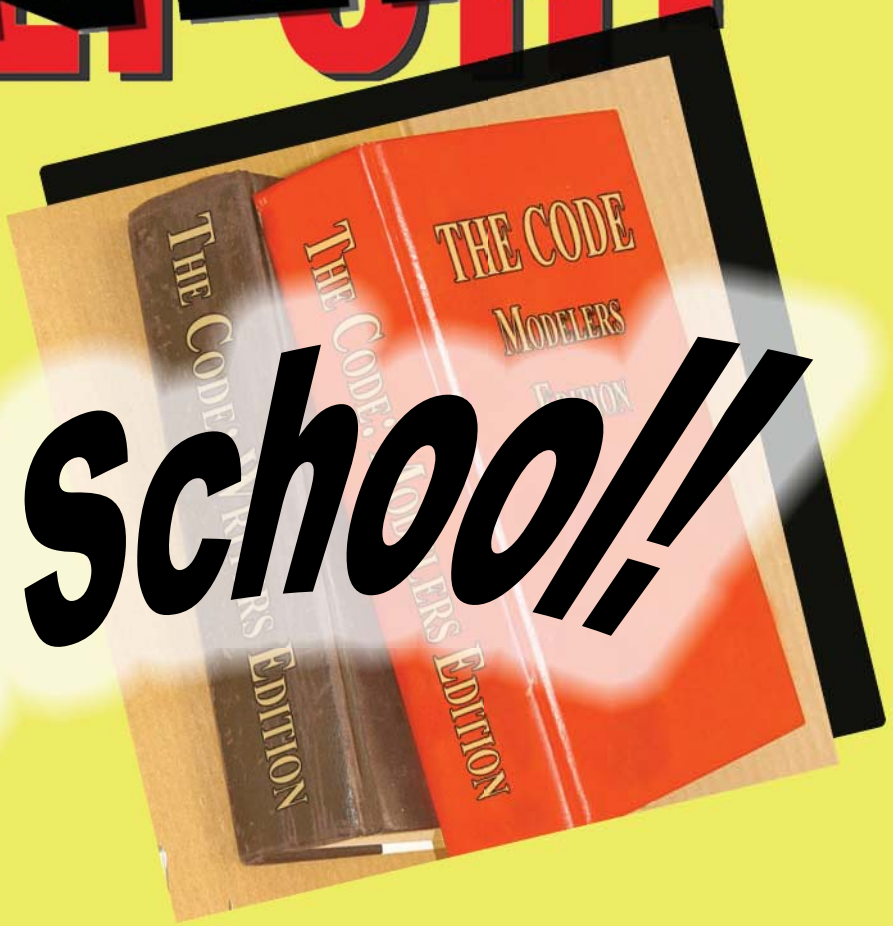
RC REPORT ONLINE

August 2009 Issue # 277

We Got Videos!!
(An RCReport First!)

Back To School!!



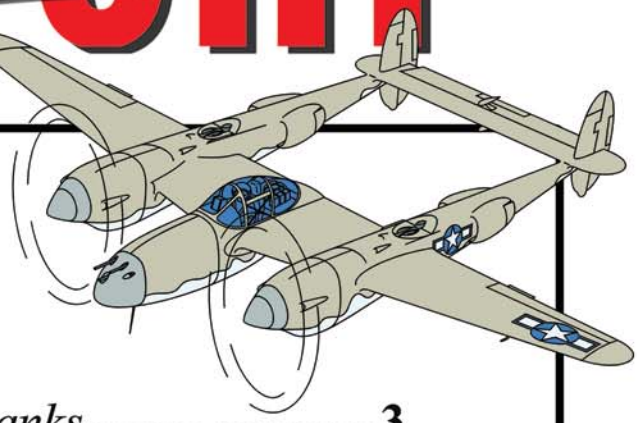
Vacations over, kids are back in school, time to get back to the sticks; both radio system and balsa!!

http://flugtagusa.info

Product Test Reports:

- Avistar .42 ABC
- New Directions RC VecJetPF
- AMR Giant Stick
- Top Flight P-47 Thunderbolt ARF
- Product Concepts HangOrStand

RC REPORT ONLINE



AUGUST 2009

COLUMNS

PRODUCT TEST REPORTS

FROM THE EDITOR

by Gordon & Mina Banks

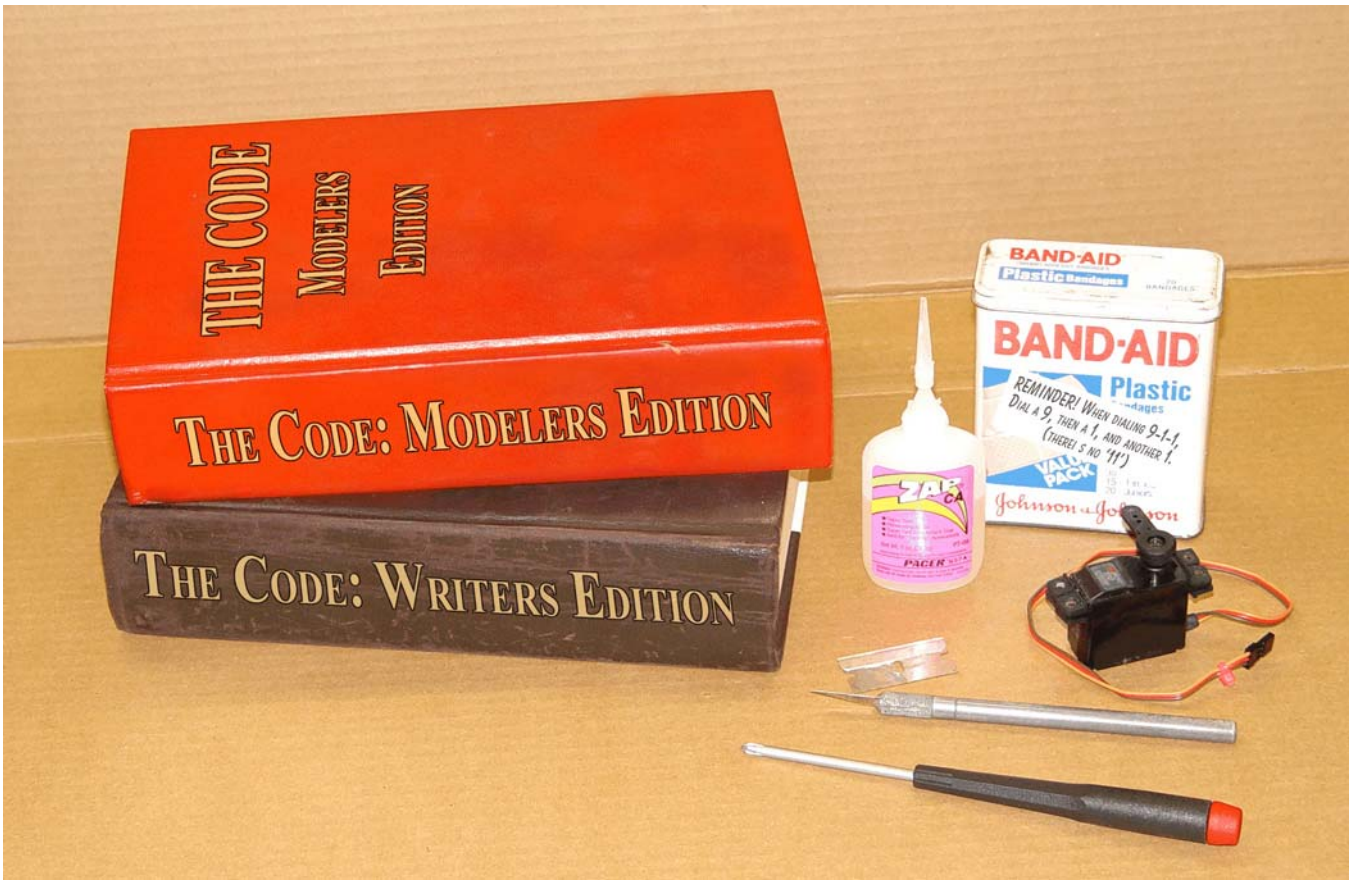
THE MODELER'S CODE

I don't believe that anyone who knows me well considers me a mean person. I loan tools, props, and glow plugs. I've even "loaned" my last few ounces of glow fuel. I lend a hand when asked. I don't hog a frequency pin. I often overlook rudeness and personal offenses from others. I try to give the benefit of the doubt at least once, sometimes twice. But don't push me too far. I have my limits and I can get mean when someone deserves it. I've hidden more than one glow-plug battery. I once dumped a modeler's box of spare nuts and bolts into the bottom of his flight box. I've removed a model's wheels and left them sitting on the wing with no wheel collars in sight. I've filled a few trailer receivers with mud, so when the modeler drops the hitch onto the ball of his car's trailer hitch, the mud shoots out onto his shoes. I've poured a few ounces of fuel under a model's nose, just to send the pilot scrambling to find the leak. And without telling the borrower, I've taken back more than one of my tools that were "borrowed" last month (or last year). Shoot, I'll admit it, I've even done a few things that weren't very nice. Some folks might even say I was "playing dirty." But I don't think so.

So why am I not ashamed of all this? Because... I live by "The Code." If I've intentionally offended someone, they deserved it. I'm not the iceberg to your Titanic just for the fun of it. And if I unintentionally offend someone, I'll apologize and/or fully accept that they may use The Code to get even.

What? No. Uh uh. Forget it, Charlie. Don't even *try* to snow me on this. You know The Code. You know, I know, and we all know that we all know. An R/C modeler with few finger scars who doesn't even realize yet that he's addicted may not know, but you and I know. The Code has been around ever since Lenny made charcoal sketches and wood carvings of flying things. As modelers we live by The Code. The Code is old. The Code is tradition. The Code is sacred. The Code, after all, is our equivalent of the Samurai's Bushido. The Code is what makes it possible for two or more modelers to share the same pit area and flying space without involving the local homicide detectives. Without The Code we'd be constantly updating the beneficiary's name on our life insurance. We live by The Code, we honor and respect it, and... well, we sometimes mess up and suffer its wrath.

Oh yes, I've been *there* too. I screw up now and then. I'll admit having violated The Code. And I've had to endure its vengeance. I've called a certain modeler friend at 3:00 a.m., for example, to ask a question that seemed vitally important at the moment, but actually could have waited until noon. And I've paid dearly for it. Sometimes twice.



Since The Code is generally unwritten for the most part (I have one of the very few copies in existence), so are its rules. In fact, there's even a rule that says we're never to *reveal* all the rules. Making such a list public would open it to personal interpretation, and we can't have just anyone interpreting the rules any way they see fit, now can we? But even though the rules may be secret, their basic reasoning is not. It's 99% common sense, common courtesy, and mutual respect. In short, you show respect for me, and I'll do the same for you. Written or not, known or not, understood or not, the rules are and ever shall be sacred. The Code has always been in effect. It's not new.

Editors and writers have a code too, however, and one of *that* code's rules of the highest order is that we're obligated to tell our readers what the hell we're talking about. So alright, I'll go ahead and explain a *few* rules of The Code, but this is by no means an attempt to cover them all.

I've never been to a flying site that imposed rules on how pilots and spectators were supposed to dress. The Code, however, covers this and it *strictly* prohibits pilots and any male visitors wearing speedos at the flying site! Even going topless is highly discouraged. Do you know the number one form of birth control for people over 50? Nudity.

We don't hog more than our share of pit area. And if our share shrinks as the numbers of pilots grow, we need to act accordingly. If I'm the only pilot at the flying site, then it's *all* mine. But as more and more pilots show up, my share shrinks accordingly. I don't have to explain this any further. It's simple, common sense. But once we're down to a minimum reasonable space, new arrivals have to find their own, even if it means setting up some distance from the normal pit area. Common sense and courtesy still apply, but "first come, first serve" is always an important aspect of The Code.

We never mess with another modeler's stuff, and never *ever* without his consent. If your stuff is in my way, I can ask *you* to move it, but I'm not

allowed to move it without your knowledge. This includes autos, tents and shelters, chairs, coolers, tools, accessories, and especially model airplanes. If I think you're taking up more than your share of space, I can *ask* you to consolidate, but I don't touch your stuff without your knowledge (i.e., permission, or at least immediate presence). If you have an interesting something or other that I'd like to fondle, then I'll ask. Otherwise, it's strictly off limits.

Okay, I said "never", but there are many exceptions here, all based on simple, common sense. Our closest friends, for example, usually know when they have our implied consent to act on our behalf. I've returned to my little corner of the pit area to find one of my models turned completely around. Why? Because a friend or even a nearby stranger saw my model nearly blown away by the wind, so he repositioned it to protect it. And when I got back he immediately explained *why* he'd moved it. This falls under The Code too, because modelers are required to look out for other modelers. This guy, stranger or friend, has not only acted properly, he's earned points that can be used to avoid retaliation the next time he *violates* The Code. Oh yes, The Code includes rules on accumulating good and bad points, and the tally can hold its value for many years. It's not like we hold an old grudge for years on end, it's more like... well, it's kinda like... No, I guess it's *exactly* like holding an old grudge.

We don't hog the frequency pin. This rule is far more complex than it seems on its seemingly smooth and simple surface. Many pages could be written on this rule alone, but like most rules, it's all based on common sense.

During an open flying session (but not during events when *other* rules may apply), if I take the frequency pin from the frequency pin rack, then that pin is mine all day unless someone lets me know they want it. If the pin I want is *missing* when I arrive, it's *my* responsibility to find and inform the holder that I'm flying on the same frequency. The pin's first user is *not* obligated to constantly poll every pilot present to see if anyone else wants that pin. If you want the pin I have, you have to let me know, and tell me where to find you when I'm finished with it.

Once I know that someone else wants the pin I have, I must never leave the active area (pits and flight line) without offering the pin to the next guy in line. I don't go to the porta potti, I don't go to the snack shack, I don't stand around shooting the bull, and I don't make time consuming repairs while others are waiting for the pin. Make one reasonable length flight, and then offer the pin to the next guy in line as quickly as practical.

Once I've informed you that I'm waiting for the pin, then I have to inform you if I leave active area. I do not expect you to roam all over the flying site looking for me when you're ready to surrender the pin.

We don't break-in engines in the pit area. This not only ties up the frequency pin needlessly, it creates noise and an air blast propeling ground debris that no one appreciates. If you don't want to break it in during flight, and your flying site doesn't have an engine break-in area, then break it in elsewhere. If it's too loud to break-in at home, then it's probably too loud for the flying site too, Another rule is not to use an offensively loud engine and muffler combination anyway. It not only bothers people in the active area, it often endangers flying sites. When it comes to money and models, more is better. But noise is like taxes and body fat... *less* is better.

We don't fly when all the pilot stations are occupied. This is probably covered in the flying site rules as well, but if not, then consider the sky full when all the designated pilot stations are full. Don't go off to one end of the flight line and create your own, additional pilot station. Flyers get used to seeing no more than the prescribed number of planes in the air, and it rattles some

people when an extra airplane suddenly shows up.

Additional pilot stations are allowed when appropriate of course, but as individuals, we do not take it upon ourselves to create them.

We should never be too quick to laugh at another's mistakes. Once the hapless pilot makes fun of his own error, or a very close friend goes into "burn mode", then by all means roast him! But watch for the pilot's response, and act accordingly. Insults that hurt people's feelings are strictly forbidden, and not every pilot wants our sympathy, either. Well intended words are sometimes misunderstood, and even if done accidentally, by hurting another pilot's feelings you may be accruing bad points without even knowing it. When in doubt, take every opportunity to keep your mouth shut. Few things will get you on a pilot's "S-list" quicker than making fun of his bad fortune when he feels rotten about it. Unlike most of The Code's rules, this is one of the few that are very "personal."

We don't "borrow and steal". This is what many people call it when we borrow something and don't return it. Ths is another one of those "personal" affronts, so if you must borrow, then consider that item pure gold until it's back in its rightful owner's hands. Suggestions: Regardless of its state of cleanliness when you borrow it, clean it well before returning it. If you damaged it, offer to buy him a new one. If you borrowed 8 oz. of fuel, return 10 oz. If you accidentally took the item home without realizing it, then take it to him or at least call and offer, and don't forget a sincere apology.

We don't break promises (this is sometimes known as "lying"). If we promise to buy a For Sale model, and ask the seller to hold it for us, then we buy it. If we promise to meet someone at a certain time and place, then we keep that appointment. If we borrow something with an implied promise to return it, we return it. There's no end to possible examples here, but the bottom line is simply that we keep our word. Be trustworthy. Make it mean something when you give your word.

Reasonable people, however, usually allow a major, *major* escape from well intended promises. It may cost us a few bad points under The Code, and repeated escapes accrue points faster than rare escapes, but a proper escape usually prevents hard feelings and open aggression. To escape a well-intended promise, call. Simply notify the other person(s) as soon as practical. Let them know that you meant what you said when you said it, and that you sincerely feel bad about not keeping your word, but something has made it impossible (or unreasonable) to keep said promise. Show the other person respect by letting them know that you can no longer do whatever you said you would do, and it's wise to let them know why when practical.

We don't get downright petty about most flying site rules. Go with the rule's intent more often that its exact wording. I once had a field safety officer verbally abuse and embarrass me because my foot was on the pilot box line, when the rules *clearly say* the pilot has to be "in" the box. That same safety officer also once called a safety infraction when a modeler landed his "dead stick" model down wind. Club rules rarely include written allowances for every conceivable situation. First, it would add more pages to the rules than any reasonable person has time to read. Secondly, common sense safety dictates that mature people are supposed to do what they think is best in an unexpected emergency. I was at a giant scale fly in once in UCLA (Upper Corner, Lower Alabama). That club has a very reasonable (I think) rule that whenever possible, models must be landed on the runway. Well, at this event a big J-3 Cub with a gas engine caught on fire in flight. The pilot still had full control, but he decided to land way out in the field, well away from people. This meant a greater likelihood of loss to him, since it would take

longer to reach the model and extinguish the fire. But he didn't want to risk bringing the model in on the runway, since a total loss of control might occur at any second, endangering people and other models. It caused a small grass fire that took nearly 20 minutes to extinguish, but I and many other pilots applauded his concern for safety. The field safety officer, however, apparently incensed by the grass fire, announced that the pilot would be banned from further participation in the event, since he had violated the field safety rule by landing off the runway, where the grass fire would not have occurred. Yeah, I know... You have got to be kidding me! Well, in this instance there was such an uproar from the other pilots, the safety officer was pressured into reversing his decision, but such is not always the case.

An AMA rule says that no part of a model other than its wheels can touch the ground *except* during a landing. I interpret this to mean that touch n' goes are okay for a model with its wheels down, and it's okay to belly-land a model that *has* no wheels. I also think this means that it's *not* okay to drag a rudder or fin during a low inverted pass, and that it's *not* okay to do a touch n' go with a model that has no wheels. Personally, I'm going to remain silent and continue admiring pilots who can safely do such stunts.

Another AMA rule prohibits a modeler from attempting to "hand catch" a powered model. I'm told, however, that it's already been successfully argued that if the power was off during the catch, then it wasn't a powered model at the time. I often see people hand-catch powered gliders, but only after the power has been turned off.

Some flying site rules allow beginners to make their first solo flight (obviously), while prohibiting even highly skilled pilots from making low, inverted passes. Such a rule is obviously personal preference, and not based on safety at all. If it was approved by the club, then it's a valid rule that should be observed, period. But please, don't try to justify it under the false umbrella of "safety". The most dangerous flights of all are the maiden flights of new and newly repaired models, and they're certainly allowed.

We mustn't occupy the runway without an announcement. This includes take-offs, landings, touch n'goes, over-the-runway low passes, and walking out onto the runway. We should always let other pilots know our intentions ahead of time. And just like real airports, emergencies should be given the right of way.

I'm reminded of the story (probably just a joke) in which a USAF F-15 pilot with one dead engine called for an emergency landing. The tower informed him that a B-52 with a dead engine was already on final approach, but then the F-15 would be given priority.

"Ah yes", replied the F-15 jockey, referring to the crippled B-52. *"The old dreaded seven-engine landing!"*

We don't park our cars where we shouldn't. Our local flying site has what I think is a very reasonable rule: Park near the pits only if you intend to fly. If you're not going to fly, then don't take up one of the limited parking spots close to the flight line. This could force a flyer into lugging all his gear to the flight line from a distant packing space, needlessly. Again, common sense and common courtesy, should be more common than it is. We shouldn't even need this rule, but it's clear that we do.

Okay, had enough? Is it really necessary to list any more examples of The Code's unwritten rules? Somewhere near the top is one we're taught very early in life, yet many of us tend to forget it: "Do unto others as you would have them do unto you." We want others to show us courtesy and respect, right? So let's show them the same.

AFTER THE CRASH

I'm not a great pilot. Shoot, I'm not even a *good* pilot. At least not when compared to some of the truly great pilots in our club (Art, Gary, Jon, Tony,

Wayne, and others). I am a good builder, though, and in my own mind at least a *very* good builder. Once secluded in my shop I take the time to do things the best way I know how. I'll do something over and over as many times as it takes to get it right. I *like* doing it right. I like showing up at the field with a model that's ready to fly, and fly safely (assuming I have a good pilot with me). And I usually accomplish that. I've built and/or assembled over 40 R/C model airplanes in my new workshop, which is not yet three years old. As I figure it, that's over 40 models in 33 months. Some of them, mind you, were electric RTF's that took maybe ten minutes to make ready to fly. Some, however, took well over 40 hours to complete, and one took nearly 60 hours. And of all those models, only two crashed due to builder's error.

The first crash occurred because I souped-up an Electrifly L-39 Albatros electric ducted fan jet by installing an oversize motor and battery. We wanted it to fly 100 mph, and the *second* one came pretty close to that. But the first one crashed because I'd given it 100 mph power without strengthening its 75 mph airframe. At top speed, the elevator fluttered so violently it tore itself right off the airplane. The result was a long line of pretty foam fragments. Builder's error, my fault. I beefed up the second version, and it survived many high speed passes.

The second failure occurred just last Saturday (July 18). My new Top Flite ARF P-47 Thunderbolt was completed just two hours before its first flight. And you guessed it, I allowed myself to be rushed.

The new model was flying beautifully on its second flight, when the radio system apparently lost power. Well, at least that's our best guess at what happened. Every single item of radio gear, to include the battery, checked good after the crash. Builder's error... my error, my fault. An accident, yes, but unavoidable, no. I somehow failed to ensure that the connections between the battery and receiver were properly secured. Sure, I'll be more careful in the future, but I don't really have a "lesson learned" here, since I don't know exactly what failed... which connection came loose.

Anyway, kits usually include instructions on how to assemble the box's many parts into a flying model. Where, though, are our instructions on how to properly disassemble a crashed model? How do we go about separating the good parts from the bad, what do we save, and how do we evaluate their continued worthiness?

Sadly, I don't believe there is just one, simple, iron-clad procedure that everyone should follow. Some people think we should have the entire radio system thoroughly checked out by trained radio technicians whenever it endures a bad crash. I agree that this is a good idea, but I *don't* agree that it's always necessary. It can't hurt, right, so why not? Well, party because it's costly in terms of money and down-time for the radio. My personal rule is that if an item checks out "good as new" as far as I can test it, then I *consider* it good as new. If it acts at all weird, though, then it isn't used again until it's been given a clean bill of health.

So please, take the following suggestions and descriptions as nothing more than "food for thought". This is *not* outright advice on what I think everyone else should do. I just happen to have more crashing experience than most people, that's all.

Anyway, I consider an R/C model airplane to have three major components; airframe, power plant, and electronics.

Airframe

Most models crash nose first, so I begin there. I remove the spinner and look for any signs of damage beyond cosmetic. I won't toss it out just because of scuffs, scratches, and dirt. But if it's broken, cracked, or bent, the damaged parts are discarded, and the undamaged parts, if any, are saved.

Examine the prop carefully. Some scuffs, scratches, and chips be sanded smooth to make it reusable. Cracks and breaks, however, send it to the

paint mixer box. If it *looks* good and whole, but has a crack that makes it unsafe to fly, I'll sometimes save it to use as a static display prop, thus saving a good and useable prop from being painted and decorated for display use only.

Cracked, broken, or bent engine mounts are discarded, of course, but I've seen many that were worth saving.

Fuel tanks with obvious cracks and punctures are trashed. Those that look okay are given a pressure test. If it passes the pressure test, then it goes into the fuel tanks drawer. I don't even attempt to repair a punctured fuel tank.

The wheels are examined for damage. Those that look fine are given a simple spin test to see if they wobble. I will repair some wheels, but those that come in most ARF's usually aren't worth the trouble.

The landing gear is inspected for bends, breaks, and cracks. The good ones and those easily repairable are saved. The same goes for most hardware items, like wing bolts, all sorts of screws, nuts, bolts, washers, wheel collars, setscrews, and more. If a clevis looks perfectly good under a magnifying glass, I'll attach it to a pushrod and control horn to give it a firm push-pull test. Those that pass the tests are saved to fly again. Likewise with control horns, pushrods, servo arms, special servo mounts, etc. I save almost anything that might be used again some day. When a model's remains go into *my* trash can, there's very little left of any value at all.

Now don't get me wrong. I'm not so concerned about saving a few pennies when I save screws, washers, and greasy control horns. I'm more interested in having a lot of good parts on hand so that when I need something at 3:00 a.m., I don't have to wait until the hobby shop or hardware stores reopen. With a $10 parts organizer drawer unit, you can save and store a lot of little pieces that seem insignificant... until you need one. How much does it cost just in time and gas to drive to the local hobby shop for one lousy blind nut, or because you're 1" short on having enough fuel line? You may also find, like I have, that having a lot of stuff on hand serves as preventive insurance. There's a cosmic law that says you don't need what you have, you'll only need what you don't have. And since I have so much stuff stored away in boxes and drawers, I seldom need anything! Except, of course, what I don't have. Look me in the eye and tell me you don't wish you'd somehow saved those Mickey Mouse watches ($1.99 new in 1955, now worth $800 to $1200), 10¢ super hero comic books (many now selling for around $10,000), and old Elvis Presley 45 and 72 RPM records (don't even ask!).

Plastic and fiberglass pieces like cowls, canopies, air scoops, cockpit details, etc. are saved if they're good, and even if they might be useable once the damaged areas are cut away. I held onto a cracked Pica 1/5 scale Mustang canopy for a long, long time, before cutting it down to fit a .60 size sport model one night.

Good plywood of significant size is cut from the damaged areas and saved. The center area of a mangled giant scale firewall may yield a perfectly good firewall for a smaller model.

Examine the wing panels and tail feathers carefully. Even if they require some repair or shortening, might they be useable again for some future project? Consider your friends with similar models. If you have undamaged pieces from an overall non-repairable model, maybe a friend would like to have the good parts as spares.

Once you've stripped the airframe of every good and/or reusable part you can think of, give it one more long and thoughtful examination before casting it out forever. What about the wing mounting blocks and blind nuts? What about the landing gear blocks (fuselage and wing types)? Don't overlook a good piece of wood just because it has broken edges that can be cut away. I usually even rip out the pushrod guide tubes and save the undamaged portions.

The Power Plant

Now we're talking money! If it's clearly destroyed, of course, then it's clearly destroyed and that's it. But before tossing out the entire thing, check to see if any small parts are still good, like the carburetor, needle valve assembly, muffler parts, cylinder head, valve covers, pushrod tubes, a separate crankcase, or whatever. Disassemble the engine and save the good pieces. I put odd-ball stuff like this into a clear plastic sandwich bag, along with a note describing what it is. I once saved the crankshaft from a demolished YS .60 2C engine, and had it for years before trading it for a perfectly good Futaba 7-ch receiver.

If the engine was not destroyed, and it appears good or repairable (my 1987 O.S. FS-91 Surpass now needs an entire carburetor by the way), then set it aside until you have time to work on it. Use some common sense here, because quite often the engine needs little or no attention at all. In other cases it may require full disassembly for cleaning and to make sure there's no ingested debris inside. If you've never disassembled a model airplane engine, ask around for help from someone with more experience. They're usually not as complicated as they seem. In fact, they're usually very easy to disassemble. The trick is in putting them back together properly.

As a last resort, a clearly damaged engine with mostly good parts can be sent to an engine service center, where they will usually give you a professional estimate on what the repairs will cost. I know of at least three instances in which badly damaged 1.20 size 4C engines were returned to "like new" condition for less than $200.

If you feel unqualified to determine a damaged engine's future or potential value, ask for advice from fliers with more experience. Just don't be too hasty in throwing out an engine that looks bad. Here again, consider your friends. Someone may need the few remaining good pieces you have.

The Electronics

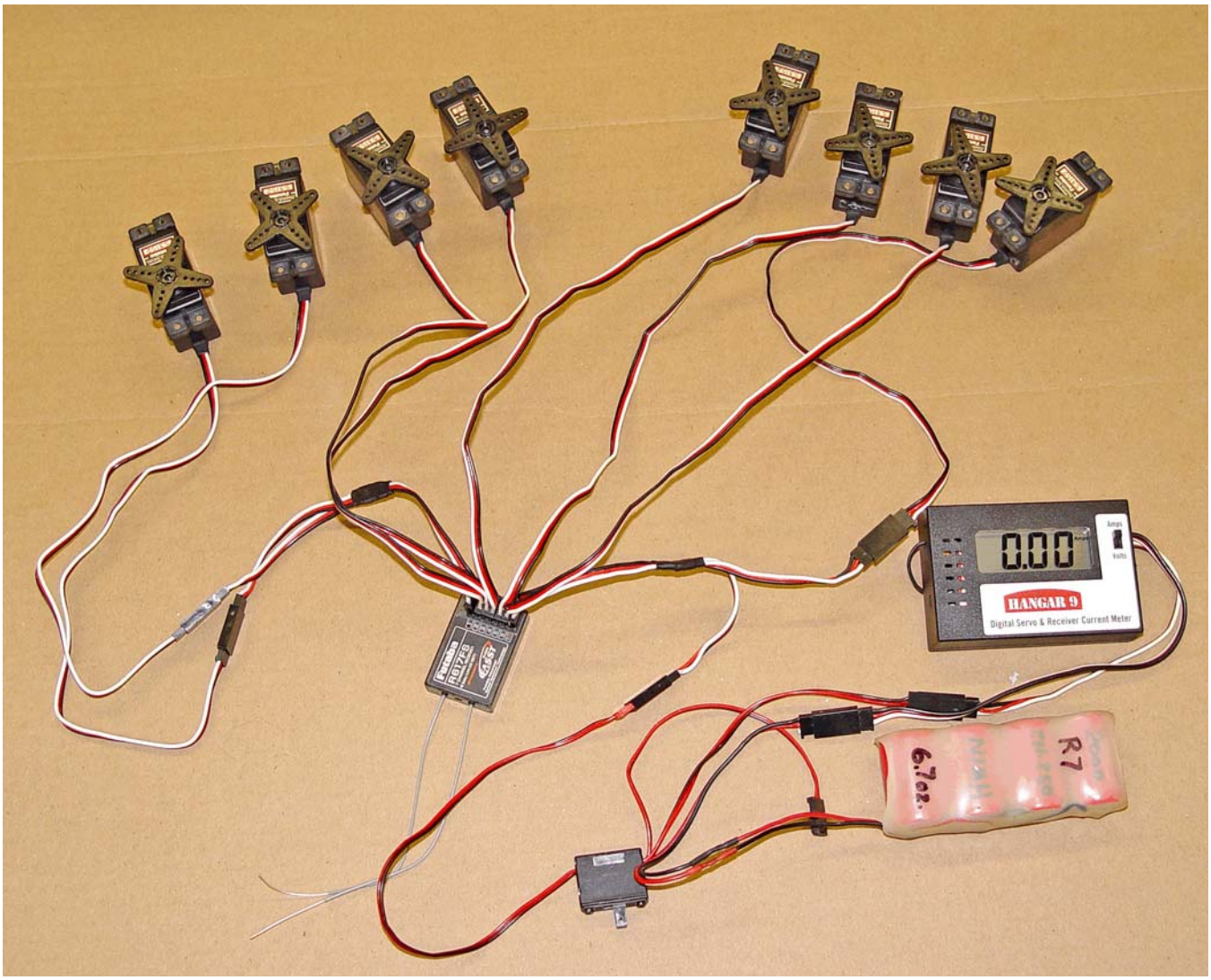
Ah, more big money, mixed with even greater mystery.

