 184 mph with a range of 5,200 miles.

Because flight times were well over 12 hours, the 314s accommodated two complete crews, consisting of pilot, copilot, navigator, radioman, flight engineer, master of the boat, and two cabin attendants. Passenger capacity was 74 for day flights and 34 in sleeper-berth configuration.

Air fares in 1939 weren't much different than today: New York to Marseilles



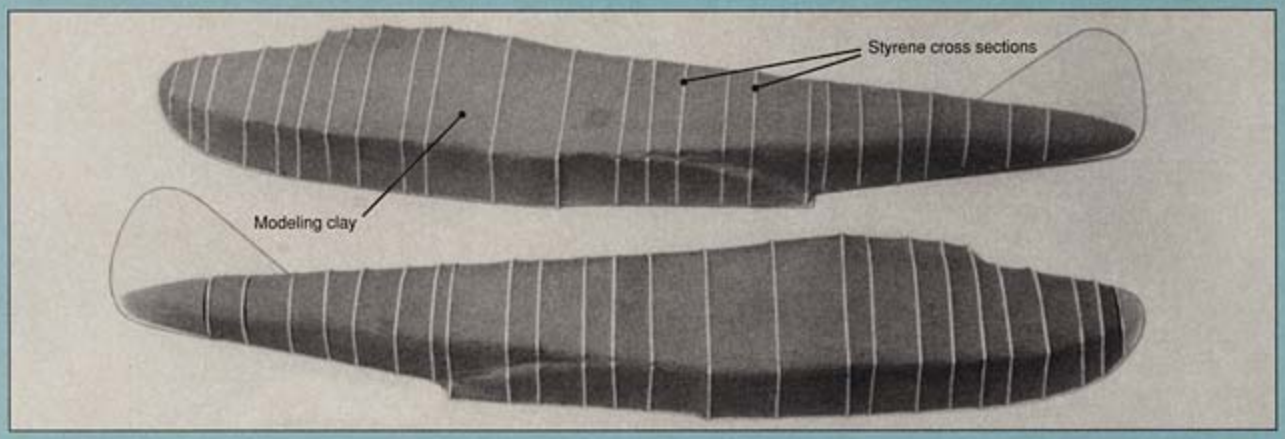
cost $375; San Francisco to Singapore was $825 – but in those days you could buy a loaf of bread for 10 cents, too. A few 314s were drafted into transport service with the U.S. Navy and wore camouflage during World War II.

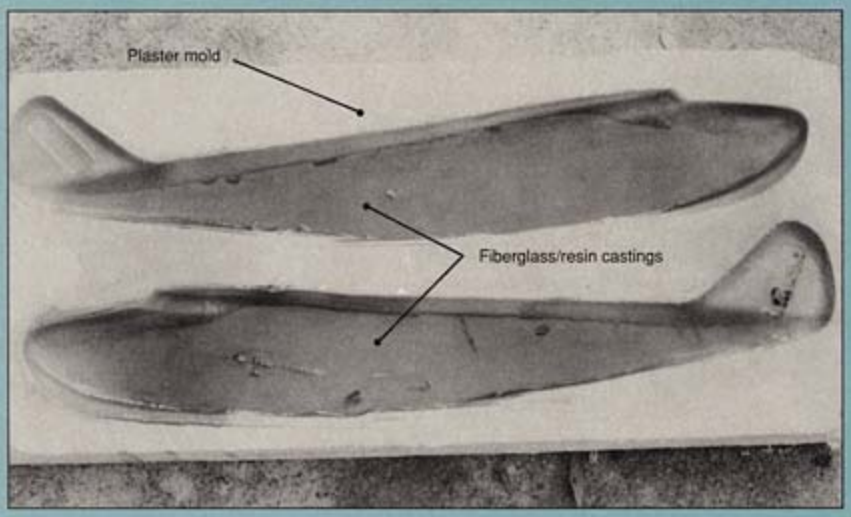
The proliferation of airfields and development of long-range, land-based airliners following the war brought the curtain down on the Pan Am 314 Clippers.

