



OT'W... #168

Richter R/C Aircraft Design
Weasel and miniWeasel

Our most recent kit review was written about Trick R/C's original Zagi, published in the January 1997 issue of *RCSD*. Yes, the original Zagi — the one made almost entirely of styrofoam. A number of advancements in construction technology have come on the scene since then, but we haven't had the inclination or the opportunity to construct a tailless glider made of EPP (expanded polypropylene). All of that changed when we heard about Michael Richter's *Weasel* and *miniWeasel*.

The *Weasel* and *miniWeasel* arrived in separate boxes. Both were extremely well packaged and survived postal delivery in absolutely pristine condition. Michael has managed to nestle the wing cores, fuselage, elevons, hardware package and packing tape in standard boxes in such way that things don't rattle and one part doesn't damage another.

The Weasel

"The *Weasel* is a small, lightweight flying wing that is extremely maneuverable, yet forgiving. Its unique shape and special blend of airfoils gives it a wide speed range and great stability. The high lift design allows it to hover in a light headwind, while the pilot maintains full control even at this low airspeed.

“The *Weasel* is extremely aerobatic in the hands of an accomplished pilot, but has enough stability for the beginner. Its small size, light weight, and durability make it a perfect contender for light combat on the slope. The *Weasel* is agile and recovers quickly from maneuvers at low altitudes. This little glider is an absolute joy to hand catch, thanks to its light weight and low stall speed. All this amounts to an aircraft that is pure fun to fly.”

The *Weasel* has a wing span of 36 inches and requires a radio with elevon mixing and dual rates, two micro servos, a mini receiver, and an appropriate NiCd battery pack. The recommended flight pack includes two HS-81 servos, a Hitec 555 receiver, and a 4.8V 270 mAh battery pack. We used HS-80 servos, which fit perfectly in the pre-cut cavities, an FMA M5 receiver and a JR 250 mAh flat battery pack.

Kit Contents

- EPP foam wing with pre-cut cavities for servos
- EPP foam nose pod with pre-cut cavities for battery pack and receiver
- Coroplast™ fin
- balsa elevons
- spruce spars
- plywood wing joiner
- Coroplast battery and receiver cover
- plastic tubes for pushrod system
- Du-bro control horns
- Du-bro clevises
- roll of colored tape for covering
- construction manual



The miniWeasel

“The *miniWeasel* is a miniaturized version of the original *Weasel* slope glider, as the name implies. Its smaller size and light weight make it extremely maneuverable. We think that this glider is a blast to fly in small places, close to the ground. Its low wing loading allows it to fly in thermal conditions and its special blend of airfoils makes it fast for its size. (If you really want to keep the weight down for thermal flying we recommend that you not cover the elevons and fin with tape; however cover them if you plan to fly mostly on the slope, as this will make them more durable.) This airplane really comes alive on the slope in 5 to 15 m.p.h. winds. You will have hours of fun flying this little glider, literally in your face — we have actually done touch-and-goes off of their own heads! Rolls, loops, inverted flying, the *miniWeasel* does them all.

“You may think that this small glider would be difficult to fly, but it is actually not. It takes a little time to get used to the increased sensitivity of the controls, but it shares the same hands-off stability of its larger brother, making it relatively easy to fly.

“Discus launching (also known as side-arm-launching) with this glider is great; simply grab a wing tip at the spar with three fingers and fling it into the wind. You will be amazed at the altitude you can get from such a launch. This type of launch enables you to fly on flat fields, where thermal updrafts are the main source of lift. You can fly this glider practically anywhere. Take *miniWeasel* along with you on a hike, a road trip, to the local slope, to a nearby school yard, or simply give it a fling in your own backyard. Get a couple of them together on the slope and prepare for insane *miniWeasel* combat! This glider has been known to make people’s heads spin.”

