RC REPORT

NOVEMBER 2009

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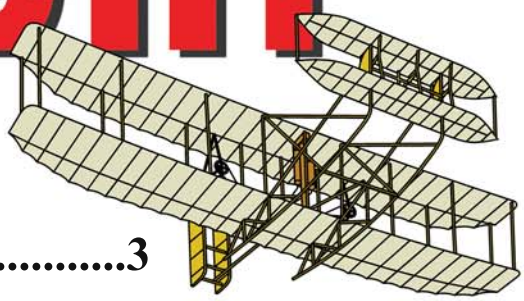
HANGAR 9®

ARF Giant Scale Taylorcraft

RC REPORT ONLINE



November 2009

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lines from the editor

THE LOSS OF TWO TIGERS

Sometimes I think I'm too sensitive. I guess it comes from being raised as the youngest of three children by a divorced mother who was very caring and loving for her children and all other animals as well. Well, nearly all. My mother passed away on Feb 7, 2009, angry only at the squirrels living in her front yard trees. To her dying day she insisted that it was her job to rake up the autumn leaves, but it was up to the squirrels to haul off the acorns. And they didn't keep their end of the bargain!

Too sensitive because for about four days, beginning on August 27 (Mina's and my 25th Wedding Anniversary!), I was bawling like a baby, and in a constant foul mood. On the 27th, you see, I went out to my work shop and found Tiger, my 110 lb., 12 year old Chow-Shepherd mix, lying in a pool of his own urine. He'd been suffering with arthritis for nearly two years, but on that day he was suddenly unable to even get up unassisted. Mina and I helped him to his feet, gave him a bath, and then helped him find a comfortable spot outside in the sunshine to warm up and dry off. While I cleaned up the mess in the work shop, I could hear him whimpering outside. When I looked, he was doing his best to get up and join me, but he was still unable to get up. We helped him to his feet, but it was an obviously painful trek to his food and water bowls. Afterward he lay in the sun again for a while, but I could tell that he wanted to be with me in the shop, so we helped him back inside to the thick, doggie-bed where he slept at night.

I spent several hours with him that evening, constantly talking to him as I fiddled around at my model work table. I'd written my May 2009 editorial about minimizing and eliminating "dead lead" used to balance a model, and I was finally trying to minimize that monstrous 17 oz. hunk of lead (nearly 9% of the completed mo-

del's total weight!) in my Goldberg Tiger 120. Every time Tiger moved on his bed I could hear faint whimpering, so I knew he was in pain. I didn't get much work done that evening. I spent most of my time on the floor hugging and stroking my loyal, loving, and very dear friend for 12 years. I knew his remaining time was short, and I couldn't help but feel sympathy for his discomfort, and a lot of self-pity for my imminent loss.

Shortly after midnight Tiger seemed to be sleeping peacefully, so at Mina's insistence I went back into the house and went to bed. Fearing what was coming far too soon for me, I didn't sleep much, but I sure cried a lot.

I got up around 6:00 a.m. on the 28th, grabbed a cup of coffee, and went out to the shop to be with Tiger. He had somehow dragged himself a short distance from his bed, and was again lying in a pool of urine (and worse). When I tried to help him up, it soon became apparent that he was no longer able to stand at all, even with my help. That triggered a whole new flood of tears because, laugh at me if you will, the look in his eyes seemed to say that he knew the end was near. He seemed to have sadly accepted it.

With Mina's help we rolled him back onto his padded bed, and pulled him outside for another bath. We then dried him as best we could (even a *part* Chow has more hair than any three dogs need!) and again helped him into a comfortable spot in the sun to warm and dry off. Mina volunteered to clean up the mess in the shop while I stayed with him. At least I think that what's she said. By now we were both bawling, so coherent speech didn't come easily.

I tried several times to help him to his feet, but it gradually became painfully clear that my best friend had probably stood on his own four legs for the last time.

After cleaning up the mess in the work shop, Mina out and joined us. For too many hours, I suppose, we quietly sat in the grass with Tiger, trying not to say what had to be said. I finally turned to her and said, *"I'll go call the vet."* She nodded, and that released a whole new flood of tears for us both.

It took a total of four calls to the vet before I was able to force the words from my swollen throat. The words were clear enough in my head, but I couldn't seem to get them approved by my tongue. We got a 3:00 p.m. appointment.

At 2:00 p.m. I spoon fed Tiger most of what was left in a pint container of vanilla ice cream. In his prime I think he'd have eaten an entire gallon of that stuff if allowed! At 2:30 we lifted him into the back of my mini-van, and ten minutes later we were parked outside the nearest McDonalds restaurant, where he ate four whole cheeseburgers. Well, no, I take that back. The word "ate" seems to imply a certain amount of chewing, a step Tiger often skipped. All he ever did was swallow them whole and then look up at me as if to say that he was ready for more. *"What, only four?"* He was *never* given more than four at once, but he *always* made it very clear that such a limit was certainly not his idea!

We arrived at the vet's office at 3:00 p.m. sharp. I crawled into the back and spent about ten minutes just hugging and stroking him. Letting him go was very difficult, and it was proving more than I could handle. Mina finally went in and asked for a cart and assistance.

Once inside I couldn't help but grasp for any shred of hope. Isn't there something... *anything* we can do? Can't we keep him at least a little while longer? The vet was quiet as she examined him, but then she turned to me with tears in her own eyes. She said he may have suffered a stroke, but she reminded me that even if it was just extreme arthritis, he had never responded well to arthritis treatments. *"He'll never again know a pain-free hour, and I know you don't want that."* She was right, of course.

So, I knew what had to be done, but I hated it, and a whole new flood of tears rushed past my weak defenses. Mina too was bawling. (What a crybaby!)

We hugged, kissed, and stroked Tiger for about 15 minutes more, while he constantly licked my face and hands. I was torn between letting him go to rest in peace, and selfishly holding onto my best friend for just a few more minutes,

despite his obvious discomfort. Then he suddenly closed his eyes and laid his chin on the cold examination table. I don't know how he knew what was coming, but he did. I gave him one last kiss before I lurched from the room and rushed out to the car. God bless her, Mina had to make the final arrangements alone. Then she came out and drove me home. How she could see through her own tears I'll never know, but we somehow arrived home. I went straight to bed, bawling loudly (more like "screaming", Mina later said). She left me alone for a full hour before she came into the room and dumped our two new puppies onto the bed. And boy was she was right, because they were exactly what I needed. I then slept for nearly 10 hours, both pups in my arms. Mina later said she came in every two hours, took the pups outside to take care of business, and then put them back in bed with me.

Around 5:00 a.m. on Sunday, the 29th, I went back out to the work shop to resume work on the Goldberg Tiger 120. The work shop... no, the entire back yard, never seemed so empty. I could feel the anger growing inside me, and I should have known better than to continue working. I was *damn* mad! At 12 years old, Tiger had already passed the average life span for dogs weighing over 100 lbs., and I knew he'd had a good, happy, and full life (well, aside from being neutered at six months old). I could fill many pages relating fond memories, but none of that seemed to matter right then. I'd lost my best friend, I felt lonely and cheated, and I was *not* accepting it lightly.

I went to the wing rack to get the Tiger 120 wing so I could trial-fit it on the fuselage after having relocated the fuselage servos. As I carried it back into the model room, I somehow drove one end of the wing into the door frame, crushing the wing tip and leaving a long split in the covering material. I stood there glaring at the damage for a second or two, and then I simply lost it. Like a spoiled child denied his favorite toy, I threw a fit. Within seconds, what *had* been a reasonably easy to repair wing was reduced to MonoKoted shards and balsa toothpicks.

Lexus Banks, born June 21, 2009

Mickey Banks, born August 17, 2009

Sure, I regret the loss of that model, but I can't seem to come right out and say the words, *"I'll miss it."* To do so would reduce the meaning of that word more than I can bear right now, because for lack of a better, stronger word, I "miss" my dog. And even though I last saw him about two months ago now, I'm still bothered by the cold emptiness I find in my back yard and work shop. I *miss* my best friend. (He never liked the word "dog", by the way. He preferred "Canine American".)

Exactly one week later we had to repeat the ugliest part of this story when one of our two new puppies died. Twice hospitalized for two days each time, and given a huge battery of tests which revealed nothing, he simply refused to eat or drink! It's just a guess, but we now think he had a birth defect in his intestinal tract. Born into a litter of seven, six of them died of the same ailment before reaching ten weeks of age.

Due to the special circumstances, the breeder later gave us another puppy, so we now have two healthy rug rats (ankle biters, etc.) that keep us smiling and laughing most of the day (in between cleaning up their "mistakes", that is). I'm still amazed (and eternally grateful) that *something* led us to get the new pups at least a little while before we lost Tiger. I've never been one of those people who, after suffering the loss of a beloved pet, elect to never have another. The loss is painful, of course, but the joy they bring to our lives (usually) lasts far longer than our suffering when they die. We gave Tiger a good life, and he enhanced ours, for 12 full years. And now we hope to share the same kind of relationship with the new guys.

Wait. I can't go without sharing at least one model-related incident with Tiger. I had an old two-door Ford Explorer SUV at the time, in which I often took Tiger with me to the flying site. One day, however, I had three airplanes in the back for photographing and test flying for an upcoming issue of the magazine. The front passenger area was filled with my flight box, transmitter cases, and camera bags, leaving no room for poor ol' Tiger. Hours later when I came home, Tiger began jumping all over the place, frantically wagging his tail to show his glee at my return. While petting him and laughing at his exuberant display, I opened the Explorer's tail gate to begin removing the models. Tiger misunderstood this to be an invitation, so into the car he happily leaped, landing on two shiny new wings, neither of which had been designed to survive 100+ lbs. of canine excitement!

Well of course I yelled at him to get out! But angry? How could I be angry at a big ol' mutt who wanted nothing more than to be with *his* best friend?

That's the Tiger I miss.

-Gordon Banks
glbanks@knology.net

CROCK POT... OR NOT?

Gordon,

I just wanted to write and thank you for the very scary and informative article a couple of issues ago about the garage fire while charging a LiPo. After seeing all that property damage, I got real serious real quick in providing myself with a fireproof "battery bunker". By the way, mine was even cheaper than yours, it was free! The attached pictures show what's left of a Thunder Power 11.1 volt 4200 mah battery that decided not to charge properly. I had always charged these on my work bench, and before your article I just sat them on a piece of metal. Well, the ceramic crock pot saved my garage! You could cut the smoke with a knife, but there was absolutely no secondary fire damage to anything on my crowded work bench.

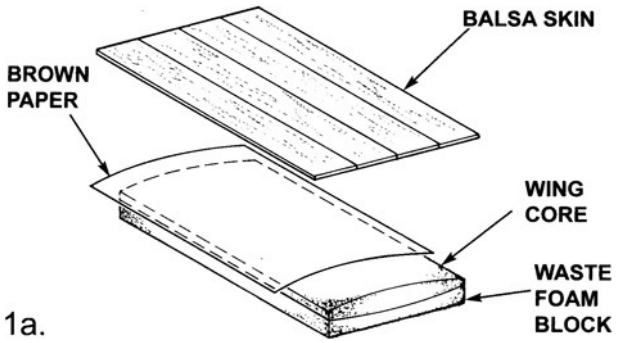
Thanks again for such a great magazine. You guys are doing us a great service.

Mark A. Sherrill
Galt, CA

HERE'S HOW...

by Walt Wilson

Share your best ideas and building tips with others. Send your "Here's How..." ideas to...
Walt Wilson, 3000 Persimmon,
St. Charles, MO 63301
or by e-mail to... rallyo@charter.net
Please include your full name and mailing address. The first submitter of any idea used here will win a one year subscription or renewal to RC REPORT ONLINE. If the subscription or renewal is to be a gift to someone else, please state this when submitting the idea.



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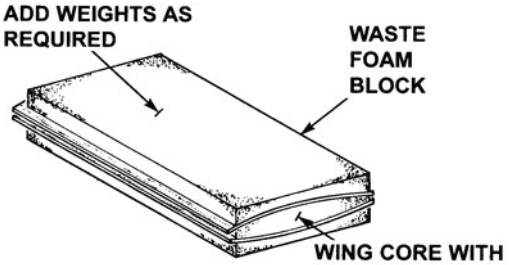


1b.

1. Suggested by an idea from Cecil Collum, of Fort Smith, AR. This one is for the neophyte builder who may be sheeting foam wings with balsa skins for the first time. Covering foam wing cores is easy with this method, but remember this... most contact adhesives allow *no repositioning whatsoever* once contact is made.

Wing skins are assembled by edge-gluing sheets of balsa together to make a "skin" large enough to cover the wing core, with some overhang around the edges. Match the edges of the smaller balsa sheets to ensure they're straight and fit together with no gaps or bends. If need be, use a straightedge to trim the edges of the sheets before joining. Then butt the sheets' edges together on a flat surface, and tape them together using masking tape. Now turn the skin over, and one seam at a time, bend slightly to open the seam, and apply glue. Aliphatic resin is best for gluing joints of this type because it's easier to sand than CA or epoxy. Wipe off any excess glue while it's still wet, to avoid having to sand it off later. Although CA adhesives can be used here, it hardens the wood along the seams, and may cause problems if much sanding is required later. It may make the masking tape harder to remove, too.

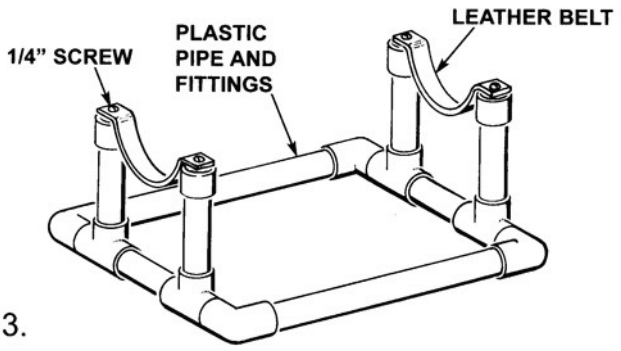
Once all the seams are glued, place the skin on a perfectly flat surface until the glue sets. If slots are to be cut for wing joiners, tubes for servo leads, or reinforcements added, etc, do it before sheeting the wing. After assembling the wing skin and removing the masking tape, spray 3M Super 77 contact adhesive in light coats onto the skin and the core. Some foam may be damaged by contact adhesives, so test the adhesive on a piece of scrap foam from the core waste. A number of other contact adhesives are usually

available at your favorite hobby shop. Let the adhesive dry until it's no longer tacky. When dry, contact cement will usually stick only to another surface with contact cement.

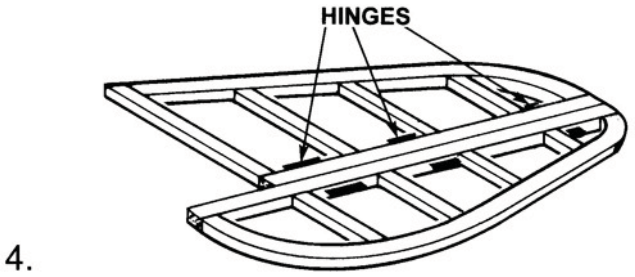
Place the foam wing core into the waste foam block it was cut from (aka, the "bed"). Cover all but a small area of the core at one end with brown paper from shopping bags (many people use wax paper). Make sure the adhesive will not adhere to the paper. Align and place the skin onto the uncovered area, and press it down onto the wing core as you pull the brown (or waxed) paper away, wiping the skin from the center outward. Continue until the skin is entirely adhered to the core. You should have no air bubbles under the skin if you work from the center out as you adhere the skin. Place the cores in the waste foam again, apply weights, and let the adhesive cure for a while. Weighting the core in the foam bed will help prevent warping while the adhesive is curing. Old phone books and/or magazines do this job very well. Use the same procedure to skin the other side of the core. Trim the skin around the edges and apply leading and trailing edges and tips as required. This adhesive method will also work on "Fan Fold" foam.

2. (No illustration) Pat Keebey, of St. Peters, MO, has been using a home-brew model cleaning solution for almost 30 years. It's inexpensive and does an excellent job of removing oil and residue from a glow powered model. It can also be used for other cleaning chores around the home. The formula costs around a $1.00 per gallon to produce. Use 5 cups (40 oz.) of water, 1 cup (8 oz.) of rubbing alcohol, 1/2-cup (4 oz.) of ammonia, and 2 teaspoons (1 oz.) of liquid dish washing detergent. Just to be safe, before spraying it all over a nicely painted surface, try it on a hidden area first to see if it harms the finish.

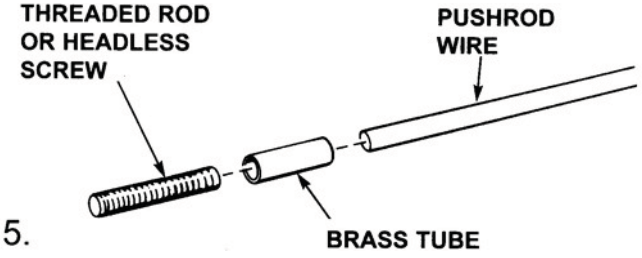
3. From Dennis Volrath, of Racine, WI. Many of us have used PVC plastic pipe to build things for our models. Then the pipe is often covered with foam insulation commonly used for hot water pipes, to protect the model from dings and dents.



Dennis, however, has built up a neat support frame using two straps cut from an old leather belt. The belt can be made adjustable, and the loop will conform to the shape of the fuselage, allowing the model to be rotated to the desired angle for better access to any hard to reach spots. If the tail feathers get in the way, just extend them out over the end of your work bench. Build the frame from 1" pipe (or larger, depending on model size and weight), and add end caps to the four vertical posts. Secure the leather straps with 1/4" screws, leaving as much slack in the belt as needed for adjustment. The 1" pipe makes a very stable support for models weighing up to about 20 lbs.

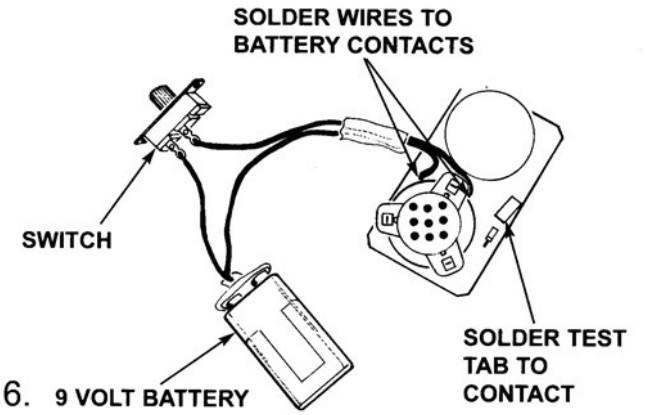


4. Frank Wright, of Ephrata, WA, cuts his hinge slots (and test fits the hinges) while the mating surfaces are still on the building board, and before shaping the leading edges. If done carefully, this assures perfect alignment.



5. From Bill Cowles, of Waverly, NY. If you need a threaded coupler for a pushrod, you can

use a threaded rod or cut the head off a long screw. Then solder an appropriate size length of brass tubing onto one end. In turn, solder the tube to the solid wire or cable-type pushrod.



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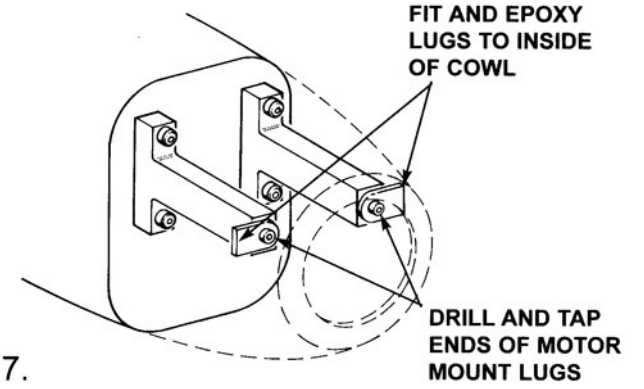
6. From Edwin Eshleman, of Barnegat, NJ. If your flying field has a corn field or some other dense foliage nearby, the chances are good that you or someone else has had to go find a plane in that jungle. If you've ever had to do so, then you understand the problem! There are many commercially available noise devices that will do a good job in helping locate your plane, but here's a more frugal (aka cheap) way. Smoke detectors can be purchased at Big Lots and other similar stores for very little cost, and they usually include a battery. It's advisable to replace the smoke detectors in your home every few years anyway, so one that would normally be thrown away could be used. Remove the printed circuit card from the plastic case. Find a connector (Hello, Radio Shack) that fits a 9-volt battery, and install a switch between the battery and the circuit board. Solder the test tab to its contact so that it's On all the time. Now install the assembly in your aircraft, and turn the switch On just before taking off. The high-pitched sound will help guide you to the plane if it goes down in the nearby jungle where visibility is so limited.

7. Here's a suggestion from me. When you don't want the cowl mounting screws to be visible, you can sometimes mount the cowl to the front of the motor mount lugs. The screws can be accessible through the space around the front plate of the engine (you frequently have to



7.

remove the spinner to remove the cowl, anyway). Depending on its configuration and how the cowl is made, the order of doing things may vary. If the cowl is fiberglass, make cardboard templates that will attach to the front of the engine mount, and then fit and trim as necessary to reach the inner surface of the cowl. Transfer that shape to 1/8" plywood or carbon fiber sheet, and cut out. Locate the holes, drill the lugs, and mark the motor mount. Drill and tap the mount with the desired threads (4-40 screws work well in most cases). Screw the lugs to the mount. Align the cowl with the fuselage and spinner, and glue in place on the lugs. Reinforce the lugs-to-cowl joints with triangular stock or fiberglass if the fit is poor or it's otherwise necessary for solid mounting. Small alignment blocks can be added around the outside edges of the firewall if necessary. If a cowl is being built from balsa, just mount the lugs on the motor mount and build the cowl around them. It takes more work than just screwing the cowl in place, but it's worth the trouble if you don't want to see the screws.

-Walt Wilson

(see addresses at top)

The children were all lined up in the cafeteria of a Catholic elementary school for lunch. At the head of the table was a large tray of apples. A nun wrote and posted this note on the apple tray:

"Take only one. God is watching you."

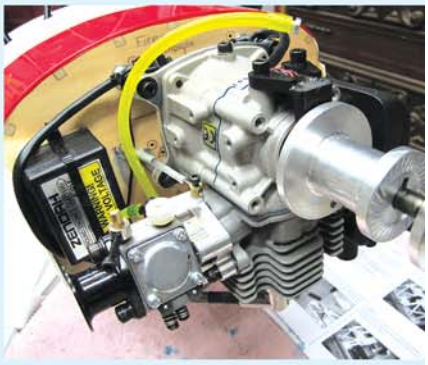
Moving further along the lunch line, at the other end of the table was a large tray of chocolate chip cookies. To this tray one of the children added this note:

"Take all you want of these.
God's over there watching the apples."

HANGAR 9®

ARF Giant Scale Taylorcraft

a new kit review by dick pettit



PRODUCT TEST REPORT

HANGAR 9'S ALL NEW ARF GIANT SCALE TAYLORCRAFT

Model Reviewed . . Clipped Wing Taylorcraft
Airplane Type . . . . . Giant Scale ARF
Manufacturer . . . . . Hangar 9 Models
(Made in China)
Distributor . . . . . Horizon Hobby Inc.
4105 Fieldstone Road
Champaign, IL 61822
(212) 352-1913
www.horizonhobby.com
Suggested Retail Price $999.99
Typical Street Price $549.99
Wing Span . . . . . Advertised: 80.5"
Measured: 80.75"
Wing Area . . . . . Advertised: 1152 sq.in.
Measured: 1164 sq.in.
Advertised Weight . . . . . 13 to 14.5 lbs.
Airfoil . . . . . Semi-symmetrical
Wing Structure . . Built-up balsa and plywood
Wing Joiner Method . . . . . Aluminum tube
Fuselage Structure . . . . . Built-up balsa
and plywood
Fuselage Length . . . . . Advertised - 63.7"
Measured - 63.75"
Hinges Included . . . . . Yes (CA-type)
Hinges Pre-installed . . . . . Yes!
Recommended Controls . Ail, El, Rud, Throt
Recommended Power . . . . . 1.0 to 1.6 2C,
1.20 to 1.80 4C, 20 to 26cc gas,
or Power 110 electric
Engine Mount Pre-installed . . . . . No

Fuel Tank Included . . . . . Yes (17 oz.)
Wheels Included . . . . . Yes
Assembly Instructions . . 56 illustrated pages
Hardware: Metric or SAE . . . . . Mixed
Hardware Included . . . Engine mount for 2C glow engine, engine standoffs for Zenoah G-20 gas engine, aluminum wing tube, formed main landing gear, carbon fiber tail wheel assembly, painted wing and tail brace struts, painted fiberglass cowl, wheel pants and gear cuffs, all required assembly hardware, all necessary control linkage materials, pilot figure and seat.
Items Needed To Complete . . Spinner, prop, engine, engine mount if needed, heavy duty servo arms, fuel filler dot, gas-compatible fuel tubing if necessary, some thread locking compound, radio system with six servos (five with electric power) servo extensions, receiver and ignition switches, batteries.
Covering Material . . . . . UltraCote
Drilling Required . . . . . Yes
Fuel Proofing Required Only for glow engine
Estimated Skills Required . . . . . Experienced
Assembly Tools Required . . Nothing special
Adhesives Required . . . . . CA and epoxy

COMPLETED MODEL

Finished Weight (dry) . 14 lb. 11 oz. (285 oz)
Wing Loading . . . . . 29.08 oz./sq.ft.
Engine Used . . . . . Zenoah G-20 (41.6 oz.)
Propeller Used . . . . Evolution and APC 16x6
Propshaft to Ground . . . . . 11"
Fuel Tank Used . . . . . As supplied (17 oz.)
Radio Used . . . . . Spektrum DX7 w/5 DS821 Sport Digital servos and 1 JR537 standard servo, 5-cell 2700 mah NiMH receiver battery, 4-cell 4500 mah NiMH ignition battery, and two Radical R/C HD Charge Switches
Covering/Finishing Used Comes pre-covered with Hangar 9 UltraCote
Special Items . . . . . Tru-Turn 2 1/2" spinner, and DuBro HD servo arms

CHEERS - Excellent instructions manual; easy to assemble with a logical assembly sequence; all supplied parts are suitable for use in the model; very good flying characteristics, slow or fast.

JEERS - Minor shipping damage found in kit; non-functional main gear braces; some of the socket head cap screws had SAE threads, but metric hex openings!; manual describes only one

specific gas engine installation; extra strut pin keepers should be supplied.

"A gorgeous re-creation of a one-of-a-kind, full-scale, clipped-wing T-Craft built by renown-ed aircraft restoration expert, Jim Moss. Ever the innovator, Mr. Moss took a run-of-the-mill Taylorcraft and turned it into a single-seat hot rod that looks every bit as spectacular as it flies."

"Taylorcraft Aviation is an airplane manufacturer that has been producing aircraft for more than seventy years in several locations."

"The company builds small, single engine airplanes. The Taylorcraft design is a conventional layout, high wing, fabric covered, two seat aircraft. The basic design has remained unchanged since 1936, yet this same design is still sold as a personal sport aircraft today."