Mini Clipper. Airfix makes a 1/144 scale kit of the Boeing 314, but I wanted a larger model. I considered scratchbuilding a 314 in 1/48 scale, but it would have been too big to display. At 1/72 scale the Clipper has a two-foot wingspan, and I could display it alongside other, easier-to-build, injection-molded airliners.

I could not find reliable plans, so I made my own based on three main sources: the November 1977 issue of *Airpower* magazine, *Wings to the Orient* by Stan Cohen, and the Airfix model. The book contains basic plans with many dimensions.

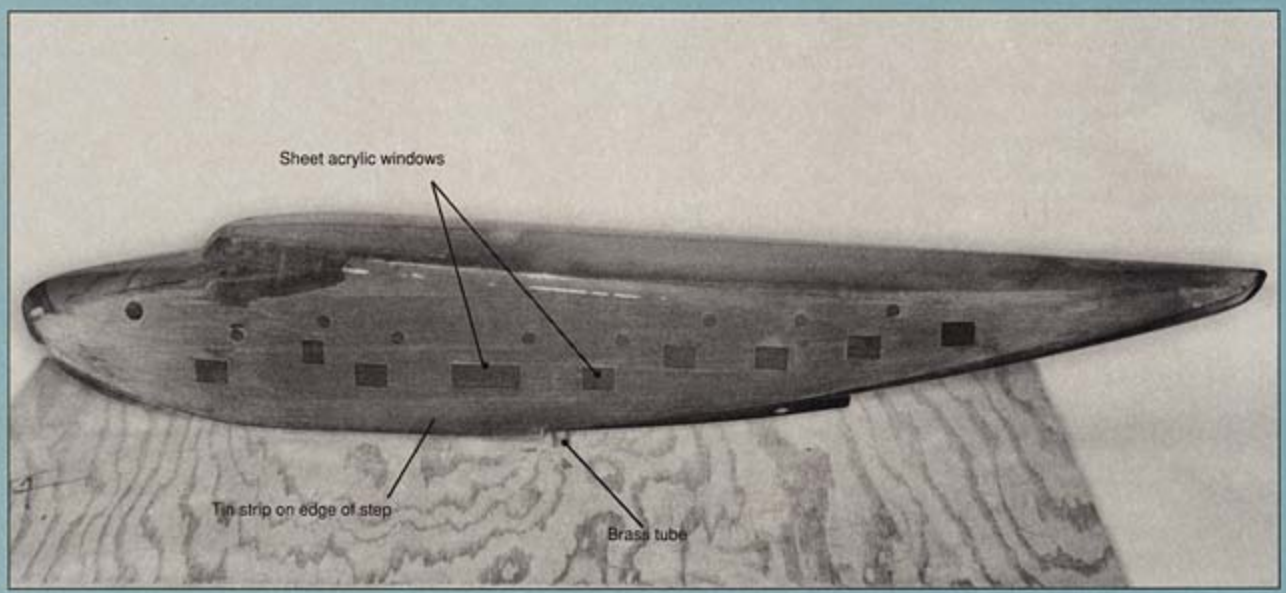
It's unlikely that you'll want to build a 314 just the way I did, but maybe you'll fall in a big way for another subject you can't obtain. When you do, pages 44-48 show techiques and construction notes that you can apply to your projects.



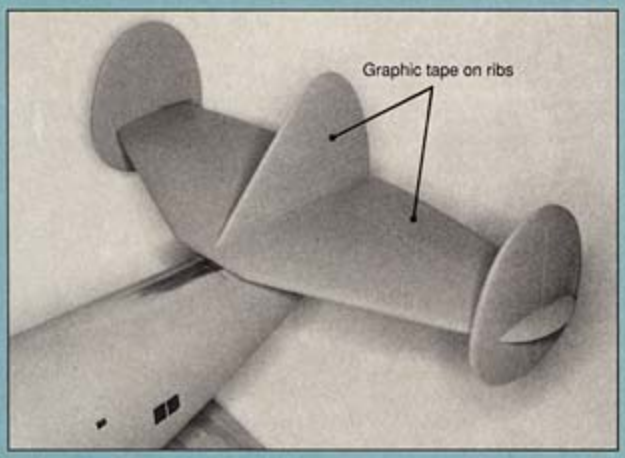


1. From his plans, Paul produced a pair of sheet styrene profiles and station cross sections. After cementing the cross sections to the left and right profiles, he filled between them with modeling clay, then sculpted the clay to conform to the cross sections.

