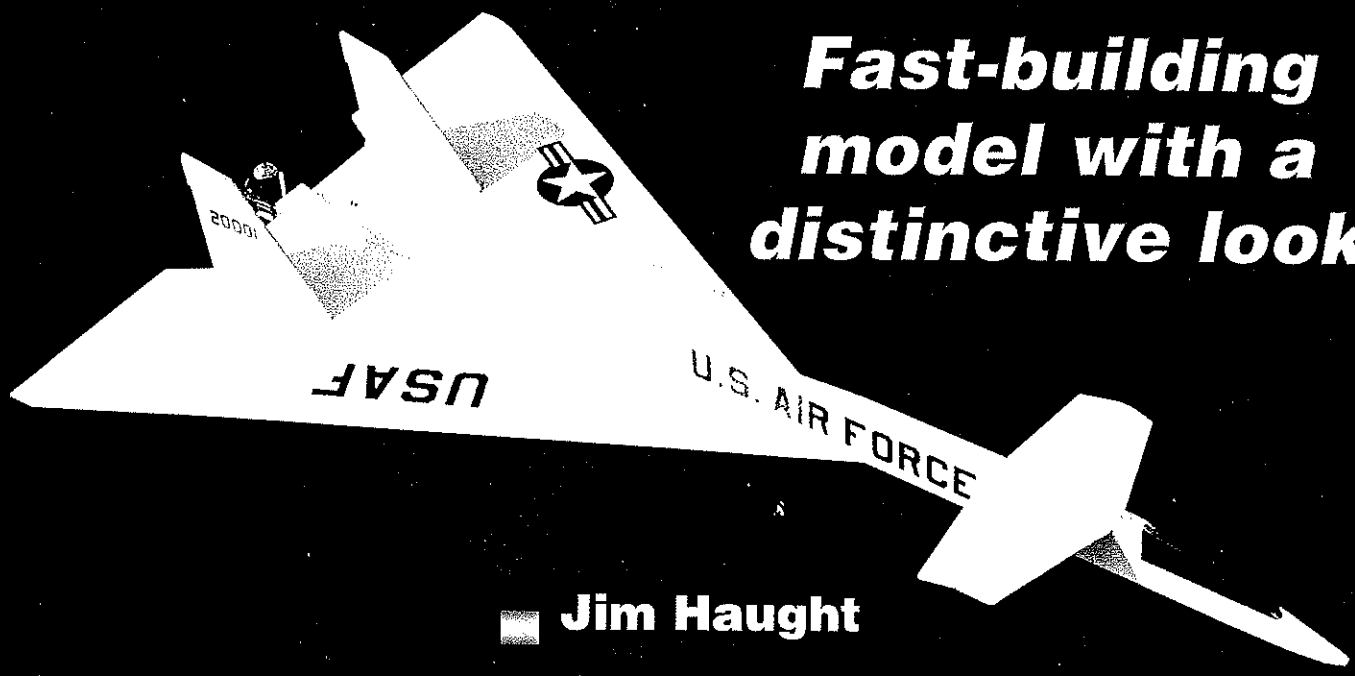
XB-70

Fast-building model with a distinctive look



Jim Haught

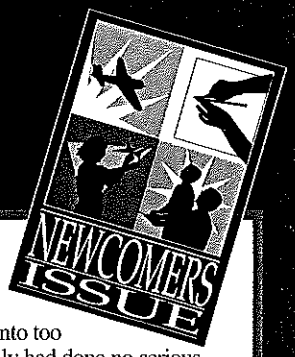
I've mentioned in "The Haught Corner" that my modeling background is a bit unusual in that as a rule, I don't have a great affection for full-scale aircraft. Models are great, and I enjoy flying in full-scale aircraft, but the twain do not usually meet. There is one exception, however:

I love the North American XB-70. I think it's the most beautiful airplane I've ever seen. And it was a fabulous engineering achievement, considering that it was designed in the mid-1950s.

The XB-70 was designed as a nuclear bomber, but with the advent of warhead-equipped missiles, only two aircraft were built before the program was scrapped. Number Two crashed during a test/PR flight in 1966; the original remained in service until 1969, when it was donated to the Air Force Museum at Wright-Patterson AFB in Dayton, Ohio. It is currently housed in an impressive exhibit that includes other so-called "X-Planes" of the era.

