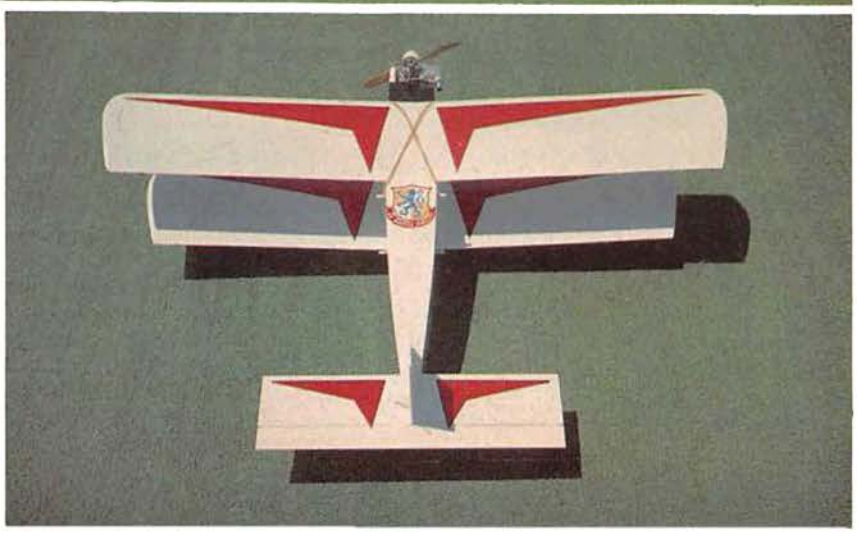
Quickie Bipe

BY GEORGE F. JENNINGS

If you want a .15 to .19 powered aircraft that attracts attention from spectators and R/C flyers alike, build the Quickie Bipe. Like all biplanes it has a certain mystique about it and, to the uninitiated, appears to be almost a magical machine. This three foot span two-winger encompasses quick construction, great flyability, economy of operation, and good looks. It is an extremely stable machine that slows down well for gentle landings, yet comfortably handles 25 mile per hour winds. Ground handling is excellent, even in windy conditions. With increased surface throws, it is capable of snappy aerobatic performance. Best of all, it won't put a big dent in your pocketbook.



● Late one evening this past Spring, Jim, my flying buddy, and myself were returning from a goodwill mission. Having visited one of the newly organized R/C clubs that seem to be springing up in the Michigan Northland, we had departed all of our knowledge to the group in short order and started home. As usual the topic of conversation was what R/C plane to build next. A rather in-depth discussion was taking place as to the virtues of Fred Reeses' 'Quickie' published in RCM back in 1972. This plane had since become our club plane since it featured quick construction, great flyability, economy of operation, and good appearance.

The discussion finally shifted to biplanes and the comment was made, "Why not design a small bipe along the Quickie lines that encompassed quick construction, great flyability, economy of operation and good looks?" This turn of events necessitated pulling off the road at the next restaurant with some subsequent serious doodling on the napkins while consuming large quantities of coffee. That night the Quickie Bipe, was born.

If you want an aircraft that attracts attention from spectators and R/C flyers alike, build the Quickie Bipe. The Quickie Bipe, like all biplanes, has a certain mystique about it and, to the uninitiated, appears to be an almost magical machine that somehow demands greater levels of competence to build and fly than the monoplane. To the already confirmed bipe flyer, nothing could be further from the truth. The Quickie Bipe is an extremely stable flyer. It slows down well for gentle landings, and handles high winds with ease. The prototypes have been comfortably flown in winds up to 25 miles per hour. Ground handling is excellent even under windy conditions.

A real plus for the Quickie Bipe is the ease with which it can be constructed. This design overcomes the drudgery of long hours in front of the workbench. Construction is strong, light and fast. Prototypes have weighed in at 2½ lbs., including radio, and with 460 square inches of wing area, gives a light wing loading of 12.54 ounces per square foot. In addition, because of its compact size, .15 to .19 engine, and three channels, the Quickie Bipe won't put such a dent in your already bent pocketbook.

This pert little aircraft reminds you of the homebuilt movement which, like R/C, is growing by leaps and bounds. If you have read this far, you must be sufficiently intrigued, so let's build. We'll start with the wings since they will be needed for fuselage construction. **Remember**, a light airplane flies better. Your finished plane with radio, engine, wheels, tank, and covering should weigh no more than 2¾ lbs. — shoot for 2½ lbs. and have a better flying aircraft. Use Titebond for all glue joints unless 5 minute epoxy is specified. Five minute epoxy is heavy and can easily add several ounces of weight to the aircraft if used carelessly.