Again, I don't argue against the policy of many modelers to simply clean up and send a crashed radio system to an authorized service center. It may cost you more than necessary in terms or money and down time, but the resulting confidence and peace of mind may be worth it. After all, this is the very same line of thought that drives our insurance industry. We pay in advance for something we try very hard to never need, but we enjoy the peace of mind that results.

My "radio gear insurance" takes some time, but it usually satisfies me one way or the other. Oh I'll replace servo cases, gears, external wires, and connectors. I may even replace a simple toggle switch in a transmitter. But that's as far as I go. If I have a transmitter, receiver, or expensive servo that acts weird, it goes to Tony Stillman at Radio South. Cheap servos (those costing $25 or less), switch harnesses, and servo extensions, however, either pass my tests or they go in the trash (after I strip off the good stuff).

Since my primary transmitter is used with many different models, I can test the transmitter by range testing it with a known good model. If that checks out okay, I'll go ahead and fly another model. If that too goes well, I then accept the transmitter as good.

Next comes the crashed receiver. First I get out a magnifying glass and give it a thorough visual inspection. If all looks well, I'll connect a known good battery, servo, and wiring, and test every channel on my work bench. If all seems well there, I'll take it outside and perform a regular range check. If it passes that, I take it back in and connect known good servos to every channel, and make sure they all work in unison. If any of the above tests gives me any indication other than normal, then off it goes to Radio South. If it passes all my tests, however, it goes into a "less than favorite" model for



Here I'm using two Y-harnesses to connect a battery and eight 70 oz. torque digital servos to a 7-ch receiver. Using the Servo Test feature in my Futaba 10C transmitter, all eight servos are cycled back and forth between their travel limits. With the receiver switch turned off (as shown), current flow is 0 ma and the battery voltage reads 5.2 volts (four 2000 mah C-size NiMH cells). With the switch turned on and all eight servos at idle, the current draw jumps to 120 ma at 5.18 volts (approximately 10 mah per servo, and 40 ma for the receiver). With all eight servos cycling (but not under load), the current draw is 740 ma at 5.00 volts, with each servo now drawing about 88 ma. Completely stall just one servo, and the total current draw jumps to 1315 ma (up 575 ma), and the battery voltage drops to 4.8 volts. Stall *two* servos and the current draw is 1890 ma (up another 575 ma), and the battery voltage drops to 4.63 volts. If all eight servos were stalled, the receiver would attempt to pull over 5 Amps, until the battery voltage dropped so low the receiver would temporarily cut off! For this many high-power servos I should use even more battery.

flight testing. Then if it's flown several times without showing any signs of unusual behavior, I accept it as good and ready to use in any model.

My radio gear test model, named "Scraps" to describe the source of its parts, is a .25 size Stick design using an old DuraPlane foam wing with added ailerons, and an even older Enya .29 engine. Oddly enough (or not), ol' Scraps has never been crashed!

Every servo from a crashed model is bench tested. Luckily for me, my Futaba 10C has a Servo Test feature that drives every servo attached to the corresponding receiver, from one end of its travel to the other. While the test servo is being cycled I use my fingers on the output shaft to impose a

heavy load. Then I listen and feel for any roughness, hesitation, or jerking. If I detect anything that might be attributed to bad gears, I'll take it apart and use a magnifying glass to inspect every gear. If I find gear damage in a servo that costs $10 or less, I put it aside for "spare parts only." If it costs more than $10 to replace, I'll order and replace the gear set (unless I have a good gear on hand in my "spare parts only" collection). But if the servo acts weird in any way *not* attributable to the gears, cheap servos are replaced, and costly servos go to Radio South.

The switch harness and all servo extensions and Y-harnesses are carefully examined under a magnifying glass for damage to the wiring or connectors. Even though they may work fine on the bench, I don't trust obviously damaged wires and connectors. If I see no damage, however, then I'll test each item, checking for a firm connection to other connectors, and using my Hangar 9 Digital Variable Load Voltmeter to make sure each item will carry a 2 Amp load without heating. A switch harnesses may even be tested to make sure it carries enough current to power four to eight digital servos being driven all at one time by the transmitter's Servo Test feature. By forcibly stalling some of the servos, I've seen as much as a 5 Amp draw. Although I've seen batteries that wouldn't handle that without dropping in voltage to less than 4 volts, I've yet to see a heavy duty switch harness that didn't take it in stride.

You know, as I sit here editing and polishing this article, I'm wondering why I've never tested any brand new items this thoroughly. Maybe I should start doing so.

So that's it. I'll test every electrical item taken from a crashed airplane, pretty much as described above. If I get any test results that do not instill total confidence, then that item is not flown again until its somehow given a clean bill of health. But if an item *does* pass all my tests, then I consider it good as new, and ready to fly in another model.

But that's just me. Your mileage may vary. Do what you think best for your models, and for your own peace of mind.

-Gordon Banks
glbanks@knology.net

WANTED: Old back issues of *"R/C REPORT"* magazine. Please send list of prices and condition for what you have, to Donn Noble, 936 Cooterneck Road, Heber Springs, Arkansas 72543. He's already bought copies of everything I still have available, but even that still left a lot of holes in his collection.

Since birds often drive away many insects and other pests that get into our work shops and models, having bird feeders in the back yard is always a good idea.

THE BIG PICTURE

by Dick Pettit

It's time again for another installment of "The Big Picture." Like Forrest Gump once said, "Life is like a roll of toilet paper. The closer you get to the end, the faster it goes." That's about how I feel these days, so I hope that roll just keeps on spinning a while longer.

I've been busy working on several new projects, and you may be reading one of those reviews in this issue. It has been a renewed learning experience building all these kits over the past year or so, and I hope my work has generated some interest for many of our readers to try a Build It Yourself (BIY) kit soon. They're fun and you'll definitely learn from the experience. Next time you're looking for a new project, consider a BIY kit instead of another ARF.

This month I'll show you some photos sent in from readers, and I'll delve into the electronics world to introduce you to a fairly new battery technology. So, without further delay, let's get started.

CUB IN OLIVE DRAB

Don Overfelt, an employee at the Bureau of Engraving and Printing in Washington, DC, sent **Photo 1** showing his military version of the popular

Piper J-3 Cub. Don said he'd seen photos of my L-19 Bird Dog, so he wanted everyone to see his version of the popular military observation aircraft.

Don's plane began as an old Hangar 9 Piper Cub with a 100" span, two-piece wing using two metal spars and functional wing braces. Its original weight was 15.25 lbs., but the military paint scheme added another pound. He used Krylon Camo green and Minwax polyurethane semi gloss paint. The markings came from Major Decals. The radio is a Futaba 9C with a Spektrum 2.4 GHz module, driving Hitec 425BB servos. Power comes

Photo 1: Don Overfelt and his O-59 Grasshopper

from a Saito FA-150 swinging a Master Airscrew Classic 18x6 prop.

Don went on to say, *"Even at 16.25 pounds it flies great, and at a very scale speed with the 18x6 prop at about 3/4 throttle. I've always heard that Cubs like to ground loop during take-offs if not attentive to the rudder. Well, this Cub has no such problems at all. It taxies without any issues, and I just need to add some right rudder as I increase the throttle. Then straight down the runway it goes. Once flying, the rudder also needs to be used for a proper turn. Otherwise it drags its tail low in the turn, which is not a pretty sight.*

"I used a lot of paint because being bright yellow at first, it took two good coats before the green looked green. This came at a cost, adding over a pound of weight, but the big slow flyer doesn't seem to care. I used the U.S. stars with the red dot from Major Decals. The red dot was removed in May of 1942, but since the Army did testing of the J-3's in early 1942, I believe the inclusion of the red dot is correct for my aircraft. I modeled mine after the U.S. Army designation O-59, the first lot ordered for U.S. Army evaluation. Piper supplied the Army over 20 of these aircraft that were regular, commercial J-3's until painted olive drab, thus without the greenhouse style cockpit.

"Anyway, I'm proud of the way mine turned out, and I can use it for Cub and war bird events. I think Cubs look good dressed in military green.

"We're real busy these days producing U.S. currency that we all want and need each and every day. So remember, use all you want, we'll make more!

"Have a great day and keep on flying."

Thanks Don. By the way, do you folks give out any free samples?

SOMETHING NEW IN THE BATTERY WORLD

I recently needed receiver batteries for a new project. I'd been using NiMH batteries for quite a while without any failures or problems. I'd already heard about a new battery technology available for portable power tools, etc., and a number of R/C modelers have been experimenting with them in planes, cars, and boats. This new "A123 battery" has been discussed before, both by Tony Coberly and Peter Young, but it still seems to be the latest thing, and right on the leading edge of battery technology. Its claim to fame features include more power per ounce, superior charge and discharge characteristics, a longer life expectancy, and perhaps most important, it's easier to use safely than some of the lithium based cells available today.

I read the following at the A123 Systems website: *"Founded in 2001, A123Systems' proprietary NanoPhosphate™ technology is built (using) new, nanoscale materials initially developed at the Massachusetts Institute of Technology.*

"A123Systems is now one of the world's leading suppliers of high-power lithium ion batteries, using our patented NanoPhosphate™ technology designed to deliver a new combination of power, safety, and life.

"Based on new nanoscale materials initially developed at MIT, A123 Systems' low impedance Nanophosphate electrode technology provides significant performance advantages over alternative high power technologies. Our cell and electrodes are designed to deliver low cost/watt and cost/watt-hour performance. They have higher voltage than other long-life systems, enabling lower pack cost. Their long life leads to reduced life-cycle and system costs, resulting in greater overall price-performance.

As I said before, A123 technology batteries excel in several key areas:

"Power: Nanophosphate is a positive electrode material of remarkable rate capability, critical to high power systems. Our high power products are able to pulse at discharge rates as high as 100C and deliver

superior power by weight or volume in a cost effective solution. With their low impedance and thermally conductive design, A123 high power cells can be continuously discharged to 100% depth of discharge at a 35C rate, a marked improvement over other rechargeable battery alternatives.

"Safety: A123's Nanophosphate™ technology is designed to be highly abuse tolerant while meeting the most demanding customer requirements of power, energy, operating temperature range, cycle life, and calendar life. Multiple layers of protection are employed at the chemistry, cell, and pack level to achieve an energy storage solution with superior safety and abuse tolerance compared to metal oxide lithium ion.

"Life: A123's Nanophosphate™ technology delivers exceptional calendar and cycle life. At low rates our ANR26650M1 cells can deliver thousands of cycles at 100% Depth-of-Discharge (DOD), a feat unmatched by most commercial lithium ion cells. Even when cycled at 10C discharge rates, our cells deliver in excess of 1,000 full depth-of-discharge cycles."

What does all this mean to R/C modelers? It appears to mean that this battery technology is lighter, able to be charged and discharged faster without damage, and it may even last longer while doing all this.

Photo 2: Homemade A123 batteries with output and balancing leads

I came across another website, one developed by my friend, Sid Kauffman, of SLK Electronics, that tells us about the basics of choosing and using Lithium NanoPhosphate cells for R/C applications. Take the time to read and digest this information, because it explains a lot about why R/C modelers are gradually moving toward this technology.

www.slkelectronics.com/DeWalt/index.htm

This website also shows the potential A123 user how to build batteries from commercially available cordless power tool batteries. While not inexpensive yet, the standard 36 volt battery from DeWalt contains ten 2300 mah A123 cells in series, along with some electronic circuitry that isn't needed in our applications. So, I went out and bought one of those 36 volt batteries, followed the instructions on the website, and built five 2-cell, 7.2 volt batteries with cell balancing taps, for a total cost of $114. That's less than $23 for a 2300 mah battery, and the instructions at the SLK website make it easy to do. **Photo 2** shows some of my homemade batteries using 20 gauge wire for the output leads. The two-wire connector provides power to the radio system, while the three-wire connector serves as the tap for cell balancing.

Since Tony Coberly and Peter Young have both already discussed A123 cells, I don't plan to do any long-term testing or research. But I do want to dig a little farther to see what other modelers have learned about using these cells in model aircraft.

One important thing to remember is that A123 cells produce 3.6 volts, not 3.7 volts like Lithium Polymer cells, so they need a suitable charger. There are a number of A123 chargers available today, and

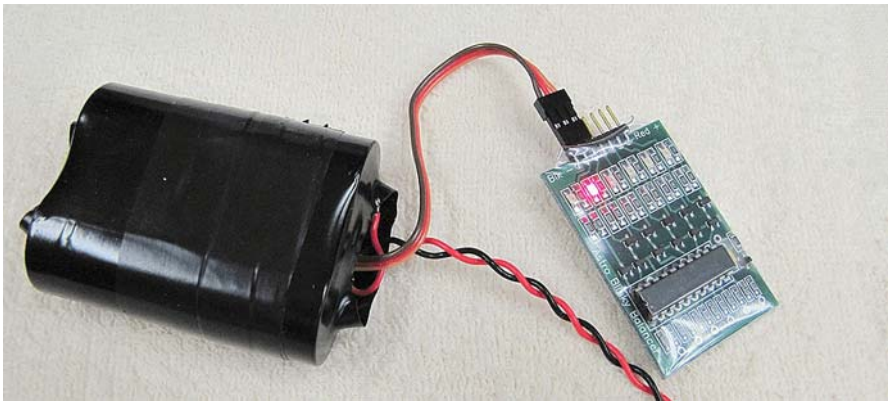


Photo 3a: The Astro Flight A123 Blinky battery balancer at work

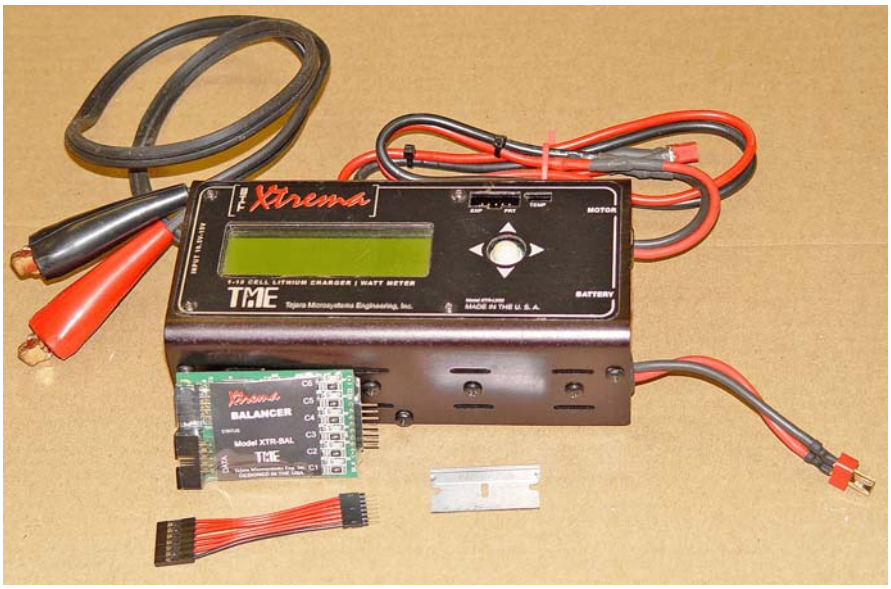


Photo 3b: The little TME Xtrema Balancer, shown with the Xtrema charger and an optional cable adapter. Razor shown for size reference.

many provide the option of extremely fast charging cycles. When I say "fast", I mean fully charging a totally depleted 2300 mah battery in less than 20 minutes! Yes, you can charge an A123 battery at 10 Amps without damaging the cells. *(Editor's Note: Since the A123 Systems cells, also known as "M1 cells", have been available for some years already, quite a few popular chargers have A123 capability. I'm using the Hobbico Accu-Cycle Elite charger for up to three lithium cells, and the TME Xtrema lithium battery charger for up to ten cells.)*

Since all cells connected in series tend to charge in direct relationship to their internal resistance, it makes good sense to attempt to balance the charge equally, using external electronic "balancing" devices. Many Lithium battery chargers already have internal or external balancing circuitry, and such devices are also available for A123 technology.

One is called a Blinky A123, and it's available now from Astro Flight. Seen in **Photo 3a**, the Blinky simply plugs into the balancing taps connected to each battery, and can either allow the charger to balance the voltage on each cell while charging, or it can be used to discharge the cell with the higher voltage while the battery is not being charged.

Another good balancer for the A123 and other lithium batteries is the "plug and play" TME Xtrema Balancer seen in **Photo 3b**. It uses jumpers to select the proper operation for a wide variety of lithium chemistry cells. It can be used as a stand-alone balancer that automatically compares the voltages of two to six cells, and discharges the higher voltage cells to match the lower voltage cells. Or it can be used in unison with the TME Xtrema charger to monitor the charge current status of each cell, to keep them balanced during charging. For more info on the Xtrema charger and cell balancer, point your website browser to www.TMEnet.com

I mentioned balancing taps and how they're used, but you may not know what they are or how they're connected. For a 2-cell battery I use a standard, 3-wire servo connector, as seen in **Photo 4**. The black wire is connected to the negative battery lead, while the other two wires are attached to the positive ends of each cell. The servo connector fits the terminals on the Blinky balancer perfectly, and makes it

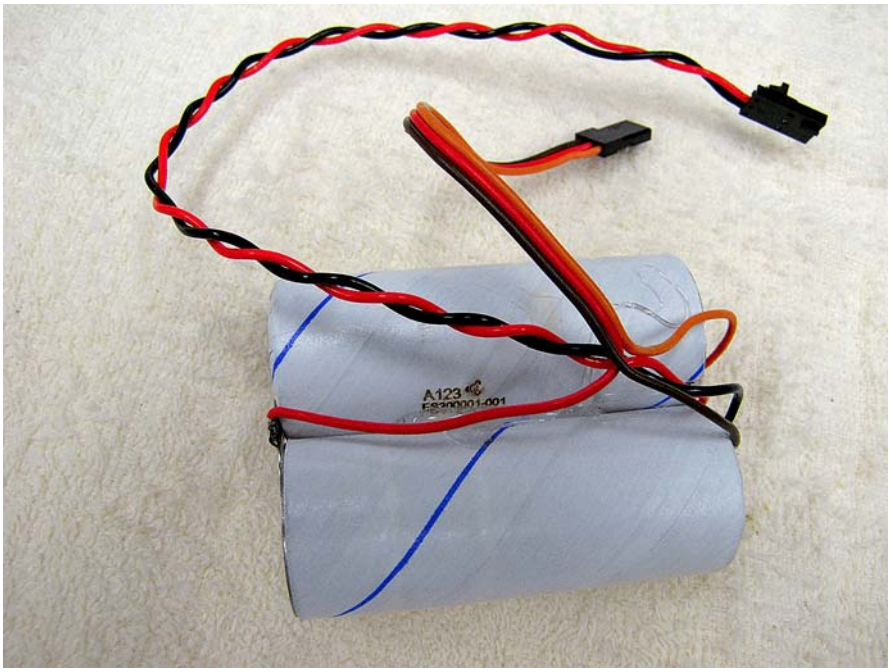


Photo 4: This battery is wired with a balancing tap and output lead.

easy to wire up a home-made battery.

Now that we have our battery charged and balanced, how fast can we pull the energy out? These batteries are capable of 30C constant discharge, with a 10 second burst rating of 60C. If you do the math, a 2300 mah battery can be discharged continuously at 69 Amps, with short bursts as high as 138 Amps. Granted, the battery's stored energy won't last long at *that* rate, but it's there if you need it.

The battery itself used to be a limiting factor when it came to supplying enough current to our modern, high-power servos. With the newer, high current cells, however, the limiting factor shifts to something else. Now we'll need heavier gauge wires and switches to cope with all the power available from such capable batteries. Be sure to upgrade appropriately when using such powerful batteries if your flight pack needs all that power.

Another consideration is that the terminal voltage on A123 batteries will actually increase a bit when the load is removed. This is true of other battery technologies too, but if you merely plug in your loaded Expanded Scale Volt (ESV) meter into your charge switch or battery lead, the battery voltage may give you false sense of security. The discharge curve of A123 cells is extremely flat, meaning that the terminal voltage remains very constant during the discharge cycle, and cannot be used to give the user a meaningful reading on the meter. Several noted battery experts agree that there is a way to determine the remaining charge, but it involves charging the battery fully, exercising it to drain off about half its rated capacity, and then recharge it, noting how much charge is needed to bring the battery back to full charge. There are a number of variables in this method that may or not happen during any one particular flight, so it should be used only as a reference.

According to the "Radical R/C" website, if we merely want to know if our A123 battery has enough charge remaining for another safe flight... leave the model turned on after a flight, and connect a loaded voltmeter directly into the pack balancing plug. Then while holding the load engaged, switch the model off. Then allow the pack to drain into the meter for 5 to 10 seconds before taking your reading. If using a 1 Amp load, don't fly below 5.35 volts. If using a 0.5 Amp load, don't fly below 5.72 volts. Meters with lower loadings should not be used for this.

Now quoting, *"The most stable and repeatable readings are taken in this fashion. The idea here is to preserve the existing condition that the battery has been loaded for some time prior to your taking the reading. Pilots are accustomed to taking readings prior to a flight, and thus the reason for the often printed myth that these cells cannot be*

Photo 5: Homemade 1 Amp load resistor for checking an A123 battery's voltage under load

Photo 6: This battery is being load checked over a 2 hour period

load checked. Check them immediately after your flight and recharge if they fail the test."

Taking this a step further, I made up a little add-on for one of my digital voltmeters to place a 1 Amp load on the A123 battery after a flight. I could not find a suitable resistor with a high enough wattage, so I used three 18 Ohm 5 Watt resistors in parallel to make a 6 Ohm 15 Watt resistor. Using Ohm's Law, where current equals voltage divided by resistance, and since we want a 1 Amp load for an approximately 6 volt battery, 18 Ohms is perfect.

As you can see in **Photo 5**, I soldered the three resistors together and connected them to a pair of banana plugs. These will plug into my analog volt meter, which also has a built-in load resistor. I'll keep the internal load turned off, and only put a 1 Amp load on the battery. A fully charged A123 2-cell 2300 mah battery measures 6.93 volts unloaded, as seen in **Photo 6**. It then measured 6.85 volts with the 1 Amp load connected.

I kept the homemade load resistor connected for one hour, which removed 1000 mah (or 1 Ah) from the battery. I recorded data every 15 minutes, and you can see how gradually the battery voltage drops over time. After this discharge period, the battery measured 6.46 volts. Since the battery voltage only dropped a slight amount in that hour, I feel that the 1 Amp load was constant enough to give me accurate readings.

I put the battery back on charge and recorded that 1141 mah was used to fully charge the battery, indicating again that my data was accurate.

There's probably a much easier method to ensure that our A123 battery is sufficiently charged for another flight. Since we can fully recharge an A123 battery very quickly, just recharge it after every flight or

two, and it will always be ready to go. You can also use this method to determine how much capacity was used during the previous flight(s). Then base your future flights and recharging on those results.

Battery voltage . . . . . 6.93 (no load)
Battery voltage . . . . . 6.85 (1 Amp load)
Recharge time . . . . . 68 mins
Recharge current . 1141 mah

I'll keep you posted on anything else I learn about A123 batteries, and if you hear anything new, please let us know.

For more info about charging and checking A123 cells for R/C applications, visit www.hangtimes.com/a123rxsetup.html

SECOND TIME,
BUT BIGGER

In my May 2009 column I showed a photo of Jim Meyer, of Raleigh, NC, and his Great Planes Extra 330S. Jim was as proud of that plane as any modeler could be, and he really loved it. Now Jim recently took possession of the beautiful 38% Great Planes Extra 330S seen in **Photo 7**. Jim wrote...

*"I flew the largest R/C plane I've built to date this evening. It flew really great, with hardly any trim needed from the transmitter. Unless I obtain a larger vehicle than my Ford Excursion, however, I can go no bigger!" (**Photo 8**.)*

*"My 38% Extra 330S weighs 40.2 lbs., has a 110" wing, uses two complete radio systems with ten servos, and is powered by a DA-150 engine (see **Photo 9**) with a Mejlik carbon fiber 30x12 prop. That engine, by the way, sounds like a really gnarly Harley!*

"The radio is a DX-7 running two AR7000 receivers and JR heavy duty switches, with a 4200 mah 6 volt battery on each side. The engine ignition battery is 2000 mah.

"I'm running eight Hitec 7955MG servos (four on the

Photo 7: Jim Meyer, Raleigh, NC and his Great Planes 38% Extra 330S

Photo 8: Jim's Extra 330S shoe-horned into his Ford Excursion

Photo 9: Here's the a big DA-150 twin that powers Jim's 38% Extra. Is that a beautiful sight or what?

ailerons, two for the elevators, and two on the rudder), one JR 821 on the choke, and one Hitec 5645MG on the throttle.

"So far I have seven flights on the model, and am still breaking in the engine. It's very easy to fly, being even more stable than my 27% Extras, but landing a 40+ lb. model requires a little more runway.

"The Great Planes 38% Extra is the most complete and best kit I've ever built. All the parts fit perfectly and were very well made. The test flight required two clicks of right aileron because the left wing was a little heavier than the right."

Thanks for the letter and photos, Jim, and good luck with that beautiful plane.

TIME IS NOT ON OUR SIDE

Like so many modelers, I made the switch from glow to gas engines long ago. I came to realize that glow engines, while easy to maintain and operate on smaller models, are not particularly well suited for most true giants. Added to the fact that glow fuel is ever increasing in price and it is really messy to remove from the airplane after flying, I've come to prefer gas engines.

I recently had the opportunity, however, to assemble a small, glow powered trainer produced by a major model manufacturer. It was to be a project for my

grandson and me to put together over a weekend, and fly it soon thereafter. Before my grandson arrived, I took the engine from the box, mounted it on a test stand, and prepared to run it for a while to polish off its "rough edges".

First, however, I needed to find some glow fuel! I knew I had some in a corner somewhere, and finally located several almost empty jugs sitting on the floor behind my work bench. I also found one nearly half full. I'd used it not too long ago, and it worked fine then, so it should work fine now, right?

Wrong! I filled the tank on the test stand, started the .46 size ABC sport engine, and allowed it to run at about half throttle until it emptied the tank. After ti cooled off I repeated the procedure, and again it ran fine. During the third break-in run I began dialing in the mixture adjustments. It ran fine the entire time, so once we had the airplane ready, we installed the engine and took it out to fly.

Well we ran into all sorts of problems, and everyone who stopped by offered an opinion on why the engine was running so poorly. We tried new glow plugs, the carburetor was adjusted every which way imaginable, all the screws were checked for tightness, and all the fuel lines were checked and rechecked for holes or other damage.

Actually, we did get the plane into the air three times, and completed all three flights with the engine running. But it took four hours to complete those three flights. We finally decided to pack up and go home, where we'd dig deeper into the problem. We'd already tried everything we could think of, though. So what were we to do?

Back in the work shop I noticed that the jug of fuel we'd been using was getting empty, so I decided to buy fresh fuel at the local hobby shop. Well, what can I say? What a difference that fresh fuel made to our engine! Now it ran perfectly again.

It turns out that I'd bought hat old fuel nearly four years ago, but had used only half the gallon at the time. The remaining two quarts sat in my shop ever since. The jug was tightly sealed with one of those red plastic stoppers under the screw-on cap, but even those things can't protect the fuel for years on end. It looked okay, but it sure didn't run like fresh fuel.

Sometimes you have to step back and consider the obvious possibilities before diving too deep into a problem, no matter what you're working on. Look at the simplest possibilities before you go hog-wild attempting to correct a problem. In my case, had I simply borrowed a tank of fuel from another flyer at the field, our engine probably would have run just fine, and we might have enjoyed the day a lot more. But no, I had to try everything except the one true solution, which only got me deeper into trouble as I proceeded down the path of self-destruction.

The bottom line here is that old glow fuel may not be a good thing to keep around. For that matter, gasoline gets stale and useless too.

When disposing old or contaminated fuel, do so in a safe and environmentally friendly manner. Then shake the cobwebs out of your wallet, and buy new fuel. It may save you a lot aggravation later.

And when you get that new jug of fuel, write the purchase date on the jug with a bold permanent marker, to remind you how old it is, and more importantly, when you should get rid of it.

That's all I have this month. Next time I hope to have more photos from local flying events and readers. I'm also working on some new projects for more reviews in the coming months. So, until next time, happy flying and see y'all at the field!

-Dick Pettit
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(Editor's Addition: I too have seen bad glow fuel cause an engine to run poorly. Personally, though, I still think

The problem (a less than full bottle of fuel containing moist air) and one possible solution (an air tight and fuel resistant Zip-Loc storage bag from which air can be easily expelled).

