Northrop XP-56 No. 2 at Hawthorn Field. First welded all magnesium aircraft. Contracted for in 1941 by Air Corps. First flown on March 23, 1944 by Harry Crosby. Movies exist of this aircraft in flight. Pratt & Whitney R-2800-29 Double Wasp. Northrop photo.

Northrop XP-56 "BLACK BULLET"

By BILL YOUNG . . . A project only for experienced modelers, this one was designed around an electric powered contra-rotating prop drive unit that can also be modified from pusher to tractor. A real challenge!

• The US military was concerned about the advances in fighter aircraft in Germany and Japan. To encourage the US aircraft industry to experiment, the Army Air Corps opened informal competition in late 1939. Three of the proposals were selected to be built. These were the XP-54 Swoose Goose of Vultee, The XP-55 Ascender of Curtiss, and the XP-56 Black Bullet of Northrop. Two of the XP-56's were built. The first to fly had a short upper fin and flew in September 1943. Stability problems led to the extension of the upper fin. This first airplane crashed in a landing accident. The second XP-56 first flew in March 1944, with the enlarged upper fin and some changes in the control system. The airplane was painted olive drab on top and neutral gray on the bottom. The fin tip and the numbers were painted orange-yellow. The Northrop logo was orange and black. This airplane was given to the Smithsonian and is now back at Northrop being restored (1983-).

This model is unusual in many ways and requires special consideration before building. If you have no experience with flying wings or scale, I would suggest some simpler flying wing to practice on. I built several slope gliders of the airplane to test my skills and check the basic layout. The contra-rotating propeller unit requires careful construction, or the substitution of a single-rotation unit. I chose a fixed gear for the model at this stage of its development, as the geometry of the

"Harry Crosby" in the No. 2 model ready for first flight, September 1983, Sepulveda Basin, Van Nuys, California.

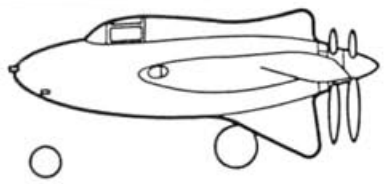
The XP-56 at Hooper's Dry Lake, in Nevada. Note closeness of lower fin to ground. Not much room to rotate for takeoff, but fin also protected props!

main gear is at least as complex as that of a Wildcat, and besides, the original XP-56 spent a lot of time flying with gear down due to problems with the gear retraction, and the difference in aerodynamics with the gear in the up and down positions. Yes, the gear could be beefed up for an IC engine. And no, don't be tempted if you plan to fly electric. You can probably tell by my selection of subjects that I prefer the unusual. This one is a prize in that nothing about it is conventional.

COUNTER-ROTATING PROPELLERS

There are many interesting scale subjects that use counter-rotating propellers. I, like many others, have shied away from these subjects because of the gearing complexity. However, I kept thinking about it and woke up one night with this relatively simple solution. There are many successful gear and belt drives on the market today for gas and electrics. Guess what? A belt drive gives same rotation and a gear drive gives opposite rotation! So each propeller is driven by a simple one-step gear or belt drive. You may gear down or not, as the case may be. One final problem is easily handled with this system. The rear propeller must run at a higher RPM or have a coarser pitch as it is running in air that has already been accelerated. This is easily solved as the belt drive can have any center distance that you may desire by using different pulley sizes and/or different belt lengths.

The photos and drawings show a unit that I built for an Astro 15 Cobalt to run in the 1-1/4" = 1' model of the Northrop XP-56 Black Bulllet. The idea can be adapted to other subjects easily. While the author used a lathe for some of the parts, others were built up from tubing and collars pinned and soldered together. I think



Profile of first prototype. Almost no upper fin. Had stability problems.

that all of the parts can be assembled the same way with a little ingenuity. Naturally, heavier gears and belts would be necessary for a gas engine. A copy of the Stock Drive Catalog can be very helpful and is a great gadget source for belts, gears, bearings, shafts and etc. Stock Drive Products; 55 South Denton Avenue; New Hyde Park, New York, 11040.

Build the motor unit first so that the rest of the fuselage can be fit around it.