The suggested radio gear for the 24 inch span *miniWeasel* includes a transmitter with elevon mixing and dual rates, two sub-micro servos, a sub-micro receiver, and a 50 to 150 mAh NiCd battery pack. The airframe is set up to take two Cirrus CS-10bb Molecular servos, Cirrus MRX-4 sub-micro receiver, and a Wattage 4.8V 150 mAh NiCd battery. We found MPI MX-30 micro-servos to be the exact size for the pre-cut servo wells. A standard Batteries America 150 mAh (N) battery pack fit with plenty of room to spare, but we had some problems fitting the M5 receiver in this model. We’ll take a look at this difficulty in greater detail in a moment.

Kit Contents

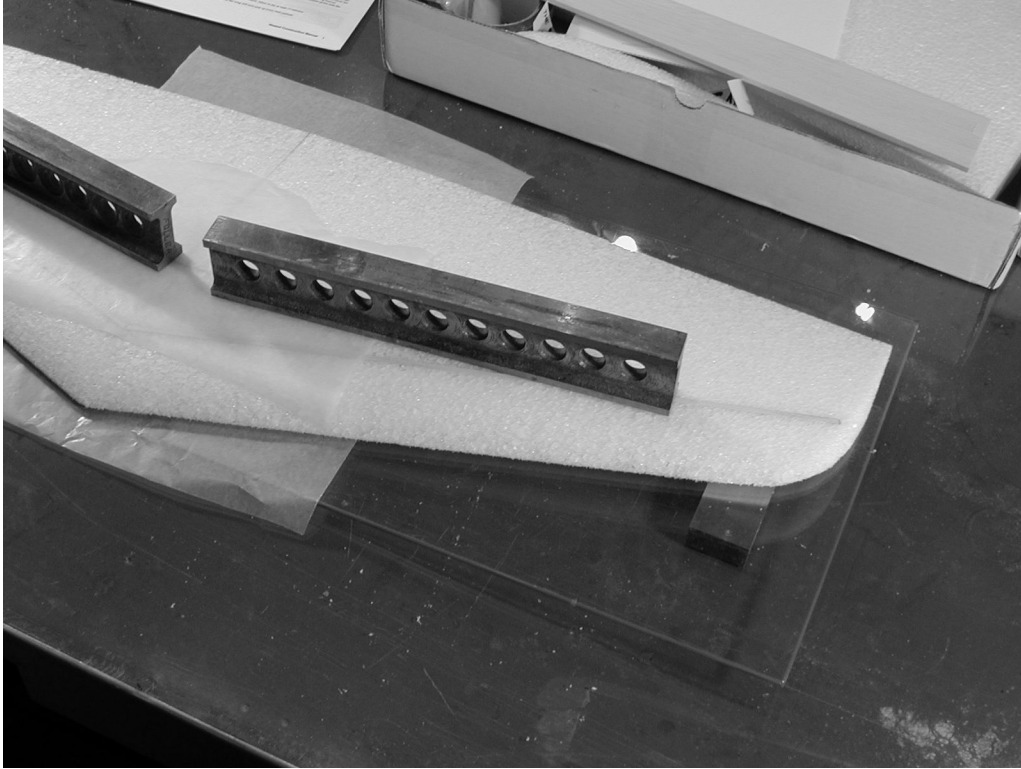
EPP foam wing set with pre-cut cavities for servos
EPP foam nose pod with pre-cut cavities for battery pack and receiver
Zeproon fin and elevons
basswood spars
3/16" x 3/8" balsa wing joiner
3/32" sq. x 5" long basswood fin reinforcement
Coroplast battery and receiver cover
music wire pushrod material
Du-bro Micro control horns
plywood control horn mounting plates
Du-bro Mini EZ connectors
Du-bro micro EZ links
roll of colored tape for covering
construction manual

Construction hints and tips

Construction manuals for both aircraft are available on-line on the Richter R/C Aircraft Design web site <www.flyweasel.com>. They're at <http://www.flyweasel.com/instruction_files/weaselinstructions_1.pdf> 610K, and <http://www.flyweasel.com/instruction_files/miniweasel_instructions.pdf> 1.2 MB. While you're there, make sure you download all of the cool *Weasel* and *miniWeasel* movies.

