July Issue 276

RC REPORT

Happy July 4th

RCGF 45

Old school?
Maybe Not!

R/C REPORT ONLINE

JULY 2009

FEATURES

FROM THE EDITOR

by Gordon & Mina Banks

UGLY PICTURES

It isn't hard to imagine the pain and anguish the owner must have felt as he viewed the results of this tragedy, which to him was surely more like a disaster (it's a tragedy when it occurs to someone else, a disaster when it occurs to us). Although I don't see any damage to the transmitter on the upper step of the ladder, the one on the lower step looks bad. But not as bad as that SUV!

What happened? I don't know, I wasn't there. And the info I got with the photos is sketchy at best. But I'm told that it was the result of leaving unattended a LiPo battery on charge, a charging session that went really, really bad. We may argue tragedy or disaster, but I think we all agree that it was bad.

I've heard stories of kitchen stoves (been there), TV's (been there, too), ceiling fans, clothes dryers, space heaters, battery chargers, and other electrical appliances going bad and sometimes causing a fire, but I've never heard a reputable story of a *nickle* chemistry battery exploding dangerously, or erupting into flames. Due to their overall good safety records we tend to accept most electrical appliances as safe to use, just as we commonly charge nickle chemistry batteries without hovering over them like an attentive babysitter. We simply trust them to operate safely. But despite a safety record that probably exceeds 99% when properly charged, lithium chemistry batteries have a less than stellar reputation when it comes to home-made fireballs.

This all began, I'll bet, when some uninformed modelers attempted to charge lithium chemistry batteries using chargers that were not designed for that type of cell. The batteries became so angry at being improperly handled, they lost their temper and became in-home melt-downs and/or fiery explosions that sometimes took models, workshops, garages, and even entire homes with

them to their early, charred graves. In most cases the fault lies with the modeler(s), not the charger or the cells themselves. In some instances, however, which continue even today, cells that were damaged and should have been discarded, were put on charge. This too can lead to disaster, especially if left unattended and thus given time for the flames to spread unnoticed.

The "rules" for charging rechargeable batteries are really pretty simple:

1. Use only chargers designed for the type and size of battery being charged.

2. Make sure the charger's adjustments, if any, are properly set for the type and size of the battery being charged.

3. Always have the charger and battery sitting on a fireproof surface.

4. Never leave a lithium battery being charged unattended. Stay there and keep an eye on the process until it's completed.

Finally, even though it's not widely considered a "rule", I like to use a temperature probe that shuts off the charger if the battery overheats.

Now, rules 1-3 are easy to observe, I think. These fall into the "set and forget" category, much like operating one's refrigerator. Once we have a proper charger and we've learned how to set it up for the battery we intend to charge, we can just place it and the battery on a concrete block and we're done. But that "stay there and keep an eye on it" rule is often hard to do. And it only gets harder after we charge LiPo batteries hundreds of times without incident. After all, just how long does it take before we begin to trust our setups *not* to need constant adult supervision? This sounds a lot like entrusting teenage offspring with the family car, doesn't it? And just as grandchildren are our reward for not killing and eating our own kids, so is long lives for our batteries and airplanes our reward for following the rules when it come to proper battery charging.

If you're a parent, you probably know how to safely store kitchen knives. If you're a gun owner, you probably know how to safely store weapons. If you're a dog owner, you probably know how to provide a safe environment for your dog. If you own a boat, car, motorcycle, or airplane, you should know how to safely store motorized vehicles. And in most cases we're talking about storing them in a manner that protects the items, as well as protecting others (people, pets, etc.) from these items. In short, a responsible owner should know how to safely store his or her "stuff".

Quickly now, how do banks, credit unions, and many businesses safely store their money while "unattended"? Right, they keep it in a "safe", which is simply short for a "safe place". We do the same

thing with our "stuff", we put them in what we consider a "safe place".

So why not do the same when charging batteries "unattended"? It *can* be done. One easy example is to place the charger and battery outside on a concrete driveway well away from people, pets, and any flammable materials. Then if the battery goes into "4th of July" mode, only the battery is lost, and the odds are high that the battery was bad anyway. I mean, if we're using a proper charger, what else would cause the battery to act like a Roman candle?

But okay, we can't always put the charger and battery outside on a concrete driveway due to weather, kids, pets, or even the lack of having a concrete driveway. That may be why banks don't store their money outside on a concrete driveway. Instead, they keep it in a "safe place". So maybe all we need to do is develop our own "safe place" where we can charge LiPo batteries without hiring a babysitter.

In this case, a "safe place" means a fireproof place, and ideally one that's electrically insulated as well. A nice big concrete box is what we need, and we surely can find them in many different shapes and sizes at the online "Concrete Boxes R Us" store. The only trouble with that is, the shipping costs for a concrete box is kinda high. The frugal-minded among us will thus turn to "rolling our own". I did.

I made my charging safe from an old steel toolbox. I like steel boxes. They're tough, they can be repainted many times, and you can put stickers on them to reflect your current favorite brand names. But America doesn't like steel boxes any more. They rust, they get dented, and they cost more than a plastic equivalent. I'm sorry I brought it up.

Although steel tool boxes are no longer common in stores, we men have to face the fact that yard sales are not only for women. Believe it or not, guys, there's no law against men buying other people's junk from their front yards. It's not always easy to keep a straight face at such outings, and you must *never* laugh out loud saying something like, *"What idiot bought this?"* while eyeing one of those pink flamingo yard ornaments with big white eyes. And if you find yourself staring at a lacy black 60DD bra, just pretend you're having an allergy attack or something. This

is *not* the proper time to practice your stand-up comedy routine. Trust me (and without asking why, I beg of you!), you will *definitely* regret making any comments including the phrase "Guernsey in heat".

Actually, I *could* have erected a concrete box if I'd wanted to. Buy six of those 2" thick, 12" square concrete blocks found in the lawn & garden departments at Home Depot, Lowes, and fasten them together to form a box. If you have room for it, such a box would cost less than $20 to assemble and it would be great for safety. Of course, you'd need an 800 lb. gorilla (or a football star offspring) to move it, and it would take up a lot of space. I have neither, so I said no to concrete.

My battery charging safe is an old steel tool box. Steel, however, conducts electricity, and I think the reasons are obvious for not wanting an electrically conductive charging safe. And since the charger and battery only sit on the bottom of the box, I could have simply added a few bricks or even a 1" layer of sand. That would work, and I certainly like the low cost. But the bricks would make the safe heavy, and the sand would likely stick to the charger and battery, which is messy. Cheap is good, but heavy and/or messy is not what we want.

So I made another visit to the local home improvement center to see what else I could find. It doesn't take a really strong case to get me into a store that sells tools.

Frankly, I already had something in mind, and I knew right where it was. I'd seen it one day in the northwest corner of the vast men's playground so often called "Home Depot". So naturally I began my quest at the southeast corner. One must check every aisle regularly, you know, in case something new has been added since the last visit. I think they should send us an email notice every time they add something new. They don't agree.

With my shopping cart growing heavier by the minute, filling with absolute necessities (work with me here), and my wallet growing proportionately lighter, I finally made my way to the bathroom department. I once thought it terribly inappropriate that the many different toilets were sitting right out in the open like they are. But I later learned that they're for display purposes only. Who'd have thought that a simple misunderstanding could lead to a store-wide ban for 30 days?

And there they were, bathroom tiles in assorted sizes and colors. Oh, and prices. Now, you may disagree with me here, and that's fine, but I'm not sold on the necessity of lining the inside of an old steel toolbox "tastefully", which is the one and only reason (again, work with me here) I declined Mina's offer to come with me. No, I'm thinking more along the lines of low cost. I want fireproof tiles and I want 'em cheap, so I don't *care* if they're pink with green butterflies. Do the batteries really care?

Bathroom tiles usually come in boxes containing a lot more tiles than I'll need, but some stores, including this one, often have a special little area where they sell damaged or incomplete packages for about half-price. So there I went, and there it was, an open box with about half the normal quantity of some really ugly dark brown tiles. Now, I just can't help but wonder who bought the other half, but even moreso *why*! Is dark brown a color you really want on your bathroom floor or walls? Let's move on.

Anyway, for less than ten bucks I got enough fireproof tiles to line the floor *and* walls of my toolbox. One bonus here was that they already look burned, so one or two mishaps would likely go unnoticed by workshop visitors. I think the old saying, *"Every dark cloud has a silver lining"* should apply here somehow, but the colors don't work out.

It took me less than an hour to glue the tiles in place using a tube of Zap-A-Dap-A-Goo. Now if I have to leave a LiPo battery unattended while charging, I place the charger and battery into the box, route the charger's power cord through a slot cut for that purpose (and to help relieve the pressure of an explosion), and close the lid, locking it in place with the lid's built-in clamps.

Is my Charging Box 100% safe? Maybe, maybe not. But I

For those of you who say you can't find our flying site, it's right here.....

accept the fact that virtually nothing is 100% safe, and we live with all sorts of risk factors every day, doing our best to survive anyway. (Yes, I have a fire extinguisher in my workshop.) What's more, when I suggested the alternative of hiring the very attractive college girl down the street to babysit my batteries while charging, even Mina agreed that the box was good enough.

Your mileage may vary, so you'll have to satisfy your own requirements for safety while charging batteries or storing your excess money. But if you do choose the "outside on the concrete driveway" method for LiPo's or money, please let me know, and include your name, address, and the most common hours when no one will be at home.

Can't find a suitable steel box? Other yard sale possibilities include old fireproof document safes, roasting pans and pressure cookers with lids, small outdoor grills with tops, and even some small microwave ovens (working or not if the price is right). Just keep an open mind and use your imagination. The first buyer of those brown tiles sure didn't.

-Gordon & Mina Banks
glbanks@knology.net

THE BIG PICTURE

by Dick Pettit

Wow, it's already the middle of the new year, and I just celebrated (and survived) another birthday. Where *does* the time go? It seems like just last week that we were dusting off our models for the new flying season. I've already been to the Perry Swap Meet, the Toledo Show, Top Gun 2009, and several local flying events, and that's just the beginning! But there's still plenty of time left in *our* flying season to attend many more modeling events in this part of the world.

I regret not attending the 2009 Joe Nall event this year. It was scheduled so close behind Top Gun, I really needed some rest after spending five hot days down in Lakeland, FL. My charge cards needed a cool-off period as well. But I hope to be there again next year, because Top Gun 2010 is scheduled a few weeks earlier.

Photo 1: "Dawn Patrol" at Joe Nall 2009. I sure wish I'd been there to join in the action.

I've heard nothing but good reports about the great weather and fine airplanes that flew at Joe Nall this year. **Photo 1**, for example, shows three giant Pups ready to head out on a Dawn Patrol mission. One belongs tomy friend and chief test pilot, Rick Cawley. These are truly outstanding models.

Photo 2: The 80" span SIG Kadet Senior ARF makes a good first giant.

Build-it-yourself fans take note, I just got word that I'll soon receive another BIY kit to review. This one comes from a company in Canada who makes laser-cut kits for quite a few beautiful (and huge!) scale models. Although my project isn't scale, it promises to be just as interesting, with a 106" span, and weighing around 20 lbs. It will be red with white trim, and it was one of the first models designed expressly to test new versions of one of the first modern radio control systems. Anybody want to take a guess?

Now let's see what else we have this month. I've several photos from local pilots, and I took many pictures myself at some local events. I'll also try to explain the focus of this column, and add a few suggestions on how to graduate from smaller planes to giants. Okay, then let's get started.

WHERE AM I GOING?

Before we get to more photos, I want to explain the goals I have for this column. RC REPORT ONLINE also has columnists who focus their attention on scale modeling, to include building and detailing, as seen in "Two Old Scale Guys", by Dick Watz and Bill Hurt. Gary Webb covers scale competition and judging in his "Webb Scale" column. Although I'll often show and discuss some scale models, my primary focus will be on giant models of all kinds. My primary goal is to help modelers who wish to move up from the smaller models to what we refer to as "giants". This generally means monoplanes having wing spans of 80" or more, biplanes of 60" or more, or any model that's true 1/4 scale or larger. I may sneak in a model now and then that's a bit smaller, but that won't occur very often.

Where do we begin? Let's first consider those modelers who've been flying smaller planes for a while, and have gotten pretty good at it. They may have built a kit or two, and probably a few ARF's as well. So we're *not* talking about total newcomers to R/C here.

I'm often asked, *"Which model would you recommend to a first time giant builder?"* Frankly, there are so many fine models worth recommending, it would be difficult to list them all (especially with my memory). So, what I'm going to do is mention some that I have personally built and flown over the years, and then let the modeler make the final decision based on his personal desires and requirements. Some people want to jump right into something scale, while others may want to start out with something simpler.

First on my list is the very popular SIG Kadet Senior, a trainer design available as a 4-ch ARF and a 3-ch BIY kit. Both are light but large models, with the ARF having an 80" span (see **Photo 2**) while the BIY version has a 78" span (see **Photo 3**). The latter, however, is easily modified to have the 80" wing required to make it a "legal" giant. Since both are high-wing trainer designs, either can be used as a primary trainer, too.

Photo 3: There's also this BIY version of the Kadet Senior kit.

Photo 4: The aerobatic SIG Four Star 120 is also great on floats.

Photo 5: Here's a 1/4 scale Piper J-3 Cub from Hangar 9.

The 3-ch BIY kit (see **Photo 3**) not only assembles easily, its construction serves well as an introduction to model building. Ailerons can be added if desired, and I recommend doing so. Either model can be powered by engines as small as .40 2C or .50 4C, but my personal preference would be a .70 size 4C. Come to think of it, I believe Gordon flies one with a 25 size electric motor. *(Editor's Note: Mine actually uses an E-flite Power 32 motor, but it has far more than enough goose to it, so it certainly would fly well with a Power 25.)* Even with ailerons, the Kadet Senior needs only five standard size servos (three will do for the 3-ch version) and an appropriate battery, so the cost of this giant would not be high at all.

Next on my list is the Four Star 120, also from SIG (see **Photo 4**). This one too has an 80" span, but it's a low wing sport design for better aerobatics. It's a bit heavier than the Kadet Senior, and needs the power of a .120 4C or equivalent for good maneuvers, but it's a great sport model with which to enter "the land of giants". I built and flew a Four Star 120 a while back, and later added a set of SIG floats. This made it a very enjoyable model with which to enjoy hot afternoon at a nearby lake.

But as I mentioned earlier, some modelers will want their first giant to be a scale model. In this case they simply *must* consider one of the many fine J-3 Piper Cub offerings available today. Hangar 9 offers 1/4 scale versions (see **Photo 5**) in both an easily assembled ARF,

Photo 6: Hangar 9's Giant Piper Pawnee is a good plane with which to start out in Fun Scale

Photo 7: I'm awaiting this beauty right now, a Hangar 9 Taylorcraft ARF

Photo 8: The Great Planes Giant Big Stik ARF is another nice flying giant.

and a "Plug-N-Play" version where all you have to do is add your receiver! They both have a big 106" span, and both fly very well.

Horizon Hobby also offers the very nice ARF Piper Pawnee seen in **Photo 6**. It flies great and is easy to transport. And even though I have *not yet* built or flown the soon-to-be-released Hangar 9 ARF Taylorcraft (see **Photo 7**), it certainly sounds promising, with a big 80" wing. Either of these two models could be used for sport scale competition, or just for fun weekends at the local field.

Great Planes was recently offering a fabric covered 81" Cub. I don't see it on their current list, but you might still find one in a hobby shop or at a swap meet.

There are, of course, many other giant Cubs available, so if you find one that peaks your interest, ask around to see if any local modelers know more about the one you like.

Great Planes offers *numerous* introductory level models that would make a good first giant. Their Giant Big Stik, seen in **Photo 8**, has an 80.5" span and tricycle landing gear, making it an easy transition to large models. But if you want a sleeker and more sporty design, the Giant Super Sportster seen in **Photo 9** is a great choice. This one works well with a small gas engine or a suitable glow engine.

Photo 9: Great Planes Giant Super Sportster ARF, a beautiful low winger

Photo 10: The Great Planes RV-4 ARF is a small but true 1/4 scale giant.

Photo 11: Jacqui Lewis, of Raleigh, NC with her Gee Bee Model Y

The Great Planes 1/4 scale RV-4 seen in **Photo 10** has only a 70" span, but it still qualifies as a giant since it's true 1/4 scale. Its low wing design and great flying characteristics make it an ideal candidate for sport flying or as an intro to fun scale competition.

Then there's the...

Oh my. Where do I stop? Even if the list included only the models I've owned and enjoyed, it would still be too long for one column! There are just so many good choices! So how about this... if you come across a giant model that attracts you, shoot off an email and I'll tell you what I know about it, okay?

Anyway, those I've mentioned are just a few of the models I think would be perfect candidates for newcomers to giant models. Each can be powered by relatively inexpensive engines, none require truly high-dollar servos, and they're all big enough to qualify as giants and too see well in the air. And keep in mind that not only do giants *look* better in the sky, they fly better as well!

Remember too that some of the ARF kits are also available as BIY kits, so ask around if you prefer to build your own. I encourage modelers to build a BIY kit of some kind in the near future. We must preserve the art and skills of model building.

YES IT'S A LADY

Jacqui Lewis, of Raleigh, NC, a member of RDRC and wife of local pilot, Larry Lewis, is seen in **Photo 11** with her Pacific Aeromodels 82" span Gee Bee Model Y. Powered by an SPE-43 gas engine swinging a Vess 21B prop, this beautiful model is guided by a Spektrum DX-7 radio. Jacqui

has been flying for about a year and a half now, and flew this year at the big, Joe Nall Fly In, something she's wanted to do for a long time.

RADIOS FOR 2010

I often receive letters asking about the status and reliability of today's radio systems. I hope by now that you have read the article in the final print issue of *"R/C REPORT"* (March 2009), by Cal Orr, the former radio columnist for *"RC Modeler"* magazine. If not, try to find and read this very enlightening article, wherein Cal carried out several exhaustive tests on numerous 2.4 GHz radio systems. That article made quite an impression on me, even though I had already converted to 2.4 GHz gear.

I realize that many of you are still using your tried and true 72 MHz radios, and with good reason. It can be very expensive to replace a large collection of transmitters and receivers. Plus, with so many modelers jumping onto the 2.4 GHz band, the old 72 MHz frequencies are becoming less and less crowded, making those older frequencies even more attractive than before! And make no mistakes about it, there are no plans to do away with the 72 MHz frequencies any time in the near future.

Despite the highly touted promise of "interference free" flying with the new 2.4 GHz radios, such is not always the case. Although very rare, and certainly less frequent than the common and well known problems inherent with the limited number of 72 MHz frequencies, there have been some documented cases of possibly overloading the 2.4 GHz band, when an unusually large number of pilots have their transmitters turned on. This includes those who are flying, others who are testing some aspect of their models, and others who have their transmitters turned on for any number of reasons.

One such incident is said to have occurred at the 2009 Joe Nall event, when several 2.4 GHz transmitters "locked out", resulting in an ugly outcome. How could this happen? Since there were no frequency pins issued to pilots using 2.4 GHz radios, there was no limit enforced on how many 2.4 GHz radios could be operated at the same time. The flight line may have been full, with another dozen or so waiting to fly, another 20 or more down at the 3D area, still more at the lake flying float planes, and who knows how many more flying helicopters. At such a large and highly attended event, it's really not hard to imagine 80 or more 2.4 GHz transmitters being turned on at the same time! And I don't care how bulletproof these radios are, a hundred 2.4 GHz transmitters simply cannot operate safely on the 80 available 2.4 GHz frequencies! Something has to give, and gravity is going to win! *(Editor's Note: Keep in mind, guys, that when you hear about events at which over 100 models were in the air at the same time, not all of them have to be using 2.4 GHz radios. There are still 50 useable frequencies on the 72 MHz band, plus those on HAM and the 27 MHz frequencies.)*

What can we do? Personally, I think the really large events should employ a limited number of 2.4 GHz "pilot pins", in addition to the normal "frequency pins" for the 27, 50, and 72 MHz bands. All transmitters should be impounded, and only those pilots with a pin are allowed to have and operate their transmitters. There would be only one "frequency pin" for each of the 27, 50, and 72 MHz band frequencies, of course, and a limited number of pins for the 2.4 GHz band. How many, you ask? That would be something for the radio experts to decide, but 20 to 25 seems reasonable to me, to allow for unforseen circumstances (kids playing with 2.4 GHz R/C toys, for example).

By the way, I've heard that 2.4 GHz radios will be *required* at the Top Gun and Joe Nall events in 2010, with no exceptions. I think I understand why they came to this decision, but I still have mixed feelings about it.

Photo 13: Kelly Sanderson, of Beulaville, NC, and his Top Flite Corsair

Local flying sites hosting smaller events need to keep the facts in mind, but will likely need less stringent rules since many already require pilot pins for all transmitters, regardless of their frequency. As always, however, this should be left up to the club officers and contest directors.