After pouring the fuel into the bag, nearly all of the air was released from the bag, and the empty bottle was prepared for the next step.

it has more to do with fuel contaminants (water, etc.) than the fuel's age. Back when "R/C Report" magazine was reviewing one or more glow engines almost every month, and providing glow fuel to our Huntsville resident writers, we were ordering anywhere from 48 to 100 gallon bottles of fuel at a time. And to make a long story short, we never noticed any performance difference between freshly opened bottles that were one or maybe six years old. We did learn, however, that an old bottle holding a half-gallon or less was not to be trusted until tested. What I think happens is that the half-gallon of fuel absorbs all the moisture from the half gallon of air in the half-empty bottle, and then it's the water that gives the engine fits. To help prevent this problem, we developed the easy habit of minimizing our store of "less than full" fuel bottles. We always preferred to use one freshly opened for engine tests, but not many engine tests used an even gallon or two, so we often had some "less than full" bottles on hand. Since our fun flying doesn't require a specific fuel, we often consolidated the contents of several opened bottles, regardless of the nitro content or fuel type (2C or 4C). The less air in the bottle, the less moisture and the less often our old fuel was bad fuel.

To minimize this problem when you have only one half-empty bottle, simply pour the contents into a clean, smaller container. Smaller bottles are often more convenient to carry to the field anyway. But the

The fuel bag is now placed inside the plastic 'can' to help protect the bag from puncture. Even if the bag does leak, it stays inside the can. The cut off top at right can be saved as a funnel, or discarded.

real point here is to minimize the air in the container, thus minimizing the moisture content as well. And like good commercial fuel bottles, any container holding fuel should be sealed air tight. I sometimes store fuel in Zip-Loc food storage bags. Pour in the fuel, squeeze all the air out, and then slip the bag into a topless fuel bottle (which is then what, a plastic can?) to help protect the bag from punctures, and to capture any leaks. Stored like this, the fuel should remain perfectly good for a long, long time. Although I've stored fuel like this for over seven months without a problem, I still don't know the long, long *term life span of the plastic bag.*

Although I rarely use gasoline engines in my models, I do keep several 5-gallon gas cans on hand for my ATV and dirt bikes. My current rides are all four-stroke Hondas, so there's no oil mixed with the gas. When I rode KTM two-stroke bikes, however, I and other riders noticed that raw gas often went bad in six to 12 months, but pre-mix (gas with oil mixed in) often lasted twice that long! The oil seems to somehow serve as a stabilizer for the gasoline. Anyway, now when I find that I have raw gasoline on hand that's over six months old, I pour it into my car where it mixes with fresher fuel and runs fine. (A modern car's computer-controlled fuel and ignition systems handle stale fuel much better than older cars with carburetors.)

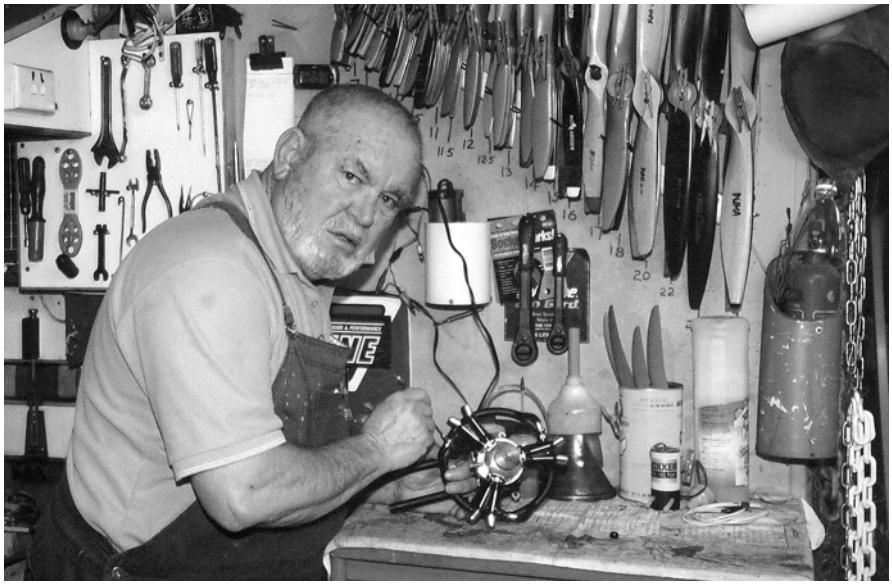
And while we're on the subject of cars and gasoline, please forgive our President's automotive ignorance when he said in a speech that frequent tune-ups and proper tire inflation could save 50 million barrels of oil every year. After all, how would he know that hardly any cars produced in the last 20 years need tune-ups more often than once every 100,000 miles? And while under-inflated tires do waste fuel (and wear out faster), the fuel mileage difference is very small. According to one of our own government's websites, if all four tires on the average car were 10 psi under-inflated (not very likely because they'd bulge so much you'd quickly notice), you'd see only about a 3% decrease in fuel mileage. So, if your tires should be inflated to 30 psi, and your car normally averages 20 mpg, you'd still get about 19.4 mpg even if all four tires somehow dropped to 20 psi (again, highly unlikely). Overinflating your tires, however, appears to result in even less difference. According to tests performed by a major car magazine, running the tires at 40 psi instead of 30 resulted in less than a 1% improvement in gas mileage, while producing a noticeably harsh and uncomfortable ride, and causing premature tire wear. Tire manufacturers, of course, are a major consumer of oil themselves, so in the long run it does pay to keep your tires properly inflated, but it's not going to save millions of barrels of oil each year. Gasoline production is not the largest consumer of crude oil anyway.)

The Oily Hand

by Brian Winch

WHO'S THERE?

The following is part of an inquiry from a modeler who flies control line models, but the problem and information applies just as well to R/C fliers, and I have had similar questions from them over the years.



Joe is from a hot and humid tropical state where the general weather is hotter and dry or hotter and humid, depending on the season, and these conditions are just the ones to set up the problem in question. Like many fliers using 4C engines, his choice is a Saito. I don't know why these engines are particularly popular with CL fliers when there are a number of other brands available, so don't pre-empt my conclusion since I don't have one. I like Saito engines as well as many others, but I still wonder why Saitos are so common in CL circles. Anyway, Joe asked my opinion about a knocking noise heard by others outside the circle while he's flying. He claims to have good hearing, but he doesn't hear it. *"Hey Joe! Your engine is rattling. What kind is it?"*

"Oh, about 2 o'clock I guess, judging from the sun. Haven't you got a watch?" This happens to many modelers, and is called "exhaust ear", a particular form of tinnitus that often strikes modelers. You constantly hear an engine running somewhere (unqualified diagnosis, mostly BS), but other fliers are aware of sounds you can't hear. Joe is running a Saito .72 with a 13x5 3-blade Eather prop (custom made) which is quite a load for that engine to spin, even though the propeller is extremely light weight. He uses an O.S. F-type glow plug, and fuel containing 20% Coolpower oil, 20% nitro, and 60% methanol. RPM at launch is between 8,800 and 9,000 with a slightly rich setting. Joe said the critical point of successful CL is to have the engine running as cool as possible, and he's found the engine to respond very well on hot days using the high nitro fuel. Joe also mentioned an anti foaming additive in the fuel, and asked about different glow plugs. My reply follows, to include a few more thoughts on the subject.

Joe, it might be the knocking of opportunity! Your knocking is also called "pinging" and "pre-ignition" due to using 20% nitro in an engine with too much compression, and such a light weight propeller (lighter even than most wood props) that provides almost no flywheel effect. As far as the engine running cooler, this *is* a characteristic of using higher than normal nitro, but it's not the nitro that does the cooling. The nitro actually increases the fire, which is why we use it. What happens is the higher oxygen content of the fuel (due to the nitro) requires you to run a much richer mixture. A richer mix means more fuel, and more fuel means more lubrication, hence the cooler running.

Another point often missed by many model engine enthu-

siasts, is that a richer mix means more methanol as well. Oil is great for general cooling, but the addition of more methanol plays a big part too.

I'm going to move away from the main path here for a minute, because this is a good opportunity to explain something. This is something that applies to many non-ringed (ABC, AAC, and ABN) engines, but I will use an Enya .40 as a prime example. A few years back when these engines first came on the market, I had quite a few of them come in for warranty checks from modelers who couldn't start them. I must admit that they *were* very tight, making it difficult to flip the prop past Top Dead Center (get the piston past the top of its travel). Some electric starters even balked at the job. If you gave the prop a couple of really determined flips, they would loosen slightly due to the friction-generated heat of the piston in the liner causing the liner to slightly expand, just as it's designed to do. Okay, you actually got to flip the prop and it was feeling a bit easier, so let's give it a choke to introduce a drop of fuel, and then we can surely start it.

Nope, not on your Nelly! They were bloody obstinate, tight as a cheap wedding ring, with the piston stuck partway up and not moving. What's wrong? What happened is that the incoming fuel, mainly methanol, quickly cooled the engine and took out that little bit of heat you built up. For one inexperienced in the black art of engines (modelers who know only that the engine is supposed to swing the propeller), this situation is bloody frustrating and so it surely *must* be a warranty problem. My simple solution was (and still is) to give the top of the engine a good blast with a heat gun until it's uncomfortably hot to the touch (burns fingers), and *then* apply an electric starter for an instant start. I ran the warranty engines hot and cold several times until they loosened enough for an electric starter cold start, but no priming!

For your information, these types of non-ringed engines (ABC, AAC, and ABN designs can also be ringed engines) are never to be run overly rich. A tad on the rich side for a start is okay, but never run them slobbering rich as one might run a ringed engine. If you do, the rich mixture keeps the engine too cool, so the top of the liner does not expand, and the piston keeps getting pinched and wearing rapidly. The connecting rod and crankshaft are under severe strain by the pinched piston, so you often wind up breaking something, or the tightness has gone completely away due to the piston having worn out its required fit. The engine will then turn over easily, but probably still won't start due to being totally knackered, worn out in the piston and liner fit area.

Okay, now back to Joe's engine. The knocking heard by the other modelers was pre-ignition (aka, pinging) caused by the load of the lightweight propeller, and the changing RPM as the engine was loaded and unloaded during flight. Many Saito engines are right at the top of the compression readings, and often *too* high for an unusually high amount of nitro. Straight nitro ignites by itself at 6:1 compression, so a very simple calculation indicates that this is increased to 16.8:1 when the nitro is diluted to 20% of the fuel mixture. An engine with high compression, a big prop load, running a bit lean, and using a hot, long glow plug could easily reach this figure, so the combined factors would lead to the pre-ignition condition. A little richer on the needle might help some, but because of the large prop load and the high nitro fuel, I'd at least lift the glow plug a little by fitting an extra plug washer or two to retard the timing a little. If *this* was not effective, my next move would be to fit a shim under the cylinder, something I do quite often for modelers flying scale aircraft and wanting their Saito engines tamed a little for larger props and smoother running. The metal shims I make range from 0.015" to 0.026" generally, but I have gone as high as 0.032" to *really* tame a big Saito 1.80 for a scale model application. As a side note here, the later ver-

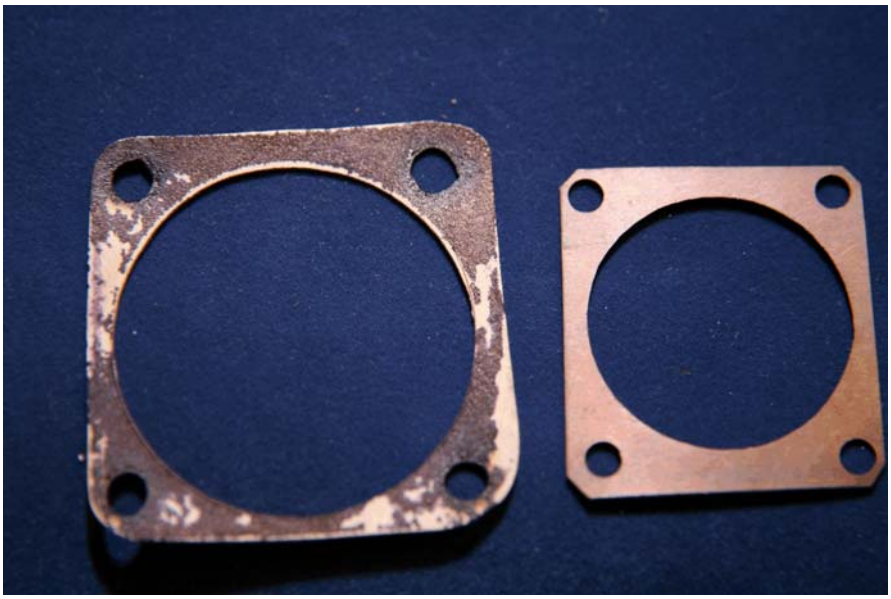


Photo 1: Saito base shims made from very hard gasket card on the left, and bronze sheet metal on the right.

sions of Saitos are generally a little lower on compression, and thus smoother running.

Regarding Joe's questions relating to anti-foamers and different glow plugs, Cool Power oil already contains an effective anti-foaming ingredient, as do most synthetic oils these days, I'm sure. The practice of using foam packing material around a fuel tank seems to be slipping into the past, but don't discount its value yet.

On the glow plug question, I'd rate the O.S. "F", the YS "F", and the new Saito 4C plug as being so close and equal, it would be hard (and pointless) to chose between them. The O.S. plugs have always been winners for me over many years, but I *have* been noticing a growing similarity between them and the others I mentioned. Time will provide the answer, as the O.S. "F" plug is a long lifer, and only time will tell if the others can stay in the race.

Now closing Joe's story, for readers who want every point of the answer, the following goes just a little deeper into the reasons for tuning changes.

As Joe said, the engine responds well to the extra nitro on hot, humid days. The reason for this is simply that humid air contains less oxygen than dry air. Joe lives in a tropical atmosphere where his engine is often oxygen starved. This is why you tune leaner on humid days (less oxygen needs less fuel) and richer on hot, dry days (more oxygen needs more fuel). A gas engine is not so critical of the oxygen content due to the air fuel ratio of 14.5 parts air to one part gas required for combustion. That's a lot of air, and the very reason petrol engines use less fuel than one designed to run on methanol. The ideal methanol fuel ratio is closer to 6.4 parts air to one part methanol. This much lower ratio shows how easy it is for the fuel mixture to be upset by things like atmospheric conditions. As an aside, this is also partly why the Australian government fuel watchdog is on the lookout for petrol suppliers using too much ethanol in the fuel. Ethanol (with a 9:1 ratio required for combustion) is an okay fuel ingredient, but the engine's fuel system must be designed (or modified) to use it correctly. Otherwise you'll find the engine running terribly lean, usually with disastrous results. It appears that gas with up to 10% ethanol (technical name for alcohol) can be handled safely by most cars, but any higher could be a real problem without proper modifications. (There are other problems using ethanol, such as well, such as reduced power, less mileage, and corrosion problems, but this isn't a car article, so you can check that out elsewhere.)

Back to Joe's fuel. Due to the air's lower oxygen content on humid days, Joe's engine responds to the higher nitro content because it enriches the mixture with oxygen. Nitro is a fuel oxygenator.

Having mentioned ethanol in gasoline, I'm reminded of the concerns by many modelers about using gasoline with ethanol included in their gas model airplane engines. Although I have not encountered any problems, many modelers have, so I'm not saying that

there aren't any. I'm not too concerned about gaskets and diaphragms in gas engine carburetors, as these carbs have also been used with methanol fuel for many years. Ethanol, of course, is different, but the jury is still out for me. But if you're really concerned about using ethanol in your gas engine, you might try this at your own expense and risk. I am *not* recommending this, but I've done it and, apparently it works. (I said 'apparently' because I have no laboratory facilities to check the result.) Pour about cup of water into a clear container containing a measured amount of petrol. Note that you should know the exact amount of petrol, but the exact amount of water is not important. Now give the water time to settle to the bottom. Later on, siphon off the petrol until you get almost to the level of the water at the bottom. The water, you see, should absorb the ethanol and take it with it to the bottom of the container. So if you're really smart, careful, and accurate, you could go right to the level of the water, and then stop siphoning. Now measure the amount of petrol you took out. If your petrol contained 10% ethanol, the volume of the petrol you took out should be 10% less than you earlier put in... maybe. This is not rocket science or laboratory standard testing, it's just something to try on an off day if you're inclined.

By the way, if you or a friend comes up with the bright idea to freeze the mixture and then pour off the petrol from the frozen lump in the bottom, forget it. You might get water out this way, but ethanol requires -115º C (-175˚F) to freeze, while water turns into ice at 0º C (32˚ F). The dilution is the factor. For example, around 1% of ethanol in water as a mix will freeze just *below* 0º C. From this you can work out how much water you would need to freeze a 10% ethanol mix in your home freezer, which *might* get down to -18º C (0˚ F). Since my lovely metric system beats your weird old imperial system hands down, if you have one liter of petrol with 10% ethanol, you'd need to add 10 liters of water to be able to freeze the methanol/water mix, and a very tolerant wife or mom to allow you to put 11 liters of water and gas mix in the freezer! *"Mommy, this fish tastes weird." "Yes, sweetheart, it's petrol flavored because your pea brain father's container split open when the contents froze. But if you think the fish is bad, wait until you taste the corn."*

ENGINE REPAIRS

Who does engine repairs in the U.S.? I've had several inquiries from readers wanting to know if I will repair an engine for them. Sorry, but no. It's way too messy. Communicating with the modeler has to be done by email or an expensive phone call, and the shipping cost both ways is a horror. And frankly, I really don't want to be taking work away from your local model engineers, of which I am sure there are quite a few. What we want is to hear from any or all reputable and capable modelers who will contract to carry out engine repairs for other modelers. If you want a free plug in this column, let me know all your details and capabilities, such as any glow engines, 2C, 4C, gas engines, any engine at all, service and repair, maybe you'll manufacture unavailable parts, and so on. If you'll repair model airplane engines, then let's hear from you. *(Editor's Note: I'd like to add model airplane engines <u>parts</u> sources as well, for modelers able to repair their own engines.)*

BREAKFAST OFF THE MENU

If it must to be known, then I am not in the best of moods today. For one thing I missed breakfast, which is one of my favorite meals of the day (the others being morning tea, lunch, afternoon tea, dinner, supper, and in-between snacks and nibbles). I like rolled oats and bananas for breakfast, but this morning I had already poured the oats into the bowl, and added slices of banana on top before going to the front door for the milk, which is delivered fresh daily by our friendly milkman in his horse

drawn milk cart. (A side benefit of this is that his lovely horse often leaves a free pile of fertilizer for the flower garden). Anyway, as I approached the front door I heard a horse yell (an eerie sound that rattles your ears) and a lot of rattling, clanking, glass breaking and swearing from the milkman. The horse was bolting up the hill, the milk cart swaying and flinging bottles of milk in all directions, and the poor old man was struggling with the reins. Instead of a couple of bottles of milk on my doorstep, there was none other than Arando T. Phoggwissel, Horse Biter, with a stupid smile on his kisser and a goodly size patch of horse hair in his mouth. This whacko is a cousin of Log Head (my current nickname for that stupid assistant of mine), who'd invited him to spend a week or so here. He'll be lucky to last a week if I have my way.

This oddball started his weird ways as a mere babe in the cradle. His grandpappy bought him a little stuffed horse toy that squeaked when you squeezed it. When the knucklehead discovered that the toy would squeak when he bit it, and the harder the bite the louder the squeak, he loved it! He drove everyone crazy with the constant squeaking and his chuckling. He was just barely walking when he came in contact with a real horse, a Shetland Pony at a fun fair where kids were given pony rides. Now, Shetland Ponies are not known for their outward display of love for mankind. They'll bite you just for the fun of it! Well, Arando was absolutely beside himself with joy when he saw his first real horse. With arms outstretched, he ran (or wobbled) to the pony, looked up into its lovely, soft brown eyes, and then bit the hell out of one leg! That pony was *really* upset at having the tables turned and seeing someone bite *him*, plus the bite really hurt! He threw off the hapless kid on his back at the time, squealed loudly, and took off across the fair ground, bowling over a clown as he ran. Arando was so overjoyed at this he peed himself... twice!

Thus his future was set. Unlike the so called "horse whisperers", "dog whisperers", and "cat counselors", Arando became the famous "Horse Biter." He progressed rapidly through his early years, biting Lipizzaners, Appaloosas, Arabians, Orloffs, Suffolks, and eventually on to big stuff like Clydesdales, Percherons, and Shire horses. He was very quick on his feet, too, as many a poor Trotter or Pacer learned the hard way. Horses began to tremble when they saw him, often a case of "once bitten, twice shy." Around the race tracks many a tired old hack ran away from the field right after, or sometimes trying to avoid, getting a sound and painful bite by Arando.

But when horse racing enthusiasts learned of this, the demand for Arando's unique service grew, and he was soon making good money. Arando, however, had his sights on a bigger prize... rodeos! And soon he was well known in those circuits too, as the absolute best performances came from wild horses he bit just before their release. It's a rare rider who could stay the saddle on an Arando bitten Mustang. He even chewed on a few rodeo bulls, and due to the aloof look they gave him, he chomped a few camels as well.

Anyway, to get him out of my house I'm sending him and my batty assistant to this really big dressage event way across on the other side of oz. I even bought an old jumping horse (but with no jump left in it) for Log Head to ride in the event. My plan is for Arando to give the nag a really good bite, after which it will jump all the logs, and then the fence, and hopefully continue running into the far distance, taking Log For Brains with it. Then Arando will find a new home biting horses that balk at jumps. Then I'll have some peace (and hopefully some milk) for a while.

Now it's time for...
APRILWUN
DOT ROT DOT CON

This section is devoted to weird ideas, strange stuff, and mental interventions from my underground workshop. Warning! Be fully understanding that these ideas will incur a major risk to your sanity, your family finances, your elm trees, and maybe even your pet real estate agent. Before even *considering* any of these ideas, you should discuss the matter with your mental health professional, or somebody else who might be stupid as yourself if you think these ideas are real. In other words, this is a joke, and *not* a project anyone but Gordon should actually attempt. Believe *nothing* you read here or see below this warning, for nothing in this section is decent, authentic, or wholesome... other than me, of course.

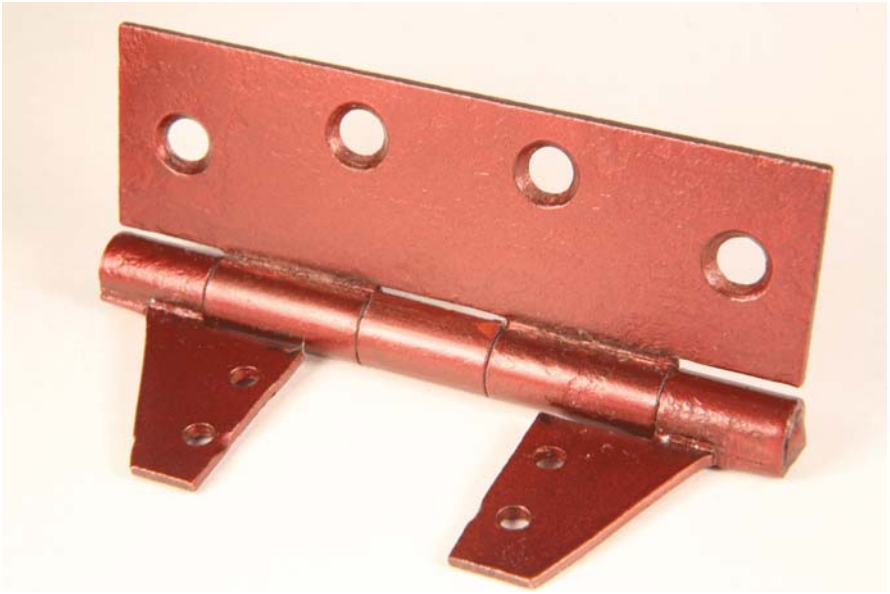


Photo 2: The beauty of using a hinge is that the mounting holes are already drilled for you. Make sure you oil the hinge pin so it works freely.

This month I bring you my perfect engine mount! With all the great R/C gear we enjoy these days, just about everything on a model is adjustable and trimable.

(Editor's Note: Hold it right there, Mr. Word Butcher. There's no such word as "trimable", even in Oz slang!)

(Brian's Note: No? Well why not? We have fixable, adjustable, moveable, stoppable, etc., so why not trimable? You're an editor... fix it!) But okay, "able to be trimmed", then. One aspect over which we have no control when the model is flying is the engine position. If we want more up or down offset, it has to be done on the bench. Another problem is take-off and landing when the model has very little ground clearance for the propeller. What about slowing down or stopping on tarmac strips. We have no reverse pitch! Think of an impending mid-air collision. Even if you go up or down, the other pilot might do the same, so you'd still crash. So wouldn't it be great if we could send the model vertically up or down without forward movement, sorta like a helicopter? Well, the good news is... now you can! Now we have the magnificent Oily Hand Controllable Engine Mount. And more good news is that you don't have to buy it, you can make it yourself, in any size you need! The only item you need is a door hinge, using the proper size to suit the engine you'll use. **Photo 2** shows see how simple it is. All I've done is cut out a section from one leaf of the hinge (the two main parts of a hinge really are called 'leaves'), and drilled it to suit my engine, which you

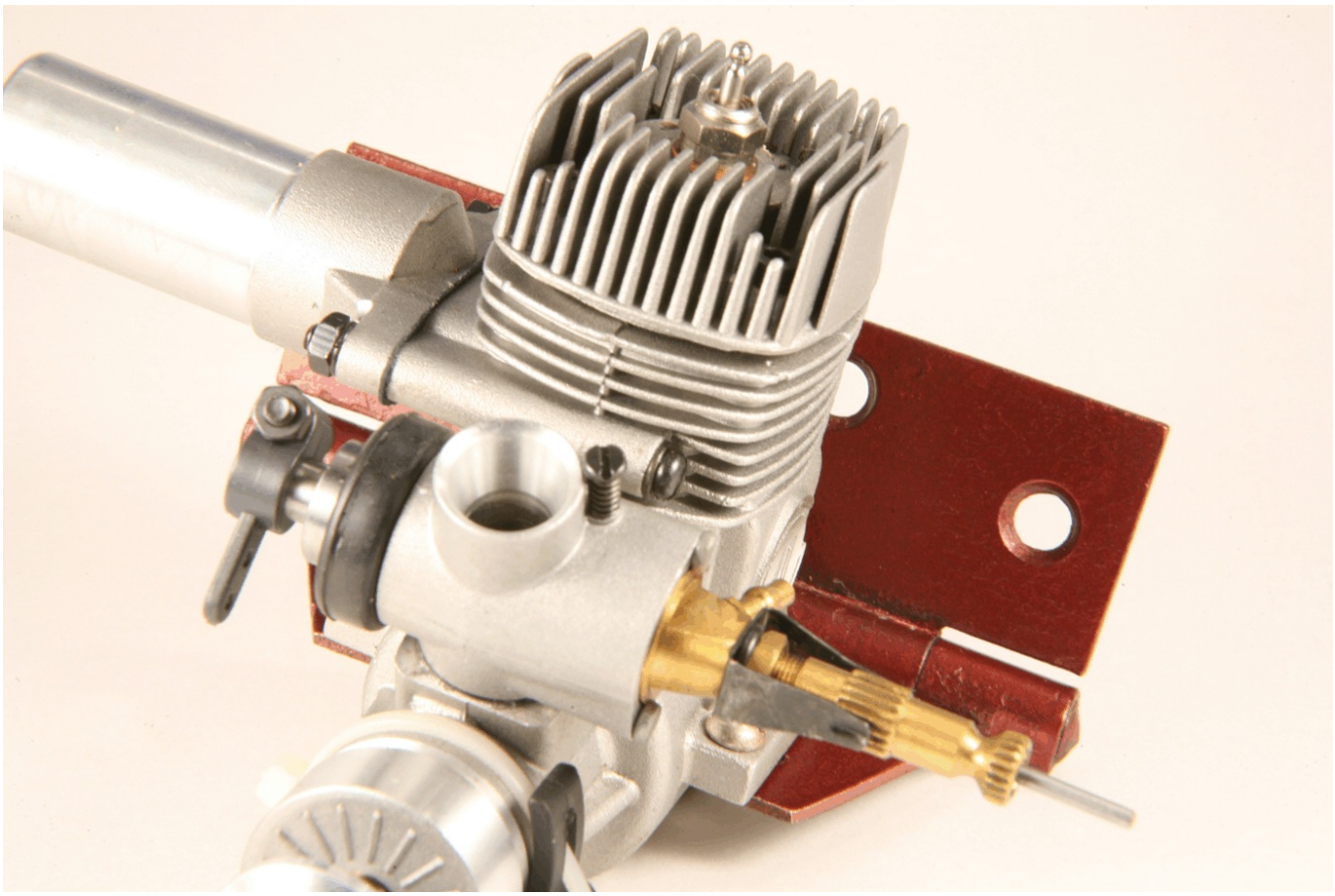


Photo 3: Other than the movement up or down, it's no different from mounting your engine on any type of engine mount.

can see in **Photo 3**. Using a method of your choice, fit a control connection to the leaf with the engine attached, and connect this to a servo controlled by a spare channel. When the model is taking off or landing, you nose the engine up a bit to increase ground clearance and pull the nose upward. In flight, if the model needs more up or down thrust, you can adjust it in flight to the perfect angle! With extreme up movements it will be possible to have the model perform the tightest loop ever seen, even spinning on the axis of its CG! Rapid up movement without forward movement will be dependent on the length of the hinge leaf and how far you can pull it up before being stopped by the engine, but vertically down movement is instantaneous, and the model won't move forward one inch as it drops like a lead ball. Imagine the fun landings you can make, flying toward the landing zone, but then at the halfway point, drop the engine down for an instant vertical drop until you're about 3" off the ground. Then level the engine again and land right on the spot, or fly back up after the greatest touch-and-go ever performed!

Don't wait! Make your own Hinge Mount today and be the first at your club with this great new invention!

Yes, it's just one more absolutely spiffing idea from Winch th' whatsit wiz. (And Banks, if you even *dare* mention "spiffing" not being a word, I swear I'll give your full home address to my assistant after telling him how desperately you need his help!)

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

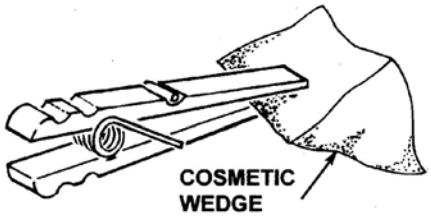
A radio message from the Landing Signal Officer (LSO) to a carrier pilot after his sixth unsuccessful landing attempt:

"You really need to land here, son. This is where the food is."

HERE'S HOW...

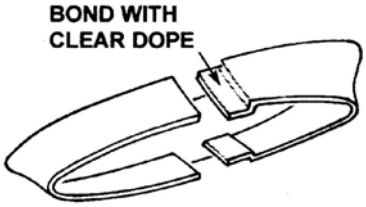
by Walt Wilson

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



1.

