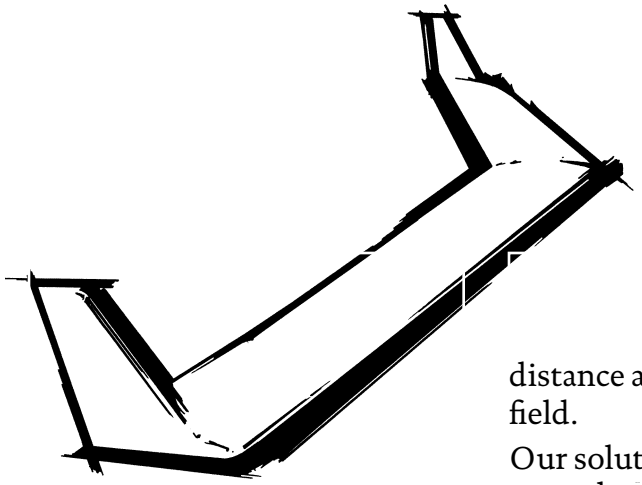


On the 'Wing...

Bill and Bunny Kuhlman, <bsquared@themacisp.net>

Quite a bit of work has been accomplished on our second Richter RC *Alula* since our last column. We've even done some initial test flying, but that particular aspect of this project will be covered in detail in a future column.

This month we're going to concentrate on some of the solutions we worked out for the unique aspects of the basic construction and the control system linkages.

Fuselage One of the problems we had with our first *Alula* appeared during the first really hard launch - the fuselage fractured at the leading edge of the wing, carrying the battery pack and receiver in a long distance arc across the flying field.

Our solution to this problem started as temporary, but has been working well. We simply placed a piece of electrical tape along the left side of the fuselage. This is the inside of the throw during launch, and the small amount of additional strength has now held for a few hundred launches.

This *Alula* has two carbon fiber tows glued to the fuselage sides. We stretched the tow along the foam, held the ends down with masking tape, and used thin CA to bond the fiber to the EPP. (Photo 1)

Additionally, rather than glue the fuselage to the wing with hot melt glue, we stripped away some of the tape covering and then applied a very light coating of Goop to both the bare foam of the wing and the fuselage wing saddle areas. The fuselage was then slid onto the wing with the servo and antenna wiring poking into the elevator servo cavity. The assembly was placed on a narrow elevated platform and a heavy metal weight was placed over the glue joints and left overnight. This created an exceptionally strong bond without adding excessive weight.

Control system hardware As mentioned in previous columns, this *Alula* incorporates separate ailerons, each driven by its own Hitec HS-50 servo, and coupled elevator halves connected to a single Hitec HS-55 servo.