So, now that I've opened this can of R/C worm, let us know what you think. Meanwhile, if you're planning to attend a major event in 2010, be sure to check on the radio requirements. If the Top Gun and Joe Nall coordinators have reached this decision, you can bet your last glow plug that others will follow. Personally, I'd start planning right now to upgrade at least some of our better models to the modern radio systems, at least those still using vacuum tubes!

A CROWD PLEASER

Photo 13 shows Kelly Sanderson, of Beulaville, NC, with his new Top Flite Corsair. Kelly built the plane from a kit, and used Warbird Colors paints over the fiberglass finish. The plane weighs 30 lbs. powered by a ZDZ-80 gas engine turning a 26x10 prop. Robart main gear and a modified tail wheel assembly support the plane on the ground. Kelly uses JR radio gear in all his models.

A SMALL GIANT EVENT

One of the local clubs in my area held an IMAA sanctioned event a while back, and for a noontime demonstration they held a different kind of "giant event" (see **Photo 14**). The models were small, but the number was large! Nineteen of the extremely popular (and practically identical!) Park Zone T-28 RTF electric models

Photo 14: These aren't large planes, but there's a large *number* of them, a fleet of super popular Park Zone T-28's ready to mass launch.

Photo 15: Note the right aileron after a minor mid-air collision.

all took off at the same time from the same runway! Once they were all airborne, it was every plane for itself, but amazingly, only one plane was damaged by a mid-air collision, and that one remained in the air until the very end (see **Photo 15**). There were a lot of close calls, but everyone had a great time and they plan to fly even more at one time in the near future.

HERE'S A *REAL* BIG ONE

Photo 16 shows Jeff Foley flying low and slow over the flying field in his Stearman at a local event. Jeff, from Roanoke Rapids, NC, a former scale columnist for *"R/C REPORT"* magazine, was even kind enough to take two raffle winners for a ride in his beautiful Stearman.

Well, we've come to the end of another column, and I'm running low on both photos and ideas for future issues. Please share some photos of your favorite giants, and let us know what you'd like to read about here in the coming months. Until then, see y'all at the field. *-Dick Pettit*

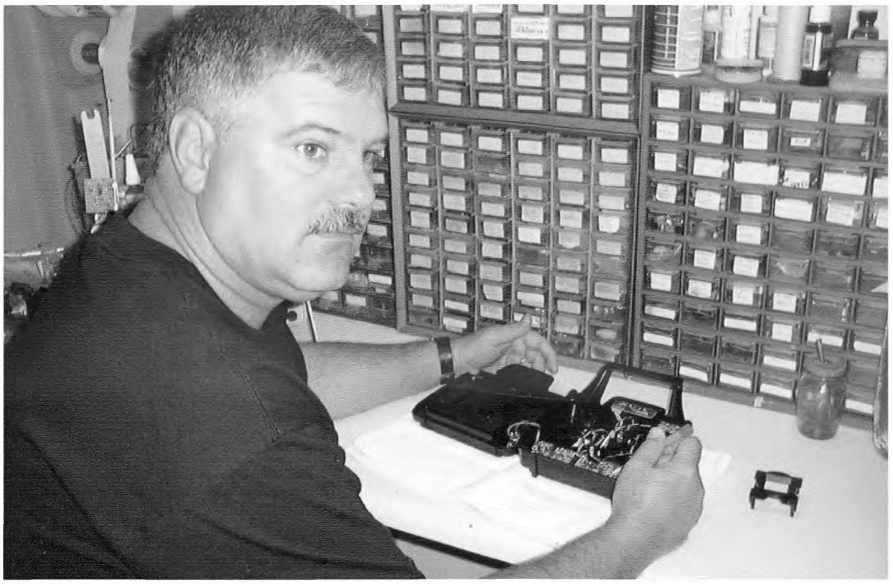
5704 Dedmon Ct.
Durham, NC 27713
pettit@ti.com

Photo 16: Here's former RCR columnist, and many times scale champion, Jeff Foley in his full scale Stearman.

RADIO RAMBLINGS

by Tony Stillman

It is definitely summer now! Temps are often reaching triple-digits here in the south, which can mean lots of great flying time, but be sure to drink plenty of fluids while you're outside. And don't forget the sun screen either!



PCM vs. PPM (again!)

I recently received the following email from a reader:

"I just read your column about PCM vs PPM in the May issue. I think you left out a very important point. The PPM signal, when it gets into the noise level, gets dithered by noise spikes. The servo then begins to get antsy. Some like this as they can tell when they are getting close to the end.

"PCM, on the other hand, is transmitted via a digital 'word'. In the transmitter, each pulse is sent to an a/d converter that converts its width to a digital word that's transmitted to the receiver. The receiver looks at the word and decides if it's authentic, and converts it back to a pulse width if it passes the tests. If the receiver decides the word has been corrupted, it sends the last good word to the servo. If the receiver has received several corrupted words, then it goes into fail safe. You could have some servos getting good words and others not for a period of time.

When the PCM receiver looks for a word in the noise, it can recognize the word at a level far below where dithering takes place in a PPM system. It can read (further) down in the noise.

"Back when interpulse coding was introduced to radars, it permitted a 3db increase in the sensitivity of the receiver. A 3bd increase in the receiver sensitivity is the same as doubling the transmitter power.

"Several years ago I had a severe problem with ignition noise from a ZDZ80. I could not get control even 10' from (the model) with the engine running. I replaced the PPM receiver with a PCM receiver. Then I could get twice as far from the model with the engine running. I then flew the plane several times. There are those who say the sensitivity of the two receivers are the same, since they both use the same FM transmission. That is simply not true."

Richard H. Kelly

Thanks, Richard. You are correct, of course, and you've offered a good explanation of what's going on.

The bottom line here is that PCM receivers will work well in noisier situations than FM (PPM). The PCM decoder adds a level of noise blocking that makes this happen. This is why I prefer PCM receivers in my models when I'm not using 2.4 GHz system.

MORE ON BATTERIES

It seem that we can never escape battery discussions here in Radio Ramblings. I've heard a lot of complaints about batteries lately, so I thought I'd share with you what I've heard, seen, and learned over just the past few months.

Here at the Radio South service center I've been using

Sanyo cells exclusively for nearly 20 years, and they have always worked very well. Sure, you find an occasional problem cell, but they've been few and far between.

This has not been the case over the last three or four months, however. I don't know what's happened, but Sanyo seems to have changed something in the way they manufacture their NiCd and NiMH cells.

The first indication came from customers who complained about poor discharge and cycle times with brand new cells. Most of the time I find that they are not charged sufficiently, or that the customer is trying to fast-charge them before "seasoning" the cells. With new NiCd and NiMH cells, it's important to "season" or "break-in" the cells so they can obtain their full capacity potential. To do this, simply charge the battery at C/10 (1/10 the rated capacity marked on the cells) for 24 hours. Then, discharge the battery using a cycler, or by just operating the unit until the battery runs down. Repeat this process four or five times and your battery should be seasoned and ready for normal use. But note and record the final discharge capacity for future reference.

Here's where the problems started. I received some batteries that customers complained about. When I ran them through some break-in cycles, they still didn't show a sufficient capacity. I saw some 1100 mah NiCd and 2300 mah NiMH batteries that were cycling at less than 50% of their rated capacity! This is *not* good!

After discussing the issue with my battery supplier, I learned that they too were having trouble getting more than 90% of the rated capacity when cycled. I couldn't even get that much, so I asked lot of questions, and here's what I found out.

At some point (and fairly recently, it seems), Sanyo (and probably other battery manufacturers as well) made some changes in the design and make-up of their cells. These changes were supposed to *increase* the cells' capacity, but it had an unexpected effect. After these changes, the charge characteristics of the cells changed. Normally, NiCd and NiMH cells behave similarly in charge, except that NiCd's "peak" when fully charged, while NiMH's simply "flatten out". I'm referring to the voltage level when viewed on a graphic display. I'm sure most of you are familiar with "peak charging" NiCd cells, and this is what I'm referring to.

A NiCd cell increases in voltage steadily while being charged. When fully charged, the cell's energy "spills over", actually causing a slight drop in voltage. This creates the "peak" we can see on a voltage graph. This peak is used by most of today's NiCd chargers to determine when the cell(s) are fully charged.

NiMH cells are similar, but the voltage doesn't peak, it just quits rising and flattens out. When charging NiMH cells, it's important to select the proper charge program so that the charger will detect this change and cut off properly. *(Editor's Note: I can't speak of other smart-chargers, but the Hobbico Accu-Cycle Elite al-*

lows the user to select the sensitivity of peak detection. Using 8 mv for NiCd's, and 3 mv for NiMH's works nicely, as the charger the "sees" the flattening voltage as a sort of peak when charging NiMH's.)

So, what's going on? It seems that the changes in the cells actually made the NiMH cells "step" instead of flatten. The graph would look like a set of stair steps, increasing in voltage, flattening out for a short time, and then going up again. The step fools many chargers into thinking that the cell is fully charged, so it automatically switches over to the lower trickle charge rate.

I personally have not been able to verify this "stepping", but I'm told that this is what's happening. In order to ensure a full charge, we need to make sure our charger is overlooking these steps. I too use a Hobbico Accu-Cycle Elite, where we can go into the cycle charge setup and modify the cut-off settings so that it will not be so sensitive. This way, it will ignore the steps and only cut off when the pack is fully charged. I don't have any specific numbers to give you right now, but I cut mine back about 60%, and now it seems to be working fine. We can also modify the peak charge settings for NiCd's. And once I made the changes, my chargers ran longer and I got better capacity from all of my test cells.

I also learned something else. It's very important that you charge these cells at C/10

(or a little higher) for 40 hours or so! In fact, they need to get a little warm when charging! For some reason, these new cells want to be pushed much harder when seasoning. The problem with this is that it's becoming increasingly difficult to find fixed-rate, constant current chargers that don't cut off automatically! You used to be able to get the ACE Dual Metered Vari-Charger DMVC) that would do this job perfectly. It had dual outputs to handle batteries of 1-10 cells, and would charge up to 500ma. If you have something that you can set like this, use it to season your new batteries.

After following *this* procedure for a while, I was able to get my cells up to 90% of their rated capacity. I also found out that Sanyo now sets its discharge voltage at 0.9 volts per cell, so in order to achieve that "90%" figure (or better), you'll need to set your cycler to cut off at 0.9 volts per cell instead of 1.1 volts.

Now sit tight, because I'm not at all sure that this is the final word on this situation. I hope to learn more about this subject, and I will keep you

posted on whatever I learn. If you have any knowledge or input on this subject, please let me know by phone or email.

UPDATING OLD TRANSMITTERS

This has become a hot topic at Radio South lately! I've been kept very busy installing 2.4 GHz radio systems into old Kraft and Ace transmitter cases. Working with the folks at XPS, we have come up with a module version that works great in old, Kraft transmitters. I've installed them in 1971 single sticks, all the way up to the later Kraft systems. I even put one in an EK Logitrol case from the late 60's!

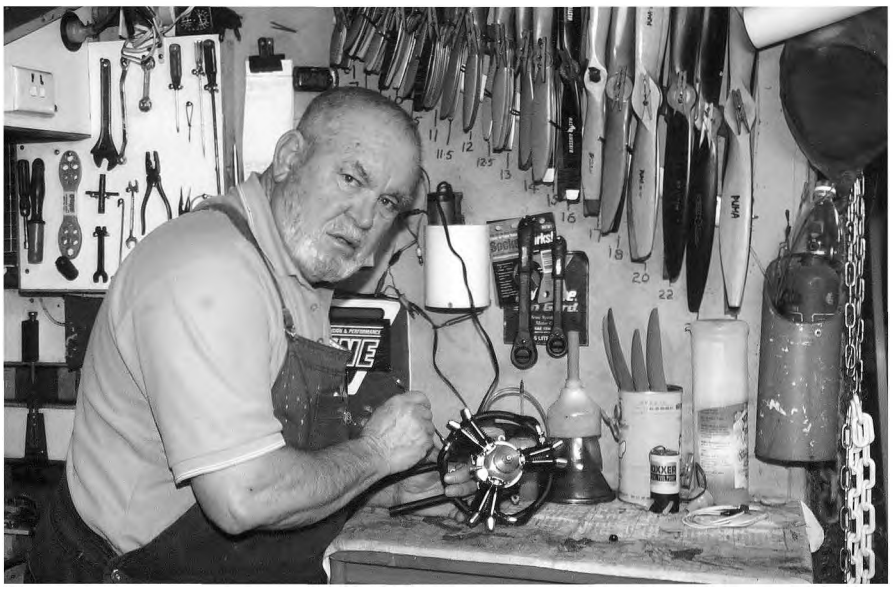
The nice thing about 2.4 GHz is that there is no FCC certification required to make the change, unlike the narrow banding that was done years ago. The FCC allows this retrofit without any certification, as the RF units are already certified, and the FCC allows that kind of change in this frequency band.

This has really opened up some options, especially to the single-stick fliers out there. Now you can find just about any single stick transmitter and convert it to 2.4 GHz. The cost is reasonable and it makes a very solid system. I've had several customers bring out old equipment to refurbish and fly, as a set with an old model and engine that they flew 25-30 years ago. It's really cool to see this stuff being used again, and brought out to the flying field so the new folks can see what an old Pro-Line or Orbit set actually looked like, and then see it fly! Awesome!

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

The Oily Hand

by Brian Winch



ANOTHER OPENING, ANOTHER SHOW

Well, thanks to Tony Coberly we have been resurrected from the pizza boxes in Gordon's office, to show up in full color with all the whistles and bells online. I note that old Grumpy Bum is still around, though (Hello sweetie, how's yer belly where the pig bit you?), and the rest of the flight crew are carrying out their duties very nicely too. So without further ado (just what is "ado", anyway?), let's get a bit more into the action. I'll be submitting my versions of engine reviews as you have already seen in the first online issues. I'm interested to hear if you like this, in-depth style of review or not.

WHAT'S UP, SPARKIE?

I like to carry out a few yard chores in the morning, feeding my fish their morning treats, and giving nuts, fruit, and bread to the birds (I have a bit of a zoo.) Dog biscuits are handed out to my three dogs, while Shirley tends to the five cats. Then I relax and have breakfast while reading the daily news (but mostly the comics). Sure as eggs, four mornings out of seven the phone will ring just as I get comfortably seated with eating tool in hand. This morning was one of the four (okay, sometimes five or six... but never more than seven!). Shirley answered it and delivered the message. *"Kanga (the name had been changed to protect the innocent) wants to speak with the master."* He's a good friend, a modeler, and a very knowledgeable person in his profession. He's been involved in modeling for quite a few years. Due to the time restraints of his business, he's had other modelers build and set up his models with many failures. It's a sad fact of life in many cases, that a person building for somebody else might not take the necessary care, which results in models that fly poorly and often crash quickly. So, Kanga has crashed many models... many, *many* models. In recent years he's been nearing the point of giving up and looking for another hobby. But his Oriental background and business drive made it hard for him to quit anything. He was never a loser, but common sense must prevail at some point, and he was looking at his past record without anticipating a rosy future. I first met Kanga when he came to me with an engine problem. Over a period of time we became close friends, and I started pushing him to take a more active role in his modeling, with less reliance on others to build and set up his models. It was a hard road, however, as he lacked confidence in his own building. Now keep in mind that he's a very intelligent guy. Anything less would not have rendered so much success in business. But this is common with many modelers who come into the hobby late in life. Many are intelligent, clever, and articulate, but the often lack a bit of confidence due to the fear of

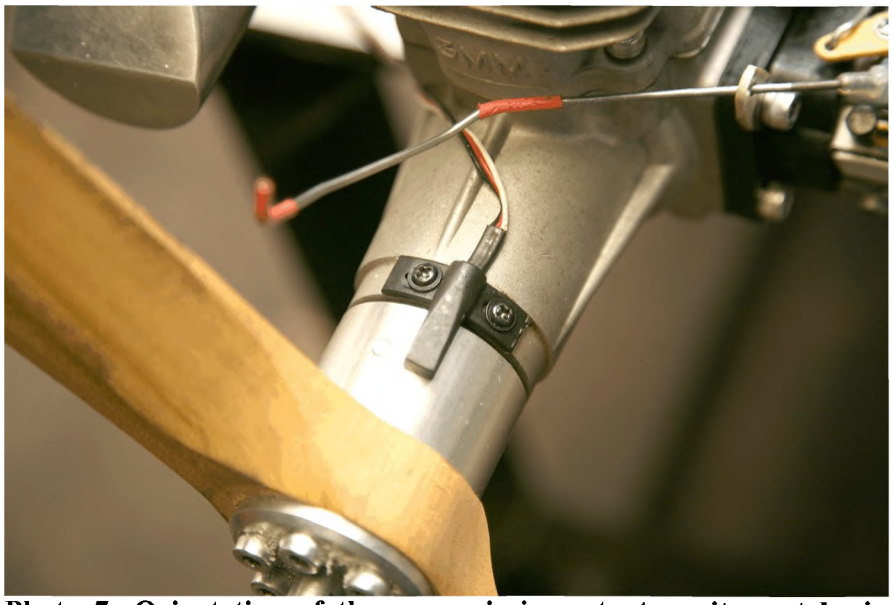


Photo 7: Orientation of the sensor is important, as it must be in accordance with the polarity of the magnet exciter in the propeller hub.

failure (spelled, crashing!). So what if the model crashes? It happens to all modelers some time or another. After all, models last only until they are crashed or sold (and *then* crashed). Anyway, slowly but surely, I got Kanga into doing more and more for himself, and he was enjoying the new adventure in every step. Eventually he completely set up an ARF scale model almost entirely on his own (with just a few phone calls), and it flew well! Needless to say, he was re-captured.

The next step was a bit of engine work. He rang to say that his petrol engine wouldn't start. After a few questions I determined the problem and he learned a new lesson... you cannot test a CDI unit (Capacitor Discharge Ignition) without a ground connection to the spark plug, or for that matter, having a plug connected. He had thus cooked the jellybeans in the CDI. I gave him instructions for buying a replacement unit, and when it arrived I told him that *he* would have to test and install it, but I would guide him over the phone. Well, he had a tizzie fit at that, coming up with loads of excuses. But I'm a tough old bugger, and never backed down. I wanted him to do the job, no matter how much he complained and blubbered. This way he'd gain a better understanding of the ignition, as well as having the satisfaction of having done the job himself

His first task was to orient the sensor. The sensor is pole sensitive as far as the magnetic exciter (a small magnet) in the propeller hub. The magnet will be either north or south pole upwards, and the sensor is polarized to react one side to the north pole and the other side to the south pole. It's a simple matter to set up the ignition unit, making sure that the plug lead is earthed (grounded). I usually add another earth (ground) wire, but more on that later. Then wave the sensor over the magnet.

Wait. A word of caution is due here. Don't let the sensor sit on the magnet without moving or it may be damaged inside. The sensor is inserted in the mounting bracket, and then a small wedge is pushed in. If you put the sensor in the bracket the wrong way around, it is almost a 'seek and destroy' job to get it out again. Generally, one side of the sensor tip is flat, and the other side is slightly wedge-shaped so you can visually check. Once you've established the correct orientation, insert the sensor into the bracket *before* you do the final job of jamming it in with the wedge (see **Photo 7**).

Well, after the mandatory moaning and grumbling, he carried out the test, and to his great joy (and satisfaction) he saw a spark at the spark plug. This was his first success with electronic gizmos.

Then a pall fell over the conversation. *"I've read the instructions and I see that I have to time the engine at 30°. What does that mean? How do I do that? If it's wrong, will the sky fall on me?"* I explained that this job had already been done for him, since his engine had always been a spark ignition type, and nothing changes from engine to engine once the magnet is set correctly in the drive hub. Even so, I gave him a brief run down on how engine timing is checked and set up for the needed value.

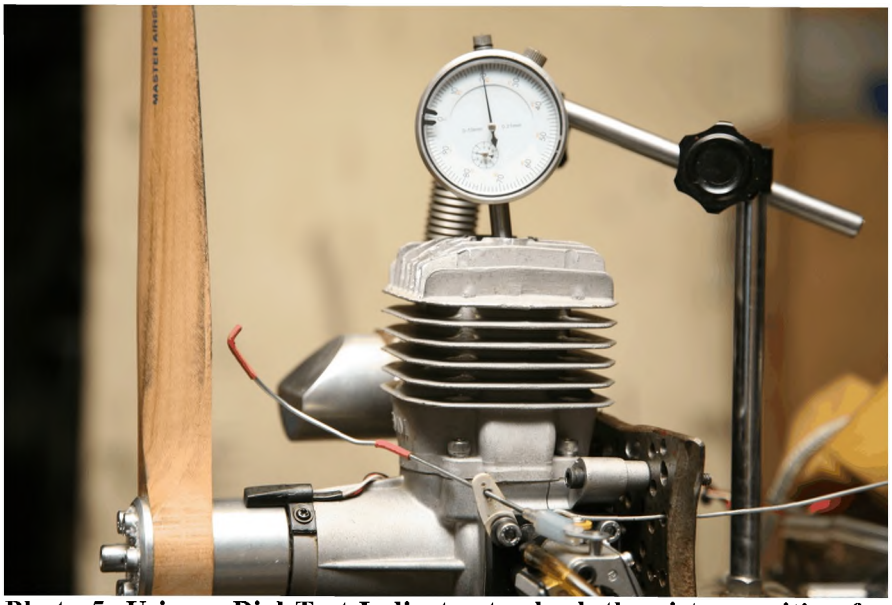


Photo 5: Using a Dial Test Indicator to check the piston position for timing purposes.

