EEE-Z-FLI

The Maui Wind Machine

• Those of you who have visited and flown with us on the Hawaiian island of Maui are aware that our widely touted "gentle trade winds" frequently become quite energetic, particularly during the summer months. Flying during these periods leaves the enthusiast with few choices; get up with the proverbial chickens and fly from 6 a.m. till about 9 a.m. when the winds pick up, fly a pattern type aircraft with good penetration, or pack it in and go home. Unfortunately, many modelers (and some well known editor/publishers) are not early risers, not all of us are into pattern aircraft, and those going home are often faced with mundane tasks like mowing the lawn, trimming the hedges, or worse.

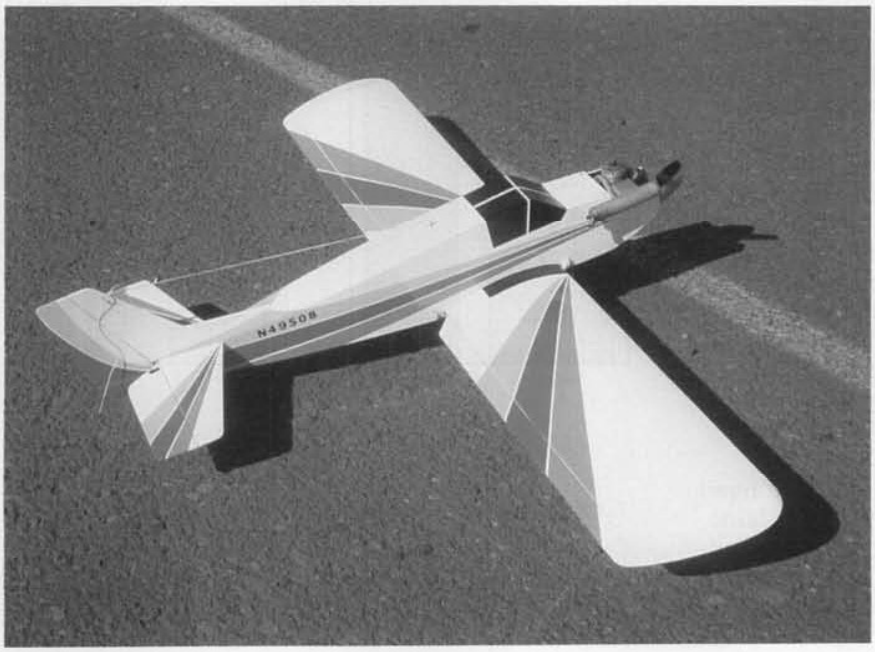
Seriously, the least fortunate are the students, as most of the "leading trainers" just plain blow away before they even get off the ground. The obvious answer is an airplane capable of handling the windy conditions in the hands of a student, one that is tough enough to withstand the inevitable knocks of training under adverse conditions and, most important, an airplane that introduces the newcomer to R/C flying as an affordable pleasure rather than an expensive task. Other considerations for those who like to build is ease of construction without a need for exotic materials and a basic structure that, should it be damaged, is easily repairable.

In addition to the foregoing, basic design goals are quite simple.

1. A landing gear that is "student strong" and properly triangulated to prevent easy tip over when operating in strong winds and one that provides straight tracking and easy rotation.

2. A combination of airfoil and wing loading that provides stability, good penetration and minimized gust effect on approach and landing.

3. A control system adaptable to both the student's slower response requirements and the more advanced flier's aerobatic taste.