So when I was lamenting the fact that the person I had asked to design and build the CL model of this trio was unable to do so, and we were quite short of time, I gave in to deviously planted suggestions by Steve Kaluf and Matt Usher, who know of my weakness for this airplane. Within a few days the model was ready for testing.

My model is based heavily on an old .020-powered free flight version designed by Jack Linn in the early 1960s and produced as a kit years ago by Competition Models. For .049 CL flying I enlarged the model a bit, removed the dihedral from the canard, changed the airfoil from a reflexed section to a flat plate, and made modifications to the engine location, rudder shape,



Test Pilot's Report

When Jim Haught asked me to test-fly a control line model for this issue of *Model Aviation* I figured I could not get into too much trouble, since the airplane was to be a "beginner's" model. I had not flown control line for several years, and really had done no serious CL flying for more than 12 years.

Understand, Jim is mostly a free flighter, and most of my experience is with RC—not designing a control line trainer. So I laughed a little, and suggested in a moment of desperation (trying to get Jim to bother someone else) that we do an XB-70. Shortly thereafter, he brought in a set of plans with a bellcrank drawn on it. I knew we were in trouble!

After some preliminary design consultations (like: Jim, I really think the bellcrank should be on the CG, and yes, I demand that it have landing gear) Jim proceeded to build the model. I was working on a CL Sig Twister at the time, so control line "stuff" was fresh in my mind, and I relayed as much information as possible to Jim.

In less than a week he brought the completed XB-70 in for inspection. Overall everything looked pretty good. We worried over what length to cut the control lines to. I finally decided that 26 feet looked about right, and the lines were cut and the control handle adjusted for neutral elevator. (Don't forget to do this.)

Our next problem was the weather; the Midwest has seen record snowfall this winter. With a deadline getting very close, we decided to give it a try on a less-than-perfect day. The wind was at about 8 mph when we got to the circle. By the time we were all set up it was probably up to 10 mph—not great for the first flight of a new model. The circle also had a little snow left on it.

The engine was a little troublesome in the cold weather, but Jim got it running. I ran out to the control handle and checked the controls; up, down, neutral. This is a good habit to get into: you want to be sure you don't pick up the handle upside down, and that your neutral position did not shift.

I signaled to release the model and immediately had to step backward to maintain line tension; the model was trying to turn into the circle. We had been a bit worried about this, since the landing gear has a narrow stance, and the pusher setup did not allow for much airflow over the rudders. The wind immediately blew the model over, and toward me. It slid to a safe stop upside down, with no damage.

Jim put some right turn into the nose gear and added right thrust to the engine before our next attempt a couple of days later. This day was much warmer, and the wind was only blowing about 5 mph.

We decided to set up so that the model was pointing downwind at the start. This would give it ½ lap prior to coming fully into the wind. I wanted to try to keep the model on the ground as long as possible to see if anything would sort itself out prior to getting airborne.

We rechecked everything, started the engine, and I signaled to release the model. There was a slight tendency for the XB-70 to turn into the circle, but one tug on the lines stopped that; a little up elevator and we were flying!

As we expected, the model is fast. And my "looks about right" 26-foot line length should have been a bit longer. Thirty to thirty-five feet would probably be a better choice for beginners. Stay with 30 feet if the wind blows much more than 5 mph. You'll have to turn faster, but the airplane will penetrate the wind much better.

By the time the XB-70 took to the air, the wind was probably up to 8 mph. This is a fair amount for a ½A airplane, but this one handled it well. When it flew upwind, there was a tendency for the wings to tip toward the center of the circle; this is normal for small control line models. If the wind gets too strong, you may have to take a step back at times.

The XB-70 flew very well. A neutral elevator produced level flight. The elevator seems more than ample, but not at all excessive.

Landings should be done carefully. Especially in a bit of wind, the model should be flown to the ground fairly quickly. Don't try to slow it down too much. Instead, get it down to a few inches off the ground and then rotate the nose up for touchdown. On the first flight I "landed" about two feet off the ground, due to pulling up too soon.

Since this is a fairly small airplane, you will have to back up as soon as the engine cuts out to maintain line tension. Lead the airplane a little to keep speed up. Level off as you near the ground, and pull the nose up at the last instant.

