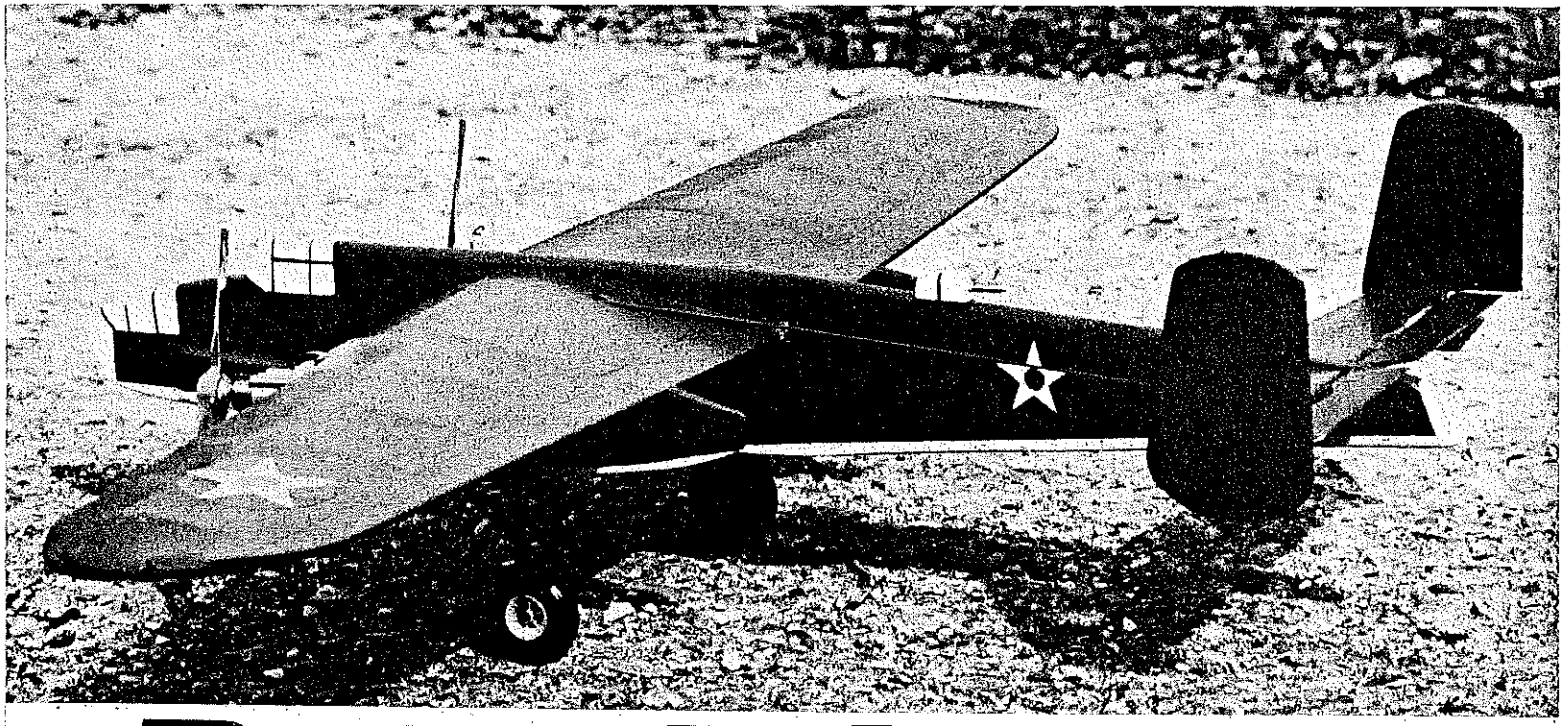


B-25 Mitchell

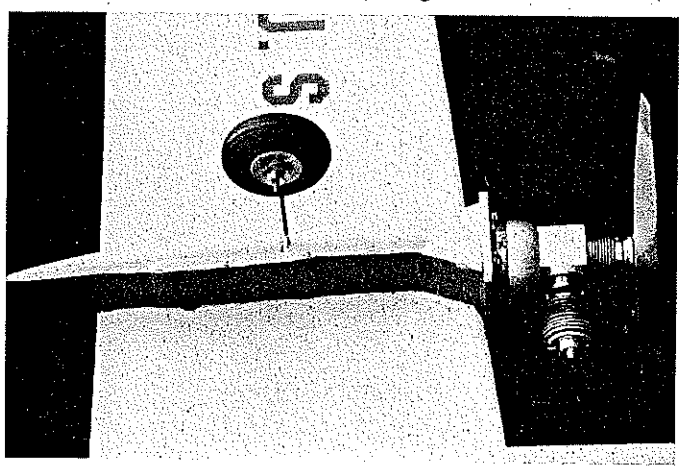
The lure of multi-engine models is legendary. This small Profile Scale Control Line model for two .049 engines captures the essence without much difficulty or cost. ■ Bill Michaels

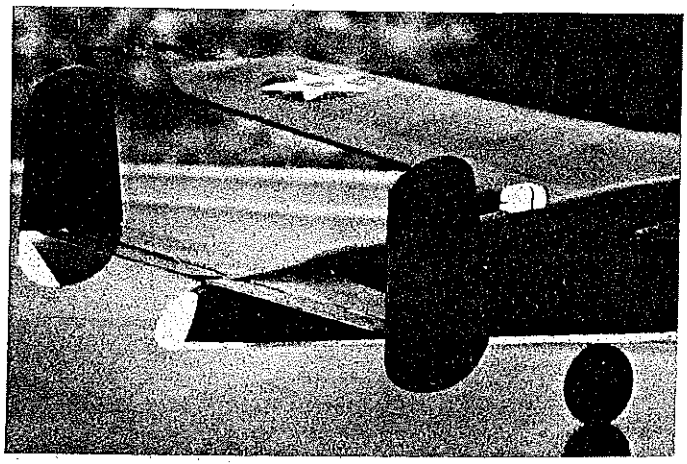
IN THE SPRING of 1942, the war in the Pacific was going badly for the U.S. As victory followed victory for the Japanese, the Americans wanted desperately to strike back if only to revive morale. Unfortunately, there seemed to be no way at the time to accomplish this. Sending an aircraft carrier task force close enough to Japan to launch an air raid and recover the planes would probably have resulted in the loss of all the ships involved.

Finally, someone suggested finding a long-range bomber—one that could take off from a carrier at a safe distance, bomb Japan, and continue on to land in China. The plan had merit, and Lt. Col. James H. Doolittle was assigned to work out the details. Thus began the famous "Doolittle Tokyo Raid."

