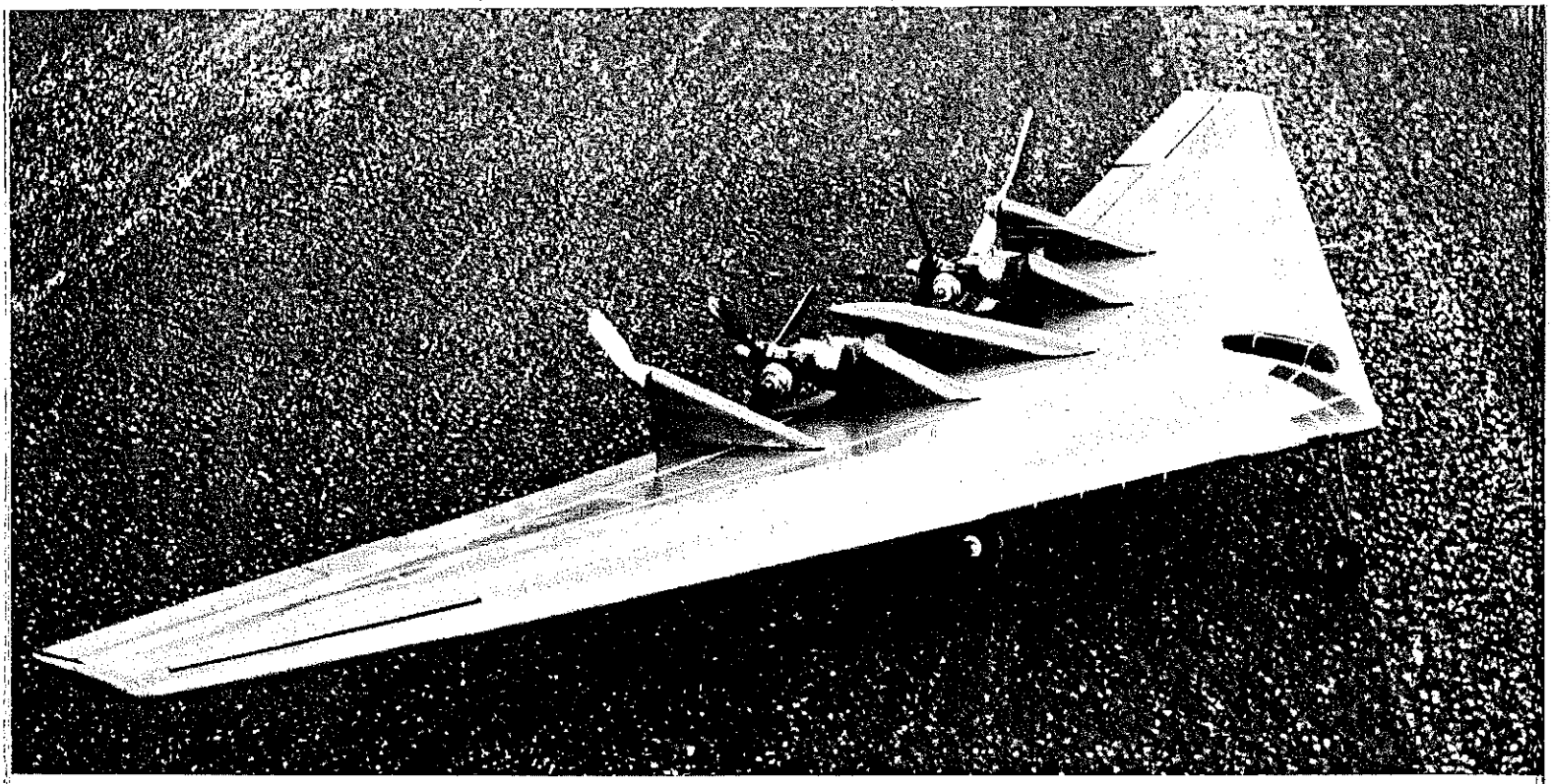
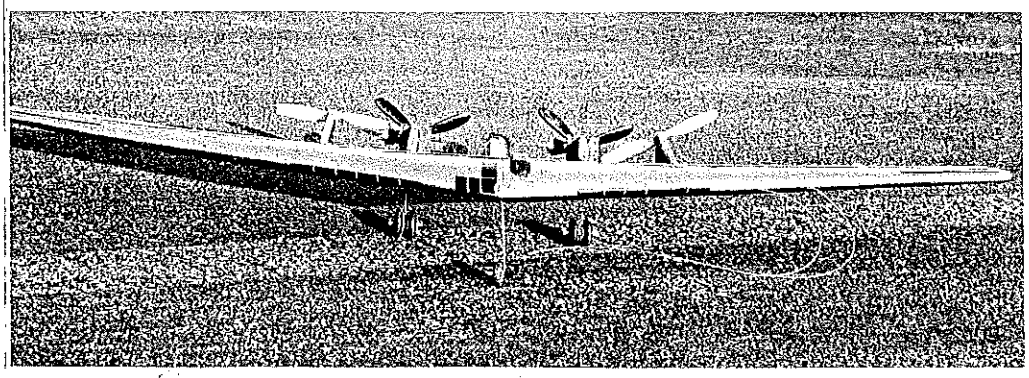
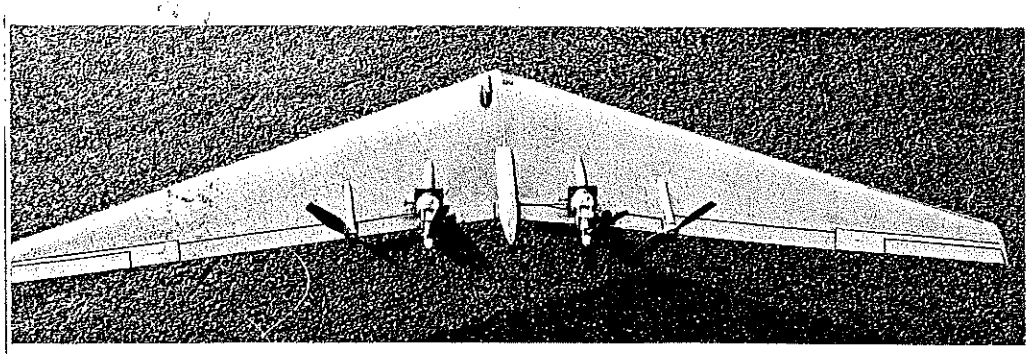