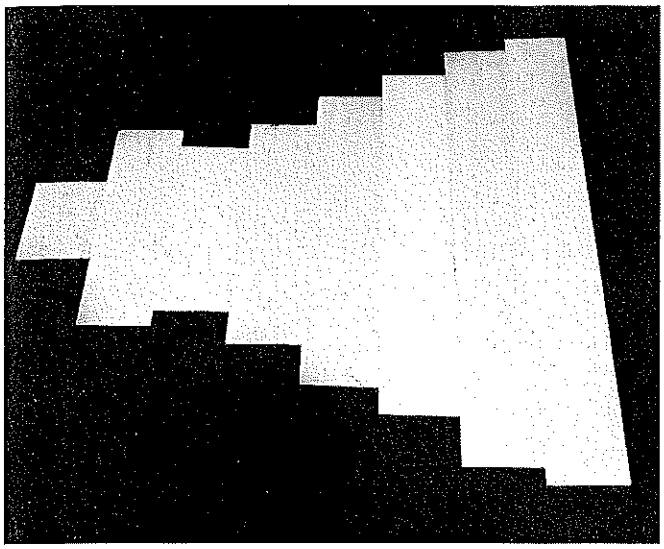
The XB-70 is a lot of fun to fly. It looks great in the air. This is the one time that a beginner can build and fly a "scale" model for their first airplane.

Above all have fun, and fly safely! ✈

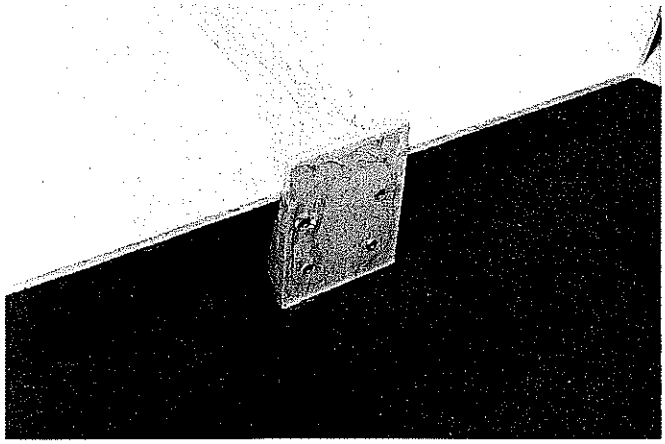
Steve Kaluf

On a balmy (45°) February day, Steve Kaluf checks out the XB-70. Unmistakable on the ground or in the air!

Photos by the author and Matthew Usher Graphic Design by Carla Kunz



The delta is laminated 3/32 sheet. Establish the centerline as a reference to attach/align the other parts.



The firewall is 1/8 plywood, reinforced with scrap balsa and a layer of silk wrapped around the attachment points.

nd a few other minor things to help it go 'round and 'round.

And go 'round it does. It's a bit faster than your typical ½A trainer, ut it has more-than-adequate line tension, and it seems to "track" quite vell. It's also a safe bet that your flying buddies will not have seen nything like it on the flightline.

The model may *look* exotic, but it's actually quite easy to build. If ou can draw and cut a straight line, and have a draftsman's triangle to ine things up, you can build this model.

CONSTRUCTION

Materials: I have always used Sig wood for my models; I believe its onsistent quality is unmatched. The bellcrank, wheels and retainers, vire, fuel tank, engine, flying lines, and other hardware are also vailable from Sig.

Much of the construction consists of laminating sheets of wood, so ick an adhesive that gives you a bit of time to get things set. Duco ement is good for this application, and aliphatic resin glues like Titebond or Sig-Bond work well too.

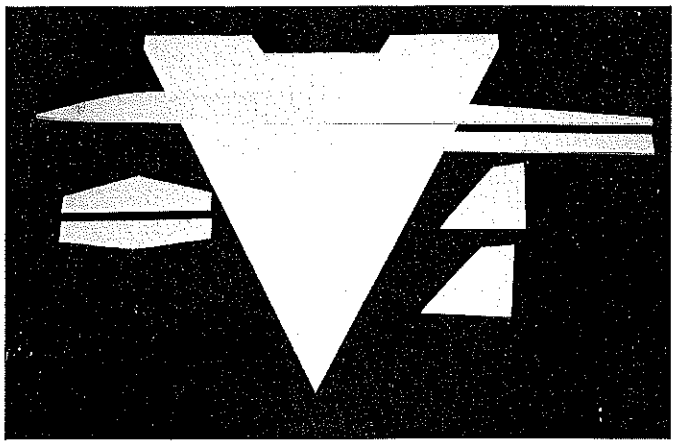
Unless you are an experienced modeler, I would not recommend the yanoacrylate (CyA) "instant" glues for this model; there's quite a bit f area to be glued, and when you're learning, it takes a little more time o get things aligned.

