

where it is necessary to have a continuous coat of Balsarite, it is actually on the heavy side. You would be better off using transparent Monokote. For all of the materials tested, the transparent colors were significantly lighter than the opaque colors. This is due to the transparent colors being tinted with a dye while the opaque colors require a layer of relatively dense pigment sufficiently thick to block most of the light. The 3M 77 spray adhesive is an example of how much the weight of coatings can vary between "just enough to do the job" and "that should never come unglued." The following are the weights I came up with:

Material Weight	(oz/sq.ft)
EZ-LAM epoxy on balsa	0.127
Diluted aliphatic resin glue on balsa (3:1 with water, applied with a sponge roller)	0.086
3M77 spray adhesive (2 surfaces, light coats)	0.037
3M77 spray adhesive (2 surfaces, heavy coats)	0.143
Monokote (opaque: white and orange)	0.250
Monokote (transparent: red and green)	0.185
Oracover (opaque white)	0.267
Supercote (opaque yellow)	0.177
Micafilm (pearly white)	0.136
Micafilm (clear)	0.073
Ultracote (purple)	0.228
Lightspan (blue)	0.086
Clear Mylar w/adhesive (Model Research Laboratories)	0.134
Water based polyurathane (one coat applied with a sponge brush)	0.122
Balsarite (one coat needed for applying Micafilm and Lightspan)	0.094

from Baltimore Area Soaring Society News Baltimore, MD

### The Wing's Too Big!

by Carl F. Brandenburg

from the AMA National Newsletter - Aug. '94

Big airplanes are fun! It's just a pain in the south side, hauling them around in your average car. My car can manage a five foot wing of 10 to 12 inch chord, but beyond that, it gets sticky. It hurts to slam the door with your aileron hanging out!

What to do? For a seven to ten foot wing, it is possible to part it in the middle and make two "handleable" wing panels to haul. However, the center of the wing has the greatest bending moment, and it usually contains the aileron and flap/spoiler servos, plus the fittings to attach the wing and fuselage.

On my 2 times size Super Stick and the 83 inch span Kadet Senior that I am presently building, I chose to separate the wing into three sections; a five foot center section plus two shorter outer panels. This allows a solid center section spar and wing structure, a fixed in place aileron structure and a straight forward wing/fuselage mounting system. In each case it is necessary to build a spar slip joint to carry the loads of the outer panel into the center wing section and to split the ailerons just outboard of the aileron drive horn and key or pin these outboard sections to the driven portion of the ailerons on the center wing. Neither of these two tasks is too daunting or excessively heavy. It is somewhat of a design challenge to make the parts fit easily and to be simple and positive to fasten in the field, but these tasks are not difficult. It is essential to insure that outer panel deflections do not cause a separation of aileron drive pins, but this is not difficult. So, if you have a problem getting your big wings into your car, buy a station wagon or try building a three piece wing. I believe that the economics suggest a three piece wing I could be wrong of course!

from Carrier Wave - Phil Moore, Editor - McDonnell Douglas RC Club - St. Peters, MO

### ON A BET OR A DARE - An Electric First

Steve Anthony - Feb. '95 *Silents Please*

It was about 4 years back, while out at the Long Island Falcon's flying site, that I got an idea. I was watching "Tony's Towing Service" in action; a big 1/4 scale Curtis Robin hauling off the grass via towline a 130" sailplane. The Robin had a releasable tow point somewhere near the C.G.; and the sailplane was towed from the nose, also with its own release. It was a wonderful show; the Robin, with the hammer down and the tail up, "breaking loose" the huge sailplane, the sailplane rising while the tug gathered speed, and finally, the tug is off, climbing, slowly gaining altitude.... ah, 'twas a wonderful thing to watch. When Tony had a free moment, (a rare thing; that tug was in the air dragging sailplanes almost non-stop!) I wandered on over to pick his brains. I believe his reaction to an "electric tug" was "WHAT?!!... not even on a bet!"; and so another electric challenge was born.