I had the opportunity to assemble and fly the first Hangar 9 ARF Taylorcraft a number of years ago, and I was extremely pleased with it. That model drew rave reviews wherever I took it, and I still see many of them flying. Then, for no apparent reason, Hangar 9 suddenly stopped offering this fine airplane. Rumors were flying about what was going to happen next.

Last year Horizon Hobby put an end to all those rumors, by revealing a brand new ARF Clipped Wing Taylorcraft in their trade show booth. It's a bit smaller, but still qualifies as giant scale with its 80.5" wing span. It was designed around the already popular Zenoah 20cc gas engine, but could also be flown with medium size 2C and 4C power plants, or a modern electric power system. There were a number of updates to the construction and details on the new T-Craft, including a nice looking interior with instrument panel and a full pilot figure, a scale side door that opens even with the wing in place, an easy method of attaching the wing struts, and completely hidden servos. With all these new features coupled with the rich heritage of the original Hangar 9 Taylorcraft, it's no wonder that the entire first shipment of kits was sold out by the time it arrived in the USA.

In the box there's a well written and detailed instructions book that follows a nice, logical sequence of assembly. I often jump around in the steps when assembling ARF's, but this time I followed them pretty closely. It goes into great detail, up to the point of telling the builder what kind of screwdriver to use and in which hand to hold it! But it's not *totally* perfect, as we'll see when we get to the engine installation.

Next we find the stabilizer and elevator assembly which is all pre-hinged, along with the rudder and fin, plus the ailerons and wings. This eliminates the hinging step. The control horns were also pre-installed on all control surfaces.

The fuselage, complete with its hinged side door, was laying in the box under a cardboard separator. I and several other modelers have all found a small crack at the joint where the fuselage side meets the firewall. Presumably damaged in shipping, this is easily repairable with a little dab of thick ZAP.

There are two rather large boxes of hardware that include wheels, cowl, a windshield, wing struts, tail braces, control linkage materials, lots of nuts and bolts, a pre-plumbed 17 oz. fuel tank, a pilot figure, more nuts and bolts, and just about everything needed to assemble the model.

I spent my first hour going over the covering with a heat gun and a soft cloth, locating and shrinking those pesky bubbles and wrinkles found on just about all ARF's. It's an easy process to remove these problem areas, but make sure you poke a pin hole into every tightly sealed area (like between the ribs on the stab and fin, and the ailerons and elevators) to allow the heated air to escape, rather than expand and balloon up the covering. The manual doesn't mention this shrinking process, but you'll find even the smallest hidden bubbles and wrinkles as you pass your heat gun over the covering.

I'll be using Pacer brand adhesives to assemble the Taylorcraft, but after reading the manual I can't see where they'll be needed. I'll also be using Pacer thread locker on most of the nut and bolt connections, of which there are a lot! Sanding and fitting have also been minimized because the kit's parts fit so well.

Assembly begins by installing the elevator and rudder servos in the fuselage, where the mounting screw holes were drilled at the factory. The servo openings fit my Spektrum DS821 digital servos perfectly. Also, since the elevator servo arms face each other, some sort of reversing must be planned to make the elevators operate correctly. Transmitter mixing or a JR Matchbox can be used.

The fin and rudder are then slipped into the slots at the rear of the fuselage, the stab halves separated, and their joiner rods slipped through holes in the fin. The stab is then bolted to the fuselage with a bit of thread locker on the bolts, and the tail surfaces are done. It took more time to type the wording for this process than it took to actually do it! But let me say this about the screws used on this model. The stab is attached with 6-32x1" socket head cap screws, but they have a *metric* hex opening! Or at least I found a better fit with a metric hex wrench. The same holds true for other SHCS's in the kit, too. My advice is to use whatever hex wrench fits the opening tightly, and be sure to use thread locker on all of them.

The elevator control rods are pre-cut to the correct length, and are attached to the servo arms using ball links, and clevises at the control horns. I found it difficult to thread the ball link onto the rods inside the cockpit, so if I had it to do over again I would have done that first and pushed the rods back to the tail, rather than install the clevis first and push the rod forward. Anyway, since everything fit perfectly, the sometimes tricky task of cutting control rods to the correct length was eliminated. (*"I cut that darn thing three times and it's still too short!"*)

The rudder is operated using pull-pull linkage, and after the ball links were added to my heavy duty DuBro servo arms, the wires were crimped in place, threaded back to the tail, and crimped again to rigging couplers and clevises. Be sure to center the rudder servo while doing this, and make sure the loops in the pull-pull wires are tight, and not off center on the rigging couplers.

The tail wheel assembly, made from sturdy and lightweight carbon fiber, is installed using a couple of wood screws that thread into pre-drilled fuselage holes. A tiller bar is mounted to the underside of the rudder, where actuating springs attach. The springs were rather long in my kit, and needed shortening to provide a bit more pull on the tail wheel.

Remember how easy it was to install the stab and fin? Well, we're not done yet. Tail brace tubes are used to strengthen the tail assembly,

and everything is bolted into place using pre-drilled holes with screws and lock nuts. The lower braces simply bolt into place. The upper braces have threaded couplers for adjustment if necessary. Again, every bolt that does not use a lock nut should have a dab of thread locker to keep it securely attached.

The main landing gear leg assembly is pre-drilled, as is the fuselage. Standard axles are attached, and flat spots are ground on them at specific locations to help keep the wheel collars in place. Remember to use thread locker on the wheel collar screws too. Don't forget to install the fiberglass gear cuffs on the gear legs before installing the wheels, and make sure they're installed in the correct orientation.

The wheels are installed, followed by bolting the gear leg to the fuselage, and then the wheel pants are bolted into place. No cutting, fitting, sanding or drilling is needed. There is a pair of solid gear braces with simulated springs that do nothing but tighten up the main gear leg flexibility. They do nothing to assist the operation of the main gear legs, but they sure do look nice.

I spent less than three hours from opening the kit box to reach this point in the assembly process, and that includes removing everything from the plastic bags and boxes, making an inventory, and shrinking the covering. This is so fast and easy, even a caveman could do it!

The Zenoah G-20EI engine specified in the manual is a perfect fit for the Taylorcraft firewall, but other power choices are available too. Some modelers will prefer using a 1.20 to 1.80 4C or a 1.20 2C engine, and some will opt for clean and quiet electric power. All of these choices are possible, but the manual describes only the Zenoah G-20EI setup. I'm guessing that Hangar 9 assumes everyone already knows how to install the other power choices, but I'm not so sure. Many newcomers to giant scale do not yet have that ability.

Anyway, I made provisions for mounting the ignition box on the firewall, and replaced the glow fuel tubing in the tank with Tygon gas line, both inside and out (more on this later). Holes for the engine mounting bolts were drilled at the laser-etched marks on the firewall, and blind nuts were installed. Builders with larger than average hands may need to recruit help from someone with smaller paws. There's not much room between the firewall and instrument panel.

The ignition box us held in place on the firewall by a tie wrap that's just as easy to install as those blind nuts. The engine bolts to the firewall using the set of standoffs in the kit, and be sure to put some thread locker on all the bolts. Then the ignition wires are connected, and the throttle servo installed in the area under the seat. I did not use the connection from the throttle pushrod to the carb lever because I always found those little circular arms to be too small. I installed a

nose wheel steering arm to the opposite end of the throttle shaft. I also did not use the metal throttle rod because I prefer to use a plastic piece that won't transmit RF noise into the radio compartment. It took a little bending and adjusting but ultimately the throttle operated smoothly.

Since the carburetor air horn and muffler outlet have to come out of the cowl, templates were made up to cut the holes using a rotary tool and a sanding drum. Neither stick out all that far, but the holes are needed anyway. Please provide adequate ventilation while grinding on the cowl. It gets rather dusty, and fiberglass dust isn't good for the human respiratory system.

The fuel line from the tank needs to be connected to the carburetor with a tee in the line for filling the tank. The manual shows how to route the fill line out the bottom of the cowl, but I think that would create a potential problem if you pull the plug in the fill line and dump gasoline all over the flying field. I made the fill line long enough to sit on top of the carburetor where it can be easily reached through one of the air inlets in the cowl. I also removed the long plastic lever from the choke shaft, replacing it with a wheel collar and a long bolt that's also easy to reach. The vent tube is run behind the engine to the bottom of the firewall, and is secured with a cup hook. These are both a matter of personal preference. The procedures described in the manual will also work well.

Another four hours were spent getting to this point in assembly.

Aileron servo installation is very easy, and this is the first time I've had to use any adhesive (unless you call thread locker an adhesive). Wooden blocks are glued to the servo hatches after centering the servo arms in the outlet slot. By the way, these slots are actually wide enough to handle any size servo arms. Servo lead extensions are added now, but I prefer to lengthen the existing servo lead soldered joints and locking servo connectors. Pre-cut aileron control rods and 4-40 clevises connect the servo arms to the pre-installed aileron horns, and after the servos are centered with the radio system, the ailerons can move at least as far as stated in the manual. Thread locker is applied to each metal clevis to keep it secured. I also put a small piece of fuel tubing over each clevis to keep the arms closed.

The metal wing struts only fit one way, so be sure to follow the instructions carefully. They're held to the wings with metal brackets and jury struts, and everything bolts together with safety nuts everywhere. Wait until you actually mount the wing to the fuselage before tightening all the fasteners. There may be a few minor adjustments that necessary for the entire strut assembly to fit correctly.

Radio installation begins with installing the radio switch and, in my case, the ignition switch. I use Radical R/C Heavy Duty Charge Switches, which fit the available holes perfectly. The receiver battery is then mounted with Velcro, followed by the receiver. The manual describes installing a modern, Spread Spectrum receiver with a remote antenna, but if you use a 72 MHz radio, there's tube in the rear of the fuselage through which you can route the receiver antenna wire. In either case, it's easier to leave the receiver floating in the cockpit until all the servo plugs are installed.

Smaller details like gluing in the landing gear cuffs and installing the windshield come next. I used tiny wood screws to keep the windshield in place rather than permanently gluing it. Small blocking plates are glued to the air inlets in the cowl to keep the air flowing only over the cylinder head, but I made one opening a bit larger to allow access to my fuel filler tube and the choke lever. The radio cover is installed, the seat is placed over the magnets provided, and then it too is done. The top window is screwed to the fuselage, and we're ready to mount the wing. The metal wing joiner tube fits perfectly, and the locating tubes align the wing halves to the fuselage. Nylon thumb screws are used to hold the wing panels in place, and the aileron servo leads can be run down along the fuselage sides to the receiver.

The wing struts connect to the fuselage using Hangar 9's classic strut pins and keepers. These

are easy to install, but those tiny little spring keepers can and do get lost. I lost two of them in the work shop. I'm using 4-40 bolts and safety nuts for now, but a supply of replacement pins and keepers are on the way to my door!

The pilot figure was installed in the seat after removing his life vest and cutting his boots down to look more like shoes. Still, something was missing from the cockpit. Wait... there's no control stick! I made one from a scrap aluminum tube and some shrink tubing, and attached it to the floor in a drilled hole. I may even go to the trouble of making a throttle quadrant for him to regulate engine power.

Last on the list is the fuel dot and vent, and here I made a few more changes to my Taylorcraft, based solely on personal preference. I ran the fuel filler tube out along the engine towards the front, and opened up one of the air inlet blocking plates so it can be pulled out to fill the tank. A piece of looped wire is attached to the engine to keep the line from flopping around inside the cowl. I can reach the choke actuating bolt though this hole also.

The cowl is mounted with four bolts and some thread locker, but I'll wait until the engine has been tuned before securing the cowl. I also chose the recommended Tru-Turn spinner for my model. Since that's one of the first things noticed on any plane, I wanted it to look really good. And as we all know, Tru-Turn spinners always look good.

Now it's time for the moment of truth, checking the completed model's total weight and balance point. The manual suggests starting out at the 25% point on the wing, but I went ahead and made lines at 25%, 30% and 33%. My model then balanced perfectly somewhere between the 25% and the 30% lines, so it should be just fine. I can move the heavy ignition battery closer to the firewall if necessary, but for now I'll leave things alone and see how it does.

My Taylorcraft, ready to fly but dry, weighs 14 lbs. and 11 oz., giving a wing loading of just over 29 oz./sq.ft. The manual and box top say the weight should be between 13 and 14.5 lbs., but the most recent Hangar 9 literature online shows the weight range as 14 to 15.5 lbs. This puts my plane right in the middle of the "new" weight range.

Thank goodness for computer radio systems. The control throws were relatively easy to set up using the numbers in the manual. These are only starting points, however, and I'm sure many of you will be changing the control throws as soon as the first few test flights are complete.

Total time spent assembling the Hangar 9 Taylorcraft ARF was just under 12 hours, but I seem to work a little faster than most modelers. I'd plan on a week of evenings and maybe a Saturday to run-in a new engine. You can theoretically take this plane from the kit box to the flying field in a week or less.

I took the model out to the engine testing area to set up the throttle and to see how it "drives" around the back yard. The tank was filled, the ignition and receiver were switched on, and after a few flips with the choke on, it sprang to life. I let it warm up a while and then set the needles for a good idle and easy transition to full speed. I taxied it into the street and found the idle was low enough to allow the Taylorcraft to completely stop on the pavement. When I brought it back to my driveway, strange things started happening. The engine began to run faster at idle, and I saw bubbles in the fuel line. It was as if I had run the tank dry! Since the radio system checked out well, I took the plane back to the shop to work out the problem with the fuel delivery.

The fuel tank was still nearly full, but when I tried to empty it, none would come out! I pulled out the tank and found the entire clunk line lying on the bottom of the tank. It had somehow slipped off the metal tubing, even after putting a tie wrap around it, as suggested in the assembly manual. So, I cleaned the brass tube, wrapped some thin bare copper wire around it, and soldered the wire to the tube. After smoothing it with some sandpaper, the pickup line held tight, but I added another tie wrap just in case. I then filled the tank half way, ran the engine and

drained the tank just like it's supposed to do. I recommend that you do something similar to prevent a similar problem.

FLYING THE HANGAR 9 SUPER CUB

It took quite a wait, thanks to the weather, but a beautiful Sunday morning finally arrived. My flying buddy, Rick Cawley, agreed to meet me at the field that afternoon. After the customary ground photos were shot, I filled the tank and started the engine. My procedure included the use of a well placed thumb in the carb opening, because the choke plate didn't seem to be closing far enough. I allowed the engine to warm up, and then completed a radio range check in two directions, just to be sure.

I made a high speed taxi run in each direction on the grass runway, mainly because there was no wind at all. Once I verified that the Taylorcraft was tracking straight on the grass, I advanced the throttle and began my take-off run. It took quite a bit of power to get the plane moving, and I had to hold a lot of up elevator to keep the nose from pointing down, both due, I think, to the small wheels and the wheel pants dragging in the tall grass. Once up to flying speed, the model lifted off nicely and it trimmed out with only a few clicks of down elevator.

After a few circuits around the field to get my bearings with a new model, I tried a roll, using low-rate aileron. It took about three seconds to complete, which is sorta pretty scale-like. It took only half that time when using high-rate, which is not at all scale-like.

A large loop showed that the Zenoah G20EI had plenty of power to pull it over the top with no difficulty. I really like doing stall turns on the first flight because they look so nice and really impress the crowd. The Taylorcraft performed these beautifully. After a few low passes for the camera, I noticed that I'd been flying at about half throttle the whole time! So I went ahead and tried using full power, but that proved way too fast for a plane like this. I went back to half-throttle for the rest of the flight, which is all that was necessary to do just about anything I asked the plane to do.

I set up for my first landing, and the model slowed only a little, and touched down at a rather high rate of speed. As you can hear in the included video, the wheels even made a prototypical tire squeal as they touched down on the runway. True, I'm flying from a grass field, but it still sounded neat to me!

See the "Hangar 9 ARF Taylorcraft Review" video in the RCRO Video Library.

www.rcreport.net/videos

It was time to let Rick fly while I took over as th team shutterbug. Rick got the Taylorcraft off the ground smoothly and easily, and later commented that there was plenty of power for everything he asked the plane to do. He flew the airplane through loops, rolls and other maneuvers as he crossed through the sky, seemingly having a great time doing so. He flew for about 15 minutes before landing slowly and gently. He felt that the Taylorcraft flew pretty well for a plane its size.

Then I flew again, and tried a spin from a very high altitude. It entered the spin easily and continued for at least five revolutions, and once I released the controls, it ended the spin after just a half turn more.

The Hangar 9 ARF Taylorcraft flies really well, and I like it! The kit was quick and easy to assemble, the instructions were clear and easy to follow, the plane was ready to fly in about 12 hours of work, and it weighed and balanced within the official specifications. Other than a few minor errors and a small amount of shipping damage, it was a very enjoyable project to assemble and fly. I'm sure we'll be seeing a lot of them at local flying sites in the coming months.

-Dick Pettit
pettit@ti.com

THE BIG PICTURE

by Dick Pettit

I recently had a great weekend at the field. The weather was good for this time of year, the skies were partly cloudy, and the wind was right down the runway at maybe 5 mph. It was a perfect day for flying, and I hope the weather in your area woods was just as good.

I've been working on a few new projects, one of which you will see soon (maybe in this very issue), complete with a short video. Plus, I'm adding something new to my column this month. I have video from a new, giant scale kits distributor that just happens to live right down the road from me. I'll also show you a gorgeous Corsair built by one of our readers, and I'll bring you up to date on another project of mine, a big WWI biplane. SO let's get to it now and take another look at RCRO's "The Big Picture".

CREATIVE CORSAIR

George Hovey, of Willimantic, CT, built the beautiful F4U7 seen in **Photo 1** to represent a French Navy Corsair used by the F-14 Squadron in the 1956 Suez Canal Campaign. George's 86"

Photo 1: George Hovey, Willimantic, CT, built this French Navy version of the F4U Corsair

Photo 2: George Hovey's Corsair has many details and scale modifications

span Corsair took over two years to complete, and is powered by a Zenoah G62 engine. It's finished with Flite Metal and 3/4 oz. glass cloth applied with Pacer Z-Poxy, and painted with Rustoleum auto primer, detailed with ChartPak tape panel lines, and finished off with Model Master paints. The rivets were simulated with a 1/8" brass tube attached to a soldering gun and burned into the primer. The model also uses Robart main and tail retracts with Aerotech wheels. The fiberglass cowl is from Stan's FiberTech.

George made a number of modifications to the basic Top Flite kit, including changing the shape of the rudder and wing tips, adding a sliding canopy, building functional gear doors and door closers, and scale guns. Many of these details can be seen in **Photo 2**.

Thanks, George, for sharing your beautiful photos with our readers.

REALLY BIG KITS!

A new member of our local flying club showed up at the field a few months back with a beautiful 1/3 scale Sopwith Pup, and flew it for an appreciative crowd of onlookers. It was powered by a large twin, and flew in a scale-like manner at just a hair above idle. He introduced himself as Goetz Vogelsang, the son of world famous giant scale pioneer, Georg Vogelsang, who was one of the first to work out the details of flying giant scale models. Goetz is presently operating a business that imports a number of giant scale kits, including the Pup and the 45% scale Fly Baby seen in the video. This Fly Baby has a span of 149.6", and weighs about 39 lbs. powered by a Zenoah G62 engine coupled to a Schlundt 2.5:1 belt reduction drive turning a 34x20 prop at about 2900 RPM. With its canister muffler, the sound level of the G62 exhaust is actually lower than the sound from the prop!

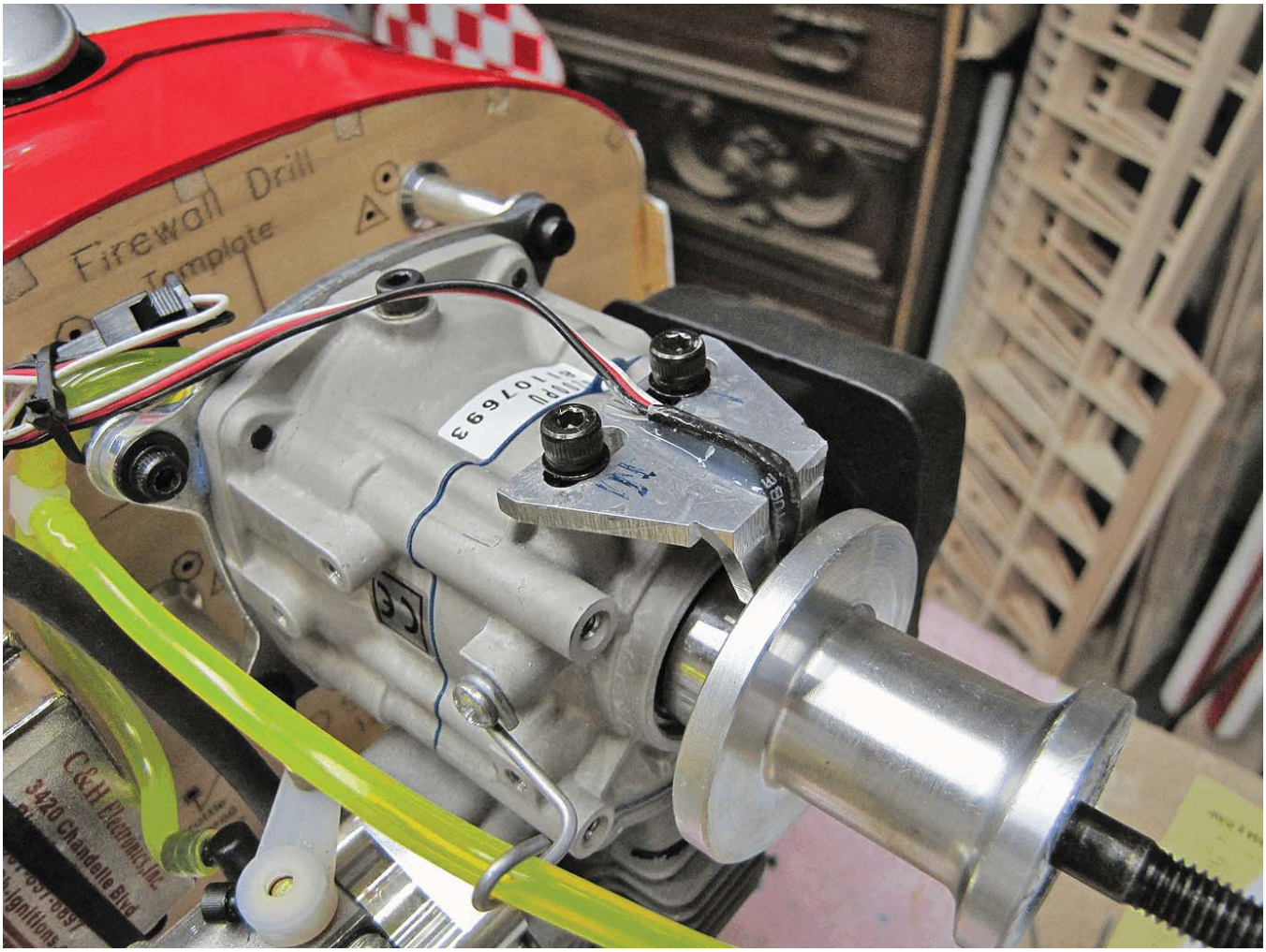


Photo 3: Adjustable timing plate from CH Ignitions for Zenoah G-20EI

I was very impressed with the way the Fly Baby flew, and at least one of our club members will be building one in the near future. The website for Vogelsang AeroScale is www.vogelsang-aeroscale.com, where you can browse the long list of kits and accessories that Goetz is currently offering.

ADJUST YOUR TIMING

I was in the process of installing an ignition system in a new ARF that I'm reviewing, when I recalled that the engine, a Zenoah G20EI, uses the same ignition system as the G-26EI. While its ignition system works just fine, the power requirement requires a very large battery to provide enough power for even a few flights without recharging. As I recall, the stock Zenoah ignition unit draws over 2.2 Amps while running, which is quite a bit more than many ignition units available today.

So, I called my friends at CH Ignitions (P.O. Box 1732, Riverton, Wyoming 82501, Ph. 307-857-6897, Fax 307-857-6900, www.ch-ignitions.com) to order one of their RCEXL upgrades for the G20EI. I then learned that CH has a new version available that features adjustable timing. **Photo 3** shows the adjustable ignition pickup. I made arrangements to install this new version on my engine, and here's what I later discovered.

First, the CH RCEXL unit with pickup and ignition box weighs just 4.2 oz. (1.8 oz. less than the Zenoah unit). The CH unit also draws only about 0.4 Amps at full speed compared to 2.3 Amps for the stock Zenoah system. And with its variable timing I measured almost 200 RPM

Photo 4: Complete installation of the CH Electronics RCEXL ignition system

more than with the stock Zenoah unit. The idle speed was the same, and it starts easily by hand.

As I began to experiment with the timing, I found that the best setting was between 28 and 32˚ BTDC. Hand starting was a bit more difficult at 32˚, but this range is better for the longevity of the engine.

I'm using the CH system (see **Photo 4**) mainly because it draws so much less current from the ignition battery, which allows a smaller and lighter battery. The adjustable timing may come in handy too. The system costs about $95 plus shipping, which is the same price as the one without adjustable timing.

MY LATEST PROJECT

I wanted to include a few photos of a project currently in my work shop. This is the new Balsa USA 1/4 scale deHavilland DH-4 that I'm modifying into the 1920's mail plane version. It has a 129" span and over 4100 sq, in. of wing area. I project that it will weigh in the mid-30 lbs. range, but will need only a 50cc gas engine to fly well.

I decided to add functional flying wires, so I needed some raw materials to make the fittings. I went to the website for my favorite online hardware store (www.mcmaster.com) where I found some L-brackets that can easily be cut

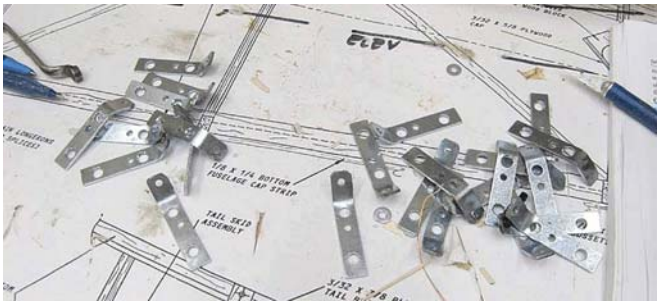


Photo 5: The raw materials for the DH-4 wing wire installation

down to the correct size. **Photo 5** shows the brackets after modification. They bolt in place and sandwich the strut brackets supplied in the kit. **Photo 6** shows how they will look when the plane is completed. The strut will mount to the center bracket, while the flying and landing wires will clip to the outside brackets with clevises or crimp fasteners.

Photo 6: Brackets installed on DH-4 wings

One problem I had was how to cover the wing panels and install the brackets at the same time. I found that I could cover the bottom of the top wing, and then cut slots to install the brackets. Then I covered the top of the top wing. The bottom wing was more of a challenge. On top I first attached the covering only to the balsa that surrounds the brackets, and then I covered the bottom of the wing. The rest of the top covering was then attached and all the overlaps were in the correct places, with the top overlapping the bottom.