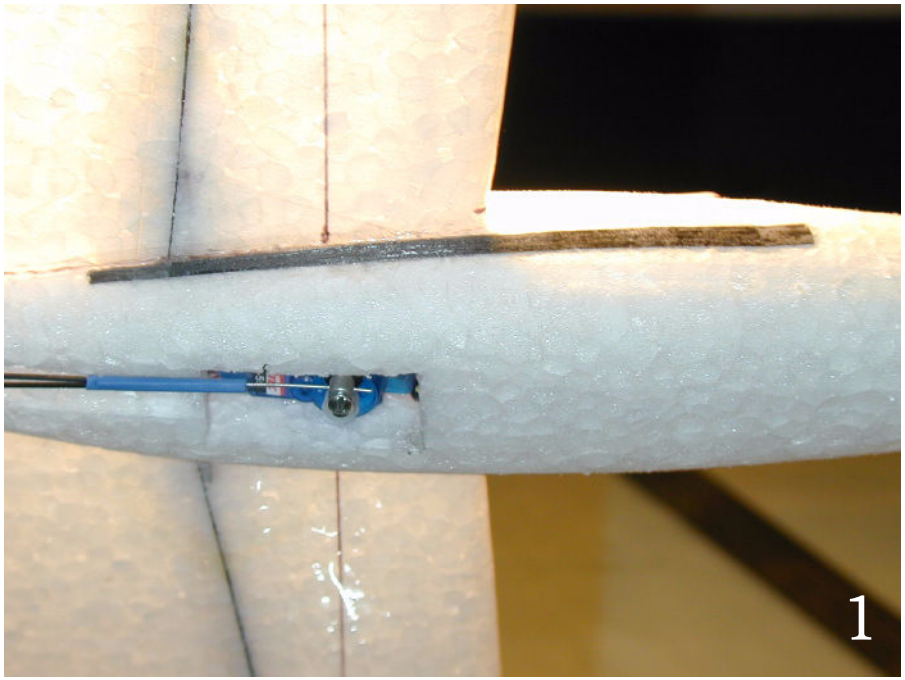
The aileron servos (Photo 2) were mounted in wells cut into the wings as close to the carbon rod spars as possible. To eliminate any binding or resistance, the pushrods are aligned parallel to the control surface hinge line. This has additional advantages - it moves the servo inboard somewhat, slightly reducing roll inertia, it provides just enough servo wire to allow connection with the receiver without having to splice in additional wiring, and it moves the servo to a slightly thicker part of the wing.

It should be noted that the *Alula* wing is very thin, but we checked the thickness in the area of the aileron servo and found the wing was just thick enough to house the servo without having any bulges.

An X-Acto blade was used to cut a vertical slot in the wing leading from the servo location to the root of the wing. The wiring for the aileron servo was then pushed into the slot to a point below the surface so the foam closed over at the surface.

A the wing root, the wiring was inserted into the foam sufficient for the elevator servo to clear.