"Bloody hell," he swore, *"I could never do that!"*

"All in time," I said (see **Photos 5 & 6**).

I left him at that point, but asked him to report back when he'd flown his model. In the meantime, I encountered a problem that had me scratching my hardwood head and kicking a stray kangaroo that got in my way. *(Editor's Note: Stinkin' rotten beast! (Brian, not the poor 'roo'.))*

SPARK BUT NO RUN

I had two engines on my bench from two different modelers, but both had the same problem, hard to start and very unreliable with consistent short run times. One was a big 85cc brute of a thing, while the other was a milder 58cc, and both were the same brand as an engine I'd tested not so long ago. I spent the best part of a day fabricating a safe mounting system for the 85cc brute. An engine that size, swinging a 27" log, is a deadly machine quite capable of removing a hand and a head, and maybe even a hardwood head! Mounting it safely requires considerable thought. One safety factor is vibration. A single cylinder engine unavoidably vibrates when running, and the amount of vibration is usually proportionate to the engine's displacement. As such, an 85cc engine shakes like a bowl full of Jell-O in the hands of a tipsy waiter.

After setting up a suitable mounting arrangement, I then spent way too many hours flicking, checking, cursing, flicking, and more flicking. And all I got was one stiff shoulder and one very short engine run.

First I completely disassembled the Tillotson carburetor (no big problem), and then tested the spark, trying several different plugs and a range of plug gaps. All wiring was checked, as was the battery for the CDI. I found no problem, but there was still no joy with the engine. Frustrated, I decided to set it aside for the time being. My right arm was almost useless by then anyway. Although I do have an electric starter suitable for that size engine, I did *not* have a spinner to fit the engine, and you need a spinner for this starter.

Photo 1: How it was in the beginning. This good old Brown Junior is still going strong, and starts every time with no more than three flicks.

The next day I set up the 58cc engine, which was much easier since it fit well on my test bench. I stripped the carburetor down and found a reasonable amount of junk in the filter, so I hoped that was its only problem. While I had the carb in pieces, I fitted a new carb kit because the later versions of Walbro carbs are much better than the old ones, particularly the flap valve plates.

We now interrupt our regularly scheduled program for a word about filters. I've read in a model magazine where it was advised to remove the filter mesh from the carb, and use a fuel filter in the fuel line. No, not me! For sure I'll add a fuel line filter. This is always a good practice. But don't remove the carb's internal filter. If it's not in place when a foreign body (hair, lint, etc.) somehow passes through the line filter (and it does happen), that crud goes directly into the fuel passages and jet orifices (which are quite small). You may have a real job on your hands trying to get it out, too. Please, add the fuel line filter by all means, but leave the internal filter in place.

Now, just as with the 85cc engine, this one would fire and burble a bit, but would not run more than a second or two. All checks proved fruitless, so in desperation I peeked inside the engine, although I'll admit right now that I had no idea what the bloody hell I was looking for! Eery test I could run yielded satisfactory results, except for one thing... the engine still wouldn't run.

Then, like a bolt from the blue, a spark hit me. In days gone by, you could trot down to your friendly service station to clean and test the old used spark plugs from your car or bike. One at a time, the plugs were screwed into the machine, grit-blasted clean, air blown to remove any remaining grit, and then you turned the high power on to see the plug sparking in a small mirror. And if you *really* knew what you were doing, you'd raise the air pressure up to simulate the cylinder pressure of the engine, around 130 psi. If the plug was faulty it would either cease sparking or the spark would be dancing all over the place. In simple terms, the increased pressure at the firing end causes a form of electrical resistance that may prevent proper operation if the plug is bad or worn out. Could this be the problem with the two recalcitrant engines on my bench? No. I knew this wasn't the case as I had already tested the spark plug in my own engine.

What about the CDI unit? Could it be too weak to overcome the higher spark resistance when the cylinder pressure built up? The symptoms make sense. The engine would sometimes run for a few seconds, just enough time for good working pressure to develop, and then the sparking stopped.

So I hooked up another CDI unit, and... on the very first flick it started and ran like a clock! *(Editor's Note: And one revolution per hour is good?)* After six more first-flick starts, I let it run flat out for 15 minutes, and all went perfectly. Yep, the CDI had a pain in its jelly beans (electronics). I then fitted both engines with new CDI units, and had two very happy customers, plus one pleased Oily Hand and one stiff shoulder.

Photo 2: How many 'Sticks' have *you* seen powered by an O.S. FT-160 Gemini Twin?

This was a difficult problem to isolate. I currently have no way of testing a spark plug under pressure, but I'm going to build a test unit for future work... and my own satisfaction.

I know the second engine had been involved in several disasters (i.e., sudden, unplanned arrivals), so that could have upset a jelly bean or two inside the CDI, or maybe an internal connection. The 85cc engine, however, had *not* been crashed (at least not to my knowledge), but it vibrated so much, maybe it shook the daylights out of the CDI.

Anyway, it was a good learning experience, and something we can note on the wall for the future in case you have a spark engine problem.

BACK TO KANGA:

This week Kanga called again. Shirley answered the phone, and he again requested an audience with the master. *"Bless you, Grasshopper"*, I said. *"How can I help you?"* His gas engine was giving him trouble again. It would start and idle well, but it cut out as soon as he advanced the throttle past half. With his previously gained knowledge, he had checked the entire ignition system and all seemed well in that department. My suggestion was that the filter in the carb might be partially blocked. *"Oh no,"* he moaned. *"You're not going to make me pull the carburetor apart are you?"*

I love this part. *"I sure am, so scoop up a good-fitting screwdriver."* I ignored the renewed moaning and sobbing, and then told him how to remove the two cover plates off the Walbro carb so he could gain a bit of insight as to what was inside. I also assured him that nothing was going to fly out and bite him. After a time he found the filter and carefully slid it out with a pin. It did have a bit of rubbish in it, but from his description I was not convinced that it was enough to cause a disruption to the fuel supply. But then I remembered that he had been overseas for a while on a business trip. *"How long has it been since the engine was last run?"* He said it was last run during the latter days of summer, during a very warm spell. It was now winter and raining. *"When you reassemble the carb, turn the main jet needle out 1/4 turn. The carb is set too lean."* I soon heard the engine singing a fine song (well, up to high 'C', anyway). End of problem.

Well, maybe not. The very next morning he called me from the flying field (he likes to fly before going to work) to say I was wrong!

Why me? What had I done to deserve this? *(Editor's Note: You want that list in alphabetical or chronological order?)* The engine was still running well, but it had no torque. *"The model took a long time to take off. Then it didn't fly well and would not climb. I couldn't even get it to level out for a good landing, so it nosed down on the final approach."*

"What changes did you make since yesterday?", I asked.

"Nothing," he protested. *"All I did was change props, but I fitted the same size, a 20x8."*

"What prop did you take off?", I asked

"A Bolly wood."

"What did you put on?"

"A Master Airscrew plastic

Photo 3: A giant scale Cessna powered by a very reliable 100cc gas twin

18x8", he replied.

"The plastic prop is a lot heavier then the wood prop, right?", I asked.

"Oh yeah, a lot heavier.", he answered.

"And you balanced that model at 25%?", asked I.

"Yes, right on 25% ever since the test flights."

"Kanga?", said I.

"yes?", said he.

"Your model is now nose heavy with the heavier prop."

I don't think our prim and proper prissy editor will allow me to tell you what Kanga said as he hung up.

STOP THE PRESSES!

This will rot your socks! That (Australian expletive deleted) 85cc engine problem popped up again! The owner called to say he'd received it, but after flicking the prop for half a day (ring up one more stiff shoulder), he decided to try the old CDI again. I can't even begin to understand why he went back to the old unit, but he found that not only was the original CDI faulty (as I had found), but the engine was timed incorrectly.

Now, this is a brand new engine from a well known company, but the ignition set-up is done by the selling dealer. Why? I dunno.

The magnet in the hub was set 30° *after* top dead center instead of *before*, which is *considerably* retarded! I know, I should have picked up on that myself. But who'd expect such an error from a well known manufacturer? This just proves again that you cannot accept all things on face value. It's now a lesson learned and stored in my hard drive (the official "TOH Memory").

I'd seen a video of this engine in a model being flown, and I knew it was fitted with a prop just over the top of the suggested range, but I assumed that the automatic timing of the CDI was taking care of it. The main reason I didn't catch the problem was due to there being *two* magnets in the hub. One is for a fail safe system that cuts the ignition off if there's no engine action after a brief idle period. I should have checked which magnet was used to excite the ignition... but I didn't.

Photo 4: Here's an economy biplane. You save on horizontal stabilizers! Actually it's a scale model of a French Pou du Ceil (Flying Flea), a popular home-built tailless biplane design of the 1930's.

A BAD CALL

When Tony Coberly invited me to write for the online version of RC REPORT, he probably didn't know that my pea-brained former assistant uses the same email address as I, so now he's back! I caught him in my workshop going through my notes on checking compression ratios of engines where you use oil to measure the swept volume and the combustion chamber for the correct answer. I noted that thick oil was recommended in days past, as it had a higher viscosity than thin oil, and the old pedantic motor engineers had to do every job "by the book". I also noted that the thick oils generally used then are no longer available, but there are substitutes that can be used.

Well, ol' "bugs for brains" pondered this and came up with the idea of using honey, since it has a high viscosity like heavy oil. Well, as you can imagine, honey in the winter is not the easiest liquid to pour into a 1/4" glow plug hole. His bright idea was to heat the honey to lower its viscosity, pour it in while it was hot, and then let it cool before measuring. Sure it's a stupid idea, but that's what he was on about. Now it's a plain fact that honey, when heated, gives off a very strong aroma, and that aroma is a magic drawing card for... guess who... bees! But he heated the honey anyway, and the aroma wafted up and out the roof vent. Soon every bee within a five mile radius homed in on the smell and flew in through the flue. It was actually pretty interesting to see several thousand bees humming and buzzing as they filled the workshop. I just closed the door and threw the bolt before sitting back to ponder the Doppler effect of ol' bird brain being chased around the workshop by a cloud of angry bees. (I still wonder why they were angry.) From the far end of the shop I could hear "Brrrzzz Wow!". Then from closer to the door I'd hear "Brrrzzz Wow Slap." This went on for quite a while, but I eventually had to leave and re-open my underground workshop.

APRILWUN - DOT
ROT - DOT - CON

Just as before, anything discussed here is not to be attempted by any sane (or otherwise) person, as it's nothing more than a figment of my imagination, much like our editor. To even *attempt* carrying out any of these experimen-

tal projects could cause harm to your great - great grandparents, your children's children's children, the local postal delivery person, and your pet wombat. If you even have a *thought* of trying any of these ideas, discuss the matter with a medical professional before signing yourself into an institution for metal treatment. (or is that 'mental"? Whatever.)

This month's great idea is a real dollar saver, and an environmentally friendly idea to put an end to the chore of cleaning your model after flight. Before we move on, however, it's vitally important that you understand this: lubricating oil does not wear out, it just becomes polluted. When you consider how much oil is left on the model after a flight, you can easily see how much is wasted in discarded paper towels. Instead, why not use it again?

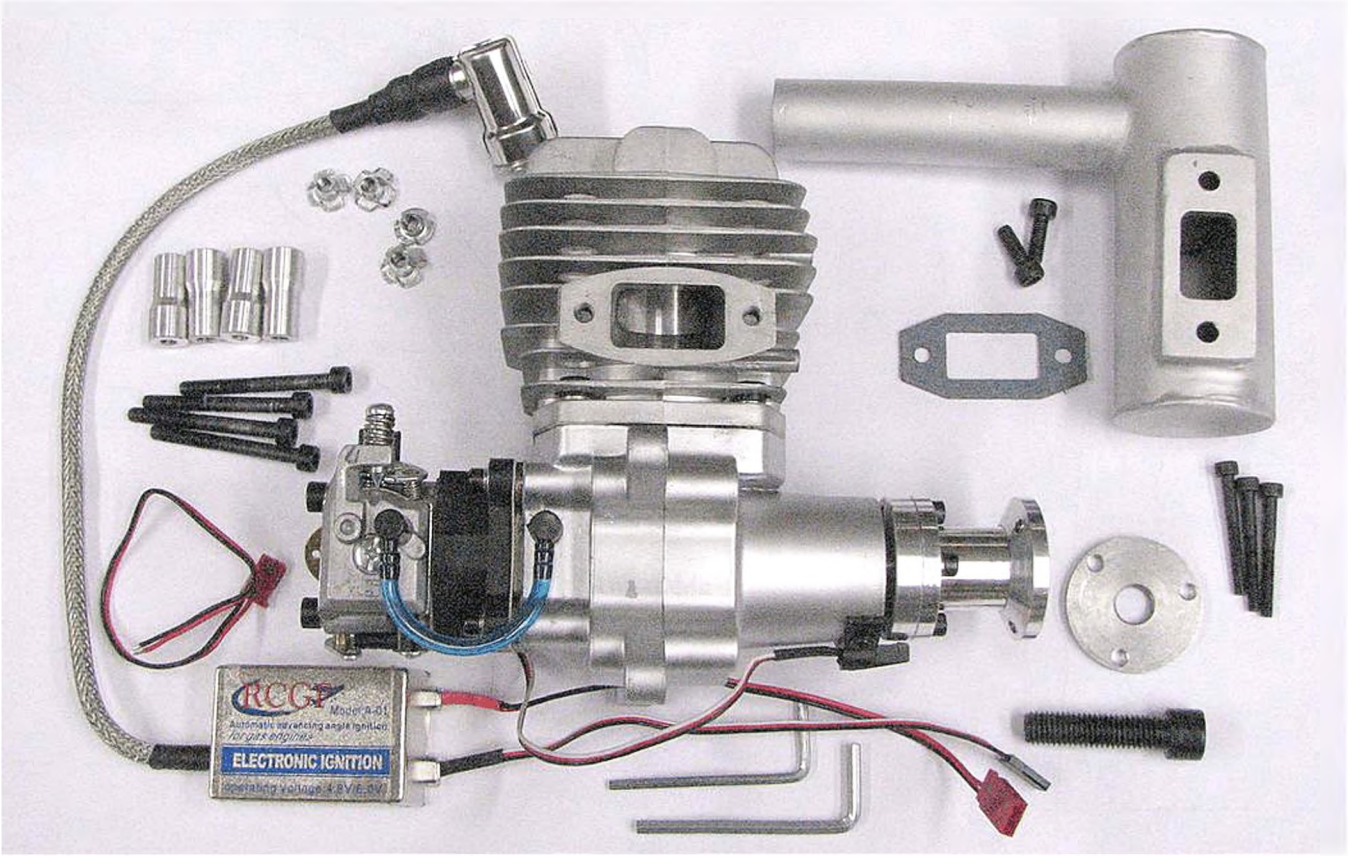
From your local cigar store buy a packet of cigarette filters like those used by smokers who roll their own cigarettes, or use them in cigarette holders. These filters are designed to stop the flow of deadly, oily substances that come from the burning of tobacco, and otherwise wind up in your body. Then fit a standard size nipple in the bottom rear section of the engine muffler. Next you'll need an extra fuel tank in your model. Now, to set up this recovery system, ram a filter into the exhaust outlet of the muffler, and connect the muffler nipple with fuel tubing to the extra fuel tank you installed in the model. According to your fuel mix preference, say 18% oil, you fill the spare tank with 82% of its capacity using your methanol/nitro mix. This tank has only one outlet, and that's to your main tank. In operation, the filter will stop the oil from flowing out the muffler, so it will drip to the bottom and be blown into the extra fuel tank. Due to engine vibration and model movement, the oil will mix with the fuel and you will eventually have a full tank of mixed fuel! After careful calculation, I found that the filter in the muffler will eventually load up with oil at close to the same time as the second tank is full. This is commensurate with the size of the engine and the muffler, and once its clogged with oil, the muffler pressure will blow the filter out and the oil will stop flowing into the tank. At this time you will see smoke from the muffler. This signals that you need a break from flying, so land the model, switch the oil line to the now empty tank, fill it with your oilless fuel, and the model is once again ready to fly, using the tank of recycled oil.

Just think... you may never have to buy oil for your fuel ever again. Yes, it's another brilliant insight from the never-ending supply of absolute spiffy ideas from Winch - The Well Oiled Wiz.

-Brian Winch
33 Hillview Parade
Lurnea, NSW
Australia 2170
oilyhand@bigpond.net.au

RC REPORT ONLINE

ENGINE TEST REPORT



Engine . . . . . RCGF 45
Manufacturer . . . . RCGF Model and Engine Mfg. Co., China
Importer/Distributor . . . . RC Aero Products
2045 Niagara Falls Blvd., #9
Niagara Falls, NY 14304
(905) 688-3947
support@zrcgf.com
www.zrcgf.com
List Price $269.99
Warranty . . . . . One year
Muffler Included . . . . . Yes
Glow Plug Included . . . . . Yes
Tools . . . . . Spark Plug Socket and two Allen wrenches
Accessories . . . . . RCEXL Ignition unit, center prop bolt and washer, three small prop bolts, and four standoffs with mounting hardware.
Bore x Stroke . . . . . 1.69x1.22" (43x31mm)
Actual Displacement . . . . . 45cc (2.74 c.i.)
Recommended RPM Range 1500-7600
Advertised Power . . . . . 4.3 BHP
Schnuerle Ported . . . . . Yes
ABC Design . . . . . No
Ball Bearings . . . . . Two on crankshaft, plus roller bearings on the connecting rod
Engine-only Weight . . . . . 53 oz.
Muffler Weight . . . . . 3.8 oz.
Ignition Unit Weight . . . . . 3.8 oz.
Total Weight . . . . . 60.6 oz. (ignition switch and battery not included)

Recommended Props	20x8, 20x10, 22x8
Overall Length	7.88"
Overall Height	6.5"
Overall Width at Mount	3.88"
Overall Width at Carb	2"
Firewall to Prop, minimum	5.5"
Crank Center to Outermost Point	2.25" (muffler not included)
Mounting Plate Width	3.63"
Mounting Hole Centers, Side to Side	3.38"
Mounting Hole Centers, Top to Bot	2.13"
Propshaft Diameter	10mm
Propshaft Length	40mm bolt
Muffler Length	4.38"
Muffler Width	1.88"
Side Projection	1.88"
Fuel Used	87 octane gasoline, mixed 50:1 with Amzoil Sabre
Sparkplug Used	As supplied

NOTE: All Test Props are APC composites unless otherwise noted.

Minimum Reliable Idle

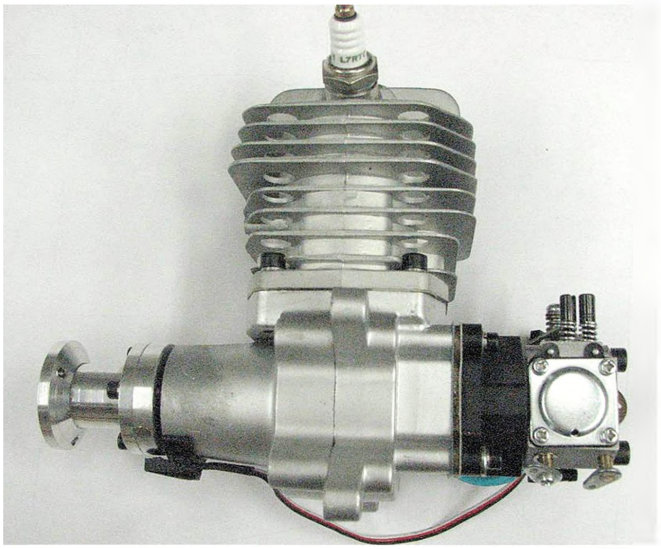
Propeller	**RPM**
18x10	1620
20x8	1560
20x10	1470
22x8	1260

Maximum Measured Noise: dB(A)

Propeller	**@10'**	**@25'**
18x10	104	95
20x8	101	93
20x10	103	94
22x8	101	92

Maximum Measured RPM

Propeller	**RPM**
18x10	8340
20x8	8010
20x10	7320
22x8	6900



COMPARED TO OTHER 45cc ENGINES

PROP	20x10 APC	22x8 APC
RCGF 45	7320	6900
Brand A	6330	6700
Brand B	not tested	6650
Brand C	7240	6700

CHEERS - Light weight; excellent power; easy to start; relatively quiet; distributor is very responsive to customer concerns.