For the covering I used Sig Koverall applied with Stix-It, followed by a few coats of clear,

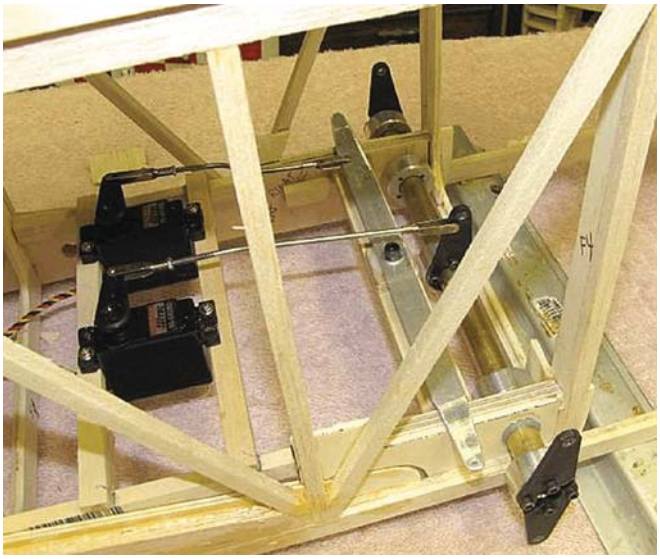


Photo 7: My DH-4 rudder and elevator linkages

water-based polyurethane with a bit of baby powder mixed in to help fill the weave. The final painting process is still under negotiation.

Another challenge was the design of a scale-like elevator and rudder control system that has all the linkage wires running outside the fuselage. Again McMaster-Carr came to the rescue with nylon bushings, collars, and aluminum strips. **Photo 7** shows what it looks like temporarily installed. It will be installed permanently after the plane is fully covered and painted in the next few months. **Photo 8** shows the entire structure "in the bones". Next month I may be able to show you things like engine installation and some control linkage details.

That's all I have this time. I've also almost run out of readers' photos, so we'd appreciate any you can us send via email. I'll even accept photos and videos sent by mail on a CD, to include just about any video format because I can now convert them to the format my video editor uses. So come one, folks, I showed you mine, no now show me yours.

See y'all at the field!

-Dick Pettit
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To see the FlyBaby video, go to the RCRO Video Library at...

www.rcreport.net/videos

...and select the file "FlyBaby Video".

Photo 8: My progress so far on DH-4 project

Southern Dawn Patrol

December 4th & 5th, 2009

Location

Hodges Hobbies, Andersonville, GA.

www.hodgeshobbies.com

Format

Open Fly-in

With an Optional Fun Event Each Day

Qualified Aircraft

World War I Scale Warbirds

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Background Art Courtesy of Steve Anderson: Du Doch Nicht!!

Monster Planes 2009 in Lake Wales Florida was dreamed up by Mr. Frank Tiano, and first held in 2008. This fly in is for large scale planes only. Now this definition of large is not like your average IMAA large planes, but much more. This event is for scale aircraft that weigh at least 35 lbs! Generally models that weigh at or near this weight limit are so large that they are not always welcome at your average AMA sanctioned flying field. This is usually due to two main concerns: the large area needed to fly these planes, and the inherent noise that these monster engines make. Well here in Lake Wales, Florida we are using one end of the 17/35 runway at Lake Wales Municipal Airport. The runway end that we are using is about 100 feet wide and more than 1000 feet long., so plenty of room for even the largest of models. Considering this is a very active airport for small personal aircraft and a southern hub for skydiving sports there are always full scale aircraft in and out of the area, so noise is not an issue. I arrived from the airport in Tampa, midday Thursday. Many pilots were already onsite, even though we did have threatening weather.

A quick perusal of the planes onsite was a sight to behold. A 50% Extra sits next to a 50% Ultimate with a 50% Spacewalker right next door. Wow, that's about 300 pounds of hardware awaiting their time to fly. Moving on down the flight line we get into some beautiful war birds. Corsairs, Tigercats, and P-40's from the World War Two era followed by Eindecker, DR IIV's and Sopwith Camels abound. Now we get into the really BIG planes. What as is if 50% is not big enough we have a B29 from the stable of Mac Hodges. This is the 3rd generation of this plane, and the most powerful yet. Four-DA-100's pull the 80+ pound plane around and is an amazing performer! Check out our NEW Video page for several short videos from this event and other review items. www.rcreport.net/videos.

Carl Bachhuber's beautiful Connie! This is one of his "Smaller Planes"

- **Lockheed Consellation**
  model 749 military version.
- 180 Inch wing. 15ft wing span approximate 1/8 scale
- 4- Fuji 32 gasoline with Mejzlik 18x10 3 blade props
- Don smith plans-enlarged and modified
- Homemade landing gear
- Robart wheels and brakes
- 98 lbs ready to fly

This is Carl's "Big" plane… Convair B-36 Peacemaker. First long range nuclear bomber

- **B-36b Peacemaker**
- 230 inch span -1/12 scale
- 6- Zenoa G-26 engines
- Bob Walker prop extensions
- Bob Walker landing gear
- 98 lbs.

Now we can look at a few of the newer generation of monster planes. There some great looking jets that continuously were turning and burning! These larger jets are able to carry more fuel due to their size, and therefore they get great flight time. This is the first time I personally have witnesses pass after pass at full throttle, three feet off the deck, screaming jets. F-4 Fantom, F-100, and several others. These things were drop dead gorgeous and the pilots that flew them had grins from ear to ear all the while!

Now I have only touched on a few of the models that were onsite. I counted more than 60 planes! The pilots that build and fly aircraft like these are truly the cream of the crop. These guys are not afraid to actually fly the planes when the weather is not the best. We had rain on and off over the three days, but that never dampened the spirits of the pilots. Frank Tiano had a large tent big enough to store more that 30 models during the rain storms

Unfortunately I had to get on a plane and head back to Huntsville, Al by early afternoon on Saturday, so I missed the steak dinner and awards that evening. I am truly sorry to have missed this, but I am still glad I was able to go to see all the planes at this great event. I will defiantly be coming back next year,(as long as Frank and his crew have this great event again) and I will be a little more prepared to cover the event more in depth.

Please check out our new video page at:

www.rcreport.net/videos

Tony Coberly
tonyc@rcreport.net

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MARINE CORPS RESERVE

TOYS FOR TOTS

TOYS FOR TOTS FLY - IN

November 6th-7th, 2009

Friday: Noon till 6:00 pm -- Saturday *8:00 am till 6:00 pm*

Site: Captain Trey WILBOURN

Model Airplane Park (Club Field)

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The Webb Scale

by Gary Webb

Hello again, scale folks. By now the leaves have fallen from the trees here in the North, while the flying season is still in full swing down south. This month I'm going to cover in parts (due to the meager space they allow me!) the D.O.G.S.' R/C Air Show held here in Dayton OH, at the USAF National Museum, and I also want to mention the Japanese WWII A6M2-N "Rufe" being built by my new friend, Robert Ball. So, let's get started.

The Dayton Ohio Giant Scalers' fly-in has evolved into a huge RC model air show with all types of models being flown throughout the weekend. The event has been on Labor Day weekend for many years now. In good weather the event draws around 20-40,000 spectators, becoming one of the largest events the museum hosts each year. There were over 125 pilots in attendance this year. Figuring at least two planes per pilot and you have a lot of model airplanes, yet most pilots brought *more* than two. There were scale planes representing all eras from WWI, Classics, WWII, modern day fighters, and lots of civilian models to boot. You're permitted to set up your sun shade on Thursday, and even get in some flying late in the afternoon. The show officially starts on Friday, however, and runs through Sunday. The main sponsors are the USAF Museum, Horizon Hobbies, and "R/C Hobby Shop" located right here in Dayton. John and Jeanette Nagel, owners of R/C Hobby Shop (see **Photo 1**) have sponsored the Friday night pizza party for many years, providing a fun and relaxed atmosphere for all the pilots to hang out together. The pizza ain't bad either!

Photo 1: John and Jeanette Nagle seen in front of their booth at the D.O.G.S. air show. These fine folks have been among the more generous main sponsors of this event for many years.

Photo 2, taken early Friday morning before the crowd arrived, shows the large Horizon Hob-

Photo 2: Horizon Hobbies' large tent was packed with new R/C products on display.

Photo 3: Lewis Patton and his all new F-15 Eagle. Lewis flies a beautiful routine to Ray Charles' ever popular song, "America", and just *has* to be seen (and heard) to fully appreciate. Great show, Lewis!

bies tent. Horizon had all their latest models and radio gear on display for inspection. Their newest little foam war birds are a hoot!

As always, there was a large vendor area where sellers hawked everything from apparel to all kinds of R/C kits and supplies.

On Saturday night the pilots and their families get a private tour of the museum. After that comes the big raffle in the museum's auditorium, where over $5,000 worth of R/C products are handed out. Horizon Hobbies provided many of the kits and radios, including one of there new Clipped Wing Taylorcraft ARF models. All of the vendors generously contribute to the raffle in some way. This year yours truly walked away with a large package of Velcro products. (Thanks Vel-Tye!)

The air show part of the event runs approximately two hours each day, starting at around noon. All pilots are encouraged to take part in the show, where they categorize the aircraft into groups or types so everyone can get be involved. There were aerobatic solo and multi-plane aerobatic flights, all types of civilian aircraft flew as a group, then WWI aircraft, WWII, Korean era, scale helicopters, and then *all* types of jet fighters flew together! And what a show it was! Everyone agreed that it was one of the best they had ever seen, and everyone who wanted to fly did so. After the air show the event reverts back to open flying until 5:00 p.m. when all flying is stopped to allow the spectators to leave, and the museum to close. Open flying resumes unofficially at 6:00 p.m., and some pilots even fly after dark with special lights on their models. The weather really smiled on the event this year, giving perfectly blue skies, light winds, and comfortable temperatures in the high 70's and low 80's throughout the weekend. You simply couldn't have asked for better air.

Photo 3 shows Lewis Patton's new F-15 Eagle with tricked-out scale detailing right down to the turkey feathers! Guys, it just doesn't get any better than this, having your picture taken with your new model while the USAF museum serves as the back drop. I've always loved taking photos of my Mustangs and other war birds in flight with the museum in the background. Flying from this hallowed air strip is simply awesome. By the way, there's great news concerning the museum's runway, which has numerous rough spots due to its age and heavy use. We've

Photo 4: Jared Sisk (left) and John Light stand behind Jared's 60% Extra 260, one of *two* such models that he brought to the show!

been told that a space shuttle is being delivered to the museum via a piggy-back ride on a 747, so the runway will be resurfaced before the next fly-in! Sweet! Those of you near Houston, TX, Huntsville, AL, and southern Florida may have already seen it, but come hell or high water, this modeler plans to be part of the crowd that will gather here to see the space shuttle arrive!

Photo 5: Jared also brought two of these 60% Ultimates to fly.

Photo 6: Bob Bush and his award-winning F-100, built from a BVM kit.

Photo 4 shows Jarred Sisk (L) and John Light with one of Jared's 60% Extra 260's. Yes, I said 60%! From Kansas City, MO, Jared brought *two* 60% Extras, *two* 60% Ultimates, *and* a 50% scale Clipped Wing Cub finished in Hazel Sig's famous white and blue scheme. The Extras have a 180" span, weigh 95 lbs. each, and are powered by 3W 342cc twins, with JR 2.4 radios for guidance. These awesome giants were designed by Bill Hemple. **Photo 5** shows Jared with a huge Ultimate biplane, which has a 120" span, weighs 68 lbs., and uses a 3W 275cc twin.

Photo 7: Bob's awesome F-100 returning from a mission.

Photo 6 shows Bob Bush and his award winning F-100 Super Sabre built from a BVM kit. Using a Pagasus turbine, this 43 lb. model is guided by a Futaba 2.4 GHz radio system. Its full-scale counterpart is on display here at the USAF museum! **Photo 7** shows the beautiful model returning from a combat sortie.

Photo 8: Rick Cawley stands with his fantastic Balsa USA 108" Sopwith Pup.

For all you WWI buffs, **Photo 8** shows Rick Cawley (Dick Pettit's good friend and chief test pilot of "Area 51" fame in North Carolina) and his beautiful Sopwith Pup. This 108", 31 lb. model started out as a Balsa USA kit. In fact, there were three of these planes present, and they thrilled the crowd by flying in formation as the "Dawn Patrol." As Dick Pettit told us some time ago, all three of these Pups come from the same area where they were built as a group.

Another great thrill was seeing Mike Selby's Top Gun award-winning A-10 Wart Hog on display at the air show (see **Photo 9**). Mike recently donated this model to the museum, where I'm told it will soon be put on permanent display.

I'll have more photos next month.

Photo 9: Mike Selby's Top Gun award-winning A-10 Wart Hog was recently donated to the USAF museum. This amazing model earned an incredible 99.667 point static score at Top Gun!

Now let's look at Robert Ball's A6M2-N "Rufe", seen in **Photo 10** just after its first primer coat. I met Robert at a local fly in and we started talking about scale models. He'd seen my

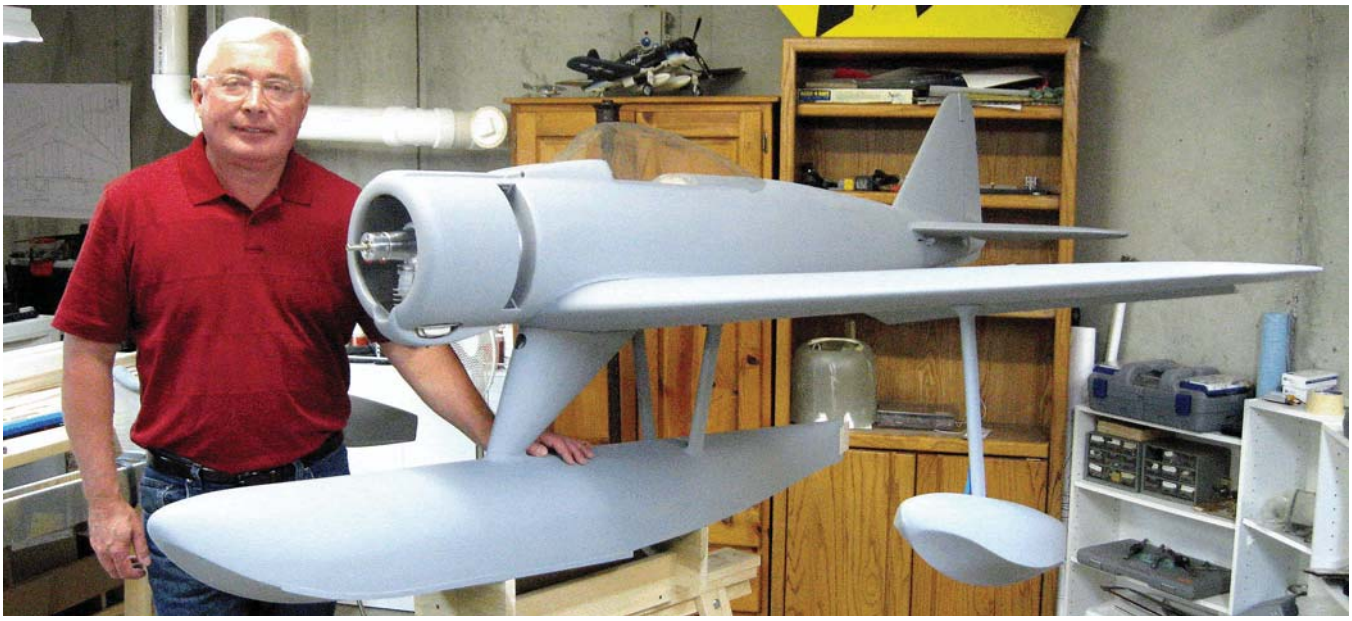

Photo 10: Robert Ball with his A6M2-N "Rufe" just after its first primer coat.

Photo 11: One of the plastic kits of the "Rufe" that Robert is using for its outline and surface detail for his model.

T-28 sitting in front of my sun shade, so he stopped by to talk about it. He told me he was a full scale pilot, but I didn't realize until I visited Robert at his home that he was a professional airline pilot for DHL. Robert served in Viet Nam as an Army aircraft mechanic and door gunner in a Huey helicopter. All the crew members were given sufficient flight training on the helicopter so that in case of an emergency, they could get the aircraft and crew home if something happened to the pilots. That training sparked his interest in flying, so when he left the Army he enrolled in pilot training using his G.I. Bill benefits. He then went on to being a bush pilot, first in Washington state and later Alaska, and he also did some oil line patrol flying (he's also float plane certified) before going on into the larger aircraft and receiving his ATP rating, and finally moving up to heavy jet transport aircraft. He's currently flying 727's and will transition to the larger DC8 aircraft soon. Robert told me he's been flying the big jets for about 24 years now. Along with his love of flying and modeling, Robert's an avid big game hunter (Prong Horn Antelope, Elk, and Deer).

Robert had a photo of this model in his cellphone, and showed it to me at the fly-in. I was immediately interested and excited about his project, as I had never before seen a model of this aircraft. Naturally, I thought it would be an excellent project to share with our readers here at RC Report Online. And, after seeing it in person, I knew it was a winner!

The model started out as a Ziroli A6M3 kit, a late version of the famous "Zero". He had to increase the wing span by 4" because the later A6M3's had less span than the M2. He's using a DA85cc gas engine for power, and a Futaba 10C 2.4 GHz radio for guidance, using all digital servos. Robert is trying to keep the finished weight to no more than 30 lbs., an amazing feat for a model this size.

I've found Robert to be a consummate designer, and builder. He's using scale plastic models of the "Rufe" and the A6M2 for outline and surface detail (see **Photo 11**). The Rufe was made only from the A6M2, the first Zero that saw production, and was used during the Pearl Harbor attack. The Rufe allowed the Japanese to operate from island harbors when there were no air fields available. Robert had to first design and build his own cowl, change the tail and wing configuration to match the earlier A6M2 and Rufe modifications, and then the hard part started. He projected the plans of the A6M2 fuse onto his garage wall and then designed and drew the plans for the three floats. He also had to modify the tail, because the rudders on carrier-based A6M2 aircraft stopped at the tail cone. He's now in the process of adding the surface detail, consisting of panel lines, flush rivets, access panels, and cockpit details. He'll also build a sliding canopy for the model, and is using a Dynamic Balsa cockpit kit (see their ad in this issue) to create a scale-looking interior.

We'll look into more of the design details next month, when I'll also describe how he used a laser to make sure all the airplane's elements were in proper alignment! Robert just recently moved here to Ohio this year from Washington state, and he's never been to the Toledo show, so he's looking forward to displaying the model at next year's event. (Gee, I wonder where he got *that* idea?) Stay tuned, scale guys!

Until next time, fair winds and blue skies to you all.

-Gary Webb
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Two Old Scale Guys

by Dick Watz & Bill Hurt

Dick: Our search is on for information we can use in a column about sliding canopies. It will require some drawings and pictures to cover the ABC's of a complete canopy. Good grief, I think it was over 20 years that I last built a sliding canopy, on a small F4U Corsair. I think it was Top Flite's 1/9 scale. I don't think I ever took a picture of that plane, though. Maybe some of you have pictures of sliders you could send along. Bill, maybe I could find time to install a slider in the F4U I'm building for Eric, and follow the steps with pictures. It would move back my YMF5 a little, but it might work out okay. What do you think?

Bill: Dick, we've only had one request for the slider, and you have the YMF well underway, so I say let's first see if there's enough real interest in this project. If there is, then we'll just have to do one. Modelers need to remember that when you're dealing with model airplanes, the same idea will not apply to every model, no matter how good it is. The canopy slide is far different on a Japanese war bird than on a German fighter, and then you have the different American birds where the installation is different again. I normally ask the modeler to visit a hobby shop that specializes in model railroading supplies. Go through all their Plastistruct packages and find a box they can inlay in the side of their fuselage, and use a tongue strip that will fit within the box and slide along inside. Not all models will work with this, though.

I think we'd serve our readers better by compiling a list of requests, and then choose the one that would help the most people, answering specific questions from the different readers on a one-on-one basis.

Dick: Wow, it was 22˚ this morning. Where's this "Global Warming" they keep talking about? Bill and I both are on blood thinners, so we're gonna have to turn up the heat in the hangar at Geezer Gulch, or start meeting in a little bar and grill with a strip joint next door. No wait, that's a supply store that sells support hose and walkers now. A lot of free flighter's I know get their wheel chairs there, so they can chase after their fly-away's. Of course, the only free flight I fly myself are rubber powered scale, and I only use 80 to 120 turns so they can't fly very far. Then they sort of plop down on the ground. Either gravity is getting stronger, or the government has put a tax on it to make us use less.

Bill: Bar and Grill? Strip Club? Dang, we don't have any of those down here. Well, at least not in this town. We have plenty of bars, and maybe a few grills, but no strip joints, and I'm doggone sure we have no bars and grills that include pretty girls. The average age here is 73, and most gals at that age could use some ironing. They don't call this town "Wrinkle City" for nothing. A young pretty girl here is a tourist!

Dick: I can't wait to see Bill's 1/5 scale YMF. The discussions we've had and the pictures I've seen tells me it will be something really special, but as you're quick to say, this is not a regular "job", so just relax and it will all get done in good time. I always get excited about new projects, and especially scale drawings. *Scale* drawings? What other drawings *are* there, Bill?

Bill: Well, there are all kinds of drawings. There are always drawings for raffles down here, but I never win any. Then there are drawings for the Power Ball Lottery, but I haven't won that either (you can tell too, because I'm still here!). Then there are drawings of pretty girls, and there are drawings of scale models, and the latter two are the only ones I care about.

The Waco YMF is coming along nicely, but I'm again in new waters with the redesign of the

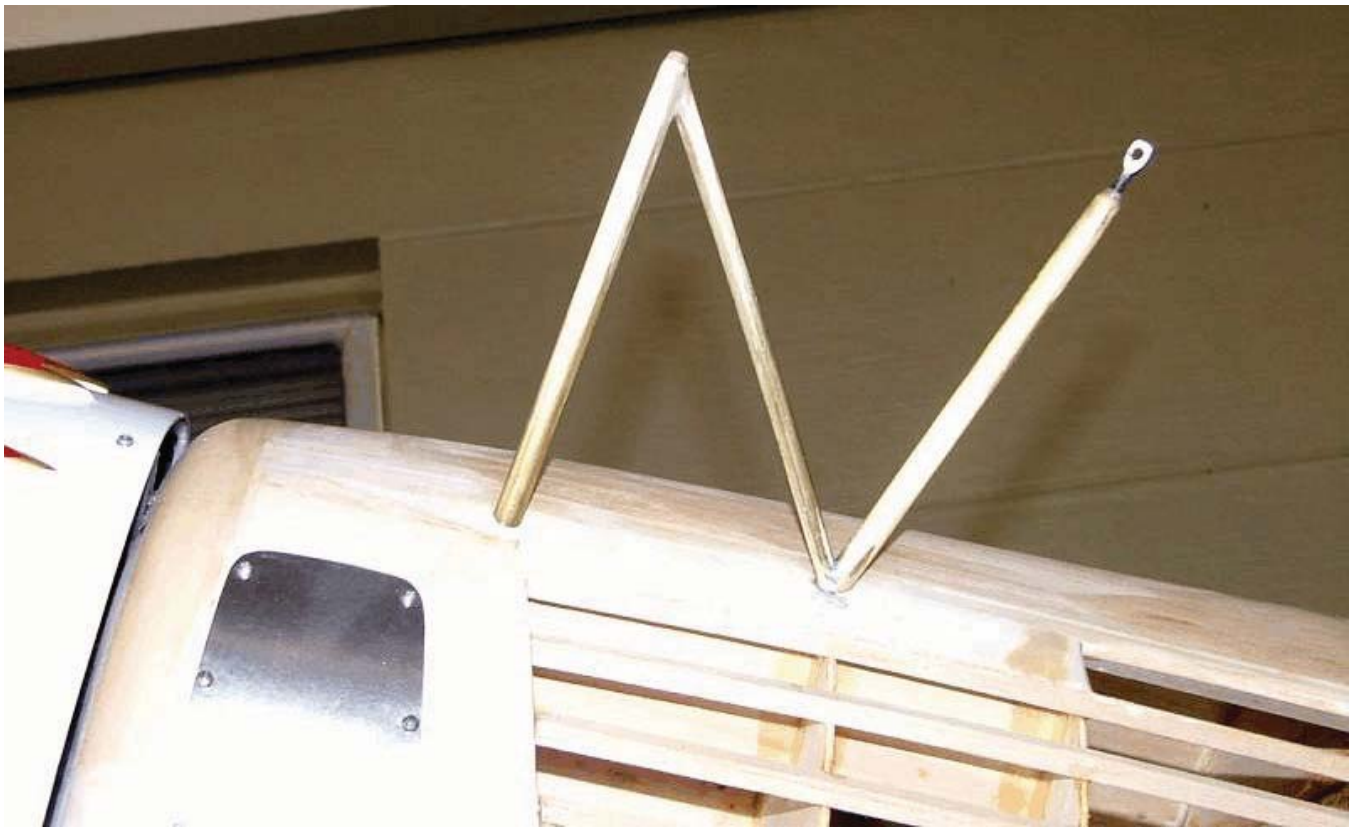

Photo 1

wings. For some reason the original design put the spars about 3/4" further aft than they should be. This makes mounting the double shears for the strut mounts out of the question. Also, they designed the wing as a D-tube wing, and we all know that Waco never used a wing like that. So, having said all that, it's fresh paper time. The wing as designed originally used tiny little wing joiners at the spar locations, and most of the failures of the wings occurred there. Mine is using a box spar and tongue design that will allow the wing centers to remain with the fuselage. The outer panels will slide into the spar boxes where they will be locked in place with appropriate hardware.

The spars will be in the correct location in my wings, and will use a double shear plate to allow the cabane and interplane struts to mount in a scale manner. See **Photos 1-3**.

The wing tips are also being changed to a built-up type, and will use laminated spruce strips instead of a tip plate.

Looking back on the build of this one, and with all the modifications necessary, it's no longer a Pica Waco, but has become a completely new plane. Only about 25% of the original parts have been used in building this one, and virtually none of the plans. Most everything from the firewall to the tailwheel has been redesigned.

Dick: Most of you long time readers may remember an old friend of mine who did some pretty wild electric planes, and the seven cylinder electric radial (using battery cells for the cylinders) in particular. Well, I'm sorry to report that Al Willhite passed away in October. He was 83 years old, and will be sorely missed. His contributions to my column were interesting.

Now for some email.