A few suggestions which may help during construction of the *Weasel*, in order roughly parallel to the construction manual:

- Drip small quantities of epoxy into the spar slots, then use a 1/8th inch dowel, held at 45 degrees along the length of the slot, to spread the epoxy in the slot. Run the dowel back and forth in the slot in a dragging motion. This wipes epoxy downward into the slot while covering the sides and bottom, and tends to put a bead in the lower corners of the slot.
- Rather than covering the plywood joiner with epoxy, and having epoxy stick to your gloves and make a general mess, bend the wing over the edge the building table to open the slot in the foam. Drop some epoxy in the slot, then take a wooden coffee stir stick, again held at 45 degrees to the length of the slot, to spread the epoxy across the vertical sides of the slot. The plywood joiner can then be easily inserted.
- We applied a single coat of dope on the elevons, lightly sanded the surfaces with fine sand paper, then used the included packing tape to make the hinges, as outlined in the instructions. Looks good and works as it should. Not sure if we saved any weight, but it did give us the opportunity to exercise our olfactory nerves.
- The directions explain how to spray on the 3M 77 adhesive and wait before applying the tape covering. We waited overnight and applied the top covering, but ended up tearing it all off because it just would not stick for more than a few minutes before coming loose. Fortunately, taking it off was easy. We applied a very light coat of 3M 77 adhesive over what was already there, then covered, and everything is fine.
- We build on glass (an old sliding glass door) and used a smaller piece of glass to fully support the wing at the proper angle (one inch at the wing tip) while placing the dihedral brace. After covering was completed, however, the dihedral was down to a fraction of an inch. In retrospect, we may have put a small amount of tension on the tape while covering the lower surface. Michael said some people are building the *Weasel* with no dihedral at all, with no adverse effects, but we were more careful when covering the *miniWeasel*, and the dihedral turned out exactly as specified.
- The instructions mention that lightly sanding the covering material on the fuselage should be done before applying the double-sided fabric tape. The same should be done to the lower surface of the wing where that same tape is expected to stick. The double-sided tape supplied in the kit sticks wonderfully well — enough that we did not bother to use the crisscross tape over the fuselage and leading edge.



- We used a very light coating of Household Goop to glue the fin into position rather than using the taping method. This technique was picked up while our granddaughter Alyssa was building her MAD *Highlander*.

Other than some of the tricks we used previously on the *Weasel*, we did make a few changes to the *miniWeasel* construction process.

- We didn't add the strapping tape to the wing tip, as we have no plans to discuss launch.
- The fuselage is supposed to be attached to the wing by means of the tape covering material. We used Goop instead. After the exposed portion of the bottom wing surface was covered, a length of tape was folded along its length and applied to the fuselage so that the folded part would attach to the lower surface of the wing. The credit card idea, as described in the instructions, works like a charm!
- We did not use the full tape width to attach the basswood strip to the bottom of the fin, but rather cut the tape in half along its length and used only one half. Goop was used again to mount the fin in the fuselage slot.

A couple of suggestions which apply to both the *Weasel* and the *miniWeasel*, as well as other foam-based aircraft:

- 3M 77 and packing tape do not really make the ideal covering material. One trick we use to smooth things out is to set our Goldberg covering iron to “2” and use the low heat to get the tape

to stick. Your thermostat setting may vary. This tightens tape which is slightly slack and works especially well in areas where the tape seems to resist sticking.

- The trick with Goop is to use very thin coats — just enough to wet the porous surface. When used in this way the Goop vehicle, toluene, evaporates so fast that the initial bond is very much like working with contact cement. EPP foam lets enough evaporation to take place that the joint is nearly fully cured in a half hour or so.