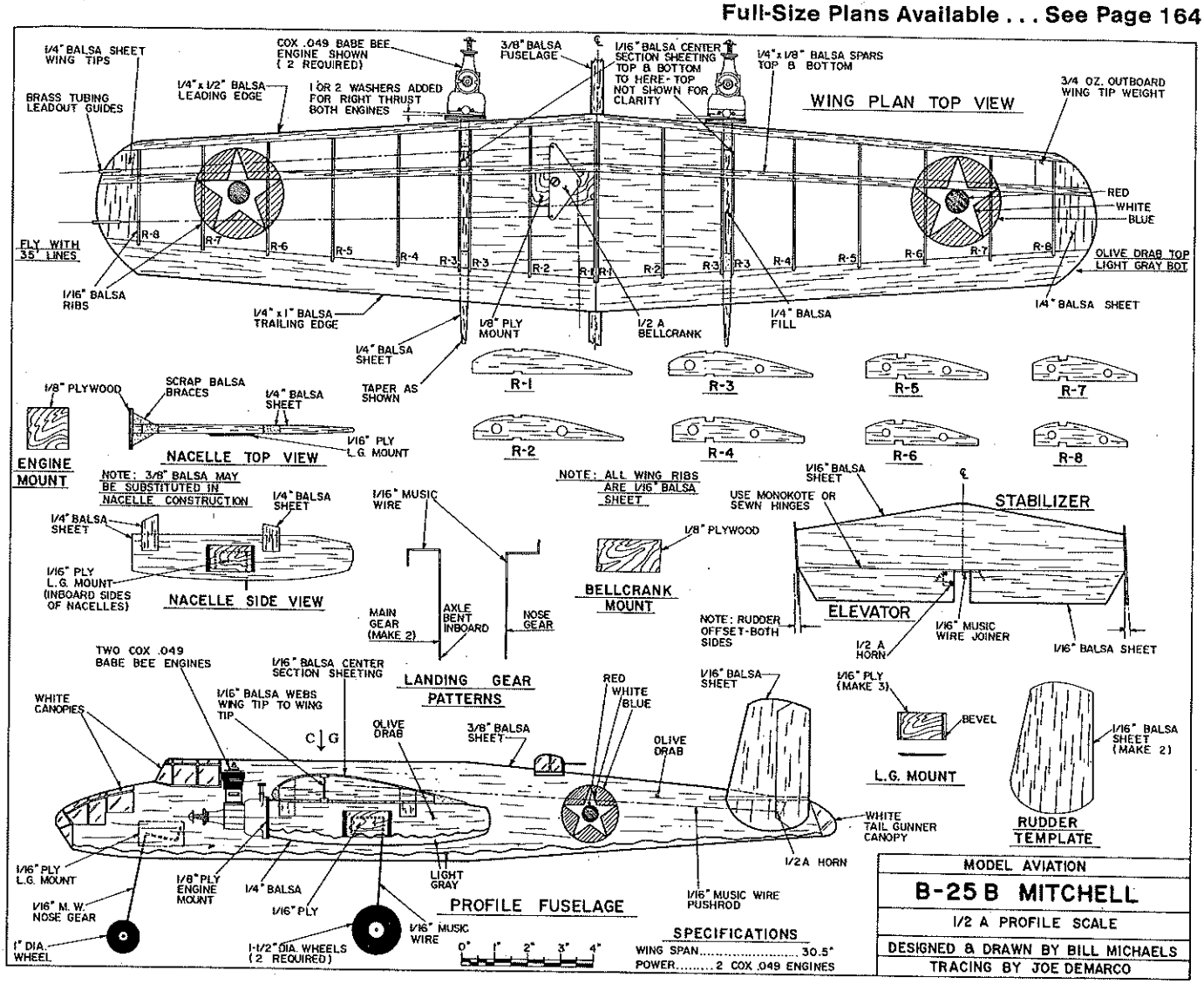
The plane chosen was the North American B-25 Mitchell. It was the only plane available that could be modified to fly all the way to China after bombing Tokyo—while being able to fit on a carrier deck. Modifications included removing the belly turrets and heavy radios, among other things, to make room for the extra fuel tanks needed to complete the mission. Twenty-four B-25Bs were outfitted for the raid. The plan was to use 16 for the raid, the other six being spares.

The aircraft were loaded aboard the carrier U.S.S. Hornet. Because they were too large to use the hangar deck elevators, they had to be secured to the flight deck during the seagoing part of the journey. The





Top: Canopies, gun turret, and markings dress up what is clearly a simple model. Construction is sheet balsa with the exception of the built-up wing. Above Left: The landing gear is covered with 1/16 ply, and the firewall is perpendicular to the nacelle, not to the wing leading edge. Above Right: Tail surfaces are hard 1/16 sheet balsa. Paint scheme is olive drab upper surfaces, light gray undersides, and white canopies.