"Dick, I thought you wrote an okay column before, but teaming up with Bill Hurt was a stroke of genius. I don't know Bill, but I sure like him. It seems that he tells it like it is, the same as you (and the entire magazine). You're both a little hard on ARF's, but you have a right to your opinions." *-Jim*

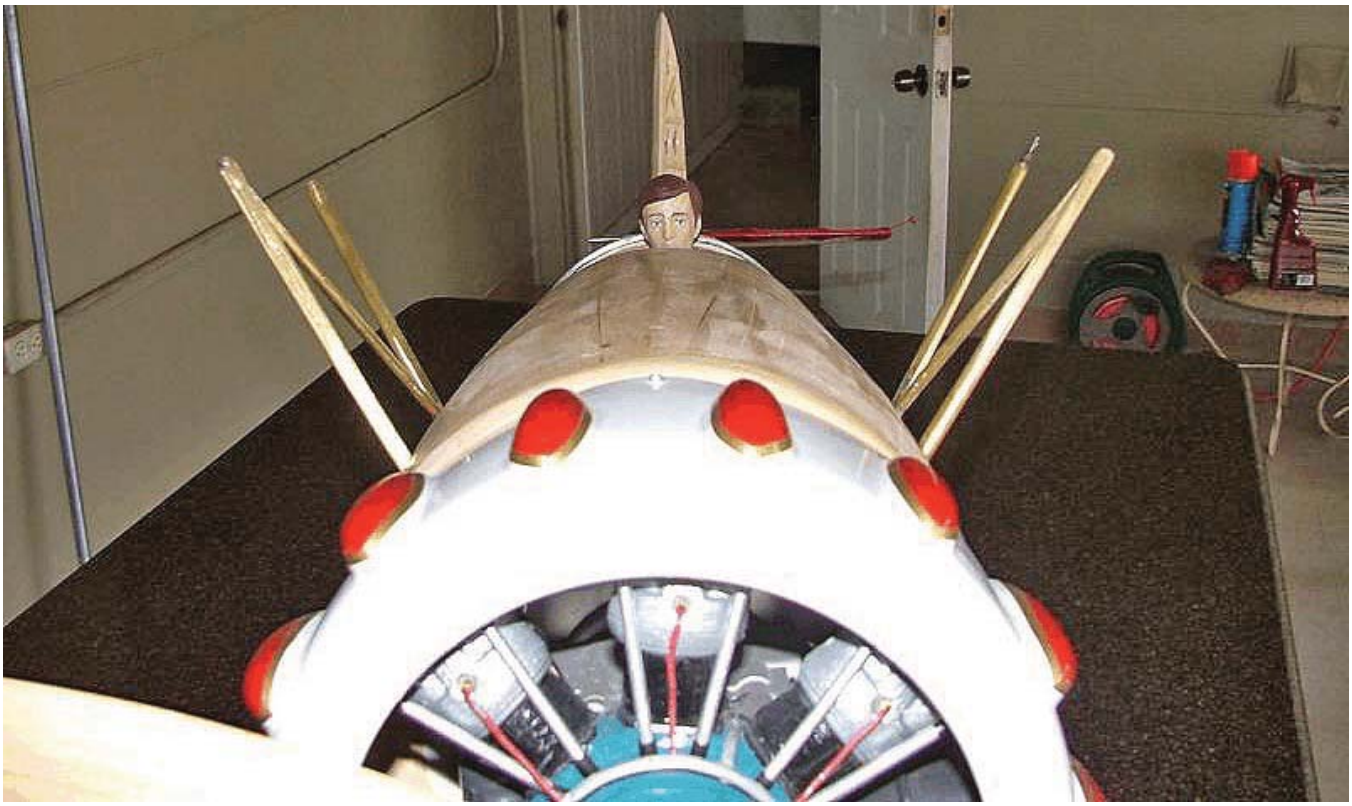

Photo 2

Jim, getting Bill on board was not genius on my part, it was an unbelievable stroke of luck! When I was ill, Bill volunteered to write my column for me. He did such a great job, I'm lucky to still be a part of it now! And according to my email, what he contributes is making it a much better column. And I agree.

I don't think Bill and I are hard on ARF's. My grandfather always said, "If you can't say something good about something, say nothing at all." So we mostly say "nothing at all".

The way I feel about it is, if I can't take pride in what I have, why bother with it? It's true that ARF's have gotten much better, and it's also true that I have one (a P-51). After all, I spent 52 years learning the craft of model building, so I'm not an ARF'er, I'm a modeler! I'd like to thank Nick Ziroli for giving me a couple of bumper stickers that I proudly have on the back of my truck that say the same thing. I'm sure Bill and I are on the same page here. This is not a campaign against ARF's, but a campaign to maintain the craft part of this hobby. Am I right, Bill? If we lose new modelers to ARF's, where are the scale modelers of the future coming from? Bill, feel free to add your thoughts to that statement.

Bill: Add to that statement? Wow, that would be like adding to the Encyclopedia Britannica. I don't think that we're hard on ARF models, it's just that we don't really like them. I don't own one, but I know a lot of modelers who use them to spare their high-level scale models.

I will also make the point that there are absolutely NO scale ARF model airplanes. There are differences in the design of the wings, tail groups, fuselages, landing gear, and so on. At best they are sorta scale, or what some folks call "Fun Scale". Most ARF's use both down and right thrust in their firewalls even though we all know that very few full real airplanes use those offsets. Those that do can be counted on the fingers of one hand.

But tell me Dick, on your P-51 ARF, is the wing a laminar flow design, or is it a semi-symmetrical airfoil? What about the wheel wells? Are they full of hydraulic lines, trunions, electrical conduit, and ribs, or are they just little plastic tubs? What about the tail wheel? Does it retract, or is it fixed in position? If it retracts,

Photo 3

does it retract forward as does the full scale airplane, or does it fold to the rear? If you enter a hard turn with the wing vertical, does it immediately snap out and depart on a reciprocal heading, or does it make a pylon-type turn and keep flying? If it flies like a pylon racer, it ain't scale.

I'm totally against using ARF models in competition, but I'm losing ground here. One of the biggest contests will allow ARF models in the entry level classes in 2010. I fear that this is the beginning of the end of our hobby. I really liked the old "Builder of the Model" rule, but that's going away. I guess lots of people like driving someone else's car and bragging about it as if it were theirs. When all the builders have died off, there won't be anyone left who has a clue as to how to build one, and so the ARF models will be all there is. What a pity.

You can use all the arguments that you wish, and I'm sure that this will stir a stink, both from the proponents of ARF models, and maybe even from our editorial staff as well, but you can't put a red silk dress on a Spotted Poland China Sow, and pass her off as a go-go girl. It's either scale, or it ain't. *(Editor's Note: No way! You guys are snobs, and you're scaring away potential scale modelers! By its very definition, a "scale model" is one that represents a real full-size something, airplanes in this case. From there you can further categorize them into "Fun Scale", "Sport Scale", "Stand-Off Scale", "True Scale", and whatever you like. But if you're going to pick on things like hydraulic lines and electrical conduit, why stop there? If the model doesn't have an exact replica of the full size engine and propeller(s), is it scale? If the tires don't have the exactly correct diameter*

and width, plus the proper tread pattern and valve stems with screw-off caps, is it scale? One of you is suffering brain freeze, and the other has been out in the Florida sun too long. I've told you before, Dick, quit playing hockey without your helmet! And Bill, try wearing a hat without all the tubing and beer cans on top!)

Dick: This past month, I answered several email letters directly. Some were so involved and complicated, they'll take some space in a future column, and I'm working on those. One fellow asked what a used G-62 and a Saito FA-150 were worth. My answer would be to check the ads and auctions on the internet. I would guess a good G-62 to be worth about $400. Saito's new FA-180, however, is so superior in almost every way, it pretty much makes the FA-150 obsolete. I had three FA-150's once, and lost cranks in all three.

I've been in contact with Wendell Hostetler, and am making progress on his new Luscombe Silvair. As is my practice, I'm building two. I'll fly one to near destruction while test different engines and learning everything I can about the plane without wearing out (or crashing) "the good one". What do think about this, Bill? I don't plan on campaigning this model, but I want to wake up a few people at the flying field to the fact that good looking scale models can also fly well.

Bill: I think it's a great idea to build a practice plane or test bed first, but I normally don't have time to do two at once. For a long time I didn't have the space either, but my new shop at the new house allows me to have a lot of things that I couldn't have before. Shucks, I even have lots of room to store more money now. It used to be that I had very little room but was okay on the money part. After buying the new house, though, I now have lots of empty space in my bank account!

I don't know what to do about the time issue, though. Life is kind of like a roll of toilet tissue... the closer you get to the end, the faster it goes. (I

didn't come up with that one, but I don't know who to credit, either.)

Dick: Next month I hope to have some pictures of the Luscombe. Wendell also mentioned that he's working on a Fairchild, which is not a favorite airplane of mine, but it should be a good flyer. Please keep me informed about what you're up to, Wendell. We can always use more scale plans here at Geezer Gulch.

While at the Toledo show I spoke with Mr. Ziroli and Mr. Vallencourt. Both gentlemen mentioned that they were thinking about doing a Spitfire. Since PICA ceased production, the Spitfire from these gentlemen will be a welcome addition to scale modeling. By the way, I don't mean to put you on the spot, Wendell, but I'm going to make you an offer. I'll be happy to do the preliminary drawings and help in any way I can, if I can just talk you into doing some Waco plans. These are beautiful aircraft and we need to make some good plans available. I'd even be willing to do the complete drawings if you'll consider adding them to your plans inventory.

What do *you* think about that, Bill? I hope Wendell doesn't get angry at me, but if someone doesn't start offering WACO plans, I'm going to start my own plans service! These WACO's need to get out there.

Bill: I agree with those statements (to a point), but there are other scale models that have always been under-represented. The Fairchild 24 comes to mind, but that is not a very pretty airplane in my eye, and is far from a favorite, as are the airplanes from Pilatus. They fly great, but they

sure ain't pretty. I can't think of any airplane that Fairchild built that didn't fly well.

A Spitfire? Yes, I'd love to see a good one, but keep the wings right. That includes the tips, and the flaps. The flaps on a Spitfire will make almost anyone an ARF fan! There's no degree of flap, they are either retracted or deployed, and getting them built correctly is enough to make anyone tear out their hair (or what you have left).

I'd like to see some designs of the other fine airplanes from Supermarine. They had a Schneider Cup racer in the 30's that looked fast as hell. How about some plans for that one? There are tons of aircraft that have never been offered as a model, or if they have been, have seen limited success as plans or kits. They don't all have to be warbirds, either.

My least favorite era is WWI. I don't particularly like airplanes from that era, but that's purely personal. I have friends who build models *only* from that era, and they love 'em.

I was happy that Wendell offered the Cessna 195, but wondered why he didn't follow it up with a C-50. I'd love to have the "Bobcat" done up as the "Songbird" in about a 140" span.

Well, I guess that wraps it up for us this month. Keep the snow up north, y'all, I like mine warm, and it's still warm down here at this end of Geezer Gulch.

-Dick Watz & Bill Hurt
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R/C PONDERINGS

Transmitter brand names are often like religion to some people, and each brand is a different sect. Criticize a Thunderbolt transmitter, and people in the National Thunderbolt Owners Club take it very personally. They may have one of those very same transmitters at home, sometimes surrounded by candles and incense burners, with a framed photo of Mr. Thunderbolt himself on the wall. They don't like it if you misunderstand its features or fail to appreciate its finer points, like battery covers that fall off.

Troubleshooting stuff is different today. Just 40 years ago there were no "right answers" because there were no answers period! We all had to work and feel our way to the truth, which gave us all invaluable lessons in learning "cause and effect". Today we have *experts* in all areas, from propeller selection, engine tuning, radio technicians, air frame designers, and even glue specialists. It's as if the white light of R/C aeromodeling has been refracted into separate colors by the prism of specialization. It's a new reality.

The Oily Hand

by Brian Winch

DO NOT FOLD, SPINDLE, OR POKE.

Yeah yea, I know. It's supposed to read "mutilate" instead of "poke". But in the following case, a "poke" caused terrible mutilation and a bloody awful headache for me. What's worse, this problem is not at all uncommon! I've had quite a few such cases, and sometimes the problem is "squeeze" instead of "poke". I'll explain shortly, but first let's have a little history lesson as a possible background to the problem.

Many years back, in an earlier profession, I used various types of office machines, but mostly a photocopier. This photocopier was also used by other folks, which included certain females. Now please understand that I am not sexist, racist, or any other "ist". I am merely stating a fact that applied to a few members of the female staff, who often discussed at morning tea or some other gathering, their recommended "fixes" for photocopier problems.

Anyway, one day when the photocopier was out of order, so I called in a technician to put things right. He came in, checked it out, and told me that the machine had suffered an attack of "the dreaded ruler". It turned out that the machine earlier had a simple paper jam. When this was discovered by a certain young lady, she applied "the fix". Using an 18" wooden ruler, she poked around in all available apertures of the copier, apparently thinking (hoping) that one of her pokes would somehow miraculously cure the problem. To make this already ugly problem

Photo 1: The sword edge of the "Copier Poker". Note the dreaded metal edge, the killer of many copier drums.

even more interesting, these rulers had a brass strip inserted along one edge for guiding an ink pen to draw a straight line without leaving an ink smudge (see **Photo 1**). That metal strip did all sorts of damage inside the copier, breaking wires, damaging connections, and to really finish off the job, it scratched the polished cylinder roller. Well, needless to say, that was the end of *that* copier. According to the technician, this was a common problem in many offices with female workers. For some reason, male employees didn't do it. His suggestion was to hide any item longer than 1" and less than 12" in diameter from any staff member who believed in the "poke and see what happens" theory of office machine repair. Since that would include pens and pencils considered important in an office, however, we put up a sign asking people not to poke the copier with a ruler. Someone later took down the sign, folded it into a 1" wide 10" length, and used that to poke into the copier.

But as I said, that was a long time ago. Sadly, however, people have a tendency to breed, passing their genes on to their children, and I think I've met some of those kids as modelers. *"Poke something inside and see if that fixes it."* But wait... you want to embrace some *real* fear now? Some of those kids became doctors.

Anyway, as well as engine repairs that come to me, I visit the local model shop each week to pick up warranty and general repair projects. On

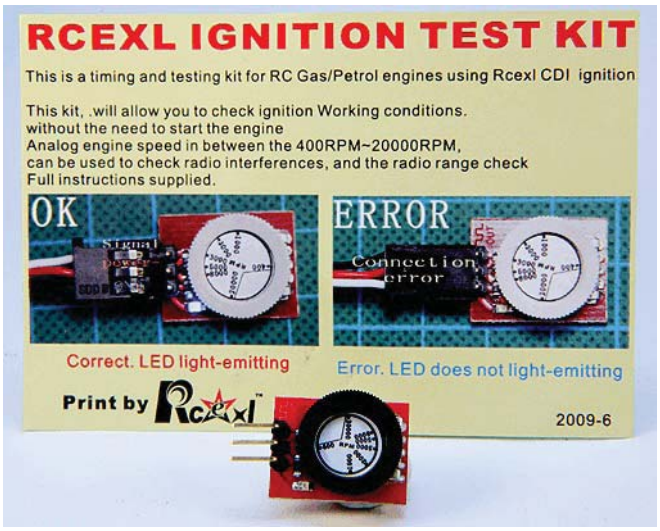

Photo 2: My very neat little CDI checking unit. Wind it up to test the spark.

my most recent visit I picked up a 50cc petrol engine that was still brand new, yet the owner was not asking for repair under warranty for some reason. Gas engines are a bit of a nuisance for me in some respects, mainly due to their many (many!) different mounting patterns, and the need for many different lengths of stand-offs. And if the problem is ignition related, it *was* difficult to check because the plug might spark while *out* of the engine, but under cylinder pressure and higher speed requirements, it might not spark when installed. This is difficult to check, and usually requires a known good ignition unit to be installed, and hoping that you can connect the test unit to the fitted sensor of the problem engine. Otherwise, the sensor has to be removed and another one fitted. All this takes a lot of time, and modelers, being generally reluctant to part from a dollar (many keep black widow spiders in their pockets), get a bit fussy when you tell them the cost of a few hours work.

Anyway, a cursory glance was enough to indicate that the mixture screws were set too far in, so I thought, with a bit of luck, a tune-up would fix the problem. After all, the modeler's description of the problem was that the engine would start but not accelerate. On the bench I checked the ignition unit. Here astute readers will have noticed that I said "it *was* difficult to check". "Was", in past tense, because I now have an electronic checking unit for ignition assemblies. This delightful little (about half the area of a standard postage stamp, and only about 4mm thick) piece of equipment is plugged into the sensor lead, the ignition switched On, and the spark gets to "sparking" (if all is well). To *fully* test the CDI, the tester can be dialed up to 20,000 RPM, and this is almost as good as a check under pressure for operating speeds under 10,000 RPM (see **Photo 2**). Well, the plug sparked a deep blue flame right up to the 20K mark, so the next job was to check the carburetor settings. Adjusted to their factory settings, the engine fired on choke, so I thought I knew the problem. Most of the common gas engines we use for modeling need a bit of warm-up before advancing the throttle. Otherwise the engine may gag and get really quiet. I hoped this was the problem (I am *such* an optimist!). After re-starting with the choke off, the engine idled well, so I let it warm up a bit. One thing that did disturb me, though, me was a little dribble of gas coming out the front of the carb at the air intake section of the venturi. After an adequate warm-up I moved the throttle cable and the engine... stopped. It did this *several* times, even though I was making fine changes to both needles.

Okay, it's an internal carb problem so I removed the carb and disassembled it on the bench. All appeared okay, but maybe a small speck of crud was under a valve had been flushed out when I pulled the front off the carb. No problem, I reassembled the carb and re-installed it on the engine, and found the same problem again. Hmmm. Again I removed the carb and stripped it down. I even removed and checked the needle and seat. On re-assembly I pressure checked the carb, and the test indicated that it was perfect in operation. Perfect, except that the bloody engine still would not accelerate!

One thing left to check, but one that rarely has a problem, is the reed valve assembly. Off it all came and... that's when the shock wave hit me, *and* the understanding of why a warranty claim had not been made. The style of reed block in this engine is akin to a simple tent shape, triangular in section with a reed on both

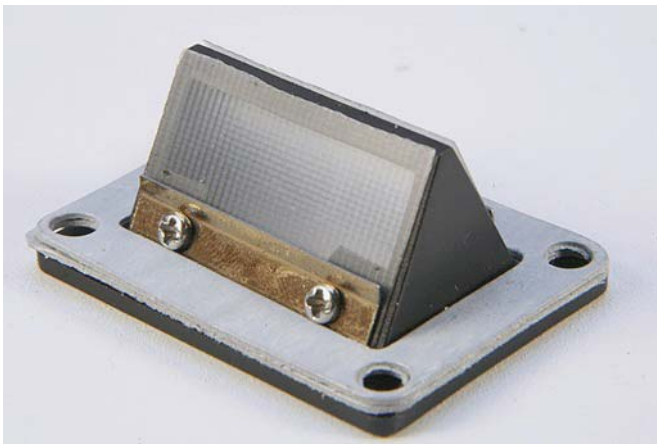

Photo 3: This is how a healthy reed block should appear. Pretty, isn't it?

sides of the tent (see **Photo 3**). There in the front reed was a slot that gave me the immediate impression that it had been attacked with a flat blade screwdriver. The reed had been pushed to the inside of the frame, but it was still attached by the two mounting screws at the top of the frame (the ridge of the tent). The second reed also had the ragged slot, but it had been pushed and torn from its mount. It was still hanging on, but highly distorted (see **Photo 4**) Well, there was the problem without a doubt! And it also explained the dribble of gas-oline from of the carb's intake. The natural suction of the piston and atmospheric pressure had drawn petrol inward as the crank rotated and the piston rose, but then it pooled in the bottom of the case until it was pushed back out again as the piston descended. The reason the piston's downward pressure (positive pressure) could not drive it up the bypass ports was due to the gaping hole in the intake tract that should have been sealed by the reed valves. The pool of gas was simply taking the line of least resistance to escape!

I rang (Yanks say "I phoned") the engine's owner, and made a tentative suggestion and query (never go straight to the point, you might get a defensive denial). He said he'd poked a screwdriver in the hole to fix whatever the problem was, as the engine would start but gag when you opened the throttle. When I told him that the mixture needles were way off the correct settings, and that the engine needed warming a little after starting, he said the "engine expert" at his

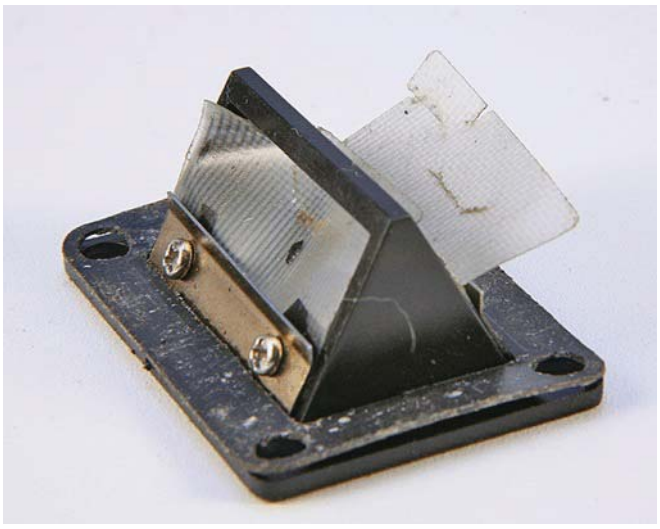

Photo 4: This reed bloke has suffered a dose of the dreaded "poking".

flying site had adjusted the needles because "they're never set right by the factory". Then he thought something might be stuck inside, and that he screwdriver poke might fix it.

I then asked if his mother had ever worked in an office with a copier machine, but he didn't know.

NOT UNIQUE.

If you were a bit , shall we say, surprised by that incident, here's an ever better shocker, and this is not an isolated incident. I've had *three* such jobs recently. Two did the damage with a screwdriver, and one with a pointed scriber. (Does no one have wooden rulers with brass edges anymore?) Two of the owners told me that they thought the reeds (they "knew a bit" about reed valves, you see) may not have been "flapping correctly", or that a bit of grit or grass seed was preventing them from fully closing. The third modeler thought the engine might have sucked something "up the chute", so he poked around with the sharp-tipped scriber, and poked a neat little hole in the valve. Yes, interesting horror stories about things *you*, dear reader, would never do. Right? (This is where you're supposed to nod your head to assure me that your mother never worked in an...)

So, since you're totally innocent of this sort of engine malpractice, how about some more work bench shockers with which I've had to

Photo 5: Multi-grips can exert incredible pressure, and the teeth can do a lot of damage.

Photo 7: This liner suffered terrible rim damage, and is now oval from an attack with one of the gripping tools.

contend. This one is reasonably common, and is often emphatically denied by an owner who wants repair under warranty, even in light of the highly visible butchery. This one occurs when a modeler tries to remove the liner from an engine with a pressed in cylinder liner, or after a crash caused case distortion or overheating (lean running) binding the liner in the barrel, or maybe a build-up of carbon is jamming the liner. Another odd one is where the head is locked tight in the top of the liner. This comes about from a foreign object (grit, metal piece, melted plug element) being bounced around on top of the piston, making contact with the head insert section, causing it to expand and lock almost

Photo 6: Vice-grips have an even a stronger grip, and can distort or crush things easily.

permanently in the top of the liner. Okay, we have the problems , so now comes the circus freak show of various solutions tried by modelers.

To remove the tight liner (engines such as Super Tigre have pressed-in liners in their engines with piston rings), a firm grip around the rim of the liner with vice- grip pliers or multi-grip pliers (see **Photos 5 & 6**) with a goodly amount of strong-arm pressure applied (heavy in the hand, light in the head) is frequently attempted (see **Photo 7**). This is made even more interesting if the modeler does not notice the locating pin in the top of the barrel that locates in the slot in the liner. Another super good idea for removing tight liners is to fit a screwdriver or similar device of destruction through the exhaust port, and *lever* it out using the top of the piston as a fulcrum! Yes, this usually does a great job... of totally wrecking the engine. One modeler inserted a length of 8 gauge music wire through the port, and then levered the tight head out of the liner with a large flat blade screwdriver. The engine was sent to me because for some reason, it then clicked and "caught on something" when you turned it over with a prop.

A real classic was the engine having a locked prop nut and prop. The original nut had been lost, so another nut was found that fitted "at first" but then became very tight. (Of course it was tight, it was the wrong thread size!) Anyway, to get it on, the modeler had slipped a Phillips screwdriver down through the carb to

Photo 8: In the port of this crankshaft you can see the damage from the inserted screwdriver that led to the eventual breakage.

hold the crankshaft. He finally forced the nut on and pulled it up real tight, but noticed that it chewed into the plastic prop because he'd forgotten to add the prop washer. Hey, no problem, he just stuck the screwdriver in through the carb again, to hold the crankshaft while he removed the nut, now fighting the damaged threads. Then he did it all again when he re-installed the prop, prop washer, and prop nut. At last all is in place, but oddly enough, now the engine won't turn over. Could the now seriously distorted port in the crankshaft have anything to do with it? Our strong-arm modeler eventually got the propeller to turn freely, because he broke the crankshaft! The question he sent with his "warranty claim" was, *"Is this a common problem with these engines?"* (see **Photo 8**). No, only when they're sold to idiots.

SOLUTIONS

Okay, we've examined a few problems to which I hope the answers are patently obvious... do not poke where you can't see, and do not poke if you don't fully understand the problem or the likely final result. To remove a pressed in or tight liner, heat the engine with an industrial type heat blower to get it smoking hot if necessary. You can use a heat shrink gun designed for covering film, but it will take time to get enough heat in the job. Putting the engine in a kitchen oven often works (*not a microwave!*) but is not a good idea in my opinion. The prolonged heat could cause problems, and you'll need the oven at near full power, which still might not be enough. Apart from that, you (and you know who) might notice a strange smell (and taste) the next time you cook up a Thanksgiving editor... uh, turkey.

To remove a head stuck in the liner, remove the liner with heat if necessary, and then freeze the job overnight. The aluminum will shrink more than the steel or brass liner, and carefully tapping out with a wooden dowel (as big a diameter as will fit in the liner) will generally do the job. Heat will not work to remove the head, because the aluminum head will expand more and just get tighter.

To remove tight nuts and props from crankshafts, use a proper piston stop tool as described in detail a few issues back in these hallowed pages.

IN THE RIGHT KEY.

The modeler I'm about to describe shall remain anonymous, because I know some of you cruel blokes are really into poking the borax at someone who's made a colossal blunder. Today's quote: "Point out a person who has not

made a mistake, and I will tell you that *you* are mistaken."

Okay then, this modeler had problems with a reasonably new 4C engine. He'd been using the engine for only a month or two, and it ran like a pearler (an old Oz colloquialism for "extra good"). On the day the problem began, nothing other than a prop change had been done to the engine. It started, ran a bit, then made a popping sound and stopped. Everything was checked, local experts were asked for opinions, but still no joy. So, off it went to ol' BW for a check-up. On receiving the engine I made a cursory check and mentally noted absolutely no compression. A busted rod? A broken crank? No, there was no grating or crunching noise which would be manifest if internal parts were broken. The crankshaft is, in fact, turning very freely.

Wait a minute! That shaft is *not* turning! Only the prop driver turns! Well I'll be a bunkey's monkel! The only thing wrong with this engine is that the bloody drive key is missing! While changing the props, the key (that little swine) fell from the slot into the grass and disappeared into that parallel universe where all small dropped parts gather, never to be seen again. The engine ran briefly due to the pressure of the rear of the prop driver pressing against the inner rim of the bearing which was pushed hard against the thrust shoulder of the crankshaft, a short lived situation.