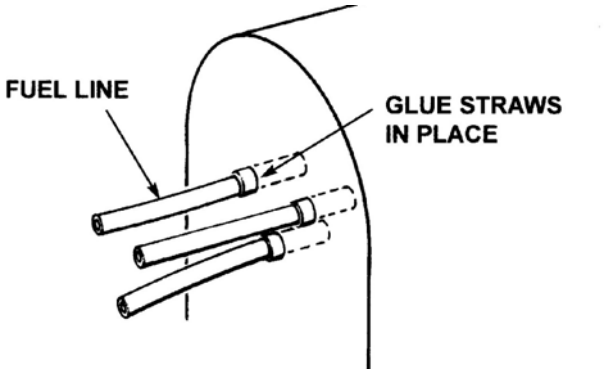
1. Raymond Lefrancois, of Garner, NC, for years has used inexpensive sponge paint brushes from home improvement and craft stores, for painting and spreading. He once ran out, however, so he scavenged (a modeler's technical term for "stole") some "Cosmetic Wedges" (aka, makeup sponges) from his wife. He found them to be even better than what he'd *been* using! They're denser and impervious to most of the paints and solvents that sometimes attacked the sponge brushes. Now Ray uses a reversed clothespin as a handle, and frequently cuts the sponges in half to make smaller brushes.



2.

2. Cecil Collum, of Fort Smith, AR, was building a Sterling Kits PT-17. While assembling the plastic gear fairings, he tried a couple of different adhesives, all to no avail. Then be recalled a trick from many years ago. He still had a bottle of clear dope on hand, so he applied the dope into the seams from the inside of the fairing. The dope seems to soften and "weld" the plastic seams, and the fairing became a solid, single piece. He finished up by filling the seam with putty, sanding it smooth, and painting it.

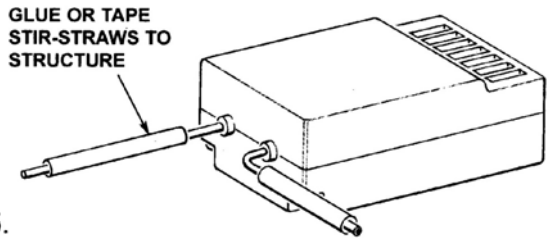
3. (No illustration) From Edwin Hawk, of Smithville, OH. When installing fuel lines in a gas powered plane, it can be rather difficult to get the Tygon yellow fuel line to slip onto the grooved ends of the fueler, clunk, or brass tubing. Edwin's method is to heat the end of the line with a heat gun, so the softened line will slip into place easier. As it cools it conforms to the grooved edges, making an even better seal. Use the heat carefully, though, and don't melt it!



4.

4. Mark Immonen, of Ann Arbor, MI, likes to protect fuel lines from chaffing when run through a firewall or plywood former. For

individual lines, cut a 3/4" length of a drinking straw that's just barely larger in diameter than the fuel line. Slip it over the line, center the straw in the firewall, and glue it in place. He says it also works well wherever the fuel line touches any part of the engine. A second method is useful when several lines pass through a large opening. Cut a section out of an old bicycle inner tube, slip it over the bundled lines and position the inner tube at the firewall or former. Mark feels that it doesn't pay to throw away anything that has even a remote chance of being useful in the future! *(Editor's Note: Amen!)*



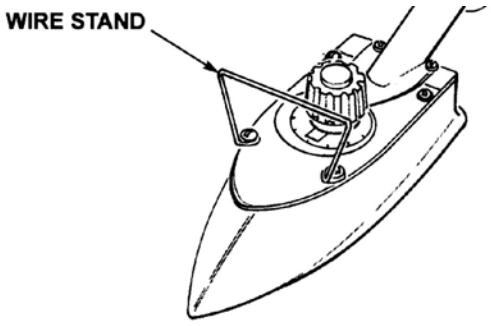
5.

5. Don Fitch, of St. Charles, MO, has an application for those tiny little stirrer straws often found in bars and coffee shops. The short, small diameter antennas on our 2.4 GHz receivers must be correctly positioned relative to each other to provide maximum signal strength. To hold them in the correct positions, fasten short sections of the straw (with the antennas inside) inside the fuselage. The antennas will then remain in the correct positions, but are easily pulled free when necessary. Without some kind of retainers, the antennas sometimes become bent or move out of position. Gluing or taping the antennas directly to the plane presents the danger of damage when the receiver is removed (sometimes unintentionally!).

6. (No illustration) From Mark Klein, of New Hyde Park, NY. In the "good old days", transmitters displayed their frequency numbers. If your P-47 was on Ch-27, you knew which transmitter to take if the airplanes had corresponding numbers. With today's 2.4 GHz, transmitters, however, there are no channel numbers so it's all too easy to take the wrong transmitter. After this happened to Mark (he didn't reveal how many times it happened!), he began color coding the proper transmitter to its airplanes... red tape on the transmitter, and red tape on its models, etc. Now it's easier to select the matching combo!

Walt's Note: All of my 72 MHz radios are on Ch-54, making it very easy to grab the wrong transmitter. I've done it! So I started labeling each airplane to identify its transmitter. I use a labeling machine, but you could simply write the info on plain white tape.

(Editor's Note: Due to having all of my models assigned to the same transmitter, I don't have that problem. My trouble was trying to remember each model's special setups for flaps, retracts, engine kill switch, electric throttle arming switch, mixing switches, etc. My solution was to create and carry model info sheets in my transmitter carrying case. Each model has its own info sheet, which I briefly review before crash... before flying that particular model.)

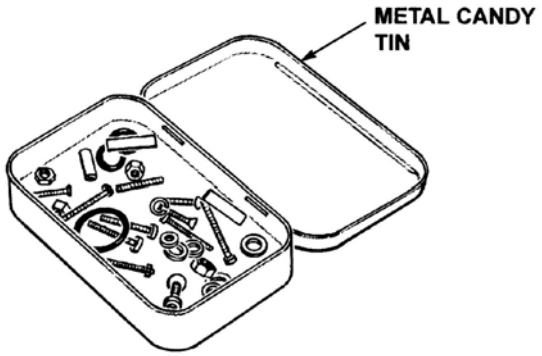


7.

7. From Earl Acker, of Fenton, MO. Heating irons used for covering materials often come with a stand that is equally often lost. When in use, however, the iron is too hot to simply sit on a workbench surface, so Earl makes and uses a wire stand attached to the iron's screws as shown. Simply bend loops in each end and then bend the wire into shape. The screws are usually long enough to hold a thin wire. Then when the iron is set down, simply turn it upside down.

8. (No illustration) Jack DeLisle, of Saint Clair, MI, once ran out of CA, and the nearest hobby shop was far away. To save time, he went to the local Wal-Mart and bought a small bottle of Loctite Super Glue Precision Max, which Jack says works great! He's has used it often, and

says its applicator doesn't clog. It's a medium viscosity CA, which is what Jack uses most.



9.

9. Here's one from me. Kit hardware usually comes in one or more sealed plastic bags. To avoid losing parts and to make them easier to see and sort, I dump the parts into an empty metal tin. Such boxes are a convenient size, and make it easy to find specific parts. They can also be closed and set aside without fear of losing anything. They also make great storage boxes for long term use.

The plane I'm holding at the top of the column this month is a Top Flite P-40 that I built about 30 years ago. It's fiberglassed and finished with Chevron Perfect Paints. All markings and insignia are painted. It has a SuperTigre .60 up front, and flew very well until I retired it.

Help! We need more "Here's How..." tips and hints! They come in so slowly during the summer months, I've been digging through my archives for ideas. But surely not every good idea in the modeling world has been covered! What's *your* helpful hint?

-Walt Wilson
(see addresses at top)

THIS COULD HAPPEN TO YOU!

Joe was driving through southern Georgia on his way to a big scale contest in Florida. During a terrible storm with hard rain and stiff wind, his car was blown off the road and into a ditch. Unable to free the car, Joe began hitchhiking to the next town. No cars stopped for hours, and the storm was growing worse, so he was excited when he finally saw a car approach and stop. Without even thinking about it, Joe jumped into the car and closed the door. Then he was both shocked and frightened when he realized... there was no one else in the car! But then the car started moving again, and soon Joe saw a curve ahead in the highway. Scared stiff, he began to pray, begging for his life. And then, just before he reached the curve, a hand suddenly appeared through the window, grasped the steering wheel, and steered the car safely around the curve. Still paralyzed with fear, Joe watched in awe how the hand appeared every time the car approached a curve.

Finally too terrified to remain in the strange car, Joe jumped out and *ran* to the nearest town. Soaking wet and still in shock, he went straight to the first bar he saw, ordered a large coffee, and tried to settle his nerves. Then he began telling anyone who'd listen, all about the frightening experience he'd had. At first they all thought Joe was drunk, but they became increasingly quiet as, one by one, they gradually came to realize that Joe was crying from his experience, and wasn't drunk at all!

Pretty soon two more guys came into the bar, both every bit as soaking wet as Joe. They came to the bar, ordered drinks, and then looked around. When one of them spotted Joe, his eyes grew wide as he turned to face his friend. "Look Pete,", he exclaimed, "There's the selfish and ungrateful idiot who got into your car while we were pushing it to the gas station!"

The Webb Scale

by Gary Webb

Hello everyone. I hope you've been out flying your latest scale model and showing off your handiwork.

Last month I was asked to join a good friend of mine, Ted Stickler, to attend the Giant Scale Warbirds Assoc. fly in at Mac Hodges' field down in Anderson, GA. Mac has flown at the D.O.G.'s fly-in on numerous occasions, so I thought it would be nice to return the favor. I'd heard he had a great hobby store right on the premises, and I looked forward to seeing it.

Yes, I'd already heard that Mac had a great hobby shop. What I'd heard, however, sounded an awful lot like fond exaggerations based on fond admirations. Sadly, this left me totally unprepared for what I was about to encounter.

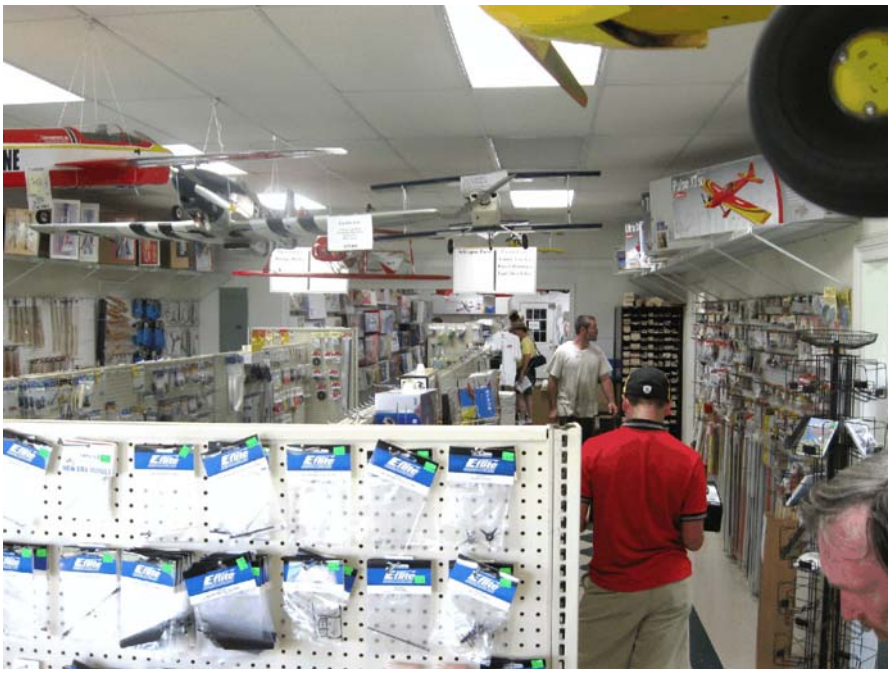
Anyone fortunate enough to have already been there knows what's coming. Mac and his family own over 2400 acres. No, I didn't inadvertently put too many zeros in that number, either. Wait, to give more of you a better idea of what I'm talking about, the AMA headquarters in Muncie, IN, sits on 1200 acres. Got the picture? Mac's farm is *twice* that size. To me this was the Ponderosa of the South, and I kept looking around, expecting Hoss and Little Joe Cartwright to come riding up at any moment! It's a big place. Big.

The R/C runway? Oh well, that part's only about 1000 feet

Hodges Hobbies, the store.

One room inside the Hodges Hobbies store

long and 200 feet wide! And it looks a lot like the world's largest golf green! The grass is short, thick, and unbelievably smooth. The runway is orientated east and west, which makes flying available all day without having the sun in your face. I overheard one pilot saying, *"If you can't hit this runway, you might want to think about taking up a new hobby."* The tree line is a good half mile out in front of the pilot stations, with clear approaches at both ends. To this Mac added a huge, all metal sun shelter that must be around 150 feet long and maybe 40 to 50 feet wide. And oh yeah, it has a smooth, asphalt floor! I hear it often gets awfully hot down there in



Another room inside the Hodges Hobbies store

Yet another room inside the Hodges Hobbies store. Did I mention it being big?

the summer, so the shaded shelter is much appreciated. There are picnic tables and assembly tables galore, too.

I do have one complaint, though. It was hot while I was there, and I personally felt that the air conditioned rest rooms were a little on the cool side. Yeah, maybe you *should* read that line again... I said the aerodrome rest rooms are *air conditioned!* Man, I'd have stayed in there all day had the rude banging on the door not

Huge covered shelter with paved floor for the pilots. But they're not spoiled... much.

Check out that wind sock! It's an old, experimental home-built!

This shows the east end of the runway. Disgusting, isn't it?

been so annoying! *"Hey fool, you gonna stay in there all day or what?"*, asked Ted.

Mac's place is big, it's nice, and I'm already collecting business cards from Anderson, GA, real estate agents!

The hobby shop? Oh, it's probably not the biggest in the world, it's just the biggest I've even *seen*! Picture a major department store with specific areas dedicated to certain product lines. There's this one room reserved for nothing but iron-on covering materials! Can you imagine that?

"Good morning, sir. May I help you?"

"Yes, thank you, I need some covering material."

"Plastic or fabric?"

"Plastic, please."

"MonoKote, UltraCote, or...?"

"MonoKote, I believe."

"Opaque or transparent?"

The west end of the runway. I don't know if it's in the same zip code or not.

This big P-40 was dwarfed by the huge runway.

"Gee, opaque I guess."
"Regular or metallic?"
"Regular, please."
"Military or sport colors?
"Military."
"Regular or bulk rolls?"
"Uh, regular I think."
"Certainly, sir, aisle 12."

I'll tell you what, since a photo is worth a thousand words, I'll include some photos and skip a few dozen pages of descriptions that probably wouldn't do the place justice anyway. Let's just put it this way... if Mac doesn't have it, you don't need it!

I even saw Mac out mowing grass the night we arrived. And after meeting him, I can't say enough nice things about him. Mac is a *very* gracious host.

The event being held there was hosted by the Giant Scale War Bird Assoc. Organized in 1996, they now have members

Some of the crowd early Friday morning. Some had been here before. The rest were in awe.

The highly energetic Cape Coral Seahawks gang, staking out their spot in the shade.

in over 26 states. What's more, they really know how to run a class-act event. Gentleman, I thank you all for your hard work and well earned success.

There were approximately 80 pilots in attendance. My buddy Ted, a snowbird who lives in Florida during the winter and Ohio come summer, joined a great club called the Cape Coral Seahawks. He and a lot of his Florida friends came to this event early to stake out a spot under the large shelter. When we arrived, we found that they'd reserved a spot for us as well. They were a great bunch of guys, and we enjoyed hanging out with them all weekend.

There were vendors there, too. Aero Accessories and Meister Scale Kits were both

Frank Tiano was there, with two beautiful airplanes.

Allen Yendel with his amazing Sopwith Tri-plane, "Binky".

This beautiful razorback P-47 was awesome!

present. Dino Di Giorgio put in some great flights with a Dauntless Dive Bomber, a P-47, an L-19, and even an F-4 Phantom powered by turbine jet. It was great seeing this Top Gun winner out flying just for the fun of it. And man can he fly low! The Dauntless was framed-up by Dino's father before he passed away, and a friend asked to finish it in his honor. He did an excellent job throughout, with details befitting Dino's dad.

Also present was a well known figure no stranger to the *"R/C Report"* gang, Frank Tiano. Frank flew a great looking Corsair, and a twin engine Tiger Cat.

There was Scott Prossen with his super T-28. I told you last month that Scott took 4th place in the AM side of the Pro-Am class at Top Gun 2009. Scott flew his contest model, one with which he is (obviously!) very familiar, as me made it appear very, very real!

As the photos show, there were war birds present from all eras, WWI to modern day jets. Flying began early and lasted well into the night with guys bringing out their LED equipped models. Models other than warbirds could be flown at night, but Dino was out there with a *great* looking twin engine DF767 jet, complete with navigation lights and a bright landing light that really lit up the runway! He must have flown it once for over 20

Mike Stevens did a great job with his German VB 237. Wow!

Ted Stickler's beautiful OV-10 has an incredible scale cockpit.

Byron with a great looking Skyraider like he flew in Vietnam

minutes! Dino, what kind of batteries are you *using* in that thing, anyway?

One fellow had a really fast delta, and there's just no way I could have kept up with it in the dark! Another really cool model was a big Sig Kadet with clear-covered wings and LED's inside, so the entire airplane *glowed*! That was really cool in the dark!

In between taking pictures and interviewing pilots, I got in some fun flights with my trusty "C" model P-51 Mustang, L-4 Grasshopper, and my new KMP Skyraider. They all flew well, and they all made it back into the trailer in good flying condition! And yes, I managed to hit the runway every time, so I guess I don't have to look for a new hobby.

The food? Oh, it was pretty much like everything else there, plentiful and excellent! There was pizza and barbeque on Friday, hamburgers and hot dogs on Saturday.

There were some unusual aircraft there, too. One was a big Dornier 335 built by John Nizelski, and flown by his grandson Matt. John, in fact, brought several great models, like the VB237 flown by Mike Sterns.

Byron Sauriol, one of the event hosts, flew a truly magnificent Skyraider. He said it was a model of the plane he piloted in Vietnam, in which he flew 122 combat missions "up North". He even wrote a book about his experiences, titled

The entrance to Moton Field, at Tuskegee, Alabama, home of the famous Tuskegee Airmen.

"122 Trips Up North". I'll be looking for a copy of that. It's not every day you get to meet a real war hero. Thank you, Byron, for your brave service to our country.

While planning our trip to "Mac's Place", I realized that we'd be only about 70 miles from Tuskegee, AL. Naturally, we had to make a side trip there to see where the Tuskegee Airmen had trained at Moton Field. It was a sobering experience to walk the hollowed grounds where history had been made that helped change the way people look at one another. We also learned that there's a second field about 12 miles away where they were trained in AT-6's. Moton Field was for basic flight training, while the second field was for advanced trainers.

Moton Field hangar with control tower

Most of the old buildings are being restored now. We were able to see inside one hangar, where they've restored a Stearman and a J-3 Cub like the one in which Chief Anderson took Mrs. Roosevelt for a ride. Some of the small rooms flanking the main hangar were classrooms. Back then, there were very few men in each class.

Dino Di Giorgio and his father, with his award winning Mustang

After that tour we headed north, homeward bound. It was a great and memorable trip that I'd highly recommend for anyone with a passion for war birds or military aviation history.

Now, as promised, here's my first interview with a high-profile scale modeler, this one with my good friend, Dino Di Giorgio. I asked the questions, and Dino filled in the answers. I'm also including some photos he kindly provided.

Dino winning at Top Gun with his outstanding P-51 Mustang

Dino Di Giorgio Interview

Occupation: President of Meister-Scale Models, Aero-Accessories, and a licensed insurance broker.

Q: How did you get started in modeling, and at what age?
A: It was 1976 when I first took an interest in model aviation. I was five years old! For a long time I was limited to cleaning my father's models, but I managed to solo at age seven. Age ten brought some new aircraft and new challenges. I flew pattern for a few years until I discovered my true passion and part time career, giant scale! I've been flying giant scale war birds ever since, and I continue to expand my fleet of war birds.

Q: Did you begin in R/C, or something else, like control line or free flight?
A: I started off in control line for a short time. My first R/C model was a 2-ch Cox Hobbies Sportavia .049. I had my first

solo flight with that model, a day I'll never forget.

Q: Did someone introduce you to modeling? If so, who?
A: My late father was involved in the hobby ever since *he* was a kid. Luckily for him, I was the only child who took to the sport. My brother Marc has a passion for music.

Q: What motivated you to build scale models vs sport models?
A: There's just something special to me about a heavy metal war bird, their looks, size, and power, but most important is their place in history.

Q: Did you have a mentor to help you get started in building scale models, or did you learn by trial and error?
A: My father and many of his friends were involved in the hobby during the 80's. I watched them almost every night in the basement building room. My uncle, Ed Ajamian, from Eddie A. Aircraft, was one of the most inspirational modelers I've ever met. He was a model designer and ex-air force pilot.

Q: Have you flown full scale aircraft? If so, what types, and do you currently hold a pilot's license?
A: My private pilot experience consists of approximately 200 hours of single engine time. Military aircraft I've flown include the North American T-28 Trojan, T-6 Texan, Beech T-34, Boeing PT-17, Fairchild PT-19, and a Dehavilland DCH1 Chipmunk. The civilian planes include a Christen Eagle, Extra 300, Piper Cub, Cherokee Comanche and Colt, Cessna 150, 172, 182, and 206, Myers OTW, a Maule (of Maule-Air Inc.), and a Beech Baron twin. I do not currently hold a GA PP license.

Dino's first R/C scale model was this Ace R/C T-34 Mentor, built for the 1986 WRAM

Dino built this Byron Originals Pitts Special in 1991 for practice.

Q: Can you remember the first scale model you built with which you competed?
A: That was an Ace R/C T-34 Mentor which I built for the 1986 WRAM show in White Plains, NY.

Q: What was the result? Did you place well?
A: I won first place in the junior division.

Q: What motivated you to get deeper into competition?
A: In 1986 I went to my first U.S. Scale Masters with my father to watch our friend, George Leu, compete with his Monocoupe. That's when I first met Charlie Chambers and saw his P-51 Mustang, the "Big Beautiful Doll". Charlie was al-

In 1991 Dino flew Bob Pickney's Ziroli Beech D-18 twin at Top Gun.
This was Dino's first appearance there, and they took first place in Team Scale!

ways a pleasure to talk to. He'd give you all the time you needed to answer questions about anything you threw at him. He was a huge icon for me when I was growing up.

In 1991 I was asked by Bob Pickney to test fly a Ziroli Beech D-18 twin. It would be my first twin ever, but not my last! After the flight Bob asked if I'd enter with him in Team Scale at Top Gun! I was both shocked and honored, so we decided to go for it! I'd never flown in competition before, but there I was, going to the world famous Top Gun! I decided to build a Byron Pitts Special for practice, and began going to different scale events. Competition experience was a requirement at the time for Top Gun pilots.

Anyway, we entered Top Gun for the first time in 1992, and we somehow won First Place in Team Scale! The rest is history. I've won Top Gun as a pilot five times since, but I'll *never* forget that first time1 That's a special feeling I wish every modeler could experience and enjoy.

Q: What's your favorite era and type of scale aircraft to model?
A: That's hard to say because I really love all types of aircraft. I fly WW1 model and modern jets alike. Still, I'd have to say that my passion centers on WWII war birds.

Q: How many hours a week do you average in building and flying models?
Q: I've not been building much since my father and uncle passed away. They were my closest building buddies.

Also, free time has been lacking since I took over Meister Scale Models, as we're always working on new ideas and future designs. I do, however, love to do finishing work. Scale detail finishing is my favorite. I just love to recreate battle scarred and weather beaten aircraft.

Q: When preparing for a contest, what's your procedure and how much time do you dedicate to preparing yourself and getting confident with your model?
A: I must admit that I really don't spend much time preparing for competition. I realize, though, that practice is vital for the best results. Back in the early 80's my father and

Dino and Wayne Fussel at the Hodges Hobbies flying site in Anderson, GA.

uncle always made me practice emergencies. I had a .60 size Aeromaster biplane that I flew for hours and hours. They'd put me in all sorts of odd situations where I needed to make it back to the field or runway.... without power! They stood behind me, pulled the throttle back to idle, and then yelled "Emergency!" Then I had to make it back to the runway in one piece! For years all I did was take off and land, over and over. But all that time and those experiences were well spent, as it really helped improve my overall proficiency. I've been real lucky through the years. I seem to have a natural ability to look over a model and pre-flight it in my mind before I even take off. It's a strange feeling that's hard to explain. When I'm focused on flying a particular model, I put myself inside the cockpit and then it just comes natural to me. It's really not like flying a model anymore. It's like I can feel the aircraft's weight and movements through the radio's sticks.

Q: What advice would you give a newcomer to scale competition?

A: My advice would be to find out what excites you. Find your passion, and move forward with it. Don't be afraid to contact someone who's already involved in whatever it is you love. Ask questions, and ask their advice. I think you'd be surprised at how many people are willing to help. Also, watch and learn. Learning is the fun part. Then set a goal and so for it. No goal is modeling is out of reach.

Well guys, that wraps it up for me this month. We'll talk again soon, and don't forget to send me your questions, and some photos with details of your latest scale projects. Until then, fair winds and blue skies to you all. *-Gary Webb*

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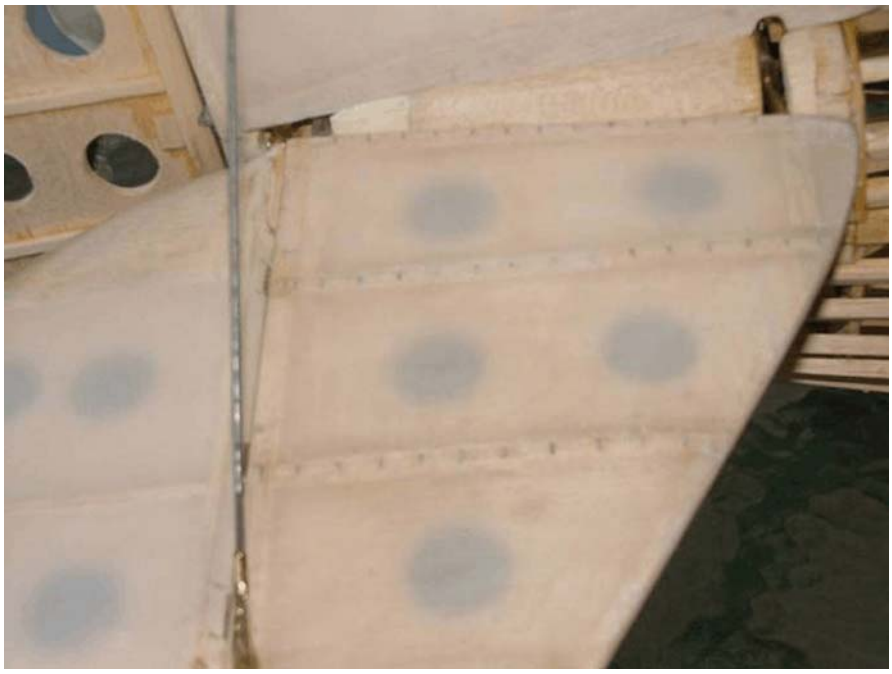
Two Old Scale Guys

by Dick Watz & Bill Hurt

DW: This month we'd like to continue our discussion about selecting a subject for scale. We touched on selecting a plane we like, then talked about documentation, and agreed that it should have a lot of wing area to provide good flying characteristics. Your choice should also reflect your building experience. For example, don't pick an AT-6 if you've never done any surface detailing. Begin with a fabric-covered model. Sure, you'll have rib stitching to contend with, but an AT-6 has tens of thousands of rivets, which require a lot of practice to get right. Rib stitching is labor intensive, but at least it's not difficult to master.



BH: Easy for you to say! My current build required 296 rib stitches on the horizontal stabilizer and elevators alone! And you don't even want to hear about the fuselage, wings, vertical stab, and rudder! My fingers will be dead tired by the time I've cut all those little bitty pieces of thread and doped them into position!

DW: Maybe so, but war birds also require a smooth metal surface like fiberglass and resin, silk and dope, or silk span and dope

But let's recap: I think it's very important to select a plane you really, really like. Why? Well, think about it. You'll be spending a lot of time with this plane, and you need to stay focused and enjoy working on it. This helps keep you interested and improves your enjoyment, which is why we build scale models in the first place. So keep it fun and you'll get it done.

Remember to plan your time, too. We get only 24 hours a day, so allocate your time to whatever is important to you. If building scale is really important to you, then you'll find the time you need. Besides, who's imposing a deadline for completion?

Now, about subjects... If you're new to scale, keep the KISS principle in mind (Keep It Simple, Stupid). You may even want to start with a kit, like maybe a J-3 Cub.

Oh oh. Do you hear all that moaning and groaning, Bill?

BH: Yeah, but how many scale Cubs have you actually seen that are truly correct? I think maybe I've seen three that are close, but only one that was right on the money. That was the one built by Octavio DePaulo, and it was actually an Army Observation variant. But talk about a great Cub!

DW: Yeah, but think about it. The venerable Cub is fairly easy to build, there are an endless number of kits out there, documentation is plentiful and easy to find, and Cubs fly scale-like. Or, any high wing classic airplane will do just as well. What about a Porterfield Collegiate, a C-7 Champ, a Cessna 195, or a Silvair. They all have some very good features in common, with large wing areas and slow,

Gary Mills entered this outstanding Corsair F2-G for his first appearance at Top Gun. All the detailing was there, but it wasn't overdone. Very nice model.

gentle flight characteristics. These things will help you improve your early flight scores and make practice flying a joy. Yes, I said flight scores, because you will have to fly your creation. Figure many practice flights into your overall plan, and allow plenty of time for it.

Let's say your tastes lean toward the classic biplanes. Let's say maybe a Stearman, a 1930 Fleet, or my all time favorite, nearly any Waco. What do you think about *that*, Bill?

BH: Yeah yeah yeah, Waco Waco. He said Waco, didn't he? Yeah yeah yeah... Waco!

DW: Or maybe even a Great Lakes or a Pitts, although the Pitts could be a real handful to fly. But sorry, Bill, I didn't mean to put those other planes ahead of the Waco. My brain must have been damaged by the stroke or something. I do know the "two wings and a round engine" rules.

And speaking of round engines, if you haven't seen one of Bill's scale round engines, you're really missing something Show 'em, Bill, you have pictures.

But I digress. All the classics I mentioned would do well for someone new to scale but not necessarily new to model building. Maybe you like heavy metal war birds like the P-51 or P-47. My favorite war bird is the F4U Corsair. Top Flite's 1/5 scale Gold Series would be a good starting point for a war bird, or even their P-47.