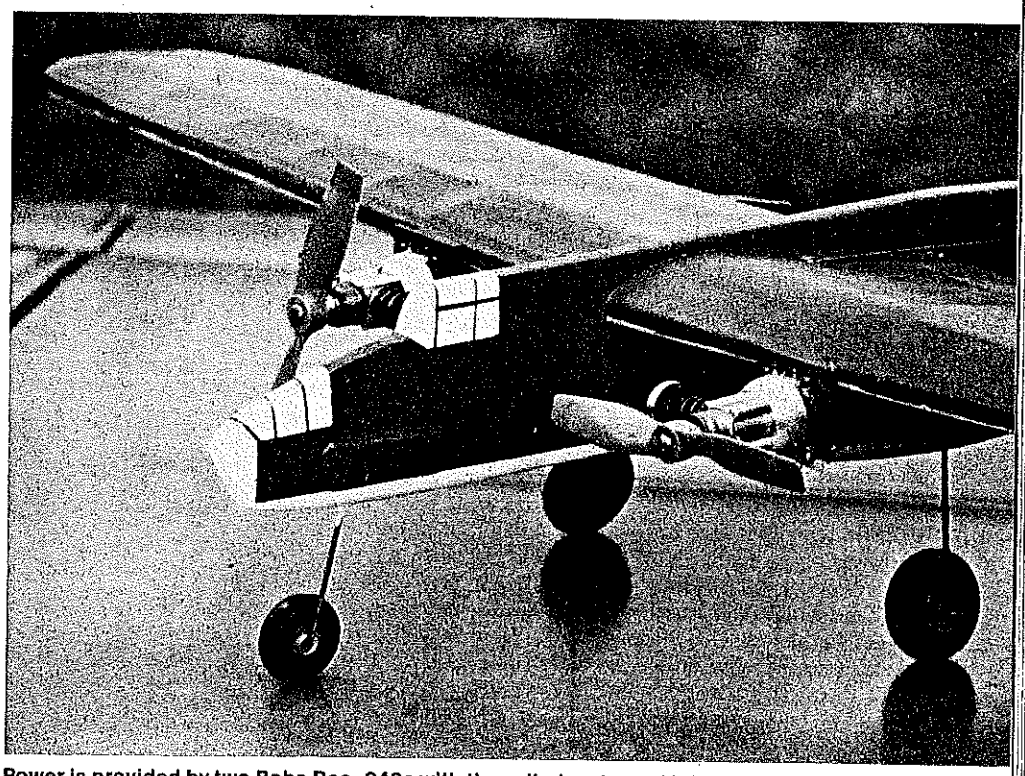


carrier Enterprise went along to provide cover; with a deck full of B-25s, the Hornet had no room to launch any of her own fighters. When all was ready, the two carriers sailed for their destination—a point 400 miles off the coast of Japan—roughly twice the distance from which a standard carrier-based air strike could be launched.

The voyage was uneventful until the fleet neared its destination. Then, just 600 miles off the coast of Japan, they were discovered by a Japanese patrol boat. Once sighted, it was too risky to attempt to move the task force any closer; there was nothing to do but launch the B-25s early and hope for the best.

All 16 planes were safely launched, and they headed for their targets in Japan. The raid went well: the targets were bombed, and no planes were lost over Japan. The Japanese were expecting the attack to come a day later, thinking the carriers would have to move closer before the planes could be launched.

The continuing flight to the landing fields in China did not go so smoothly. The weather worsened as the bombers approached the China coast, making it impossible for any of the B-25s to be landed safely. Eleven crews bailed out over China when they ran out of gas, and four planes



Power is provided by two Babe Bee .049s with the cylinders turned inboard for the sake of appearance. Glow plug access would be easier if mounting was with the cylinders vertical. In this picture, the needle valves have been removed for protection during transportation.

crash-landed. The only safe landing of the 16 B-25s was in Russia; this plane didn't have enough gas to cross the Sea of Japan.

Militarily, the raid didn't do much damage, but psychologically, it was a great success. Morale in the U.S. soared. In Japan there was dismay. The raid caused the Japanese High Command to initiate an operation they hoped would finish off the American fleet. The result was the Battle of Midway which, as we know, was the battle that broke the back of the Japanese Navy. The Doolittle Raid was a bold risk that paid off.

This profile model of the B-25B was designed to provide an interesting project for a couple of .049 engines. It is also a logical step up for the beginner who has mastered single-engine profile models and wants to experiment with a twin-engine model that doesn't require complicated construction. All pieces, with the exception of the wing, are solid balsa. The built-up wing has no dihedral, is planked with balsa out to the nacelles, and is covered with silkspan.