The carbon fiber push rods which Michael supplies with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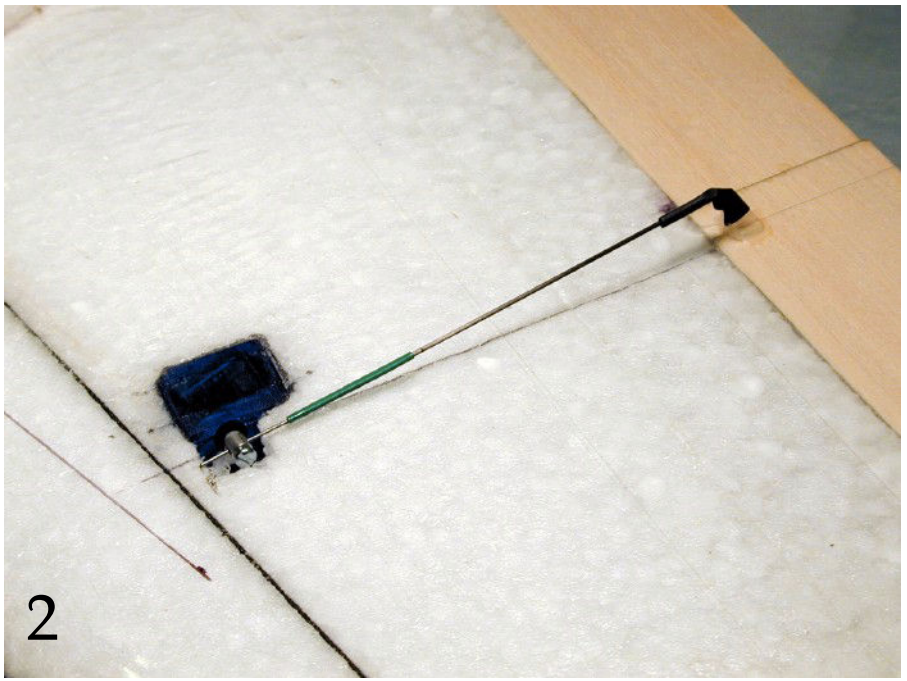
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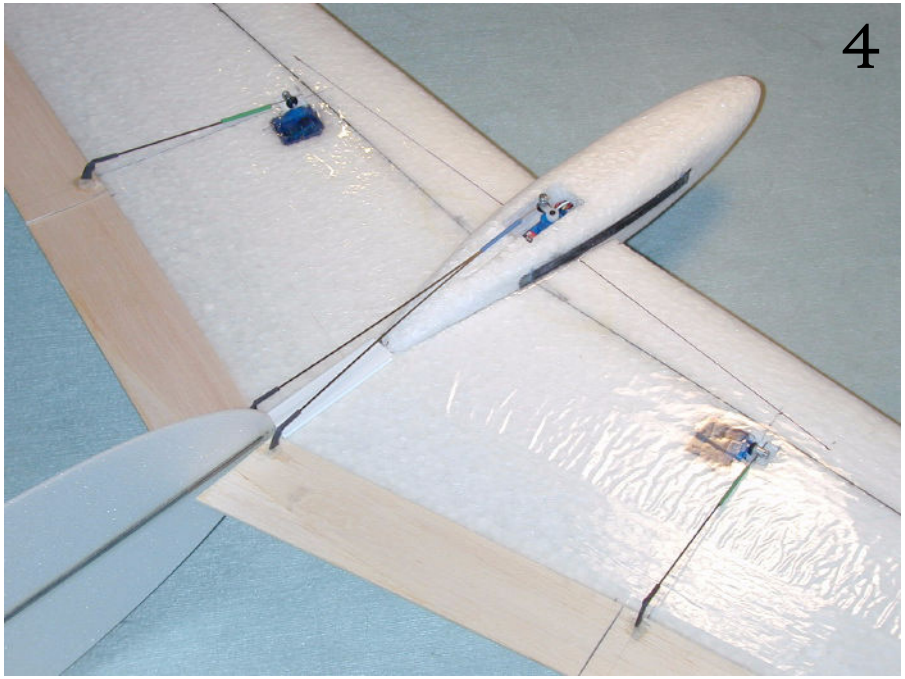
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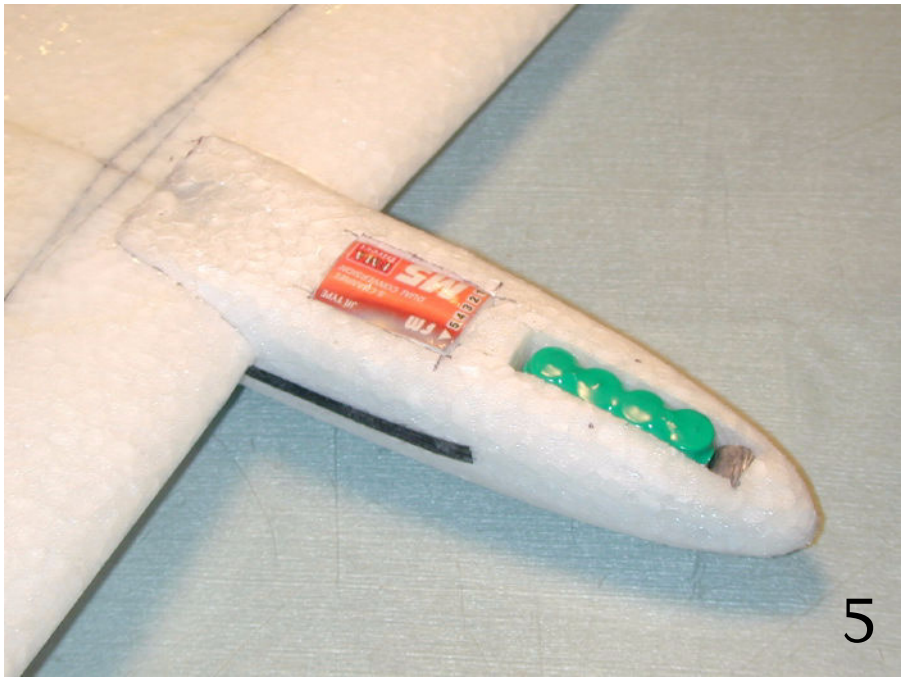
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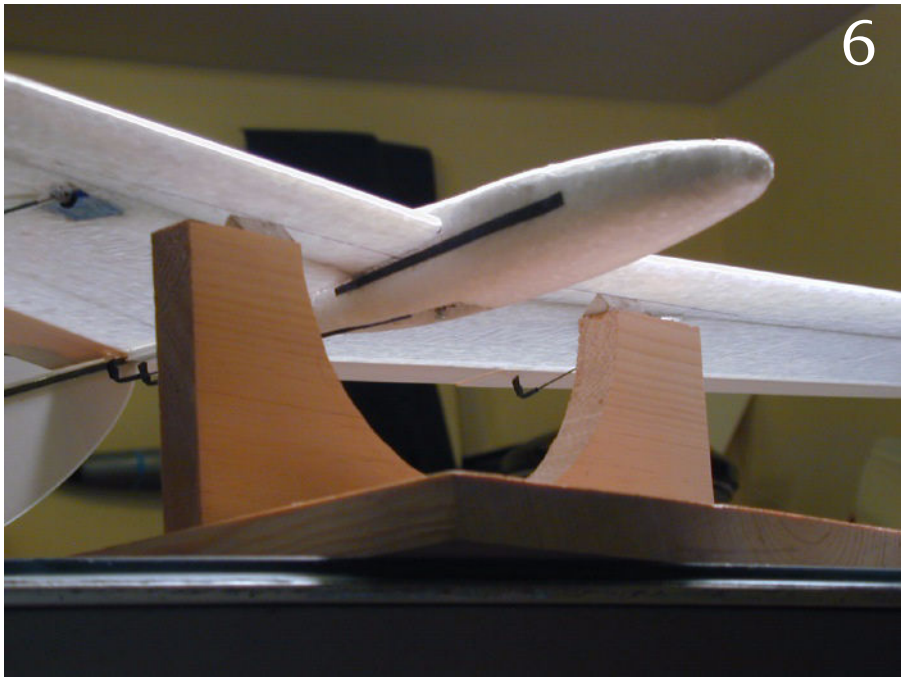
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the kits is strong enough for the servo and aerodynamic loads, but it does not withstand the crushing force of the connector set screw very well. The rods tend to fracture as the fixture is tightened.