CONTRA-ROTATING MOTOR UNIT

This unit has been made with hand tools and with a lathe. Proceed with hand tools as follows:

PROP ADAPTOR/INNER SHAFT

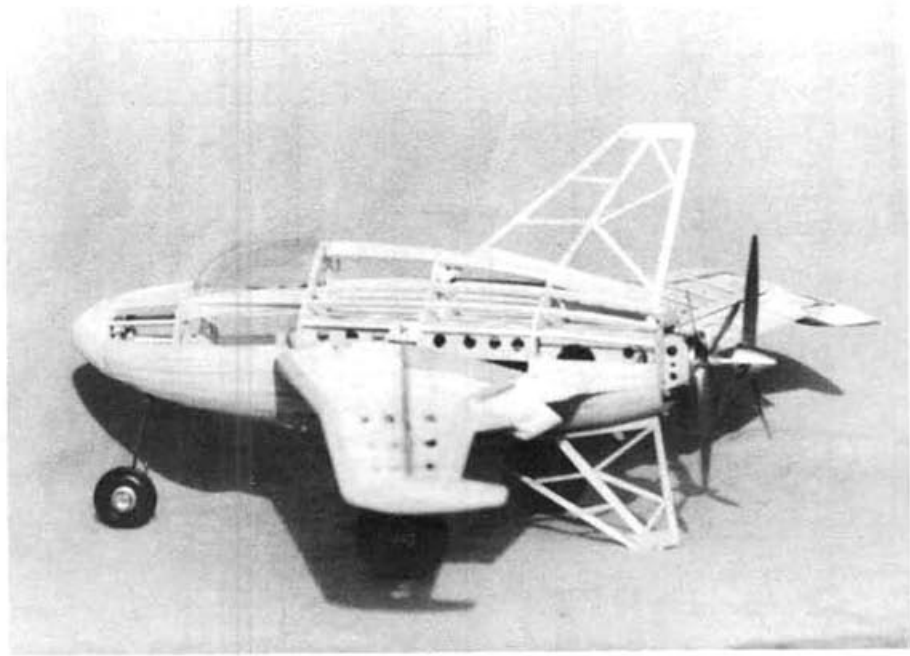
Make from nesting sections of brass tubing assembled to the 3/16 inch steel shaft and silver soldered.

BRASS HUB

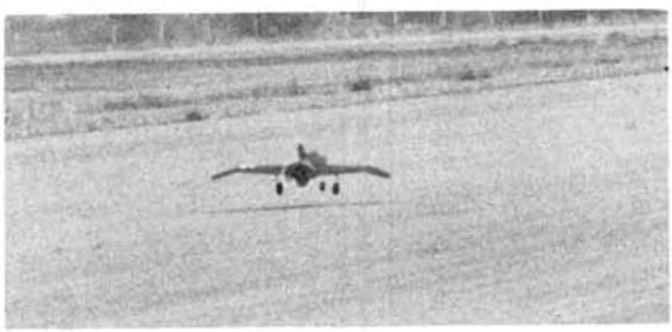
Also made by nesting sections of brass tubing and a wheel collar, all silver soldered.

PROP CARRIER/OUTER SHAFT

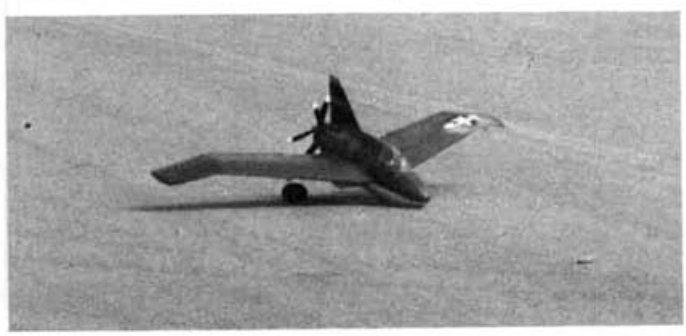
The threaded piece is an electronics item. There are used as extension bushings for potentiometers. The gear carrier is the wheel hub from Associated that fits the gear. This has to be carefully reamed out to fit the 1/2-inch OD brass tubing. This piece is held in place with set screws and Locktite. The balance of the shaft is again nesting pieces of brass tubing and silver soldered together. Inserting a 3/16 inch aluminum tube and one 3/8 inch



Fuselage planking goes on last after all equipment is installed and checked. Note many lightening holes in framework. Lower fin held on with double-stick tape.



