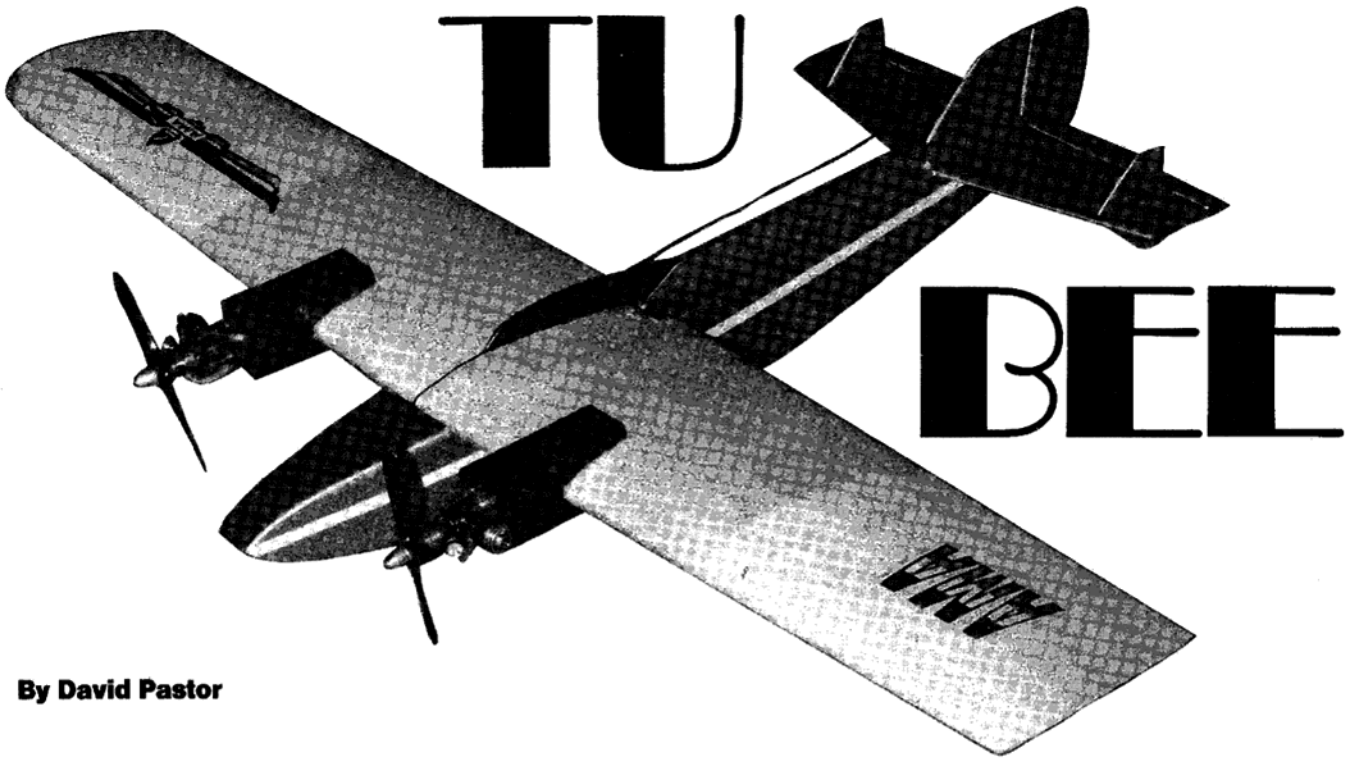
TU BEE



By David Pastor

Designed to be flown by anyone who can handle a quickee 500, the Tu-Bee is inexpensive, easy to build and presented in full size.

Why TU? TU heads are better than one. TU can live cheaper than one. TU engines sound better than one. It just had TU BEE. Besides, what do two TD .020's sound like? That's right — TU BEES.