Top Wing

☐ Join two 3" sheets of 36" long, 1/16" balsa together for wing sheeting in the following manner: Butt the two sheets together flat on your building board, making sure they fit tightly along the entire length. Sand the edges lightly with a sandpaper block if necessary to get a tight fit. Run a strip of masking tape the entire length of the seam. This tape serves as a hinge. Turn over and fold back the two sheets and apply a bead of glue the entire length of the joint. Fold back flat with tape side down and wipe off excess glue that has squeezed out. Run a second strip of masking tape down the seam on this side. Set aside to dry.

QUICKIE BIPE
Designed By: George F. Jennings

TYPE AIRCRAFT
Sport Biplane
WINGSPAN
38" Top — 34" Bottom
WING CHORD
6⅜ Inches
TOTAL WING AREA
460 Square Inches
WING LOCATION
Bi-Plane
AIRFOIL
Flat Bottom
WING PLANFORM
Constant Chord
DIHEDRAL, EACH TIP
1¼" Top — 1" Bottom
O.A. FUSELAGE LENGTH
25⅝ Inches
RADIO COMPARTMENT AREA
(L) 7" X (W) 2½" X (H) 3¾"
STABILIZER SPAN
16 Inches
STABILIZER CHORD (Incl. elev.)
4¼"
STABILIZER AREA
68 Square Inches
STAB. AIRFOIL SECTION
Flat
STABILIZER LOCATION
Top of Fuselage
VERTICAL FIN HEIGHT
5 Inches
VERTICAL FIN WIDTH (Incl. rudder)
3½" (Average)
REC. ENGINE SIZE
.15 — .19 Cubic Inch
FUEL TANK SIZE
4 Ounce
LANDING GEAR
Conventional
REC. NO. OF CHANNELS
Three
CONTROL FUNCTIONS
Rudder, Elevator and Throttle
BASIC MATERIALS USED IN CONSTRUCTION

Fuselage	Balsa and Ply
Wing	Balsa
Empennage	Balsa
Weight Ready-To-Fly	44 oz. max.
Wing Loading	13.8 Oz./Sq. Ft.

☐ Repeat the above step and join the second two 3" sheets to make the second piece of top wing sheeting.

☐ Using a straight edge, cut the **bottom sheeting** to a width of 5-13/16" and leave 36" long. Mark this as bottom sheeting with a ballpoint pen. Top sheeting need not be altered. Simply mark as top sheeting.

☐ When dry, peel off the masking tape from both pieces of sheeting you just joined.

☐ Pin down a 1/2" sq. soft balsa leading edge to your wax paper covered building board.

☐ Pin down the bottom sheeting so that it butts against the 1/2" sq. leading edge after adding glue.

☐ Pin the 1/16" x 3/8" x 36" filler strip to the back of the 1/2" sq. leading edge after adding glue. See plan.

☐ Glue the two center ribs in place 1/16" apart. Angle the center ribs slightly apart at the top to get the correct dihedral angle. The plans call for 1¼" dihedral under each wing tip.

☐ Starting at the outboard ends of the sheeting, glue in the remainder of the ribs spacing them 2¾" apart. See plan.

☐ When all ribs have dried thoroughly, trial fit the top sheet where it butts against the leading edge. Bevel the trailing edge. Glue the top sheet in place being sure to get glue on every portion of the ribs, leading edge, and trailing edge where the top sheet comes in contact. Use pins to hold in place at the leading edge and weight the sheeting down with 4" stacks of magazines until dry, preferably overnight.

☐ When dry, carve the leading edge to shape with sharp knife.

☐ Use a sharp knife or razor saw and cut the wing in two halves at the center section. Using a sanding block, **carefully** sand the center of the wing for a proper fit and the correct dihedral.

☐ Pin down one half of the wing and squarely block up the other half of the wing to 2½". Coat both surfaces with 5 minute epoxy and join.

☐ Sand the center section of the wing lightly and wrap a 3" to 4" band of light cotton or dacron cloth, Celastic, or fiberglass cloth completely around the wing. All materials except Celastic are saturated with Titebond. Celastic is simply soaked in dope thinner and applied. **Do not eliminate this step** as virtually all the center section strength comes from this wrap.