JEERS - Several dimensions in the manual do not match the engine; choke plate hole prevents proper priming; throttle and choke arms are too short for accurate operation; awkward carburetor orientation (but see text for a fix); smooth, non-griping drive washer.

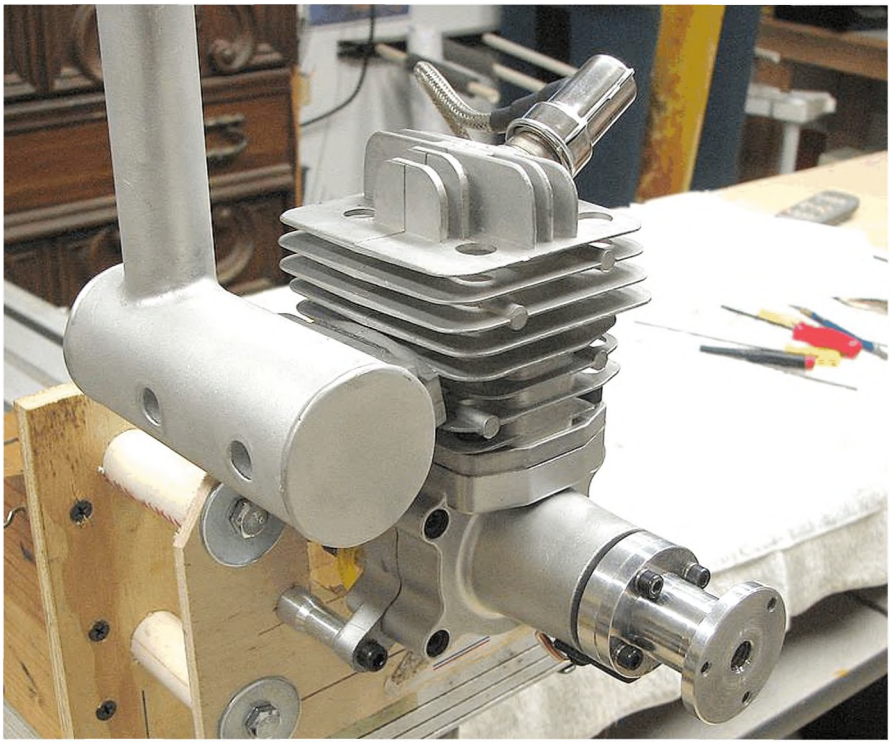
Seen in ad for the engine:

"ZRCGF is the USA/Canadian Distributor for the RCGF Model & Engine Mfg. Co. The company has established its model aircraft engine division and quickly positioned itself as a high-value manufacturer of gas engines specifically designed for giant model aircraft.

"Our manufacturing facility has its own research and development department, and this contributes to the extraordinary quality and price points in our product line. Our engines are continually tested across the world, by pilots in all disciplines, under all sorts of conditions and circumstances. This allows us to respond to

the needs of our modeling community quickly and efficiently.

"At ZRCGF our engine quality, power, warranty, service, and ease of use can be yours at a reasonable price. Giant scale flying has never been more economically available."



The first time I saw the advertising above, I decided right away to take a closer look at some of their products. I needed an engine for an upcoming project, and ZRCGF had several sizes available that might work in the new plane. I contacted the distributor, and received a very nice reply stating that they would be very interested in allowing us to review any of their engines, and especially if that engine would be used in a model review as well. At first I was interested in their 50cc twin, until I learned that the spark plug boots would protrude through the sides of the cowl, so I chose the 45cc single instead. Shortly after giving them my shipping address and plastic-money account number, the RCGF 45 arrived at my shop.

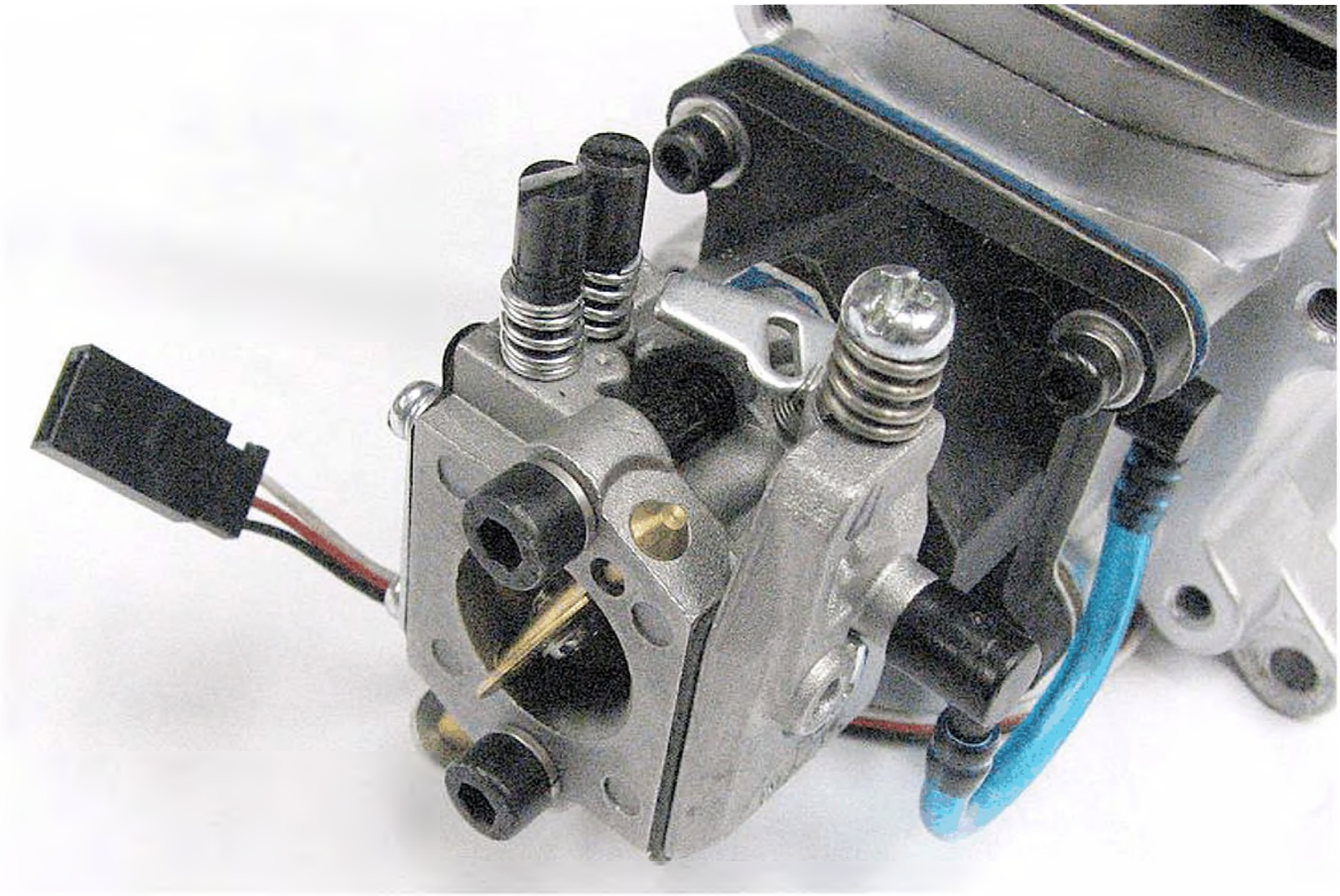
I immediately removed everything from the box, and spread out all the pieces on my workbench. This included a side-mounted muffler with gasket and moumting bolts, a large (10mm) prop bolt with washer, three auxiliary prop bolts, a set of four standoffs with mounting hardware, an RCEXL ignition unit, a spark plug, a spark plug wrench, two small Allen wrenches, and the instructions manual. The prop washer, in addition to it's main hole, also has three holes for the smaller prop bolts, but I'd rather not drill out my test props for just one engine. The 10mm center bolt will work fine if you add a piece of double-sided sandpaper behind the prop to keep it from slipping against the smooth drive washer.

The four standoffs are designed for engine mounting arrangements where the carburetor will be inside an engine mounting box, leaving the cylinder head and muffler out in the open. I'll make up a plywood sub-firewall to be used with the factory standoffs to have the carburetor clear the mounting plate on my engine test fixture. If that works out well, I'll later use the same arrangement to hang the engine on the airplane.

With the mounting arrangements taken care of, I bolted the RCGF 45 to my test stand and prepared to run it for the first time. According to the instructions, *"Ground running should be done with a slightly smaller prop, and with the cowl off to promote good cooling. It is not recommended that you run the engine on a test stand, as they do not allow vibration energy to be properly dissipated. Plus, it is not needed. Your engine is ready to go."*

Sorry, but I always test engines on my test stand. It is not a rock-solid bench that does not shake and twist as the engine is running, however. It can and will move side to side a little, providing some "vibration absorption" much like an airplane would.

Since I was using the supplied side-mount muffler that doesn't interfere with the carburetor's fuel mixture needles, I



connected the throttle linkage to the carb, bolted the engine to the stand, and connected the ignition system and fuel tank line. The RCEXL ignition box can use a 4- or 5-cell battery, so I chose a fresh 5-cell 1650 mah NiMH.

I was just about to start the engine for the first time when I noticed something peculiar about the way the prop hub was moving as the prop was rotated. It appeared to be wobbling quite a bit. I removed the prop and spark plug, and used a dial indicator to find that the crankshaft was bent, causing the prop hub to wobble! I have no idea how this happened, since the engine was brand new, and the shipping box showed no damage at all.

I called ZRCGF and explained what I'd discovered. He asked only a few questions before promptly agreeing to replace the engine. I agreed to return the one I had, so it could be inspected to determine what caused the problem. I was pleased that they wanted their engines to be perfect when delivered, and were willing to make things right if necessary. The replacement engine arrived in three days, and when I checked *its* crankshaft, it was within 0.002" of being perfect. I later learned that the first engine's crankshaft was not bent, but had been assembled improperly aligned at the factory. Henry, at RCGF, contacted the factory to ensure that such does not happen again.

Like nearly all Walbro carburetors on engines this size, the throttle and choke arms are too short to provide adequate resolution in operation. I replaced the throttle arm with a reworked nose wheel steering arm, and added a brass extension to the choke arm. Longer arms allow finer adjustment of both functions. I also removed the end of the spring from the throttle arm, but left the spring in place to help keep the throttle plate from vibrating and wearing the carburetor bore.

Another problem I've found with most Walbro carbs is that the choke plate has a hole in it to help prevent flooding when used in industrial applications. With model airplanes, however, this hole doesn't allow much fuel to be sucked into the carburetor. I like to seal this hole with a small dab of solder,

after which the carburetor can be primed with just a few flips of the prop.

With the engine securely fastened to my test stand, I turned on the ignition, fully closed the choke, and set the throttle to about half open. After three flips, the engine burped to indicate that it was ready to start. After opening the choke and setting the throttle to a high idle, the engine started in only three more flips. It ran quite well too, albeit a bit on the rich side. I let it run at about 4000 RPM for almost 30 minutes, and then let it sit and cool off. Then I refilled the tank and began the test runs. From that point on, the engine never needed more than two flips to restart, which I found impressive. The carburetor needles required minor adjustments for each different size prop, but the engine always started easily.

At first there was some slight but noticeable misfiring at full throttle high RPM, but it ran just fine at 3/4 throttle. I tried adjusting the fuel mixtures, but this messed up the otherwise fine throttle transition. I called and talked with a few modelers who already have some experience with RCGF engines, several of whom recommended opening the spark plug gap to 0.032". When I tried that, the engine immediately ran much smoother at high speed, and it allowed a better low speed adjustment for a smoother and more reliable idle. After that, my test runs were all completed with no further problems at all.

During the test runs I began to notice that the RPM figures seemed very good for an engine this size, so I checked the figures I'd recorded for three other 45cc gas engines I'd run. Using the same props I reserve for engine reviews, the RCGF 45 did indeed prove more powerful than the other three engines. Plus, none of the other three started as easily, which was equally impressive. The sound levels I recorded were all well in line with the other three engines, and should pass most of the suggested maximum noise levels for both 10' and 25'. It doesn't meet the AMA's "90 db at 9'" recommendation, but I've never seen a stock-muffler gas engine that would!

I also made a few inquiries about the position of the carburetor on the back of the engine. I was concerned that if a Pitts--style muffler were used, the needle valves would point directly toward the muffler. I found that the carburetor can be rotated 180° after you install a longer piece of tubing between the crankcase fitting and the vacuum inlet on the carb. But this alignment puts the throttle and choke connections right next to the muffler. The carburetor mounting block, however, can be re-drilled and tapped to rotate the carb 90, 180, or 270°, giving a lot more flexibility to engine mounting. I also heard that the factory is drilling the blocks this way on the next shipment of engines. I drilled and tapped my block rather than wait for a new one, and the carburetor operates just fine now.

Well, what more can I say? The RCGF 45 engine has proven to be a lightweight but powerful engine that produces more RPM than three other engines this size that I've tested. Other than a few minor glitches that can be solved by the user, and one big problem that was solved quickly and question-free by the distributor, the RCGF 45 is a really nice engine for the modest price. I'll be bolting mine into the nose of a new plane soon... well, as soon as I get it built!

-Dick Pettit
pettit@ti.com

HOSPITAL CHART BLOOPERS

1. The patient refused autopsy.
2. The patient has no previous history of suicides.
3. Patient has left white blood cells at another hospital.
4. Patient has no fever today, but her husband says she was very hot in bed last night.
5. Patient has chest pain if she lies on left side for over a year.
6. On the second day the knee was better, and on the third day it disappeared.
7. The patient is tearful and crying constantly. She also appears to be depressed.
8. Discharge status: Alive but without permission.
9. Patient was examined in ER, x-rated, and discharged.

The Webb Scale

by Gary Webb

By the time you read this, Top Gun will have once again come and gone. Congratulations to all the contestants, because I consider every one of them winners due to the fact that this is an invitational event... you have to be a winner just to get an invitation!

Out "hats off" to David Hayes and his Rockwell Thrush for not only taking first place in the Masters class, but also for earning the highest combined score and being proclaimed "Mr. Top Gun"! From a judge's point of view, the crop dusting routine David performed was simply spectacular!

Greg Hahn again won the Expert class with his B-25D, and gave David Hayes a close run for the coveted "Mr. Top Gun" honor.

In Team scale, Graeme Mears and David Shulman formed this year's dream team. Graeme gave David a perfect 100 point static score to begin with, and with David's great flying talent, their F-16 was presented in a very convincing, realistic, and unbeatable manner. It's an extremely rare occurrence for anyone to earn a perfect 100 points in static, and I believe this was the first time this has happened at a Top Gun event. In other words, in the static judges' eyes, Graeme's F-16 was a perfect rendition of the full scale aircraft, with *no* flaws! And no one, in over 20 years of Top Gun competition, has ever accomplished this feat before. Incredible!

David Shulman(Orange shirt) and his brother Jason, ready the F-16 for another mission.

Graeme is one of the most dedicated builders out there. I'll be doing an interview with him in an upcoming issue, along with some other top competitors from around the world.

John Boyko, who won the amateur side of the Pro-Am class last year, was moved up

A rare British Vulcan bomber

to the pro side this year. Some people said *"Welcome to the majors, John."* last year. Welcome indeed, because John stepped up to the plate, met the challenge head on, and won the Pro side this year! He is such an inspiration to everyone around him. John, you see, has Cerebral Palsy, and at times has trouble getting around. He has to sit on a stool while he flies. He, of course, insists that he has no disability, he just walks differently, yet he's also a physical therapist! So don't try telling John that you can't do something during rehabilitation! I hope to interview John soon too. He motivates us all to strive for the best we can be. John's model, by the way, is an awesome Pitts S1-S.

Mike Selby, a retired USAF Colonel who now lives in Thailand, always brings a new and fascinating model to Top Gun. This year was no exception, with his super-fine F-111E.

I normally spend some time with my sister and her husband who live in "The Villages" just North of Lakeland, FL, right after Top Gun. I dropped the wife off on the way down, so she can spend time with them as well. On the way to their house, you pass through a little town named Wildwood. (Yes, I started singing that song too.) As I drove down the main street I saw a hobby store reminiscent of days gone by, and just had to stop. It was closed at the time, but was scheduled to open in a few hours. Since Wildwood is only about ten miles from where my sister lives, I decided to come back later to check it out.

Mike Selby's F111E taxing out for take off.

What a walk into the past! Noell's Hobbies is packed with all kinds of model aircraft, many hanging from the ceiling, and stocked to the rafters with kits, engines, radios, and all sorts of modeling supplies. There are R/C cars and boats as well. I needed some Zap Hinge Glue for the KMP B-25, and thought they might have it. Sure enough, they had a complete selection, and I bought all the Zap Hinge Glue they had, which is hard to find in Ohio hobby stores.

Jack Noell has owned and operated his store for over 28 years. He started out part time, but after retiring from a local steel company, he now devotes most of his time to the store... when he's not out flying (testing his products, I'm sure!). He has two loyal and very knowledgeable employees, so if you're ever in the area, stop in and tell them Gary sent you!

Scott Prossen entered this Byron T-28 in the Am side of Pro-Am, and won Fourth place in his first try at Top Gun.

Memorial Day has come and gone, but I hope you did something to honor our military veterans. I was again involved with the Tuskegee Airmen, beginning with a parade in Springfield, OH. I didn't know it until after the fact, but Springfield's parade is the second largest Memorial Day parade in the U.S.!

My FiberClassics Mustang and the Kondor Model Products B-25 were both used. The Mustang was in the parade on the float, and was seen again in the large hall for an indoor display during the dinner. C.I. Williams, at 92 the oldest living WWII fighter and bomber pilot of the Tuskegee Airmen, was the parade's Grand Marshall. He was also given the task of tossing the wreath from the memorial bridge at the halfway point of the parade. I'm told that Mr. Williams was the first black man ever to be bestowed this honor.

C.I. Williams was the commander of the 477th bomber squadron, flying the B-25's.

There were literally tens of thousands of people lining the parade route. The airmen were given a standing ovation the entire route. Even the truck driver who pulled the large float said he was moved to tears at the outpouring of affection. To see the many veterans along the parade route stand and salute them was very, very moving. It was also wonderful to hear them tell their stories after dinner.

I received an email from Rick concerning his repair to a Byron's Original Staggerwing Beech (I've built five of these models in the past.)

"Hi Gary. It's been a long time, but I'm back with more questions if you don't mind. I don't recall what happened at the DOGS show nearly six years ago, but to make a long story short, I finally got the Staggerwing flying last weekend. We made two great flights on Sunday, and one more on Monday, proving the plane to be a good flyer. The final flight on Monday, however, was made during some strong cross-wind gusts which caused me to snap it and crash on

Mr. C.I. Williams is the man with the white ball cap and B-25 lapel pin who was Grand Marshall of the parade.

takeoff. I now need to repair the cowl, both wings, and replace the firewall.

Would a thicker firewall be advisable, or should I stick with the 1/8" stock thickness? Since the paint is peeling and cracking all over this possibly 25 year old model, I'm going to completely redo the exterior. The foam parts are covered with what looks like Econocote, but I want to glass and paint it. Do you have any advice about removing the covering from the foam? Also, any advice on straightening a foam wing (about 6" of one tip in crushed) and filling the dings and dents? Would 3 oz. glass cloth be too heavy (it's what I have on hand)? During this rebuild, I want to add tail gear doors. Have you ever done this or seen it done? Have you any details or advice to share? Do you know anyone who produces windshields for this model? How about replacement decals?

Thanks in advance for any help you can give me.

Rick Vera-Burgos

Don Cummings was a B-25 pilot during WWII. His crew was noted to be able to drop a dumb bomb in a pickle barrel from ten thousand feet.

Sorry to hear about the crash, Rick. First, the cowl and windshields should be available through Iron-Bay Models. If he has time, John should be able to pull a new windshield and make a new cowl for you. At present they cannot make the foam parts due to their steam boiler being down. The wing can be repaired, however, with blue or pink foam. Glue it in place with 30-min epoxy. Fill any dents and dings with lightweight Dap spackling, found at most hardware stores. If the wing is broken in two, I'd use 1/8" to 3/16" carbon fiber rods, connecting both haves at least at the leading and trailing edges to add support to the joint.

To remove the Econocote, I'd try to coax it off with low heat. Too much heat will cause the foram to expand, giving the texture of a football.

As for the firewall, I'd stick with the 1/8" seven-ply ply-

Part of the huge crowd lining the streets on both sides to honor our Vets and present service members..

wood, because it also acts as a flex-plate and vibration dampener. I have never had one fail. A thicker firewall will just add weight.

As far as glass cloth goes, use 1.5 oz. cloth. This provides enough strength without a lot of weight gain from trying to fill a heavier cloth. Normally I'd use 1/2 to 3/4 oz. cloth to glass a surface that's sheeted with balsa or 1/64" ply. If you use this light a cloth over foam, though, you may puncture the cloth while handling the parts after painting. Ouch! So I recommend using 1.5 oz. cloth. I'd also use Zap Finishing Resin, thinned with denatured alcohol 1:1 to apply it. Then lightly sand with 320 paper, and do a second coat with 2:1 mixture of epoxy to alcohol.