I mentioned this quite some time back, and Gordon said he tried it but it didn't work. And I know why. He had his brain the wrong way around, set for "Repel" instead of "attract". But then, is Gordon *ever* attractive?

Okay, after his caustic comment, here's the tip. First add a strong magnet to your flight box to help in finding small parts lost in the grass. Put the magnet in a small plastic bag, drag it back and forth across the grass, and then turn the bag inside out and remove the magnet. Now check for the lost bit inside the bag, along with all the iron-based pebbles that would have stuck to the magnet had it not been in the bag. To prevent the problem from occurring again, glue the key in the slot when you first get the new engine. Remove the prop driver and, if fitted, the steel washer. Now, staying away from the slot, apply a coating of oil to the shaft and the front of the bearing, then put the washer back on and oil this as well. You can also use light grease or Vaseline, as these are also effective for the job. Then thoroughly clean and dry the key and the slot with alcohol or acetone, and give the prop driver the same oil or grease treatment. Then add one drop of a medium thread locker (Loctite 243, for example) into the slot before inserting the key. Make sure it's fully inserted (see **Photo 9**). Now, be sure you perform this next step

Photo 9: This little piggy (key) will not go to market or get lost in the grass. He's now secured in his home with a little touch of thread locker.

within 10 seconds, or the thread locker might be a bit aggressive on curing time. Using another cotton tip, remove any excess thread locker that oozes out, and then slide the prop driver into place. Leave the job sitting for half an hour or so, and then continue using the engine as needed. The key will stay in place even if the prop driver is removed. If it becomes necessary to remove that key, remove it with pliers or grip it with end-cutters. You can sometimes use the tip of a flat-tip screwdriver to lever it out of the slot. *(Editor's Note: I agree with all of the above, except that I've found high-temp silicone adhesive to work better than thread locker. I use it on the key, and I also disassemble multi-part mufflers, and reassemble them with high-temp silicone sealant at the joints to help prevent exhaust seepage. Furthermore, magnets in bags do not reach into that parallel universe!)*

THE CIRCUS IS IN TOWN.

When I was a young bloke, one of the main attractions at the circus was the "Human Cannonball", some bloke in a fancy outfit and exotic-painted crash helmet (aka "skid lid", "brain bucket", etc.') who was shot from a huge cannon to fly though the air and land in a distant safety net. *(Editor's Note: They had cannons and nets when you were young?)* "Noodle brain", my weirdo assistant, was also enthralled by this display, and in his never ending quest for flight (sans aircraft, of course) he figured that this was a sure fire way to fly, despite the short distances.

Wait... a little local information here is pertinent to this story. See, I live half way up a large hill (hence my street's name, "Hillview Parade"), and the infrastructure for this area was set up in 1919 when it was carved into six acre plots for returning WWI servicemen (my house is one of the original houses built then). Due to the age of the utilities here, there's been some upgrading lately, the first being to install new water mains. (Not beforetime, either. I could pee faster than the water flow we had from our faucets, and I'm an old codger!) The current project is new storm drains, 24" i.d. pipes heading out to sea to direct the flow of rain water. The project is now at the stage where the open end of the pipe just coming onto my property, with the end pointing upwards to go up the hill, ready for the next section of trench to be dug into which the pipe will lay. Well, ol' Noodles for Brains seized on the idea that he could use the storm drain pipe for a cannon, and fire himself over the hill to land in a tennis court net. And since a holiday weekend was coming up, the workmen were off for three days. So, he bought 10 lbs. of rocket propellant powder and 8' of fuse to produce his cannon power. He stuffed the propellant into a large bag and pushed it down the storm drain about 7'. He then cut a tight fitting disc of 1" plywood to fit in the drain as a piston (or platform) for himself, and to protect him from the burning powder. Then donning his 'Super Flying Fool' suit and a dome-shaped helmet, he climbed into the drain, waved to the morons watching, and lit the fuse.

First you could hear a fizzing sound, then there was silence... for a second. Then with a monstrous noise like a super loud gulp, a big puff of smoke came out the drain pipe, but nothing else. When we looked inside, the pipe was empty... no fool, no platform, no powder. Then it came to me. His plywood platform was a very tight fit in the pipe, and toad brain had to stuff himself in, being rather a large size, so natural forces took over. The explosion followed the least line of resistance, and thus blew *down* the drain, which created a tremendous *suction* afterward! That "Froot Loop Fool" was sucked down the drain at great speed, and with any luck (for me, not him) is now doing his best submarine impression somewhere out in the Pacific Ocean. Eventually he'll float to the surface (his helmet is very buoyant), and with just a little more luck (for me, not him) he'll be picked up by a fishing trawler heading for Kamchatka where he will be put to work in a 16-hours a day crab canning factory to pay for his rescue and ocean voyage. (I'm *such* an optimist!) In the meantime, let's slip off and check another sign.

APRIL WUN - DOT
ROT - DOT CON

In this section we explore the world of weird and strange things, and people (to include magazine editors who are actually included in the first category) and the odd things they say and do (again, I point out our editor, considering all the odd things he says about me!). *(Editor's Note: The saddest part of this is that the "odd" things I write about you are not at all odd... for you!)*

This month I have another "Sign of the Times" which I have noticed over a considerable period of time, that were made up and installed by "people in authority" to guide us, warn us, or possibly to simply confuse us.

This month's sign was seen in an outback area far from general civilization, in the bush land beyond the countryside, right behind the beyond, and just past Black Stump. There, adjacent to a water causeway that ran across the road, was this sign, now brought to you by Winch th' Welcome Wiz, like the voice of spring. (And yes, Mr. Editor, I am well conversant with your American terminology of the word "wiz", as in taking a, having a, or doing it on one's boot. This is just another word you uncouth Yanks have misused and abused. What's wrong with good ol' "pee", "piddle", "piss", "number one", "squirt", or "Pointing Percy at the Porcelain", as any well bred gentleman would say?

-Brian Winch
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(Editor's Note: I consider my favorite "Sign of the Times" to be the one I saw just off an interstate exit somewhere out in Colorado. There was this big, school-bus yellow sign with bold black letters that simply read: "Danger! The edges of this sign are extremely sharp!" And I wonder to this day how many people stop, get out of their cars, and go over to feel the edge of the sign. Think anyone got cut? I do.)

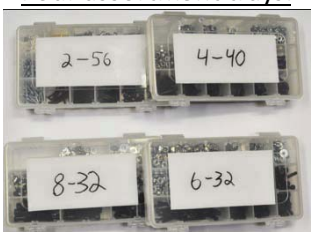
If, in the course of human events, it becomes necessary to attend a family reunion, call ahead to the local hobby shop for directions to the nearest flying site. You'll be glad you did.

If there's one thing I've learned about flying R/C models, it's this: The more I practice, the luckier I get.

RTL Fasteners

IMPROVED MASTER BUILDER ASSORTMENT #5000

- Item Tested.....Improved Master Builder Hardware set #5000
- Use.....Hardware assortment R/C plane specific
- Contents: 2124 pieces with four storage trays and magnetic pickup tool
- **CHEERS**: Everything you need. **JEERS:** Can't find any!

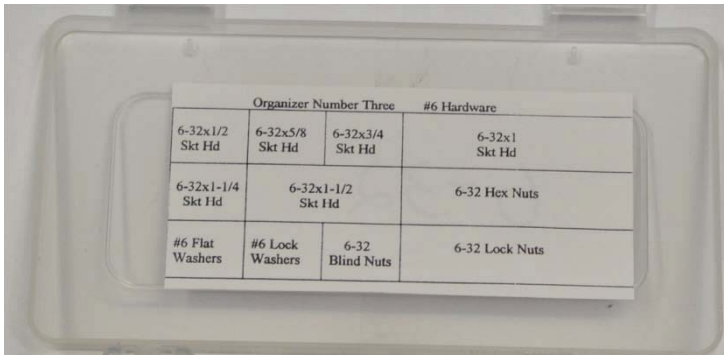
Socket Head Cap Screws: 2-56x1/4" 24pcs 2-56x3/8" 24pcs 2-56x1/2" 24pcs 2-56x3/4" 24pcs 2-56x1" 12pcs	4-40x1/4" 24pcs 4-40x3/8" 24pcs 4-40x1/2" 24pcs 4-40x5/8" 24pcs 4-40x3/4" 24pcs 4-40x1" 24pcs 4-40x1-1/4" 12pcs 4-40x1-1/2" 12pcs	6-32x1/2" 24pcs 6-32x5/8" 24pcs 6-32x3/4" 24pcs 6-32x1" 24pcs 6-32x1-1/4" 12pcs 6-32x1-1/2" 12pcs	8-32x3/4" 12pcs 8-32x1" 12pcs 8-32x1-1/4" 12pcs 8-32x1-1/2" 12pcs
Nylon Insert Lock Nuts: 2-56 100pcs 4-40 100pcs 6-32 100pcs 8-32 50pcs	Nylon Insert Lock Nuts: 2-56 100pcs 4-40 100pcs 6-32 100pcs 8-32 50pcs	Nylon Insert Lock Nuts: 2-56 100pcs 4-40 100pcs 6-32 100pcs 8-32 50pcs	Hex Nuts: 2-56 100pcs 4-40 100pcs 6-32 100pcs 8-32 50pcs
Blind Nuts: 4-40 12pcs 6-32 12pcs 8-32 12pcs	Servo Mounting Screws: "The screw with a million uses" #2x7/16" 24pcs #2x9/16" 24pcs	Miniature Brass Pan Head Phillips Wood Screw: 0x1/4" 50pcs	Button Head Socket Drive Sheet Metal: #2x3/8" 24pcs #2x1/2" 24pcs #4x1/2" 24pcs #4x3/4" 24pcs
Lock (Split) Washers: #2 100pcs #4 100pcs #6 100pcs #8 50pcs	Flat Washers: #0 50pcs #2 100pcs #4 100pcs #6 100pcs #8 50pcs	Four assortment trays: 	Magnetic pickup tool: 

I received my Master Builder Assortment # 5000 from RTL Fasteners: 2010 Old Greenbrier Rd., Ste K, Chesapeake, VA 23320. This is my first time using an assortment like this. I have always been one of those builders that ends up heading to the local hobby shop twelve times a day while building any given model. I usually end up paying nearly as much for replacement hardware than the kit cost, considering it's usually about $1.00 for four screws! This kit will be a nice addition to the workshop. Master Builder Assortment # 5000 contains over 2000 pieces of hardware and would cost more than $400 if purchases independently. (Trust me; I know!) RTL Fasteners retail price for this kit is advertised price $139.95, and it is well worth it.

Photo 1: Bags galore, let's fill up the trays!

Inside my shipping box, I have a boat load of plastic bags full of various fasteners. Each bag is labeled, and the bags are banded together in their related sizes. When I spread everything out, I have a table full. The trays provided are good quality nylon, and with four trays I can grab only the screws I need. #0 and #2 screws fit in a single tray. #4, #6 and #8 screws each have their own tray. The magnetic pickup tool is helpful for getting those small flat washers out of the bottom of the trays. There are recommended tray layout sheets for each tray, so filling up the trays is easy. It took about 35 minutes; total, to fill up all the trays with their corresponding hardware. Now, I am left with more than 80 plastic bags in which to find a use. I am sure there are some "hoarders" out there that would stuff these away in case you need them, but I had a better idea. I had my wife email Tamara at RTL, and ask her if they could reuse the bags. Tamara indicated that they could indeed reuse them, so I shipped the bags back to RTL for reuse. Is that being a "GREEN" builder?

One modification I did do to aid in screw size identification, should a tray get empty, was to take the recommend layout provided by RTL; and copy it onto some adhesive backed printer paper. This is similar to mailing labels, but it's a full sheet. I then cut out the layouts, and pasted them inside the lid of each tray. Now I can see the correct screw placement, and if a slot is empty, I know what screws to order!



The Master Builder #5000 kit is a great addition to any workshop. The improved tray system, four trays instead of two, allows you to only grab what you need, and keeps things very organized. It is worth much more than the $139.95 retail price and will save you more than double that over time.

Tony Coberly

tonyc@rcreport.net

RADIO RAMBLINGS

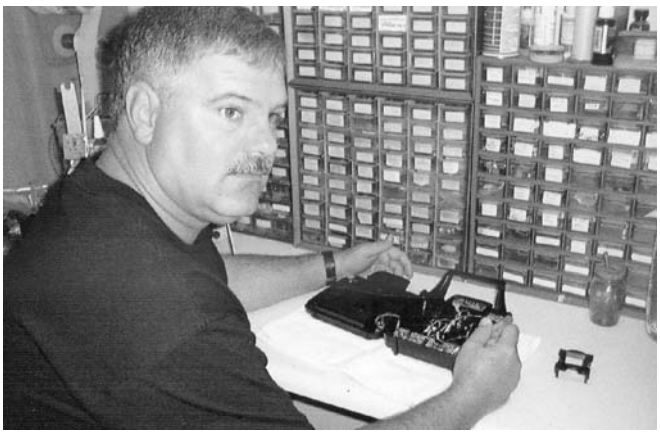
by Tony Stillman

LETTERS FROM READERS

Hi Tony. I have a question on the subject of servos that no one has addressed. I've read all your articles on servos with great interest, but none of them touched the subject of buzzing servos after and before a command. I've had this problem with many servos over the years, and have just lived with it, knowing that this runs the flight battery down faster, or I've replaced the buzzing servo. I've disassembled servos and used a spray can of contact cleaner to clean the feedback pot and the commutator end of the servo motor. I've done this on standard size and giant size servos, neither of which seems to work very well. Right now I'm flying a 1/4 scale Extra with a buzzing servo on the rudder, and would like to know what I can do to stop the buzzing before I tear up a great flying bird or have to replace the servo. The servo works fine, but I worry that something bad might happen if I just ignore it. So, could you let me know how to correct this problem, and perhaps use this as one of your subjects for a future column? I'm sure this has happened to other guys.

Thank You. Dick

Thanks for your question, Dick. This is actually a pretty common problem, and not only with giant scale servos. The cause is usually in the control linkage, however, not the servo itself. The pushrod may be binding or dragging, or a pull-pull cable system is using the wrong geometry. Many things come into play to have a properly working pull-pull rudder system. The distances from the hinge line to the control horn connector points is critical. The control horn connector points must be *exactly* on the hinge line of the rudder. The distance between the rudder control horn connections must match that of the servo arm, too. The servo itself needs to be mounted exactly in the center of the fuselage, and no binding or rubbing of the cables is acceptable.



If all this is correct, you should have no problems flying, but you may still hear a buzz from the servo. This does not always mean you have a high-drain problem! New equipment on the market today is very helpful in finding binding servo problems. Horizon Hobbies markets a nice unit designed for the electric model market, called an "E-Flight Power Meter" (EFLA110) that sells for about $50. You can also use a standard Digital VOM meter set up to read current

If you put the meter in-line with a battery lead, you can see the current draw on the system. By eliminating servos (unplugging them from the receiver) one at a time, you can locate any high-current servo(s) in the system.

You can also check the system by moving the transmitter sticks full deflection to see if any servos are stalling at the limits of their travel. This is especially important if you're using multi-servos to control a single control surface, such as dual aileron servos mounted to a single aileron.

Another common cause of this problem is the use of servo extensions and leads without gold plated connectors. My recommendation is to make sure everything you have has gold plated connectors, and if you need to replace them, do it! I don't like having extra connectors on servo leads. If I need a long extension to allow a servo to reach the receiver, I cut the servo lead and add the necessary length of wire, making a

single, long servo lead with no additional connectors. The only connectors we want in our models are those at the receiver, and those that have to be unplugged for transportation.

Making these checks and changes will help you locate the problem and solve any high-drain situations you might have. And as for servo buzzing, if you're using a 5-cell receiver battery, make sure the buzzing servo is rated for 5.0 volts. Not all servos are! Then disconnect the control linkage from the buzzing servo. If the buzzing stops, then you have a linkage problem, not a servo problem.

Again, thanks for your letter, Dick!

I also received a question from a reader about the use of older AM radio systems, specifically the Futaba FG AM series that many refer to as the "Gold Box" series. These are great systems that are very rugged and reliable. Unfortunately, Futaba has now dropped them from their service list, since they are so old. Radio South, however, still services these units, and good ones still work just as well today as they did when new. There is one problem, though... finding AM narrow band receivers is becoming more and more difficult!

On of the very best AM receivers out there is the Hitec Platinum AM receiver. These were discontinued years ago, but I'm sure many of you have some stuck in a drawer somewhere, neglected and forgotten when you switched to the newer FM systems. If you find one at a club swap meet or online somewhere, you'll find that they work very well indeed. I'm a big fan of dual-conversion receivers, and the Hitec Platinum is about the best you'll find for AM.

Another option for the old FGK AM systems is to seek out an FM module to convert it to FM. These too are no longer being manufactured, but you can usually find them if you look hard. When you convert to FM with the new module (just remove the AM module and plug-in the FM replacement!) you can then purchase current receivers that will work perfectly with the FGK, such as the Futaba R127DF. These sell for around $55 w/o crystal, and have become the workhorse receiver for Futaba systems these days. Of course, you will have to make sure all your servos, switch harnesses, extensions and chargers are retro-fitted with the J-style connector, as all the old Futaba AM systems had the G-style connector, which was a 90˚ connector with three gold prongs extending from its plastic housing. Later AM systems, including those made today, use the J-type connector.

Transmitter batteries and miscellaneous accessories are difficult to find for the older units, but they're out there. We sell quite a few, and I'm sure the mail-order battery sellers like Maxx Products and Batteries America do a good business with them as well.

With good maintenance, these systems can last a very long time. If you don't need all the fancy stuff in today's computer radios, the FGK's may provide reliable performance for many years.

SWAP MEETS AND GOOD DEALS

With winter fast approaching, it's once again Swap Meet season! I've covered this subject in previous issues of *"R/C REPORT"*, but this is something that comes up every year, and I don't want modelers buying used radio equipment without knowing what to look for, and what questions to ask.

Swap meets are a great place to pick up some wonderful bargains on R/C equipment, aircraft, kits, engines, and lots of other goodies. I also enjoy the fellowship of meeting modelers in a setting away from the busy atmosphere of the flying field. You might attend swap meets on a small scale, like those at club level, or some of the larger ones like the Southeastern Modelers Show in Perry, GA, on the first weekend in March each year. I really look forward to this one. Many of you are loyal readers of *"R/C REPORT"*, and you follow this column each month, so I especially look forward to seeing you there. And if you've not attended this show in the past, get there if you can. It's big, and the bargains are everywhere!

One thing you must do when purchasing almost anything used (and especially at a swap meet where you don't personally know the seller), is to do your homework and know what questions to ask. This is *never* more important than when looking at used radio gear!

I get phone calls every week from modelers who say they've purchased the "deal of a lifetime" radio system at a swap meet. Then they call to find out what it will cost to get the unit checked over to make sure it's reliable and airworthy. Some people find really good deals and buy good stuff at substantial savings, and only a tune-up and check-up are all that's needed to give peace of mind to the new owner.

Many of us like to upgrade to the latest and greatest equipment, often with little or no consideration of our real need. After purchasing a new, whiz-bang system, we don't use our "old reliable" radio much anymore, so we eventually put it up for sale. The ever-watchful eyes of a seasoned pilot looking for a good deal usually eagerly gobble these systems up. But sometimes we find that some "oldie but goodie" systems are more "oldie" than "goodie" This is when the problems often begin. Remember, buyer beware!

Let me give you a few tips to remember when considering buying used equipment.

1. Just because it's inexpensive does not mean it's a good deal. If it seems too good to be true, it probably is.

2. Ask questions about the history and condition of the item(s), and *especially* when buying used batteries.

3. If it's an old transmitter, does it have a "narrow band" sticker on it?

4. Is a receiver a new narrow band unit, or an old, wide-band that will have to be converted? Remember, not all wide-band receivers can be narrow-banded.

5. Buy smart: If the cost is more than half the price of a new one (with a warranty!), that may not be smartest purchase you could make today.

6. Find out if the seller is offering some kind of performance or satisfaction guarantee. Will you be allowed to return it and get refund?

Tip #1 usually gets most people. If you see a complete radio system for sale for, let's say $30, you'll probably be lucky in most cases to get even $30 worth in the long run! There's likely to be a good reason the seller is asking so little. It may be that the cost of repairs or upgrade on that system far outweighs its true worth.

Old systems may be AM modulation. Again, there is nothing wrong with AM radios! They still work just fine. Shoot, I can remember when most pilots were scared of the new FM systems! *"You'll never see me flying one of those FM radios!"* was normal conversation at flying sites nationwide. But now that kind of talk has reversed! I even hear some modelers say that AM is no longer legal! Not so! AM radios are legal and they work well in today's environment. The only reason they disappeared from the market is because it's easier and cheaper to build FM equipment to meet today's narrow band standards.

Determining if a transmitter is narrow band is the first order of business. If it's an older unit that has been upgraded, it should have a gold sticker narrow band certification on it somewhere. The reason you don't see these stickers on new transmitters is because they're *all* narrow band, so the requirement for the sticker was dropped years ago. All equipment being manufactured today meets the "narrow band" requirement right out of the box. So take the time to inspect any old transmitters closely for the sticker. If it's not there, you might be buying something that *can't* be made narrow band! On the other hand, it is still possible that it could be upgraded by a qualified service center for as little as $15 or so.

When the narrow band requirements first came out, manufacturers were working to modify existing designs to meet the new specs. Almost every manufacturer was able to modify their units by changing a few components and re-tuning to meet the new rules. This is where it can get sticky. The FCC allows modification to the RF circuit to meet the narrow band requirement *only if the original manufacturer or it's official service stations came out with an FCC*

approved modification. If the company (or its service stations) was out of business before a mod was made, the system could not be legally narrow banded. All the major manufacturers still around today came up with mods for most of their equipment, and for the equipment that they didn't have mods for, they offered (for a period of time) some kind of low-cost "upgrade" deal to allow the consumer the opportunity to get the new technology equipment without having to buy all new gear. Many, many people took advantage of this opportunity, and some manufacturers were badly backlogged in getting so much equipment updated. As far as the companies that went out of business, nothing could be done... *legally*. There were some technicians that modified this equipment, and it usually works very well. Still, it is not technically legal. I doubt that there would ever be a problem with these illegal items, but if an accident occurred while using this equipment, a very shrewd lawyer could *make* it a big problem! The AMA does not say much about this, as they probably have no idea how widespread this might be. I'm guessing that very few of these are in use today.

Here is a short email from Steve Aldridge, of Boise, ID.

Tony, I thought I'd pass along some info about a "non-electrical" glitch, which could cause serious problems if not understood. I installed a new Airtronics flight pack in a new model (an Uproar 60) along with an 1100 mah receiver battery which had been cycled twice. The cycling indicated over 1200 mah, so I knew it was good. I also tested the entire system on a table before installing it.

After installing the equipment and mounting the master switch in a switch mount, the airborne system wouldn't even turn on (the servos wouldn't function). I thought that I may have forgotten to recharge the battery after the last cycle, so I connected an alternate battery known to be good. Then the system worked, so I put the new battery on charge overnight.

The next morning the system still wouldn't turn on when using the new battery. I even tested the transmitter using another plane, just to make sure it wasn't a transmitter problem, and it worked fine.

I noticed that when the new battery was connected to the charger, the charger light would go out when I turned the switch on. This would be normal, except why would it not also turn on the system?

In examining the switch and its mount more closely, I finally saw that it wasn't going all the way to "On". Then I knew what had happened. I'd used an old switch mount from another plane which had been crashed (totaled, in fact). One of the screw holes where the mount attached to the switch was rounded out, so I had to add a small washer to get the screw head to hold the switch. The arm on the mount that moves the switch toggle On and Off was hitting the washer, ex-cept for the one time when I tried the alternate battery. (The original system test was without the switch mount, so there was no hangup then).

Moral of the story: Always buy a new switch mount for a new switch!

Thanks for writing, Steve. It's always good to hear about a problem *and* the solution. Even a small item like a simple washer can led to a crash! This would be one of those problems that might be difficult to figure out after the fact.

-Tony Stillman
139 Altima Connector,
Box 322
Brunswick, GA 31525
tony@radiosouthrc.com

When I connected a fresh battery to my receiver switch, nothing happened! Where's the voltage going? Are fish jumping in a nearby pond? Are dead frogs somewhere kicking their legs? It's probably just a ground problem... too many grounds.

If reality is only an illusion that occurs when we run out of beer, then altitude is an illusion that disappears when we run out of air speed.

****O. S.® ENGINES GT55 GAS ENGINE Press release!!**

The O. S. GT55 Gas Engine with Electronic Ignition is a real first for the O. S. Engine line. With a reputation for producing quality engines at an affordable price, O. S. takes the market by storm with the introduction of their first gas engine. Similar in appearance to other O. S. 2-cycle engines, the GT55 Gas Engine features a large number of extra-deep and thin cooling fins on the crankcase and head. A unique one-piece crankcase design eliminates gaskets and enhances strength and precision. Another performance benefit is the IG-01 Capacitive Discharge Ignition. Developed from specific O. S. technology, the IG-01 uses a microcomputer, programmed for optimum spark advance. Magnetic sensors on the crankcase and prop drive detect ignition timing. The IG-01 also detects and compensates for wet plugs – ensuring quick starts. Designed to accept a wide range of input voltages, the IG-01 requires minimal current in stand-by mode and features a low-voltage warning (intermittent engine operation). The front-mounted carb provides better cooling for more consistent engine runs and high performance, very simple, direct installation of the throttle and choke linkages and it requires shorter stand-offs, resulting in more secure installation and less vibration overall.

- A front-induction, rotary-valve crankshaft ensures that the valve is opened and closed for optimum timing.
- No oil seal is required, eliminating rpm loss due to additional friction.
- Massive front and rear bearings for longer life and maximum power output.
- A thin, high-performance piston ring and high-strength aluminum alloy piston for reduced break-in and high compression from the very first run.

Specifications:
Displacement: 54.93cc
Bore: 41.2mm
Stroke: 41.2mm
Practical RPM: 1,500-8,000

OSMG1555 GT55 Gas Engine with Electronic Ignition
Retail: $1199.99 Street:$699.99

Look for the RC Report Online in depth review coming soon!!

**GREAT PLANES® 25% PITTS® M-12s 50cc 3D AEROBAT ARF

The Great Planes 25% Pitts M-12s 3D Aerobat ARF was designed as a complete aerobatic package – one that would acknowledge the differences between 3D and precision performance and offer the best in both. And with it's 50cc engine, it'll dazzle pilots with it's precision for pinpoint patterns and the aerobatic might for exceptional 3D stunts!

RCReport Online Review

Bold bipe styling and a one-of-a-kind MonoKote® trim scheme make the Pitts M-12s a standout in appearance as well as performance!

- Unmatched for bold, biplane style and performance versatility.
- New strut system automatically aligns wings for faster, easier attachment.
- Includes painted fiberglass parts, an ultra-modern cockpit and carbon-fiber tail wires.
- IMAA and IMAC legal.

Coming Soon!!

Specifications:
Wingspan: 68.5 in (1740 mm)
Wing Area: 1545 in² (99.7 dm²)
Weight: 19 – 20 lbs (8.62 – 9.07 kg)
Wing Loading: 28 – 30 oz/ft² (85 – 92 g/dm²)
Length: 80.5 in (2045 mm)
Requires: 7 + channel radio with 8 servos and 50cc gasoline engine.