I chose to "kit" the model by cutting out as many parts as possible efore putting any parts together. It's a big time-saver in the long run.

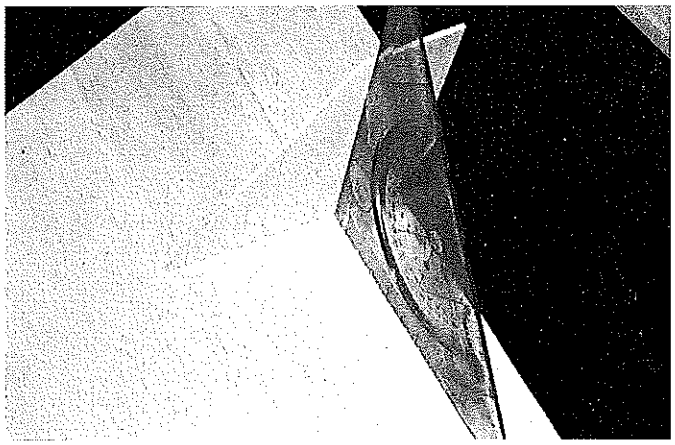
Wing: This is a flat plate of 3/32 sheet. Lay a sheet along the back edge f the wing plan, mark the centerline, and trim to length (actually it's a good idea to cut each piece a bit oversize). Save the cutoff piece for use on one of the forward (shorter in span) sections.

Repeat this process until you have worked your way to the "point" of the triangle. Some of the other offcuts can be used for the rudders.

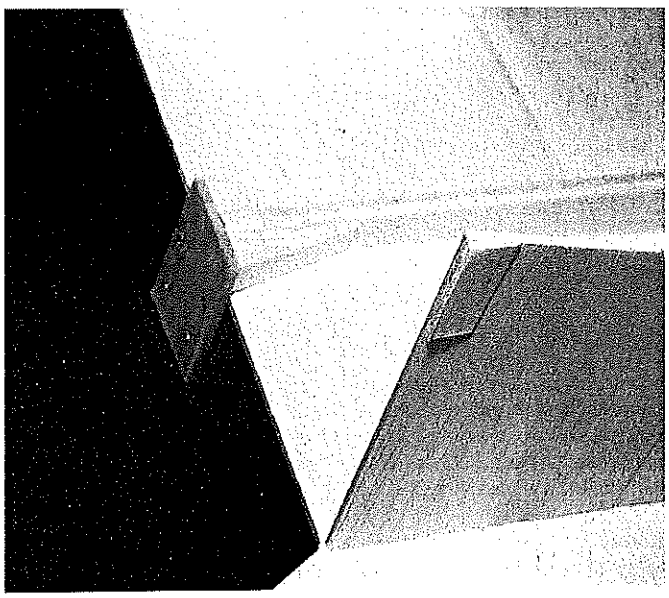
Clear a large, flat area on your workbench or a table top, cover the



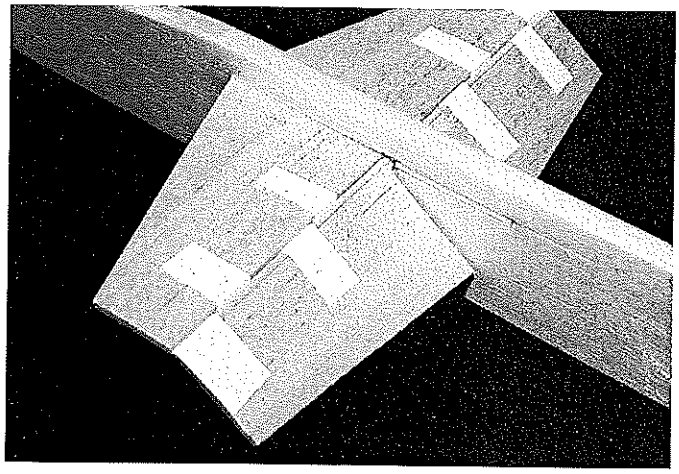
Making a "kit" of the main components can save time during assembly. Use medium-weight balsa throughout.



