

LITTLE BOMB

By Wm. R. Nielsen, Jr

• Most modelers are by now familiar with the most well known of Murphy's laws, "Anything that can go wrong will go wrong." Few realize that Dr. Murphy, after intense study and lengthy application, went far beyond the simple basics for which he became so famous.

One of Murphy's lesser known laws is especially applicable, as well as intriguing. This law states, "Man, at some stage of his existence, is INVERSELY related to HIS PHYSICAL MASS." This is the only logical explanation to Jack Spratt, who could eat no fat, while his wife could eat no lean; the little guy with the monstrous car; and the Midget who builds the ten foot models.

Being a rather massive beast, I find myself especially susceptible to Tiny Toys, and .049 models seem to be a growing weakness (my wife calls it "obsession").

Advantages of the weakness (obsession) are that at least the smaller models are less expensive to build, require less construction time, and are less likely to receive damage in a poor landing. If you can avoid tearing them up, they also require far less storage space, and use little fuel. They are, however, more difficult to fly than their larger brethren . . . and possibly even more fun.

Here in South Florida, where we fly year 'round, we hate to spend too much time building, so small airplanes seem a natural answer. I have been flying these things for several years, and finally managed to interest some of my buddies in joining the class activities. We call this Class "1/2A" Open Pylon and it not only challenges building and flying skill, but is also exciting to the spectator as well as the flyer, with little hazard to either.

Okay, so we need RULES. Well, we have 'em and we follow them to the letter!!!

Rule One: No engine shall exceed .051 cubic inches.

Rule Two: Aircraft must R.O.G. (Rise off ground).

Rule Three: Aircraft must remain *reasonably* intact throughout the heat.

The present course is two-thirds that of Quarter Midgets. We may increase this to three-quarters, as it tends to get a little tight at times, but then, since it adds to the fun, why change? Excitement is what we are looking for, isn't it?

Herewith are plans for one of these little beasts. You will notice they show a wing with optional panels (Chicken Wing) for a less sensitive machine, but hardly a docile one. The shorter wing is for the more practiced flyer, and the

will also snap, roll as though with ailerons, spin, fly inverted, and about everything else except knife-edge. All this on only elevator and rudder!

Fuselage construction is simple; a basic box with formers, and pretty much standard. Noteworthy exceptions should be considered. After cutting out the sides, rub glue (I like 5 min. Epoxy) into the inside surfaces from the engine compartment to aft of the firewall, and from just ahead of the last former back to the aft end at the rudder post. The engine mount should be secured BEFORE planking the nose, and pushrod clearance and alignment checked before planking the top. Don't neglect the doublers, as they are all of importance. You should have no trouble picking these out on the plan.

The empennage, that is, vertical fin and rudder, stabilizer and elevator, are cut from medium soft 1/8 or medium 3/32 sheet balsa, with surfaces sanded to the typical cross-section shown. Note that the leading edges of rudder and elevator are half-round, trailing edges 1/32 inch thick. If trailing edges are left thicker, you will really slow the thing down, while if thinner, they will want to warp or curl.

The wing is of typical built-up construction, pretty much the same as we used forty years ago. A shim of 3/32 by 3/16 is used under the lower spar. A 1/20 shim is used under the tail-end of the three center ribs ONLY, and the other ribs and trailing edge are hard against the building board. With the exception of sheeting the underside of the leading edge, the entire wing is built on the board.

When sheeting the underside, it is especially important that great care is taken to avoid warping. It is a good idea to wash out, or warp the tips EVER SO SLIGHTLY so they have just a bit less angle of attack than the center section, but only two or so degrees. This will make the ship settle down and "hang in the groove," but if excessive will really slow her down.

Another important point is dihedral. Now if a little bit is good, more is not. Fact is, more is bad and will cause Dutch Roll and an airplane that is lousy on the turns. DON'T INCREASE THE DIHEDRAL.

Radio installation will vary with the equipment. Many radios are suitable, but then many are not. Servos must be small (KPS-15) but need not be the smallest. Small receivers are required, but again, many standard receivers fit this description. I am certain all of the "Bricks"

will be suitable, but battery packs are a problem. I just don't like 225 ma packs, as flying time is marginal for racing. The new 450 ma. packs are great and exactly what is needed. Lightweight, they are flat and narrow and easy to install. They have enough flying time to suit all racing conditions, and most fun flying days, especially when using only two small servos.