Fuselage. Cut it from a ⅜ x 3 x 36 balsa plank. The nacelles can be built from the leftovers or cut from ¼-in. hard balsa sheeting (the plan shows use of ¼-in. sheeting). Adjust the R-3 rib spacing according to the size you use.

On my model I cut out the section of the fuselage directly above the wing for positioning and mounting the wing (instead of cutting out just an airfoil-shaped slot). The wing-to-fuselage joint would probably be a bit stronger with the slot cutout, although I haven't had any trouble with my model built according to the plans. There isn't much else to do to the fuselage except to sand the corners round. The nose gear should be mounted after the wing and tail have been glued on.

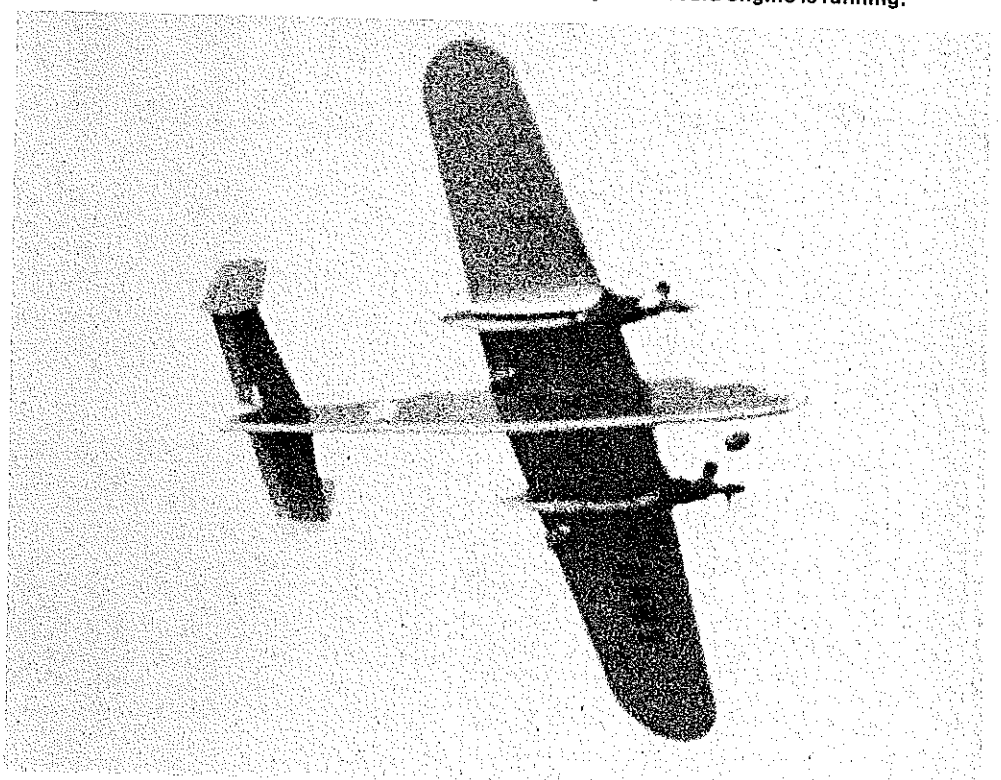
Wing. Make your own wing "kit," and assemble the pieces. Only the ribs and trailing edges require any real work. All the other parts can simply be cut to length from the appropriate stock.

Cut the ribs out of 1/16 sheet balsa. A tapered wing with its progressively-smaller ribs requires more work than a squared-off one, but the improved appearance is worth it. Use your favorite method to cut the ribs to shape. If you don't have one, you can use mine.