While trying to settle on a project to use my new Ace micro flight pack, I ordered an Ace Guppy wing set. This wing is the standard Ace tapered foam wing with the bottom shaved flat. I felt that this thin wing (about 5/8'' thick at the root) could make an .020 powered sport model practical. It was about this time that a friend asked me if I wanted a new TD .020 that he had found buried in his junk pile. If I remember correctly, it took about 60 seconds to figure 1 + 1 = 2 (I'm slow sometimes). Now, this was the first time in my modeling career that I had **two** of something. I was determined to make the most of it.

My goal was to design an inexpensive, easy to build twin that could be flown by anyone who can fly a Quickee 500 type model. The design criteria was to make this a **performance** model. I did not want to make it a powered sailplane nor did I want to spoil the lines of a small model with a bulbous fuselage. With this in mind, I settled on a wing area of 135 sq. in., and a maximum weight of 14 ounces (final weight was 12 oz.). The fuselage was designed around the Ace micro flight pack, then enlarged so that a Cannon Tiny Twin could fit.

The result is the TU-BEE. It is a fast, responsive, yet stable model. The only thing that limits how it is flown is the fixed fuel pick-up. Inverted flight is out except to shut down the engines.

I flew the TU-BEE at our club's Air Circus. The tendency while flying in front of the crowd is to show off. Prior to this time, I had been concerned about rolling the TU-BEE. If it stagnated inverted I could lose an engine and have a long engine out flight. What I found out was that it will roll beautifully. I also made a few believers of those who thought that little engines don't have the necessary horsepower to make a model perform well. The TU-BEE has almost a one to one thrust to weight ratio. This is one model that you don't have to hand launch ''slightly down.''

Because there are two engines, it is guaranteed that one will quit before the other. Consequently, there are several techniques that will help you get the most fun out of your TU-BEE. First, time your engine run on a tank. Set your timer for this time minus 30 seconds. When the buzzer goes off, climb to altitude and half roll or loop to inverted flight. Fly inverted until both engines quit, then glide to a landing.

There is also a starting technique. First start each engine separately and run it for a minute or two to check your needle valve setting, refill the tanks, and start them both. As soon as the second one is running, top off the tank of the first one started. Now both engines should be running well and the fuel level should be almost equal in both tanks.

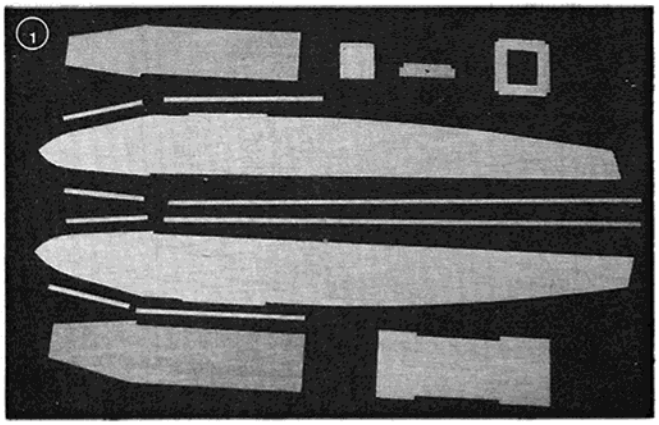
What happens if an engine quits unexpectedly? The model will roll into the dead engine (you already knew that, didn't you?). With the TU-BEE, apply full opposite rudder, and if level flight is maintained, your wings will remain level. I have developed a technique for flying with one engine out. I hold full opposite rudder and use my elevator to control my direction. Nose high will cause a turn into the dead engine — nose low will cause a turn into the good one.