Oops, sorry Gordon. Maybe I shouldn't have mentioned a Top Flite P-47, huh? *(Editor's Note: Oh, so you've heard, huh? But no, that's okay. Mine was (and "was" is the key word here) just the ARF kit. You can read about it in the review elsewhere in this issue.)*

No matter what experience you have in flying or building, I prefer the Corsair. The inverted gull wing makes construction a little more challenging, but it's worth it. And yes, I said "inverted" gull wing. Take a close look. A gull's wing does not go down at the shoulder and then up like the Corsair. I talked with a Corsair pilot at Oskosh several years ago, some guy named Pappy Boyington. He said the Corsair pilots loved their machines, but never referred to them as "gull wings." It was always the "bent wing bird" or the "hog nose bent wing bird."

BH: Say, here's a nice F2-G by **Gary Mills**. This was his first trip to Top Gun, but what

a nice Corsair he brought. All the detailing was there, and not overdone.

DW: Pappy Boyington also said it was the best damn fighter the U.S. ever had. Of course, he was in the bag at the time, but still an amazing man to talk to. He said there were a lot of great fighters, and he'd flown them all. Some were tough and some were deadly, and some racked up more kills than others, of course. The F6F comes quickly to mind, but you must consider where they flew. Their's was a very target rich area.

It also matters who you ask. If you flew P-51's, your favorite would not likely be the Corsair. But I like the Corsair because it has a lot of wing area. It's a large bird with large flaps, and... and... Well I just like it, so there!

What's your favorite war bird, Bill? And don't tell me a Waco with a jet engine and a tail hook! Actually, the UPF7 was a military trainer with the best of them, very tough, easy to fly, and not hard on the eyes, either. I built several houses for my family doctor over the years. He flew the UPF7, the Stearman, and an AT-6. He liked most but *loved* the Waco.

Say, Bill, do you know where one can get good plans for a 1/5 scale UPF7, or even a 27% YMF5 for that matter?

What's my favorite Waco? I'm glad you asked! It's the Waco QDC. By the way, Waco (wock-o) stands for "Weaver Aircraft Co.", not the town in Texas (way-co).

I'm currently building a Nick Ziroli Corsair for Eric, in between a Silvair for Wendell Hostetler and a Champ for another good friend. I'm not yet flying my 1/5 scale P-51, but I've checked out on a 1/5 scale Cub, a Stearman, and a small Champ.

I'll keep you updated on my building projects, and we'll get to some building techniques soon in future columns.

I haven't gotten any email about *your* projects, though. Come on guys, this is your column too, and I especially enjoyed your questions. Bill and I are ready to help in any way we can.

For health reasons I haven't attended any air shows yet this

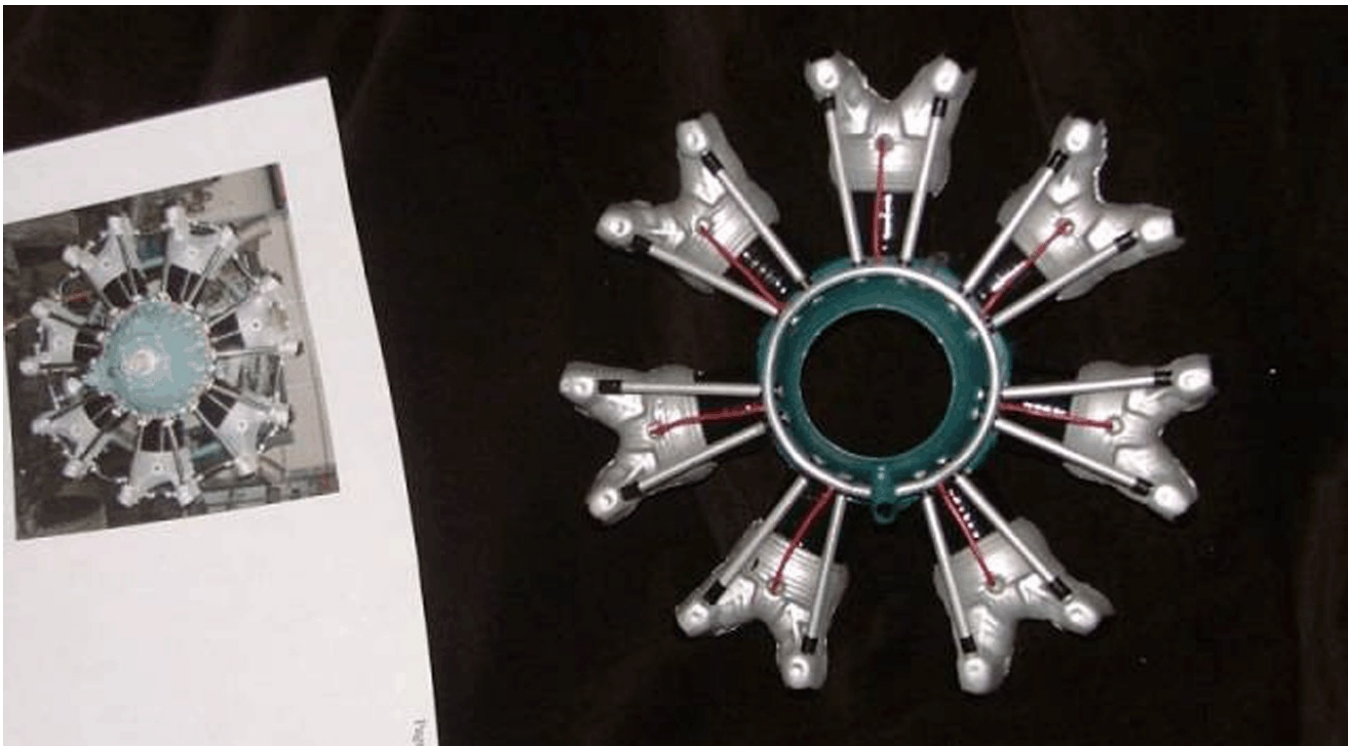
year, but I do plan on going to some. First I need a shoulder replacement! Man, if I'd known I was going to live this long, I would have taken better care of myself!

Anyway, I'm sure Bill will have some comments about stuff I mentioned this month, and you can bet your last bottle of glue that they'll be worth reading. Maybe we can get him to show us more pictures from Top Gun. Take it away, Bill!

BH: "Take it away," he says. Slick war birds, talking with world famous WWII fighter pilots... Dick is *always* a tough act to follow!

I mentioned earlier that the Waco I'm building has a lot of rib stitching, and it does! The reinforcing tape goes on first, then the small pieces of thread (I use 50 denier thread cut to 1/8" lengths), and I affix these pieces to the reinforcing tape with Nitrate Dope. Finally, the pinked tape will be doped over the stitching to complete the task.

Now, Dick mentioned that I'd built some dummy radial engines for Wacos, and I have. In fact, there was even a build sequence in an earlier column in the printed magazine. Below is a photo of the finished engine, right beside a photo of the real thing.



While I'm going on about *my* current build, I thought I'd include a little information about the seat in the cockpit. I was looking at the original drawings of the YMF, and saw an outline of the seat. I decided to make one that looked real, rather than trying to make one from wood or plastic. Using 1/8" aluminum tubing, I first formed the scale outline of the seat frame. This required joining two pieces of the tubing, so I used some smaller tubing as joiners, with thin CA glue to hold them together. Next I made the back and sides from card stock (I think it was a display card from a sanding belt), and inserted them into the seat frame so that it wrapped the entire inside of the frame. I tacked it into place with medium CA, and then trimmed the length to what I wanted the seat to look like. I added a balsa bottom and a pair of mounting tabs with stiffening ribs to stand the seat off the cockpit floor. Once completed, I painted the assembly with chrome aluminum paint by Dupli-Color (Auto Zone to the rescue!).

The Waco YMF was a fairly luxurious airplane for it's day, and as such I decided that the instrument panel needed to reflect that level of luxury. I used a few scraps of laminate (by Wilsonart, but I'm sure that any brand of laminate is available in the appropriate type), and laid out the instruments. Then using a Forstner drill bit, I cut the holes in the instrument panel and the instrument holder insert. The panel is a gunstock cherry wood grain, and the insert is oak. I think it works nicely.

The floor of the cockpit is balsa covered with aluminum foil and then painted semi-flat black. The area where the pilot's feet would wear away the paint was buffed lightly with steel wool, just enough to let the base metal show through. The rudder pedals were made from thin-wall brass tubing soldered together to make the proper shaped pedals. They were then fastened through the cockpit floor.

An interesting item came to light while researching the cockpit. The full scale cockpit floor actually rests on the spar joiners for the lower wing, so there's no room to install control rods between the cockpit and the lower wing. There's no way to build a shallower cockpit that still looks correct, so the four servos for the tail surfaces had to go into a special servo bay built just aft of the wing saddle. The throttle servo is ahead of the cockpit, and the baggage compartment is where I hid the switch and charging harness for the flight pack battery. This model got really full of equipment, really fast. The challenge is to build in all the gear without building in too much weight.

So, that's all we have this month. Dick, have you anything to add? Oh, he's asleep.

-Dick Watz & Bill Hurt
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Sparky's Revolt

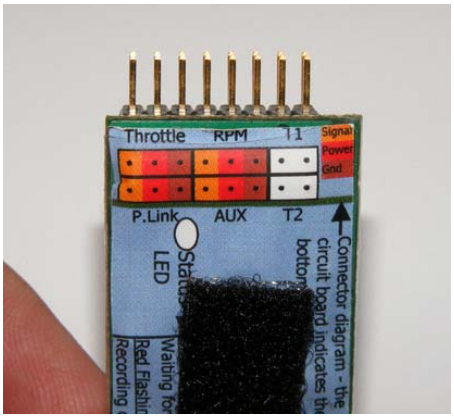
By Tony Coberly

Well hello again everyone, I have been a very, very, very long few months and I have had little time for flying. I have several items lined up for the next few months, so get ready.

Once again I will say that I am a data junkie; so my latest item continues to fuel my habit. The Oracle onboard data recorder from Medusa Research is my newest and perhaps neatest gadget yet. The Oracle data recorder is designed to be installed in an aircraft, primarily electric, and record several different data options.

Oracle 100Amp

The Oracle data recorder has two versions: MR-DR-60100 for up to 100 Amp current rating or the MR-DR-60200 that is capable of 200 Amps! I have the 100 amp version with Deans Ultra connectors preinstalled for me. The recorder can record current, watts, voltage, RPM and temperature with the provided hardware. The Oracle records voltage, watts and current through the Deans Ultra connectors, but the sensors plug into the pins on the end the recorder itself for the other data.



Sensor input end

The RPM sensor is designed to plug into one pole of a brushless motor. To facilitate connection, here they have installed a 3mm male/female bullet connector to act as a pass through.

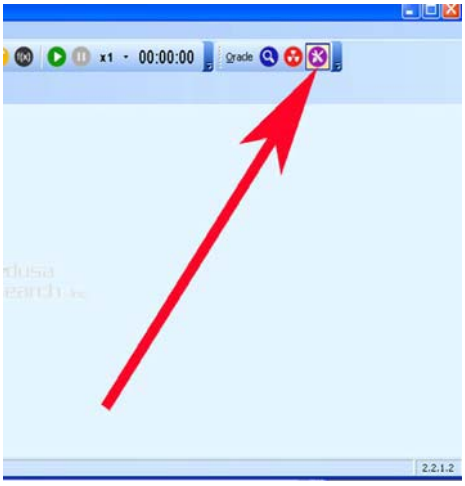
RPM Sensor

The temperature sensor is designed to be screwed or bolted onto the item you are measuring the temperature of, like a motor or battery mount. With all provided sensors connected to the data recorder, you are left with three sets of pins not in use. First, you have

Temperature Sensor

an option for a second temperature sensor. Second you have a set of three pins that you can plug the throttle into to record the position of the throttle stick while flying. The third set of pins is not used during flight, but rather to talk to the recorder with a laptop computer for download the recorder data. Okay, that's the general info about the Oracle.

Now let's get into the data and programming side of things.

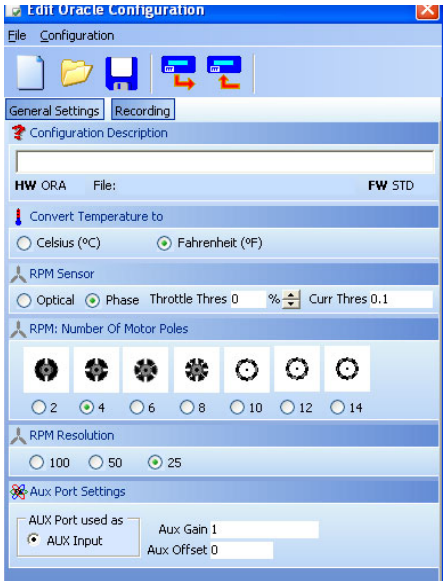


PowerPro View

The Oracle comes with software for your PC computer to setup the recorder and retrieve the data from it. With the software installed, and the recorder plugged in to the USB adapter; I can start the PowerProview software and have a look. First thing I see is basically a blank page with a bunch of buttons near the top, not really what I call a intuitive interface. I do notice in the bottom left corner we have a green icon indicating that I am connected, but now what?

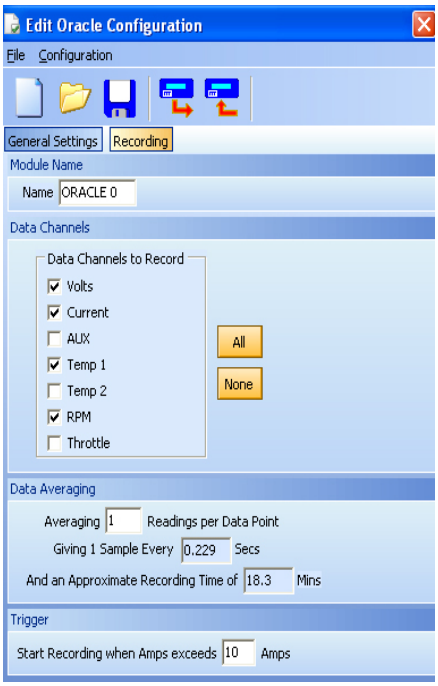
Well, with a little mussing around the screen, I find the button to bring up the configuration area of the Oracle. (Notice the bright red arrow!) Now I can see the settings for the recorder itself.

The general settings tab screen allows me to choose our preferred temperature format, RPM sensor type, number of poles in a brushless motor, RPM resolution, and finally settings for the aux port. The aux port is open for additional sensors under development.



Oracle General Settings

The recording tab is where I choose the data that I want to capture. The name can be set for saving configurations' of multiple oracle units. The data averaging is the rate at which the data is captured. The one setting is the maximum sample rate and will yield a sample every .229 seconds. This setting means that we can store up to 18.3 minutes of recordings. The last item is recording trigger. This can be helpful if you have a larger more complicated battery installation on your plane. There is no reason to record data while you are waiting to take off, or perhaps while you



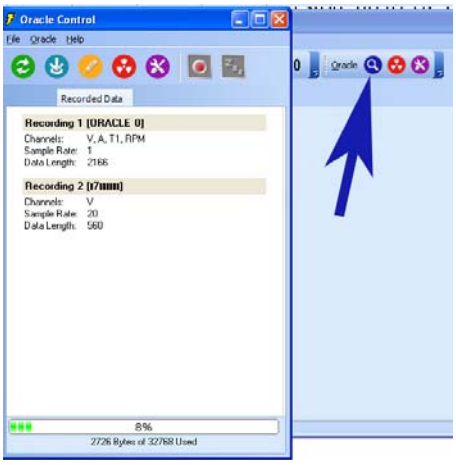
Oracle Recording Settings

are putting a canopy on! Raising this number, the recorder will not actually start recording when you plug it in; but rather when you run the motor up to full throttle prior or during takeoff. Okay, everything is set, so its time to go fly and get some data!

The Oracle recorder is small enough to fit in most any size plane. After all the total weight of the sensors and the recorder is only .8 ounces! I usually just strap it on top of my battery packs with an additional piece of velcro type fastener. If you remember the setting indicated that I could have up to 18.3 minutes of recording time, but that doesn't mean I can only fly once. Each time we plug in the Oracle, it

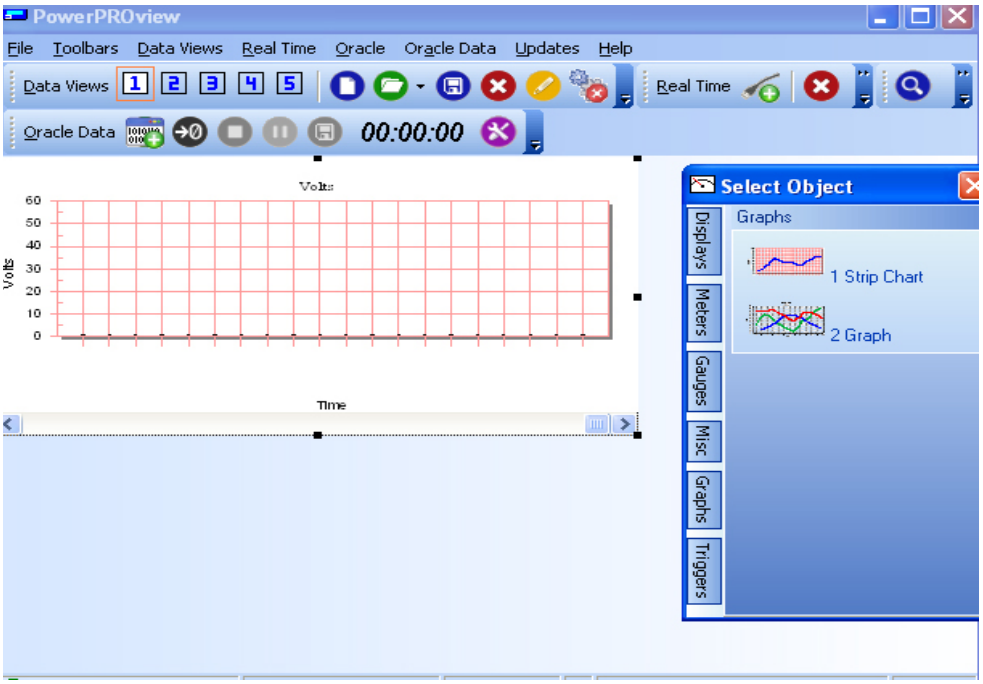
will create a database set, so if I make three flights that are five minutes long, I will have three data sets to download later! Now let's have a look at that data, shall we?

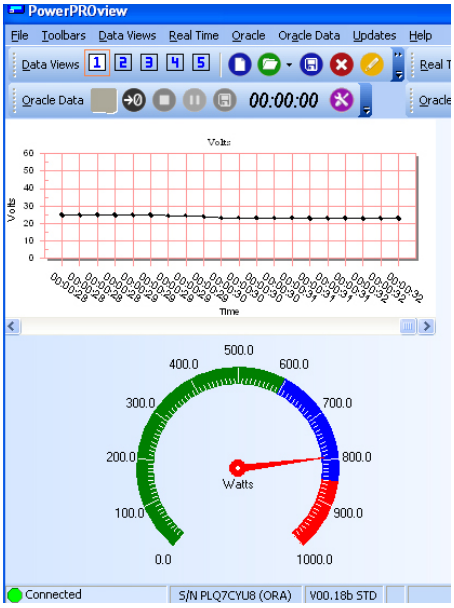
Once again I plug the recorder into our computer and start up the PowerPRO view software. This time we need to click on the blue magnifying glass to get out data.



Two datasets on the recorder

A screen pops up and I can see that I have two data sets to choose from, and save to our computer. Okay I have my file saved on our computer, so I need to play it back, but there is nothing to see yet. We have a blank canvas on the lower part of the screen and I need to add gadgets to display our recorded data, so I like to say when in doubt "Right Click". A right mouse click in the lower screen gives the option for design view.





Now I am getting somewhere, I have options for different objects, graphs and meters to display the recorded data. Just drag and drop the meter or graph to the screen and your almost there. Once the graph is on the screen I get to choose what data type I want it to display. Now this graph will show the voltage of the battery during our flight on the left vertical axis and it will show the time during flight on the bottom. Now I'll add another meter that shows wattage. By pressing the play button I point to the file I saved on my computer and the play back starts. I have a good smooth voltage and about 800 watts of power out of my Twister on six cells!

I like the functionality of the Oracle recorder, even if the computer interface could use a bit of tiding up. One thing about interface being basically blank is that you are left with many options for personalization!

Until next month!

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Bird on a Wire

by Terry Dunn

The concept of aerial photography has always interested me. In case you're confused, I'm not talking about traveling the globe to take photos of various and sundry antennae, either. I'm referring to the art of using R/C models to carry cameras for taking photos from the sky. Like so many other aspects of our hobby, aerial photography, or "AP" for short, has seen sweeping technological changes in recent times. For several years now I've scanned the online R/C forums to get a glimpse of the current state of AP, always looking for a good time to jump in. When I first started looking, a common setup involved a disposable film camera with a servo rigged to mechanically push the button. This setup was then somehow attached to a large plane that would carry it aloft. Though cheap and functional, the one photo per flight ratio really hampered the odds of capturing good images.

More recent voyeuristic trips to the AP forums blew me away! Now folks are shooting high definition video from little park flyers! And best of all, the equipment is relatively cheap and easy to use. Eureka! "Good, cheap, and easy" were the three main ingredients I wanted before taking my own bite of the AP pie. Now, I'm just getting started, but I thought I'd dedicate some column space to share some "lessons learned" during my startup efforts.

Let's begin by getting the basic definitions out of the way. From what I can see, most guys that are into AP these days are shooting video, not just still photos. So you'd think that the lingo would change to "Aerial Videography", but it hasn't. It's still called AP. And within AP there are two distinct categories, standard AP and First Person View (FPV). With standard AP you send your plane up with a camera and do your best to capture good footage from your remote perspective on the ground. You won't see the results of your handiwork until you've landed.

With FPV you have a real-time link between the camera and the ground. By looking at the transmitted signal via special goggles or a monitor, you see just what the camera sees.

Any by the way, the AMA requires you to have a partner (using a buddy-box) with eyes on the plane if you're flying an FPV mission.

From my perspective as an AP beginner, it seems that standard AP is all about the art and skill of capturing beautiful images from the unique airborne perspective that our models can provide. Conversely, FPV appears to be about using (or developing) new technology to enhance the visceral feeling of flying our models from an onboard perspective. They're very different ideas, but equally appealing to me. The difference is that FPV has not yet reached the "good, cheap, and easy" hat-trick that I require. So, for now I'll focus on standard AP while keeping tabs on FPV developments.

I'm no photography expert, but as I've built my portfolio of magazine articles these past few years, I've learned that capturing good images on a consistent basis requires two things: have good equipment, and know how to use it. My recent escapades have shown me that the requirements remain exactly the same with AP. Of course, the means of satisfying those requirements is a little different when the camera is strapped to your airplane.

I learned the value of good camera equipment when my family upgraded from a "point-and-shoot" digital camera to a digital SLR camera. The difference in photo quality is tremendous when shooting small fast things such as R/C airplanes and toddlers on the playground. Once you've seen clear action shots, you just don't want to look at those fuzzy ones anymore. Carry that same thinking over to AP and it's obvious that you don't want a crummy (notice that I didn't say "cheap") camera. I'll admit that there is some novelty to watching video taken from your airplane, regardless of the image quality. So there you may be tempted to strap on a 2nd-rate camera. But once the novelty wears off (and it will), then you're stuck with a bunch of video that nobody wants to watch. Now that good cameras are less costly, using a sub-par camera just doesn't make good sense any more.

When it comes to getting good video quality for AP, two very important factors to consider when choosing a camera are resolution and frame rate. Resolution tells you how many pixels (dots) make up each image. This value is usually given in horizontal and vertical pixels, with 720x480 being one example. If only one number is given, it's generally the vertical value. Anyway, much like still photos, the more pixels you have, the sharper the image will be. Once you get up to 1280x768, then you're in the hallowed arena of "high definition" (HD).

Frame rate tells you how many images the camera takes each second, measured in frames per second (fps). Once again, more is better. Frame rates of 20-30fps are common on many TV-quality cameras, while the better HD cameras can typically shoot up to 60fps.

I did a lot of research before buying my AP equipment and was a little surprised by what I found. Like many of you, I've seen numerous ads from hobby vendors hawking onboard video cameras. I just assumed that the AP gurus used that stuff. As it turns out, most folks are using small video cameras that can be found at your local electronics store or pharmacy. The mass market cameras generally give you more for your money over the R/C specialty units. Another thing I noticed is that most of the R/C cameras are smaller and lighter than you normally find elsewhere. But once I factored in the video quality, I was willing to accept a few more ounces of weight and sacrifice some onboard real estate.

Whatever camera you choose, *don't* get a camera with auto-focus, unless that feature can be turned off. Auto focus tends to "search" in AP use, with poor results. A camera with fixed or selectable "infinite focus" is the better option. Also, don't worry about zoom capabilities. Most of the smaller cameras offer only digital (electronic) zoom, which I personally think is worthless in *any* application. With AP, it's *definitely* worth-

Photo 1: The Flip Ultra 30-minute camcorder on the left produces TV-quality movies, but is less than half the price of the high-definition Aiptek A-HD+ 1080P camera on the right. Small mass-market camcorders like these are popular for shooting video from R/C models.

less since you probably will never use zoom anyway. *(Editor's Note: I totally agree. Digital or electronic zoom is not a "true" zoom. The camera merely crops the image (makes it smaller) and then blows it up larger. "True" zoom that's done with a lens, is like a telescope that pulls the image in closer, without cropping and sacrificing a lot of detail and image resolution.)*

For the sake of comparison, I decided to buy both HD camera and a TV-quality unit. For me, choosing an HD camera was easy. Tons of folks are happily using the Aiptek A-HD+ 1080P, so that's what I got. Just be aware that Aiptek has many very similar cameras with very similar part numbers. Others may also do a good job, but the Aiptek A-HD+ 1080P is specifically and highly recommended in AP circles. As I write this, $120-140 is considered a good price for the Aiptek. I bought mine from www.Amazon.com for $140 with a free 8 Gigabyte memory card and free shipping. *(Editor's Note: On July 22 the price was $140 w/o the 8 GB card, or $155 with the card).*

I spent a lot of time, however, searching for a non-HD camera. When you get just below the threshold of HD video quality, the price really drops and the selection is overwhelming. I found some promising units for as little as $40, but in the end I chose the Flip Ultra 30-minute. A lot of reviews touted its video quality and ease of use, so I forked over another $60 to Amazon.com for the Flip.

The Aiptek A-HD+ 1080P has several resolution and frame rate settings to choose from, including those that qualify as HD. The Flip is set at 640x480 at 30fps. Both cameras are about the same size, comparable to a pack of cigarettes. The Flip weighs 5 oz., the Aiptek 6 oz. Their size and weight makes them suitable for medium size park flyers and larger. However, I would soon find that mounting them is no trivial thing.

There's more to AP equipment than just the camera. There's also the airplane. Technically speaking, any plane capable of lifting the camera should work, but there are some desirable features that will help you get better footage.

First you need a plane that's stable enough to provide a solid camera platform. Secondly, the camera needs a clear field of view. The Multiplex Easy Star is a popular AP platform, but none were available when I was shopping for it. So, I'm working on modifying one of my existing planes for AP duty. I've already been able to strap one or both cameras to several planes for testing.

Now that I've filled you in on my AP equipment, let's talk about that other all-important factor, knowing how to use it. When it comes to AP, using the camera is a more than just knowing which button to press. It's a combination of several skills involving making the camera work, mounting it to the airplane, and then flying the airplane appropriately.

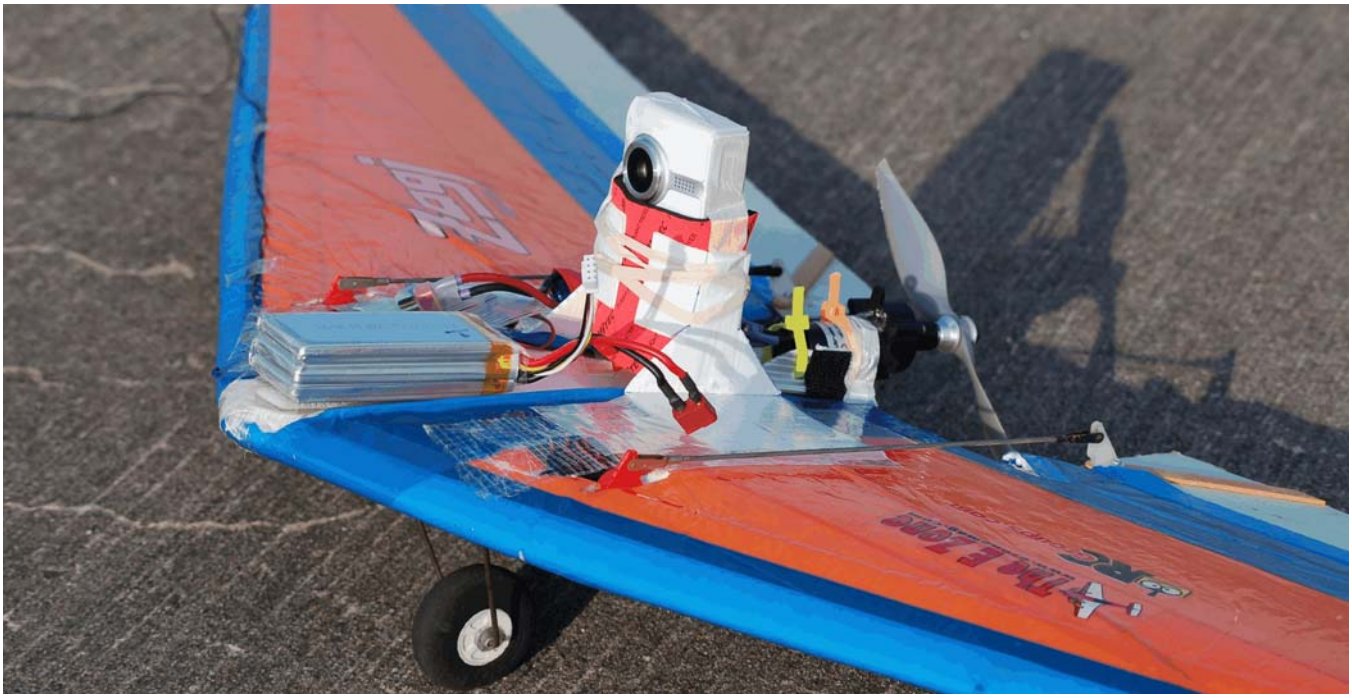

Photo 2: My first AP flights were made with my trusty old Zagi-400 flying wing. Although not an ideal (or attractive) platform, it helped me determine some of the traits I need to incorporate in a dedicated AP aircraft. Note the abundance of tape and rubber bands that hold the Flip camcorder in place.