NORTHROP XB-35

Although it first flew over 40 years ago, it still looks like something from 40 years in the future. Celebrate Jack Northrop's innovative genuis with this .049 twin-powered Control Line version of his almost mythical flying wing.

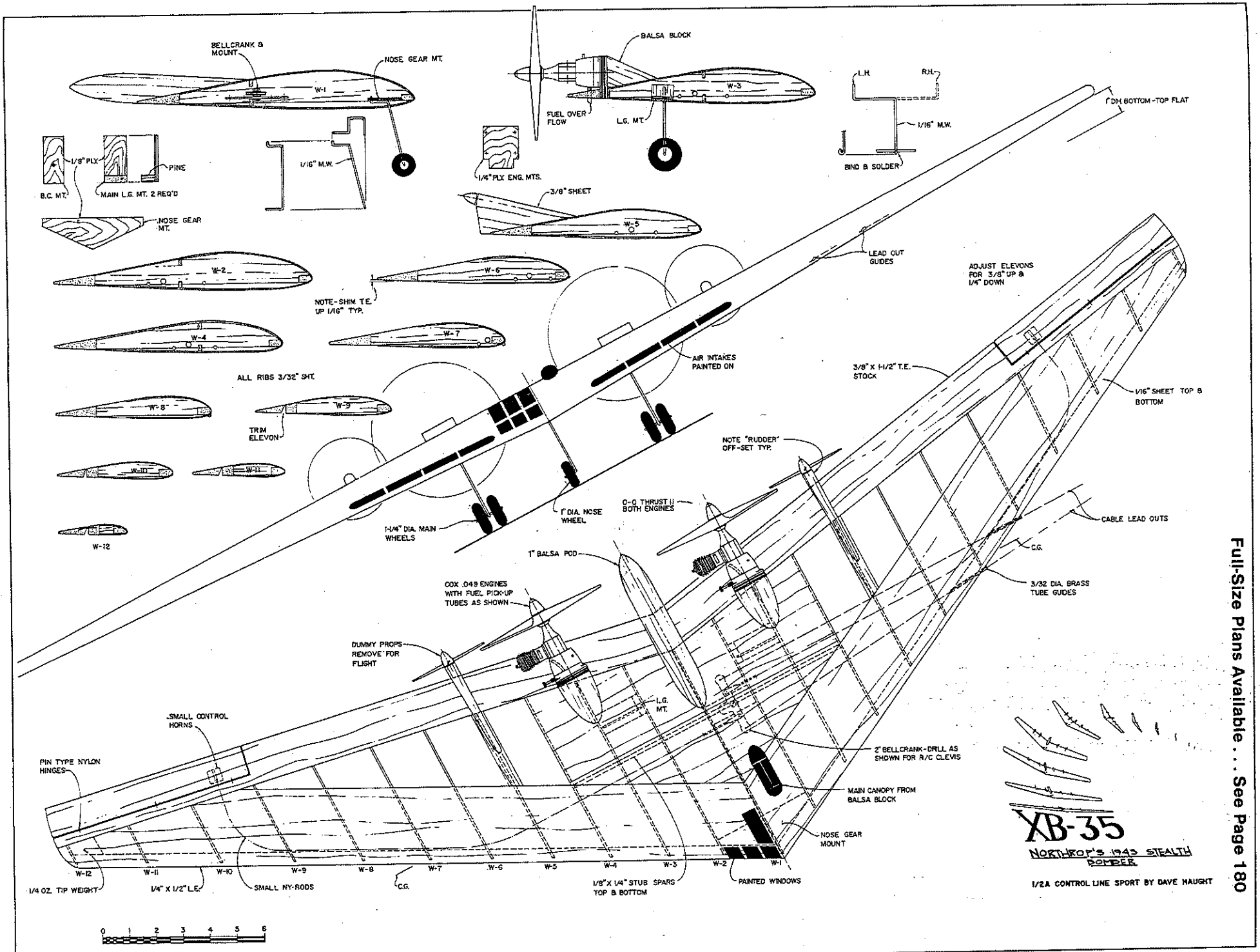
■Dave Haught



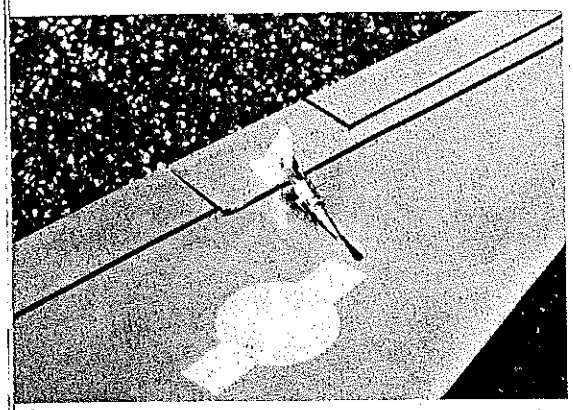


Big picture: Even when outfitted with .049s it still has the look of the future, something even more impressive when you remember it was developed just after WW II. The nose-high attitude of the model helps get it off the ground quickly. Top: The flying wing enjoys a cleanliness few aircraft can boast. With little drag to slow it down, the XB-35 is fast for its size. The lead-outs can be seen exiting under the leading edge. No other guide is needed at the tip. Above: The slight offset of the dummy propeller fairings helps provide line tension.

IT CAME ROARING onto the flickering screen, black exhaust streaming from its four pusher engines. The XB-35 loaded with A-bombs was the ultimate weapon America possessed—and the earth's fate hinged on it. The Martians, with their deadly heat rays, had virtually taken over



Full-Size Plans Available . . . See Page 180



There is not too much conventional on the XB-35. Pushrods for elevon control are made from flex cable. The control system must have the absolute minimum of friction since there is no significant rudder or engine thrust holding the model taut on the lines.