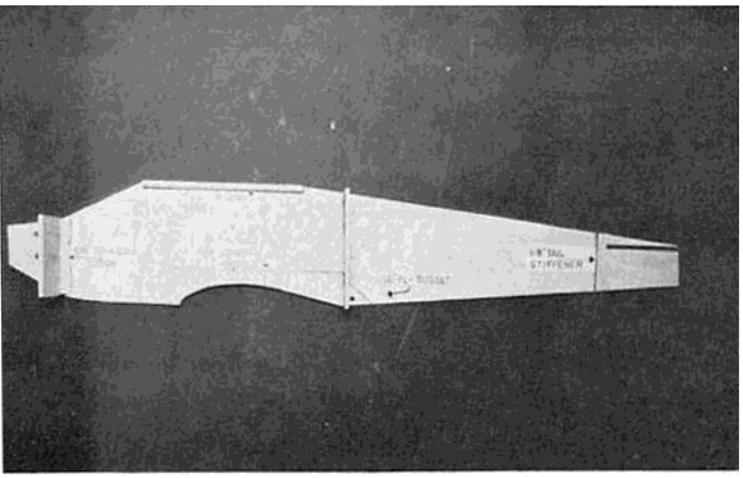
☐ Add the tip blocks.

☐ When the center section wrap is dry, carve the wing tips to the contour of the airfoil. The tip shape will form automatically as you carve. Sand the entire wing carefully and set aside for covering.

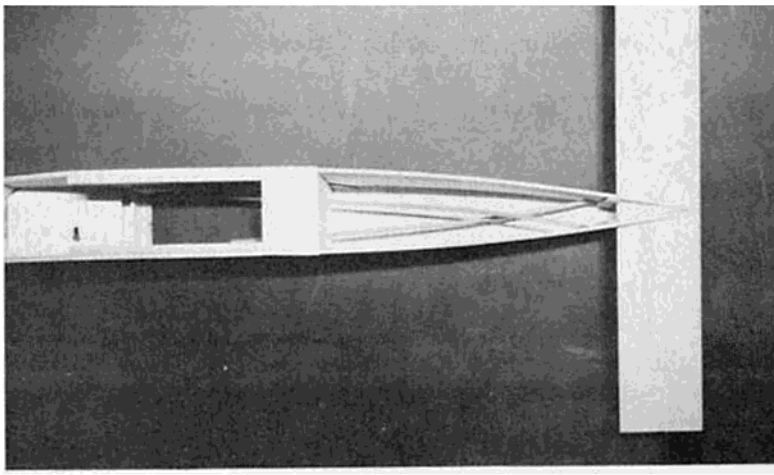
Lower Wing

☐ Cut four sheets of 3" wide 1/16" balsa to a length of 32 inches.

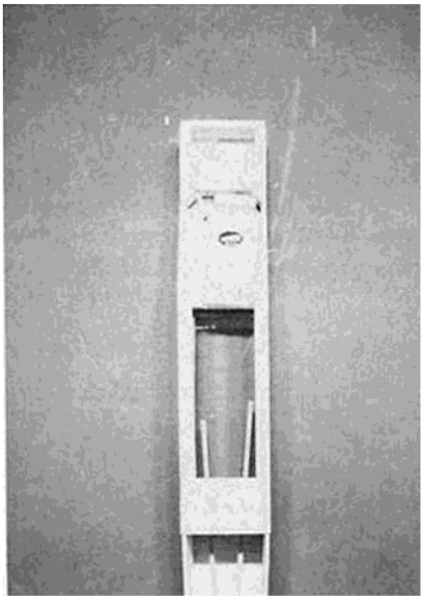
☐ Repeat each of the previous steps used to build the top wing in exactly the same order as before. The lower wing rib spacing is 2½". See plan. **(Note)** The dihedral should be the same degree angle as the top wing. Since the lower wing is shorter, there should be only 1" of dihedral under each wing when joining the two wing halves. This means pinning down half of the wing and blocking the other half to 2".

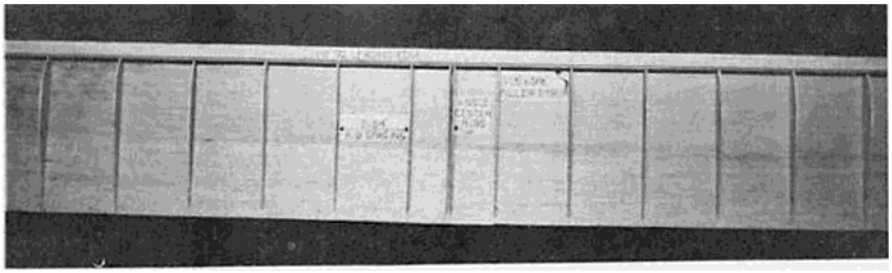


After gluing wing saddles, 1/16" ply gusset, 1/8" balsa tail stiffener, and 3/8" triangle stock to each side, epoxy the firewall and rear former in place to the right fuselage side at 90°.