We cut the carbon rods an inch short of their full length and attach small diameter music wire to the carbon rod using a piece of small diameter shrink tubing and thin CA.

The elevator servo (Photo 3) is located in the central cavity which is precut into the fuselage. The servo is mounted front to back and is set off to side of the cavity so the servo arm hole is close to the fuselage centerline. There is some elevator differential with this type of set-up, but as the elevator servo will be adjusted for a very small throw, the resulting differential is not at all noticeable in practice.

As with the aileron system, the carbon fiber pushrod is modified to have a music wire end. Because there are two carbon rods coming together, the shrink tubing must be of a slightly larger diameter than that used for the aileron linkage. (Photo 4)

Completed airframe Our faithful FMA Direct receiver was placed in the reconfigured slot, and one of Michael's 210 mAh NiMH battery packs was installed up front. (Photo 5)

On the balance stand (Photo 6) the completed airframe with all components installed required only 14 grams of lead to have the CG placed at the point recommended in the instructions. As our previous *Alula* required 8 grams of weight for the same balance point, this came as a pleasant surprise.

The overall weight, ready to fly, is 4.8 ounces (136 grams). This compares quite favorably with the original *Alula* which flies extremely well at 4.4 ounces.(124 grams).

Because we decided to not color the wing bottom surface after all, the included photographs have more recognizable detail than would otherwise have been in evidence. We're still working on getting some sort of fuselage covering put on.

Next month: test flying and flight comparisons with the standard *Alula*.