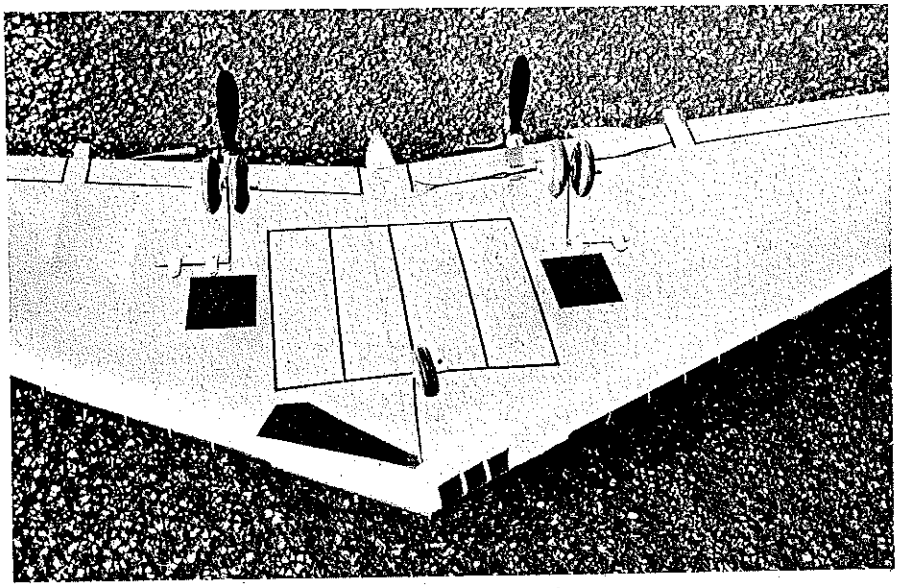
the world; and now this intrepid bomber—mankind's last hope—was being sent to decimate the merciless invaders. It was a distinctly strange-looking bomber, with no tail, and no fuselage: just a huge wing to deliver the nuclear nightmare into the midst of the advancing forces. The bomb found its mark, but the enemy kept coming. Mankind was doomed.

Well, it didn't turn out that way, at least not in the movie. I remember sitting mesmerized throughout the classic 1945 silver-screen version of H.G. Wells' *War of the Worlds,* but the thing that stuck in my mind the most was the sight of that Northrop XB-35 as it went tearing off to save our world. For many in the audience, this was the only glimpse of that strange and wonderful craft they would ever get.

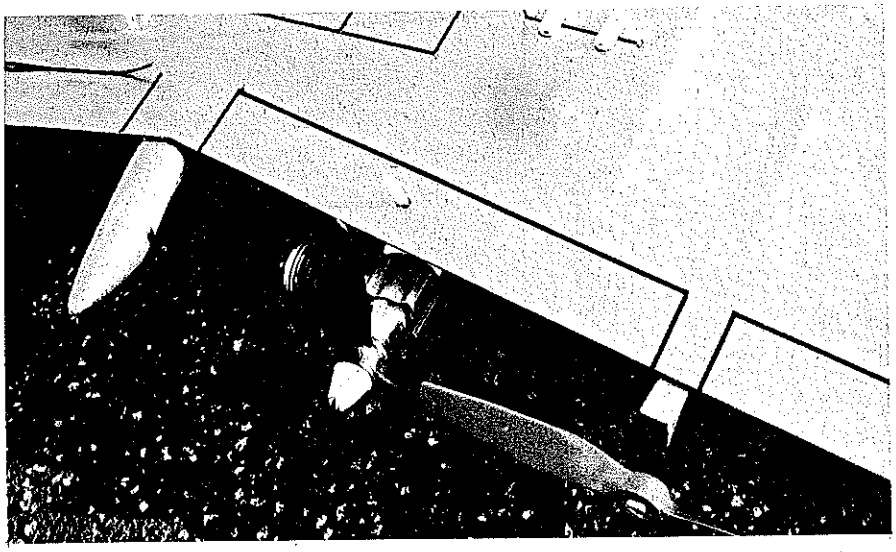
But time's arrow often travels in a circular path. The wonderfully futuristic shape of the XB-35 is making a comeback— this time, in the guise of something called a Stealth plane. It was all the media attention given the plastic Stealth model recently released by Testors™ that sparked the old memories for me and made me once again think about building a Control Line version of this phenomenal airplane.

"Stealth" has become a generic word for the futuristic fighters and bombers currently being built and flown in secret places around the world. Interestingly enough, the current articles on stealth designs often single out the Northrop flying wings of the late 1930s and 40s. These configurations, although not necessarily designed for the stealth concepts, were indeed very futuristic. The flying wing's lack of vertical surfaces and its steep sweep backward make it a natural at radar avoidance. In fact, one could take the XB-35 design, upgrade the power plants, add radar-absorbing materials and paints and have a very efficient and effective Stealth bomber. Rumor has it that the secret Northrop Stealth bomber design program currently underway is adopting an approach along these lines. We'll wait and see. In the meantime, you too can be the first one in your neighborhood to own and fly a Stealth bomber.