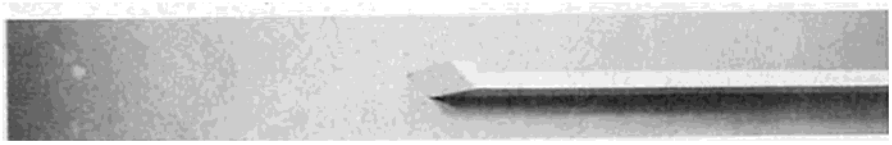


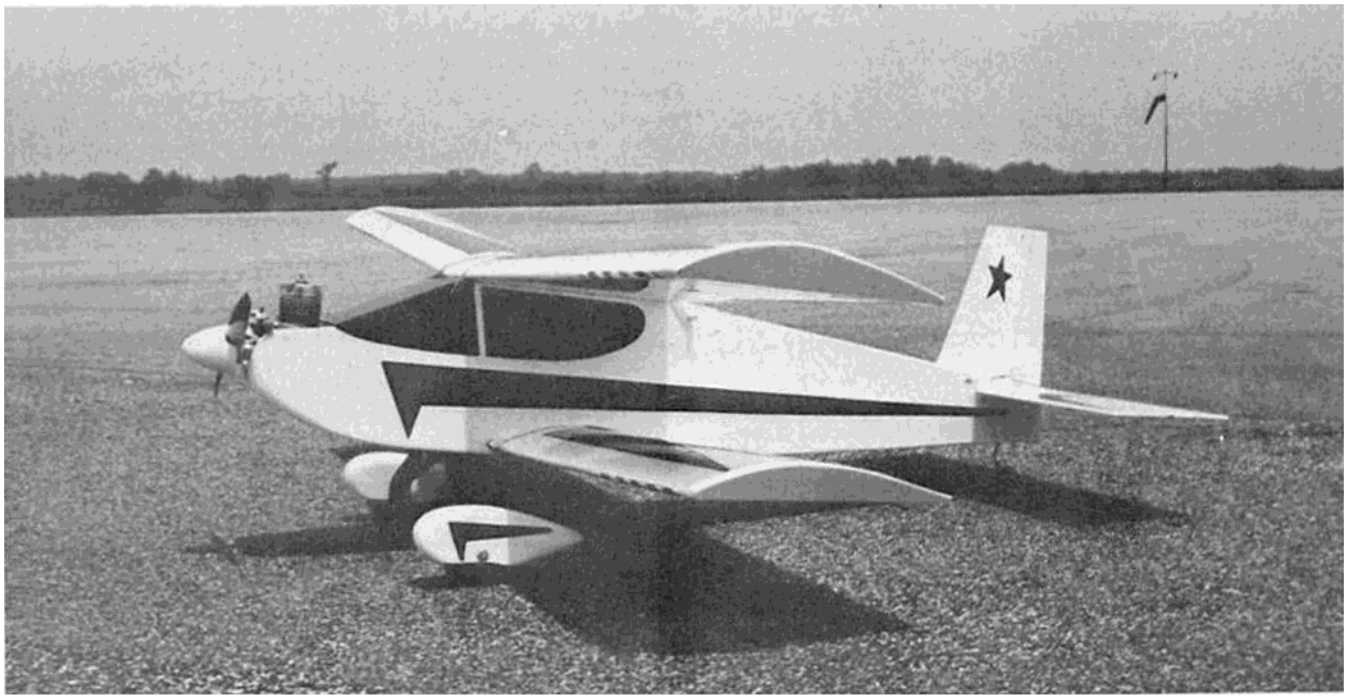
Install the outer pushrod cases before sheeting the top of the fuselage. Rough up the plastic pushrod housing with coarse sandpaper and use 5 minute epoxy to secure to fuselage bulkheads.





LEFT: Tank installation should be made prior to adding the 1/16" plywood windshield piece. The 1/4" balsa nose blocks are added at the same time. ABOVE: The wings are built in one piece and, after adding the top sheeting, cut the wing in half with a razor saw or sharp knife. BELOW: Each tip block is a 1" wide length of triangular balsa stock. Carve the tip to the airfoil contour and the tip shape will form automatically.