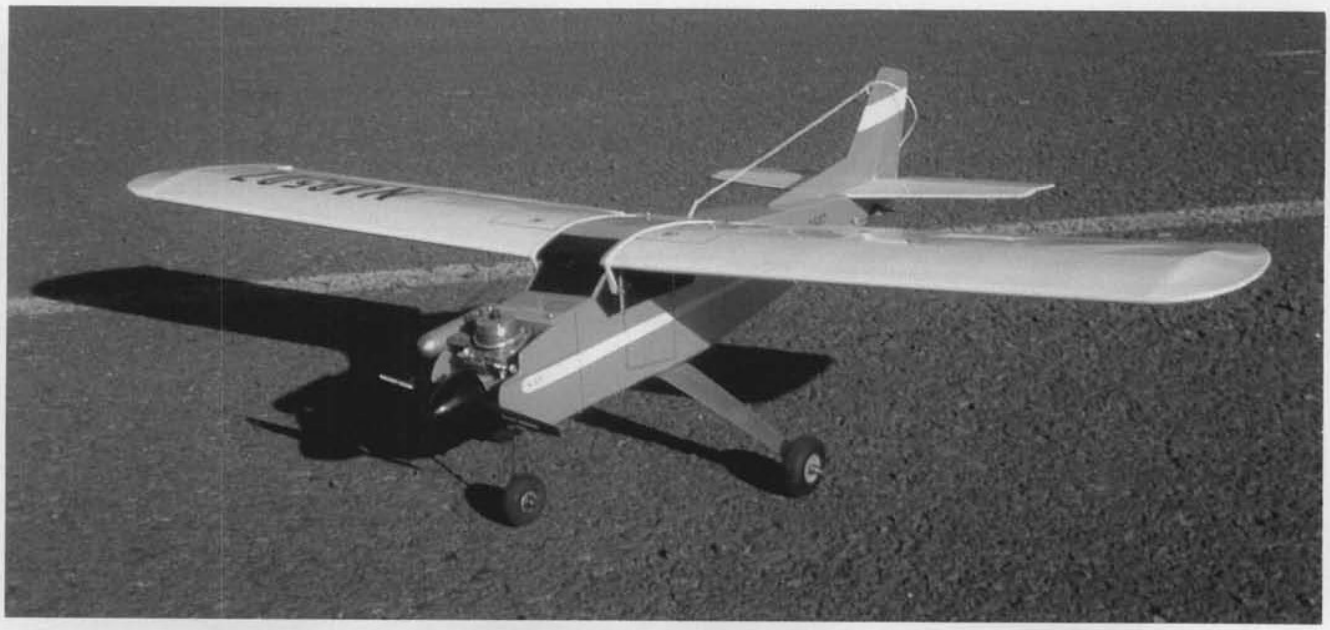


Left: The low-wing taildragger version will most likely yield the highest performance of the four variants detailed on the plan; two of the other three possibilities are shown on the facing page. All of the prototypes have been flown with K&B .20 Sportster engines, and with very good results.

4. The completed model has to look more like an airplane than a 2x4 with a wing attached.

Although not initial design criteria, follow-on considerations have produced easy conversion from tri-gear to taildragger configuration and from high wing to low wing, using all the same basic components, and one set of drawings and building instructions.

The design and test phases have now reached the point where, with over ten aircraft in all variations flown extensively, we find that all initial design and performance criteria have been met, or exceeded. Perhaps the time has come to tell all windy weather fliers about EEE-Z-FLI, The Maui Wind Machine.



By AL WHEELER . . . Here's a simple, basic airplane designed to handle windy conditions and also to be tough enough to stand up to a beginner's abuse. A bonus feature is that it can be built as a high or low wing, trike gear or taildragger—take your pick.

PRE-CONSTRUCTION CONSIDERATIONS

A review of the drawings will indicate that you have several choices; the basic high wing tri-gear version, a high wing taildragger, or either landing gear configuration in the low wing version. The basic high wing tri-gear is recommended for the beginning student, while the low wing serves as an excellent step up to an aerobatic trainer and Sunday fun-fly aircraft.

NOTES

1. It is recommended that all parts be cut out prior to the start of construction, more like a kit.
2. Any installation item peculiar to the low wing version is noted in Italics.
3. It is important that this wing be built *flat*, as this type of construction is rigid and resists corrective warping.