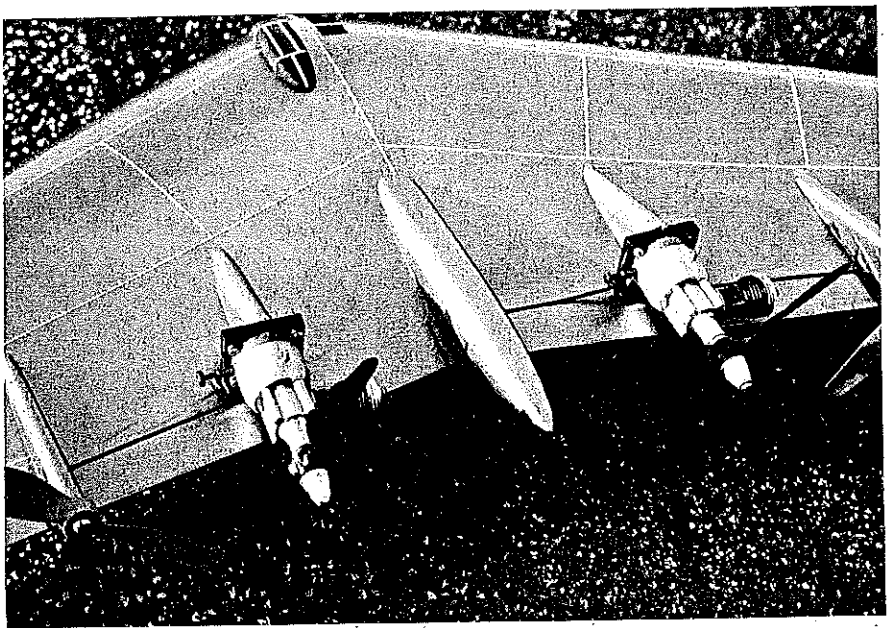
Continued on page 163



The toughest part of this model is the dual-wheel main landing gear, and this only takes a bit of patience. The twin wheels look great on the finished model and add to the uniqueness of the project. Small straps and sheet-metal screws hold the main-gear wires in place.



The small fuel tube protruding through the wing is from the vent line on the tank and keeps the fuel spill-over off the model. The dummy props are held on with a sheet metal screw.



Both engine cylinders are angled outward to distribute their weight to advantage. See text for info on how to relocate pick-up tubes. Thrust line for both engines is 0-0. The plans show full-block farings for the firewalls which helps to reduce vibration. Counter-rotating props aren't necessary but could easily be added. Dummy props removed before running engines.

getting cuts and winning matches are important, they may not care or will make do. If going fast and having spectacular midairs are the goals, they may go back to Fast Combat. In the end, I suspect that the planes won't go that slow, and the better pilots will win, and the subversive diesel will remain in the shadows.

Charlie Johnson, 3716 Ingraham St., San Diego, CA 92109.

Northrop XB-35/Haught

Continued from page 66

The highly sweptback wing of the XB-35 had a slight oscillation back and forth that necessitated installing what was then a highly advanced automatic control system built by Honeywell. Usually, models of a full-scale aircraft that was in the tricky-to-fly category will prove correspondingly difficult to maneuver. This thought kept the XB-35 sitting on my "build it someday" list. But when the media began running all those neat pictures and articles on Stealth, I got the bug again. I blew up a set of rather poor three-view drawings I had, and hung them on the shop wall to look at.

First I imagined it as a four-motor Electric model, but the reality of rigging four shaft extensions, etc., became overwhelming. I just wanted to build a flying model, not an engineering marvel. On the other hand, four gas engines, even using .049s, would make for a huge model, and with the CG location it would take a ton of lead to balance properly. Laying two .049s down on the drawings sold me on a twin. The 48-in.-range wingspan would make for a good amount of area, and the thick section would supply plenty of lift for the needed nose weight. Since the three-views I was working from weren't the best I would have to settle for a semiscale model. That was alright, since by this time I just wanted to see it in the air.

As the design and construction progressed, an avalanche of problems and questions began to present themselves, challenging my meager aerodynamic training. Where should it balance? Where to locate the bellcrank? How about the line rake, the sweep? What kind of thrust line for the engines to keep it out on the lines? I could have pondered the questions forever, but I knew I had to bite the bullet. With each new question, I convinced myself of at least one good answer. I kept coming back to the old Control Line axiom: If it has enough power and is super-nose-heavy, it has to go around in a circle as long as it has lines on it.