Early ships used the smallest radio commercially available, but this proved to be trouble prone. The model shown has the ACE 1-8 Rcvr., ACE BANTAM SERVOS, and ACE 450 ma Battery pack. Ready to go, dry, she weighs 16 ounces. With other heavier radios, she still need not weigh more than 18-20 ounces.

When hooking up controls, in most cases the INSIDE of the servo arm should be used, and the outside hole of the horn. Things can be speeded up later, but it's doubtful that many will want to do this.

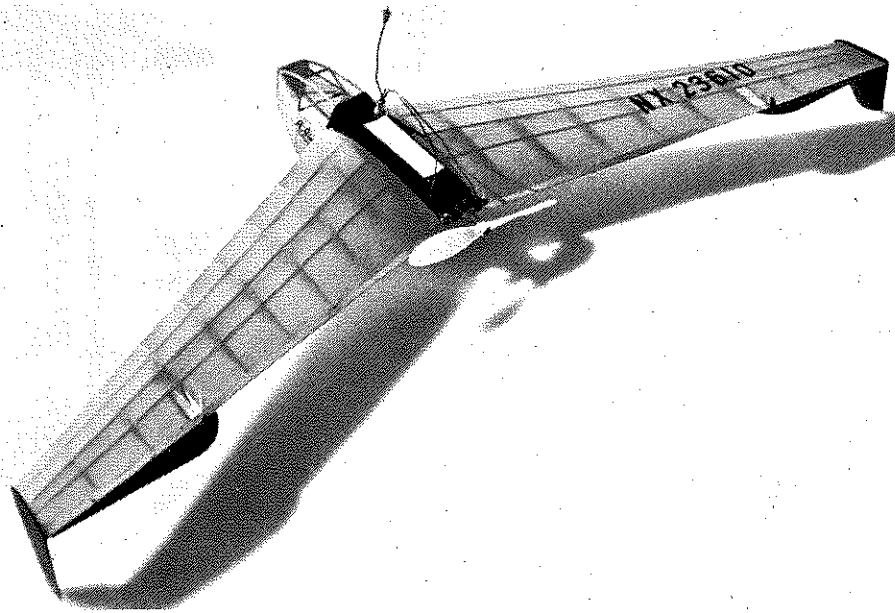
Control surface deflection should be about 1/8 inch up and 1/8 inch down, and certainly not over 3/16. The rudder may be ever so slightly more than the elevator, if desired. Trim the model to be slightly nose heavy, that is, just a bit of down elevator. With most of us it is far easier to hold a bit of up rather than a bit of down, and final trim comes AFTER we begin flying, so make the start as easy as possible. DON'T START TAIL HEAVY!

For the first flight, you can put the prop on backwards, run her rich, or use a 6-3 prop and a slightly rich setting. Any and all of these will tame things down a bit. Make the takeoff straight, very shallow climb, and NO TURNS until a safe altitude is reached. After getting good height, trim to extent required, then feel her out with minor maneuvers, progressing to more severe ones so that you get the feel of the ship.

When the engine quits, keep the nose down SLIGHTLY, at all times, and especially in the turns. Round out smoothly on the approach, bringing the nose up more as you near touch down. The ship glides well, but fast, so be prepared to overshoot. AVOID OBSTRUCTIONS at both ends of the field.

If you are a novice, I suggest you get a Formula One or a Quarter Midget flyer to test hop and trim her for you. If you are a RANK novice, I suggest you hang her up until you have more skill. After all, the fun is in the building and the flying, not the breaking and repairing. After about three "nose jobs" I lose interest in a ship, and would rather start over, and I detest wing repairs. Play it cool and have good fun flying . . .

7751



the ALIEN

By DANIEL WALTON

An interesting experiment in the use of pendulum control to maintain stable flight in a somewhat tricky design. A total success!

• The initial concept for the control system incorporated in the Alien was the result of a term paper. The system's purpose is to correct for the tendency of higher aspect ratio types of tailless aircraft toward spiral instability. Although two years lapsed between the term paper and the construction of the Alien, it was always felt the concept was viable if the mechanism could be kept light enough. Since none of the stock items available were acceptable, the system must be custom made. It may seem to be a time consuming extra to make, but if done well, it works like a champ. When flying, it can be upset by some fairly stiff gusts and correction is almost immediate. Pattern is a wide gentle left climb and glide, and flights average about one minute on a full liquid charge.