Model taking off on one of test flights. Flies well, but hot to handle. Keep up flying speed!



Well, nobody's perfect! In spite of "awkward" landing, it flew again the next day.

OD—3/16 inch ID ball bearing inside the assembly will help to keep it all in alignment.

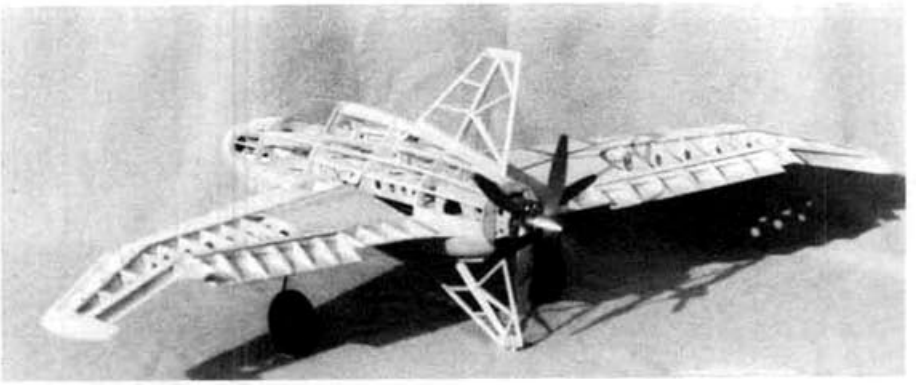
Finally, the pinion gear and small timing belt pulley require careful reaming to fit the hub. The rest of this assembly was made from 1/8-inch plywood. If there is too much slack in the belt when the gears are meshed correctly, you may need an idler on the belt. A small piece of 1/8-inch piano wire riding against the back of the belt will do the job.

If you wish you can substitute a single rotation system and it will work fine. The reason I complicated it this way was to show off the simple contra-rotating system I worried out.

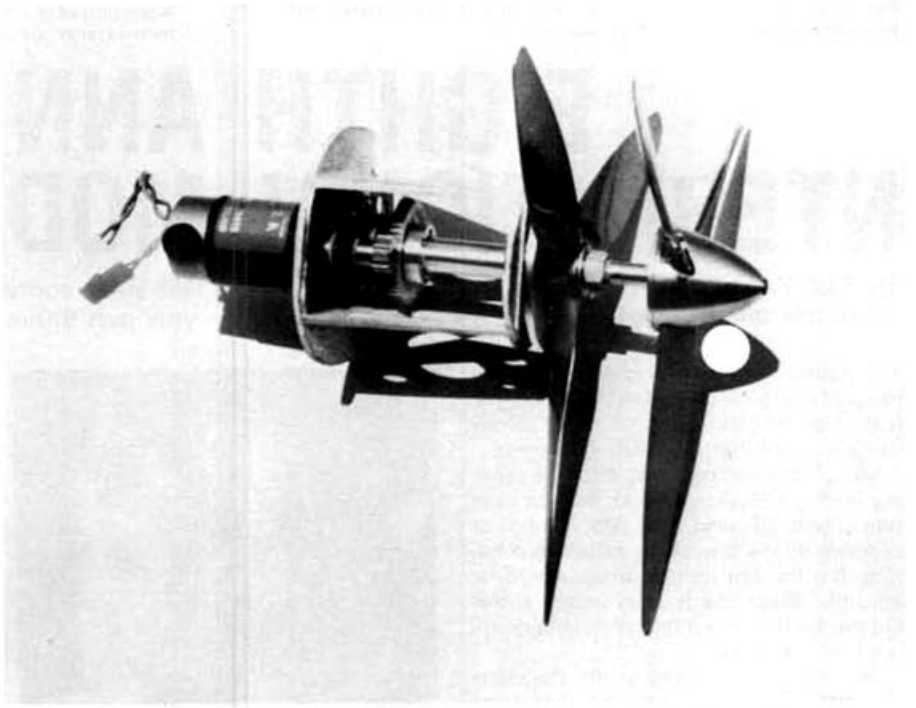
Fuselage: Build the boxes that form the nose wheel well, battery box, and motor assembly box, first. Then slide on the fuselage formers and add the wing root ribs. Now add a few strips of planking to hold things in place. Fit the nose wheel, batteries, radio system, motor assembly and internal wiring. Reinforce the wing spars. The upper fin is built in and the lower one is held on with double sided tape (this allows it to come off almost unscathed in those inevitable bad landings while learning to fly this thing). Build the canopy and hatch assembly. Double check everything to make sure you can install batteries, radio, etc. Leave the final planking until the wings are ready to fit.