CONSTRUCTION
FUSELAGE

Select two matched sheets of 1/8 medium hard balsa. Cut FS-1 and FS-2 pieces from each sheet and edge join on a flat surface. *For the low wing join FS-3 as shown.* Cement FD-1 and FD-2 to the sides starting with FD-2. Position FD-2 1/8 inch behind the front of fuselage side; this provides a slot for the firewall. Install FD-1 1/8 inch behind FD-2, this provides a slot for B-1. *For low wing version invert FD per drawing to provide clearance for the wing trailing edge.* Install vertical 1/8x1/2 pieces in aft fuselage. Mark and cut pushrod openings in aft fuselage. *For low wing now cut out wing saddle on both sides.* Install

Continued on page 81

going to be a lot of interest expressed by the model flying fraternity, especially by you older guys who would rather ride than walk. I have been having the time of my life with this little scooter, and it is becoming a familiar sight to see me flitting around the local model flying fields. I realize we have somewhat departed from model airplanes in reviewing this product, but it seems to have a great deal of appeal to modelers because of the sheer practical use it affords, and the outright fun you get from it. Besides, running small piston engines is right up our alley, and the sound of a steady putt-putt, plus a whiff of the exhaust, puts us into a kind of euphoric state.

Folded, this baby uses practically no space in the trunk of any vehicle, as it takes up only 2.5 cubic feet of storage space. Lately I've been carrying it in my motor home, and the convenience is just amazing. The fuel tank carries .2 gallons of gasoline mixed 40:1 with two-stroke oil, and it seems to run about a week (actually about 45 minutes) on a tankful. The single cylinder air-cooled Zenoah has a displacement of 22.5cc. The muffling arrangement is really ingenious; the exhaust flows into the steel alloy frame and comes out from a few small holes, keeping engine noise down to a pleasant purr. At slow speeds you can hardly hear the thing run. Horsepower is 1.4 at 8,000 rpm, and the ignition is completely electronic. There is no complicated transmission, as the direct drive principle is utilized. Your left hand controls a set of front wheel caliper brakes, while the right hand has a very responsive throttle control. The manufacturer claims 18 mph as the top speed and 15 mph for cruising, and these figures appear quite accurate to me. It is also claimed that the maximum carrying capacity is 400 pounds. The machine is supposed to be able to carry two riders, but I haven't tried it out with a passenger yet. You would need two people with small feet to get them both on the Go-Ped even though the platform is a comfortable twelve inches wide. The wheels are six inches in diameter, of solid rubber, and should last indefinitely. Replacements are available from the distributor.

Learning to ride the Go-Ped comfortably was no problem at all, and after about ten minutes I was feeling quite at ease. After half an hour of practice I found I could even do wheelies and jump small curbs. Maneuverability is exceptional, as the turning radius is just 2.5 feet. Best performance is on smooth, paved surfaces, but depending on how you like your thrills, I am sure it will negotiate some rough trails. It is really kind of eerie to go scooting along on this tiny machine, as you actually feel you are just flying through the air like Superman, suspended in the air with nothing supporting your body. And the way it zips up and down hills is remarkable, considering the modest power source. If you really want to get fancy about this pocket-sized personal transporter, the manufacturer even offers a handsome over-the-shoulder carrying case.

I just can't wait to take my Go-Ped to the AMA Nats this year. Just imagine how much ground you can cover in going from one event to another! So now that you feel you just have to have one of these sidewalk speedsters, they are available from Vopard Enterprises, Suisun City, California 94585, telephone (707)422-6755.