Photo 3: The Aiptek A-HD+ 1080P wasn't so easy to use on the Zagi. It fit my homemade mount just fine, but the rubber bands would invariably squeeze one of the buttons on the camera and foil the filming. I eventually gave up and used the Aiptek on different airplanes with less anaconda-like mounts.

Both of my cameras are mass-market items, so they're designed for ease-of-use. True to the reviews, the Flip Ultra is super easy to get going. You just turn it on and push the big red button. In fact, when not performing my AP duties, I keep the Flip in the house, ready to catch impromptu performances by the kids. The Aiptek A-HD+ 1080P is a no-brainer too, but it does take a few more steps to "roll film."

Mounting the camera to an airplane takes a bit of planning and patience. You have to factor in the weight of the cam-

Photo 4: This photo is a snapshot from my first AP flight with the Flip Ultra. That's Rocket Park at Johnson Space Center off to the left. Yeah, it's a little fuzzy, but I've learned that getting quality aerial video is all about good equipment *and* good piloting.

era and how it might affect the airplane's CG. You must also consider the shape of the camera and how its aerodynamics might affect the model's flying characteristics. Perhaps that's why you don't see many cameras stuck way out on a wing tip.

Equally important is the camera's field of view. It's nice to capture some of the host airplane in the frame for a reference point, but you want the landscape to dominate the image. Shooting through the spinning propeller is a no-no. Instead of the slightly blurred image you might expect, you'll actually get wavy lines across the screen. It's as if you need to adjust the Vertical Hold Knob…only there isn't one.

You also want to mind the relation of the camera to the horizon. A camera aimed straight down that never shows the horizon will provide a pretty narrow field of view, and will likely yield boring video. Likewise, lots of blue sky and clouds will put you to sleep in a hurry as well.

A critical consideration when mounting the camera is to keep it secure. It should be fairly easy to remove so you can upload your files after the flight, but you don't want it to remove itself during a rough landing or an impulsive snap-roll! So far I've used a combination of rubber bands and strapping tape to secure my cameras. If your plane is electric powered, vibration shouldn't be an issue. Using a wet-engine motor will probably necessitate adding foam, or something to isolate the vibration.

Photo 5: Another snapshot from my first AP flight shows Rocket Park while halfway through a roll. This kind of flying degrades the image quality significantly, so watching such video is probably fun only for the pilot(s) involved.

Now we come to the photo airplane. I'm certainly not qualified to coach anyone on their flying techniques, but I can pass along one big secret I've learned. Perhaps the most important thing about flying the photo plane is that smooth flying makes a *world* of difference! My first few AP flights were done with my 48" span Zagi flying wing. Other than a few lazy circuits of the pattern at high altitude, I flew the Zagi in my normal, aimless fashion. I was slightly more reserved because of the camera hanging out in the breeze like a barn-storming wing walker.

As I watched the video with my family later that day, I was surprised by their reactions to the different types of flying. I expected them to be impressed with my well-executed rolling circle that ended with the Zagi right over the runway centerline. What I got was *"Gee, that's neat Dad. What's for dinner?"* My wife may have even become a little nauseous from watching the spinning horizon on the TV. At least that why she *said* she left the room.

But I got a different reaction when they watched the part where I flew high and slow over Rocket Park at Johnson Space Center. (Now before you make those concerned citizen calls to the nice, friendly folks at Homeland Security, please know that Rocket Park is right next to my club's flying site.)

"Wow! Cool! Look, there's the Saturn 5 rocket!"

"Hey, you can see the longhorns grazing!"

"Look, Dad, there's Clear Lake back there!"

"Where is our house?"

"Mom, the baby is drooling on the remote control again!"

Clearly my AP footage struck a cord with them when it gave them a new view of the things they see from their earthbound perspective every day. I too enjoy watching the landscape roll underneath my airplane. Because part of the fun of AP is sharing your footage with people who probably won't appreciate your great piloting skills, I'm now enjoying the challenge of capturing smooth, pleasing aerial footage while I stand on the ground. It's not all that easy, and that's a good thing. Like many of you, something has to challenge me before it interests me. I'll probably still shoot aerobatic footage, but I'll likely be watching it alone.

Well, that's all for this month. Next time we'll discuss some of the differences I found in video quality between the Flip Ultra and the Aiptek A-HD+ 1080P. And with any luck I'll have my dedicated AP plane completed by then. I'll also offer a few words about what to do with these videos once you've captured them.

As always, please write and tell me about your electric airplane projects or questions.

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FUN AEROBATICS

by Ed Moorman

MANEUVER
OF THE MONTH
Reverse Outside Square Loop

Over the past few months we've covered the Reverse Outside Loop, the Outside Loop, and the Square Loop. Now it's time to learn the Outside Square Loop. But, just as we did for the Outside Loop when we learned the *Reverse* Outside Loop first (because it starts out going upward and is thus easier for beginners to do), this month we'll first tackle the Reverse Outside Square Loop.

You'll recall that the reverse maneuver is where we first roll inverted and do the outside loop going upwards, a lot less stressful direction for newcomers to aerobatic maneuvers. So this month time we'll first cover the Reverse Outside Square Loop to get the feel for an outside square corner, before we get into the maneuver than begins downward with the first leg.

DESCRIPTION

The Reverse Outside Square Loop is basically just a reverse outside loop with square corners. It's an outside, square cornered loop, begun from inverted level flight, followed by four, fairly tight, down elevator outside corners. You complete the Reverse Outside Square Loop back in inverted level flight, and then roll upright to finish.

KEYS TO THE MANEUVER

There are two keys to doing a Reverse Outside Square Loop well. The first is to have a plane that won't stall, snap, or roll out during a down-elevator square corner. The second is to acquire confidence in your plane and yourself while doing the outside square corners.

AIRPLANE SETUP

The best planes for this maneuver are 3D planes, fun fly planes, and Sticks. Most Stick models have a shoulder wing and a low stab. This combination gives you greater control authority in the down elevator direction than in the up elevator direction. If you have a Big Stick, Ultra Stick, Super Stick, Lucky Stick, Joss Stick, or anything like them, you're good to go. Sticks were *born* to do outside loops. Take it up and do a full up loop, and then a full down outside loop. If you have equal up and down elevator movement, the outside loop will be tighter. The stabilizer tends to block the disturbed air flow coming off the rear of the wing, leaving clean air under the stab, which gives us greater control. The top side of the stab is in disturbed air, so we get less control authority. The reverse is true for a low wing plane

RC REPORT MAGAZINE	
TEACH YOURSELF AEROBATICS CARD	**REVERSE OUTSIDE SQUARE LOOPS** **By Ed Moorman**

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

DESCRIPTION OF THE REVERSE OUTSIDE SQUARE LOOP

The reverse outside square loop is a square cornered loop started from inverted level flight with four, fairly tight corners. You end in inverted flight and roll upright.

KEYS TO THE REVERSE OUTSIDE SQUARE LOOP

The key to doing a reverse outside square loop is to have a plane that won't stall in a down control square corner and building confidence in your plane and yourself.

AIRPLANE SET-UP FOR THE REVERSE OUTSIDE SQUARE LOOP

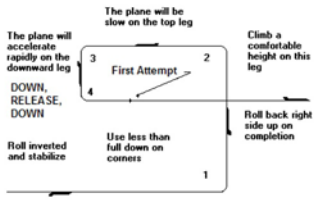
Adjust the down so you can fly through a full down outside loop without snapping.

DOING THE REVERSE OUTSIDE SQUARE LOOP

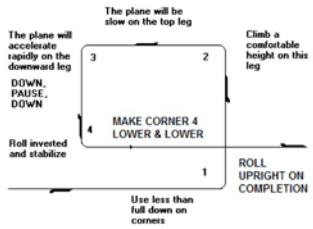
Standard Set-up: Full power, parallel to the runway, one mistake high. All loops are best done INTO the wind.

YDo not jerk in full up elevator control for this maneuver. It should be done smoothly.
YUse about half down elevator for corners to start.

Drawing 1



Drawing 2



Step 1: Roll inverted and stabilize. Don't roll and jam in the down elevator. Roll inverted, pause and get stabilized, then start the square corner.

Corner Number 1: Use about half down elevator to make a square corner to a vertical leg. Try to be smooth. This corner isn't critical

The Vertical Up Leg: Fly vertical a comfortable amount for your plane. Don't completely run out of speed. Lower power planes will have to do a tighter loop. High power and 3D planes can really climb up high.

with a high stab, one up on top of the fuselage.

Take your plane up and try a few reverse outside loops... first roll inverted, and then loop upwards using full down elevator. Repeat until you find out just how much down elevator you can use to complete a full outside loop without snapping or rolling out. You won't be using full down during the maneuver, but for the first few tries you're likely to overdo it. Once you can hold that amount of down elevator through the loop without snapping, you're all set.

DOING THE MANEUVER

Let's begin start with the standard set-up.

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

Okay, maybe *two* mistakes high at first, but don't start out somewhere up in the stratosphere! Remember, this maneuver begins by going upward. Start at a comfortable altitude for you, and then bring it down little by little as you get more confident.

The Reverse Outside Square Loop should be started flying into the wind.

WHAT TO DO

You should have already done a few *round* reverse outside loops to get the down elevator adjusted, but if you haven't, try a few to get the roll to inverted and the direction firmed up in your mind. After you're comfortable with the round reverse outside loops, then give the square one a try.

The Start: Roll inverted and stabilize. Don't just roll and suddenly jam in the down elevator. Roll inverted, pause and get stabilized, and *then* start the square corner.

Corner Number 1: Use about half down elevator to make a square corner to a vertical leg, and try to be smooth. This corner isn't critical, so start with a nice, easy, *slightly rounded* square corner. Using too much down elevator will scrub off a lot of speed, making your vertical leg and the second corner harder.

The Vertical Up Leg: Fly vertical a comfortable amount for your plane, and be careful not to run out of speed. Low power planes will have to do a tighter loop with shorter legs. High powered and 3D planes can climb higher. There's a definite downside to making the vertical leg too long, though. The downward vertical leg needs to be the same length, and if you don't reduce power on a long down leg, you'll build up a *lot* of speed, making the timing on the last corner much harder.

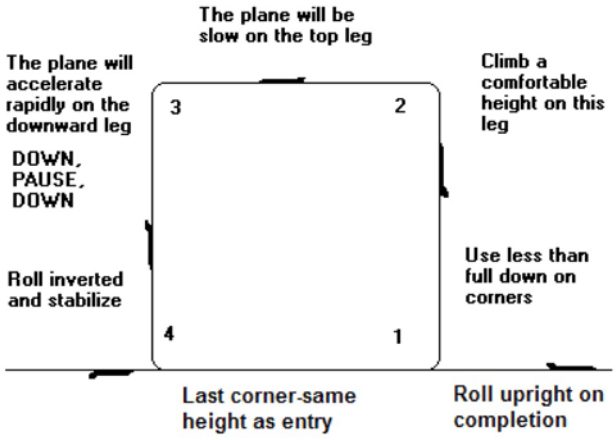
Corner Number 2: Make an easy corner here. Your speed will be slow because of the vertical climb, so make your level off slightly nose high.

The Top Leg: As I mentioned, you may need to hold a little up elevator on this leg to keep from losing altitude due to slower speed.

Corner 3 and Corner 4, the Coffin Corner: The next things you do are pitch straight down, fly a vertical down leg, then push down elevator for the coffin corner. If you have done the testing I suggested and set your plane up, you won't have any trouble.

FIRST ATTEMPTS: See Drawing 1. Do a short downward leg and pull out high. Do a DOWN-RELEASE, DOWN-RELEASE.

Progress Lower: See Drawing 2. Once you get the feel for doing a square corner, get a little bolder and try making corner 4 lower. Don't just do a blip



The Full Reverse Outside Square Loop: The big thing with square loops, either inside or outside, is the timing of the bottom corner. With the outside squares, the pull out is an inverted one. This makes most people nervous, making a hard down pull out. Ending up inverted also adds to the stress factor, but if you start out making a high corner 4, then go lower and lower as you get more comfortable with the maneuver, you'll be doing a good one soon.

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Ed Moorman E-mail: moorman1@cox.net

Corner Number 2: Make an easy corner here. Your speed will be slow because of the vertical climb, so make level off slightly nose high. If you don't, the plane will tend to descend and you'll have to correct with up elevator to keep it level.

The Top Leg: As I mentioned above, you may need to hold a little up elevator on this leg to keep from losing altitude due to the plane's slower speed.

Corner Number 3: Don't rush the third corner. Use about half down elevator to pitch the plane straight down.

The Vertical Down Leg: This one goes by pretty fast, so get ready for corner 4.

Corner Number 4: I call this one the "coffin corner." *(Editor's Note: Have you that little confidence in us, Ed? Tsk tsk tsk!)* Push down elevator for this corner. I could tell you to use half down elevator, but you'll use more at first. This corner is the reason you went up and tried full down elevator loops and adjusted the amount until the plane didn't snap. If you've done the testing I suggested, and set your elevator accordingly, you won't have any trouble.

Roll to Upright: After the coffin corner, you end up level and inverted. Do a nice roll to level upright flight, pause (for the applause), and pull up into a victory roll! You've done it!

Now here's how I want you to modify your first few attempts. Make the vertical down leg short, and pull out high. Just do a brief "down, release, down, and release" to execute corner 3, the down leg and corner 4. You'll finish level and inverted, but you've completed the loop, so roll back to upright.

That wasn't so hard, was it? Yes, you'll wind up higher than you started, but the main focus right now is to complete the maneuver. Then the more you practice it and gain confidence, you can adjust the corners and legs as necessary to make it all look better.

Progress Lower: Once you get the feel for doing a square corner, get a little bolder and try making Corner 4 a little lower. Don't just do a blip-blip of down elevator twice real fast, do it like "down, pause, down, pause, roll upright". Forget the exact entry altitude at first. just work on getting Corner 4 a little lower as you progress, and learn how to control it. The real key here is building up confidence in yourself and your airplane, that you can and will complete Corner 4 without getting grass stains on your propeller.

Photo 1

The main thing to work on when flying square loops, inside or outside, is the timing of the bottom corner. Even with an inside square loop, on the last leg, you dive at the ground and time the pull-out to level off at the same altitude you started. With the outside squares, the pull out is an inverted one, which makes many pilots nervous. Ending the maneuver inverted also adds to the stress factor, but if you start out making a high Corner 4, and then work it down lower and lower as you get more comfortable with the maneuver, you'll soon be doing it like a pro!

You *can* learn outside squares! Just follow the described procedures for setting up your plane, start high enough to give yourself confidence about the safety of your plane, and then practice, practice, practice.

FEATURE OF THE MONTH

It's summer and we've just had our second float fly of the year. Seaplane and float plane fliers from several clubs in the area try to get together every month at Lake Jackson on the Florida-Alabama state line. *(Editor's Note: I think he meant to say the "Alabama-Florida" state line.)* Due to weather, however, the dates vary. But this time the weather cooperated, with sunny skies and very little wind. It was simply great for flying off water.

We had 10 planes and one boat, which was a little better turnout than our first float fly of the year. The results were a lot better, too. The first float fly comes after the winter layoff, which may explain why that event has more... uh... mishaps than all the rest of the events all year. It seems to take at least one event for our guys to get their "sea thumbs" back. You know what I mean.

Photo 1 shows Jim Giffard with his new and great looking Sig Four-Star 120 on floats, using an O.S. 1.60 for power. This excellent float conversion flies great. A 1.20 will power the airplane very nicely, but Jim's big 1.60 *really* hauls it along, even with the extra drag and weight of the Sig 1/4 scale floats.

Photo 2 is a great shot of Jim's red Four Star in a vertical

Photo 2

Photo 3

climb. Plenty of power there! Does that look fantastic or what?

Photo 3 shows Mark Pfeiffer's O.S. FS-91 powered SeaWind. Don't worry, he wasn't really that close to the buoy. Mark has been flying that SeaWind for several years, and handles it well. It took him a few flights to learn the correct take off and landing techniques, but now he has it nailed. The SeaWind is particularly popular with the spectators at our float flies. Mark also has the smaller, electric SeaWind, which he says handles a lot better than the big one! Both are Great Planes kits. Mark also flew his electric PBY Catalina. You might think that electrics wouldn't be very good for water flying, but we see them all the time now. Flaps and I might have to try one some day.

Photo 4

Photo 4: Here's my Sea Stinger 40 with Saito .72 power and tri-floats. The engine quit right after takeoff and I somehow managed to flip it over on the dead stick landing. Stingers are good flying planes, both on land and on water, so it's too bad they quit making them.

Photo 5: Frank Liberatori has a great time with his electric powered flying boat. He's had some bad luck with his glow powered models, but this little guy just keeps on humming! His ST .40 powered trainer has Gee Bee floats that don't seem to like releasing themselves from the water.

Photo 5

Photo 6

Photo 6 shows Joe Shearer's tried and true Sig Kadet Sr. With O.S. FS-70 power. Joe has been flying this float plane for years, and at least ever since we started flying at Lake Jackson in 2003. It's a great combination. Looks nice against the clouds, huh? *(Editor's Note: My setup was very similar, with a quiet K&B Sportster 65 in the nose, until I electrified it with an E-flite Power 32 motor. It's still quiet, though!)*

Photo 7 shows my Saito .56 powered Sea Roar. I got some good stick time and at least 15 landings with this one (an "Uproar" on floats). This Uproar was originally built

Photo 7

Photo 8

from a kit by Ugo Ferrari, but he tired of it and gave it to me, after changing the ailerons from funky-looking to the nice, straight taper. The Plane Fun Floats are pre-sheeted foam with a hard back installed, and they come with all the necessary mounting hardware. They work really well, too. The struts I used are two sets of U-Can-Do 3D landing gear, ordered from Tower. The spreaders are fiberglass arrow shaft pushrods with a short piece of dowel epoxied in each end so they could be fastened to the floats.

Photo 8: Ah, the pretty one! Buddy Shuman flew his dad's Zenoah G-26 powered 1/4 scale Cub. What a beautiful model, and the G-26 pulls it very well.

It was a great day of flying off water, with good weather, good planes, good pilots, and good spectators, who seemed to really enjoy the flying. Guys, if you haven't tried flying from water yet, you're missing out on some good.... *great* fun.

-Ed Moorman
85 12th Street
Shalimar, FL 32579
moorman1@cox.net
(Photos by Doug Burge and Mark Pfeiffer)

(Editor's Addition: I don't know how to explain it either, but when I fly off water, I want to take off and land, take off and land... over and over, all day long. There's just something about the visual impact of seeing the model lift from and then return to the glistening, rolling liquid runway. Great fun, but terribly addicting, too..)

After having dug to a depth of 10' last May, scientists in New York City found traces of a copper-wire system dating back 100 years, and came to the conclusion that their ancestors already had a telephone network at least a century ago.

Not to be outdone, California scientists dug to a depth of 20' in June. The following day, a front page article in the "L.A. Times" read, "California archaeologists found traces of a 200 year old copper wire system, leading scientists to conclude that Los Angeles had an advanced and complex, high tech communications network at least 100 years earlier than New York!"

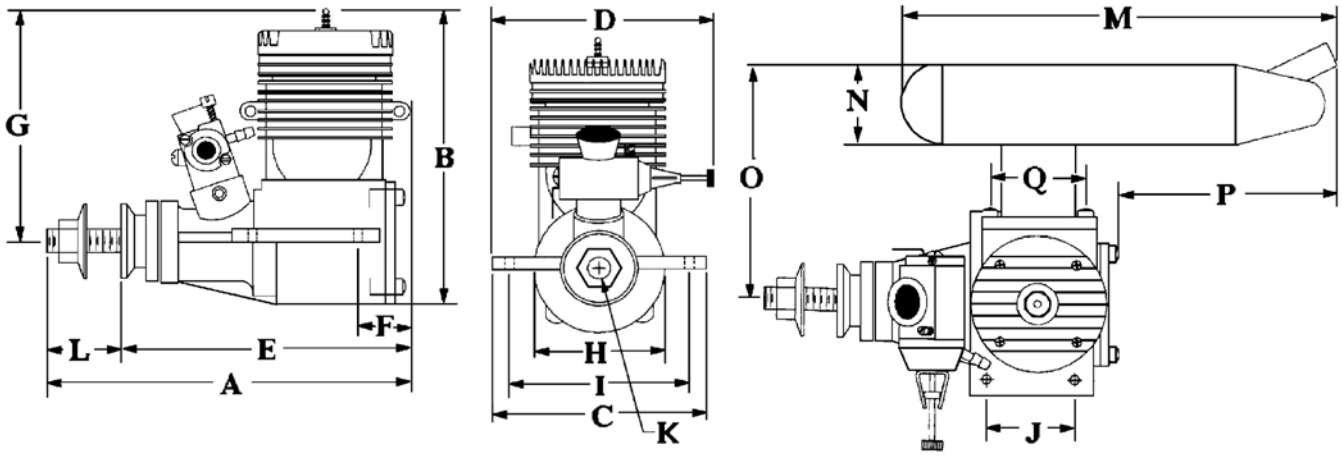
In early July, the "Redneck Rebel Gazette" in North Alabama reported, "After crashing his model airplane deep into an old cotton field near Madison, Alabama, Bubba Ray Twilley, a self-taught body and fender repairman, reported that he'd found absolutely nothing, proving that 300 years ago, Alabama had already gone wireless!"

RC REPORT ONLINE

ENGINE TEST REPORT

Engine . . . . . Aviastar AV-46
Manufacturer . . . . . Aviastar Engines, China
Importer/Distributor . . . . Sig Mfg. Co., Inc.
401-7 South Front Street
Montezuma, IA 50171-0520
List Price $49.99
Warranty . . . . . One Year
Muffler Included . . . . . Yes
Glow Plug Included . . . . . No
Tools . . . . . Several Allen wrenches
Accessories . . . . . None
Bore x Stroke . . . . . 0.886 x 0.756"
(22.5 x 19.2 mm)
Actual Displacement . . . . . .46 c.i. (7.53cc)

Recommended RPM Range 1,900 to 16,000
Advertised HP . . . . . 1.66 at 16,000 RPM
Schnuerle Ported . . . . . Yes
ABC Design . . . . . Yes
Ball Bearings . . . . . Two
Engine Weight . . . . . 13.6 oz.
Muffler Weight . . . . . 4.6 oz.
Recommended Props . 10x6 10x7 11x6 11x7
A. Overall Length . . . . . 4-7/8"
B. Overall Height . . . . . 3-9/16"
C. Overall Width at Mount . . . . . 2-3/32"
D. Overall Width at Carb . . . . . 2-15/16"
E. Firewall to Prop, minimum . . . . . 3-1/2"
F. Firewall to First Mounting Hole . 17/32"



G. Crank Center to Outermost Point 1-1/8" (muffler not included)
H. Mounting Beam Width . . . . . .
I. Mounting Hole Centers, Side to Side . . . . 1-23/32"
J. Mounting Hole Centers, Front to Rear . . 11/16"
K. Propshaft Diameter 7mm
L. Propshaft Length . . . . . 1-5/16"
M. Muffler Length . . . . . 5-3/8"
N. Muffler Diameter . . . . . 3-3/8"
O. Muffler Side Projection . . . . . 3-3/8"
P. Muffler Rear Projection . . . . . .
Q. Muffler Screws Centers . . . . . .
Fuel Used . . . . . Unspecified 15% nitro
Glow Plug Used . . . . . O.S. #8

NOTE: All Test Props are as indicated.

Minimum Reliable Idle

Propeller	RPM
10x6 Master Airscrew	2,750
10x8 Master Airscrew	2,550
11x7.5 Master Airscrew	2,200
12x4 APC	2,100

Maximum Measured Noise @ 10 feet

Propeller	dB(A)
10x6 Master Airscrew	99.0
10x8 Master Airscrew	98.0
11x7.5 Master Airscrew	97.0
12x4 APC	97.0

Maximum Measured RPM

Propeller	RPM
10x6 Master Airscrew	14,270
10x8 Master Airscrew	12,350
11x7.5 Master Airscrew	11,250
12x4 APC	12,250

CHEERS - No major leaks; excellent distributor support; good power; relatively low noise; easily handles all recommended propeller sizes; an impressive overall value.

JEERS - Comes with no glow plug; the original carburetor had to be replaced.

It's been a long time since I've run an engine this small, so I hope my earlier experiences will suffice for running and reviewing this one.

The Aviastar .46 is distributed by Sig Mfg. Co., and sells for the low price of only $49.99. It comes a robust muffler that looks large enough to suppress a lot of engine noise without killing off too much power. Several Allen wrenches are provided as well. The two-needle carburetor has to be installed by the user because a larger box would be required if the carb was pre-installed. Sadly, at this price there's no glow plug included, but any medium heat range plug can be used.

I can't remember the last time I bought a glow plug, so the first thing I did was order several at my local hobby shop, and while there I picked up a gallon of liquid gold, also known as glow fuel. (When did the price get *this* high?)

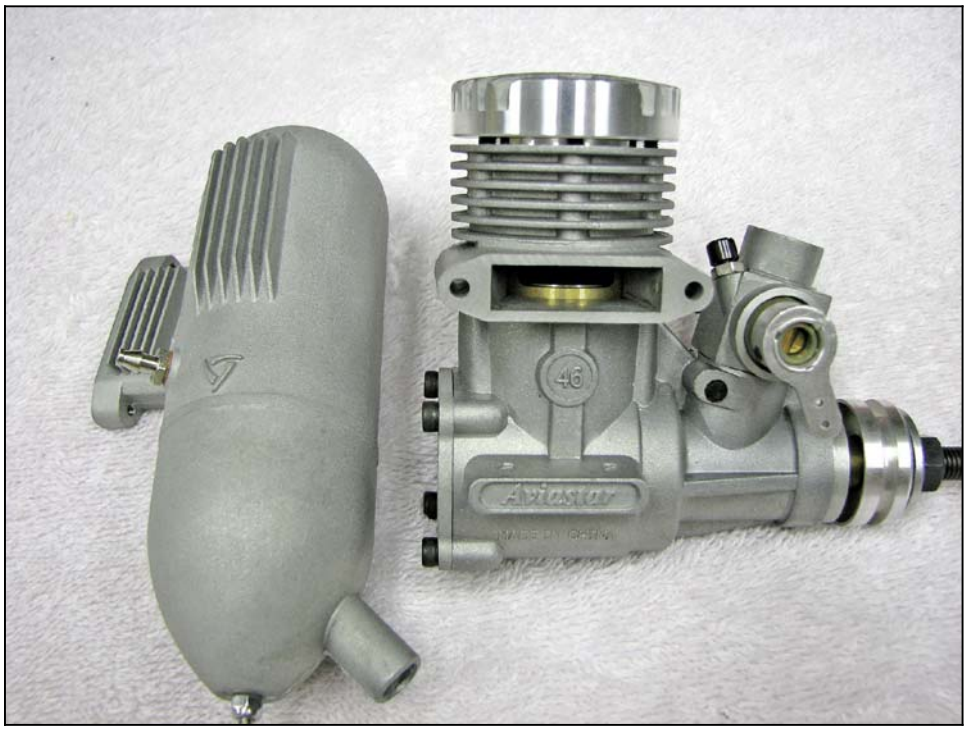
Next I had to find my old glow plug battery and charge it.

After reading through the supplied instructions, I fastened the engine to my engine test stand. Then I formed a one-man safari to go back into the jungle I call my work shop, and hunt for some suitable size props. Avoiding the finicky and often poorly sized wooden props, I finally found some composites that would work well within the engine's recommended sizes.

Now the fun began. The Aviastar .46 is an ABC engine, so the cylinder bore diameter is slightly smaller in at the top than at the bottom. This is done to allow the top of the combustion chamber to expand more when heated by the burning fuel mixture. As it heats up it expands to approximately the same diameter as the lower end of the cylinder. But that only happens when we get the engine hot, and to get it hot we first have to get it running! This sounds all good and logical, except when they're cold, some ABC-type engines are so tight it's almost impossible to turn the propeller by hand, even with no glow plug installed. And this engine just happens to be one of those "some".

After squirting a few drops of castor oil through the glow plug hole, I turned to my 12 volt engine persuader. This got it turning, and it soon became easier to spin. So I installed one of my shiny new glow plugs, filled the fuel tank with 15% nitro fuel (and I thought *gasoline* was expensive!), connected the glow plug battery, and engaged the electric starter. So that's what it takes to fire up a glow engine!

Okay, now it's running, but roughly at best, due to the still tight piston-to-cylinder fit. It seemed to be taking all its power just to keep going, but I patiently stood by and gave it time to break in a little. Well sure enough, as the minutes passed the engine ran better and better.



After about ten minutes I began experimenting with the high speed needle valve. This allowed leaning the mixture, which is good because we're never supposed to run an ABC engine sloppy rich, even at break in. Remember, getting the upper cylinder bore to expand to its normal size requires allowing the engine to warm up to its normal operating temperature.

I let three tanks of fuel run through the engine before I began to adjust the high and low speed needles in earnest. The high speed mixture was easy to dial in, but even when the low speed needle was fully seated (screwed all the way in), the mixture was still too rich! So I said to myself, "Self, this ain't right!", and myself agreed, suggesting that I contact Sig Mfg. about the problem. So I did, via an email the very next day. Well, at first they suggested I try a new glow plug and fresh fuel. Since that's all I had anyway, what's your next guess? They finally asked me to remove and send them the carburetor, but that they'd go ahead and send me a new one right away. And they did.

While waiting for the new carb to fall off the big brown model airplane truck, I decided to poke around online and see how other modelers were faring with their Aviastar .46 engines. And it didn't take long to discover that I wasn't the first to experience the very same problem. And their "fixes" was the same one Sig proposed... replacing the carb. Several people opined that the original carb *may* have been intended for a larger engine, and was mistakenly installed on the .46 (not verified).

With the new carburetor installed, the engine started easily, and with a few minor tweaks of the needles, the Aviastar .46 was reliably idling at a very respectable 2000 RPM for several minutes at a time, and would still accelerate cleanly and quickly to peak RPM. Now *that's* more like it!

I don't have a great variety of propellers suitable for this size engine, but they're enough to get a good idea how well the engine performs in normal use. After each prop was installed, the engine was re-tuned for peak performance before the test measurements were recorded.

I was especially pleased at how well the muffler silenced the engine. It's not overly large, mind you, but it did its job well without choking the engine to death.