After we had the Weasel covered, Michael wrote and made the following suggestion,

“I forgot to mention a trick that I recently learned regarding taping the wings. The problem with taped wings is that the edges always tend to pull away when a little dirt gets under the tape. This makes for some really unsightly wing tips. Instead of using Goop to seal the tape edges, as some people do, go to a home improvement or craft store and look for stretchable plastic tape — 3M makes it in 3/4" rolls in a variety of colors. This is great because you can match the tape with your color scheme. I think it is called 3M Plastic Tape. This tape has NO filaments in it and has the stretchiness of heavy duty black electrical tape (you could use black electrical tape if your plane is black). Simply take this tape and stretch a single piece along the leading edge and around the wing tip. It will conform beautifully to the compound curve and will seal all the small packing tape seams. It is quick, clean, and simple.”

This works! And if the tape deteriorates beyond usefulness, it's a simple matter to pull it off and apply a fresh strip.

Between both aircraft, the only problem we had is with the receiver installation in the *miniWeasel*. The M5 would be a nice fit with a bit of room to spare if only it had end plugs. The servo plugs stick up because of the vertical plug orientation, and the associated wiring bends the Coroplast hatch below the bottom of the fuselage about 1/8th inch. We thought about modifying the servo plugs so they don't stick up so far, or waiting for an end plug M5 to be released. (We hear FMA is considering putting out an end plug version.) In the end, we simply took out our Dremel tool and routed out the bottom of the receiver cavity until we were slightly into the wing. Now everything fits and the Coroplast cover is flush with the fuselage foam.

Construction time for the *Weasel* is projected to be five to ten hours. Despite the noted changes in the building process and the usual unexpected minor snags, our time was just over seven hours. The *miniWeasel* builds faster. Actual construction time for it was exactly as estimated — five hours.

The balance point for the *Weasel* is directly on the wing joiner. Elevator function is set up for 3/16th to 3/8th inch up and down, aileron function for 1/2 inch to 3/4 inch up and down. We adjusted the servo travel at the transmitter so that all control throws were in the middle of the suggested ranges. Our *Weasel* weighs 310.5 gm, 11 ounces, ready to fly. About a half ounce of nose weight was needed to get the CG right. This is closer to the minimum weight than the maximum, and we're pleased with the way things turned out. It looks and flies great!



The CG location for the *miniWeasel* is 4-15/16 inch forward of the hinge line. The instructions state that the location is critical on an airplane this small, so we quickly manufactured a balance stand. The recommended deflections are 3/16 inch up and down for elevator and 5/8 inch up and down for aileron. Our *miniWeasel* came in at 127 gm, 4.5 ounces, ready to fly. An ounce of lead was needed in the nose to achieve the correct CG location. This is the maximum suggested overall flying weight, so we're glad we didn't add the cross of fiber tape on the wing tip! The *miniWeasel* flies extremely well, a bit faster than expected, and is very responsive.

Test flying both models was incredibly easy and went extremely well. We could not have been more pleased with initial flights. The CG locations and control throws provided in the instruction manuals are right on! Amazing. This is the first time in our experience that the provided set-up instructions have actually been accurate!

Weather here in the Pacific Northwest is in one of its weird states again this year. It's windy when it's raining and calm when it's not, so slope flying to any great extent has so far not been possible, but hand launches over flat ground have demonstrated a lot of potential, and it looks like the fun to price ratio is going to be extremely high.

Our thanks to Michael Richter for supplying the kits for these reviews and for being incredibly responsive to our suggestions and feedback. We're still trying to talk him into kitting some of his other designs, like the very cool swept forward 'wing pictured here!

Suggestions for future columns can be addressed to us at either P.O. Box 975, Olalla WA 98359-0975, or <bsquared@appleisp.net>.



Sources:

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Prices:

Weasel \$50 plus packing and postage

miniWeasel \$35 plus packing and postage

Orders may be placed on the flyweasel.com web site.

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