CONSTRUCTION

The keynote of this ship is simplicity, because a simple plane is usually a light one. The Alien is no exception, with a total finished weight of 1.3 ounces, trimmed and flying . . . so when building, keep it light.

The only things which should be of stiff, hard balsa are the L.E., 40% spars, keel, and main longerons of pod. These really take a beating, especially the keel area. Pod is basic box type, although you may wish to sheet the bottom (1/32 sheet) for added durability.

Because of this simplicity, only the pendulum movement will be elaborated upon. The mechanism itself must be as free from friction and binding elements as possible. Otherwise, more weight will be required on the pendulum. Here is

one of those rare cases where it pays to have a little slop in a system rather than a tight fit.

Start by constructing the two bellcranks from 1/64 plywood and 1/16 dia. aluminum tube, as shown on the plan. Tubing should be secured with epoxy, being careful not to get epoxy in the tubing. Make sure the axis of the tube is perpendicular to the plane of the bellcrank. While this is curing, form all of the wire parts. Tails on the "Z" bends which go into bellcrank should be rather long so as not to hang up on slot in R-7. The washers on main pushrods are affixed with silver solder; also, note the bend, which is important.

When the bellcranks have cured, attach them, along with washers, to R-7 as shown on plan, being careful with the glue. They must move very freely and success or failure is very dependent upon this operation. Once the glue is dry, the outer wing panels may be built in the normal manner, starting with R-7 pushrods attached to bellcranks. Then slide each rib on over the rod, like a control line model. Also make sure R-1 is jugged for dihedral, using template "D". Wash-out is automatic because of the tapered wing. Just pin it 3/16 off board all the way along T.E.

Center section is built over plans, removed and then sheeted on top side only. Now glue on front support and cut out pendulum shaft hole. Next add front and rear 1/16 dia. aluminum tube bearings to assembly using epoxy, again being careful not to get epoxy in tubing. At this point, insertion of a piece of

straight .025 piano wire will aid greatly in maintaining alignment during cure. Allow this assembly to cure at least five hours. The pendulum shaft should be partially bent so it resembles the letter "J". Add the washer as shown on plans. This is very necessary to keep the main push-rods from climbing the shaft. Install by inserting into rear bearing from T.E., with a slight bowing of shaft, and running through to front bearing. Now the bottom is sheeted.

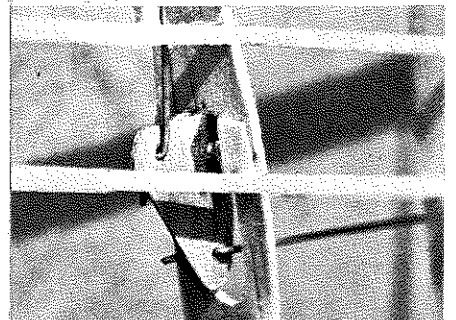
Assembly of center section and panels is done by inserting push-rods into center section through holes in R-1A and gluing R1 to R-1A with Titebond. When dry, push pendulum shaft back far enough to hook both push-rod ends, pull back, add bead and bend shaft down, making sure short and long arms are parallel. About 1/16 inch end play is also very desirable. Solder on 1/16 dia. brass tube and add wheel collar.

At this point, the wing is covered with tissue paper. Shrink with rubbing alcohol and dope assembly. Finally, attach elevons with thread hinges as indicated. They should move freely.

As for mounting the engine, Mr. Brown now has a single and a twin cylinder engine available. The Alien has been flown with both types, but you may wish to mount a second tank. Twin cylinder models seem to run 20 seconds maximum with a single tank. The second tank should be mounted on the left side of the pendulum shaft, mirror image fashion. Because of its ready accessibility, provision should be made for easy engine removal. One of the new Crocket engine mounting rings is well suited for this. The firewall is marked for single cylinder type engine. Twin will require 90° rotation of hole position. The discontinued single cylinder model with 3 hole mounting would also work on this model, but the engine itself is shorter and the firewall would have to be moved aft.

FLYING

Flying should present no problems whatsoever, if the ship has no visible warps. The original flew "right off the board" and was trimmed for optimum performance on the first day. Bank is controlled by differentially adjusting the "V" bends in elevon push-rods, and C.G. should be as marked on plans, at the 60% position of the center section.



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