In the end, Sig's Aviastar .46 performs very well with the propellers I used. Once broken in it starts easily by hand, and I noted no major leaks from the front bearing or muffler joints. The replacement carburetor was easy to adjust, and it seems to handle props large and small equally well. It may not be a record setter in any area of performance, but its combination of low price, excellent distributor support, and more than adequate power leads me to conclude that the Aviastar .46 ABC is a very good buy.

-Dick Pettit, pettit@ti.com

New Directions RC

"VecJetPF"

PRODUCT TEST REPORT

by terry dunn

Model . . . . . Vec-Jet PF
Airplane Type . . . . . Electric Aerobatic ARF Park Flyer Flying Wing
Manufacturer . . . . . New Directions RC www.newdirectionsrc.com
Regular Price $169.95
Wing Span . . . . . Advertised: 30" Measured: 30"
Wing Area . . . . . Advertised: Not stated Measured: 272 sq. in.
Advertised Weight . . . . . 10 to 11 oz.
Airfoil . . . . . Not stated
Wing Structure . . . . . Multi-layered Depron foam
Wing Joiner Method . . . . . None needed
Fuselage Structure . . . . . Depron foam
Fuselage Length . . . . . Advertised: 17" Measured: 17.75"
Recommended Controls . . . . . Four (Ail, El, Rud/Yaw, and Throt)
Motor Included . . . . . 100 Watt brushless outrunner
Motor Mount Installed . . . . . Yes
Battery Included . . . . . None
Recommended Battery . . . . . 3-cell LiPo, 800 to 1400 mah
Speed Controller Included 20 Amp brushless
Recommended Wheels . . . . . None
Assembly Instructions . . . . . None
Hardware: Metric or SAE . . . . . Metric
Hardware Included . . . . . Everything but the receiver and motor battery

Items Needed To Complete . . . 4-ch mini Rx and a 3-cell 800-1400 mah LiPo battery
Covering Material . . . . . Adhesive vinyl
Estimated Skills Required . . . . . Experienced
Drilling Required . . . . . Yes

COMPLETED MODEL

Finished Weight . . . . . 10.8 oz.
Wing Loading . . . . . 5.72 oz./sq.ft.
Motor Used . . . . . As supplied (100 Watt brushless outrunner)
Propeller Used . . . . . As supplied (4.5x4.1 APC Electric)
Speed Controller Used . . . . . As supplied (20 Amp brushless)
Battery Used . . . . 1100 mah 3S LiPo (2.9 oz.)
Power to Weight ratio . . . . . 138 watts/lb.
Flight Duration . . . . . 10 minutes when using the above battery
Radio Used . . My Spektrum DX-7 (2.4 GHz) transmitter and AR6100E receiver, and my motor battery, with the provided 20 Amp Brushless ESC and three Esky micro servos.
Covering/Finishing Used Comes pre-covered
Special Items . . . . . None

CHEERS & JEERS - None submitted

Last year I was given the opportunity to review a neat little flying wing called the VecJet. As it turns out, the makers of the VecJet, New Directions R/C, are also residents of Houston. During the course of writing my review I was able to meet one of the owners, Dale Mayer. Dale and I have kept in touch ever since, and we've even managed to fly together a few times.

Dale recently called to ask if I could help him shoot some flight photos of his newest design, the VecJetPF (PF for Park Flyer). We met at a local park where we swapped camera and flying duties over several flights. By the time we left, I had already decided that I was going to buy a VecJetPF for myself. Now, after numerous flights with my model, I decided that this airplane is too neat to keep secret, hence this review. *(Editor's Note: Hence? Hence? Who says "hence"? You weirdo, you're almost as bad as Brian "th Wiz", hence the comparison!)*

Before I go any further, I think a few disclaimers are in order. Some of you may think that it's an obvious conflict of interest for me to review a plane sold by someone I know. Well, okay, I understand that. But I assure you that I'm not getting any kickbacks from Dale, monetary or otherwise. If I were, I think he'd owe me

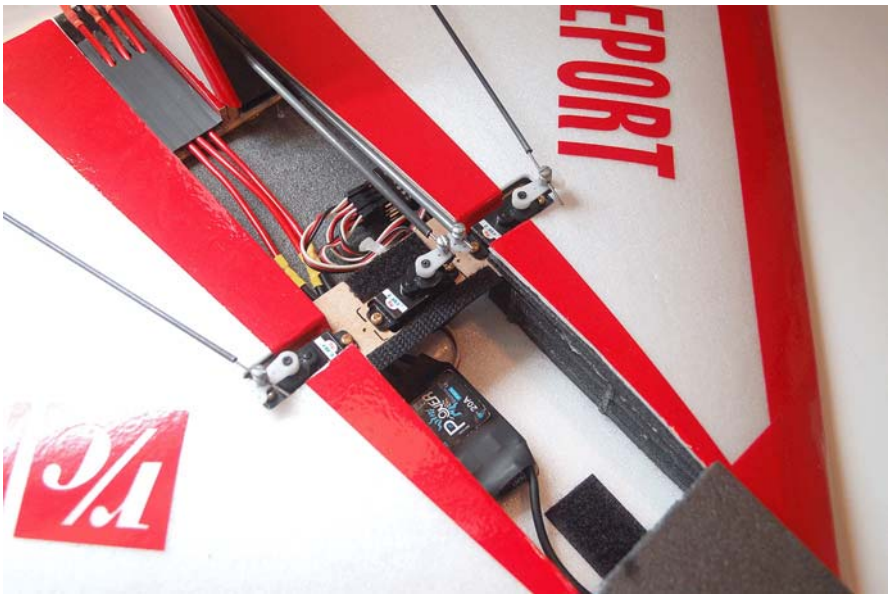
about six zillion dollars for all the sales of the original VecJets that resulted from my flights at various flying sites! Come to think of it, Horizon Hobby would owe me my cut of a few dozen Park Zone T-28 sales, too (a truly great flying RTF electric fun scale airplane). But alas, my financial stake in the R/C industry is purely literary. Heck, I even paid full price for the VecJetPF reviewed here. (Gee, thanks Dale!)

If you're still reading these words with a skeptical eye, that's fine. Simply ignore my subjective opinions and view the objective data and photos as a sneak peek at a very cool little airplane that you probably didn't know about. What's so cool about it? Well, like all of the airplanes in the VecJet lineup, this one uses vectored thrust to perform some crazy and truly attention-getting maneuvers.

The VecJetPF is essentially a Ready-To-Fly model airplane. The airframe comes completely assembled (made in the USA) and decorated with adhesive vinyl. The airframe itself is mostly Depron foam sheet. If you're not familiar with Depron, it's basically the same stuff that your grocery store uses for meat packaging. *(Editor's Note: Meat comes from grocery stores? And here I was thinking that Mina was the world's greatest hunter!)* The wing gets its airfoil shape from internal laminations of Depron that fill out the external sheeting. The wing's trailing edge has a hard balsa spar, while the motor mount is a simple hardwood stick. The elevons are hinged to the wing with a thin sheet of plastic that's laminated between the layers of foam.

Altogether this makes for a light and elegantly simple airframe. I've also found this design to be quite durable. No, I haven't crashed my PF yet, but *someone* has crashed my similarly-designed original VecJet countless times, and it's still going strong. The most complex repairs I've had to make so far have been to tack down a few areas of delaminated foam, and to flatten out an accordion-like nose. Both repairs were easy and quick with foam-safe CA or Gorilla Glue. *(Editor's Note: "Someone", huh? Let's come back to that later.)*

You can buy the VecJetPF in different levels of completion. Most folks go the same route I did with the "Fly-it-now" package. When I re-



ceived my airplane it already had the brushless motor, prop, and Electronic Speed Control (ESC) installed. It also had three Esky 8-gram servos with pushrods already in place. If you prefer mainstream brand names, you can get Hitec servos and/or a Castle Creations ESC for a slightly higher price.

All I had to do to get airborne was to install my receiver and a 3S LiPo battery. I took a detour with the ESC, however, just to satisfy my preferences. As supplied, the included ESC was mounted behind the servos, and the three motor leads plugged directly into the bullet connectors coming from the motor. To reach the battery, the ESC's battery wires had been extended a few inches and capped with a JST connector. Since I don't like (or trust) the small JST connectors, I replaced them with Dean's Ultra Plugs like I normally use.

Then, as I thought about it a little more, I decided to move the ESC ahead of the servos to help consolidate the onboard weight. This would provide two benefits. First, moving the ESC forward reduces or eliminates the need for nose weight to balance the model. Secondly, having the ESC (and other good stuff) closer to the CG lowers the model's Moment of Inertia.

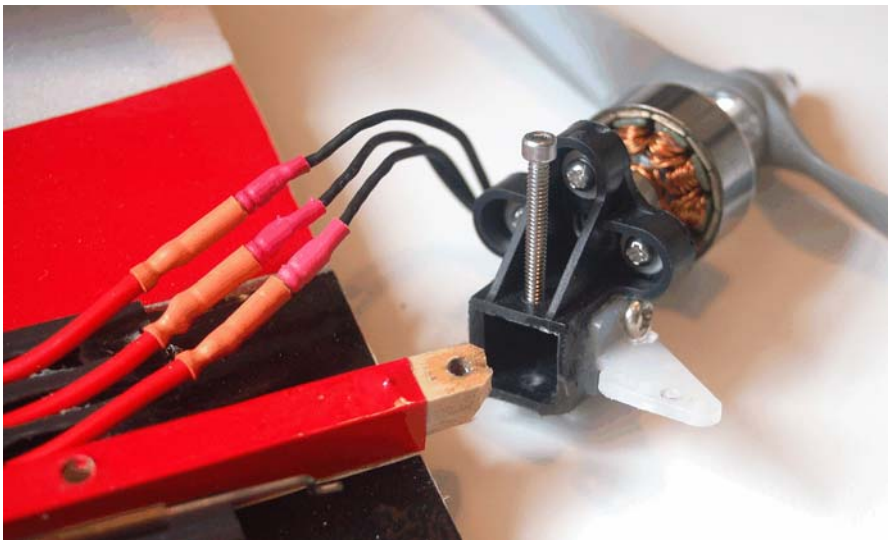
Right about now you may be asking yourself why that "bonehead Dunn" is talking about Milk of Magnesia. No no, it's "Moment of Inertia." Just sit tight and I'll get around to explaining why it's an important factor with the VecJetPF, or at least one worth considering. *(Editor's Note: "Moment of Magnesia"? Now I think I know who's <u>really</u> behind that old phrase, "In Houston we have a problem!")*

To facilitate moving the ESC, I removed the existing extension on the battery leads, and soldered a male Dean's plug to the stock wires. Then I made a set of 6" extensions for the three motor leads. With that complete, the ESC easily fit in the battery compartment ahead of the servo tray, with ample room to spare.

I used a Spektrum AR6100E receiver in the VecJetPF. It fit nicely right behind the servo tray in the left side of the wing. The upper and lower wing sheeting gently snuggle the receiver and keep it in place, so no Velcro is necessary. *(Editor's Note: You have got to be kidding me! Men in Texas, where guns are as popular as beer, use the word "snuggle"? I think I'm gonna throw up!)*

I've already mentioned that the cornerstone of the VecJetPF's appeal is its vectored-thrust. This basically means that the thrust line of the VecJetPF can be altered in flight to provide more directional control. In this case, the motor mount swivels in the yaw axis. This is accomplished by mounting an off-the-shelf brushless motor mount on a hardwood stick that's narrower than normally used in a mount that size. Then a single, vertical screw secures the mount in place while acting as a pivot point. A nylon control horn fastens to the mount, allowing a single servo to control both the rudder and motor mount simultaneously for *insane* yaw authority.

As I set up the control throws on my VecJetPF, I found that I wasn't getting as



much vectoring as I wanted. It doesn't take much throw to have a very dramatic effect, but I could tell that I wasn't getting as much as I should. There was binding somewhere in the motor mount. I removed the motor mount and quickly discovered the source of the problem. The end of the hardwood stick was still squared off instead of being rounded. This restricted the motor mount's range of motion, because the sharp corners of the stick were contacting the inner wall of the motor mount after only slight deflection. A few passes with a file and sandpaper took care of that, and provided the range of motion I wanted. I also soaked the end of the stick with thin-CA, hoping to strengthen it.

The VecJetPF's pushrods are rather unique. They're basically music wire with a Z-bend on the ends that mate with the control horns and servo arms. But they also have free floating, small-diameter tubes (carbon fiber, I believe) that prevent the wire from flexing very much. The looseness of the tubes makes them rattle somewhat during ground handling, but the sound disappears in flight.

To fly the VecJetPF you'll need a transmitter with elevon mixing, or you can use a small on-board mixer. Anyone who's flown a flying wing before should be familiar with this setup. For the rest of you, "elevon mixing" simply means that the control surfaces on the trailing edge of the wing provide both pitch (elevator function) and roll (aileron function) authority. Most computer radios, like my Spektrum DX-7, have a built-in elevon mixer.

For high rates I programmed the DX-7 to provide 5/8" of travel in each direction when using aileron input only, and the same for elevator-only input. Low-rate throws on the elevons were set at 75% of the high-rates, and I added 30% exponential for both rates. Note that once you've set these single-input travels, the elevons will move further when you apply a combination of aileron and elevator input at the same time. That's just the elevon mixing doing its job. For the rudder and yaw vectoring, I set the high-rate throws to the maximum I could get without pushrod binding, and set the low-rates to about half that. I didn't use any exponential on the rudder channel, even though the manual recommends it. This is just another personal preference of mine.

Keep in mind that the VecJetPF requires a little reflex in the elevons for level flight, as do most flying wings,. Just set both surfaces a few degrees above center, and that should do the trick. You can also adjust this in flight with the elevator trim tab.

The power source for my VecJetPF is a 3-cell 1100 mah LiPo from Falcon Batteries, rated for 10C (11 Amps) continuous output. With this 2.9 oz. battery Velcro'd just in front of the ESC, my VecJet balances at 8.25" behind the nose, exactly where it should! The ready-to-fly weight is a bantam 10.8 oz., resulting in a wing loading of only 5.72 oz./sq.ft.

As I was installing the strip of Velcro in the battery compartment, I noticed two neatly cut circles in the wing sheeting near the nose of the plane. I had not noticed them before because the vinyl trim had covered them over. I used a

sharp X-Acto blade to cut away the vinyl, and was rewarded with two nice air inlets to help cool the battery. The warmed air then exits through the gaps around the perimeter of the Depron hatches that cover the battery and radio compartments behind the servos.

At full throttle the little outrunner motor spins the tiny 4.5x4.1 prop with 93 Watts of power. This equates to a power loading of 138 Watts/lb. If you've been reading my column in this magazine (you *do* read it don't you?), you'll know that any power loading over 100 Watts/lb. promises plenty of excitement. That rule certainly holds true with the VecJetPF!

The hardest thing about flying the VecJetPF is the launch, and success depends on understanding that "less is more". With such a light wing loading, this plane doesn't need a meaty heave to get it airborne. An overzealous throw may put the airplane in a bad attitude from which you may not have the altitude or time to recover. Imagine that you're throwing a softball from the pitcher's mound to second base, and the runner is a fat guy with an ankle brace and a full mug of beer. There's no rush! I grab the left leading edge right about where the "T" in my "R/C Report" sticker is. Then, with half-throttle and the wing level, I loft it straight forward, but *not* with a stiff-armed arcing motion, and just slightly nose high. Bada-bing, it's flying! It's probably a good idea to have a buddy launch for you the first few times, but you'll soon see that it's no big deal.

The VecJetPF is a clean airplane that accelerates quickly. I wouldn't dare to guess its maximum speed, but I doubt that many of us will crave much more. Point the nose up and it will climb until you stop such nonsense. In fact, one of the things I really like about the VecJetPF is its very wide speed envelope. You can keep the power to it and make your maneuvers really big and smooth, or you can throttle back and do the same things in a much smaller box at a much lower speed. You have to slow it way, *way* down before the VecJetPF will stall.

I do most of my flying on high-rates, which makes the VecJetPF a spunky little airplane. Rolls are nice and fast, and you can "yank-and-bank" for some really fast direction changes, too. With the amount of elevator throw I'm using, even maximum input won't make it snap out of maneuvers, but the higher drag will *kill* your speed. Lower momentum is the trade-off for the benefits of the light wing loading. Still, with so much motor power on tap to regain the lost energy, it's not much of an issue.

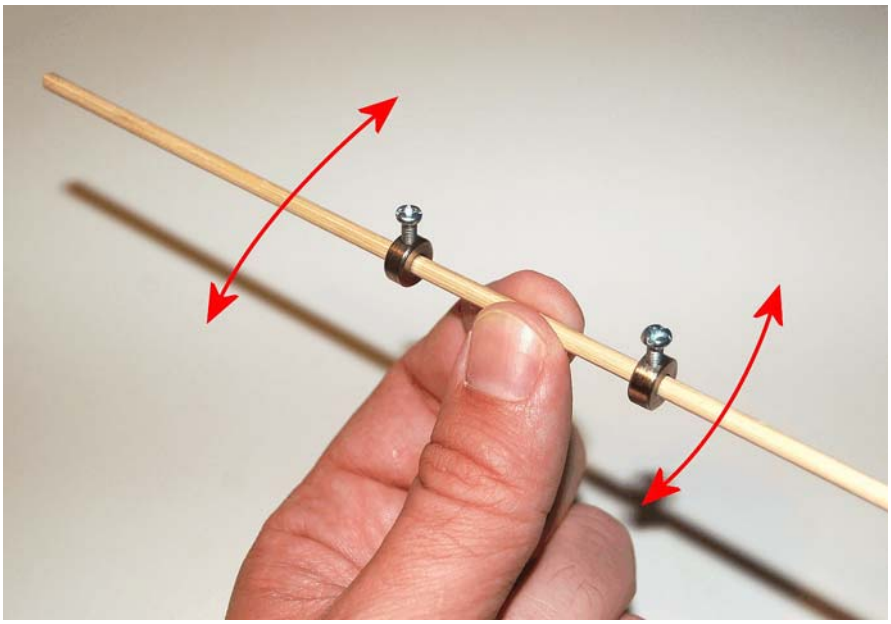


Photo 1: Low Moment of Inertia

Now let's recall that the VecJetPF is not your ordinary flying wing. Remember that swiveling motor mount in the back that sets it apart from the main herd? Most flying wings don't even have a rudder, and thus have zero yaw control. The VecJetPF, however, has gobs of it, and that brings us back to the topic of "Moment of Inertia." That mouthful is really a simple and intuitive concept. Basically, the moment of inertia is a measurement of how readily a body will change its rate of rotation, and it all boils down to the distribution of mass within that body. As the majority of mass is moved closer to the center of the axis of rotation, that body will start, stop, and change it rate of spin more easily than if that same amount of mass was widely distributed, and farther from the center.

Here's a simple experiment to make the concept clear: Find a strong 1/8" balsa stick or hardwood dowel about 12" long, and mark its center point. Then fasten two identical but good size wheel collars about 1" on each side of the center point mark, as seen in **Photo 1** above. Now grab the dowel at the center point between your thumb and first finger, and twist it rapidly back and forth like helicopter rotor blades. Note the force it takes to twist the stick back and forth rapidly, accelerating and stopping it each time. Now repeat the same exercise after moving the wheel collars out to the very ends of the stick (see **Photo 2** below). Feel the difference? Even though the assembly weighed exactly the same both times, it was far more difficult to accelerate and stop the stick when the wheel collars were way out at the ends. When the collars were centralized, it was much easier to accelerate and stop. Since the close-in weights moved slower and along a shorter arc, they carried less inertia (easier to start moving, and easier to stop). When positioned out at the ends of the stick, they moved faster and along a longer arc, thus building up more inertia, making them harder to accelerate and stop.

So what have we learned from this? Well, aside from

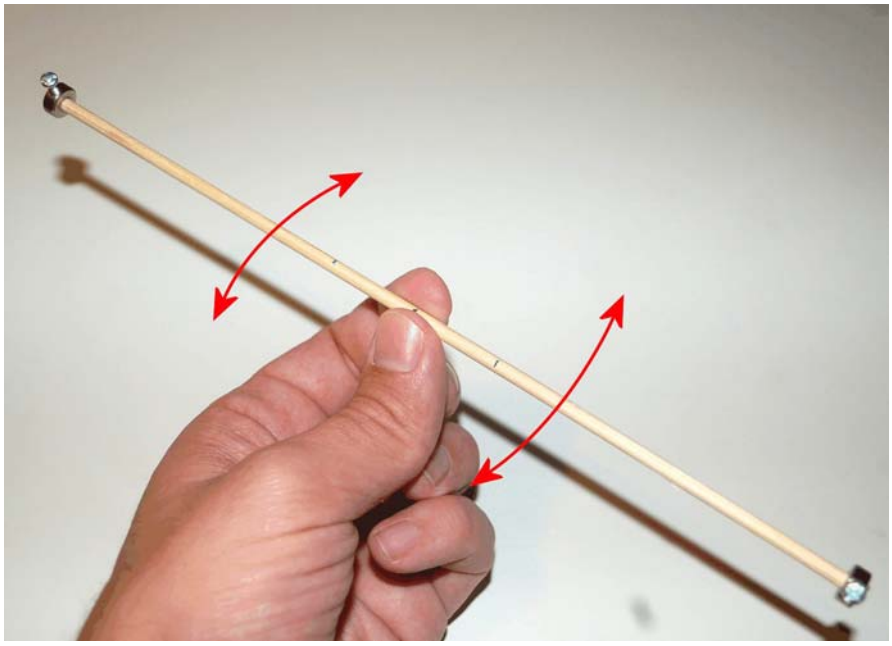


Photo 2: High Moment of Inertia

looking really dumb sitting there twirling a stick with wheel collars on it, the principle applies to the VecJetPF, and all aircraft. And thanks to its vectored thrust, the VecJetPF is often a spinning body. In fact, the "signature move" of all three models in the VecJet lineup is a whirling flat spin called the "SpinCycle" (our apologies to Whirlpool and Maytag). Now, I don't know how fast the model is spinning during a SpinCycle, but I do know that the wingtips become a blur! Add in the "wah-wah" Doppler-effect of the prop noise, and you have an impressive, attention-stealing maneuver that's as easy to do as applying full rudder and full throttle. But I digress. Let's get back to the science lesson. *(Editor's Note: Terry lives not far from NASA's Houston Space Center, and I suspect that some of the genius brain waves there may have effected his mind.)*

To maintain more precise control of this spinning capability, it makes sense to keep the moment of inertia as low as possible. This means positioning as much of the airplane's weight as possible, as close to the center of rotation as possible. By moving the ESC closer to the center (the model's CG), I was also able to keep the battery close to the CG, both of which contribute to reducing the model's moment of inertia. I can't quantify how much difference it made to the spinning qualities of the VecJet, but I know it helped to some degree. *(Editor's Note: This same trick (actually a law of physics, but I won't tell if you don't) is sometimes used in the opposite manner to achieve a very smooth flying airplane when aerobatic maneuvers are not desired (such as many non-aerobatic scale models). By distributing the weight widely, and sometimes even adding weight to the wing tips, the model flies more "heavy" and more smoothly.)*

Although it's a strictly subjective evaluation, I'll compare the VecJetPF to the original VecJet. Both airframes are exactly the same size, but the older version is about 7 oz heavier. Most of this weight is because of the heavier motor in the back, and a heavier battery in the front for balance, both being about as far from the CG as they can get! Therefore, the difference in this "Moment of Inertia" between the two airplanes is very significant. The difference really shows itself when performing spinning maneuvers.

The original VecJet has the yaw authority of ten regular airplanes, but its greater Moment of Inertia requires that you use vectored thrust more methodically. I always make sure to start Spin Cycles (and other yaw maneuvers) at high altitude to provide more altitude (and time) for recovery. Once it gets spinning, the heavier model may take a full revolution or two of *opposite* yaw input to make it stop.

The VecJetPF's lower moment of inertia allows us to use the vectored thrust much more casually, since it's easier and quicker to stop spinning. I might start a Spin Cycle while only 30' high, and abort after just two revolutions. Stopping usually requires only one quick jab of opposite yaw. One of my favorite tricks is a low altitude loop with a single-revolution flat spin at the top. That sort of maneuver really showcases the pinpoint yaw control of the VecJetPF. It's definitely a lot of fun to play with and explore the many still unnamed maneuvers that are possible. If you pick up a VecJetPF of your own, let me know what crazy antics you can come up with.

-Terry Dunn
boaw@comcast.net
(Flight photos courtesy of Fitz Walker and David Bacque)

Wife: Do you want dinner?
Husband: Sure, what are my choices?
Wife: Yes and no.

Wife: What are you *looking* for?
Husband: Oh nothing.
Wife: Nothing? You've been staring at our marriage certificate for an hour!
Husband: I was hoping it had an expiration date.

Cook: Hey, Gordo, it's noon! Want a pizza?"
Gordo: "Sure, but stop me after one... no, make that one-thirty."

Aircraft Modelers Research

Giant Stick 50

PRODUCT TEST REPORT

by dick pettit

PART I: THE KIT REVIEW

(Part II: The Step-by-Step Construction, will appear next Month)

Model Reviewed . . . . . Giant Stick 50
Type . . . . . Giant Sport Model
Manufacturer . . . Aircraft Modelers Research
1175 Frechette
Longueuil, Quebec J4J 1G9
Canada
www.amr-rc.com
(450) 677-4694
Distributor . . . . . Direct from mfg.
Suggested Price $365.00
Wing Span . . . . . Advertised: 106"
. . . . . Measured: 106"
Wing Area . . . . . Advertised: 2780 sq. in.
. . . . . Measured: 2564 sq. in.

Airfoil . . . . . Symmetrical
Fuselage Length . . . . . Advertised: 80"
. . . . . Measured: 90"
Recommended Controls . . . . . Five (Ail, El, Rud, Throt, Flaps)
Recommended Engine . . . . . 50 to 80cc gas or equivalent
Recommended Weight . . . . . 20 lbs.
Basic Materials . . . . . Laser-cut plywood and balsa
Instructions . . . . . 62 illustrated pages
Plans . . . . . None supplied or needed
Hardware Included . . . . . 5" DuBro wheels, wing mounting hardware, formed aluminum main gear and mounting hardware, leaf spring tail wheel.
Items Needed To Complete . . . . . Spinner, propeller, engine, engine mount, fuel tank with plumbing, all control linkages and connectors, point-style hinges, screws for servo and main hatches, seven heavy duty metal gear servos, one standard servo, a 5-ch radio system, covering, adhesives, etc.

COMPLETED MODEL

Finished Weight . . . . . 23.5 lbs. (376 oz.)
Wing Loading . . . . . 21.17 oz./sq.ft.
Engine Used . . . . . Zenoah G-62 Lite from RC Ignitions, with a J'TEC side-mounted muffler. Total weight 75 oz.
Propeller Used . . . . . Vess 22x8 wood
Propshaft to Ground . . . . 13.5" (held level)
Fuel Tank Used . . . . . DuBro 24 oz.
Radio Used . . . . Spektrum DX7 radio system with seven JR Sport ST126MG servos, one Hitec HS-425BB servo, two 2-cell 2300 mah A123 radio batteries, one 2-cell 1100 mah A123 ignition battery with homemade voltage regulator, and three Radical R/C heavy duty charge switches.
Covering/Finishing Used Hangar 9 UltraCote
Special Items . . . . . Robart Point-style hinges, and DuBro control linkages, heavy duty servo arms, and fuel system materials, plus as Tru-Turn Cub prop hub.

Cheers - Excellent laser-cut parts; all parts clearly identified with exact fit exactly as designed; quick assembly despite the high part count and overall size; excellent flight characteristics, from slow and gentle to moderately fast and aerobatic; literally lands at a walking speed!

Jeers - Several parts missing; measured wing area is significantly less than advertised (by 216

sq.in.!); completed model is 18% heavier than advertised (by 3.5 lbs.); engine's length was not included in the advertised overall length; sparse instructions for installing the engine, radio, fuel system, control linkages, wing, etc.; elevator servo wire tube in the fuselage is blocked at both ends (see text); more reinforcement needed at the landing gear mount (see text).

In Part I this month we're presenting the model's measured specifications, and the results of the completed model's flight tests. In Part II, coming next month, we'll present the detailed step-by-step construction sequence, along with my building notes. There will also be lots and lots of construction photos.

According to a website describing the first "Das Ugly Stick"; *"Phil Kraft pioneered proportional radio control and he designed Das Ugly Stik as a simple and robust test bed. In 1966 he published the plans in the Grid Leaks magazine, and his friend, Jim Jensen, brought out a kit. Both the design and the kit quickly became famous, and many model flyers had one or more of the originals or the several variants coming up soon and (ongoing) today.*

"It's not only the simplicity but also the effectiveness of the design that made the model attractive for so many. In those early days, models and equipment were quite expensive and both had to be simple to just be affordable. Now the Stik wasn't only that, but also very versatile. The same one model could be used as a basic trainer and then converted to an intermediate and full aerobatic trainer, only by adding engine power and control throw. And it was so good-natured and robust that it really had a chance to survive the learning curve of its pilot from the beginnings to the last stage."

Phil Kraft needed a large number of easy to build and easy to fly models that would be used to test new and repaired radio systems. He even enlisted several friends to build a number of them all at one time. I read that when one of them didn't make it back to the field, they took the engine and radio out, put it in another plane and continued testing.

Do you know how the original name came about? When Phil took the first one to the field to test fly, someone passed a comment from that old '60's punch line, "That thing looks like it was hit with an ugly stick". When Phil settled on the pseudo-German WW1 fighter color scheme, he

called it “Das Ugly Stik”, and the name stuck.

Over the last 45 years or so there have been dozens of copies, knock-offs, shrunk versions and stretched versions, high wing, low wing, two wings, two engines, and just about any configuration you can think of. It has to be the most copied and cloned RC plane ever designed. I’ve built and flown several Stik kits, and even an ARF or two. A while back I built one of the fine laser-cut kits from AMR (Aircraft Modelers Research) and I was very impressed with the quality of the laser cutting and the ease with which the kit was assembled. There are no plans as such, but rather the builder relies on the precision cut parts and a flat building board. When put together properly using mostly wood glue, it comes out straight and square.

I received an email from AMR saying they had several new sport models (they also produce a 40% Waco biplane kit, but that will have to wait for some other time),including one they call the Giant Stick 50. I examined the manual online, studied the photos and requirements for radio and engines, and made arrangements to get one for review.

Once the kit arrived, I wasted no time in getting to it. I did encounter some problems that had to be overcome, but all in all, the AMR Giant Stick 50 was a pretty good kit to build, and I enjoyed doing so. The detailed, step-by-step instructions will be examined next month during the building portion of this review. So now let’s move on the flight tests of the newly competed model.