As it turned out, the model flew right off the first time I took it out—and it's a flight I'll never forget. It tracked solidly on the lines for half of the circle, rotated, and flew. It is super-smooth and has a flight groove not unlike a .35-powered Stunter. The control response was excellent—and single-engine performance was just as good, only a bit slower. The glide is another story. Let's say it's best to have it down on the deck before the last engine stops. The angle of flight without power is not quite 45°.

The sight of it in the air made all the deliberations and head-scratching worthwhile. It definitely has the strange, eerie look of something out of space and time, and its flight performance matches its science-fiction shape. Enough of the sales pitch: Let's build one.

Construction. Cut out all the plywood parts first, drilling any holes required. Study the plans before beginning construction.

Notice that the wing section is semi-symmetrical. The wing is built in two halves and will later be joined to incorporate the dihedral. The easiest and most accurate way to build the wing is according to the following broad outline. Cut the ribs off flat-bottomed. Assemble the wing on a straight, flat building board. Shim up the trailing edges stock 1/16 in., and glue everything together. After both wing halves are completed, remove them from the building board, glue the bottom halves of the ribs on, and sand to shape.

In more detail, the procedure is as follows. Cut out all ribs and label them. Pin down the trailing edge (along with the shims to hold it in position) and the leading edge. Glue the ribs in place with cyanoacrylate (CyA). Once a wing panel is built, cut out the elevons and then cut them back as seen in W-9 to allow for full down movement. Hinge the elevons with pin-type RC hinges. It is very important that all control surfaces operate with an absolute minimum of friction.

Notch the upper surfaces of W-1 through W-4 for the top stub spar. Pin the wing panels and the spar down to the bench upside-down. This will make the top of the wing flat, and the bottom will have the 1 in. of dihedral required. While the wing is upside-down, cut and install the bottom of the ribs, and the lower stub spar. The nose gear mount and bellcrank mount can be installed now, as can the main landing gear blocks. Measure equal distance from either side of the center of the bellcrank and drill two holes to accept the RC-type clevises shown on the plans. Do not use a metal bellcrank with the RC clevises.

Sew the lead-out tubes to the bottom of the leading edge and give them a good soaking with CyA glue. Bolt the bellcrank in place and drill the lead-out and Ny-Rod holes. Use the smallest control rods you can get to help hold down friction in the linkage. Add the elevon horns and hook up the pushrods. My model has 3/8-in. up and 1/4-in. down control movements. Adjust yours to somewhere in this range.

Glue a small tip weight to the outboard wing tip and sand the wing for the planking. Use medium-light 1/16 sheeting to plank the top leading edge, and the top and bottom center-section. Leave the bottom leading edge uncovered at this time. Notch the trailing edge for the firewalls. Make sure they are perpendicular to the centerline. Set up the engines for 0° offset both horizontally and vertically. Fit the firewalls and carve the fairing blocks to fit nicely, then glue them into position.

Sew the nose gear securely to the mount and epoxy the whole works. Bend the wire for the main gear struts to shape. The XB-35 has a distinctive dual-wheel gear that looks super, but it takes a bit of effort to pull it off in building the model. If you are not into wire bending you may want to switch to single wheels. If the dual wheels appeal to you, bend the loop end of the wire first, then work your way up the strut making each bend as you come to it. Bind and solder an axle at right angles to the strut and parallel to the upper part, as shown in the drawing. Add the main gear wheels at this time. Williams Brothers' smooth contour wheels look good on the main gear, and the nose gear gets finished off with a wheel manufactured by Perfect.

Mount the engines and props and begin the fun task of adding lead to the nose until the model balances. It will take quite a bit, and you will have to beef-up the ribs around the weight (using wood supports) so that the lead does not fly through the model on a hard landing. Final balancing will be done after the model is completely finished, by adding lead solder to the nose gear.

Once you are satisfied with the balance point, remove the engines, plank the bottom leading edge, and add the cap strips on the W-5 ribs. Finish-sand the wing and cover it with your favorite method. I used Mustang Silver MonoKote, which gives the finished model a very different look—not quite silver and not quite grey.