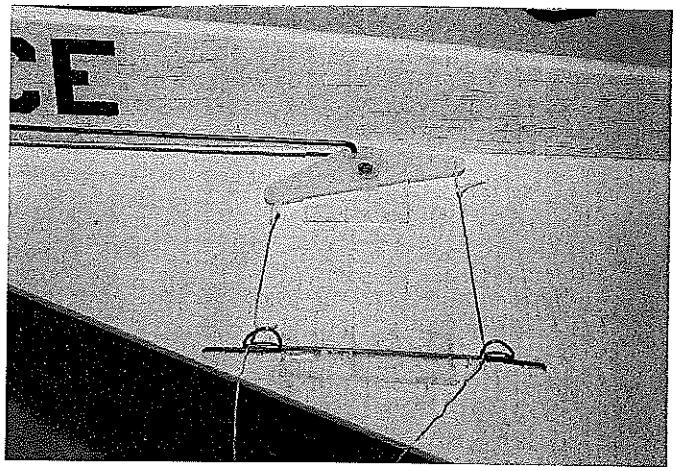
Rudders are attached before mounting the fuselage pieces. A draftsman's triangle is invaluable to help align parts.



Triangular balsa "tabs" are glued to the right side of each rudder as an aid to maintaining line tension.



MonoKote-type hinges are used to attach the canard pieces. Note stiffener dowel glued to the movable portion.



Sig ½A bellcrank is mounted through 1/32 plywood reinforcement. Line guide is 1/32 music wire reinforced with silk.

Be sure the engine is pushing air behind it—reed-valve engines will run in both directions.

area with plastic food wrap, and begin gluing the wing pieces edge-to-edge. Easiest way to do this is to work along the centerline you marked on each piece; it keeps everything organized and cuts down on waste.

Pin or weight down the wing pieces so they will remain flat until the glue has dried thoroughly (at least overnight, and preferably 24 hours).

When you're certain the glue has dried, remove the wing from the bench and give the surfaces a light sanding with #400 wet-or-dry paper to remove glue "bumps" and other places where the joints may be a bit less-than-perfect.

If you "lost" the centerline during sanding, now is the time to re-establish it—since other dimensions/placements are keyed from the center. Trim the wing to final shape and finish-sand the edges. Set aside until the other parts have been completed.

Rudders: These are laminated from 3/32 sheet, trimmed to size, and sanded smooth around the surfaces.

Carve or sand some 1/16 balsa to a trailing-edge-type cross-section, and glue a piece to the right side of each rudder (blunt edge rearward—see photo) for right turn, to help maintain line tension. Set aside until final assembly.

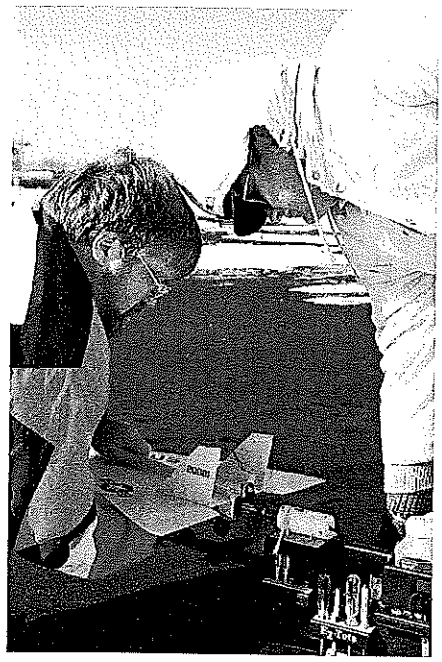
Canard: This is also 3/32 sheet, sanded smooth and cut roughly in half for MonoKote-type hinges (see the Indicator article for instructions on how to make and install this type of hinge).

Fuselage: The main portion is cut from a piece of ¼ balsa. Cut a slot for the full width of the canard, taking care to keep your knife or saw perpendicular to the fuselage so the slot will be straight (and the canard won't be tilted when you glue it in place). Don't forget the cutout in the nose for ballast.

Add the 1/16 balsa doublers to the forward fuselage and sand all edges smooth and square.