In closing this month, I wish to thank my readers for their kind and interesting letters and phone calls. I will always find time to reply to your questions and comments, and we are particularly interested in hearing of your experiences with ARFs of all types. Meantime, my address is still 2267 Alta Vista Drive, Vista, California 92084, telephone (619)726-6636. •

EEE-Z-FLI. . . *Continued from page 21*

B-1 in slot in one fuselage side and B-2 flush against the aft side of FD-1. *For low wing, install B-2 flush with the bottom of the fuselage and add scrap to the top as required. Trim the bottom of B-1 even with the wing cutout.* Join the fuselage sides by cementing B-1 and B-2 to the remaining side. Use a flat surface and square to align sides at aft end. Install FD-3 and FD, *FD-5 for the low wing.* On high wing only install 1/2x1/8 doublers at top of fuselage from the back of B-1 to the front of B-2. Make firewall from 1/8 ply, mark and drill for desired engine mount and install blind nuts. Mark and drill for fuel lines and throttle and cut slot for nose steering arm. Install firewall in slots provided using 5-min. epoxy. Install triangular braces behind firewall and cross brace across firewall top for hatch support.

Pull aft ends of fuselage together, assure

good alignment (no bananas, please), secure with clothes pins and cement. Install vertical filler, support V under stabilizer cutout and if a taildragger, a bottom V pad. Install top and bottom cross braces in aft fuselage. The fuselage bottom may now be covered with 1/8 balsa back to the 1/8 ply landing gear pad. If you plan to convert to a taildragger, install a landing gear pad long enough to accommodate both landing gear positions. Install triangle braces between gear pad and fuselage sides in the length required. The aft end of the fuselage from gear pad back is covered with 1/16 balsa cross grain. Top of fuselage may now be covered with 1/16 balsa from the back of B-2 to the stabilizer cutout. Cement windshield to forward face of fuselage sides. Note that the top and bottom edges are cut at an angle to fit. Install the hatch screw pads and install the hatch with the tab under the windshield and two #40 screws in the front corners. *On the low wing, install the cross braces at the base of the windshield area and the top of FS-3. The entire top of the fuselage from the windshield base to the stab cutout is covered with 1/16 balsa cross grain.* Servo support rails may now be installed using 1/8 ply. *On the low wing the rails are attached to the top of FD-1 and the servos are mounted inverted.* Position the forward rails to accommodate the servos used. Golden rod or pushrods may be used, all prototypes used pushrods.

TAIL SURFACES

All surfaces are medium hard balsa. Note the stab requires a piece of scrap to extend the leading edge to the 3-1/2 inch dimension. Elevators are joined with 3/16 dowel as shown. Join on a flat surface and be sure the leading edge is flat and straight. Cut hinge slots and cement hinges into stab only. Join fin and dorsal and install hinges in fin and aft fuselage only. Mark rudder and cut slots. Note: For taildragger, reinforce bottom of rudder both sides with 1/16 sheet. Trial fit stabilizer and fin to fuselage and trim dorsal to fit top of fuselage if required. Do not cement fin to stabilizer yet. Sand all edges round and put aside for covering.

WINGS

Select four matched sheets of 1/16 medium hard balsa and, working on the plans, cut and edge-join the bottom wing sheets. Leaving the bottom sheets on the plan, mark the spar and rib locations with a ball point pen. Cement the spars to the bottom sheets, assuring that the sides are vertical. Cut the trailing edge material to length, mark its location and cement it to the bottom sheets. Now install the three R-3 ribs. Make sure that they are flush with the top of the spar and 1/16 inch below the front edge of the trailing edge. Note: Angle the butt ribs to accommodate the dihedral angle.

Now install the three R-2 ribs, assuring that they are 1/16 inch above the spar top and flush with the top of the trailing edge. Bevel the ends of the R-4 ribs for a good fit and install, also 1/16 inch above the top of the spar and flush with the top of the trailing edge. On the nine R-1 ribs, be sure that the round cutouts for the leading edge allow it to seat firmly on the bottom sheet, even with the front edge of the sheet. The rear edges should be flush with the top of the spar. Install the R-1 ribs and cut the leading edge dowel to length. Cement it in place, being sure of a good joint with the bottom sheet and all ribs. From 1/8 scrap, install spacers between the R-3 ribs flush with the face of the trailing edge and 1/16 below the top. This provides a better seat for the center section planking. The area between the R-3 ribs may now be planked with 1/16 balsa. End the planking at the center of the spar. Cut a length of 1/16 for the leading edge, notch to clear the center section planking at the spar top. Wet the top surface and install flush with the rear face of the spar. Assure adequate cement on the spar too, the top of all ribs and on the leading edge dowel. Tape around the leading edge to assure a tight joint. The tip plate may now be installed; sand the straight edge for a good fit against the end rib.