GPMA1421 25% Pitts M-12s 50cc ARF Retail:$799.99 Street:$599.99

AVAILABLE: Early November

Bird on a Wire

by Terry Dunn

When you first start reading this month's column you might think I've become senile. But no, I haven't forgotten that I'm supposed to write about electric airplanes, not radio equipment. Tony Stillman reigns as R/C Report's expert on all things radio-related. And I originally intended to write only about how Electronic Speed Controls (ESC) are used to power receivers. But as I was writing this, it became clear that a supporting discussion on batteries was also prudent. And even though my focus then broadened a bit, I am in no way trying to hijack Tony's signature topic. I couldn't do that even if I wanted to. While my main topic this month concerns 2.4 GHz radios, I've tried to keep my sights on the electrical power side of things. If you'll bear with me and keep reading you'll see what I mean.

Like many of you, I've begun the transformation from 72 MHz radio gear to 2.4 GHz. I have so many 72 MHz receivers, though, it will probably be quite some time before I phase them out completely.

My first 2.4 GHz radio was a Spektrum DX-7 which I still use frequently. Before I even bought it I'd heard about the fabled "Spektrum brownout", but I dismissed it as a castigation reserved for careless modelers who forgot to fully charge their receiver batteries. Now that I've experienced two such brownouts myself, I've learned two important things:

1. I'm one of those careless modelers!

2. There are several ways to cause a brownout.

Wait... what the heck *is* a "brownout" anyway? No, it doesn't mean wearing your Fruit-of-the-Looms inside out! There's probably an electrical engineering textbook somewhere that eloquently defines "brownout" in layman's terms. You need not look it up, however. The first time you realize that your airplane is

screaming towards the ground and you have no control over it, you and your Fruit-of-the-Looms will quickly understand why it's called a brownout!

Simply put, a "brownout" in the R/C world is what happens when your receiver's power source voltage dips below the minimum voltage required to operate the receiver properly. In the case of Spektrum receivers, this is about 3.5 volts. I'm sure that modelers were getting brownouts on their analog equipment for years before Spektrum and other 2.4 systems came along. What got folks so upset was the few seconds that the first-generation Spektrum receivers required to get back online after a brownout. Those interminable seconds often decided the life or death of a model. Spektrum quickly appeased the angry mobs by implementing "Quick Connect" in their receivers to effectively eliminate the wait following a brownout.

Spektrum took a lot of heat over this issue, but, no brand of radio is immune. Regardless of what Spektrum did to address how their receivers deal with a brownout situation, the

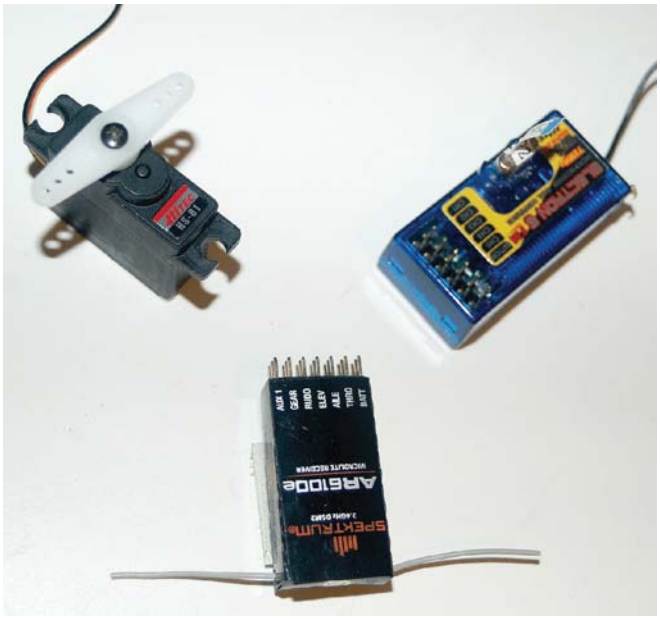


Photo 1: Brownouts are not a mystery. Give all electronics the voltage they crave and they will behave obediently.

occurrence of a brownout is almost always the modeler's fault. Most electronic components have a minimum voltage required to operate. Let the power dip below that level (or soar above the maximum) and all bets are off. So let's talk about some ways to prevent these brownouts (see **Photo 1**).

My brownout experiences are good examples of bad examples, and they provide easy lessons on how to fix some of the more common mistakes. My most recent brownout occurred during an aerotow flight. I was flying my Easy Glider while Lee Ray was flying my SimpliFly 40 tow plane using my DX-7 transmitter and AR6100 receiver. We towed the glider to our highest altitude ever before releasing. I don't know what that altitude was, but the planes looked awfully tiny. Anyway, just a few seconds after we released the Easy Glider, Lee called out, *"I don't have it!"* I looked away from my glider just long enough to see the SimpliFly in a steep dive. Knowing Lee's concern about being the pilot in command during a crash, I told him, *"Don't worry about it, it's not your fault."*, and I went back to flying the Easy Glider. Several seconds passed while my ears anticipated the thunderclap of exploding balsa that would mark the end of my tow plane, and who knows how much of the gear it carried. It also occurred to me that we had used Lee's big LiPo battery for this flight, and it was about to become a crumpled and possibly smoking mess. I decided to keep that ugly fact to myself for the moment.

But then, instead of the stomach wrenching thud I was expecting, I heard Lee rather nonchalantly remark, *"Oh. Uh, never mind. Now I have it."* I again diverted my gaze from the glider to see Lee's low-altitude, high-G pullout. Soon thereafter I noticed the Simpli-Fly making a nice landing.

My laziness, I'm afraid, was to blame for the situation, and nothing but pure good luck had saved my airplane (and Lee's battery). Had we not climbed unusually high for that flight... smash! Had the airplane been facing away from us when the brownout began... smash! I'd been very lucky, but I wasn't going to push it, so I immediately set about fixing the problem.

The main cause of this near disaster was that my receiver battery had run down from lots of flying. I even have a battery meter mounted on the plane, and I used it to check the battery after every flight. The problem is that I allowed myself to get comfortable flying the plane even when the meter indicated that the battery was beginning to sag. My complacency had almost cost me dearly, and that's not even accounting for the potential damage I might have caused to valuables on the ground. (Anybody know the going price for a Mercedes windshield? And hood?)

To prevent future brownouts like this, the simplest and best fix is to charge the battery at the first indication of low voltage. But as simple and obvious as that sounds, surely I'm not the only guy afflicted with occasional bouts of "just one more flight" over-confidence. *(Editor's Note: No, Terry, it's just you. No other RCRO reader would ever do such a thing.)*

For many years (okay, decades then!) the "gold standard" for sport plane receiver batteries planes has been the tried and true 4-cell, 4.8 volt

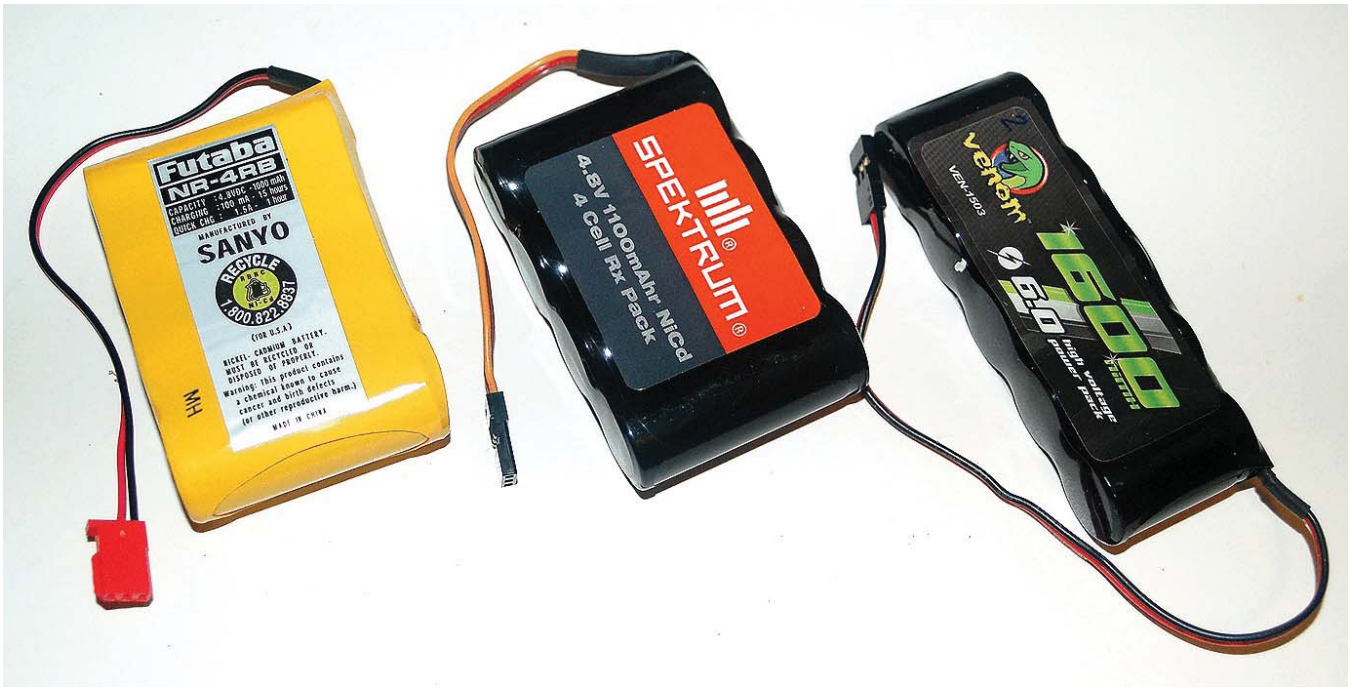


Photo 2: Switching to a 5-cell receiver battery (right) will provide a little breathing room to help avoid brownouts, but a properly charged 4-cell battery (left and center) will work just fine with 2.4 GHz radio systems.

NiCd, and there's absolutely no reason why this battery won't work fine with a properly functioning radio system. My Spektrum and Futaba 2.4 GHz radios came with 4-cell receiver batteries. With that being said, however, lots of folks recommend using 5-cell (6.0 volt) receiver batteries with 2.4 GHz radios (see **Photo 2**). And that's not a bad idea as long as your servos can handle 6.0 volts (some can't, so check your servo specs first). Basically, the higher voltage of a 5-cell battery gives you some extra headroom above that dreaded "minimum voltage brownout". Just be advised that with the higher voltage, the servos may draw more current from the battery, so you *may* get less flight time with a 5-cell battery than a 4-cell of equivalent capacity. *(Editor's Note: Field tests have shown that this is rarely the case, however. You can normally expect the same flight time from otherwise identical 4- and 5-cell batteries.)* Another option with even greater voltage is to use a 2-cell A123 (7.2 volt) battery. But here again, make sure your servos will work with the higher voltage. *(Editor's Note: One option seeing increasing popularity today is to use an even larger battery with a good quality voltage regulator. Radio South, for example, offers small, light weight voltage regulators that allow using batteries up to 30 volts, while regulating the voltage to the receiver and servos to your choice of 5.1, 5.6, 6.0, or other voltages.)*

The 5-cell and A123 options are really feasible only if your servos are operating properly. A faulty or binding servo is going to cause problems no matter what battery we use. Retract and flap servos are especially prone to stalling if you don't set the end points appropriately. A stalled servo can pull a huge amount of current which will cause a big voltage drop in the battery, and drain it all too quickly. That's why it's so important to make sure that all control surfaces move freely without binding, and that no servos are stalling at either end of its travel, *before* flying.

The SimpliFly is my only electric airplane that uses a separate receiver battery for power. The way I normally see it, a separate receiver battery is just more weight and another battery to keep charged. All of my other electric airplanes

Photo 3: A discrete switch-mode BEC, such as this CC-BEC from Castle Creations, is better able to provide reliable power to your receiver than the linear BEC built-in most ESC's.

siphon power from the motor battery through the ESC's Battery Eliminator Circuit (BEC) or a separate BEC. And *that* topic provides a convenient opportunity to talk about my *other* brownout experience.

I've previously talked about my Multiplex Twinstar as an aerial photography platform. That's just one of the many duties it has performed in the decade that I've owned it. About two years ago I decided to replace the original Speed-400 brushed motors with a pair of inexpensive brushless motors. The ones I used are available from several vendors, and are commonly known as the "2408-21". I've got a drawer full of them and their associated 18 Amp ESC's that I use on many projects.

These ESC's are not well documented, so I'm not sure of the capabilities of the built-in BEC's. I think it's safe to say that they're "linear" BEC's rather than the newer "switch mode" variety. Linear BEC's take the voltage from the flight battery and cut it down to about 5 volts for the receiver system. But the higher the voltage, the less current the BEC can output at 5 volts. Less current, of course, means fewer servos can be used. Too many servos will cause the BEC to overheat and shut down, with... well, ugly consequences.

When running dual ESC's on one receiver, it's often necessary to disable the BEC from one ESC or the other. Castle Creations ESC's are the only exception to this rule that I'm aware of. When I installed those "no-name" ESC's on the Twinstar, I removed the red wire from the receiver plug of one ESC to disable its BEC. That left me with one BEC of questionable capability that I was trusting to power four servos and a Spektrum AR6100 receiver. To make things even worse, all of this stuff was stuffed into the Twinstar's tight radio bay where it was denied any cooling air. Can you guess the results? The only surprise is that the resulting crash didn't cause much damage.

The Twinstar's structural bruises were easily fixed with epoxy, but its voltage short-comings would require a bit more finesse. I knew that the source of the brownout was an overworked linear BEC, so I decided to add a discrete switch-mode BEC. There are numerous BEC units available that have different capabilities. Most of them will tell you the range of input voltages that they can accept, as well as the out-

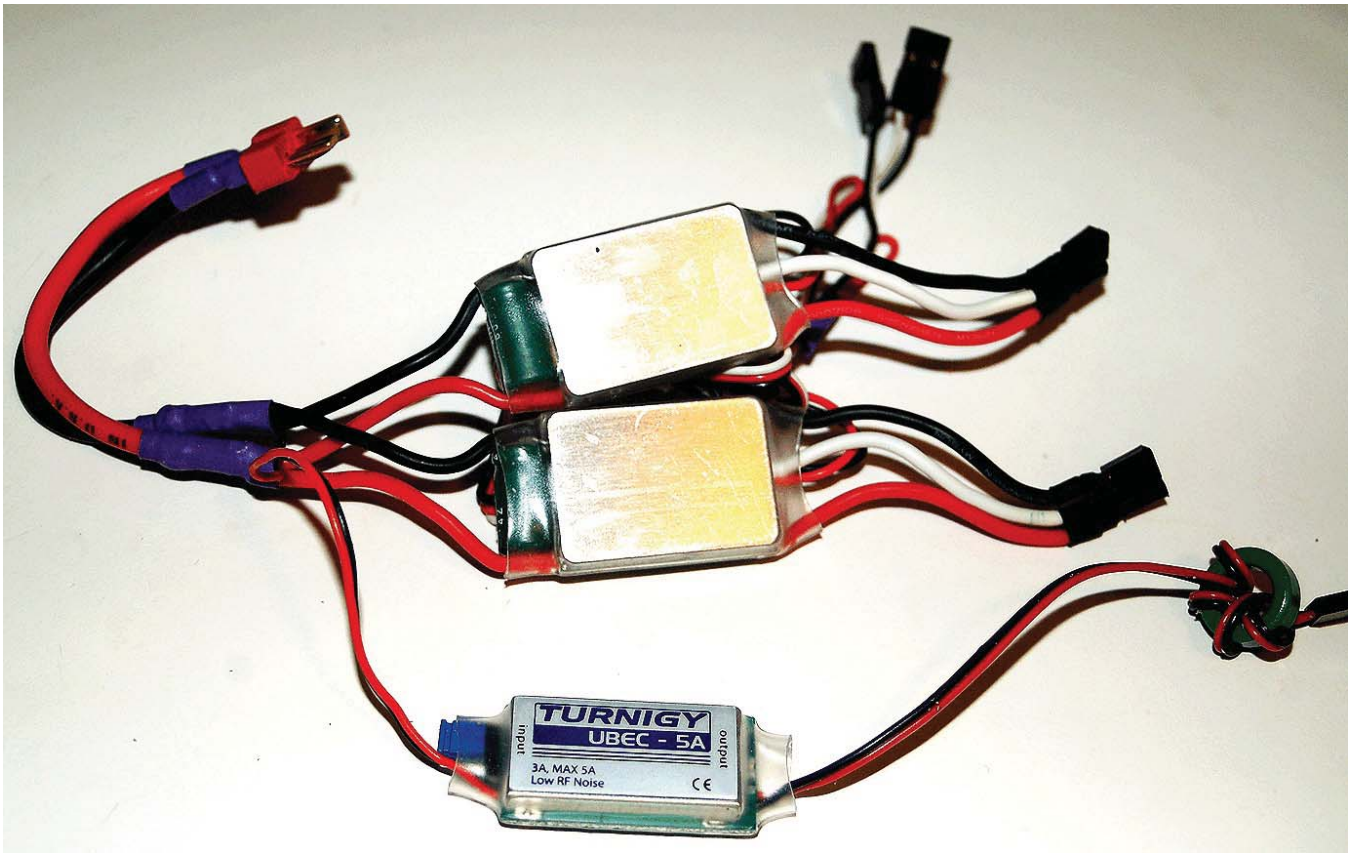


Photo 4: I used a Turnigy BEC in my Multiplex Twinstar to cure brownouts caused by the overworked BEC on one no-name ESC's. Note where the BEC input leads join the ESC battery leads.

put voltage and available current. It's helpful when they equate those output capabilities to a number of servos. I've used BEC's from Kool Flight Systems, Dimension Eng., Castle Creations, and Turnigy, all with good results (see **Photo 3**). I used a Turnigy in the Twinstar II.

I normally solder the leads of a discrete BEC directly to the battery connector of the ESC. In this case I'd already made an adapter to connect the battery leads of both ESC's in parallel, with one connector for the battery. I soldered the BEC leads at the same nodes where the ESC's leads met. **Photo 4** should help make this clear.

After disabling the BEC of the second ESC, the Twinstar was again ready to fly. There's still not much cooling air available, but numerous good flights without any trace of brownout have proven that the Turnigy BEC is providing sufficient voltage to the receiver.

As with receiver batteries, discrete BEC's will not compensate for bad servos. It's vital that we make sure all of our onboard components are working properly. I've heard that cheap servos can be real power hogs. I've never performed tests to see, but I'll take it at face value. When I use cheap servos, I'm very conservative with how many I'll connect to one BEC.

Well, I hope I've provided a little more insight into the brownout saga. More importantly, I hope you'll come away with the knowledge necessary to prevent brownouts in your models. If you ever do get hit with one, remember that it's probably *your* fault that the receiver ran out of juice! So before you write angry letters to the radio manufacturer, the FCC, and the hobby shop owner's mother, figure out what you did wrong and fix it. As for me, send me all the angry letters you want. You can't insult me any more than Gordon does on a regular basis.

Until next month… *-Terry Dunn*

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Houston, TX 77062
boaw@comcast.net

MULTIPLEX

Twinstar II

a kit review by terry dunn

PRODUCT TEST REPORT

MULTIPLEX TWINSTAR II

Model . . . . . Twinstar II
Airplane Type . . . . . Sport Electric Twin
Manufacturer . . . . . Multiplex Models
Distributor . . . . . Hitec RCD/Multiplex
www.multiplexusa.com
Typical Street Price $99.99
Wing Span . . . . . Advertised: 56"
Measured: 55.9"
Wing Area . . . . . Advertised: 676.8 sq. in.
Measured: 475 sq. in.
Advertised Weight . . . . . 3.3 lbs.
Airfoil . . . . . Not given
Wing Structure . . . . . Elapor foam
Wing Joiner Method . . . . . Fiberglass tube
Fuselage Structure . . . . . Elapor foam
Fuselage Length . . . . . Advertised: 43"
Measured: 42.6"
Pushrod Type . . . . Music wire in guide tubes
Hinges Included . . . . . Built-in
Hinges Installed . . . . . Built-in
Recommended Controls . Ail, El, Rud, Throt
Motor Included . . . . . No
Motors Included . . . . . Speed 400
Recommended Motors . . . . . Speed 400
Motor Mounts Installed . . . . . Yes
Motor Mount Type . . . . . Plastic
Battery Included . . . . . No
Recommended Battery . . . 8.4 to 10.8 volts
Landing Gear Installed . . . . . None
Wheels Included . . . . . None
Assembly Instructions . (pages, size, photos)
Hardware: Metric or SAE . . . . . Metric
Hardware Included . . . . . Two Speed 400 brushed motors with propellers and adapters, all necessary pushrod materials and connectors, nylon wing bolts, and decals.
Items Needed To Complete . . . CA adhesives with accelerator, hot-glue or epoxy, 4-ch radio system with four mini servos, an 8.4 to 10.8v motor battery capable of outputting 25+ Amps, a brushed ESC capable of handling 30 Amps.

Covering Material . . . . . None required
Estimated Assembly Time . . . . . Not given
Estimated Skills Required . . . . . Experienced
Drilling Required . . . . . No
Adhesives Required . . CA, kicker, and epoxy
Special Tools Required . . . . . None

COMPLETED MODEL

Finished Weight . . . . . 2.5 lbs. (40 oz.)
Wing Loading . . . . . 12.3 oz./sq.ft.
Power System Used . . . . . Two Multiplex Permax-400 6-volt brushed motors (supplied in kit), Great Planes C-50 50 Amp ESC, Turnigy BEC, A123 3-cell 2300 mah LiPo battery, 5" diameter Multiplex Electric props (included in kit). Full throttle power: 26.6 Amps, 238 Watts (95.2 watts/lb.).
Flight Duration . . . . . 10+ minutes
Propshaft to Ground . . . . . " (held level)
Radio Used . . . . . Spektrum DX-7 2.4 GHz transmitter, Spektrum AR6100e receiver, and four Hitec HS-81 mini servos
Covering/Finishing Used . . . . . None
Special Items . . . . . None

CHEERS - Well engineered airplane that flies well with a wide variety of batteries; clear manual; made of durable Elapor foam; many improvements over the already good original, the Twinstar.

JEERS - Self-tapping screws for the motor mount are too small; many mold marks in the foam are a visual nuisance.

Before affordable brushless motors and LiPo batteries emerged onto the hobby scene, there was an elite handful of airplanes that made good use of the then existing technology. The Multiplex Twinstar was one of those airplanes, made of molded styrofoam, and powered by two Speed 400 brushed motors. Power came from a 7- or 8-cell NiCd or NiMH battery. Just ten years later, however, this power system seems archaic.

Still, it provided performance that was good enough to earn the Twinstar widespread praise and admiration.

As the popularity of electric planes exploded early in the new century, the Twinstar gradually became obsolete. Rather than kiss their flagship product goodbye, however, Multiplex engineers revamped the design with a long list of new features and introduced it as the Twinstar II. While the two airplanes don't look much different on the outside, the evolution becomes highly evident when you look beneath the skin.

First of all, the beaded Styrofoam of the original Twinstar has been replaced with Elapor foam. The Styrofoam was easy to fix, but it was also easy to break. Elapor is much more resilient, so it's less likely to be damaged in the first place. What is Elapor? I'm not real sure, but it seems a whole lot like the Expanded Polypropylene (EPP) foam widely used in R/C models because of its ability to absorb impacts. Other than its resiliency, I also like Elapor because it can be bonded with regular (i.e. not foam-safe) CA adhesive, which would dissolve lesser foams.

Somewhat surprisingly, the perky little Speed 400 motors are still there. They used to be epoxied to the foam nacelles with little opportunity for air cooling. Now they're bolted to plastic motor mounts that provide much more air flow. These mounts also make it easy to replace worn motors, or t install brushless substitutes. You can still use a heavy NiCd battery if you want, but there are much lighter options available. Multiplex recognized this by enlarging the battery mount in the fuselage of the Twinstar II.

The old Twinstar had a one-piece wing with hardwood spars. The new wing is two-piece, using a fiberglass tube spar. Multiplex has also removed the plywood mounts and stiffeners that were epoxied into the fuselage of the older airplane. I was very happy to see that the old "hook and rubber band" canopy latch has been replaced with the fine plastic latches found on most other modern Multiplex designs.

When my Twinstar II kit arrived, I noted some damage to the shipping box, so I inspected it right away. Despite thorough packaging, the rearmost inch of both fuselage halves were broken off. Since everything else seemed fine, I just glued the severed parts back into place with medium Zap.

The instructions manual has a section of clearly drawn diagrams referred to by text supplied in five different languages! If you've built a Multiplex airplane before, the Twinstar II will feel very familiar. You Multiplex rookies, however, are in for a refreshing change of pace. I can't comment on the other four languages, but the English instructions are very well written. The Germans use good translators. The only funny thing I found was their printed value for wing area. I came up far, *far* short of their figure, even when I included the horizontal stabilizer as wing area. Beyond the specs, each assembly step clearly references one of the diagrams, and gives you tips or warnings when necessary. I particularly like how they coerce you into mounting the tail feathers perfectly square: "If these parts are misaligned, you will regret it for the whole of the model's life." Amen, Klaus, amen.

For me to narrate step-by-step through assembly of the Twinstar II would be a waste of our time and an insult to the manual. Instead, I'll just touch on a few highlights and explain the one place where I encountered a slight hiccup.

The whole reason I bought the Twinstar II was to use it as an aerial mount with my Flip Mino HD video camera. Before I even began assembly, I cut a notch under the canopy mount in each fuselage half, providing a tight pocket to hold the camera. I figured it would be easier to do this before the halves were joined. With that done, I began following the instructions manual.

I used a combination of Zap CA's to assemble my Twinstar II. Most construction was done with medium Zap and accelerator, but I used thin and thick Zap in some areas. All variations seemed to adhere tenaciously. In spite of the manual's warning, I used epoxy instead of hot glue to mount the servos, and so far they're holding up fine.

Multiplex recommends their Tiny-S UNI servo for all four control surfaces. The Tiny-S may be a popular servo in Europe, but it's pretty obscure here in the US. I checked out the specs on the Multiplex website where it says the Hitec

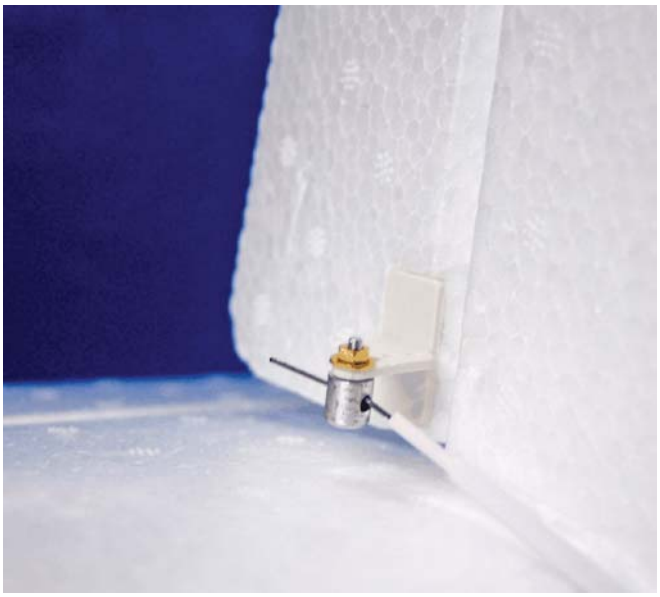


Photo 1: I inverted the pushrod connector on the rudder horn to reduce the curvature of the pushrod. Now, I have to stick the wrench through the stabilizer to get to the set screw.