The lower fuselage is also cut from ¼ balsa; if you're careful you can get both fuselage pieces from a single ¼ x 3 x 36 sheet of wood. Sand the edges smooth and square and set aside.

Final Assembly: Lay the wing on a flat surface and glue the upper fuselage to it, checking with a triangle for squareness. Add the rudders, again using the triangle



Muncie in February: How do you spell C-O-L-D? We abandoned the usual spring starter to get things going before we froze.

to be sure they're vertical.

Slide the canard into its slot and glue in place. Use the triangle again to be sure the canard is perpendicular to the fuselage. Fill in the rear of the slot (where the hinged portion of the canard passed through) with scrap balsa.

XB-70

Type: CL Sport/Trainer

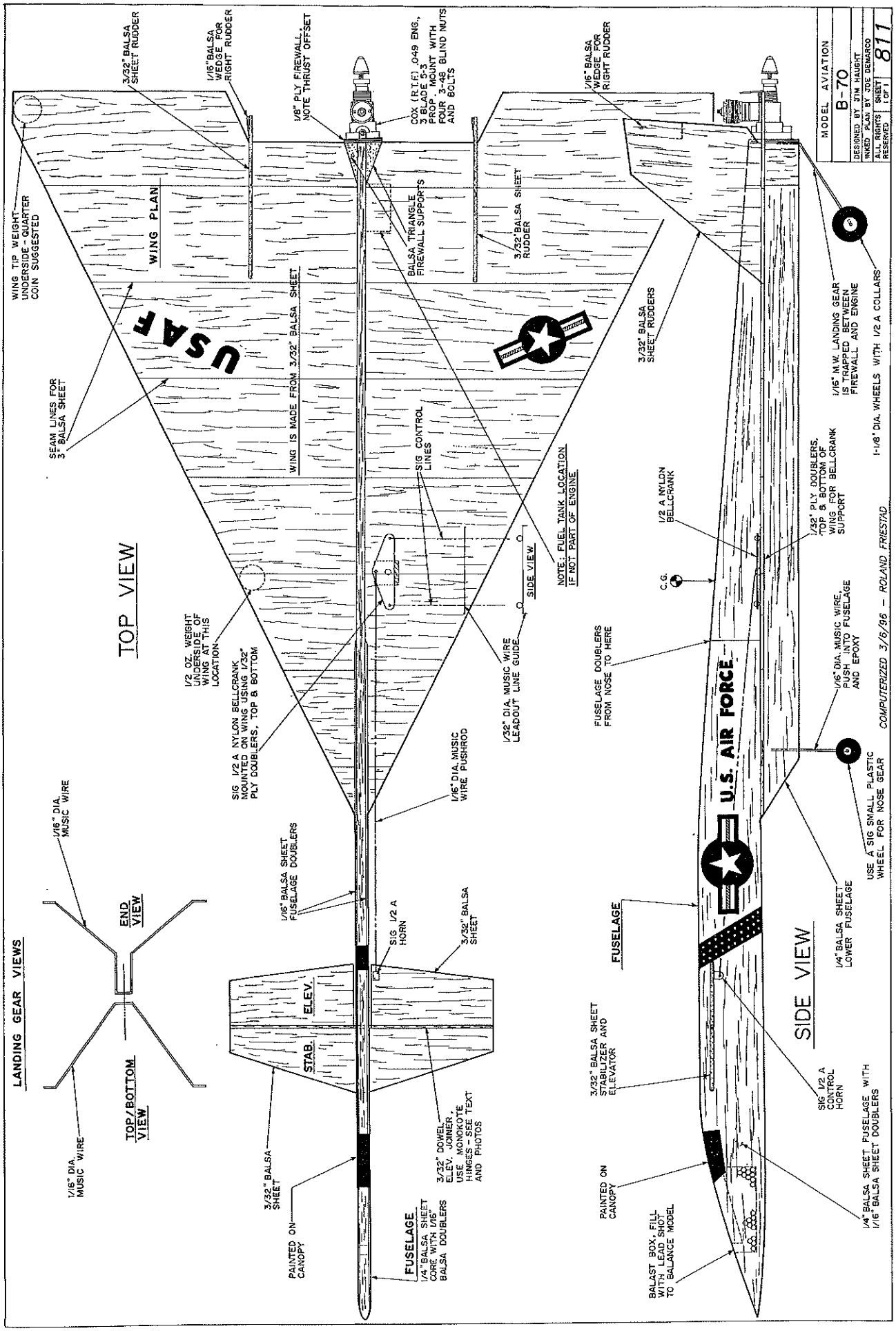
Wingspan: 28 inches

Engine: Reed-valve .049

Flying weight: 10 ounces

Construction: Sheet balsa

Finish: Nybco spray epoxy


MODEL AVIATION
B-70
DESIGNED BY JIM HAUGHT
INKED PLAN BY JOE DENARDO
ALL RIGHTS RESERVED
SHEET 1 OF 1
811
WING PLAN
TOP VIEW
SIDE VIEW
END VIEW
TOP/BOTTOM VIEW
LANDING GEAR VIEWS
WING TIP WEIGHT UNDERSIDE - QUARTER COIN SUGGESTED
3/32" BALSA SHEET RUDDER
1/16" BALSA WEDGE FOR RIGHT RUDDER
1/8" PLY FIREWALL, NOTE THRUST OFFSET
COX (R.I.F.) .049 ENG, 3 BLADE 5-3 PROP MOUNT WITH FOUR 3-48 BLIND NUTS AND BOLTS
BALSA TRIANGLE FIREWALL SUPPORTS
SEAM LINES FOR 3" BALSA SHEET
WING IS MADE FROM 3/32" BALSA SHEET
USAF
SIG CONTROL LINES
NOTE: FUEL TANK LOCATION IF NOT PART OF ENGINE
1/2 OZ. WEIGHT UNDERSIDE OF WING AT THIS LOCATION
SIG 1/2 A NYLON BELLCRANK MOUNTED ON WING USING 1/32" PLY DOUBLERS, TOP & BOTTOM