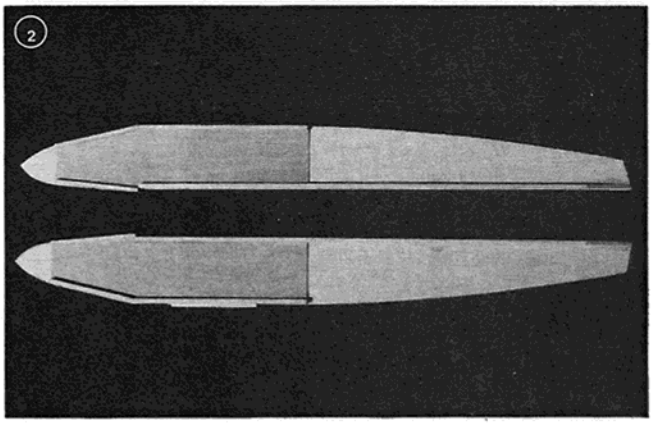
CONSTRUCTION

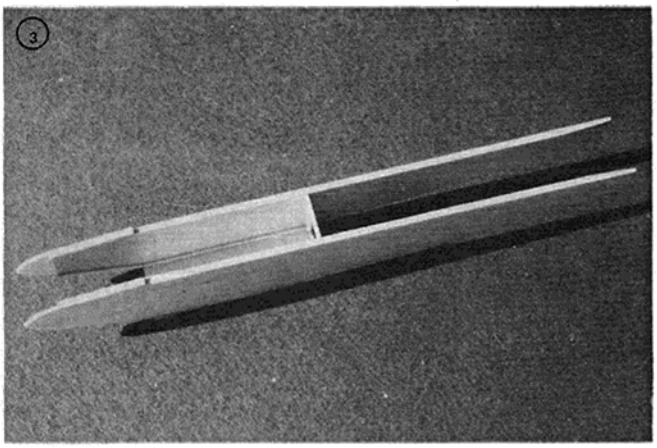
It is best to start on the fuselage and work on the wing while you are waiting for the glue to dry. I used Titebond for all joints on the fuselage. Goldberg Jet was used to tack the glued parts so that work could proceed. With rare exceptions, a cyanoacrylate glue could be used by itself, but I feel that a ''white'' glue penetrates better for a stronger joint.

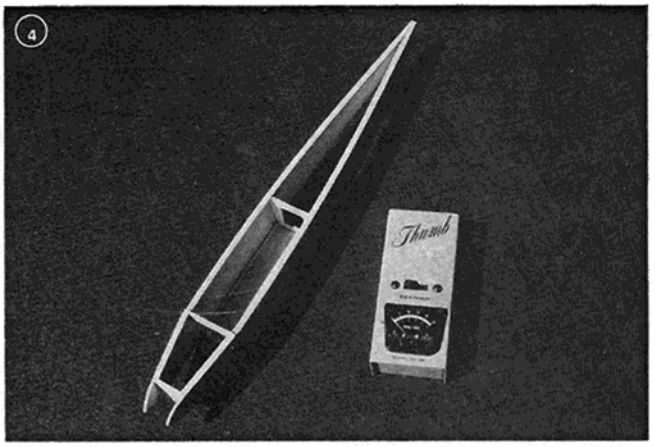
Fuselage:

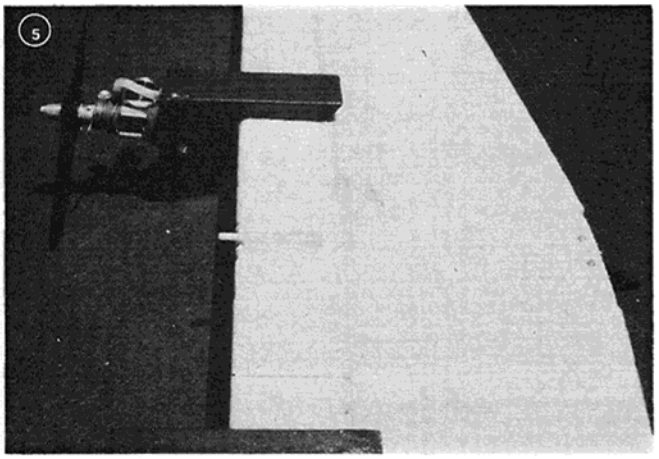
Begin by laying out one fuselage side on 3/32'' balsa. Pin this piece to a second and cut both sides at the same time. Sand off the rough edges, then remove the pins. Attach the 1/64'' ply doubler and stringers to each side. Now, if you assemble the fuselage sides to B1 and F3, the fuselage will be keyed into proper alignment. Next install F2 and the 1/8'' square crossbrace at the front of B1. Pull the rear of the fuselage together (note that the stringers are tapered at the rear) and glue. Dampen the fuselage sides forward of F2, pull together, and use Titebond to glue in F1. The fuselage is now ready for top and bottom sheeting. Leave the 1/16'' balsa bottom off until your pushrod system has been installed. I used red Gold'N-Rods for the rudder and elevator. The horizontal and vertical stabilizers are next. Align the horizontal stab parallel with the wing saddle and the vertical stab perpendicular to the horizontal stab. The rear wing hold-down is made with 1/8'' ply across the fuselage under the 1/8'' stringers and a piece of 1/16'' ply on top of it between the stringers. See cutaway AA on the plans. Install the 1/8'' balsa ''turtledeck.''











(1) The parts needed to construct the basic fuselage. Note the "key" on the fuselage sides and B-1 to align the fuselage. (2) The assembled fuselage sides with stringers and doubler in place. (3) The fuselage sides assembled to B-1 and F-3. Note that the rear of the fuselage stringers are tapered. (4) The fuselage ready for sheeting. The Heathkit tachometer in the photo shows the relative size of the fuselage. (5) The wing center section. Note that the hold-down dowel is epoxied and fiberglassed to the bottom of the wing. The only finish on the wing is two coats of clear polyurethane behind the engines to minimize the fuel that would get trapped in the foam and aid clean up. Solarfilm can be used with low iron heat.

Make sure that it is aligned with the vertical stabilizer since it is actually a part of it. Cut the "rudderlets," rudder, and assemble the elevator. These are covered separately and installed after the model is covered. Note that the rear of the "rudderlets" are 1/8" farther outboard than the front. Do not leave them off. They are essential for single engine control.

Nacelles:

Cut the five pieces necessary to make the nacelle. Install the blind nuts in the firewall. Assemble the nacelle with the fuel tank inside. Holes will have to be cut in each nacelle side so that the vents will protrude. Remember that there is a right and a left nacelle. The engines have out thrust and down thrust. After assembly, a couple of coats of epoxy paint or polyurethane paint will fuel proof them. Seal the vents and fuel pick-up openings from fuel seepage with RTV cement around each protruding tube.

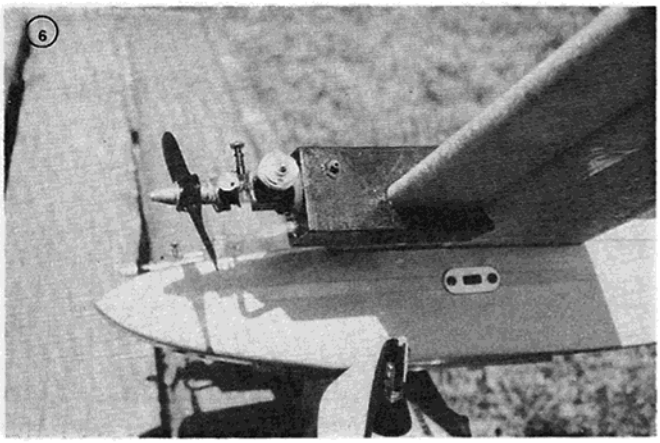
Wing:

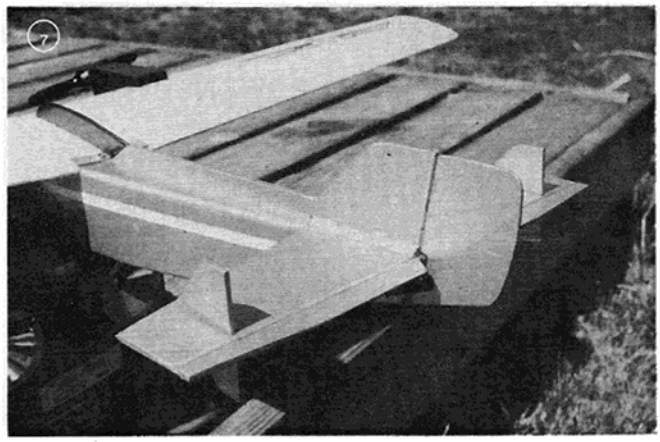
Glue the 1/8" square spars in each wing panel with Titebond. The wing is then cut. A sandpaper block is sufficient, but a table saw is good. A table saw with a plywood cutting blade is **great.** I have never found a way to cut a straighter, cleaner edge in foam than this. Cut the core at a 45° angle as close to the outboard edge of the core as possible. Measure 14½" towards the center then cut the wing with the dihedral angle. Epoxy the two wing panels together and add a strip of nylon filament tape over the spar. Follow the plans and epoxy the dowel on the bottom of the wing center. Reinforce with fiberglass. Add the 1/32" ply wing protectors and drill them for the wing hold-down screws. Using a trisquare held against the leading edge of the wing, mark the position of the nacelles. Fit the nacelles to the wings at the marked locations. Again remember that there is a left and right nacelle. Assemble with 5-minute epoxy. Mount the wing and epoxy on the 1/8" balsa "canopy."

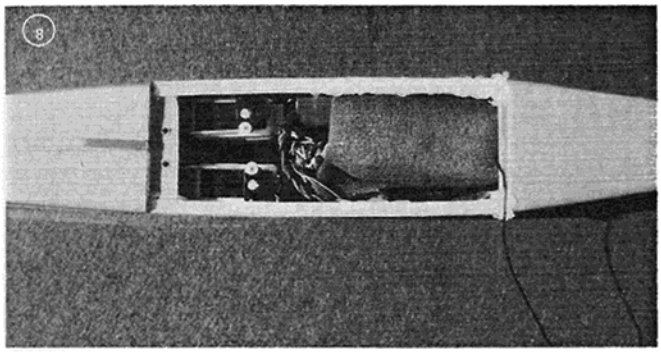
Final Assembly and Preparation:

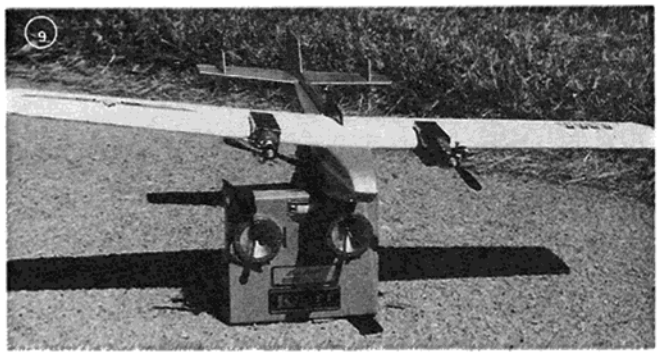
The wing can be covered with Solarfilm using low heat. I merely painted two coats of clear polyurethane paint on the top and bottom of the wing behind each engine. I covered the fuselage with Solarfilm. Solarfilm was also used to hinge the rudder and elevator.