Fuselage

☐ Using medium weight 1/8" balsa sheet, make two fuselage sides. Unless you can secure 6" wide balsa which, incidentally, will be very costly, use 4" wide sheet and splice on a 1" piece to get the necessary width. Use the same masking tape method you used to join the wing sheeting for splicing.

☐ Mark the location of the firewall and the former on the fuselage sides. Make one left and one right side.

☐ Fit the 1/16" balsa doublers to the fuselage sides between the firewall and the former. Run the grain vertically. Coat both doublers and fuselage sides with contact cement and press in place when tacky.

☐ Cut out the slot for the stab, and add the 1/16" plywood gussets as shown for the wing hold-down dowels. Add the 1/8" tail stiffeners, 1/4" square balsa top wing saddles, and the 1/8" balsa lower wing saddles to each fuselage side.

☐ Decide what engine and radial mount will be used. A Kraft-Hayes mount is recommended. Position the mount and mark the holes. Install 4-40 blind nuts in the firewall. Cut off the excess lengths of the bolts so that they are flush with the firewall. Grind the back of the mount to yield 1° of right thrust and 1½° to 2° down thrust.

☐ Epoxy the firewall and rear former to one fuselage side in the position you marked on the fuselage side. Be sure both the firewall and former are 90° perpendicular to the fuselage side.

☐ Join the other fuselage side with 5 minute epoxy, making sure the entire fuselage is completely square.

☐ Add the 3/8" triangle stock firewall back-up braces behind the firewall.

☐ Glue the 1/16" plywood fuselage bottom in place using a bead of epoxy where the ply bottom contacts the firewall. When cured, glue the rest of the ply bottom down securely with Titebond using rubberbands and weight to hold in place until dry.

☐ Add the 1/8" plywood landing gear brace as shown on the plan.

☐ Find the exact center of the firewall and former and mark with a ballpoint pen. Next, using the line on your plan from the fuselage top view, align the two marks with the line on your plan and pull the fuselage sides together at the rear so that the center is on the line. Glue in this position and clamp with two spring clothespins. You should now have a perfectly aligned fuselage.

☐ Glue on the 1/16" balsa bottom sheeting from the trailing edge of the lower wing on back towards the tail. **Make sure this is crossgrain as shown on the plan.** Add the 1/16" ply tail piece.

☐ Before gluing on the crossgrain top sheeting, trial fit the wing hold-down dowels and put both wings in place with rubber bands. Be sure the wings set parallel to each other when viewed from the front. If necessary, trim the wing saddle slightly on one side of the fuselage.

☐ Trial fit the stab in the fuselage slot using the wings as a reference point to line up the stab parallel with the wings. When perfect, epoxy the stab in place, checking several times as the epoxy cures to be sure nothing shifts.

☐ After the stab is cured, remove the wing and dowels and plan your servo or brick installation, but don't install them as yet. Install the outer pushrod cases by drilling 3/16" holes through the rear former and out the fuselage sides at the appropriate locations. Taking coarse sandpaper, rough up the pushrod cases where they go through the former and fuselage sides and epoxy in place at both ends. Bevel the pushrod case where they exit the fuselage sides so that they are flush with the side.

☐ Now add the 1/16" crossgrain top sheeting. Be sure to add the 1⅜" x 3" x 1/16" ply piece just behind the top wing trailing edge.

☐ Add the vertical fin, making sure it is 90° perpendicular to the stab at the location shown on the plan.

☐ Add a strip of 1/4" triangular stock to each side of the fin as shown on the plan. Also add 1/4" triangular stock to the under-side of the stab on each side of the fuselage. This provides a great amount of strength — **do not eliminate this triangular stock.**

☐ Next plan your fuel tank installation and drill appropriate holes through the firewall for the fuel line before adding the forward 1/16" ply top. Then glue the ply top in place. A 4 oz. tank fits nicely and . . . . gives long flights. Place the tank as high as possible. You may want to add a 1/8" tank floor.

☐ Add 1/4" balsa noseblocks as shown on the plan and carve to a pleasing well-rounded shape.

☐ Carefully sand the entire fuselage, slightly rounding all corners using a sanding block.