1/32" DIA. MUSIC WIRE LEADOUT LINE GUIDE
1/16" DIA. MUSIC WIRE PUSHROD
1/16" BALSA SHEET FUSELAGE DOUBLERS
SIG 1/2 A HORN
3/32" BALSA SHEET
ELEV.
STAB.
3/32" DOWEL ELEV. JOINER, USE MONOKOTE HINGES - SEE TEXT AND PHOTOS
3/32" BALSA SHEET
PAINTED ON CANOPY
FUSELAGE
1/4" BALSA SHEET CORE WITH 1/16" BALSA DOUBLERS
1/16" DIA. MUSIC WIRE
1/16" DIA. MUSIC WIRE
3/32" BALSA SHEET RUDDER
1/16" BALSA WEDGE FOR RIGHT RUDDER
3/32" BALSA SHEET RUDDERS
1/16" M.W. LANDING GEAR IS TRAPPED BETWEEN FIREWALL AND ENGINE
1/2 A NYLON BELLCRANK
C.G.
1/32" PLY DOUBLERS, TOP & BOTTOM OF WING FOR BELLCRANK SUPPORT
FUSELAGE DOUBLERS FROM NOSE TO HERE
1/16" DIA. MUSIC WIRE, PUSH INTO FUSELAGE AND EPOXY
U.S. AIR FORCE
1-1/8" DIA. WHEELS WITH 1/2 A COLLARS
USE A SIG SMALL PLASTIC WHEEL FOR NOSE GEAR
1/4" BALSA SHEET LOWER FUSELAGE
SIG 1/2 A CONTROL HORN
3/32" BALSA SHEET STABILIZER AND ELEVATOR
PAINTED ON CANOPY
BALLAST BOX, FILL WITH LEAD SHOT TO BALANCE MODEL
1/4" BALSA SHEET FUSELAGE WITH 1/16" BALSA SHEET DOUBLERS
COMPUTERIZED 3/6/96 - ROLAND FRIESTAD

When the above subassembly has dried, glue the lower fuselage to the underside of the wing. Measure and cut a ⅛ plywood firewall to suit your particular engine, and drill mounting holes for 3-48 blind nuts.

Epoxy the firewall to the fuselage, and be sure to have the proper thrust offset (so the engine "pushes" the model out on the lines, so they're nice and taut). Fill around the edges of the firewall with scrap balsa to give additional support to this high-stress area. A strip of silk or fiberglass wrapped and glued around the firewall-to-fuselage joint is a big help too.