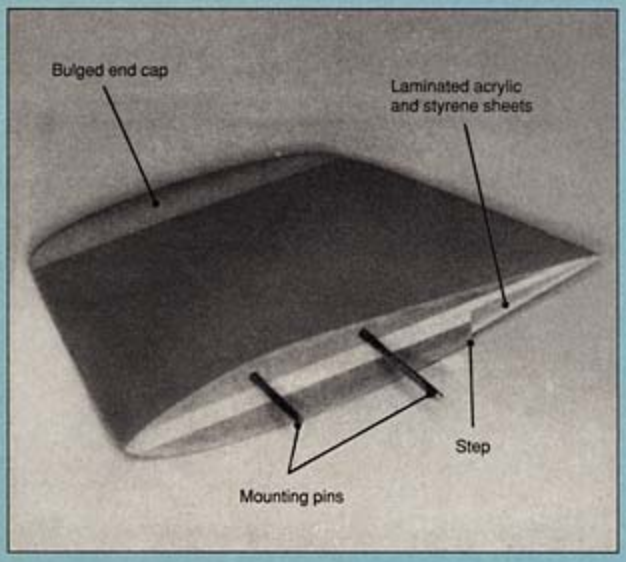
2. The clay-and-styrene forms were covered with plaster. When the plaster set, Paul removed the forms and cleaned the molds with hot soapy water. To make the hull halves, Paul laid fiberglass fabric and polyester resin into the plaster molds.



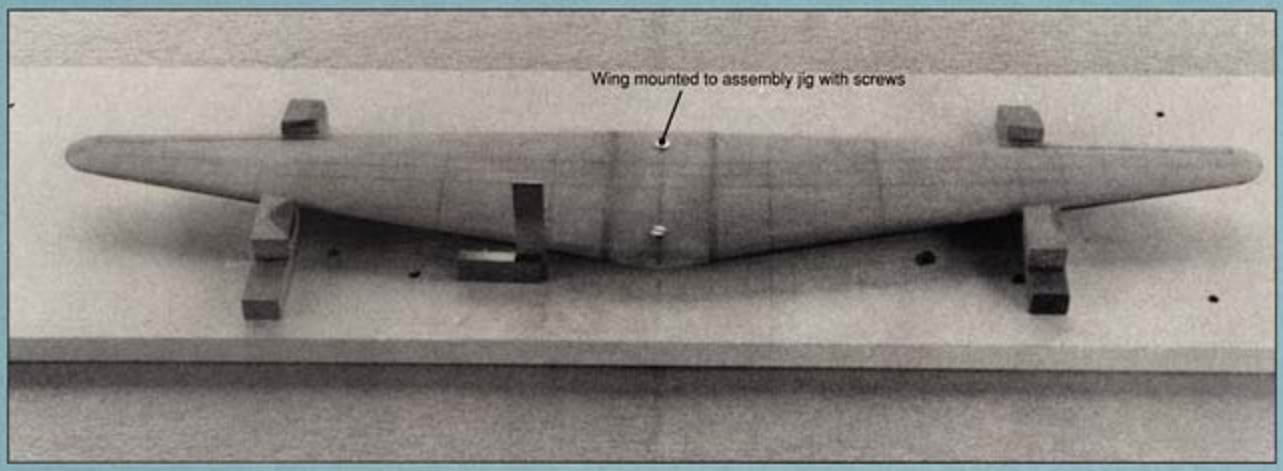
3. Paul removed the center fin and installed windows of clear acrylic sheet with the backs painted black. The thick acrylic adds depth to the windows while the black paint blocks the view of the inside of the model. Paul joined the fuselage halves with super glue, then installed a 3/16" brass tube in the center of the hull, which he used to align the hull in its assembly jig. The tube is also used to attach the model to the display base. A strip of .010" tin produces a sharp edge to the step in the hull. At this point the hull is ready for primer.