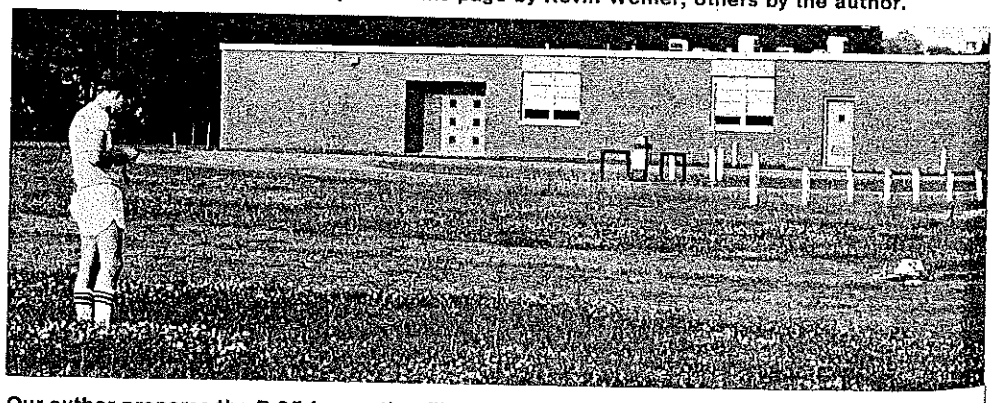
I make a photocopy of the ribs at my local post office. This gives me an extra set of rib templates that I can cut out without damaging the plans. Hold the template over the wood, and carefully draw around it. Then cut out the balsa, always staying on or outside the line. Use the piece you just cut out to draw the outline of the same rib for the other wing panel. Next, glue the two ribs together with a tiny amount of cyanoacrylate glue (CyA) such as Zap, Jet, etc., and sand them to match the template on the plans. Finally, separate the two identical

Continued on page 151

It's best to start the inboard engine first, then the outboard one. When both engines are running, refill the tank on the inboard engine only. This helps assure that the outboard one will quit first. The plane will maintain line tension while only the inboard engine is running.



With both engines running, the model is fast and maneuverable. Single-engine performance (inboard) is adequate. All photos this page by Kevin Weiner; others by the author.



Our author prepares the B-25 for another flight with 35-ft. lines. With twin engine power, nylon string-type .049 lines have insufficient strength. Steel lines should always be used.

distributed pressure over the entire assembly. Allow this assembly to cure for 24 hours.

"Step 6. Sand off the excess epoxy and you have an aluminum wing.

"Step 7. Try it; you might like it."

If any individual has something to contribute to this Speed column, please feel free to mail it in. All help is appreciated.

Here is the address of Mr. Osamu Khono, manufacturer of the monoline-type control unit: *T. Horio Speed Gang Co.*, F-Coat 207 Yakumooai 1-25-2, Choufu City, Tokyo 182, Japan.

P&G Metal Products, new source for the Dyna Jet, just happens to have the same address as mine, given below.

Gene Hempel, 301 N. Yale Dr., Garland, TX 75042.

B-25/Michaels

Continued from page 70

ribs with a knife. Don't worry about duplicating the shape of ribs *exactly* as on the plans; as long as you're fairly close and both wing panels are the same, your model should fly okay. One more thing—don't forget to cut the holes for the lead-out wires in the inboard wing ribs.

The trailing edge is made from a standard piece of pre-shaped trailing edge stock cut down to only 1 in. wide. Be sure to cut the extra width from the thick side of the wood, or your trailing edge will be too thick. The leading edge is a piece of ¼ x ½-in. balsa that is sanded to shape after the wing is built.

Because this wing incorporates no dihedral, it can be built all in one piece or one panel at a time. If your building board is as small as mine, build each panel separately, and then glue them together. Leave the top sheeting off until you have joined the panels. Then use one piece of 1/16 sheet to go from nacelle to nacelle. However, the wing will be stronger if it is built as one continuous piece instead of two halves joined at the center. If your building board is large enough, by all means build the wing as one piece, going from nacelle to nacelle with both the top and bottom sheeting.

Use a very straight and flat building board. Place the plans on the board, and cover the plans with clear plastic or wax paper. Start construction by pinning the bottom spar over the plan, followed by the bottom sheeting. (Don't worry about the holes for the nacelles—they will be cut out later.)