Since there are many possible engine/tank combinations, I didn't show a particular tank type on the plans; that's left to the individual. My model used an old metal Perfect tank, mounted on the lower fuselage just behind the engine. This gave engine runs (estimated) of 3 minutes or so—and that's plenty.

Finish: As with Potato Man, this model used Nybco brand spray epoxy (Appliance White) as its only finish. It takes a couple of coats to get a nice, even shade, but it stands up to fuel well (we used 25% nitro with castor oil—my FF Nostalgia mix). Allow a couple of days for the epoxy to cure before you finish things up.

The stars-and-bars and U.S. Air Force are Sig Kougar pressure-sensitive markings (sold through the Sig catalog as replacement items.

The USAF is a reduced-size photocopy of another Kougar marking (so it would be roughly the right size and fit on the wing!). The numbers on the rudder are also photocopies. These markings are covered with solvent-resistant clear tape.

The markings are not truly accurate in size or location; they just give a bit of the "flavor" of the full-scale aircraft.

Control System: The Sig nylon bellcrank is mounted just behind the Center of Gravity (CG) location. Scrap squares of 1/32 plywood are glued to the top and bottom of the wing at the location of the bellcrank mounting hole to add integrity to the hole area. The bellcrank I used (Part #SH-234) comes with mounting hardware and the control horn for the canard.

We decided to "dedicate" a set of dacron control lines to this model, so leadouts were not used; the lines were connected directly to the bellcrank. Again, Sig offers a handle-and-flying lines set that is so inexpensive (Part #SH-544, $2.95) that it's easy to leave everything connected.

Landing Gear: Like Potato Man, this 1/16 music wire gear is "trapped" between the firewall and engine. What's unusual about the gear is its swept-forward orientation. This was brought about by a request from test pilot Steve Kaluf, who felt that a conventional (straight) gear mounted by the firewall would not allow enough clearance for the model to lift off properly.

The shape is a bit unusual, to be sure, but it can be done adequately with a bit of practice. Try using an old coat hanger for your first try—the wire is soft and more easily shaped than music wire. After a trial or two, you'll get an idea of what to anticipate as far as bending goes.

The main things are to get the wheels level and to have enough clearance so the prop won't strike the ground on takeoff; everything else has some margin for error.

I used Sig ½A wheels on my model; you might want to try some of the new lightweight wider-tread wheels, like Dave Brown Lite Flites. They are a bit wider, and may make ground handling even easier.

The nose gear is a Sig plastic tailwheel, mounted on a piece of music wire that is simply press-fit into the fuselage and glued in place at the proper depth.

Once the engine and landing gear have been bolted in place, the model is ready to be balanced.

Suspend the model from the CG with a loop of string or monofilament; it will doubtless be tail-heavy. To remedy this, you will need some lead shot, or a material called Cerrobend (used by model railroaders, among others. It's a low-melting-point material that's quite dense.) Carefully pour the shot or molten Cerrobend into the nose cavity until the model hangs level. Add the tip weight and you should be ready to go.

Flying: Our testing was done with Killer Bee and Black Widow engines, using 25% nitro fuel on a 5 x 3 three-bladed Cox nylon prop and 26-foot lines.

Be sure to pull-test your model to be sure the control system can withstand flight stresses.

Take a bit of time to familiarize yourself with the idea that, since this is a "pusher" orientation, lots of things seem to be "backward" from the way you're used to. For instance, the engine points to the rear, has the prop mounted facing forward, and is started backwards (clockwise). And with the movable control surface in the front, the control lines are reversed from "normal" orientation.

Be sure to check that the engine is running in the proper direction—reed-valve engines (as most ready-to-fly engines are) will run either way—and you have the proper thrust "push" before you launch the model!

One important thing we learned from testing is that *this is not a windy-weather model. Fly only when the wind is 10 mph or less.* When the wind came up, the model lost a bit of line tension (as most ½As will in that much wind).

After our first test session, I added weight opposite the bellcrank to help the line-tension situation. (There was already weight added to the outboard wingtip; the extra weight may or may not have been necessary, but I felt better having it there, so we left it in place, and it's shown on the plans.)

Since this is more of a cruiser than an aerobatic model, there's no reason to fly in windy weather anyway. Think of the XB-70 as a "let's go flying after supper" model and you'll be fine.

Steve Kaluf's sidebar details the rest of our test-flying experience. ✈