The ailerons may now be cut from the trailing edge, trim the inboard ends as shown and bevel the aileron leading edge. Cut hinge slots in the ailerons and the trailing edge, install the hinges in the trailing edge only. Install actuating hardware as shown. *On the low wing version, the actuating arm is in the up position and should be bent forward about 15 degrees to provide clearance at B-2.* Trim and sand the bottom sheets and the top planking to form a round contour with the leading edge dowel.

The wing halves may now be joined. With a 1-1/2 inch block under one tip,

sand the butt ends to obtain a good fit assuring that the leading edge is straight. When satisfied with the fit, puncture holes in both butt ribs to provide for better epoxy penetration. Join with 5-min. epoxy. When cured, sand entire wing and ailerons. Install glass tape reinforcement, double in area of aileron servo attachment. *On low wing model, install 1/8 ply pad for landing gear mount, drill and tap 1/4-20 to match holes in gear. Note: If gear is not pre-drilled, drill mounting holes per drawing.* If a tail-dragger version is built, mount gear in the forward position and install a Goldberg or similar tail wheel support, bend wire as shown and make a U-clip for attachment to the bottom of the rudder. Mark and drill holes for wing attachment dowels, cut and install dowels, press fit only, no cement.

COVERING

Sand all surfaces a final time, round fuselage edges, hatch corners and windshield. Covering may be done in the builder's choice of materials. The prototypes were covered and trimmed in Super MonoKote. Mark, cut, and remove covering from all assembly joints to assure a wood-to-wood cement joint.

ASSEMBLY

Cement stabilizer to fuselage, checking for alignment. Position fin on top of stab with rudder attached, to check alignment with the aft fuselage. Mark and install, using a square to be sure it is true, and be sure the dorsal is centered on the top of the fuselage. The elevators may now be installed and the hinges cemented, followed by the rudder. Install fuel tank, engine, landing gear, servos, and control pushrods. Engine thrust lines are built in. The wing saddles, both high wing and low wing, should provide a +2 degree incidence angle with the stabilizer level (0 degrees). Adjust control throws per drawing. Roll the aircraft to assure straight tracking, adjust the nose gear linkage as required.

BALANCING

Battery location may be varied fore and aft to produce a slight nose-down attitude when suspended from the balance point on the drawings (fuel tank empty). None of the prototypes have required the addition of any weight to correct balance.

FLYING

All prototypes were flown with the K&B .20 Sportster, turning a 9x6 Master Airscrew on 5% fuel. Double check all control throws for amount of deflection *and proper direction.* Adjust engine for proper running, a little on the rich side, if new. On a smooth surface, EEE-Z-FLI will track straight on acceleration and, due to the negative ground angle, will not lift off without a touch of up elevator. There are no surprises in EEE-Z-FLI's flight characteristics once it is properly trimmed out. You will find that it stays in any moderate attitude that it is put and nose drop in turns is slight. Power off approaches are slightly nose down and the flare is smooth and effortless. Touchdowns are soft and the rollout is straight, making touch-and-goes a delight, even with the taildragger.

FINAL COMMENTS

All versions of EEE-Z-FLI have been flown extensively by fliers with broadly varied flying experience and several have been built from the plans presented here. All have been pleased with both the performance and the ease of construction, and some have even found crash survivability to be remarkable!

BUILD . . . FLY . . . AND ENJOY! •

Free Flight. . . *Continued from page 59*

has classic rubber model lightweight style; stick and tissue. Another feature that I like