All of the Staggerwings I built had tail wheel doors. I used the spring wire method to open and close them with the wheel pulling the doors closed as it touches the spring wire.

I hope this helps, Rick. Please keep me posted on your progress.

Mr. C.I. WIlliams was a B-25 pilot during WWII.

I'm now finishing up some repairs on my C Mustang, which I plan to take to the Mac Hodges war bird event, along with my trusty old L-4. I wanted to take my new KMP Skyraider, but there's a size limit, with giant scale models only. I may take it to fly in the evening hours, though, after the event officially ends at 5:00 p.m.

Get started on a scale model of your choice. Send us an email about your choice, and the fun you have hunting down the documentation to make your model realistic.

That wraps it up for me this month. Stay tuned for some upcoming interviews with several of the world's leading scale modelers.

Fair winds and blue skies...

-Gary Webb
gcwent@woh.rr.com

2009 War Bird Event

Rocket City Radio Controllers

Huntsville, AL

CD- Alan Berard 256-417-5499

Visit **RocketCityRC**.com for information

Door Prizes to be awarded
Food and Refreshments available
Landing Fee $25
SORRY, NO VENDERS ALLOWED

GPS Info:
34 41.192 N
86 35.725 W

July 17th and 18, 2009
Friday at 1200, and Saturday 0800 till 1700
Spectators Welcomed
Pilots Meeting at 0800 Saturday
Overnight Camping Available, no hook-ups

Come by the Home field or RCReport Online for our War bird event in July!

Keep an eye at RocketcityRC.Com all year to see what events are coming up! We would love to see you there!

Two Old Scale Guys

by Dick Watz & Bill Hurt

Ebesfeld-Fairchild Sopwith Camel

DW: Hi Bill. It sounds like Top Gun 2009 was another great experience. I'd like to hear your comments about it when you have time.

I'm sure that most of you know that Bill is an Outline Judge at Top Gun, and the founder of the WACO Brotherhood. The latter is a group of aviation lovers who believe when the last WACO lands, the sky will return to being just empty air. I'm proud to be a member of this organization, too. Of the many great planes of the Golden Age (1920-1940), none has the romance and beauty of the WACO. Riding in the seat of a WACO 10 was the high point of my younger days, and maybe the most fun you could have with your clothes on. Right, Bill?

BH: We both had the wonderful experience of getting to fly in full scale Waco aircraft when we were kids. My grandfather owned a YMF and a Standard biplane. Some of my earliest recollections around airplanes has to do with flying in one of granddad's planes, and evidently he also owned a Monocoupe because I remember flying in one of them, and watching the rivets spinning in the boot cowl the whole time we were flying.

DW: Bill is a full scale pilot with a love and respect for aviation in general, he has a real soft spot in his heart for the venerable WACO. Will Rogers once said, *"I don't know if I'd want to be a member of any club that would have me as a member."* But I agree with Bill. Lordy those WACO's are cool. I love the WACO Brotherhood as much as Stickman. Oh, sorry Bill. I meant Stick builder. (Did I say that out loud?) Bill is six foot three inches of twisted steel

Fuori-DiGorgio AC-47.

and sex appeal. Oh well, one out of two isn't bad. I must have been thinking about his stature when I said Stickman. I'm going to give you two lines to get even, Bill. Go!

BH: Well, Bill is no longer a full scale pilot, since I lost my ability to pass the physical after my cardiovascular accident (i.e., heart attack). Now I get to enjoy wringing my planes out with both feet firmly planted on terra-firma. I really do miss flying the little bipe though, and what do you mean "one out of two"? Oh yeah, I've shrunk a little so I'm only six feet two and a half inches tall now. (Snicker.)

DW: I'm sorry you can't call me the Big Dicker any more. I've lost 120 lbs. With a name like "Dick", I'm sure you can come back with something. Brian might say, *"No worries mate. I know your patch, and I get to the colonies from time to time."* Speaking of Brian, he and his wife are two of the sweetest people. Mrs. Winch knitted me a plane when I was recuperating, and Brian called me on the phone. What nice

Fuori-DiGorgio AC-47

Mears-Shulman F-16.

people! So I did some research and learned that the plane she knitted is under consideration as Australia's new, front line fighter to replace the J-3 Cub. Is that true, Brian?

In the months to come we'll follow the construction of my F4F, Eric's F7F, and Bill's 27% YMF5. There will be lots to talk about, but keep sending email and pictures. Remember, this is your column too.

One email I received asked if I planned on doing another plane for Wendell Hostetler. Yes, I do. As some of you may know, Eric ran into some trouble last year and couldn't finish the Navion in time for Toledo this past spring, but I cut a kit for Eric and the Navion will be coming soon. Wendell has the plans ready now along with the Cessna 195 I did two years ago.

My new project for Wendell could be a 100" (approximate) Luscombe Silvair. I have the plans now, and have already started cutting. It will be all metal, not a rag wing. Owners of the Luscombe say the metal wing flies better, so maybe the model will too. The plans will show the rib layout so you could build either version.

Newman-Ziroli Feisler Storch.

Simpson-Jones N2S-3 Stearman.tif

If I modeled for a hundred more years, I'll never understand why people will spend hundreds of hours building and finishing a sport model that looks like the box it came in. What are your thoughts on that, Bill? I say if you're going to put out the effort, then make it mean something. It's been said, *"God does not deduct from your time on earth the hours you spend modeling"*, so I think it should be spent on *scale* modeling.

BH: Well Dick, I don't know all that much about sport models or even sport scale airplanes since they all pretty much look like flying crosses to me. Some of them even look like a flying bread sack. I've never seen a full scale airplane that was covered with iron-on plastic film. Since I'm a bona-fide scale modeler, it would not be fair for me to comment further on these miniature airplanes.

In the columns to come we will bring you building information, surface detail tips, finishing information, contest knowledge, and anything else you'd like to know. We don't have all the answers, but we'll try our very best to make your scale building experience a happy and rewarding one.

A question often asked is what paint to use? I like to spray epoxy. That's a good question, isn't it, Bill? I'm sure you have some thoughts on that. Actually, I've tried just about all the available paints, and after all these years I still come back to epoxy. If I was painting control line or free flight, I'm sure I'd still use dope, which I did for years, mainly because it's lighter. The classics and heavy metal I build now aren't bothered by an extra ounce or two of paint.

This is a subject on which we could write an entire column, right Bill?

BH: I think that would make a wonderful topic for a future column. Personally, I've used the old Pettit Hobby Poxy, and liked it very much, and I understand that the Klass Kote finishes are much like that old product. I use a lot of dope (Wait... that didn't come out

right!) and automotive base coat/clear coat more than any other finish.

DW: I use mostly silk or other shrink-type fabric coverings instead of plastic. As a top scale modeler once told me at Toledo, when they start putting plastic shrink coverings on classics and war birds, then I'll start using it on my models. I'm not sure, but I think Bill would have something to say about this as well.

BH: I normally don't use any iron-on materials. I use the time-tested Koverall fabric that's applied with nitrate dope. Most don't realize it, but nitrate dope is actually nothing more than clear nitrocellulose lacquer. It can also be thinned with lacquer thinner rather than having to deal with dope thinner.

DW: I can't remember, but it seems like it was something about putting a bread wrapper on a scale model plane. Eric does a superb job with plastics on his 3-D planes, but those guys are looking to save every ounce they can. I'm sure you know by now, I've never met a plane I didn't like. I think Golden Age is the most varied and interesting, but warbirds are fun to build and fly, too.

In this column, we will eventually cover some of all different types, to include the different building and flying aspects. Be sure and let us know what interests you. I hope to understand the southern accent a little better, so when I fly at an air show down south, and they say, *"You all come to the flight line now"*, I'll know a little better what they're talking about. In Michigan they just say, "Get your six to the flight line right now!", not *"You all come"*.

Sorry Bill, you may have to straighten this out for me. I'm a northerner and don't even live in southern Michigan!

I'm going to leave you with Bill now. I'm sure he has plenty to say about Top Gun *and* my poor southern accent.

Take it away, my brother. And I'll see "you all" next month.

BH: As usual, Dick, you Yankees have it screwed up! It is not now, has never been, and probably never will be, "You all." It's "Y'all"! And I guess this is as a good a time as any to straighten this out. "Y'all" can be used in the singular, plural, or even the pulperfect subjunctive. If I say "Y'all come", that could mean you, or it could mean you, you, you, you, and you. But if I say "All Y'all", then it means for everyone as a group to come on down. It's actually very simple.

Top Gun 2009: Wow, what an event *that* was! It's actually more than an event it's a *happening!* And it takes on a life of its own being the most demanding five days that you'll likely ever spend, and at the same time it's the most rewarding five days you'll likely ever spend. It doesn't matter if you're a competitor, an official, or just an observer. The intensity has to be experienced to be believed.

This year, I met some new people who were attending as contestants for the first time. Talk about having "big eyes"! The sheer magnitude of the event is simply mind boggling. There were a lot of the regulars in attendance, of course, and some who were missed in their absence. Some new planes made the cut, and there were some who have either timed out or this was the last year their model could compete. I'm really going to miss Mike Barbee's Big Yellow YMF. He's working to finish his Texan II for next year, and I'm sure that it's a superb airplane, but (sigh) it ain't a Waco.

Mitch Epstein had his new 33% YMF there this year, and it's a beauty too (I posted a photo of his plane last month). There are always some very unusual entries, and this year was no exception. There was a Formation Stearman, a TU-95 Bear, an Aardvark F-111, and of course the faultless F-16 of Graeme Mears was back. David Hayes had his Thrush flying just like the real McCoy again this year. That thing even has scale grit on the engine! Dick Pettit included a lot of photos in his report last month, but I have lots of pictures of great models on the judging table. I'll be posting them from time to time. These are views

just as I see them, but it may be a new way for you to see these models.

I mentioned that Graeme Mears' F-16 was faultless, and indeed it appears to be. It is *possible* to score a perfect 100 in static judging, but it's never been done at Top Gun until this year. Oh, several have come close, but Graeme finally nailed it. You really need to spend a lot of time looking over this model. It looks like he picked it off the vine before it grew to full size! Everyone who comes in contact with Graeme should congratulate him.

I've heard for years that jets and warbirds have an advantage at scale contests, but Top Gun proves that this ain't so. David Hayes has taken home the top marbles for the past two years with a civilian agricultural airplane. It's a tail dragger and it has no machine guns or bombs. What it does have is "believability" (and in spades!) and a pilot who knows how to fly it well within the scale envelope. This model is not "too slick" and not "too pretty". It looks real! It looks used and worn, just like 99% of the ag planes you'll see across the country. It flies like its on rails, though, and David makes it look sooooo easy! And you know what else? He didn't "ver detail" it, either. Nothing, not one single thing jumps out at you as being overdone. It's an excellent and well executed scale model, and he flies it to perfection.

Top Gun takes the scale aeromodeling experience to a whole new level. It's almost like a five day party for scale model enthusiast.

I'll be posting more photos in the coming months, and hopefully I'll be able to provide a little more in the way of a personal touch regarding these fine models.

-Dick Watz
8400 Swan Creek Rd.
Saginaw, MI 48609
watz7@aol.com

-Bill Hurt
1212 Oak Drive
Leesburg, FL 34748
williamhurt@comcast.net

SPARKY'S REVOLT

by Tony Coberly

Okay everyone, I've been busier than a one-legged waitress at IHOP over the past month, so I'm forced to recycle a column from awhile back. But I *have* recently received several questions regarding multi- motor setups, so I've decided that this might be just the right time for a refresher.

I've often been asked about the best and/or most widely accepted way to handle a multi-motor setup. Everyone who's flown a multi-engine glow model will agree that one of the worst things that can happen with a twin is to lose an engine... to have one motor quit while the other continues to run. But with electric motors this won't happen, right? Well, let's take a closer look.

I'll start with an old school, brushed multi-motor setup using 550 size can motors. Let's say we have a single 3-cell, 3300 mah, 20C LiPo, and we run a 12x8 prop that burns 20 Amps on one motor, according to our watt meter (see **Figure 1**). We can run both motors on a single ESC as long as it's capable of handling 40 Amps minimum. Since our LiPo battery can handle 66 Amps, we're okay there (see **Figure 2**) This is a basic and simple setup that will power a reliable, twin-motor electric air plane. We'll have two motors that will run at similar RPM throughout the flight, losing RPM at the same rate as the battery voltages drops, and the ESC will shut down power when the pack voltage reaches 3 volts per cell, according to its programming. As long as neither motor has a physical failure, we shouldn't have to worry about a motor failure.

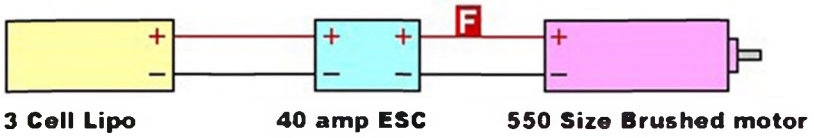


Figure 1

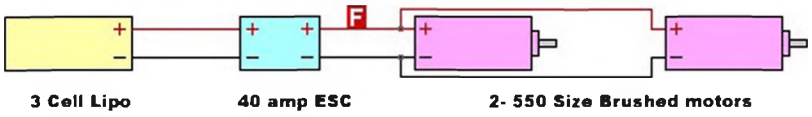


Figure 2

What exactly is a "physical failure"? Well, keep in mind that we're talking about brushed motors that have brushes. If you have brushes, then by definition you have two points that will wear, and eventually wear out. The brushes themselves are made of carbon, and make contact with the commutator of the motor to switch the polarity of the armature and cause the motor to turn. This contact between the commutator and the carbon brushes causes wear, so it is a known point of failure in time. This is a part of the reason why, with brushed motors we need to break-in the motors to make sure the brushes are

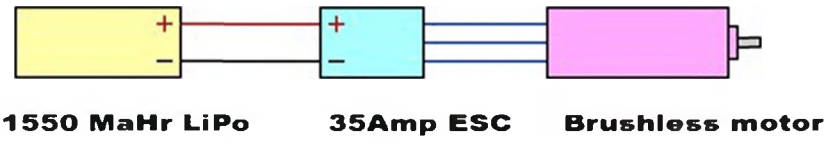


Figure 3

seated as smoothly as possible to the commutator, and therefore provide the best possible current flow to the motor. We can see that there are benefits for electric brushed motors for a multi-motor setup, but not an infallible option.

Okay, now let's look into the more popular brushless motor options.. We'll start with the most logical option of using the same 3-cell LiPo (3300 mah, 20C) with a single brushless ESC and one 42mm brushless motor. This single 42mm brushless motor with a 12x8 prop uses about 31 Amps (see **Figure 3**) Well, we know that our battery is capable of 66 Amps, so we have just enough battery to power two motors. But what about speed controllers? Can we use one 60 Amp brushless ESC with two 30 Amp motors? Yes and no. Personally, I do not recommend using a single brushless ESC for two brushless motors, but I *do* know of several people who have done so, even though sometimes only one motor will start! This is not what we want! If we're going to run two brushless motors then we need two brushless ESC's. Looking at **Figure 4** we see a single battery powering two brushless ESC's, and each ESC powers a single 42mm motor. This is a very acceptable configuration to power a twin electric model.

What are the possible problems with this setup? None, did you say? Let's look again. At full throttle we have 62 Amps being drawn with both motors running, and we're having a great time flying for several minutes with no problems. We're beginning to think about landing, when all of a sudden we notice a change in the sound of our motors. The we get a sudden and severe yaw, and down we go... *dirt nap!* Well *%$%$%^#@@@^%! What happened? Our ESC's are programmed to shut off when the pack voltage reaches 3 volts per cell (generally speaking, of course), at which point the motor power is shut down, or at least it goes into a lower power mode. The settings vary by manufacture, but just for example I'll use a Castle Creations Phoenix 60 ESC as an example.

When the battery drops to 9 volts, one of the ESC's will shut down before the other. This is a timing thing, and to expect two ESC's that are polling at over 20,000 times per second, to shut off perfectly simultaneously, is simply not done. When one ESC shuts down, the other ESC will suddenly see a *higher* battery voltage, because of the drop in current. The higher voltage will naturally result in *more* RPM to that motor, which will result in a sudden and severe yaw resulting from the extra surge in thrust on one side, coupled with a total loss of thrust on the other side. This all too often results in a re-kitted model airplane.

So, is this then not a good power system for a twin? No, this is a *fine* system to power our multi-motor model, we just need to use a timer to prevent using more than about 50% of the battery. Then we won't have to depend on the ESC shutoff circuit. We should also size our battery large enough to give us the flight time we want, without depleting our battery to the point where it will trigger the ESC voltage cutoff. The

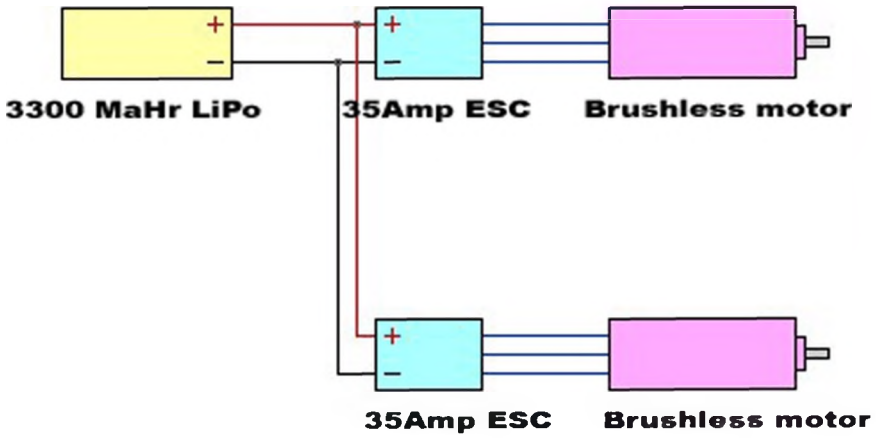


Figure 4

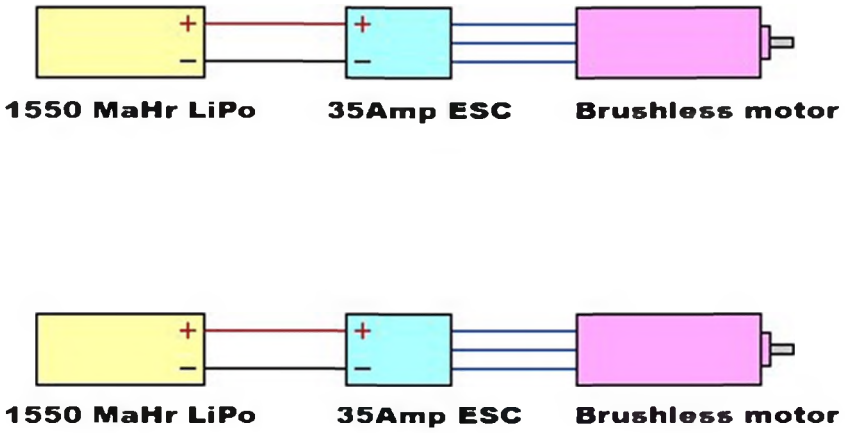


Figure 5

3300 mah battery I referenced is going to give us about 5-7 minutes of flight time, depending on our left thumb.

What, only 5-7 minutes? Now folks, let's face it. Very few people like to fly a twin more than several minutes, so the 5-7 minute flight time is usually enough. If is not, just increase the battery capacity to gain the extra flight time. I'll cover how to figure that out a little later in this column, but for now let's move on. Is this our *only* option for our multi-motor model? Well of course not!

We'll now look into a twin where we want to use a battery for each motor and ESC in our model (see **Figure 5**). Using the same motor and prop setup as before, we'll need two batteries and two ESC's. Each battery and ESC needs to be capable of handling 31 Amps. If we use a 3-cell 20C LiPo, we need at least 1550 mah batteries. Having two batteries, we can assume that they will generally discharge at a similar rate, and therefore reach cutoff voltage at approximately the same time, but not necessarily *exactly* the same time. Should one ESC reach the low cutoff voltage before the other, (and it will), we'll again be visited by the dreaded "one dead motor" demon, and he just loves to send models to ye old Dirt Nap. So we're right back to the same issue where the pilot needs to make sure there's more than enough battery capacity to fly for the minimum acceptable flight time without dropping the voltage to the point where the ESC reaches cutoff.