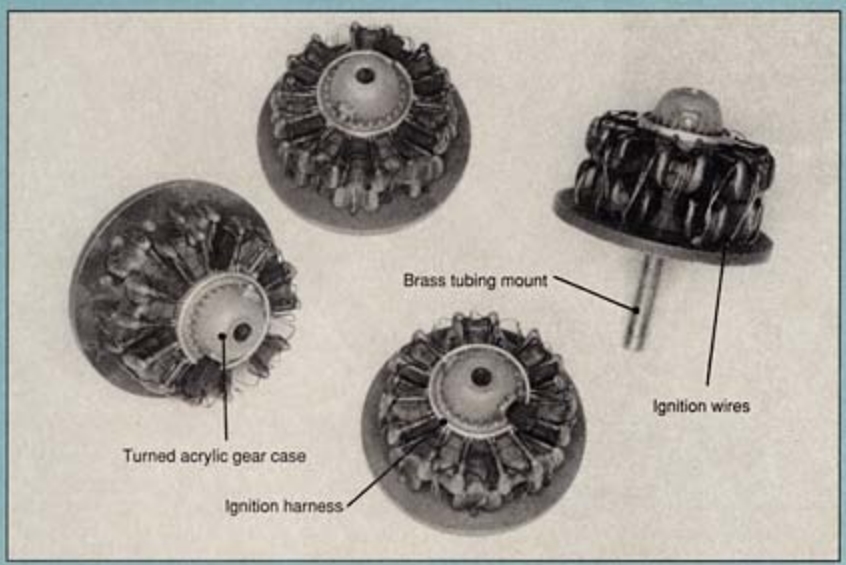


4. Paul carved the tail plane and fins from sheet acrylic. His primary tool here was a belt sander. Holes drilled in each piece accommodate mounting pins for a sturdy assembly. Paul scribed panel lines and added thin graphic tape to simulate the fabric reinforcement over the ribs of the control surfaces. After assembling the empennage with liquid solvent cement and filling gaps with gap-filling super glue, he sanded the assembly smooth and applied several coats of lacquer primer/surfacer.



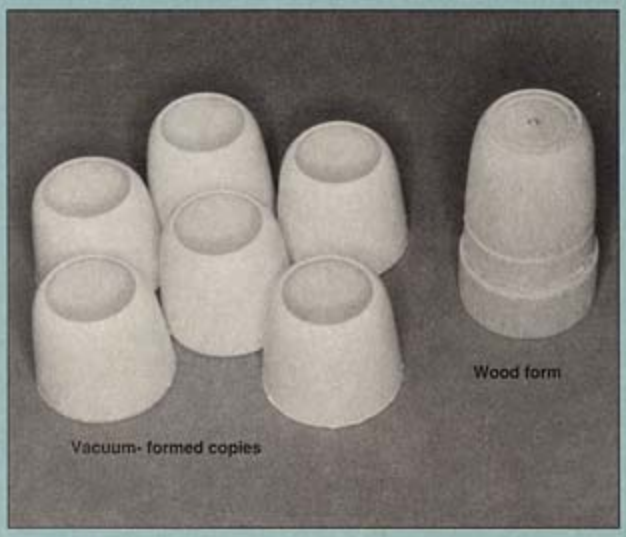
5. The hydrostabilizers (sponsons) were made from laminated sheet acrylic and sheet styrene shaped with the belt sander. Note the bulged end cap and the stepped rear portion. Wire pins were used to attach the sponsons to the hull.