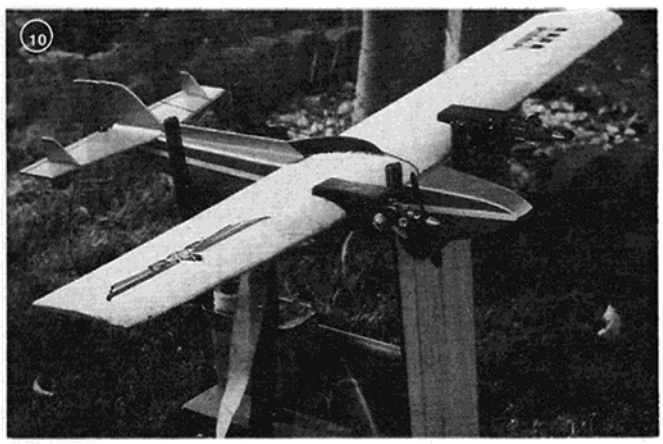
The TD .020 engines are mounted using the accessory engine backplate that either comes with the new engine or is available in the tank assembly parts package. The main concern when using this backplate is to eliminate any possible air leaks. My technique, using a toothpick, is to lay a thin











(6) Close-up of the left engine nacelle. Both tank vents and fuel pickup tubes should extend through the nacelle. The holes should then be sealed with silicone cement. (7) Close-up of the "tail feathers" showing the small elevator and "rudderlets." Note that the rear of the "rudderlets" are 1/8" farther outboard than the front. These are essential to single engine control. (8) The radio installation. The battery is forward under the cowl. The micro servos are simply stuck to the fuselage sides with servo tape. Be careful here because the wing hold-down screws can interfere with the pushrods if they are too long. (9) Photo of the finished model on top of the transmitter to emphasize its small size. (10) Photo of the completed model on the flight box. A holder such as this simplifies starting the engines. It eliminates the need of a helper while starting the second engine.

TU-BEE
Designed By : Dave Pastor

TYPE AIRCRAFT
Sport Twin
WINGSPAN
29 Inches
WING CHORD
5¼ Inches
TOTAL WING AREA
135 Square Inches
WING LOCATION
Shoulder Wing
AIRFOIL
Flat Bottom
WING PLANFORM
Tapered

DIHEDRAL, EACH TIP
3/4 Inches
OVERALL FUSELAGE LENGTH
20¾ Inches
RADIO COMPARTMENT AREA
(L)4¾" x (W)1⅝" x (H)2"
STABILIZER SPAN
10 Inches
STABILIZER CHORD (incl. elev.)
2½" Average
STABILIZER AREA
25 Square Inches
STAB AIRFOIL SECTION
Flat
STABILIZER LOCATION
Top of Fuselage
VERTICAL FIN HEIGHT
2 Inches

VERTICAL FIN WIDTH (incl. rud.)
4" Average
REC. ENGINE SIZE
(2) TD .020 Cu. In.
FUEL TANK SIZE
(2) 1/3 Oz.
LANDING GEAR
Skid
REC. NO. OF CHANNELS
2
CONTROL FUNCTIONS
Rud., Elev.
BASIC MATERIALS USED IN CONSTRUCTION

Fuselage	Balsa, Ply
Wing	Foam
Empennage	Balsa
Wt. Ready-To-Fly	12 Oz.
Wing Loading	13 Oz./Sq. Ft.

The full size plans for the Tu-Bee on pages 52, 54, and 55 may be cut out and used to build your aircraft. If you do not wish to cut your magazine, plans are available from RCM Plans Service for $1.50. See page 163.