After covering, add the dummy prop fairings. Put them on at a bit of an angle, as shown on the plans, so that they will act as rudder offset for line tension. Just a small amount of offset helps a lot, and is not noticeable. Carve the canopy and fuselage pod from balsa blocks and fit in place.

Paint and trim is all that is left. The original XB-35 was finished in natural aluminum with stars-and-bars insignias on the upper left and lower right wing panels. I added panel lines and flap outlines to the model with trim tape, and used it to form the windows and the intake scoop on the leading edge as well. The dummy propellers are just for looks and they overlay the real props, so they must be removed before the engines are run.

Before bolting the engines on for the last time, remove their backplates and relocate the fuel pickup tubes as shown in the plans. Test run and tune the engines before heading out to the flying field. Always fly twin-engine models on steel lines (40-ft. lines seem a good length for this model). They may be ½As, but the model is too fast and heavy for the cloth lines

With the balance point as shown on the plans and no warps, the XB-35 should be ready to fly. Be prepared for a crowd to form as you setup to fly. A word needs to be said about safety at this point. Twins are fun, but you need to be extra careful around the engines. It is easy to get your jacket or the glow plug leads into the one spinning propeller while trying to start the other

Continued on page 170

Northrop XB-35/Haught

Continued from page 164

engine. The best advice is to just be alert. As a twin pusher with props in close proximity to each other, the XB-35 demands an extra measure of vigilance.

Start the outboard engine first, and tune it to a rich run. Carefully start the second engine and then top off both fuel tanks. Tune the engines to a synchronous pitch, and hang on. The best launching position for your ground crew is to hold the model by the outboard wing between the dummy engine and the elevon.

Let the model run to build up speed and line tension, then ease in the up elevator and you're off, into the wild blue of yesterday—or is it tomorrow? Take your choice!

FF Old-Timers/Haught

Continued from page 67

upstroke.

Leakage by the crankshaft bearing will result in a poorly running engine even if normal compression is good. Check for a bent crankshaft by measuring from the cylinder head to the propeller while the prop is straight up. Rotate and check the other blade for equal distance. Try this with the propeller in a horizontal position as well. Bent crankshafts are usually impossible to straighten without weakening them to an unsafe condition.

While you are checking bearing fit, try to determine connecting rod wear by feeling for crankshaft play (wobble) while the piston is stopped at its uppermost travel. You can feel the mechanism "going past center" and get a reasonable idea of the wear on the internal parts. Even new engines have some of these symptoms, but an excessive or very noticeable amount usually means a high-time engine—or at least a poorly fitted one.

Try to determine the condition of any gaskets at the cylinder head, cylinder-to-crankcase joint, or back cover plate. Leakage here is usually repairable with a new gasket, but it's work that must be done. New gaskets can be made from stock obtainable at automotive parts supply houses. I once had a Madewell .49 that leaked at the cylinder-to-crankcase joint, and it took me a long time to locate the problem. Once it was repaired the engine performed beautifully, but I was at my wit's end to find the problem.

It seems that most of the engines available are of the larger sizes, with .60 cu. in. displacement being the most common. There were lots of smaller engines built, but survival seems less than with the larger varieties. One of the main reasons for the popularity of the larger engines was, of course, their ability to fly a bigger model which could effectively carry the weight of a heavy ignition system and heavy batteries. The same ignition components were required for the small engines, and that just made the wing loading of the small model too high. In the old days, batteries were not nearly as good as they are today, and D cells were the best bet. The penlite batteries would barely run an engine for a single flight.

Good luck on your search for good ignition engines.

Clarence Haught, 3226 Honeysuckle Dr., Coeur d'Alene, ID 83814.

FF Scale/Warner

Continued from page 69

hardware. Dave puts a lot of thought and high-quality materials into his offerings. The price is $10.95 plus $1.50 shipping and sales tax in all the states near Ohio which just signed agreements with that state to collect reciprocal taxes of 6%.

Dave selects his kit subjects by popular request, so you can write him with your preferences. He has a majority of military subjects at the moment. Where are all of you Golden Age fans? The address is Diels Engineering, P.O. Box 101, Woodville, OH 43469.

Just a footnote to the continuing, tiny-electric saga: my Golden Age Reproductions Cessna C-34 with Ferrell Enterprises' little 007 electric darn near flew out of sight on a test flight the first time out. Luckily it hit a downer after over three min-