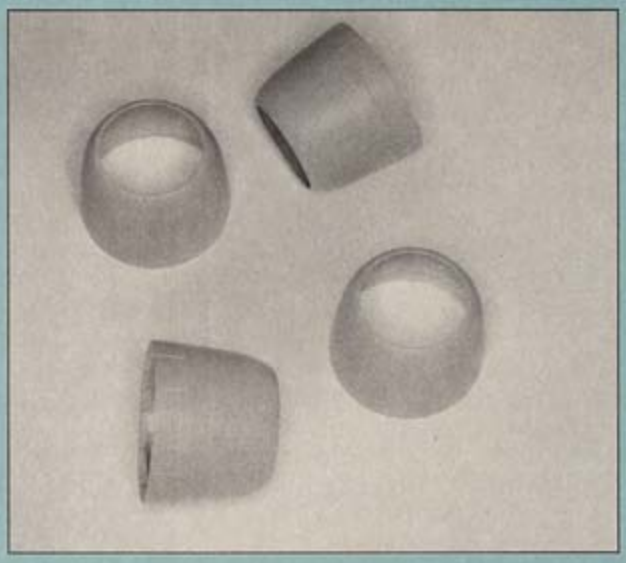


6. The wing was built with a wood core and fiberglass resin. Paul shaped the core's three sections with the belt sander and glued them together. He marked the location of the engine nacelles, then cut grooves at the aileron hinge lines. The grooves allowed an extra-thick buildup of fiberglass/resin so he could engrave the hinge lines without cutting into the wood core. After sanding and shaping the fiberglass/resin coated wing, Paul mounted it to an assembly jig with screws.

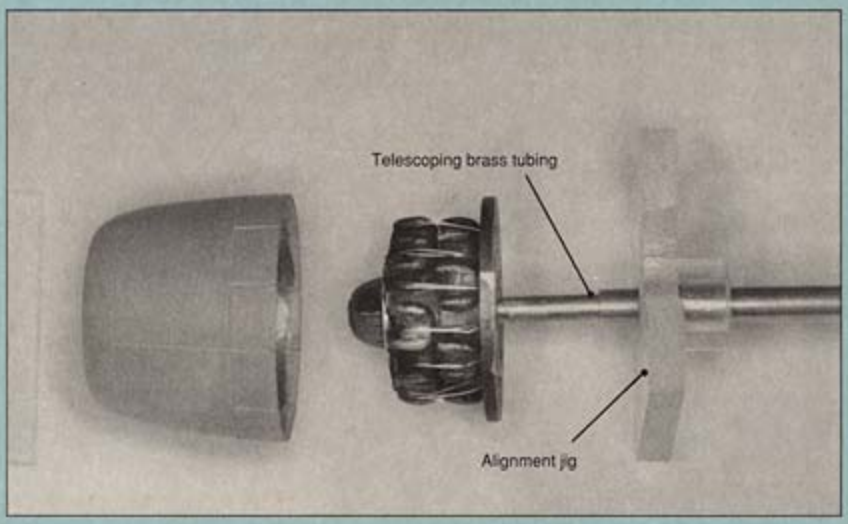
7. The only kit parts were engines from two Italeri C-47s. Paul modified them with acrylic gear cases turned on a lathe, brass tube ignition harnesses, and ignition wires.



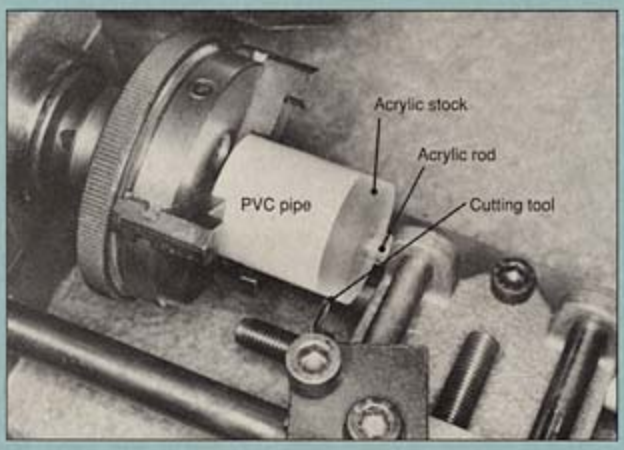
8. For the cowls, Paul turned a wood form on the lathe, then vacuum-formed sheet styrene over the form. He made a couple of extras just in case.



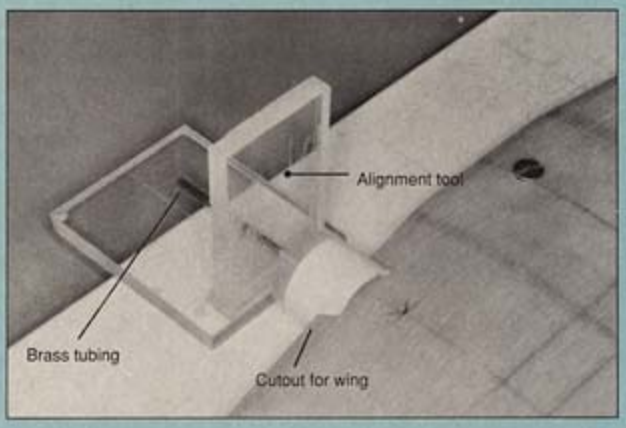
9. Panel lines and cowl flaps were scribed into the cowls and the parts were primed.