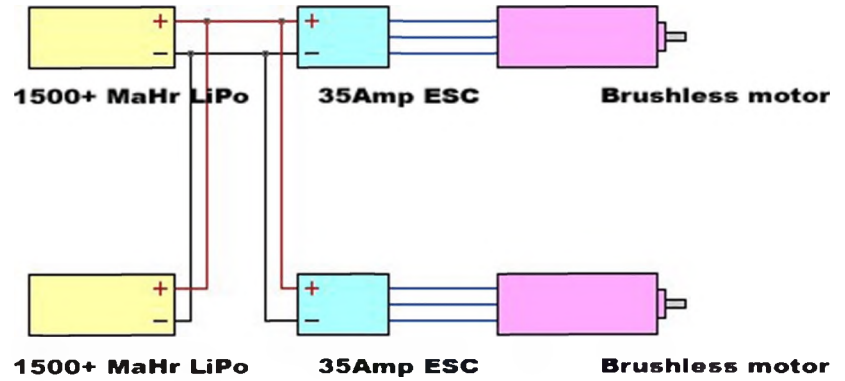


Figure 6

We still have one *more* option for powering a multi-motor brushless model. We've established (I hope) that we need two ESC's for a twin, and we know that we can use one big battery to supply the power for both motors. Or we can use a smaller battery for each motor. But we can also use a hybrid theory. That is, we can use multiple batteries in a parallel circuit to power multiple motors.

This begs the question, "Why use multiple batteries in parallel, instead of a single larger one"? The answer is very simple... money! If we look at average cost per mah, we can see that the more popular size batteries in the 1200 to 2000 mah range are usually considerably cheaper than a single larger battery. Also, if we've been flying smaller LiPo's, we may have several similar suitable batteries already, that will work well in our multi-motor application. When I say similar vintage, I mean that we have two or three batteries that we're using to fly smaller planes, and they have about the same number of cycles on them, and they hold about the same voltage levels over a flight (see **Figure 6**). By connecting two or more similar batteries in parallel, we can increase our battery capacity *and* keep our cost down... if we already have these batteries. And they'll still provide our

ESC's and motors the power they need with a minimum of risk. Again, we still need to make sure that wherever possible we do *not* drain the cells down to the point where the ESC reaches cutoff voltage.

How do we establish the flight times to expect? There is some simple math that we can do to give general numbers, but they're entirely *too* general, and can be off as much as 50% at times. If we just figure the current draw over a given amount of time, we'll get a number that *looks* good, but is not very accurate.

Why not? Math is always accurate, but we also need to figure in the efficiency of the prop, ESC, and motor. These variables are overlooked more often than one might think. I recommend that if you're going to invest in a large electric airplane, say more than 15 size or any multi-motor electric, then spend a little money on the electric motor calculation software for your computer. This software costs anywhere from $19 to $50, and are a great tool to add to one's hobby box. I like MotoCalc from www.MotoCalc.com to give me a good base line on current draw and flight time calculations. I've run several model tests through this software, and it was within 95% accurate of real world tests that I've done, so I trust it. ElectriCalc is another that I've used (although not as extensively), that can be found at www.slkelectronics.com

Several motor and ESC manufacturers provide basic calculators on their site for basic information.

I hope this month's information about multi-motor power setup will help you in some way. Meanwhile, I welcome your comments and suggestions as always. Contact me and I'll do my best to respond quickly.

Thanks for reading RC REPORT Online!

-Tony Coberly
10017 Strong Drive SE
Huntsville, AL 35803
tony@rcreport.net

MORE HOSPITAL CHART BLOOPERS

1. Healthy appearing decrepit 69-year old male is mentally alert but forgetful.
2. Patient had waffles for breakfast and anorexia for lunch.
3. She appears numb from her toes down.
4. The patient has been depressed since she began seeing me in 1993.
5. The skin was moist and dry.
6. Occasional, constant infrequent headaches.
7. Patient was alert and unresponsive.
8. Rectal examination revealed a normal size thyroid.
9. She stated that she had been constipated for most of her life, until she got a divorce.
10. I saw your patient today, who is still under our car for physical therapy.
11. Both breasts are equal and reactive to light and accommodation.
12. Examination of genitalia reveals that he is circus sized.
13. The lab test indicated abnormal lover function.


RC REPORT
ONLINE!
Subscribe Now to RCReport Online!
1 Year Standard subscription
$24.95
Access to archive and current magazines
1 Year Premium subscription
$29.95
Access to archive and current magazines PLUS downloadable and printable PDF files!
WWW.RCREPORT.NET/LOGIN.PHP

Bird on a Wire

by Terry Dunn

Last month's column was a bit heavy with all the gloom and doom associated with lengthening ESC wires. Now I think we deserve some lighter fare, so I've been working on a couple of small projects that you may find interesting. I'll share them with you while also inviting you to write to me about your own electric flight tinkerings.

One Heli of a P-38

For whatever reason, the R/C helicopter bug has just never bitten me. I certainly can appreciate the engineering involved, and I usually stare in awe when a good heli pilot takes the sticks. I've just never felt the urge to own anything more than a simple chopper that I could fly in my driveway, and that one collects a lot of dust. However, I am a sucker for a good deal, so I recently bought two more electric helis.

A friend of mine was selling his E-flite Blade CX2 and Blade CP Pro helicopters as a package deal. Now, I don't really have any interest in the nimble CP Pro, but the price for the pair was just too good to pass up. I also figured I could resell the CP Pro, which I'm trying to do now. The Blade CX2, however, is a good fit for my interests and skill level. It's a co-axial type helicopter, meaning that it has two sets of main rotor blades that spin on a common axis in opposite directions. This set-up negates the need for a tail rotor. Yaw control is achieved by differing the RPM between the main blades, causing the difference in torque to swing the heli around.

Co-axial helicopters are generally considered the easiest of all helis to fly, and I agree. I've been having a good time with mine. I can fly it in the driveway or even in the living room without difficulty. I might even get the kids on the transmitter and let them have a go at it.

So, after all this helicopter chatter, you probably think that one of the projects I mentioned earlier has something to do with choppers, right? Wrong!

Well, okay... maybe a little. But as I was sorting through the box of spare parts included with the CX2, I came across a spare 4-in-1 control unit.

"What the heck is a 4-in-1 control unit?"

Well, I'm glad you asked. This one is a small plastic case stuffed with a 2.4 GHz Spektrum receiver, a built-in gyro,

and *two* Electronic Speed Controls (ESC). (Note that newer versions of the Blade CX have a 3-in1 control unit and a separate receiver). All of these components work together to get the Blade CX2 airborne in a stable fashion. But here comes the messy part... since the 4-in-1 unit already on the helicopter was working just fine, what was I to do with the spare unit? I couldn't just leave such a neat little jewel unused!

(Editor's Note: If a friendly visitor from outer space were to drop down to Earth, hand Terry a hand-held device that would diagnose and cure all diseases and human ailments, saying "Give this to your leader.", I'm betting Terry would first take it apart to see how it worked!)

So, I scanned my workshop looking for a quick and dirty project that could utilize these marvel of electronics. That's when my gaze met an unused profile P-38. More specifically, it's a Foamtastic Models Lil-Lightning. I built this model about four years ago, but after flying it a few times, I hung it from the ceiling where it's been ever since, almost forgotten. It still had the motors in place though, so I knew I could get it airworthy again in no time.

Since the two ESC's built into the 4-in-1 unit are sized to operate the two 180-size brushed motors in the Blade CX, I first needed to make sure that they'd work with the small brushed motors in the P-38. The only problem was, I couldn't find any documentation indicating how many Amps the ESC's could handle. I sent an email to the tech guys at Horizon, but as yet I've heard nothing back. The *smart* thing to do would have been to measure the current drawn by the helicopter at full throttle. Then I could divide that number by two, and I'd have a common sense limit for each ESC. But I didn't have any adapters to mate the Deans Ultra Plugs on my Wattmeter with the JST plugs used on the 4-in-1 unit and the 2-cell 800 mah LiPo batteries that came with the CX. So, rather than do the smart thing and *build* two adapters, I just did a little estimating.

I knew that the Blade was getting about eight minutes of flight from each fully charged battery. That works out to an average current of just over 6

Photo 1: A 4-in-1 control unit from a E-flite Blade CX helicopter brought this abandoned. P-38 back to life. Having a 2.4 GHz receiver and two ESC's in a small package makes it ideal for the 26.5" span Lil-Lightning.

Photo 2: I was hoping that the differential-thrust yaw control inherent to this heli 4-in-1 unit would have more control authority, but even so, the Lil-Lightning is still a hoot to fly in calm airs.

Amps total, or 3 Amps through each ESC (800 mah = .8 Ah, and eight minutes = .13 hour, so .8 Ah/.13h = 6.2 A). I'm sure full throttle current is a little more, but I knew I was safe there because the motors in the P-38 draw less than 3 Amps each with 3x3 props and the same 2-cell LiPo.

Since the Blade CX uses differential motor speed for yaw control, I was hopeful that I could get the same effect on the rudderless P-38. I set it up so that left rudder input on the transmitter would make the right motor spin faster, and vice versa. And sure enough, while holding the little plane in my hand, there was considerable yaw effect. But there's only one way to see what the true effect will be in flight!

My first flight with the revamped Lil-Lightning went well. It's a little underpowered for my tastes, but it has enough guts to get where you want to go. I'm willing to bet that it could even be flown indoors in a decent sized area. The P-38 is also capable of loops, rolls, and all the basic 3-channel aerobatics, but now it's a 4-ch bird, so what about that differential-thrust yaw control? Unfortunately, it doesn't seem to have much effect in-flight. I plan to play with it some more, but so far that's been my only disappointment in this project.

(Editor's Note: This tends to support Ed Moorman's findings that slightly mismatched RPM on twins don't make much difference.)

Photo 3: The Slow Tow is the result of my effort to create a less-intimidating form of aero-towing fun for rookies (and me). Cheap and simple are the key ingredients here. (David Bacque photo)

SLOW TOW

I've dedicated a significant amount of space in previous columns conveying the fun I've been having with aero-towing. It's provided a fun and challenging change of pace that has really invigorated my excitement for this hobby. The only problem is the overhead involved. My usual aerotow partner, Lee Ray, lives on the opposite side of Houston. We often have a hard time meshing our schedules and whereabouts to pull off a meeting at the field. It's been hard recruiting any of my other flying buddies into the aero-towing cult, even though I have all the needed equipment. I've found that most folks are reluctant to try aero-towing with somebody else's planes, even when I goad them. So I set out to build a smaller, less intimidating, and more inviting aero-tow duo. I call it the "Slow Tow."

The tow plane side of the Slow Tow is a simple GWS "Slow Stick", perhaps the best-selling park flyer ever made. I see these things everywhere, and for good reason. They're cheap, tough, and fun to fly. My Slow Stick has a mild, brushless motor, but I'm sure that the stock, geared, brushed motor would work fine for aero-towing as well.

The glider is a Lifoam "Ultra Flyer" converted to R/C. The Ultra Flyer is one of those planes commonly referred to as a "dime-store glider" or "chuck-it glider". There are several similar versions available at toy stores, Wal-Mart, etc for $5 to $10. I'm sure any of them would work. I only chose the Ultra Flyer because I already had one.

Converting the Ultra Flyer to R/C was a simple matter of adding a sheet foam rudder and elevator, along with two servos to control them. The receiver and 4-cell 250 mah NiMh battery are placed toward the nose for proper CG. Thus far I haven't found the need to glue in

Photo 4: Common household items are used in the Slow Tow's tow line. A craft stick and paperclip attach the line to the GWS Slow Stick tug. Don't forget the swivel!

Photo 5: More paperclips are used on the glider's end of the tow line. The passive "hook and loop" attachment system seems to work well.

the wings, but I did add some dihedral to the outer 12" of each wing panel. Without the dihedral, rudder input would only make the plane yaw without banking or changing direction. Adding the tip dihedral was an easy fix. Note too that the wing has no spar, not even tape. It's important to keep things as light and simple as possible.

Connecting the two planes is about 30' of 4 lb. monofilament fishing line, carefully and scientifically chosen (i.e., because that's what I had on hand). Small streamers made of tape add visibility to the ends of the tow line, and a paperclip tied to each end provides a removable attachment point.

On the Slow Stick, I pass the paperclip through a popsicle stick and nuzzle the stick under the rubber bands that secure the wing. It's a simple and forgiving setup.

On the glider side, another paperclip is bent into a hook shape and taped under the nose of the plane. The paperclip on the aft end of the tow line loops over the hook. Under tension (while towing) the two paperclips stay engaged (well, most of the time). When power on the tow plane is chopped, a little wiggling of the glider is usually enough to free it from the tow line. I don't see how R/C aero-towing could get much simpler, cheaper, or less intimidating than this!

My first outing with the Slow Tow was a good learning experience. The first thing I learned was that some guys were *still* reluctant to fly my humble little Slow Stick! Yet, no one had any heartburn over taking the sticks of my $5 glider! I'm not sure whether to be relieved or offended!

Another thing that we soon learned was that swivels on the tow line are absolutely mandatory! I've always used them on my big tow line, but I thought I could skip them here. Well, I thought wrong. Once the glider is released, the tow line quickly spins itself into a spaghetti bowl of tenacious knots which both shorten and weaken the line. We managed to deal with the knots that first day, but I've since added swivels at both ends.

The very first flight was quite eventful. I flew the Slow Stick while Randy Stone flew the glider. I fed in about 1/4

Photo 6: No need for a high-end molded glider here. A $5 'chuck-it glider' converted to R/C provides plenty of low cost fun.

Photo 7: If you're thinking that this doesn't look quite right, you'd be correct. A botched tow resulted in both planes in a temporary tethered hover. A quick dive by the tow plane released the tow line and created this unusual pose. Just another example of scampy aero-towing fun.

(Randy Stone photo)

throttle, and both planes were off the runway in just a few feet. About 200' out and 50' up, we both got a little too squirrely on the rudder, so the glider came off the tow line too early. We turned our respective planes back toward the starting point. We took different paths, yet somehow, we both arrived at the same place at the same time, about 3' above the runway! Given 1000 more chances, I doubt that we'd ever recreate that slow motion mid-air! Fortunately, neither airplane was damaged (such is the beauty of minuscule momentum). Once we stopped laughing and regained our composure, we were able to get back to more aero-towing. After a few more unintended releases, we finally accomplished a good tow. Still, even the botched attempts were fun. The glider will never win any thermal duration contests, but it has the "fun per dollar" category nailed!

The next glider pilot was David Bacque. By this time, the tow line was a short, twisted mess, making the glider a little harder to fly under tow. We got off the ground okay, and made a nice, coordinated turn, and headed downwind. Between the two of us, we somehow got the glider into a full stall which pulled down the tail of the Slow Stick. There we were, about 100' high, with the Slow Stick perfectly vertical and the glider hanging motionless and helpless from the tow line. Full power on the tow plane was just enough to keep us in place, but it was obvious that we couldn't stay that way forever! I later joked with David that he was probably the first modeler to ever hover a glider!

After several seconds of slack-jawed gawking at this awkward predicament, I gave the Slow Stick full up elevator and raced toward the ground. Only after passing the glider did I pull out of my power dive. This move detached the glider and allowed David too make a fine landing. In the meantime I had a *new* problem on my hands!

My rudder pushrod had come loose from the servo during my violent, evasive action, so I could no longer steer my plane. Thankfully I still had elevator and throttle control, so

Photo 8: Bill Schwander's UC-78 Bobcat is coming along, but it's far from complete. No doubt she'll be a beauty, though. Note the transmitter under the nose for size reference.

through a series of wild Immelmans, stall turns, and frantic body contortions, I finally got the Slow Stick pointed my way and landed, Thus ending the world premiere of the Slow Tow. If the rest of my outings are even half as eventful (and enjoyable) as the first, then I've got a real winner here!

BALSA BAMBOO BOMBER

A few of you have written to us asking the status of Bill Schwander's scratch-built Cessna UC-78 Bobcat. Well, it's coming along nicely. They say that once an airplane is ready for covering, it's about 50% complete, and I think Bill has just about reached that point. Most of the framing is done, but there are still countless little details to attend to before he'll plug in his covering iron. Most recently, he built a vacuform rig so he could pull his own plastic canopy. Bill attached one of his early canopy attempts to the Bobcat for the photo you see here. The original plan was to have the plane ready for SEFF, but that event has come and gone, so now I'm prodding him to finish it before the local BEST event in October. I'll let you know when it's ready to fly.

I've already begun working on something really fun for next month's column, and I think you'll enjoy it. So, until then... *-Terry Dunn*

boaw@comcast.net
15510 Penn Hills Lane
Houston, TX 77062

AERIAL BANNERS 101

by Dick Pettit

While searching through my cabinets and shelves looking for an item I needed, I came across something I'd made many years ago but hadn't used (or even seen!) in a long time. It was an old banner that I'd made for towing behind some of my large airplanes. Finding that banner sure brought back some pleasant memories of the days when I'd haul that banner up and do a little promoting at local flying events. It also reminded me that over the years, several of our readers have asked about banner towing, both for large and small airplanes. This just may be the right time to tell you what and how I do it.

First I want to explain that banner towing with model airplanes should be carried out quite differently than full scale banner towing. The full scale guys snag the banner from the ground using a hook attached to a line that's attached to their plane. They then tow it around for a while, and then drop it back at the field, after which they might even pick up a different banner and do it all over again. That method is not very conducive for R/C models, mainly because we might miss the banner hook completely, or we might snag something other than the banner, like the ground itself!

I've seen some banner towing models that can pull the banner up from the ground on takeoff, but doing it that way can be problematic due to snagging the banner on the ground, or not being able to gain enough airspeed to get both the plane and the banner airborne! This too is not the recommended method for banner towing with an R/C model.

I roll up the banner, attach it to the plane under the fuselage, and carry it aloft in a roll. When I'm ready to unfurl it, I flip a switch and the banner unrolls in the air stream, often amazing spectators. *"Where id the banner come from?"* I'll later flip the switch again to drop the banner from the plane, allowing it to flutter gently to the ground.

First you need to figure out how large a banner you can tow *and* be able to read in the air for the size plane you're using. My 1/4 scale Cub with a 20cc gas engine can easily tow a 15' long 16" wide banner on a

Photo 1: Banner material and lettering

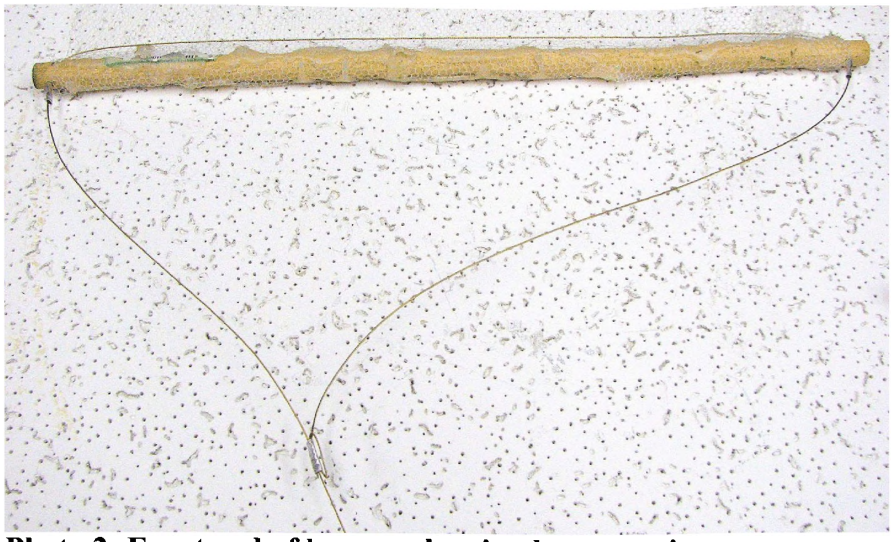


Photo 2: Front end of banner showing harness wire

25' leader wire. I'm guessing that a strong .40-.60 size model could tow a banner maybe 5' long and 6" wide, but banners that small can be difficult to read even at a moderate altitude.

You'll also need to use a transmitter with either a three position switch that controls a separate servo, or a proportional channel controlled by a potentiometer. In other words, you need enough different servo positions to carry, unfurl, and drop the banner.

I make my banners from a nylon mesh material found at fabric stores, as seen in **Photo 1**. It's all white with 1/8" openings in the mesh. It weighs next to nothing and you couldn't rip it barehanded if you tried.

The lettering is made from lightweight black nylon material cut into the letter shapes and hot glued to the mesh. Be sure to leave a foot or two of blank material at the tail end because it will flap in the breeze, hiding any lettering there.

The front end of the banner, as seen in **Photo 2**, is a 3/8" dowel to which I used hot glue to fasten the mesh banner, after wrapping it a turn or two. I then use 40 to 60 lb. test fishing leader wire for my tow leads, usually about 20' long for my large planes. Attach a length of leader to the banner dowel about three times the dowel's length, using crimp sleeves or ferrules. The attachment point for the tow lead is about 1/3 the length of the wire from the top.

Now let's build the tow and release mechanism. We'll need a plane with at least 3-4" of ground clearance because the banner will be carried under the fuselage and you don't want it to snag on the ground. We'll need a piece of 1/4" hard brass tubing about 3" long, as seen in **Photo 3**. The lower slot is about 1/4" from the bottom, and the other slot is 1/2" above that. Cut these slots about halfway through the tubing, and about 1/8" wide.