☐ Install the dural landing gear by drilling two holes through the gear. Line the gear up so that the wheel axle is in line with the leading edge of the wing. If you plan to take off from grass, move the wheel axle 1/8" ahead of the wing leading edge. Mark the location on the ply bottom and drill 1/8" holes. Install blind nuts. Cut off the excess length from the 4-40 bolts. Both House of Balsa 8" dural gear and Hallco B105-3 were used on the prototypes.

☐ Carefully round the edges of the fin, rudder, stab, and elevator. Cut strip hinge material into pieces 5/8" wide and drill 1/16" holes through the hinge as shown on plan.

☐ Carefully slot the tail surfaces for the hinges. Be sure to use at least 4 hinges on the elevator and 3 on the rudder. Do not epoxy in place until the plane is finished.

☐ Using 1/16" wire for the tail wheel, bend a 90° angle and drill a 1/16" hole into the rudder at the location shown on the plans.

☐ Carefully poke the wire down through, and out, the 1/16" hole you have drilled in the plywood tailpiece on the bottom of the fuselage. Bend the wire to accept the tail wheel.

☐ Temporarily re-install the rudder with hinges and plug the wire into the rudder. When adjusted for easy movement, solder a small washer to the wire at the bottom of the fuselage. A soldered washer takes the strain from the rudder. The rudder horn straddles the wire plugged into the rudder for strength in this area.

☐ Solder the tail wheel in place. You now have a steerable tailwheel.

Finishing And Radio Installation

☐ It is recommended that one of the mylar heat shrink covering materials be used for an attractive quick finish. Prototypes used Solarfilm with Regular MonoKote for trim. Dope and other finishes can be used but you are cautioned to be weight conscious!

☐ After finishing, permanently glue the wing hold-down dowels in place. Epoxy the hinges and control surfaces in place.

☐ Install the engine, muffler, prop, wheels, tank and control horns. Trial fit the battery under the tank and receiver and servos in the main compartment. Strap on the wings and shift the servos and battery forward or back until the correct balance is achieved. The balance point should be from 2¼" to 2½" back from leading edge of the top wing and **no further back**! When correctly balanced, the plane hangs slightly nose down when suspended on the tips of your index fingers placed under the top wing on each side of the fuselage.

☐ When the position of the servos is found for correct balance, epoxy two pieces of 1/2" sq. soft pine (not balsa) across the fuselage to support the servo tray or brick.

☐ Wrap the battery and receiver loosely in foam and put in a Baggie for fuel proofing.

☐ Install the inner pushrods (yellow) as follows: Cut off a piece of 2-56 threaded rod and screw into the pushrod at least 1/8". Screw on the clevis and insert in the pushrod case. Hook to the outermost hole in control horns.

☐ At the servo end of the pushrod, screw a section of threaded rod into the pushrod at least 1/8". Make a Z-bend in the rod and put on the servo arm. Make all initial adjustments at the servo end by screwing the threaded rod in or out to achieve a neutral condition at the control surfaces.

☐ 1/32" music wire is recommended for the throttle pushrod as it is easy to bend and yet rigid enough to actuate the throttle. Be sure the throttle linkage is adjusted accurately so that the throttle servo isn't in a stalled position at high or low throttle which can drain your battery pack and damage your radio.

☐ Set up minimum throw on the elevator so that you get **no more than 5/16" in each direction.** Set the rudder throw for no more than 3/8" throw in either direction.

☐ If this is your first radio installation, get an experienced flyer to check over your work before you attempt to fly!

Flying

The Quickie Bipe is a very easy to fly, 3 channel airplane. However, if you are a newcomer to R/C, get the help of an experienced flyer for those first flights. Many airplanes are destroyed by beginners on that first flight simply because their reflexes can't cope with an out-of-trim aircraft. Be sure the person you get to help can put his **words** into **actions**. There are two kinds of experts: flying experts who **fly** and flying experts who **talk about flying.** (I resent that! - - - Don Dewey)

Use an 8/4 prop for .15 engines and 9/4 on .19 engines. Make sure everything is straight and true with no warps. Use at least 6 rubber bands on each wing. Be sure your trim levers are at neutral as well as your control surfaces. Re-check the aircraft balance with an empty tank.

The Quickie Bipe is capable of beautiful take-offs and landings and will fly very slowly without stalling because of its low wing loading. It is also capable of aerobatics with increased control surface throws, and will loop, spin, roll, and snap although it will not tolerate sustained inverted flight and simply rolls itself upright. I hope you have as much enjoyment with your Quickie Bipe as I have had with the prototypes. ☐