Once the sheeting and spar are in place, pin the trailing edge to the plan, and glue it to the edge of the bottom sheeting. Glue the ribs in place over the spar. Use a piece of scrap balsa to get the spacing correct for the nacelles between the R-3 ribs. Add the ¼-in. balsa wing tips after W-8 ribs are in place.

The 1/16 sheet balsa webbing pieces with vertical grain between the top and bottom spars add a good deal of strength. I'm not really sure they are needed outboard of the nacelles, but I put them in anyway (besides, it's good practice of a building skill that will come in handy later when you build larger models). After gluing the webbing pieces in place, add the top spar. Finally, glue the leading edge in place, and let everything dry.

Remove the wing from the building board after the glue has dried, and sand the leading edge to shape. Mount your bellcrank on the 1/16 ply mount, then glue the mount in place. Install the 1/32-in. music wire lead-outs and the 1/16-in. pushrod. Complete the center section of the wing by gluing the top sheeting in place. Glue on the lead-out guides and the wing tip weight.

Nacelles. Cut them out of ¼ or ⅜-in. balsa (as discussed earlier). Glue the tabs into the slots on the nacelles, making sure the grain runs in the direction shown. (This method of construction is much stronger than just cutting the whole nacelle out of a single piece of balsa.) Attach the firewall braces, and sand the edges of the nacelles round.

Make a groove for the landing gear to rest in and a 1/16 plywood plate to cover it. The plane is easier to assemble without those wire legs sticking out, so don't attach the landing gear at this point. Cut holes in the bottom of the wing to fit the nacelle tabs into, and test-fit them. The nacelles will be glued in (and the firewalls attached) after the wing is covered.

Tail surfaces. Cut from 1/16 sheet balsa. Notice that the ends of the stabilizer are cut on an angle to give the one-piece fins/rudders their offset. Sand the edges of the pieces round, and connect the two elevator halves with a piece of 1/16-in. music wire.

Use your favorite method for hinging the elevators to the stabilizer. I used pieces of MonoKote ironed across the top of the pieces. Don't glue on the rudders until after the stabilizer has been attached to the fuselage.

Covering, assembly, etc. I used silkspan to cover the wing of my model. If I were to do it again, I think I would use an iron-on covering to save time and trouble. The choice of covering material is up to you.

Before I assembled the plane's sections, I gave the wood parts a couple coats of sanding sealer, sanding after each one. The pieces are much easier to work with before they are assembled, so perform this step now. A good finish isn't necessary for the model to fly, but it greatly improves the final appearance.

Begin final assembly by gluing the wing to the fuselage, making sure that it is square to it. Glue the nacelles to the wing, again assuring squareness to both the fuselage and the wing. Glue the stab to the fuselage, and connect the pushrod.

Glue the firewalls to the nacelles and wing with epoxy. Glue the main landing gear to the nacelles, then attach the nose gear. (Doing it in this order will let you adjust the way the model sits on the ground by raising or lowering the nose gear's position. The model should rest with the fuselage parallel to the ground. Remember to put tires on the gear legs before checking this.) Attach the rudders, and you're ready to paint.

My model was painted with Aerogloss Military Flats dope—olive drab upper surfaces and light gray undersides. The lettering and U.S. insignia were made from Trim MonoKote, the edges sealed with clear dope. The machine guns in the top turret were made from small pieces of wire

and painted black.

When all the finishing touches have been put on, it's time to attach the engines. Make sure you put the offset washers under both engines (as per the plans) to assure proper line tension. If you have any doubts about your engines, put the stronger one on the inboard side. After mounting the engines, check to be sure the model balances at the CG point shown on the plans. Balancing in front of this point (nose-heaviness) is okay, but add nose weight if it balances aft of it (tail-heaviness).

Flying. Use 35-ft. steel lines. Start the inboard engine first, then the outboard one. It doesn't hurt to run the outboard engine a tad on the rich side. With both engines running, top off the fuel on the inboard engine only (this helps to ensure that the outboard engine will run out of fuel first).

With both engines running, the model will jump into the air after a short takeoff run. It flies fairly fast and is reasonably maneuverable. The model has no problem flying on one engine, although maneuvers should not be attempted with one of them stopped.