That afternoon, while on the long trek home, I started to give some serious thought to the project; and some of the difficulties seemed to be a lot bigger than initially anticipated. The airframe would need to be of unique design, the weight to power

considerations would be of particular importance. The motor and motor control would be very expensive, and endurance of the battery system would at best be marginal considering the amperage requirements to produce enough power to both "break loose" the sailplane AND haul it to 1000 feet... I shuddered to think what all of this was going to do to my cat; anything big enough to haul a sailplane up was gonna do double duty as a cat taxi. That year, for Christmas, the cat got a leather flying jacket, goggles and a helmet; I got some SR packs.

As time worn on, the "Tug" project was shelved in lieu of an electric pattern ship, a couple of new electric sailplane designs, a biplane, a scale project, a bunch of OPP's (Other People's Projects) and a growing daughter. Who, incidentally, made it clear that her cat was NOT gonna go flying without a parachute. (Hmmm; I wonder how much the chute's gonna weigh?) Ah, well; time wore on, a bunch of new products appeared, I got a new job, and the tug gradually became a distinct possibility with an "off the shelf" group of components. Electric Flight technology has steadily marched ahead; the pieces necessary to accomplish the task are now readily available! Finally, over this past Thanksgiving weekend, the whole thing came together in about 10 hours!

The Tug airframe is a Hanger 9 "EZ-Fly 40" Trainer A.R.F., with absolutely no attempts made to lighten the airframe. In the interests of ease of assembly, I chose install the tailgroup servos out in the breeze right on the tail. To help facilitate the tow situation, I set her up as a tail-dragger, and added a non-steerable, castored tail wheel. The tow point was positioned 1/2" behind the C.G., operated by a mini-servo mounted on the bottom of the wing.

The sailplane is a Great Planes "Spirit" 2-meter; with 3 standard sized servos (1 ea rudder, elevator, tow release) and also has no concessions to lighten the load. The tow point was from the nose, the choice being up front or from the belly. A belly tow means you will have to hand launch, nose towing allows me a scale-like rise off grass launch. The preferred sailplane roll control system for the nose tow would be ailerons to keep the wing level, the rudder/elevator/poly-wing combo on the "Spirit" would make the sailplane pilots job rather exciting;

the sailplane wants to go one way, the nose tow point is pulling it in another direction, and the rudder input to correct the situation develops adverse yaw... as I said; the "glider guider" has his hands full!

Would you believe the power for all this combined weight 10 lbs! was a pair of 05 size motors? Would you believe only 16 cells? Would you by chance be willing to place a bet? Its true! The motors are the just-released SR Max<sup>7</sup>'s; neodym magnets, light weight, high power output and low current draw! To get the power to the prop, the final missing link was a gearbox, and Clyde at AMP provided the project with one of his just-released "AMP-Air" twin motor gearbox's. This marvelous jewel mounts two matched motors side-by-side to drive the same shaft. The SR Max<sup>7</sup> motors, The AMP-Air GBox, and one SR Max 1500 Series 16 cell pack turned the 13x8 Master Airscrew Electric Series prop at 5500 RPM, drawing just 25 amps! On Clyde's first static thrust test the test rig hopped clean off the bench! We measured over 75 ounces of thrust from this combo AFTER the thing had run for a couple of moments. Hot stuff!

Later that same evening I plucked out the Astro 40 geared motor we used to flight test the tug and tow geometry, and installed the SR/AMP-Air power assembly. The Tug lost better than a half pound between the motor weight and reduced battery pack size, and further allowed us to utilize an FX35D motor controller - also considerably lighter than the Astro 205 we tested with. More power and less weight again! I just LOVE the new stuff we got; every ounce of weight I can remove by proper equipment selection results in a net gain in performance and endurance - VERY important in electric flight!

The next Saturday morning we met at the Calverton flying facility; a site not unused to historical flights both for modeling and full-scale; for this is place that saw the first flights of Grumman's Tomcat Fighter, the Intruder, the X-29 and Tom Hunt's first successful VTOL R/C model. Sadly; the model field isn't the 4 star facility the Full-Scale site is, we only have a 100x60 foot grass (and stubble) landing strip. No trouble for Tom's VTOL; and