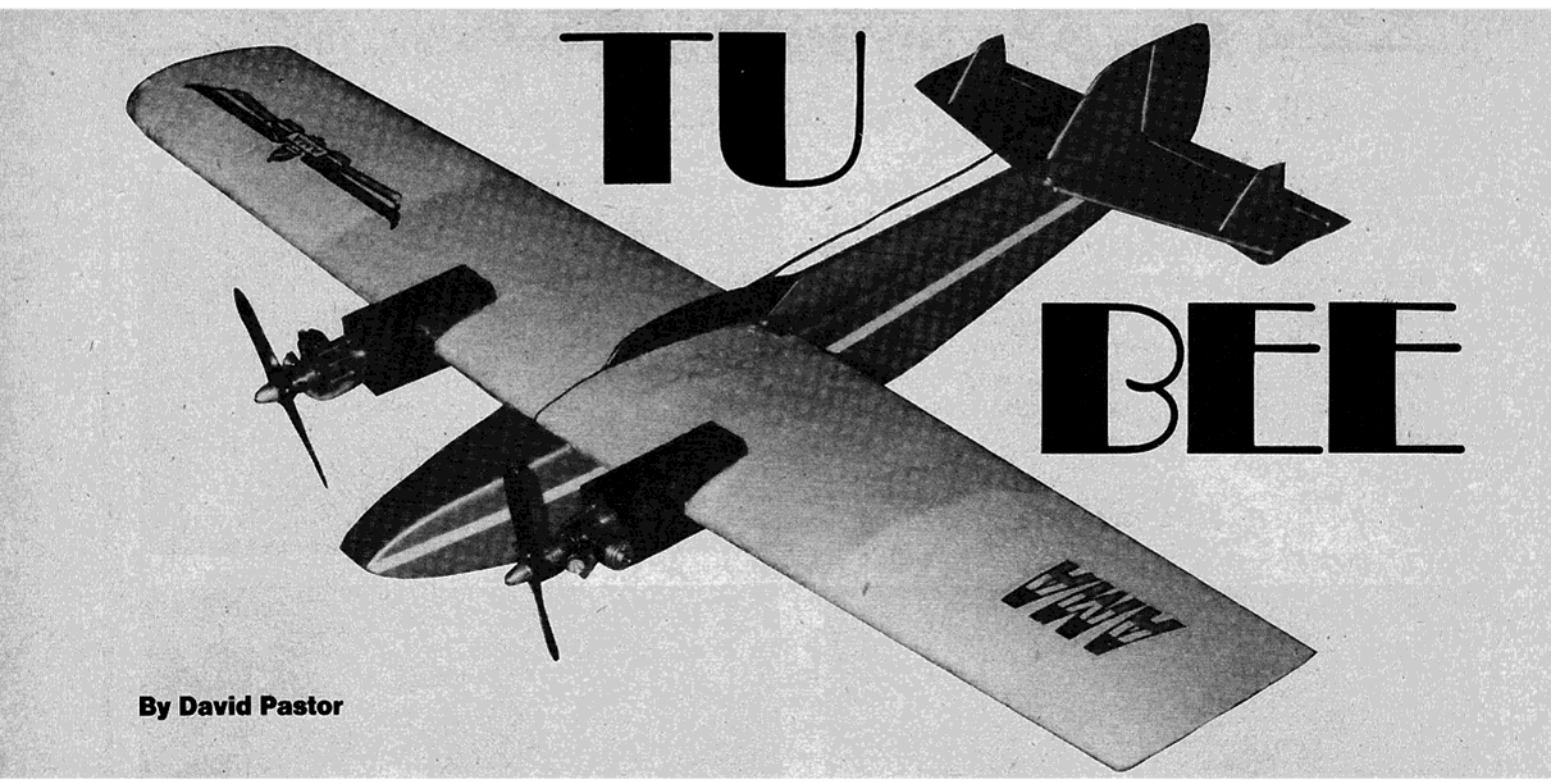
bead of RTV on the backplate where the rear of the crankcase butts to it. The engine is then mounted to the firewall with 2-56 x 1/4'' screws. Your concern here is not to damage the tank on the other side of the firewall.

Because there are two engines, vibration can be a serious problem even with these small engines. The only accurate way to balance the small props is to use a razor edge balancer. Use new razor blades. You will be surprised how even a small nick on one of the blades will stop the prop from rotating. Take your time and your reward will be a smooth running twin.

If you are looking for something different. Something that is guaranteed to turn heads at the flying field. Something that is fun to fly. Try the TU-BEE. □

By H.E
RCModeler
May 1980

TU BEE



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