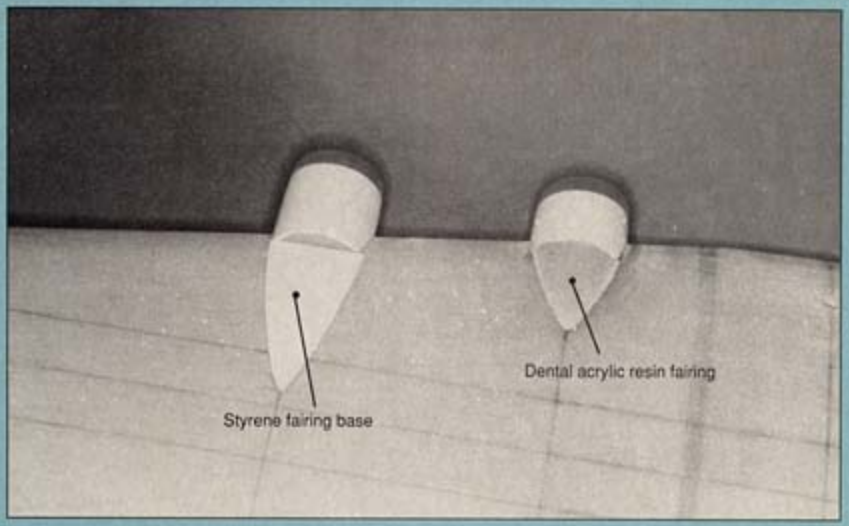
10. Engines went into the cowlings with the aid of a jig made from clear acrylic and brass tubing. The jig allowed accurate fore and aft placement of the engine and kept the engine parallel with the front and back of the cowling.



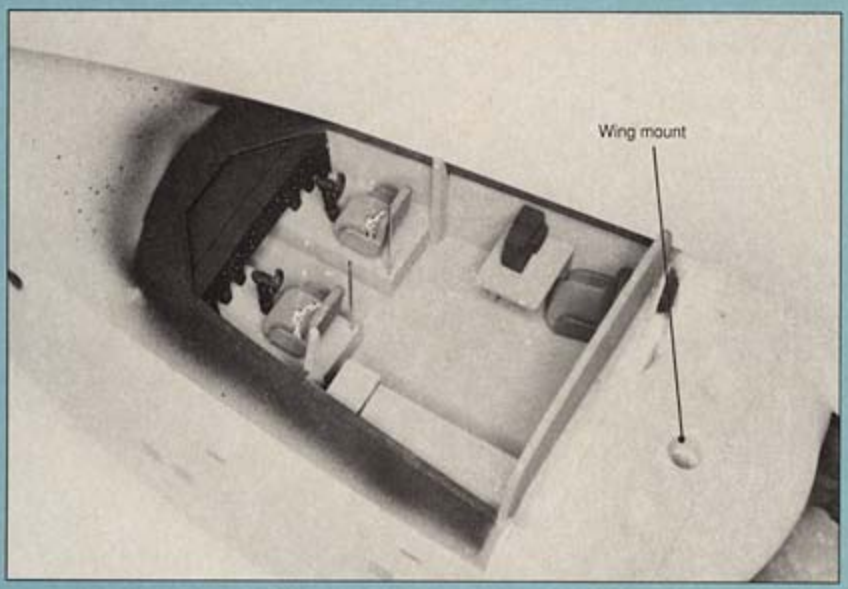
11. With the engines and cowls done, Paul worked backwards to make each nacelle. He turned acrylic stock on a lathe for the front portion and PVC pipe for the rear. A short length of acrylic rod aligns the engine.



12. Paul made alignment tools of acrylic stock to mount the nacelles to the wing. With each nacelle attached to the tool, he could mark the location of the wing cutout in the PVC pipe. Once aligned, he cemented the nacelle to the fiberglass covered wing with super glue.