Now drill a 1/4" hole through the bottom of your plane, preferably through a piece of hardwood like a landing gear block. This hole needs to be drilled at or near the balance point of the plane and be sure that there's enough room inside the plane to mount a servo near the hole. **Photo 4** shows a mock-up of the complete release mechanism in-

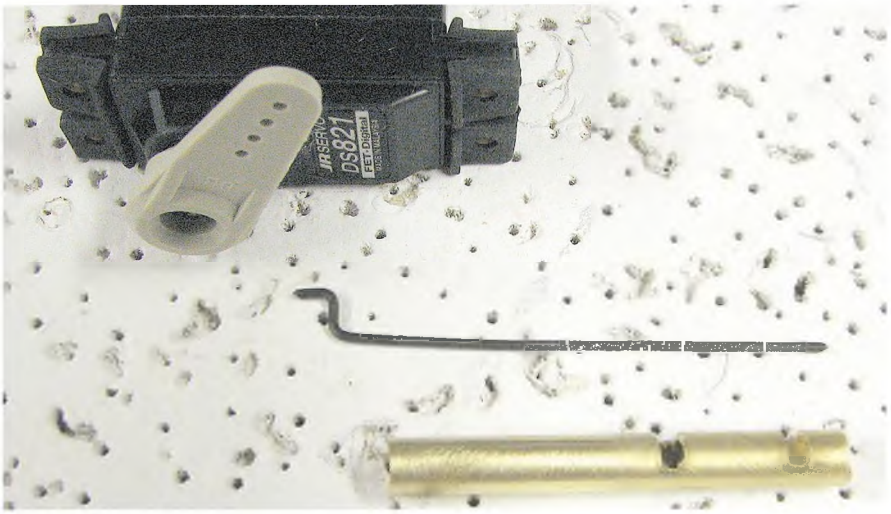


Photo 3: Parts of release mechanism inside fuselage

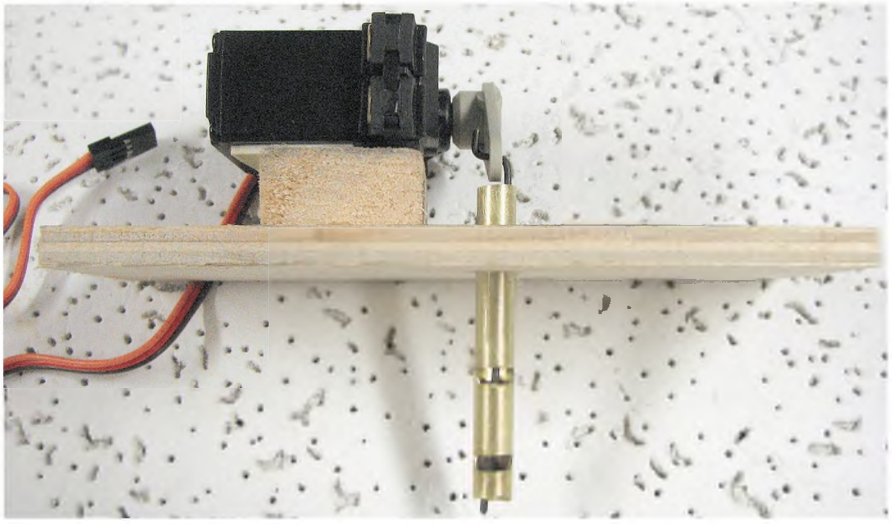


Photo 4: Mock-up of release mechanism showing servo, tube, wire, and fuselage bottom.

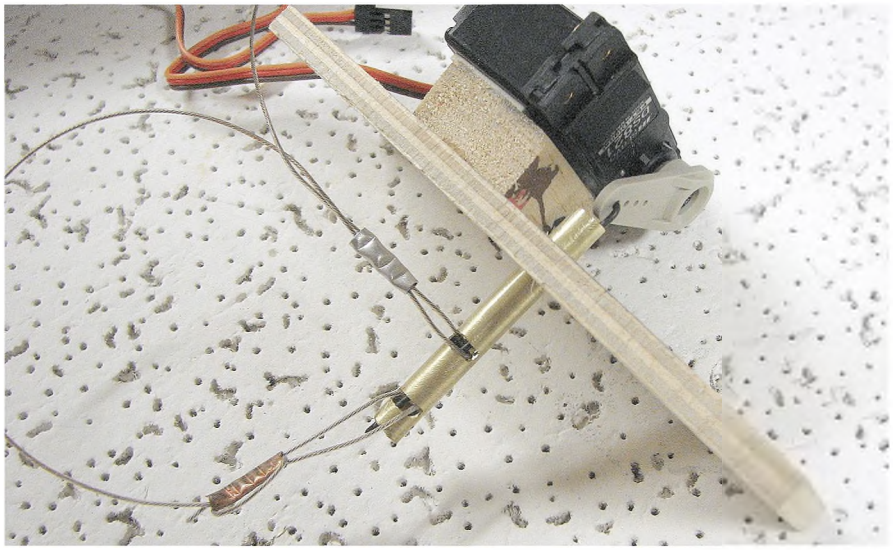


Photo 5: "Down" position of servo when taking off

cluding the simulated fuselage floor, servo mount, the hard brass tube, and the release wire, all to be described later. This is another reason I like to fly large models because there's always lots of extra room inside the fuselage for things like banner towing mounts. If there isn't a suitable hardwood part at this location, glue one in and drill your hole through it. You want a good bit of support for the tube when pulling backwards on it.

Attach the hard brass tube through the hole in your fuselage with a drop of thin Zap, making sure the slots face to the rear of the plane. Install a servo with an arm that's about 1" long so that the end of the arm is directly over the hole in the tubing inside the fuselage. Double-sided foam tape may work here, but you may want a more permanent installation.

Set up the control of your servo as follows: You'll want the first position "down" to look like **Photo 5**, the second position "middle" should look like **Photo 6**, and the third position "up" should look like **Photo 7**. There needs to be at least 3/4" of movement between position #1 and position #3, so set your servo travels accordingly. Bend up a piece of 1/16" music wire with a Z-bend at the servo arm end, making it just long enough to get it even with the bottom of the tube at the "down" position. The "middle" position should allow the wire to clear the lower slot but not the upper slot. The "up" position should allow the wire to clear both the lower and upper slot completely. It sounds complicated, but once you get

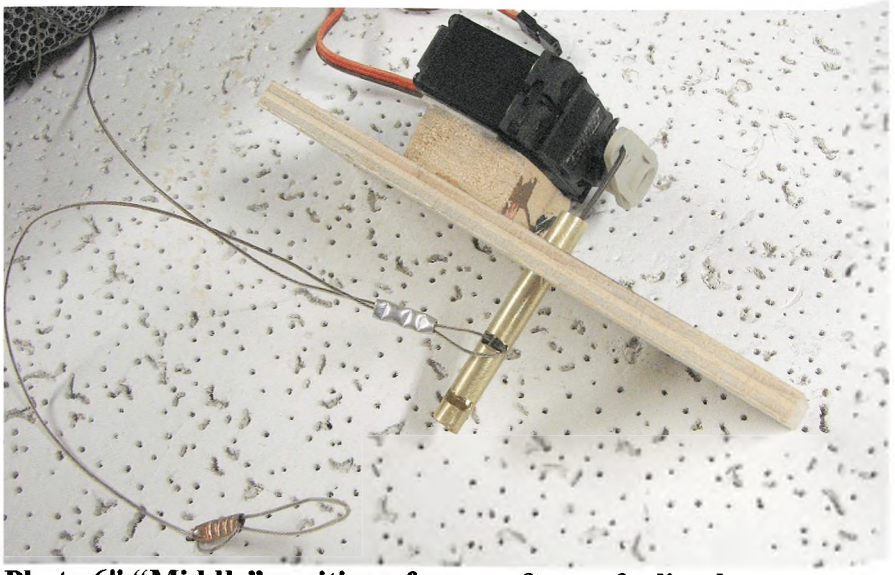


Photo 6" "Middle" position of servo after unfurling banner

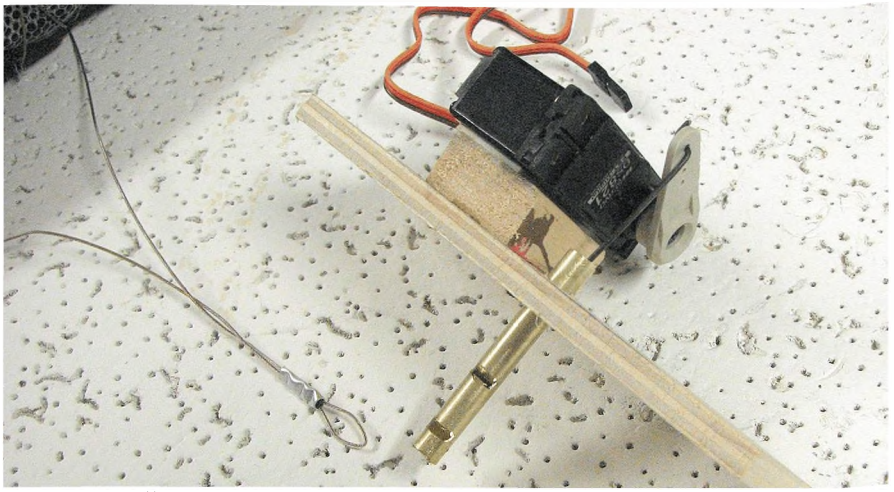


Photo 7: "Up" position of servo after releasing banner from aircraft

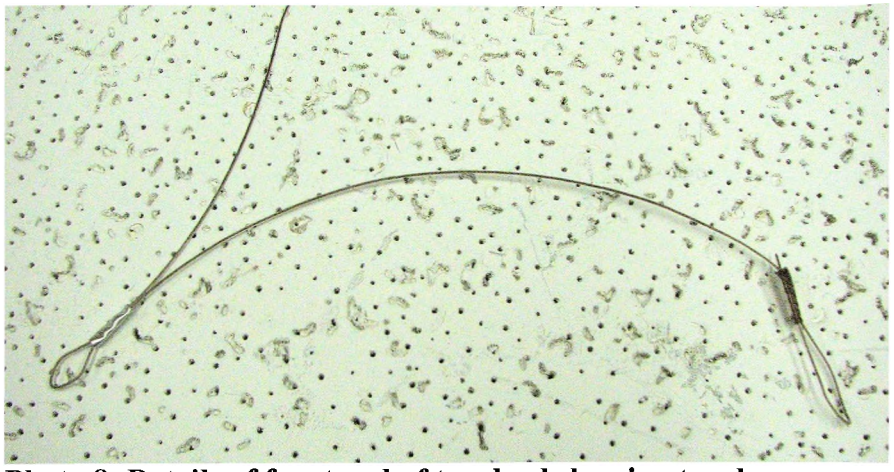


Photo 8: Details of front end of tow lead showing two loops

the idea of what we're trying to accomplish, it will become easier to comprehend.

At the front end of the tow lead, it gets a little more interesting. Make a 1" long loop in the front most end of the lead, securing it with a crimp sleeve. Now, roll up your banner starting at the rear and measure the circumference of the rolled up banner. Make another loop in the lead wire at this dimension behind the first loop and secure with a crimp sleeve. These details can be seen in **Photo 8**.

Here's how to attach the banner assembly to the release mechanism. Roll up the harness and lead wire over the rolled up banner until you get to the loop that's not at the very end. With the release servo set at the "up" position (the wire is clear of both slots), insert this loop into the upper slot and move the servo to the "middle" position. If all is correct, the banner will now be attached to the plane but will unfurl if the plane is flown. Now, wrap the rest of the lead wire around the rolled up banner and put the end loop into the bottom slot. Move the servo to the "down" position, which should keep the banner attached to the plane without dropping. Refer to **Photos 5, 6, and 7** for more details.

Here's how the release mechanism is supposed to work. With the drop servo in the "down" position, you can get your plane airborne. At a safe altitude, you can move the servo to the "middle" position and your banner will unfurl and open up in the air. The part of the lead wire that wraps around the rolled up banner gets disconnected and the banner deploys to the rear. If you move the servo to the "up" position, the banner becomes disconnected from the plane and the banner falls to the ground. Be

Photo 8: Details of front end of tow lead showing two loops

sure to do this over the flying field unless you like to climb trees.

Photo 9 shows my Cub towing a banner around the field during a flying event. If you look closely under the plane, you may be able to see the piece of tow cable that was wrapped around the banner during takeoff, but is now hanging free. While it would be nice advertising for Gordon, you can choose to write whatever you wish on your banner.

By the way, there's one more thing you can do with your newly installed tow and release mechanism. It's called the "Delsey Dive" and it will certainly be the hit of your next air show. Rather than attach your banner to the release fixture, get a half-used roll of toilet tissue and attach it to the release using a long rubber band. When you take off and get to a very high altitude, release the tissue roll, allow it to unroll and then you can "dive" toward it, trying to cut it with your propeller. That's where the name "Delsey Dive" comes from. Or you can ask several other pilots to get their planes in the air before you drop the tissue, and they can go diving toward it. In that case, try to steer clear of those other planes because it will get crowded really quickly.

Happy Towing! *-Dick Pettit*
pettit@ti.com

FUN AEROBATICS

by Ed Moorman

MANEUVER OF THE MONTH

Inside Square Loops

Some maneuvers have names that make them sound harder than they really are. This month's maneuver is one, the Inside Square Loop. You've probably never thought about doing one, but believe me, you'll like it, and nearly any powered R/C airplane can do one.

DESCRIPTION

An Inside Square Loop is a loop with four fairly small radius corners and four short, straight legs in between. The corners don't have to be really sharp, just tight enough to distinguish them from a round loop. Inside Square Loops may be done with up-elevator, or Outside Square Loops done with down-elevator. To do an Inside Square Loop, you make four fairly tight, up-elevator corners, and you're done. It couldn't be much easier.

Don't overdo it! You don't need to jerk full up-elevator. You're better off being nice and smooth.

SETUP

You need a normal amount of up-elevator and enough power for a short, vertical leg. As I said, most planes can do one. You just have to train your fingers.

SAFETY FIRST

Square loops can put a lot of stress on your wing, especially if you're yanking hard on the elevator. If you aren't sure about the strength of your wing joint and dihedral brace, no matter whether it's a kit or an ARF, reinforce it or take it real easy. Even with reinforcement, some trainer wings will not take this much stress. If you're not sure, let a local expert inspect your plane and give you his opinion as to whether it's capable of doing squares without coming apart. Acro planes like the Sig 4-Stars, acro trainers like the Easy Sport, and all fun fly planes will have no trouble with square loops.

THE STANDARD SETUP

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

The Inside Square Loop should be started while flying upwind (into the wind).

WHAT TO DO

Line up in your standard setup and start. After you pass in front of yourself, begin corner 1.

Corner 1: Use about half-stick to start with. Don't overdo it and yank full up. This only scrubs off a lot of speed that you may need to climb to the second corner. Your corner should be tighter than a regular loop, but not so tight that the plane slows down too much. You'll just have to try it with your plane and see how much elevator is best for your plane. If you have a plane with great vertical power (and a strong wing), then go ahead and use full up.

RC REPORT MAGAZINE	
TEACH YOURSELF AEROBATICS CARD	**INSIDE SQUARE LOOP** By Ed Moorman

DESCRIPTION OF THE INSIDE SQUARE LOOP

A square loop is a loop with short, straight legs and four fairly small radius corners. The corners don't have to be sharp, just tight enough to distinguish them from a round loop. Square loops may be done inside with up elevator or outside with down elevator. To do an inside square loop, you make four fairly tight, up elevator corners and you have one. It couldn't be much easier. Believe it or not, most planes can do them unless they are very under powered.

KEYS TO DOING THE SQUARE LOOP

DON'T OVER DO IT! You don't need to slam in up elevator. You are better off being smooth.

AIRCRAFT SET-UP FOR DOING THE INSIDE SQUARE LOOP

You need a normal amount of up elevator and enough power for a short vertical leg. As I said, most planes can do one. You just have to train your fingers.

SAFETY FIRST

Square loops put a lot of stress on your wing and can cause it to fail in the middle. Be cautious. Check the center wing joint and the spars of your plane first.

STANDARD SET-UP

1. Full power.
2. Parallel to the runway.
3. One mistake high. All loops are best done INTO the wind.

FLIGHT DIRECTION

Start the square loop while flying into the wind.

DOING THE SQUARE LOOP

-Do not jerk in full up elevator control for this maneuver. It should be done smoothly.
-Use around half elevator control for corners to start. Use more control later if your plane has the power and the wing strength.
-The size of your square loop depends on your plane's power and weight.

THE UP LEG

The vertical up leg of the square loop is the one you'll need to adjust depending on the power of your plane. Pilots with hovering 3D planes can go as far as they like. Guys with trainers need to see how far the plane will go upward, and then start the second corner at about half that height. You'll need a little speed on the top leg so the plane doesn't wallow around while you're inverted. If you're having trouble doing a square loop with your trainer, you might want to try a lower pitch prop. A 10x6 seems to be the popular choice for most .40 size engines, but you might try an 11x4 to see if you get a little more climb.

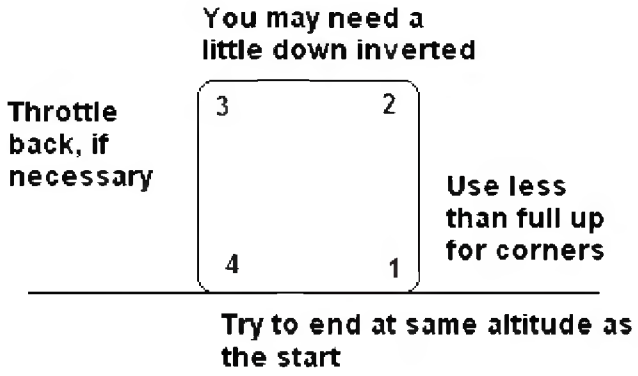
Corner 2: Make your second corner a nice and easy one, using about half stick. Here's a tip: Don't rotate a full 90° at corner 2. Think about how your plane flies inverted, especially at slow speed. If it flies inverted slightly nose up, stop your second corner at that angle. Remember, you're going to be flying fairly slowly here, so don't let the nose drop, or you'll never recover the top inverted leg.

The Inverted Leg: You're going to be at a fairly slow speed here, so if your plane flies inverted slightly nose up, this is the attitude you want to be in. If you keep the legs short and stop the corner slightly nose high, you won't need any down elevator. For longer legs, use a little down to keep the nose from falling. Fly as far as your up leg, and then make corner 3.

Corner 3: You may want to throttle back before this corner. Use half up-elevator or a little less for this corner.

The Down Leg: If you're making a *big* square, throttle back because the plane will gain a lot of speed depending on the length of the leg. If your square loop is fairly small, you won't need to reduce power. As an example, on my Big Stick 40 with a .46, I don't need to reduce power. This leg also takes less time due to the increase in the speed. Watch it or you'll end up a lot lower and much faster than you started.

Corner 4: This is what I call the "coffin corner". If you're too low, look out! If you let the speed build up too much, you can overstress your plane. The key thing to remember is that the legs do not take the same amount of time. The down leg to corner 4 goes very quickly because you're going straight down, maybe at full power. Time the bottom, use half up elevator, and level off, adding the power back in if necessary.

A light, powerful plane can do a large square. Lower powered planes should do smaller squares.
Corner 1: As you pass in front of yourself, pull up to vertical. Do not yank in the elevator
The Up Leg: The length of the up leg determines the size of the whole square loop. Fly vertical a comfortable distance for your plane. Lower powered planes will have to fly a shorter leg for a smaller, tighter square loop.
Corner 2: Make an easy corner here because your speed has slowed in the vertical climb. Level off slightly nose high.
The Inverted Leg: Hold a little down to keep the plane level inverted.
Corner 3: You may want to reduce power before this corner. Make this an easy corner. The plane will drop to straight down quickly.
The Down Leg: This leg doesn't take much time. Even at idle power the speed builds quickly.
Corner 4: Don't overdo this corner. Due to your speed the g's will be high. Add power back in after you level off.

CLIP OUT-TAKE TO THE FIELD *COLLECT THE WHOLE RC REPORT SERIES*
For reprints of Fun Aerobatics or back issues call R/C Report magazine: (256) 539-3031
Ed Moorman E-mail: moorman1@cox.net

Okay, that wasn't too hard, was it? Now all you need to do is get out there and practice.

FEATURE OF THE MONTH
Flaps builds a Wing-Air 75

In last month's teaser preview I told you about talking Flaps into building a single-engine flying wing from a conventional, twin-engine kit. This is a built-up kit, not an ARF.

Flaps was "bored to tears," as he put it, and reduced to watching daytime soap operas on TV. At age 87 he's seen every old movie there is, often twice, and some many times. I needed to get him out of his lethargy, so I was trying to think of a project for him when I remembered that I had an extra Northeast Aerodynamics Twin-Air 45 kit. You may remember the March 2005 issue where I did a mini-review on this kit. Later on we converted it to a *triple* by adding an engine in the nose!