HS-81 is equivalent. And those I've got! They fit well into the molded servo pockets in the fuselage and wing, too.

Now while we're talking about radio gear, I should mention that you'll need two servo extensions for the wing. If you use the supplied servo/motor connector board in the kit, you'll need two 12" extensions. I went a different route which I'll explain later.

The music wire pushrods for the rudder and elevator slide along in plastic sleeves, with the outer sleeve glued to the fuselage. Z-bends connect the servos to the pushrods, while EZ connectors (setscrew type) are used at the control horns. With the connector placed on top of the rudder control horn, I thought that the pushrod was at an awkward angle, so I placed the connector on the bottom of the horn to straighten out the curve in the pushrod (see **Photo 1**). The trade off is that I had to poke a small hole in the horizontal stabilizer to tighten the setscrew. For what it's worth, the other Twinstar II's I've seen all have the pushrod connector on top of the rudder horn, and it seems to work fine.

The diameter of the pushrod wires is slightly smaller than the holes in the HS-81's servo arms, so there's a little slop when you insert the Z-bend. I doubt that it's critical, but I attacked it anyway. Using needle-nose pliers, I decreased the right angles in the z-bend. Now the wire passes though the servo horn at an angle, which takes up the slop.

If I weren't building this plane for the magazine review, I probably would have scrapped the included Permax Speed 400 motors and installed some nicer brushless units. This kind of modification is not allowed in kit reviews, however, and I knew many of you would like to know how it performs with the supplied motors anyway. Knowing that I would eventually install brushless motors, I positioned a third motor wire in the conduit of the wing before I glued the cover in place. Once that cover is glued down, it would be a really big deal to get to the motor or servo wires. Now, the conversion will be as simple as replacing the current ESC with two brushless ESC's, and then soldering brushless motors to the three motor wires. Whether brushed or brushless, the ESC(s) is located in the fuselage under the wing. Remember that it's always better to have long motor leads rather than long battery leads.

I already mentioned the new plastic motor mounts (see **Photo 3**), which are a huge improvement over the old mounting method.

Photo 3: The screws included with the plastic motor mounts were too small, so I replaced them with 2-56 bolts and nuts.

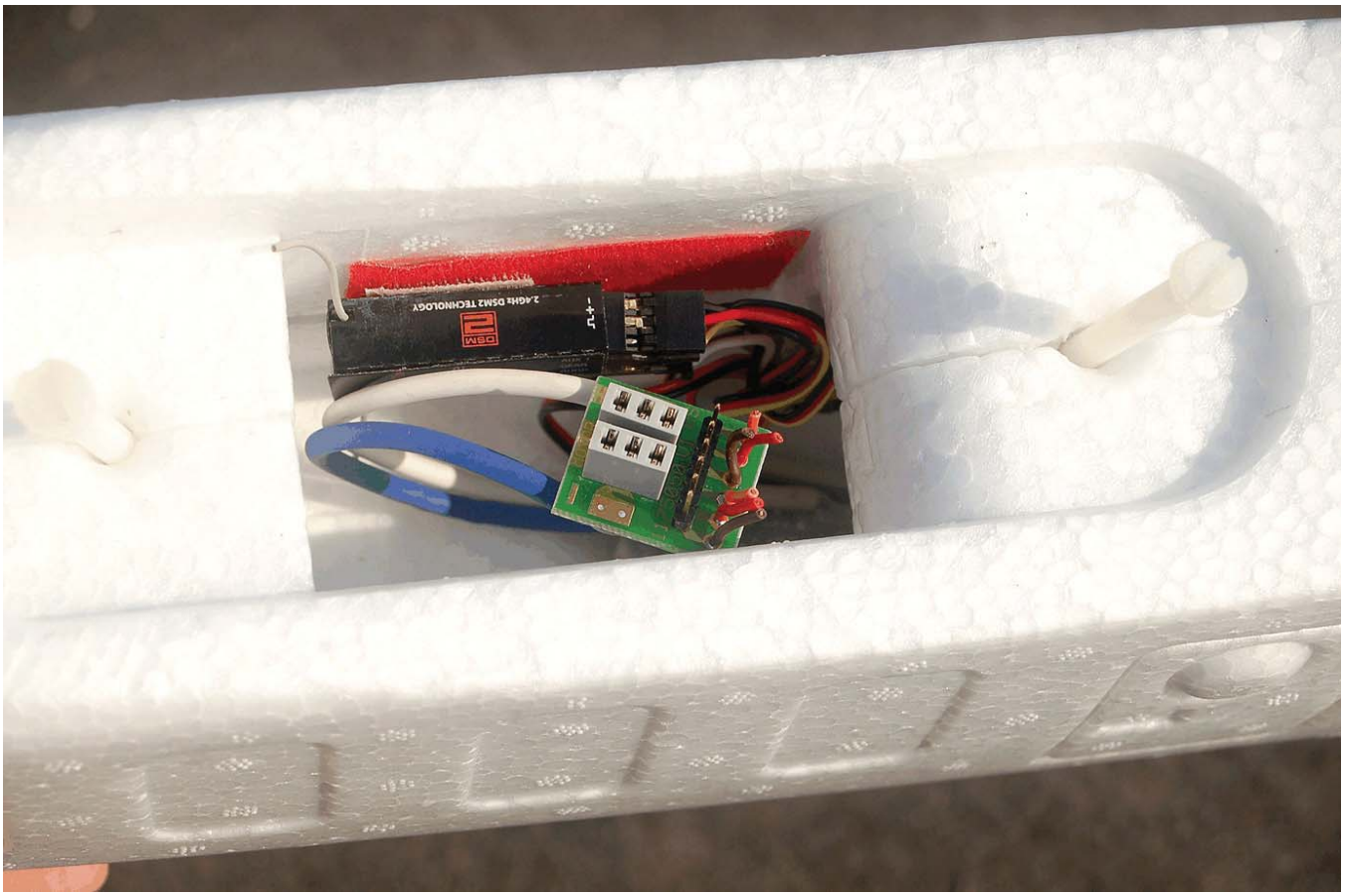


Photo 4: Multiplex includes this board for connecting the leads for the aileron servos and motors to the gear in the fuselage. I used a Y-harness for the servos, and cut off the unused servo leads from this board.

Each new mount is a two-piece unit assembled with self-tapping screws. The only problem here was that the included screws were too small. They simply turned in their holes without threading into the plastic. I replaced the screws with 2-56 nuts and bolts. I had to trim the plastic a little to get the nuts to fit, but it's now very secure.

The Twinstar II has new props that mate with a small plastic spinner before being glued to the motor shaft. That system may work fine, but it sounds like a pain if you ever need to replace a prop. I had some aluminum prop adapters in my spare parts box that fit the Permax 400 motor shafts (2.3mm) and the supplied props without modification, so I used them. The props are 5" in diameter, but their pitch isn't given.

By design, the Twinstar II has a two-piece wing. It isn't a big wing, though, so I build it as one piece. Doing this meant I could use a *single* 12" Y-harness for the two aileron servos. By using the Y-harness I eliminated the need for the servo extensions on the servo/motor board. I cut them off so they wouldn't crowd the radio compartment (see **Photo 4**).

To power the onboard radio I added a Turnigy BEC unit with the output jumper set to provide 6 volts. I think that the BEC portion of the Great Planes ESC might be overworked driving four servos, so the Turnigy ESC provides a little extra insurance against "voltage brownout" at the receiver. Multiplex includes adhesive-backed hook and loop material to mount the battery, receiver, and ESC. I followed their advice and supplemented the adhesive with CA.

The manual suggests using a 7- or 8-cell 3000 mah battery to power the motor. These are Sub-C size NiMH batteries that are basically the same as those used by the original Twinstar, except that the capacity has increased dramatically.

Photo 5: My 3-cell A123 battery (bottom) provides about the same voltage as an 8-cell NiMH battery, but it is a lot lighter. The unique shape of this pack is solely to accommodate my onboard video camera.

Common capacity for these batteries in the late 90's was 1700-2400 mah. Now you can get Sub-C cells up to 5000 mah capacity. What this means is that you can fly the Twinstar II with the same performance of the original Twinstar, but for much longer flights. Or can take advantage of the newer battery technology and get even better performance. That seems like a win/win to me, so I used a 3-cell A123 2300 mah Lithium Nanophosphate battery. And to make room for the video camera, I soldered my battery into an unusual configuration (see **Photo 5**). Without the camera, a more common side-by-side layout is fine. The 3-cell A123 pack has roughly the same voltage as the suggested 8-cell NiMH battery, but weighs far less. For example, my A123 pack weighs 8.5 oz., while an 8-cell 3300 mah NiMH battery weighs 18 oz. Trust me, 10 oz. makes a huge difference in this plane! That's about 25% of its flying weight!

If you're sticking with the brushed motors, LiPo batteries require some consideration. A 2-cell LiPo will provide the voltage equivalent of a 7-cell NiCd or NiMH battery, and the airplane will fly just fine. It will be on the low side of the power curve, but with less weight due to the lighter battery. You can always gain back a little power by switching to larger props, but I wouldn't go any bigger than 6x4. The potential for weight savings and increased flight duration with a 2-cell LiPo helps to overcome the decrease in power. If I were using LiPo's with the Speed 400 motors, I'd use a 2-cell 3000 mah battery, or similar.

But resist the urge to use a 3-cell LiPo! That voltage is basically equivalent to a 10-cell NiCd or NiMH battery. The higher voltage will overpower the motors and produce lots and lots and lots and lots of heat. You will likely burn out the Permax Speed 400 motors very quickly (if not instantly!) with a 3-cell LiPo. Don't do that.

Yet *another* battery option is to use some of the smaller but high-output NiMH batteries now available. An 8-cell pack of the Elite-2000 from www.cheapbatterypacks.com looks like a good match, though I've never used one. Such a battery would provide good duration with the robust nature of NiMH chemistry, but without the weight of Sub-C size cells. If you go this route, make sure the cells you choose are able to deliver 25 Amps comfortably.

The possibilities for finishing a Twinstar are virtually endless. The only hurdle that may stifle your imagination is the multitude of tiny mold bumps all over the airframe. They're a necessary evil that comes with the injection molding process, and they show up even *more* vividly if you paint the model a dark color. No, decals won't hide them. You could sand them off, but then you'd lose the glossy sheen on the foam. I chose to leave them be and live with it.

A large sheet of decals is included, but I didn't use them. I brushed on some paint to color the foam canopy, and then outlined the panels with a Sharpie marker. The stripes on the wing and stabilizer were created with a combination of MonoKote trim sheet and Krylon spray paint. The scheme is definitely simple, but it provides good visual orientation.

Flying the Twinstar II

Ah, the fun part. Before the maiden flight, I checked the power readings with a wattmeter. The little brushed motors were pulling a combined 26.6 Amps to pump out 238 Watts of power for this 40.4 oz. airplane. That equates to a power loading of 95.2 Watts per pound, which suggests sporty performance.

Launching the Twinstar II takes only a moderate push forward with the motors running. You don't need an assistant to launch it for you. Since the wing loading is only 12.3 oz./sq.ft., it doesn't need much speed to fly. I was, in fact, pleasantly *surprised* by the climb performance with the brushed motors. The lighter battery really pays really big dividends here.

I was instantly comfortable with the Twinstar II, since it flies just like all the other Twinstars I've flown during the past decade. It easily performs loops and rolls, but don't confuse the Twinstar with a pattern plane. The tail wags around during rolls, and loops tend to be a bit oval. But everything happens slowly, and there's never even a hint of an unexpected stall or snap.

Inverted flight is easy. In fact, I think the Twinstar II can fly as slowly inverted as it can upright, and that's pretty darn slow! Just wait until you see how slow it gets when you land! It won't fly knife edge or anything that even resembles knife edge, but that's okay with me. If you get too adventurous, it will let you know by getting sloppy. Take for instance a rolling circle. The Twinstar II will do them, but it ain't pretty!

The Twinstar II is right at home at small fields, just cruising around with the occasional aerobatic move thrown in. I really like to do slide-and-go's on the grass. It's a tricky move, since you have to slow way down to land, while still retaining enough energy that the grass won't grab the plane before you throttle back up to flying speed. This isn't an issue if you upgrade to brushless motors, though. With their extra power you can often take-off from the grass.

At a recent fun fly I flew around with a few other Twinstar II's equipped with a variety of brushless motors. The other guys were impressed with the performance of the Permax Speed 400 motors with the A123 battery. My brushed-motor bird was just about as *fast* as the others, but they sure had me beat in climb performance. By the way, the Twinstar II still flies well with the extra 3.3 oz. of a Flip Mino HD video camera, but I rarely attempt any aerobatics with a camera on board.

Just for the sake of comparison, I also flew the Twinstar II with an 8-cell 3300 mah NiMH Sub-C battery. Yes it flew, and yes it was still fun, but the extra weight could definitely be felt. I doubt that I will ever try that again. The A123 battery provides plenty of run time (usually over ten minutes) and much better performance. In fact, I plan to install brushless motors soon. The stock brushed motors are good, but I've been corrupted by the allure of more power. I still have to decide on the products I'll use, but in lieu of a 3-cell LiPo, I may stick with the A123 battery.

I'm glad I decided to retire my old Twinstar and replace it with the Twinstar II. It's like replacing your favorite pair of old sneakers with new ones just as comfortable. At first, though, it feels like you're being disloyal to those old, trusted shoes that have shielded your feet from hot pavement, cold wet grass, and steaming piles of... well, stuff. But after one walk around the block in your new shoes, all that allegiance may be gone forever! The old sneakers soon become just stinky, dirty, has-beens. And so it is with my Twinstars. The old has been replaced with the new, and I like new.

-Terry Dunn
boaw@comcast.net
(Flight Photos by Fitz Walker)

R/C REPORT PRODUCT TEST REPORT

Photo 1: The new Flip Mino HD on the left is slightly smaller than the Flip Ultra (middle) and the Aiptek 1080P A-HD+ (right) cameras that it replaces. It's also significantly lighter and provides very easy, high-definition recording.

Item Tested . . . . . Flip Mino HD 60-minute high definition video camera with sound
Manufacturer . . . . . Flip Video
Suggested Retail Price $199.99
Warranty . . . . . None mentioned
Included Battery . . . . . Built–in Lithium-Ion
Included Charger . . . . . None (see text)
Built-in Speaker . . . . . Yes
Viewing Capability . . . . . Yes
Screen Size & Type . . . 1.5" (diagonal) LCD
Dimensions . . . . . 4x2x.66"
Weight . . . . . 3.3 oz.
Included Accessories . Cable for TV viewing, carrying case, and a built-in, flip-out USB connector for use with a computer (see text).
Instructions . . . . . None mentioned
Items Needed Before Use . . . . . None
Flown In . . Multiplex Twinstar & Twinstar II

CHEERS - Small, light, and super easy to use; provides high-definition picture quality in varying light conditions.

JEERS - Vibrations may cause picture distortion.

Photo 2: A simple slot cut into the foam fuselage of my Multiplex Twinstar II keeps a tight grip on the Mino HD. Note the slight downward angle of the camera that provides more ground and less sky in the picture. (Fitz Walker photo)

The Dive-in Movie

Go ahead and look through all your old R/C catalogs. Nowhere will you find the Flip Mino HD (pronounced "minnow") camera. You may find *some* video cameras, but you won't find a Flip,, because none of the cameras in the Flip line were designed to be attached to an R/C airplane and carried skyward. But does mean that they aren't any good at this task? Hardly. Take, for example, the Flip Ultra 30-minute camera that I discussed in my August 2009 column. That camera really impressed me with its ease-of-use and clear video. The only downside for me was its TV-quality resolution, which limits the viewable size of the video. On the flip side, the HD resolution does generate much larger file sizes, and consumes more memory.

Based on my experience using the Flip Ultra and the Aiptek 1080P A-HD+ (another high definition camera), I came to the conclusion that a version of the Flip with High Definition (HD) resolution would provide the best of both worlds for aerial photography (AP): ease-of-use and a big, clear picture. As it turns out, Flip makes *three* HD cameras; the Ultra HD, and the Mino HD in 60-minute and 120-minute versions. The "minute value" denotes how much cumulative video footage the built-in memory can store. I chose the Mino HD 60-minute version over 120-minute version since it's the lightest of the bunch, and I didn't see a need for two hours of footage. When I called and asked, the good folks at Flip kindly provided a sample for this review.

Compared to my Flip Ultra (5.0 oz.), the Mino HD (3.3 oz.) is slightly smaller in each dimension, and considerably lighter. The smaller dimensions are not great, but every little bit helps when you're trying to stuff a new item into an already crowded fuselage.

Photo 3: Aerial Photography is a fun new experience when you use easily adaptable equipment like the Flip Mino HD and Multiplex Twinstar. (Fitz Walker photo)

Best of all, though, is that the Mino's resolution is fixed at 1280x720 pixels, compared to the Ultra's 640x480. When it comes to AP, you can often compensate for size and weight, but video quality is where the rubber meets the road. There's just no substitute for more pixels.

My Mino HD is black, but it's also available in chrome. If you order directly from Flip Video (www.theflip.com) you can design custom graphics for the case. The camera comes with a soft carrying case and the necessary cables that allow you to play your captured video through your TV. To attach the flip to your computer, a USB plug "flips" out from the top of the camera case. Once you've uploaded your video files to your computer, you can delete them from the camera to free up the memory for more recording. A rechargeable (but non-removable) lithium-ion battery is built into the camera, and is recharged whenever the USB plug is connected to a computer. Or you can purchase a separate charger that plugs into a 110V wall outlet.

The main appeal of the Flip for many users is its ease-of-use. I don't see how it could get any simpler. You push one button to turn it on, push the big red button to start recording, and push the same red button again to stop recording. That's it. There are no settings for resolution, frame rate, focus, or anything, which means there are no setting to be accidentally set wrong. All the settings are pre-set in the camera, so you get whet you get. But that's okay, because what you get is darn good.

I've already mentioned the HD resolution, and the frame rate is 30 frames per second (fps). While some other HD cameras are capable of 60 fps, 30 fps is adequate and keeps file sizes from getting totally out of hand. The lens' focus is fixed at 1.5 meters to infinity. This is a good feature because auto-focus lenses often wander in and out of focus as you fly. Let's just hope that I don't fly any closer than 1.5 meters to the landscape I'm filming!

The Mino HD does have a 2x digital zoom, but I've never used it. This is not the same thing as an optical zoom, which physically changes the focal length of the lens. Digital zoom basically just crops the image for you, while lowering the resolution of what remains. I wouldn't bother with it. If you want to see something in more detail, move the camera closer.

A 1.5" (diagonal) LCD screen on the back of the camera shows what you're recording, and also provides a portable means of playback. You might be surprised, though, at how many people crowd around that little screen when you push the play button. The built-in speaker is plenty loud enough for outdoor playback as well.

The first time you plug any of the Flip cameras into your computer, it will automatically install "FlipShare" software, which provides an automatic interface for uploading or download-

ing movie files to or from your computer, and also provides some handy editing features. Just like the camera itself, I found FlipShare to be very intuitive and easy to use. It doesn't have all the features of some video-editing software, but I was a complete rookie to video editing when I bought the Flip Ultra, and I had no problems using FlipShare to edit my movies. It also includes music selections that you can add to your videos. Propeller and wind noise do not a nice soundtrack make.

To use the Flip Mino HD for aerial video work, I mounted it on my trusty old Multiplex Twinstar in the same slot that used to house the Flip Ultra, using foam padding to fill in the extra space. I took it up for a couple of flights and then came home to see the results. I was surprised and disappointed to see that the video was wavy whenever the Twinstar was flown under power. During glides it was fine, so my theory is that vibration from the motors was mechanically causing the picture to distort. If that's true, you'd need some pretty good isolation if using this camera with a glow-powered plane. I'm always sermonizing about making sure that your electric motors don't vibrate, and here's another good reason to do so. In my case, the prop shafts were very slightly bent from a recent... uh, incident. (Don't say it, I know... practice what you preach.)

Rather than replace the bent motor shafts (or the motors), I replaced the whole airplane! I now use a Multiplex Twinstar II as my camera plane. And this tme I made the camera mount a custom-fit for the Mino HD. It slides snugly into a slot under the canopy, where it's held in place strictly by friction. The camera case has a built in socket with 1/4-20 threads for mounting to a tripod or... whatever.

My first opportunity to use the Mino HD in the new plane was at a fun-fly. I waited most of the day for a break in the overcast sky, but I never got it. I finally gave up and decided that this would be a good opportunity to test the Mino HD's low-light capabilities. My flying buddy, Lee Ray, took off with his Park Zone T-28, and I tried to follow him with the camera-equipped Twinstar II. Despite the lack of sunshine, the camera did a great job of capturing the chase!

You can see my video at the RCRO Video Library under the filename "Flip Mino Camera".

Www.rcreport.net/videos

(Editor's Note: I've seen the video, and I was impressed! After adding that to what Terry has said in this review, I'll soon be ordering my own Flip Mino HD. I plan to use mine for aerial and off road motorcycle riding videos.)

I've since used the camera in the Texas sunshine, which certainly provides a much more colorful result. I just have to be careful not to point the camera directly into the sun, since that causes red, vertical lines.

The waviness is gone now, and I have HD resolution in a small, light, and easy-to-use camera. And that's exactly what I was looking for when I targeted the Flip Mino HD. Now, I'm not saying that the Mino HD is the only mass market camera that works well for AP. There are others. I'm not even saying that it's the *best* camera for AP. I've not tried all the others. What I am saying is that if you want a small, very simple camera to use for aerial photography (or other video uses), the Flip Mino HD is an excellent choice.

-Terry Dunn
boaw@comcast.net
(Photos by Fitz Walker)

An older man approached an extremely attractive young woman at a shopping mall.

"Excuse me, miss, I can't seem to find my wife. Will you talk to me for a few minutes?"

The young woman, feeling sorry for the old fellow, said, "Of course I will, sir. Do you know where your wife might be? Should we go looking for her?"

"I have no idea where she is", replied the man, "but no, we needn't go looking for her. You see, every time I stop and talk to a young lady with a figure like yours, my wife almost instantly appears out of nowhere."

SPARKY'S REVOLT

BY TONY COBERLY

Well November is here and I have to address something that has been bothering me over the past several months. I recently got a phone call from a fellow flyer about a news report. Another fire in a garage from directly related to Lithum batteries! ARG!!! This time the fire was not contained and caused over $300,000 in damage. This got me to thinking...I would rather not burn my house down, so it's time to seriously address all my Lithum batteries and their storage. I asked myself, "How many Lithum batteries do you actually have?" Well that was not hard to figure out. I looked on my storage shelf and began to count. One, two, three, nine, 10, 11, 12.....19, 20, 25, 26, 27, I stopped counting there, even though I was only about half way done! All my packs are stored at no more that 50% charge and simple sit on a shelf. In order to store this number of packs in something like a LiPo Sack...I would spend a fortune on the things! Several club members use fireproof safes to store their packs, but again they don't have the number of batteries that I do. But let's just say, for the sake of argument, that I have a clay pot or a fire safe to store my batteries in. If I have one large five cell battery pack go bad and catch fire, all the batteries in my box will be destroyed by a single battery failure! What we need is a battery storage system that we can isolate our packs. Time to get out the drawing paper, (yah right, not when you have Photoshop) and see what we can come up with.

First thing to think about is materials. I need something that is noncombustible and preferably nonconductive as well! Fire safe boxes have something very like a sheetrock material sandwiched with some high temp polymers. I suppose sheetrock is a good choice, but it still has a paper coating that can burn, even though it may not continue to support

Flame. I want something that is solid and has no paper or plastic surface on it all. I looked in my storage trailer out back and found the perfect solution. Concrete backer board for laying tile! I found a 3x5 uncut sheet ready and waiting so here some manufacture specs.

Home Depot price of $10.99

36inx60in sheet

HardieBacker® 1/4" Cement Board

Thickness: 1/4" Weight: 1.9 lbs/sq.ft.

HardieBacker® cement board is recognized for use in non-combustible construction in NER-405.

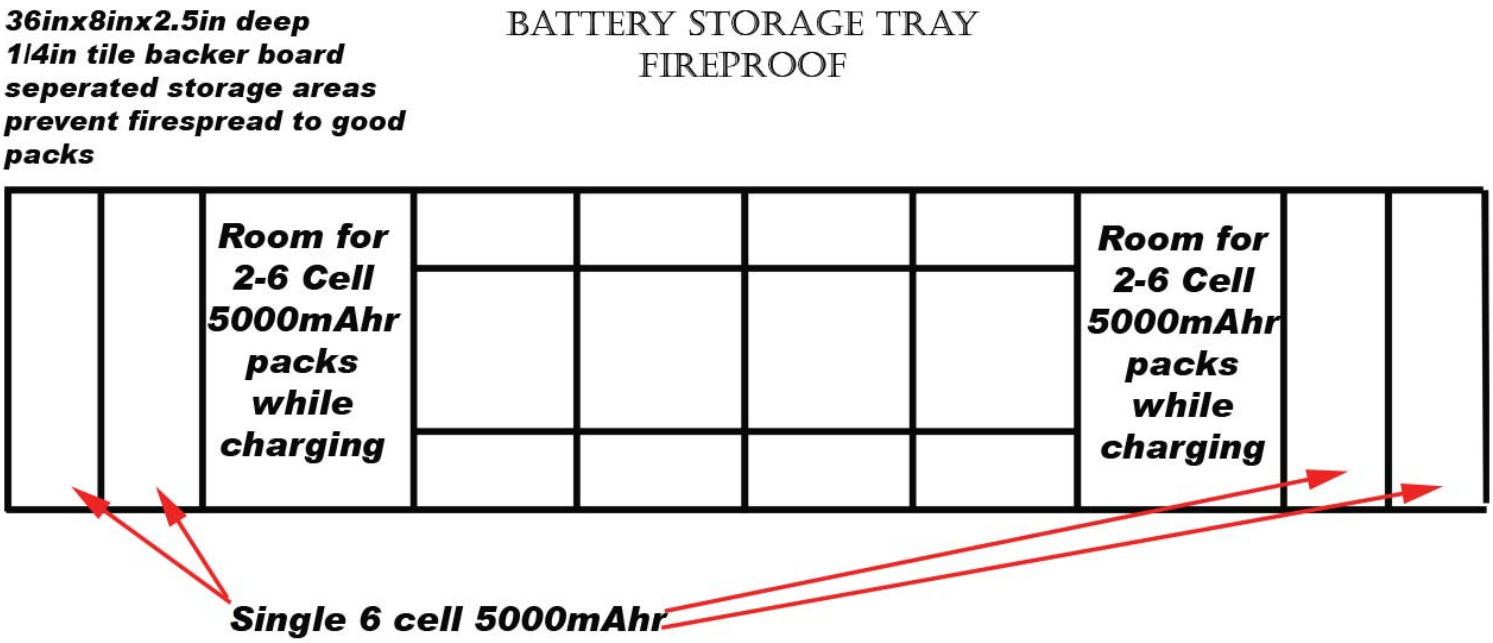
Surface Burning Characteristics

When tested in accordance with ASTM test method E-84:

Flame Spread	0
Fuel Contributed	0
Smoke Developed	5

Thermal Resistance

(Approximate value) 1/4" thick: R:0.13



Here are my rough drawing specs for storing many batteries in isolated storage areas.