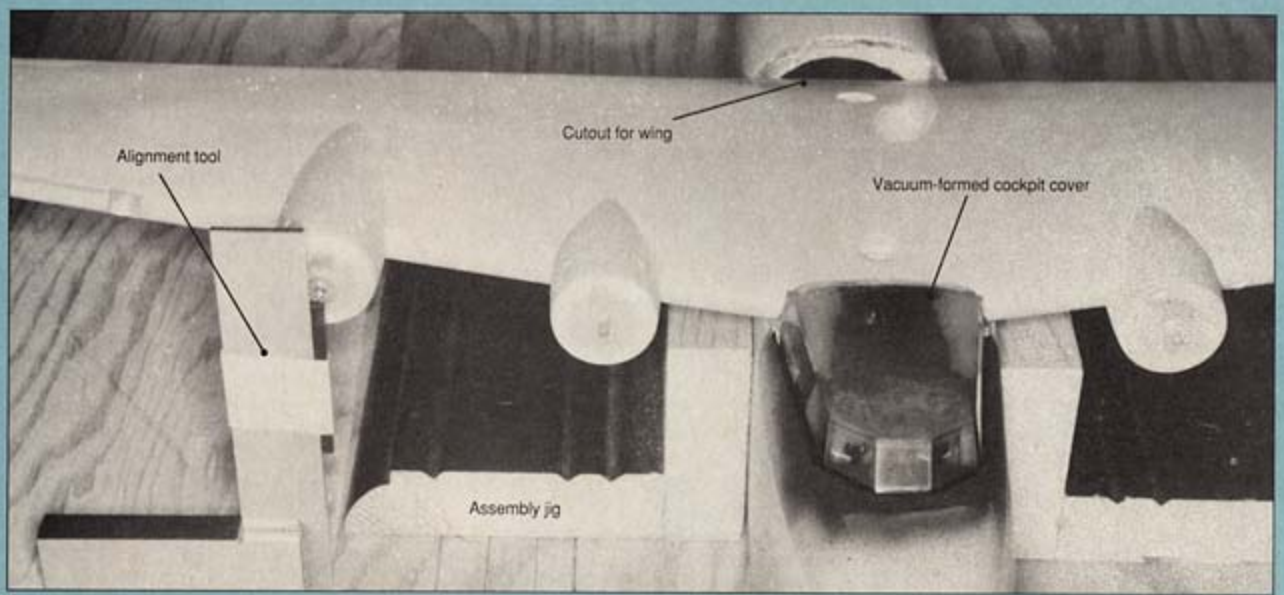


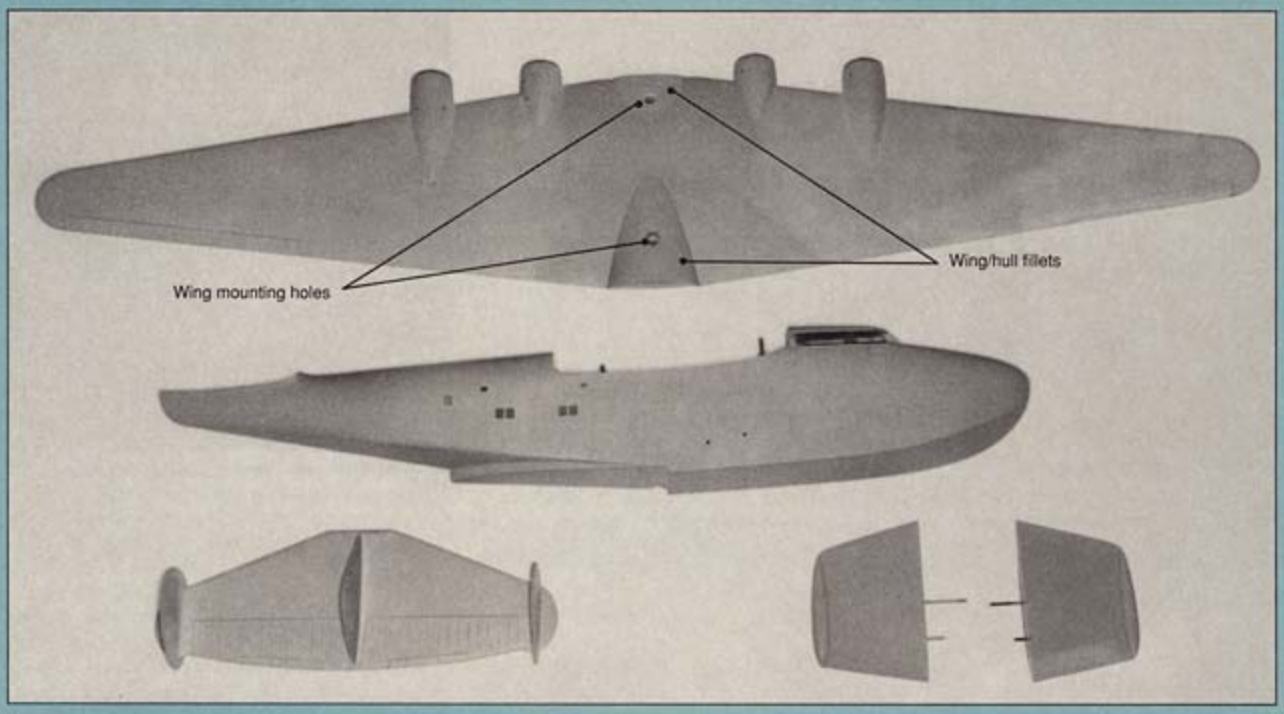
13. With the nacelles set, Paul built up the sheet-styrene bases for the fairings, filled and molded with dental acrylic resin.