Wings: The wings are straightforward except...well...except for everything. Each rib is a different length and angle of attack. A jig to hold the tip and root ribs and build the wings in between is my way of doing the job. I build each wing straight and then cut it for the tip droop. Install wing wire guides and corresponding guides in the fuselage. Don't forget plenty of balsa packing around the tubes. Install servo mounts in wing and route wire extensions through the wing.

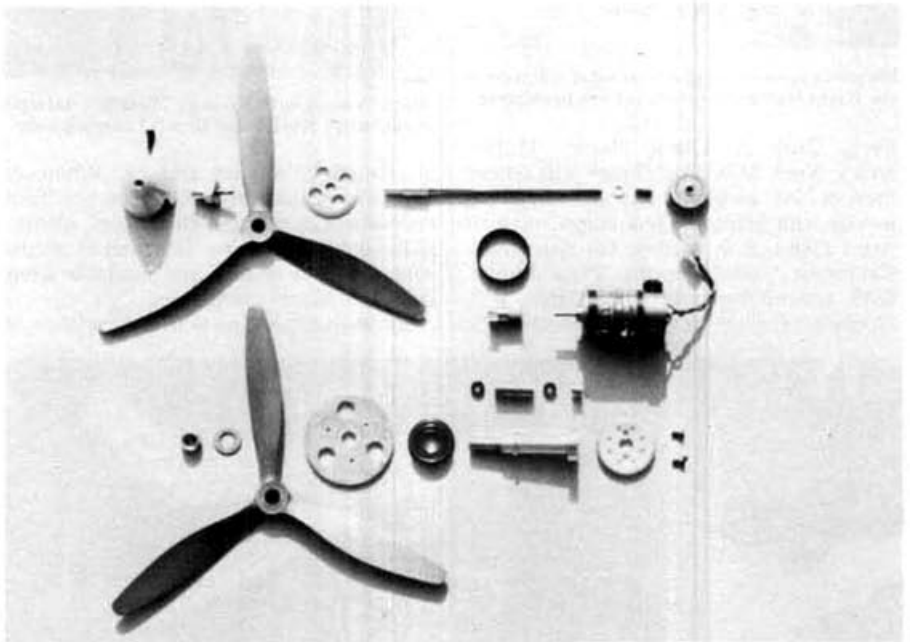
Now check again that everything fits together. Complete the fuselage planking and wing sheeting. After this, you will still find errors in the calculations, so cut holes, make corrections, and patch everything back together.



The "Bones" from another angle. Build contra-rotating power unit first, then assemble fuselage around it. Wing is 5 degrees positive at root, 0 degrees at tip.



Contra-rotating drive system with Astro 15 cobalt electric motor. Single drive and/or gas power may be used, but that's too easy!



Prior to assembly, or after disassembly, your choice. Parts relatively easy to make and/or obtain.

Covering: Silk and dope. This is the lightest covering, and it adds structural strength to the finished aircraft. (Besides, it smells good!) Don't forget that the original airplane was painted with dull finish all over.

Flying: What can I say? At best, it is difficult. No rotation due to the lower fin. Slight nose up tendency at lift off (just like the real thing). Turns are relatively easy except for the yaw that occurs before the turn begins and after it ends. Landings are done hot in order to fly the airplane onto the runway (I told you the airplane was weird).

Finally, don't bother Northrop for photos and technical data. The author has both available if you do not know or have references to fill the void. Oh yes, I do plan to detail the main gear retract geometry as soon as I have it worked out. Bill Young, 8106 Teesdale Ave., N. Hollywood, CA 91605. •