Now this backer board is a bit heavy, so I'll design my storage system to basically act as a stationary shelf, rather than something you transport to the field.

Now let's start cutting and assembling our fireproof box. The 1/4in HardieBacker is strong, but it is only 1/4 in thick. This makes it a bit on the brittle side when you have a long narrow piece. I am going to use a piece of an old hollow core door to act as a stable base for the box. When I cut the hollow core door, I end up with open areas that need to be capped off. (Photo 1)

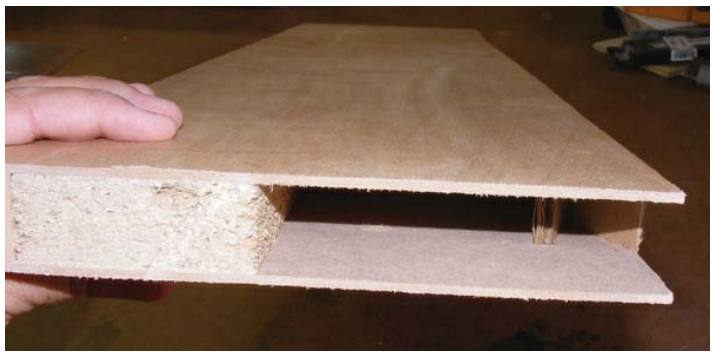


Photo 1: They don't call them hollow core for nothing!

I just used some scrap balsa to close off the hollow open areas. (Photo 2)

Photo 2: Edges capped with balsa

Once all the sides are closed in, I cut the HardieBacker to the overall size of the door piece. There are special blades for grinders and saws to cut this concrete board with, but I just used an older carbide tipped skill saw blade, and a dust mask because the dust is very fine when during cutting. Now I don't want to use any screws or nails to hold the HardieBacker to the wood. My theory is any metal that penetrated the box could be a heat transfer point from inside our battery box outside. Should a fire start in the box, it would heat the screws or nails and perhaps start a fire outside the storage box. I use some mastic tile laying adhesive for laying tile to glue the backer board to the door. I spread a good 1/4 inch layer of adhesive down and placed the cut to

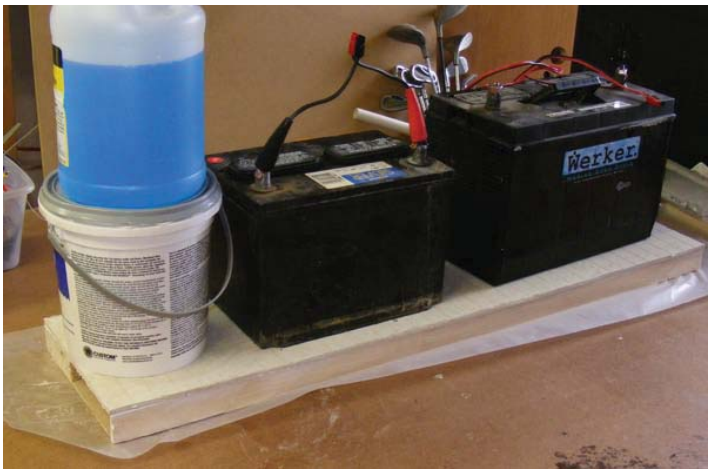


Photo 3: Plenty of weight to hold things still

fit piece of HardieBacker on top and add weight to hold it in place overnight. (Photo 3) The base of our storage box is ready so now I am going to make the sides of the box.

Once again I am going to ad a bit of additional strength here, so back to the storage trailer I go. I come back with a 1/8 in piece of hard board. This dark brown board is very similar material to old time peg board that use to hang tools on the walls of your shop, but this piece has no holes. The board has a smooth side and a rough side. I cut strips the length of my box and about 3.5 inches wide. Ill glue these

Photo 4: Sides glued on with fire caulking

strips to the sides of my box base. Now here I use a special type of caulking to hold the sides in place. Now this is not your standard bath tub caulking, but rather a fire block caulking. This yellow fibrous sealant from 3M, IC 15WB+, is tested to resist fire for up to two hours. This is a water based sealant that when exposed to heat, it expands to maintain a tight seal. I picked up this caulking at local Home depot for $7.95 for a single 10.1 ounce caulking gun tube.

Photo 5: 2-Hour fireproof caulking

Now we have a box about 2.5 inches deep with wood sides but a concrete bottom. We need to cover these wood sides with the HardieBacker. Simply cut strips of HardieBacker into pieces to fit inside the wood sides. Again using the fire block caulking, and clamps, I glue in the pieces of backer inside the box to make it lined completely with concrete. (Photo 6)

"I never blame myself when I'm not hitting. I just blame the bat and if it keeps up, I change bats. After all, if I know it isn't my fault that I'm not hitting, how can I get mad at myself?"
Yogi Berra.

Photo 6: One corner completed!

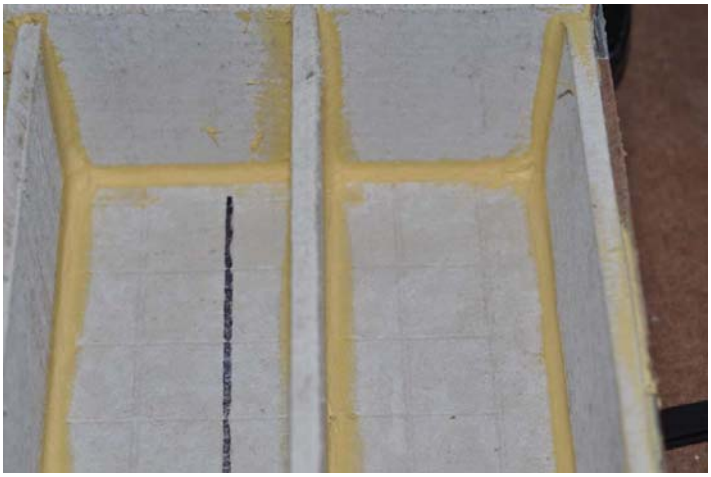


Photo 7: One separator in place

Photo 8: Just a test fit for a few packs

Now off to do more cutting on the concrete board to make separators in the box. My aim with this box was to be able to store lots of batteries, in the minimum amount of area, and should a pack light off, I would not lose all my packs. You can choose exactly how many areas you need because that entirely depends on your inventory! Just glue in the separators, once again no fasteners, with the fire block caulking and let everything setup overnight at least. (Photo 7)Ok now I need to consider one more thing to complete our storage box. This box is to isolate our batteries, but what about a top for the box. I need something to keep flames from catching secondary shop materials on fire so a top is a must. I cut a piece of HardieBacker 36 inches by 8.5 inches and lay it on top of my box. Now I could just allow the top to just set on the box, but when batteries go bad and catch fire they tend to roll around as they swell up. So I decided to hinge the lid on the top of the box. Now here we are again with a small problem. I still don't want any fasteners passing from inside the box to the outside, so I need to glue on the hinges. Now I could have used a small piano type hinge, but that would be a very small glue area. I had a set of standard door hinges in the shop so I put them into service. I just marked where I wanted the hinges to go. Two hinges are plenty since they are door hinges rated to hold 100 pounds. I glued on the top portion of the hinge to the lid of the box with 5 minute epoxy with a bit of milled fiberglass mixed in. I'm not looking for pretty here just functionality. Once the epoxy cured I repeated the process and glued the lower section of the hinges to the storage box itself. Now we have a ready to use fireproof storage box for our batteries.

Photo 9: Ugly but very functional

Ok everyone we have been talking theory in regards' to the ability of this HardieBacker to with stand the heat of our LiPo packs when they fail. Now it's time for a practical test of this board.

DO NOT TRY THIS AT HOME!

I have constructed a simple box from the ¼ inch HardieBacker. This box is simply taped together with A/C duct tape initially. I then sealed the joints with our 3M fire blocking caulking. I have a lid that just sets on top of my box and is hinged with a little more A/C duct tape.

I have a 3200 mahr 3-cell LiPo pack that I will force to fail. I shall not divulge how I caused the failure. (I have several short videos of this test and pack failure. Check out www.rcreport.net/videos)

Photo 10: Smoke beginning to subside!

As the pack failed I could see the smoke billow out of the box in three clear stages. One stage for each cell as it failed. When the smoke cleared, I slowly and carefully opened the box to have a look. Using my IR thermometer I measured in excess of 400 degrees Fahrenheit on what was left of the pack itself. The surrounding HardieBacker was found to be in the 120 degree to 135 degree range. This temperature dropped very quickly due to the mass and heat sink qualities of the concrete backer board.

Photo 11: Top of test box before opening

This shade tree battery storage box is not overly large but it offers a huge amount of security. This box can be built in a weekend from items from local hardware store. Total cost of materials is less than $25.00. I think that everyone who has more than a few LiPo packs should have something to store batteries in, so why not try this!

Tony Coberly
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FUN AEROBATICS

by Ed Moorman

MANEUVER
OF THE MONTH
SIX-SIDED INSIDE LOOP

After last month's break from the square-cornered maneuvers with the "Cloverleaf", now we're back to another "corner loop", the 6-Sided Inside Loop. We'll cover the 6-sided *outside* loop in a future column.

DESCRIPTION

The 6-Sided Inside Loop is an inside looping maneuver with six straight sides and six 60˚ corners.

KEYS

Your plane needs more than the minimum power necessary for a basic loop, because of the two, nearly vertical, climbing sides.

AIRPLANE SET-UP

Your normal set-up should work if you have enough elevator and power to do a fairly good size inside loop from level flight. A .46 powered trainer should be able to easily complete a 6-Sided Inside Loop.

DOING THE MANEUVER

What to do: Check the diagram on the Maneuver Cards. It doesn't look hard because it isn't. Remember, we're not flying pattern contests here. We're only learning

RC REPORT MAGAZINE

TEACH YOURSELF AEROBATICS CARD

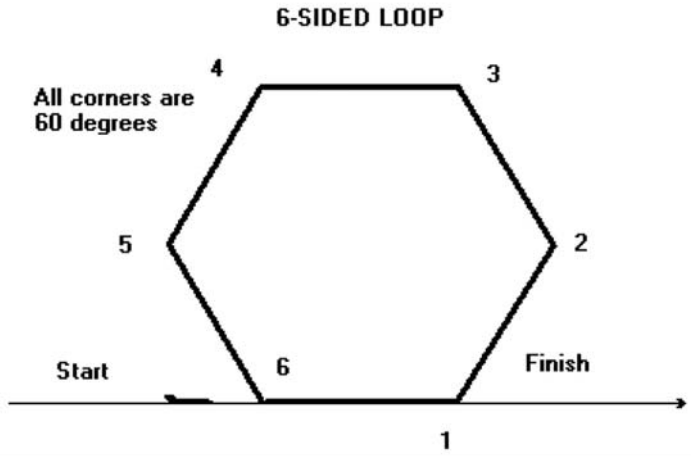
6-Sided Inside Loop
By Ed Moorman

DESCRIPTION OF THE: SIX SIDED INSIDE LOOP: The 6-sided INSIDE loop is an inside looping maneuver with 6 straight sides and six 60 degree angled corners.

KEYS TO DOING THE: SIX SIDED INSIDE LOOP: Your plane has to have more than the minimum power required to do a basic loop because of the two, near vertical, climbing sides.

AIRPLANE SET-UP FOR DOING THE: SIX SIDED INSIDE LOOP: Your normal set-up should work if you have enough elevator and power to do a fairly good sized inside loop from level flight. A .46 powered trainer should be able to easily do a 6-sided inside loop.

DIAGRAM OF THE 6-SIDED INSIDE LOOP



DOING THE SIX SIDED INSIDE LOOP

Standard Set up: 1. Full power, 2. Parallel to the runway, and 3. One mistake high.

how to do a loop with six corners and six sides. It's always better to learn to go through the maneuver a few times before worrying about the angles. Later on, if you want, you can work on the angles.

As always, use the...

STANDARD SETUP

1. Use full power
2. Fly parallel to the runway
3. Fly one mistake high.

Begin the 6-Sided Inside Loop by flying into the wind.

CORNER 1: Starting from your standard setup, when you pass in front of yourself, pull up into a 60˚ climb. There's no need to use *full* up, and there's no need to *jerk* the elevator control stick. Half stick should be fine. Then pause and let the plane climb for about a second.

CORNER 2: Make another 60˚ pull. This should leave you in an inverted climb. Watch the line so your plane doesn't drift downward toward level. You may need to use a little 'down' to make the maneuver look really good, but for the first few tries, just let the plane fly for a second.

CORNER 3: After the same distance as your first leg, do another 60˚degree pull into inverted flight. Your plane will be slow here, so you may need a little 'down' to keep from descending.

CORNER 4: Make your fourth 60˚degree pull to an inverted dive. This leg takes only a short time and your speed will be building, so you may want to reduce power.

CORNER 5: Halfway down, make another 60˚degree pull. You are now in an upright 60˚degree dive with the speed increasing.

CORNER 6: At level-off altitude, pull to level flight. If you reduced power, add it back now.

Here's another thing to check. Once you can go through the loop, start checking your wing attitude on every leg. You pause for the leg, so if the wing isn't level, make a correction. If you're making the wing corrections in the wrong direction, remember what I told you some time ago about correcting while in regular loops. Make your corrections in the *bottom* half of the loop. This

DIRECTION: The 6-Sided Inside Loop should be started flying into wind.

CORNER 1: Starting from your standard set-up, when you pass in front of yourself, pull up into a 60-degree climb. There is no need to use full up. There is no need to jerk the stick. Half stick should be fine. Pause and let the plane climb for about a second.

CORNER 2: Make another 60 degree pull. This should leave you in an inverted climb. Watch the line so your plane doesn't drift downward toward level. You may need to use a little down to make the maneuver look really good, but for the first few tries, just let the plane fly for a second.

CORNER 3: After the same distance as your first leg, do another 60-degree pull to inverted flight. Your plane will be slow so you may need a little down to keep from descending.

CORNER 4: Make your fourth 60-degree pull to an inverted dive. This leg takes only a short time and your speed will be building. You may want to reduce power.

CORNER 5: Halfway down, make a 60-degree pull. You are now in an upright 60-degree dive with the speed getting pretty fast.

CORNER 6: At level-off altitude, pull to level flight. If you reduced power, add it back in.

Once you can do the loop, start checking your wings on every leg. If the wings look like they aren't level, make a little correction. Make your corrections in the BOTTOM half of the loop.

Ed Moorman E-mail: moorman1@cox.net

Photo 1: Ernie Misner, of Washington, sent this photo of his Edge profile, 3D plane. The power is a Saito .82. Profiles are excellent 3D planes.

is where corrections are easy to get right. For the 6-Sided Inside Loop, this is in the first leg after the first corner, and on the last leg during the 60˚degree upright dive.

That's the details, now here's what you do. Fly by in front of yourself and make six quick pulls to get through the loop. Count 1-thousand, 2-thousand, 3-thousand, 4-thousand, 5-thousand, 6-thousand. On each number, you pull and release. Saying the word "thousand" is your "timer for the length of the leg. Try it.

Photo 2: Steve Stanford from, the Northwest Florida Modelers in Pensacola, sent this picture of his Phoenix Models Yak-54. It is powered by an OS .55AX.

Photo 3 shows Ed with the OS .46LA powered Double Sonic twin.

By the way, most trainers can do this maneuver unless your adrenalin gets too high and you yank the wing off!

Once you can get the feel for going through the maneu-ver, you can lengthen the legs and make some wing leveling for a better result.

FEATURE OF THE MONTH

The "Sonic 25 Half-Tail"

Flaps was working on his latest project, drawing plans for an electric ducted fan plane. I don't know what's come over him, but recently, he's bought two electric planes and is scratch-building a third! It's downright revolting!

I, on the other hand, was without a project and was looking for something new. I was in my garage shop when I spotted a couple of Sonic 25 fuselages. A few years ago, when Flaps and I were into twins, we built two twin fuselage planes, a twin Sky Raider Mach II (O.S. .46AX) and a twin Sonic (O.S. .46LA). To do this, you buy two kits and use both fuselages and tails, but only one wing, which gets extended in the center. **Photo 3** shows me with the O.S. .46LA powered Double Sonic twin.

I still had the Double Sonic hanging on the way, sans radio. I never cared much for it because it was so heavy. At 8.5 lbs., it weighed the same as the Twin Raider, but had less wing area since the Sonic is a .25 size plane. The two O.S. .46LA's weren't enough power for that weight.

If Flaps still had the left-over wing, I could assemble a regular Sonic. I guess you've figured out by now that Flaps and I like new planes. We get tired of our present fliers pretty quickly. The hobby shops love us!

So I checked in with Flaps about the wing, but he'd given it to Ugo, whose son-in-law, Richard, was going to use it to repair *his* banged up Sonic. I called Ugo anyway and he still had it, since Richard bought a Stick and no longer

Photo 4: The Sonic's stab and elevator. One side is a few inches shorter.

wanted to bother with repairing the Sonic. I immediately drove over and picked it up, finding that it had no ailerons! Ugo looked around and found some old ailerons from another model, so I tossed them in the van and drove home.

I was installing servos in the fuselage when I noticed that we'd shortened one side of the stab and elevator by 2" to join them for the twin (see **Photo 4**). Well now, this left me with a dilemma! I didn't want to do the work necessary to extend the stab back to its normal size, nor did I want to shorten the other side. So thought, "I wonder what that much difference in stab size would do to the plane? Heck, let's give it a try and call it "Experiment 187"! The guys all know that Flaps and I come out with some really weird stuff, so this won't even phase them. And if it doesn't fly well, we'll know that you definitely have to have both sides of the stab the same. *(Editor's Note: Well, aside from the uneven aerodynamic drag, what's going to happen when you use the elevator? Go buy a new kit!)*

The engine... now that's another story. The Sonic is a .25 size plane. I have a couple of O.S. .25FX's available, and a couple Magnum .28's. But I have an .46LA already in the fuselage, and it's already hooked up to the tank and throttle pushrod. Oh lazy me! What do *you* think I did?

The O.S. .46LA is a mild-mannered, plain bearing engine, with an air-bleed carb. It's made to be a semi-expendable trainer engine, but it has a little more oomph that the smaller .40LA. Yes, it still has the plastic backplate, but it has a needle valve assembly with a sheet metal bracket like the .46AX. This is better than the plastic, break-away type on the .40LA.

The LA engines are not known for lasting as long as the more expensive, ball bearing O.S.'s, nor do they have the power of their more expensive counterparts. They are, however, light, easy to start, reliable, and fairly narrow to fit on a small engine mount.

Now, I mentioned that the .46LA was light, but I didn't know how light, so I went to the Tower Hobbies web site to check. I noted the weight on the .46LA, the .25FX, and the new .25AX and .35AX. Here's what I found.

O.S. .25FX, 10.8 oz. (No longer available)
O.S. .46LA, 12.4 oz., $80
O.S. .25AX, 12.6 oz., $140
O,S, .35AX, 12.8 oz., $140
O.S. .46AX, 17.2 oz., $130

Note that the .46LA is slightly *lighter* than the .25AX and .35AX, and only 1.6 oz. heavier than the .25FX. And it's 4.8 oz. lighter than the O.S. .46AX. *(Editor's Note: Many years ago we called the O.S. .40FP (then their lightest and least expensive .40) the best buy in .25 size engines, because it was lighter, less expensive, and more powerful than their high-price .25.)*

After I installed and connected the servos, the fuselage was done. Remember, this fuselage had flown before. The wing didn't take much longer, either. I slapped some 30-min. epoxy on the dihedral brace and root ribs, and it was done. After the 'poxy cured, I installed the ailerons and their servo.

Since the Sonic uses just one aileron servo, the radio setup was a snap. I set dual rates and a little expo, and I was ready to fly. (See **Photo 5**)

Flying with one short stab

Saturday morning the O.S. took a little effort to start. It had sat idle for a few years, so the plain bushing was tight with congealed oil. Once I got it started and warmed up to loosen the crud, it has hand started easily every time.

I taxied out, lined up into the wind, and gave her the gas. With a little 'up' I was airborne. No surprises yet, but everyone was watching. I

Photo 5: The half-tail Sonic ready to test fly with OS .46LA, plain bearing engine.

trimmed it for straight and level, and then set up for some aerobatics..

The first maneuver was a simple loop to check out the unequal elevators. Low rate was no problem. High rate was no problem at first, until I tried one at *full* up. This time the plane snapped out at the top of the loop. I can live with that, though, since I have an awful lot of elevator throw on high rate.

Next I tried some rolls. The roll rate is s-l-o-w. But hey, it's never going to roll like a fun fly plane with big, wide ailerons. I'll seal the aileron gaps and maybe that'll help.

After the basics I went through a lot of different acro attempts:

Immelmans: Good, even if a little slow on the roll out. Using rudder with ailerons for the roll out helps.

Cuban-8: Good, but same slow roll.

Outside Loops: Good. The semi-symmetrical airfoil didn't seem to be making any difference.

Double Immelmans: Good. I like double Immelmanns, and there was no problem on the downward, outside half.

Square Loops: Good, both inside and out.

Vertical-8: Good, and the .46LA has enough power to pull through the upper loop. I don't consider the Sonic over powered, but it's probably better than .25 power, and about the same as a good, .32 ball bearing engine.

Blender: Fair, it wasn't great, but it wasn't too shabby.

Spins: Good, upright and inverted. I never could get the Sonic to go very flat, probably because of the tiny ailerons.

Snap Rolls: Good, both upright and inverted. This little sucker will *definitely* snap! Release the controls, though, and it recovers quickly.

Knife Edge: While flying knife edge it looked good to the guys, but I was holding a real handful of up-elevator. The airplane holds the knife edge angle well, so the dihedral angle must be very close to correct. You may remember that I've mentioned in previous columns that high wing planes with a low stabs, like Sticks, tend to pull toward the top of the plane with rudder. Low wing planes like the Sonic tend to do the opposite, and pull toward the gear. The Sonic would need some up-elevator mixed in with rudder for good knife edge.

Landings: Good. Ugo says it lands like a Kaos... touches down and stays down.

All in all it's a good flying little airplane. It's not super, but it's good. And no extra weight was needed for balance with the .46LA.

As for the chopped-off stab, I couldn't tell much difference. I didn't balance the plane laterally, and the few deviations in maneuvers didn't seem to be the same direction every time, so I think the short stab on one side is pretty much a non-factor.

Mixing for Elevator Correction in Knife Edge

Now that I've told you about my half-tail Sonic airplane, let's take a look at the mixing I used to eliminate the pull toward the gear when I use rudder in knife-edge flight. To do this we need a transmitter with mixing capability, but most radios with six channels or more have this. On JR radios like mine, they're simply called MIX1, MIX2, etc. I was looking at a friend's older Futaba 6-ch, and it has two of what they called "PMIX" (Programmable Mixer). This will work, but I noticed that his didn't let me set the mix differently for left and right rudder. If this is the case, program your mix for your favorite direction and fly knife edge that way only.

Take your plane up and fly knife edge, making the elevator correction, and try to remember how much elevator you used to correct the pull. If you aren't comfortable doing this, fly straight and level and put in rudder and do a flat turn, keeping the wings level. If the plane climbs like a Stick, or dives like the Sonic, correct with elevator to keep it level. Try to remember how far you moved the elevator stick. Then land, put your plane on a table and try to apply the same amount of elevator you used to keep the plane straight in knife edge, or level in the flat turn. Then look at the elevator itself and see how far it moves. Then...

1. Go to your radio's menu and find MIX.
2. Set rudder as the master channel. This is normally channel 4 (ch 3 on Multiplex).
3. Set elevator as the slave channel (1 for Airtronics, 2 for Futaba and Hitech, 3 for JR and Spektrum, 4 for Multiplex).
4. Find the "percentage" setting.
5. For a low wing plane like the Sonic:

a. Hold the rudder stick to the left.

b. Blip in up-elevator to match what you used in flight.

c. Switch the stick to right rudder. Does the elevator move down, or does it stay neutral? If it moves down (opposite of what you set in with the rudder left) then your radio cannot

Photo 6: The elevator trimmed for level flight.

be set for knife edge in both directions. If the elevator returns to neutral with right rudder, you're good.

d. Hold the rudder right and set in the same amount of up-elevator.

6. Then set a switch for turning the mix on and off. If you're not used to moving switches in flight, put a 1" length of fuel tubing over the switch so you can find it without even looking.

Photo 6 shows the Sonic elevator trimmed for level flight.

Turn the mix off, crank up your plane, and then fly around some to calm down. When you are ready, flip the switch, set up, and roll into knife edge (or use rudder for a flat turn). Check the plane before making any corrections. Does it still dive or climb, or does it stay straight in knife edge (or level in the flat turn)? I ended up with about 1/4" of up-elevator at full rudder. **Photo 7** shows the Sonic elevator with the mix on and left rudder applied.

Then land and make another adjustment to the mixing amount. You may need several flights to get it just right, but it will be worth the time and trouble when you get it right. When you do, you will love to roll into knife edge, apply some rudder to hold it there, and watch your plane fly parallel to the runway.

Guys flying Sticks will need to program in some *down* elevator instead of up. Unless you have anhedral in your plane, like my Ultra Sticks, you'll also need to use a second mix (rudder as master, aileron as slave) to correct for rolling with rudder. High wing planes roll in the

Photo 7: Elevator with mix on and left rudder

direction of the rudder, so you'll need to program right aileron when you give left rudder, and vice versa.

Give mixing for knife edge a try. You'll like it once it's right. *-Ed Moorman*

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Not everyone enjoys the fitness level that allows throwing out your back with a simple sneeze, but I'm one of the gifted. For the next week I was shuffling around like one of those zombies from *"Night of the Living Dead"*, except I have no appetite for human flesh. I get by very nicely on a diet based on the premise that pizza, cheeseburgers, and french fries are the basic building blocks of life. Nevertheless, I managed to Boris Karlof my way out to the work shop, where I was pleased to note that I was still able to walk fast enough to trip the motion detector lights that flank the doorway (never mind that I was swinging my arms like a sailor waving off a bad carrier approach). And once inside I sat down in the warmth of good intentions as I stared at my latest acquisition, an old Great Planes .60 size J-3 Cub. Some months ago while flying my Hangar 9 Electri-Cub, I happened to mention that I've had several different size Cubs, but never a .60 size. Well, about 7 p.m. that night I got a call from a guy with a .60 size Cub for sale. It has no radio, wheels, or struts, the engine is really old and has no carb, and the wing needs a few repairs. But other than some minor fuselage damage, it's almost complete, and he wants only $50 for it. Now who could turn down a combination like that? At least both sides of the stab are the same length.

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