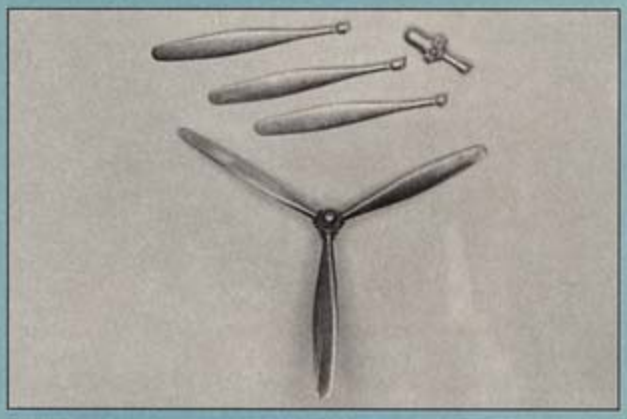


14. Paul carved away the fiberglass and scratchbuilt a basic cockpit with styrene and bits of brass. He carved a wood form for the cockpit top and vacuum formed a clear copy from thin sheet acrylic. Here you can see the forward end of the cutout for the wing and the dental-resin covered wood block that serves as a wing mount. The center hole corresponds with a hole in the wing for the mounting screw.

15. With the hull in the assembly jig, Paul could align and temporarily attach the wing. Using Bare-Metal foil as a barrier, he built up the wing/hull fairings with dental acrylic resin and sanded them smooth. When the resin set, Paul removed the screws and popped the wing from the hull. The foil kept the resin from bonding to the hull.







16. Here are the major subassemblies, primed and ready for paint. Note the wing/hull fairings on the wing and the mounting holes for the screws. Paul painted the model with Lumonz Products' Alclad aluminum paint and orange lacquer for the wing panel. He later added a vacuum-formed overwing astrodome.

17. Paul made his own brass propellers, using the lost-wax investment process often employed to make jewelry. **FSM**

REFERENCES

- ***Airpower***, November 1977, Sentry Books Inc., Granada Hills, California
- Cohen, Stanley, ***Wings to the Orient***, Pictorial Histories Publishing Co., Missoula, Montana, 1985

SOURCES

- **Foil:** Bare-Metal Foil & Hobby Co., P.O. Box 82, Farmington, MI 48024
- **Sheet, tube, and rod styrene:** Evergreen Scale Models, 12808 N. E. 125th Way, Kirkland, WA 98034
- **Brass tubing:** K&S Engineering, 6917 W. 59th St., Chicago, IL 60638
- **Fiberglass resin:** Sig Manufacturing Co. Inc., Route 1, Montezuma, IA 50171
- **Alclad:** Lumonz Products, P.O. Box 15571, Long Beach, CA 90815