The Northeast Aero Twin--Air is one of the best flying sport twins out there. Right now I'd be hard pressed to think of a twin that flies better. The old Pica Duelist is popular too, but I've never flown one. Anyway, I ordered a second kit after flying my first one. If I managed to bash one, I wanted another one real handy. Fortunately, I still have the first one, so the second kit was never needed... until now.

The Twin-Air is an excellent kit, CAD designed and laser-cut, so everything fits perfectly.

I didn't really want another twin right now, and I felt sure that Flaps could make something interesting from the kit. Both he and I like non-conventional airplanes, so I figured why not a flying wing? He said a flying wing wasn't odd enough, and he'd already done lots wings and deltas already. I kept bugging him about it, though, until he finally gave in and agreed to it. I knew that once he got CA on his fingers, he'd be hooked and finish the job. **Photo 6** shows the normal Acrodynamics Twin-Air 45.

Basic Design Modification

For the basic design of a flying wing, you need to start with the CG a good bit forward of where you would normally balance. A good rule of thumb for flying wing CG's is 10% to 15% of the average chord. We'd normally use 25% to 30% for a conventional plane.

Then you need a reflex airfoil, or you have to add some reflex to the airfoil you have. Let me explain: The lift of a

Photo 1: Young Daniel DeMaria with his father's kit built 4-Star 40. Frank uses an Evolution .46 for power. Great colors and trim design! Frank later told me he pulled the engine and radio to put in a Kaos since it flies better. I loved the Kaos. I built 4 of the original ones and a couple of the Tower ARFs. Frank's is the old Kaos Jr, original 40-size, built from RCM plans.

Photo 2: Jorge Estrada with his Su-31. Jorge uses a Thunder Tiger .75 4-stroke in it. He originally had trouble with the engine leaning out and quitting, but found he had fuel foaming. With a little extra foam around the tank, the engine turned out to be a sweetheart.

wing on an R/C airplane acts rearward of the center of gravity. This makes the wing want to rotate forward, or nose down. The horizontal stab provides a downward force, countering the wing's nose down tendency. We don't have a horizontal stab on a flying wing, though, so we have to provide something else to counter the forward rotation of the wing. To do this we generally raise both elevons slightly. This forces the rear of the wing down, countering the natural rotation. You simply make an educated guess of the correct amount, and once in the air you trim the plane to fly level. This gives you the right amount of up-elevon. You may remember the October 2007 issue of *"R/C Report"* magazine in which Flaps and I sawed the stab off an old Goldberg Extreme 330 to make it into a flying wing. We adjusted the elevens (the former ailerons) up about/4" to give the needed reflex. In-flight trimming later resulted in the exact amount needed. After predictions of disaster from Ugo and others, we proved them wrong. The model flew great.

Twin-Air Kit Modifications

Wing: You can build the wing normally but without the twin engine nacelles. This works just fine as the nacelles are normally added *after* the basic wing is built. I did want one mod for safety reasons, however. I lost a delta with elevons when one of the elevons failed. It was either the servo or the linkage, which left me with no control on one side. Any attempt at up elevator then resulted only in roll. There was nothing I could do but throttle back and watch the crash. For this reason I asked Flaps to cut the elevons into two pieces and use four servos. This way if one fails, I'll still have *some* control. So delete the nacelles, build the wing by the plans, but use four elevon servos.

Fuselage: Since the kit is a twin, the nose is a solid balsa block to be carved and sanded to shape. This needs to be removed and an engine mount installed. Northeast Aerody-

Photo 3: Ugo Ferrari has hung up his Tower Trainer and is now flying this new Great Planes Escapade. It only has 462 square inches of area, so the OS .40FP he used is an excellent match for the plane. Does anyone else miss the OS .40FP? Ugo let me give it a try and it's an excellent flying plane and only $99.99.

Photo 4: Jon Kline and his Hangar 9 Funtana 40. It uses a Magnum .91 4C for power, so it doesn't lack speed and vertical.

namics also sells a .60 size single-engine kit with an almost identical wing and fuselage (same span and length). The twin gets nacelles and a big balsa nose block. The single gets an engine mount on the nose. I checked the plans and right behind the nose block was a very nice 3/8" plywood firewall. Flaps wouldn't even have to cut out a firewall for this model.

Naturally, the stabilizer has to be removed to have a flying wing. To help us get the balance without a lot of work, I decided that we should cut the stock fuselage off at the bulkhead that's mid-way back between the trailing edge of the wing and the leading edge of the stab. I told Flaps not to worry about tapering the new, shorter fuselage, but to decorate it like a jet exhaust. So delete nose block and cut the rear fuselage off at mid point.

Fin and Rudder: Normally, if you shorten the fuselage you'll want a slightly larger fin and rudder to compensate for the lost fuselage side area. For this project I asked Flaps to move the original fin and rudder forward on the shorter fuselage, and I'd give it a try like that. The tail is already a pretty good size, so if there *was* any yaw instability, I figured it wouldn't be much. Besides, we can add to the size of the fin later on if needed. So, move the standard fin and rudder forward on the shorter fuselage.

Northeast Aerodynamics' kits are laser-cut and feature top quality balsa. Flaps' said the kit has "good lumber." The kit includes landing gear and the regular kit hardware. Flaps and I usually replace at least half the hardware, but that in the kit will work.

The wing ribs of the Twin--Air are semi-symmetrical with a flat bottom from the main spar to the trailing edge. This is the same design as used on the original Ugly Stick and the newer Uproar kit. It means you can build the wing flat on the table, making it easier to align everything and keep it warp

Photo 5: John McGowan and his Air Devil combat plane named *"Bitch Slappin' Mama."* John likes the Magnum .15XLS for power.

Photo 6: Ed and Flaps' Twin-Air 45. This kit was the basis for the flying wing detailed below.

free. The instructions are excellent and there are plenty of pictures. One thing Flaps said that the instructions stressed several times was keeping the wing straight. After starting, it didn't take Flaps long to finish framing up the wing panels using thin CA and joining the two panels with 30-minute epoxy and fiberglass cloth.

The fuselage is a simple, slab-sided box, so the construction is very easy. There's a 1/16" plywood doubler from the wing trailing edge to the firewall, and 1/4" balsa doublers in the wing saddle area, so the basic fuselage is pretty sturdy. The top of the fuselage is designed as an all-balsa, cabin-like structure with a windscreen and turtledeck. Tongues on the bulkheads fit nicely into laser-cut sockets in the sides, making for a strong, straight fuselage. Some carving is required to round off the edges, but this is minimal. Frankly, I think and Flaps agrees, that a little whittling does a man good, so we never mind this part of construction. Many of you will probably remember back when you were a kid, you would sharpen your pocket knife and just whittle on a stick with nothing particular in mind. I know I did.

Flaps chopped the fuselage off just aft of the center fuselage bulkhead between the wing and stab. Next he cut a new slot for the fin in the top of the turtledeck. Since this is a flying wing, the stab isn't required.

The supplied nose gear mounting block is bolted to the rear of the firewall. This locates the steering arm under the fuel tank. A bottom hatch is provided to make it easier to get the tank in and out, and also to adjust the steering arm.

I had a Tower .75 engine available that had been broken in but never flown. My other Tower .75 is in a Pole Star flying wing. It ran so well I bought a second one, but never got around to using it. It should be good power for this model, and hopefully give us a good bit of speed.

Photo 7: Ed and his Wing-Air 75 prior to the test flight.

Photo 8: The Wing-Air 75, left side.

There was no engine mount included, so we chose a Great Planes adjustable mount. We like this one because it allows us to change engines later without drilling new holes in the firewall. Besides, I already had one that was drilled for the engine we were going to use.

The engine is side mounted, so Flaps decided to get fancy and add short cheek cowls to both sides, one over the engine and a matching one on the other side. Before I could even ask, Flaps said, "Don't worry, I know you're a nut on cooling, so the inlet and outlet are *big*. That engine won't overheat." The cheek cowl additions and a 2-1/2" spinner dress the nose.

We're using a JR 9303 transmitter, a JR 770 PCM receiver on 50 MHZ (ham frequency), four Bluebird 630 standard servos for elevons, one Hi-Tec 5625 digital servo on the rudder, and a Bluebird mini servo on the throttle.

Friday, I dropped over to Flaps' shop to set up the radio controls on the Wing-Air. I took one look at the finished plane and said, "Whoa, buddy, that thing is bright!"

"You said you wanted to see it," he answered. I'd told him earlier that I wanted an easy to follow plane in flight, and he sure gave me one! **Photo 7** shows me with the Wing-Air 75 flying wing.

The other thing I noticed was that it looked very short and stubby, and not very esthetic. "Looks to me like you took a plane and just cut the fuselage off," I commented.

"That's what you told me to do", he replied. And he was right. **Photo 8** shows the Wing--Air from the side.

For the elevons I needed to set my JR 9303 Wing Type feature to "Delta" or "Elevon." I'm using four eleven servos for safety reasons, so I decided to keep it simple. I used a Y-harness to connect the two left servos together, and a second Y-harness to connect the two right servos. Once this is done, the right wing servos plug into the elevator channel, and the left wing servos plug into the aileron channel. The transmitter's programming allows the controls to work together for elevator or pitch control, and opposite for roll or aileron control.

This is a flying wing, so the airfoil needs reflex. After I got the dual rates set, I used the Sub Trim (center adjust) feature to raise both elevons about 1/8" above neutral. I figured this would be a good starting point until I get it trimmed.

Since Flaps used a pull-pull cable for the rudder, he wanted to use a separate servo for nose wheel steering, so another JR 9303 was added, mixed with the rudder channel.

Saturday was cloudless with only a light breeze, so it was a great day for flight testing. Flaps and I assembled the Wing-Air, did a range check, and tried out all the controls. After starting and tuning the Tower .75, we were ready to go. I taxied out, turned into the wind, and eased in the power. After about a 20' roll, I started easing in some back stick. The nose gear suddenly turned 90° and the plane nosed down, killing the engine. Rats!

We brought the plane back into the pits, sat it on the work table, and took a close look. The nose was angled a little bit low. It wasn't really noticeable when the plane was on the ground and you were standing up, but it was clear sitting on the table. This caused the model to push down on the nose gear as speed increased. It was easily fixed by extending the nose gear a little, or we could have installed a slightly larger nose wheel.

Next we flipped the plane over and removed the lower hatch. The nose wheel steering

used a flex cable and the steering arm was fairly flexible. Between the steering arm and the flex cable, I could turn the nose gear by hand pretty easily. Flaps said he could fix it, but he wanted to take it home and do it right. I'm a band-aid type, full power and go-for-it guy at the field, so Flaps has to hold me back at times. I knew he was right this time, though. The plane didn't have a scratch on it except for the scuffed tips of the Master Airscrew prop. We agreed to pack up, take it home, fix the nose gear right, and try again next weekend. I then settled for flying his scratch-built scale Fairchild 24.

On the following Sunday I was primed and ready to fly the Wing Air. Flaps had changed the nose gear linkage to a solid wire that was much stiffer. I swapped the nose wheel for one a 1/2" larger, thus raising the nose 1/4".

With the model on the runway and aimed into the breeze, I added power. It was tracking fairly straight, so I added some up elevator. Then I added some more, then more. When I was holding full up-elevator and the plane was still glued to the runway, I shut it off and aborted. Double rats! Now what?

Flaps, I, and several other guys discussed it and decided that it was too heavy on the nose gear. Duh! I should have thought of that during construction! The gear is in the stock location, which is fine for the normal CG, but the forward CG of a flying wing places more down-force on the nose.

This would require a major fix. We have to move the main landing gear forward. I'll have to get a good check on the CG and move the landing gear mounting blocks, or add new ones, which might be easier. An inch behind the CG ought to be about right.

So, I can't give you a flight report just yet, but that's how it goes with original designs and heavy conversions. This is especially true for unconventional planes like flying wings, deltas, and canards. Hopefully, I'll have a flight report next month.

-Ed Moorman
85 12th Street
Shalimar, FL 32579
moorman1@cox.net

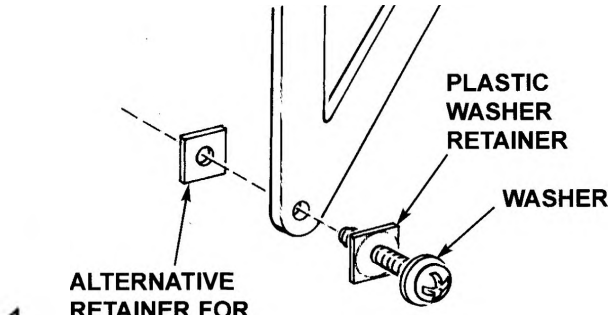
The last of the...
HOSPITAL CHART
BLOOPERS

1. The patient's skin is somewhat pale but present.
2. The pelvic exam will be done later on the floor.
3. Patient has two teenage children, but no other abnormalities.

HERE'S HOW...

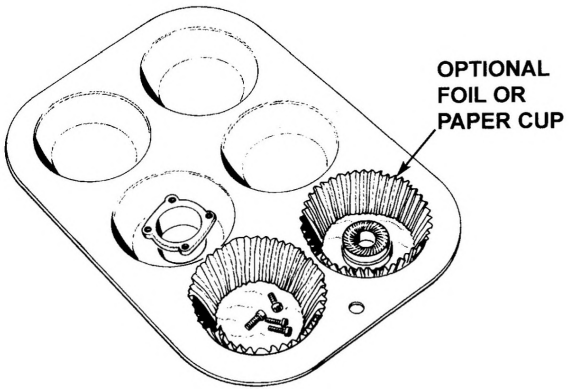
by Walt Wilson

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 email to... rallyo@charter.net
Please include your full name and mailing address. The first submitter of any idea used here will win a Two-Year subscription or renewal to R/C REPORT ONLINE. If the subscription or renewal is to be a gift to someone else, please state this when submitting the idea.



1.

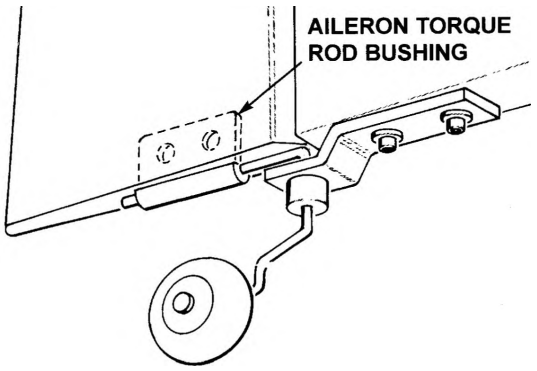
1. Mark Immonen of Ann Arbor, MI, had the problem of losing the washers on the little bolts that fasten the wing struts to his models. He cured the problem by cutting a piece of discarded, flat plastic from a product package (or any scrap plastic of suitable thickness) into washers. First drill holes in the plastic just a bit smaller than the outer diameter of the bolt. Then cut out the washers and thread them onto the bolts. If the plastic washers are an easy, slip-on fit, they won't stay on any better than the original washers. You may have to repeat the process every once in a while, as the plastic will eventually get squeezed and stretched out, so it's well worth replacing them occasionally. (Walt's Note: The bolts can be held onto the struts or mounting lugs in the same way, to avoid dropping and losing them altogether.)



2.

2. Mark A. Sherrill, of Galt, CA, was about to throw out an old muffin (or cupcake) pan when he found another use for it. He was always losing track of small engine parts on his messy workbench when performing repairs. Now Mark uses a Sharpie pen to label the pan's cavities to isolate and keep parts from mixing, such as valve train parts, etc. He makes notes on the pan where necessary, for parts orientation. Clean up is easy with a little alcohol, which gets rid of any oil residue and the old notes. If he can't get complete the engine work right away, the pan can be easily stored with all the parts identified for the future. (Walt's Note: Aluminum foil or paper baking cups can be used to line the pan's cavities, and can make picking up tiny parts easier, as well as preventing accumulation of oil residue.)

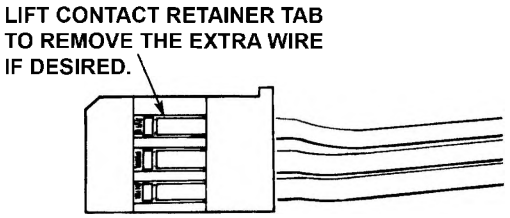
3. From Mark Klein, of New Hyde Park, NY: To isolate the rudder and tail wheel assembly, Mark uses aileron torque rod nylon bushings. Cut a



3.

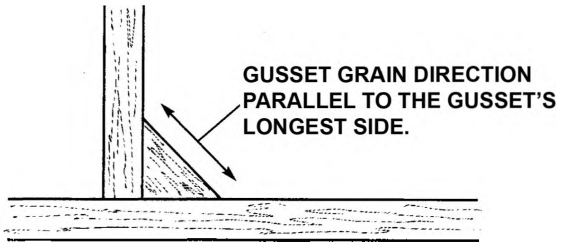
slot into the bottom of the rudder, push in the bushing, and add a drop of CA to secure it. The tail wheel tiller is inserted into the hole of the bushing, and then the wheel mounting assembly is fastened to the bottom of the fuselage. Repairs to the rudder are now easier, as the tiller is not actually glued to it. Also, there is less stress transmitted to the rudder servo with this setup.

4. (No illustration) James Biza, of St. Paul, MN, uses Zap-A-Dap-A-Goo to adhere plastic canopies to his planes. He says it's a great product for this, but clean-up can be difficult if it wicks up or gets smeared onto the canopy itself. He found that a common household product, called "Goo Gone", does a great job of cleaning it off without any clouding, scratching, or other damage to the plastic. Just scrape off the bulk of the adhesive with your fingernail, and then gently rub the residue with "Goo Gone."



5.

5. From Jim Crawford, of Merced, CA: If you have a bad servo that is not feasible to repair, at least save the connector and lead. It can be used to adapt a different servo to fit your receiver, or use it on batteries that come without connectors. Since most batteries use only two wires, the third wire can be removed from the connector. (Walt's Note: If the gears are the only damaged parts, replacement gears are often available from well-stocked hobby shops. If they don't have them in stock, they can be ordered. Gears can be replaced for a fraction of the price of a whole new servo.)

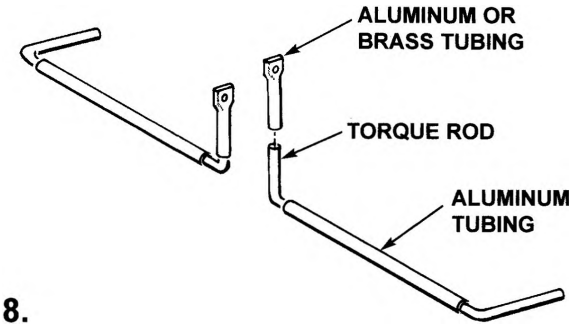


6.

6. Leo Huminick, of Weatherly, PA, wants to remind us that triangular gussets are frequently used to reinforce butt-joints when building. The direction of grain is very important for maximum strength. The wood grain should always run parallel to the longest side. If the grain is perpendicular to the stressed side, the gusset will likely split under stress and leave the joint unsupported.

7. (No illustration) Jack DeLisle, of Saint Claire, MI, uses plain old cotton swabs for touching up or painting small items when he doesn't want to use a paint brush he'll have to clean afterwards. If the cotton starts to come off, he throws it away and gets a fresh one. He bought a 250 count box about five years ago, and still has about half of them left. (Walt's Note: I suggest using good quality swabs, such as "Q-Tips" for this. The cotton ends come off cheaper swabs more easily.) *(Editor's Note: I once used cotton swaps this way, but now Harbor Freight stores sell 20-pc packages of cheap, artist's brushes for 99¢. They cost more than cotton swabs, of course, but they work better and are still too cheap to worry about cleaning.)*

8. Here's one from me: When scratch-building small planes using a single servo to drive two strip ailerons, the control arms usually stick straight out from the center of the wing. Commercial aileron control linkage is available in various sizes, and does a fine job. It's easy to build your own, though. Most small to medium size models use 0.062" to 0.093" diameter wire. Smaller models may use even smaller wire. Use



8.

the correct size aluminum (or brass) tubing for bearings, and bend the wire to the desired size and shapes. Be sure to make left and right-hand torque rods. The linkage attachment arms can be made from the same size tubing. If larger diameter arms are desired, use the next larger size tubing slipped over the smaller size. Mash flat about 3/16" to 1/2" of one end. Drill a 1/16" hole in the center of the flattened area if standard clevises will be used. If another method of attachment is used, drill to match so there is minimal play. Sloppy linkage will promote aileron flutter. Cut the tubing to the desired length, and use JB Weld metal epoxy or solder to hold it on the wire.

9. (No illustration) Here's one from Suzi, *my wife!* It's easy to forget these hints and ideas as we get older. This column or any other can be printed, hole-punched, and kept in a loose-leaf binder for future reference. If you don't want to use expensive color ink, use the correct printer command to print them in black ink only.

-Walt Wilson
(see addresses at top)