This model is designed to use two .049 Cox Babe Bee engines, though other varieties of Cox .049 engines could be substituted. In fact, the pictures show different engines. On the first day of test flying, one of the Babe Bees developed a fuel leak, and I replaced the Babe Bees with two other Cox .049s, a Black Widow and a Dragonfly. The replacements provided some extra power and longer running times, though no doubt the plane would fly almost as well with the Babe Bees.

This model has met all of my expectations. I enjoy the sound of the two engines in synch and the ability of this model to make fast laps on the ground by holding down-elevator before taking off. Twins are a lot of fun, and this model is an easy way to try a twin with minimum investment.

FF Indoor/Tenny

Continued from page 74

us can get a completely true-running prop on a single bearing!) Shaft/spar misalignment can be spotted easily from the side as the prop is driven by a few turns in a short motor. Be sure this problem is not caused by the shaft/spar joint having been broken loose. Correct any other problems you find by "tweaking" wherever necessary!

Automatic-centering hooks can be made many ways, but my favorite is shown in Figure 2. The side view shows a traditional round hook with the shaft centerline passing through the center of the hook. The end view shows how to form the back edge of the hook in an "S" curve. This bend tends to force the rubber toward the center of the hook rather than riding up into a crooked knot. The hook is most easily formed using round nose pliers to make the round hook. Dashed lines in the side view show where to grip the hook with conventional needle-nose or duck-bill pliers to form the "S" curve. Align the tips of the round-nose pliers with the shaft centerline and twist clockwise to make the "S" curve. It may take two or more tries to get just the right curve, since music wire tends to spring back. After getting the "S" curve just right, inspect the hook closely to be sure the alignment has not changed.

Use a prop-pitch gauge to measure pitch in both blades and be sure both blades are at the same angle. If the gauge is adjustable, check pitch angles at two or three places on each blade to be sure blade twist is equal in both blades. One of the photos shows an adjustable prop-pitch gauge being used to check setting on a torque-variable-pitch prop. If you care to make your own gauge, note the following features:

1) The prop shaft is provided with a fixed reference point to insure exact measurements.

2) Provision is made to measure blade angle at one-inch intervals. Both blades must be checked at the same radius, and the angles must match closely.

3) The blade-angle protractor should have increments of one degree and be constructed solidly enough to insure repeatable measurements.

Repairs made to damaged prop blades must be carefully made to avoid changes in stiffness of the structure. In particular, application of a skin of glue at a fracture in a prop spar can affect the flaring characteristics of the prop. Cyanoacrylate glue can also stiffen a structure unless used sparingly. Finally, damaged all-balsa blades must be very carefully repaired to restore the exact blade shape. Two other photos show two extremes which illustrate the concepts involved. One is of a Bostonian prop with very deep camber and curvature. Any damage which changes the camber will obviously affect how well the prop runs, as will incautious application of a glue which shrinks, thereby pulling in additional camber. The photo of one of Stan Chilton's Easy Bs gives a clear view of full-length prop spars. Stan uses very soft and light wood, sanded very thin, for prop blades. The full-length spar is necessary to control the blades under power and to allow the model to ceiling-scrub without damaging the prop blades. Repair of this type of prop is very delicate and must be done on the block used to build the prop initially.

Next time! The prop wobble issue will be carried to construction techniques which minimize prop wobble and other inefficiencies.

Bud Tenny, P.O. Box 545, Richardson, TX 75080.

Hummin'bird/Caton

Continued from page 80

I use a straightedge to find and mark a top centerline on the tube. Then I lay a straight piece of wood that is almost the thickness of the pylon along the top centerline to sight down toward the tail to aid in checking alignment. When satisfied, I mark on each side of the straightedge and cut through the tube so the pylon will fit in the hole. Note that part of the tube above the tank compartment should not be cut; the walls of the pylon will have to be fitted to the top of the tube in this area, with the two spruce supports straddling the tank compartment.

A very important step is in setting the proper incidence in the pylon. Measure from the top rear of the pylon to the centerline on the side of the tube. This rear