great for model "Aircraft-Carrier" type practice; but for cripes sakes, fellas, this is a GLIDER TOW! I kinda like; you know, need a bit more room....? We set up initially with an upwind takeoff across the field. After two attempts, it was very apparent that 60 feet of field wasn't going to be enough. The tow line was 26 feet long, we just couldn't get enough roll to get the tug up before we ran out of field. So; we did the only thing we didn't think the rig would do, and that's a crosswind takeoff. Without a steerable tailwheel on the tug, and without positive roll control on the glider, we were asking for a disaster. We needn't have worried, for Larry Sribnick (umpteenth billion hours on full-scale gliders) tamed the bucking "Spirit" and I horsed the tug into the air with about 2 (nah, coulda been 3) feet to spare- no problem 'atall, y'all! And folks, it looked just grand! We got the sailplane to 1000 feet in jig time, Larry got a 15 minute flight, and I landed the tug with my knees knocking and the biggest grin you ever saw. After a quick check-over on the tug we proceeded to put up 3 10-12 minute flights, shooting touch-and-goes, doing lazy rolls, loops, inverted flight, stall turns, and just generally messing around. The E-Z Fly 40 is in fact a very nice "Trainer", the control authority and honest flying characteristics this ship demonstrates will no doubt usher in a new era in the credibility of "ARF" type models. Hats off to Hanger 9 for this fine flyer.

**The real hero's** of this story are Larry Sribnick of SR Batteries, and Clyde Geist of AMP Products. Larry has been working on the development of NEODYM magnet motors here in the U.S. for several years. Endless fussing with prototypes, developmental headaches and difficulties have finally borne fruit! SR's Max 7 and Max 10 neodym motors offer far more power, at lower current levels and less weight than anything else flying today. Factor in Clyde Geist's AMP-Air side-by-side dual motor gearbox and suddenly the net power increase becomes more than that of the two motors taken individually! What appears to be happening is that ONE prop on ONE shaft has the base power of the TWO motors, PLUS the added efficiency gains of TWICE the brush area, and TWICE the commutator surface area. Simply put: 1+1=3. No kidding! The efficiency gains provided by spinning one prop and

shaft by 2 motors produces MORE power than 2 motors and 2 props! When the ease of assembly, minimum modifications to the airframe, lighter weight, smaller battery packs were all added up, we discover that an old electric adage no longer holds true. It used to be that we could fly the 40-sized ships with electric power, but to get "Wet" performance, we would sacrifice flight endurance; 3-5 minute motor runs would be the norm for an decently powered 40 sized trainer. The words "Electric Trainer"; like "Military Intelligence" simply did not belong together! The first because Electrics don't provide flying authority AND endurance; the second for the obvious (at least, to any ex-serviceman) reasons. With the SR MAX/AMP-Air power system, I get 10-12 minute solid flights on the 40-ARF, doing all the things a fledgling pilot would need to do. Guys, that is easily an 10 oz. fuel tank's worth of flight training on every flight! With a purpose-designed electric aircraft flight times increase even more- Clyde's Porterfield easily pulls down 20 MINUTES OF POWER-ON flying! There is only one thing left to do... Here Kitty, kitty... kitty.. Nice kitty.

### June Meeting

#### June Demo at Midwest R/C Field

The June meeting was held at the Rushton Road Field of Midwest R/C. Yes, it's back. Unfortunately, only a few of you attended, but we did have a nice time flying. The July meeting will be held at the Rushton Road Field and is very important, since it is just before the July Fun-Fly. Please try to make it.

On June 20 the EFO and friends put on an electric Demo for the Midwest R/C club. It was a wonderful evening of flying, almost a mini-fly in with lots of different types of planes. The EFO members in attendance were; Ken Myers, Jeff Hauser, Ernie LaBelle, Tom & Ernie Bacsanyi, Richard Utkan and Dave Weatherup. Guests of the EFO included Keith Shaw, Ray and Chad, Art and Bob and Midwest member Bill Brown.

**Highlights** included: Keith Shaw flying Ernie Bacsanyi's Goldberg Ultimate biplane - 60 powered; Keith flying Dave's Graupner Partnavia with twin speed 400's - THIS PLANE NEEDS AILERONS!; Kieth's Aveox powered biplane - the Flashback; Jeff's landing gear staying on the bottom of the wing; Ken's really warped tailed flying of his Senior Skyvolt.