FLYING
the AMR Giant Stick 50

I asked Rick Cawley to meet me after work for the first flights. I arrived first and assembled the plane for ground photos. I filled the tank with fuel and started the engine to make sure everything was still in good order. The big Zenoah G-62 fired up just as Rick arrived with his perfect timing (i.e., after the model has been assembled). A few more photos were taken, another radio range check was completed, and it was time to fly.

The first takeoff was made at no more than half throttle, which was plenty to get the Giant Stick 50 into the air. Only a bit of right rudder was needed to keep the plane straight down the runway, and it lifted off smoothly and solidly. Turning to come back across the field, I later needed two clicks of elevator trim to achieve hands off, straight and level flight. Simple turns in either direction *required* no rudder input, but they looked a lot better when rudder was added. I tried a roll to the right

and a roll to the left, and both were as axial as I'd ever seen for a plane of this type and size. Up at a safe altitude (roughly half of Gordon's safe altitude), I cut power and began gradually feeding in more and more up elevator. The model slowed, then slowed some more, then slowed a lot more, and then it finally just quit moving and hung there! Well finally the nose dipped just noticeably, after which the model slipped forward and resumed flying with absolutely no indication of a wing tip stall. So okay, maybe the 33% CG was good after all.

I flew around a bit more and then asked if anyone wanted to see how the Stick 50 would perform with *more* than the half-throttle I'd been using. But without waiting for an answer, I slammed the throttle full forward and watched as the Giant Stick 50 took off as if shot from a gun! There was *plenty* of power available for nearly unlimited vertical, but full power was never needed in straight and level flight, even during maneuvers. Even very large loops didn't need full power... but I often used it anyway, heh heh. It was fun!

Then I tried the flaps, at both half and full down, to which I had programmed a little down elevator mixing. At low throttle settings and full flaps, the Stick 50 could be flown across the field at a walk, and with no lack of control. Half flaps provided a little slowing, and still with full control. Here again, the flaps aren't necessary, but they sure are fun!

Before I landed I wanted to see if the Stick 50 would spin. But even more importantly, I wanted to see if it would come *out* of a spin. Well, the answer is yes to both concerns. It broke into a spin at very low airspeed, spun a few times, and then stopped immediately after the controls were relaxed. It sure looked good spinning so slowly, almost hypnotizing the pilot in the process. Somebody wake me before it makes a hole in the runway, okay?

Well you know how time flies when you're having fun, and all too soon it was time to land. I'd been flying well over 12 minutes and had only a 24 oz. tank. I lowered the flaps and reduced throttle to a high idle. The model slowed nicely, but it didn't come down! This thing is a Big Glider 50! Since that approach obviously wasn't going to work, I added a little power and circled around for another try. This time I cut power to a low idle, and the model actually began to descend. Finally back at the runway, the Giant Stick 50 made one little bounce before

rolling nicely across the neatly cropped grass (I'll have to remind Gerry about this). I made a mental note to chop the throttle next time, about a day and a half before the landing.

Rick's turn came next, so just before take-off he asked what I wanted him to do during the flight. I told him to be gentle but go ahead and do whatever he wanted. I think that was Stupid Mistake #287 for me this year.

Rick immediately bent the throttle stick forward, made about a 20' take-off run into a vertical climb that may have lasted longer had I not begged him to fly it where I could see it! He finally leveled it out, murmuring something about *"Yeah, it has enough power."*The he began looping, rolling, stall turning, tail chasing, back biting, and I don't know what all. I loudly mentioned how much I appreciated his "being gentle", but all he did was smile. I can't say for sure, of course, but the smart money says he was having fun.

Soon he dropped the flaps, saying this would give him some practice for flying his new Corsair, which was just about ready to fly. He dragged the Giant Stick 50 across the field even slower than I had, and slower, in fact, than I even thought it would even fly! This brought on Stupid Mistake #288, when I said, *"Now that is being gentle!"*, which served as a switch to his brain, and immediately led to a renewed effort to tear the model in half during more looping, rolling, and anything that would fluster poor Dick Pettit! Remember when I said that Rick was my friend? Now I'm thinking, not so much!

Rick flew for more than 15 minutes. When I voiced my concern about gas mileage, trying to hide my concern for the tortured airframe, his only response was to say that this was one of the most fun test models he'd flown for me in a long, long time. And since he's flown nearly *all* the test models I've reviewed for the last five years or so, that's saying a lot!

Well it's about time! Rick's now lined up with the runway, the engine is idling, and the

Giant Stick 50 is about to settle down on the runway. Now it's rolling and... *what th'...? He took off again!* That was a touch 'n go, Rick, not a landing!

And he got me again, too. I thought sure his next touch down would lead to taxiing back to the pits. It was another Touch 'n Go, though, carefully designed to fade what little hair color I have left!

Rick eventually landed (and without bouncing, the show off!) and brought the Giant Stick back to the pits. When I asked for his overall opinion, he slowly shook his head and said, *"You know, I'm really not sure. Say, why not top off the tank and let me try again."* Now granted, I know Stupid Mistake #289 is coming, but this wasn't going to be it!

I flew the Giant Stick 50 several more times before the sun quit on me. Rick helped me clean and disassemble the model, also getting his first look inside. *"Good grief! There's room in that fuselage for my lunch! Or maybe even someone's cat!"* Now don't get your panties all in a knot! Trust me, I would *never* allow anyone to put a cat in one of my airplanes! Never, ever, *ever* again!

Rick and I both were impressed by how well the new engine had pulled the 24 lb. model straight up. Since it was his engine, though, I guess it was okay for him to babble on and on about it... until I finally threatened to smack him with a prop! It had been a great evening of flying, and neither of us wanted to see it end in the emergency room, so he clammed up, helped me put the model back into the trailer, and left with a big, almost evil grin on his face. I began making and memorizing as many excuses as I could, on why I'd be unable to return his engine... this year! (Mess with me and my model, will ya?)

SUMMING THINGS UP...

...the AMR Giant Stick 50 was a pretty good kit to assemble, but an absolute blast to fly! Even though the instructions abandoned the builder early, leaving him out in left field after the game was canceled, the information that was shown was excellent and complete. I think even a first-time kit builder could assemble the model with a little help from someone more experienced. All the parts fit beautifully, and the quality of the laser cutting was just as good as I've ever seen. I wouldn't recommend using a *much* smaller engine on this plane, but it certainly doesn't need a full 62, and anything larger would be totally wasted. If the engine you choose will turn a 22x8 prop at least 7500 RPM on the ground, you have all you need for great flying.

My AMR Giant Stick 50 will be flown again and again (with Rick's G-62 as long as I can hold him off), and then with a new engine that I hope will arrive soon. When that engine is installed and flown, I'll let you know the results. In the meantime, *I'll* be the one with the silly grin on my face, while *Rick* watches and begs for his engine back! Man I love aeromodeling!

-Dick Pettit
pettit@ti.com

TOP FLITE MODELS

ARF P-47 Thunderbolt

PRODUCT TEST REPORT

by gordon banks

Model Reviewed . . . . . P-47 Thunderbolt
Airplane Type . ARF Scale (approx. 1/7 scale)
Manufacturer . . . . . Top Flite Models
(Made in China)
(217)398-8970, ext. 5
airsupport@top-flite.com
Distributor . . . Great Planes Model Mfg. Co.
(Made in China)
P.O. Box 9021
Champaign, IL 61826-9021
(217)398-3630
www.greatplanes.com
Suggested Retail Price $399.99
Typical Street Price $319.98
Wing Span . . . . . Advertised: 63"
Measured: 62.75"
Wing Area . . . . . Advertised: 730 sq.in.
Measured: 725 sq.in.
(Calculated by cardboard template)
Advertised Weight . . . . . 9.5 to 10.5 lbs.
Airfoil . . . . . Semi-symmetrical
Wing Structure . . Built-up balsa and plywood
Wing Joiner Method . . . . . Hardwood joiner
Fuselage Structure . . . . . Built-up balsa
and plywood
Fuselage Length . . . . . Advertised: 56"
Measured: 56"
Pushrod Type . . . . . 0.07" mild steel in
pre-installed plastic tube guides
Pushrods Installed . . . . . No
Hinges Included . . . . . Yes (see text)
Hinges Installed . . . . . Some, but not all
Recommended Controls . . . . . Six
(Ail, El, Rud, Throt, Flaps, and Retracts)
Recommended Engine 60-.90 2C,
or .90-1.20 4C
Engine Mount Installed . . . . . No
Engine Mount Type . . . Two-piece composite

Fuel Tank Included . . . . 420cc (14.2 fl. oz.)
Landing Gear Installed . . . . . No
Wheels Included . . . . . 3.25" mains, 1.1" tail, lightweight hard foam
Assembly Instructions . . . . . 36 page booklet (8.5x11") with many illustrations
Hardware: Metric or SAE . . . . . Mixed
Hardware Included . . . . . Spinner-nut with 5/16x24 threads (fit O.S. .61-.91 2C and O.S. .91-1.20 4C engines), beautifully painted and detailed fiberglass cowl, a black plastic dummy radial engine (with pre-cut aluminum tubes for pushrod covers, and a 12" length of red wire for spark plug wires), two-piece composite engine mounts with hardware, 420cc (14.2 oz.) fuel tank kit, four 5" lengths of 3/4" Velcro, clear plastic canopy with pre-painted framing, built-in servo tray, fiberglass belly pan, two mechanical retract units with 3/16" struts, pre-painted fiberglass main gear covers with mounting brackets, two 3.25" and one 1.1" wheels, main wheel axles and wheel collars, white nylon tail wheel bracket, pre-formed tail wheel wire with steering arm and hardware, all necessary pushrod materials and connectors (to include clevises, FasLinks (aka, swing-keepers), and EZ connectors), nylon control horns, two 1/4x28 nylon wing bolts, CA-type hinges, black plastic tubing for wing guns, pre-formed steel wire elevator halves joiner, numerous plastic scale details (scoops, etc.), complete cockpit kit with pre-installed gauge faces, three large decal sheets offering three different markings schemes (*"Eileen", "No Guts, No Glory"*, and *"Top Hat"*), and a generous bag full of miscellaneous hardware.
Items Needed To Complete . . . . . Propeller, engine, fuel lines, fuel filler, 6-ch radio with eight servos (50 oz. minimum, with one retract servo recommended), an appropriate battery (at least 1000 mah), servo extensions (two 18-24" for ailerons, and one short Y-harness for flaps), optional pilot figure, and nose weight for final balancing.
Covering Material . . . . . Not stated
Drilling Required . . . . . Yes
Soldering Required . . . . . No
Fuel Proofing Required . . . . . No
Estimated Assembly Time . . . Assembly time is advertised as 15-20 hours, but I think they

may have meant 15 *plus* 20 hours! I put about 42 hours into mine.

Estimated Skills Required . . . . . Experienced

Assembly Tools Required . Normal modeling tools, to include an assortment of SAE and metric ball drivers, various drill bits, an 8-32 tap, and a Dremel Moto-tool (or equivalent) with assorted bits.

Adhesives Required . . . . Thick and thin CA, 5- and 30-min epoxies, thread locker, canopy glue, and micro-balloons.

COMPLETED MODEL

Finished Weight (RTF, dry) . . . . . 170 oz. 10 lbs. and 10 oz.

Wing Loading . . . . . 33.77 oz./sq.ft.

Engine Used . O.S. FS-91 Surpass (22.2 oz.)

Propeller Used . . . . . Master Airscrew 14x6 (Weight 1.94 oz.)

Fuel Tank Used . . . As supplied (14.2 fl. oz.)

Radio Used . Futaba 10C on 2.4 GHz, using a Futaba R617FS receiver, eight Futaba servos (S3001 on throttle, S136G on retracts, and six S3152 digitals for flight surfaces), a 6.8 oz. 4-cell (C-size, not AA) 2000 mah NiMH receiver battery, and four servo extensions (two 24" for ailerons, one 6" Y-harness for the flaps, and one 6" Y-harness for the battery and retracts servo).

Covering/Finishing Used Comes pre-covered

Special Items . . . . . Great Planes pilot bust

CHEERS - Helpful instructions with many good photos and illustrations; numerous fiberglass and plastic scale details; no reversed servos required; although *described* as 90˚ retracts, which would look weird hanging from a wing with dihedral, the supplied retracts actually have the proper angle for the wing's dihedral; the pre-painted fiberglass wheel covers are not simply flat pieces, but are nicely curved to match the wing's contour; totally useable hardware; good overall appearance on the ground and in the air; good, solid flight characteristics, with a slow landing speed that belies its 33+ oz. wing loading.

JEERS - Numerous minor dents and dings in the wing panels; no optional spinner nut for engines with metric thread crankshafts; no pilot figure included; the left hole in the fuselage for the wing's leading edge dowels is 1/8" off-center; numerous errors and oversights in the instructions (see text); the supplied 3/4" control horns are too short for the suggested control surface throws (see text); some of the stickers came loose overnight; very little guidance for final detailing.

On June 12, 2009, Tower Hobbies' prices were as follows:

Top Flite ARF P-47 kit	$319.98
O.S. .61FX engine	$179.97
O.S. .75AX engine	$209.97
O.S. .91FX engine	$229.98
O.S. FS-91 Surpass engine	$299.97
O.S. FS-120 Surpass engine	$379.98
	($419.97 with pump)
Futaba S3001 servo	$19.99
Futaba S3152 servo	$34.99 or two for $67.48
Futaba S136G retract servo	$49.99

According to some interesting *"Did You Know..."* notes in the instructions booklet...

"Built in greater quantities than any other US fighter, the P-47 was the heaviest single-engine WWII fighter to go into production, and the first piston-powered fighter to exceed 500 mph. The Thunderbolt performed (over) 546,000 combat sorties between March of 1943 and August 1945, and is considered the real forerunner of today's multi-role fighters."

"P-47's... destroyed 11,874 enemy aircraft, some 9,000 locomotives, and about 6,000 armored vehicles and tanks. Only 0.7% of the fighters of this type dispatched against the enemy were lost in combat. As a testament to the survivability of the P-47, it should be noted that the top ten aces who flew the P-47 all returned home safely."

"Before the was over, a total of 15,579 Thunderbolts were built, about two-thirds of which reached operational squadrons overseas."

I'm going to assemble my Top flite P-47 using Zap CA's and Pacer epoxies. I've always had great results with both, and now's not the time to experiment with something new. When using *any* modeling chemicals (adhesives, paints, solvents, cleaners, etc.), be sure to provide adequate ventilation to help prevent respiratory problems. I like to set up a small fan that blows air gently across my face, which blows away most fumes before they reach my eyes, nose, and mouth.

When I opened the box and inspected each piece as I examined the kit contents, I was thrilled to find so many pre-painted plastic and fiberglass scale details. Included too are the retracts, engine mounts, fuel tank, wheels, and

much, much more. Although my wing panels had numerous dents and dings and one small crush spot on the right panel, none were serious enough to warrant asking for replacements. I was also disappointed that no pilot figure was included.

The instructions are good, with tons of helpful photos and sketches, and all the information I needed. There are some errors and oversights, however, one of which I consider critical, which I'll describe in detail. I'll also offer some builder's tips based on my experiences. Note that this kit is not recommended for beginners, or any builders with little experience. Modelers with considerable kit and/or scratch-building experience, however, will have very few problems. In fact, there were just enough challenges to make this a fun and interesting project for me, and I thoroughly enjoyed it.

On the other hand, according to the box top, this kit should take 15 to 20 hours to assemble. In retrospect, I do not believe those figures are accurate or even reasonable. I spent very near 42 hours on mine, and I wish now that I'd taken a little more time in some areas. I spent a solid hour assembling the dummy engine, and a bit over two hours carefully fitting it and the cowl onto the fuselage with minimal cuts.

The assembled wing panels come with the flaps and ailerons pre-hinged, and the retractable wheel wells already in place. The fuselage, with integral fin, is built up from lite-ply formers, crutch, and servo trays, and then sheeted with soft balsa. The wing bolt

plate is already installed, complete with blind nuts for the wing bolts, as are the guide tubes for the elevator, rudder, and tail wheel pushrods. The wing saddle even has wide and beautifully finished fairings. Only the rudder and elevator halves require hinging, but all control surfaces need control horns installed. The elevator halves use a stiff wire joiner to operate as a single piece requiring only one pushrod. The very cleverly mounted tail wheel assembly is located in the scale position instead of being simply fastened to the rudder, and uses its own pushrod attached to the rudder servo. A simple cover allows steering adjustments without having to remove the wing.

The two-piece engine mounts are self aligning and very easy to use and install. The large and roomy cowl is fastened to six pre-installed mounting blocks, using short screws. The 3-line fuel tank kit includes an aluminum stopper for the fill and drain line.

The one-piece horizontal stab is airfoil shaped, not just a flat slab, and fits snugly into a pre-cut slot at the tail of the fuselage. The recommended method for installing the horizontal stab with epoxy is pretty messy, but it works well. Also, the pushrods for the tail wheel, rudder, and elevator are truly friction-free, with long pushrod wires in installed over-size guide tubes.

If you decide to build the Top flite ARF P-47 Thunderbolt, I hope you will read through the instructions book and this entire review before you begin. I believe the following notes will prove helpful.

INSTRUCTIONS BOOK ERRORS

1. Minor: The drawings of the screws on page 4 are backwards. The text is correct, but the drawings are not. This is no big deal, of course, I just don't want to be criticized for overlooking it. I can go back in the house and be criticized, y'know. I have a wife, so I don't need your criticisms too!

2. Minor: The instructions leave a lot unsaid about installing the aileron and flap servos, but it *has* been clearly pointed out that this is not a kit for inexperienced builders. If you follow the instructions on pages 7 and 8 to the letter when installing the flap servos, you'll just have to turn right around and remove them on page 9 (step 5) to correct the servo arm positions. (See Builders' Tips #2.)

3. Critical: When joining the wing panels, step 4 on page 9 says to mix up 1/2 oz. of 30-min epoxy. After looking at the surface areas of everything that needed to be "painted" with epoxy (the root ribs of both wing panels, the wing joiner, and the two wing joiner pockets), I decided to *double* that and use a full ounce. And before I was done I had to back up and prepare *another* 1/2 oz.! Joining wing halves is *not* the time and place to scrimp on epoxy! Also, see Builders Tips #4.

4. Moderate: Step 8 on page 11 tells us to install the retract units, but not until step 9 are we told how to align them. See Builders' Tips #6.

5. Minor: Step 19 on page 13 tells us to connect the re-

tract pushrods to the retract servo, but there should be a reminder to first use the radio to make sure the servo is in the retracted (full up) position.

6. Minor: Step 1 on page 19 says to install the tail wheel wire nylon support *beneath* the steering arm. As the photos show, however, it goes *above* the steering arm.

7. Moderate: Step 1 on page 19 also says to install the "brass screw-lock connector" (i.e. EZ-connector) to the tail wheel steering arm. That's fine, except what they fail to mention is that the steering arm is too thick to allow the EZ-connector's nylon retainer to lock onto the groove in the EZ-connector pin. See Builder's Tip #16 for one possible cure.

I found no other errors serious enough to merit mention or elaboration. (Oh cool! I don't recall ever using the word "elaboration" before!)

BUILDERS' TIPS

1. Mark the positions of the aileron and flap servo hatch covers before removing them from the wing. This will eliminate any confusion later as to where they go. (The aileron hatch covers have white *and* silver covering material, while the flap servo covers have only white.) Each pair are interchangeable *until* the servos are installed. (Note too that this kit has been thoughtfully designed *not* to require any reversed servos. Thank you, Top Flite.)

2. I realize that experienced builders already know this, but I'm going to suggest it anyway, even if just as a reminder, since the instructions are a bit sparse in this area.

Before drilling the screw holes for the aileron and flap servos, place a temporary 1/32" to 1/16" spacer between the servo and the hatch cover. This will ensure than when the spacer is removed after installing the servo screws, the servo will not be resting directly on the hatch cover. Leaving a small gap allows the rubber servo mounting grommets to isolate the servos from some of the engine vibration.

Aileron Servos: Before installing these two servos, use

your radio system to make sure the servos are centered, and *then* choose a servo arm that can be installed perpendicular to the side of the servo. Do this *before* cutting off the unused arms of a multi-arm servo arm, so you can choose the output arm with the best centering. Then, when installing the servos onto the hatch covers, position the servos to have their output shafts at the end of the hatch cover closer to the wing's trailing edge.

Flap Servos: Before installing these servos, use the radio system to make sure the flap channel and flap servos are in the middle or half-flap position (not full up or full down). Install the servos onto the hatch covers with the servo's output shaft toward the rear of the hatch cover's servo arm opening (i.e., toward the wing's trailing edge). *Then* choose a servo arm that can be installed perpendicular (at a 90˚ angle) to the side of the servo. And do this *before* cutting off any unused arms, so you can choose the arms that provide the best position match for both servos.

3. I have a hard time holding nylon control horns in place on the control surfaces while I mark and/or drill the two screw holds. This may have something to do with having gorilla-size hands and fingers. I find it easier to position the control horn with one hand, and then apply a drop of thin CA to glue it in place before drilling the holes and inserting the screws. Your mileage may vary, so do it however you like.

4. When joining the wing panels, the instructions on page 9 are fine (except they recommend using only 1/2 oz. of epoxy!), but I have a suggestion that I think helps. If you'll do step 5 on page 10 (install the nylon dowels into the wing panels' leading edges) *before* joining the wing panels, you can then stretch one strong rubber band around the two dowels, and two more rubber bands around the temporarily installed wing bolts (one each on top and bottom of the wing) to hold the wing panels firmly together while the wing joining epoxy cures.

5. Step 3 on page 11 says to remove "the" set screws from both sides of each landing gear retract unit so you can reinstall them with thread locker. Although each of the four holes has *two* set screws, one on top of another, I agree with the instructions. If you tighten the inner setscrew, and then lock the outer screw in place with thread locker, it effectively locks both screws in place, so we don't really need thread locker on both screws on each side of each gear. Locking all eight screws could come back to haunt you later if removal is necessary for adjustment or repair.

6. Before installing the retracts (page 11), I think it's best to temporarily install the wheels on the axles, using *their* fit into the wheel wells to help align the retract units. The wheels *must* move in and out of the wheel wells with rubbing against the sides.

7. Before attaching the flap pushrods to the flaps servos, use the radio to make sure the servos are in their middle or half-flap position, and then set the flap throw to 7/8". Why? Because we can easily use the transmitter's End Point adjustment feature to set the servo's precise position at each *end* of its travel (i.e., full up and full down), but it's harder to adjust the precise mid-point (half-flap). So we set the mid-point (half-flap) position mechanically (physically?), and then use the transmitter's End Point adjustments to set the full up and full down positions.

IMPORTANT REMINDER!

Once the flap and retract servos and pushrods have been installed, be sure to use a current meter (I use a Hangar 9 Digital Servo & Receiver Current Meter) to make sure the servos are pulling zero current when in the full up and full down positions. Don't let your flap and/or retract servos drain your battery in flight!

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8. As we near the wing's completion we're told to glue the eight gun tubes into the wing's leading edge. I propose putting this off until the final finishing stage. There's no sense in having the tubes in

place now, when they might get in the way or get damaged in handling while we're still working on the model. You don't even have to consider their effect on CG since the total weight of all eight pieces is only about 1/8 oz. Also, when you check the model's side-to-side balance later on, the gun tubes are a convenient spot to add weight (lead shot) to the lighter side.

9. The very first step in the fuselage assembly (step 1, page 15) is installing the horizontal stab. I find that having the stab installed so early leads to unnecessary dents and dings from turning the fuse this way and that many times while installing the fuselage servos, fuel tank, engine, and cowl, so I usually skip ahead and come back to the HSTAB later.

10. Before installing the rudder servo arm (page 17, step 1), see step 8 on page 18, where we're told to remove the rudder servo arm, install a ball link for the tail wheel steering, and then re-install the arm. Also, the instructions say to install the ball link in the *center* hole of the servo arm, so I did. But later I had to remove the ball link and re-install it in the *inner* hole, to leave proper clearance for the rudder pushrod. This still provided more than enough tail wheel steering, too.

11. When installing the engine mounts, the instructions say nothing about centering the engine left-to-right, and the adjustable-width mounts make them easy to position off-center. Once I had the engine installed on the mounts, I used the cowl to center the engine before tightening the engine mounts' firewall screws.

12. The instructions say to install "a" 12" plastic tube in place for the throttle pushrod. The only loose plastic tube in my kit was 19.75" long, so cut from that whatever length you need.

13. We're never really told when to install the throttle servo, but it magically appears in the photos, so use your own judgement here, *after* establishing the proper throttle pushrod for the engine you're using.

14. Although the supplied throttle pushrod wire will work once you make numerous bends to minimize its drag in the guide tube, I simply replaced it with some Sullivan NyRod scraps for a smooth, friction free pushrod.

15. In step 1 on page 19 we're told to install the tail wheel steering arm onto the tail wheel wire, and lock the set-screw against the flat spot on the wire. Fine, but make sure you install the steering arm at the very bottom (the end nearer to the wheel) of that flat spot. We need at least 1/4" of the tail wheel wire protruding through the upper wheel collar that holds the assembly together. That extra length fits into a support bearing already in the fuselage, and we need a good 1/4" length for that.

16. Also in step 1 on page 19, when installing the brass screw-lock connector (aka EZ-connector) into the tail wheel steering arm, you'll find that the steering arm is too thick to allow the EZ-connector's nylon retainer to lock onto the groove in the EZ-connector pin. With the EZ-connector loose in your hand, first pop the nylon retainer onto the pin and make sure it locks into the pin's groove. Now you can see the maximum allowable thickness of the steering arm, so carefully carve or sand *only the bottom side* (I'll explain why soon) of the end of the steering arm to the appropriate thickness. Once it fits into the gap between the EZ-connector's body and the nylon retainer, then remove the nylon retainer and assemble the tail wheel assembly as per the instructions.

Why carve or sand only the *bottom* side of the end of the steering arm to make it fit the EZ-connector? This will help provide more clearance between the EZ-connector and the fuselage when the tail wheel assembly is installed. Even then you may have to carve on the inner fuselage a little to get an interference- free fit. At first I thought an EZ-connector with a slightly shorter body would do the trick, but the protruding setscrew still interfered, so I had to carve a little extra clearance into the fuselage side.

Next, when installing the tail wheel assembly into the fuselage, I recommend using slightly fatter screws than the #2's provided in the kit. I tried using the #2's, but they wouldn't tighten well in the holes already there.

Finally, when cutting the 36" tail wheel steering pushrod to the prescribed 27-3/4", mine came up a little short so I had to replace it (I could also have turned the servo around to shorten the required length of the pushrod). I suggest cutting the pushrod to 28-1/4" to get it in place, and then cutting it again after determining the precise length needed.

17. When it came time to install the battery and receiver (page 20, step 1), I decided to postpone this task until it's time to check and set the model's CG. I see no sense in installing them now since I may have to relocate them later to achieve the necessary CG. If the recommended position is fine, then I'll still only have to install them once. (As it turned out, my battery had to be installed in the engine compartment!)

18. When installing the fake pushrod tubes and spark plug wires onto the dummy engine, I should have measured the tubes first, but I didn't. I highly recommend shortening all 18 tubes by 1/8" *first!*. It would have been cleaner and easier to do this before they were glued in place. I didn't think far enough ahead, though, and sure enough the tubes prevented the cowl from going far enough over the engine. I had to grind off the excess lengths *after* they were installed, which was messy.

All in all, my dummy engine never did fit well into the cowl, so as the instructions suggest, you'll likely want to use a generous mixture of epoxy and micro-balloons to secure it. I spent about an hour assembling the dummy engine, and just over two hours satisfying myself that no matter how long I pestered the cowl and dummy engine combo, it was never going to fit any better than it did.

I was later pleasantly surprised to see how little of the cowl had to be cut away to clear my engine's standard muffler. Note, however, that mine is an old, 1987 version of the O.S. FS-91 Surpass, so your mileage may vary.

With the cowl, dummy engine, O.S. engine, fuel tank, fuselage servos, and tail wheel assembly in place, it was finally time to go back to page 15 to install the horizontal stab. The only problem I encountered here was that the ball link for the tail wheel steering pushrod interfered with the rudder pushrod, so I had to move the ball link from the center hole in the servo arm to the inner hole. This still provided enough tail wheel steering.

For the pilot figure, the instructions recommend the Century Jet Models 1/7 scale full body pilot (CJMQ9038, $29) or pilot bust (CJMQ9036, $26), both of which require assembly and painting. I chose to use one of the pre-finished 1/6 scale Great Planes pilot busts that came with the Great Planes ARF PT-17. I trimmed the shoulders a bit and glued it in place on a 1/2" thick piece of scrap balsa to achieve the height I wanted, omitting the pilot's seat altogether. (When I reviewed the Great Planes ARF PT-17 in May 2005 (for the July 2005 magazine), those pilot busts were selling for $5 a pair. That's right, *two* for $5! I considered them to be an outstanding bargain, so I said so and ordered several more pair. Bargains like that don't last long, and soon they were priced at $5 each, which was *still* a good deal. But even that was too good I guess, because on July 16 of this year, I was unable to find them at the Tower Hobbies website. They don't even have a part number any more as replacement items for the PT-17 kit!)

If you have a warbird meet coming up soon, and you need a quick and easy, heavy-metal warbird at the last minute... this ain't it. I put in over 40 hours on mine, and in some places I wish I'd taken even more time. Nor is this one of those rare, perfect kits where every line of the instructions falls right in place with the parts and pieces of the kit, making it an *"anyone could build this"* kit.

No, in fact, there were just enough challenges involved to make this a fun and interesting project. I love building models, and I thoroughly enjoyed this one.

After using the radio system to set the flaps to full up, and all other control surfaces to center, I roll-tested the model on my driveway to make sure the tail wheel was centered (it was very close). Then I installed the tail wheel cover.

Now it was time to remove any wrinkles and bubbles from the covering (there were very few), and to apply the stickers. We're given stickers for three different choices of markings schemes, "*Eileen*", *"No Guts, No Glory"*, and *"Top Hat"*. I chose "*Eileen*" for two reasons. First, because it's the most colorful of the three possibilities, and second, because the remaining stickers are more likely to be usable later on some non-scale model(s).

The drawings in the instructions for placing the stickers are more like caricatures, and are not even close to scale. Nevertheless, note that on the sheet of "stars 'n bars" stickers, the two largest are marked "Bottom". These are only for the *"Top Hat"* version, which uses two oversize markings, *one on each side* of the wing's bottom surface. The two "stars 'n bars" stickers marked "Top or Bottom" are used on the other two versions, and only on the left sides of the wing's top and bottom surfaces.

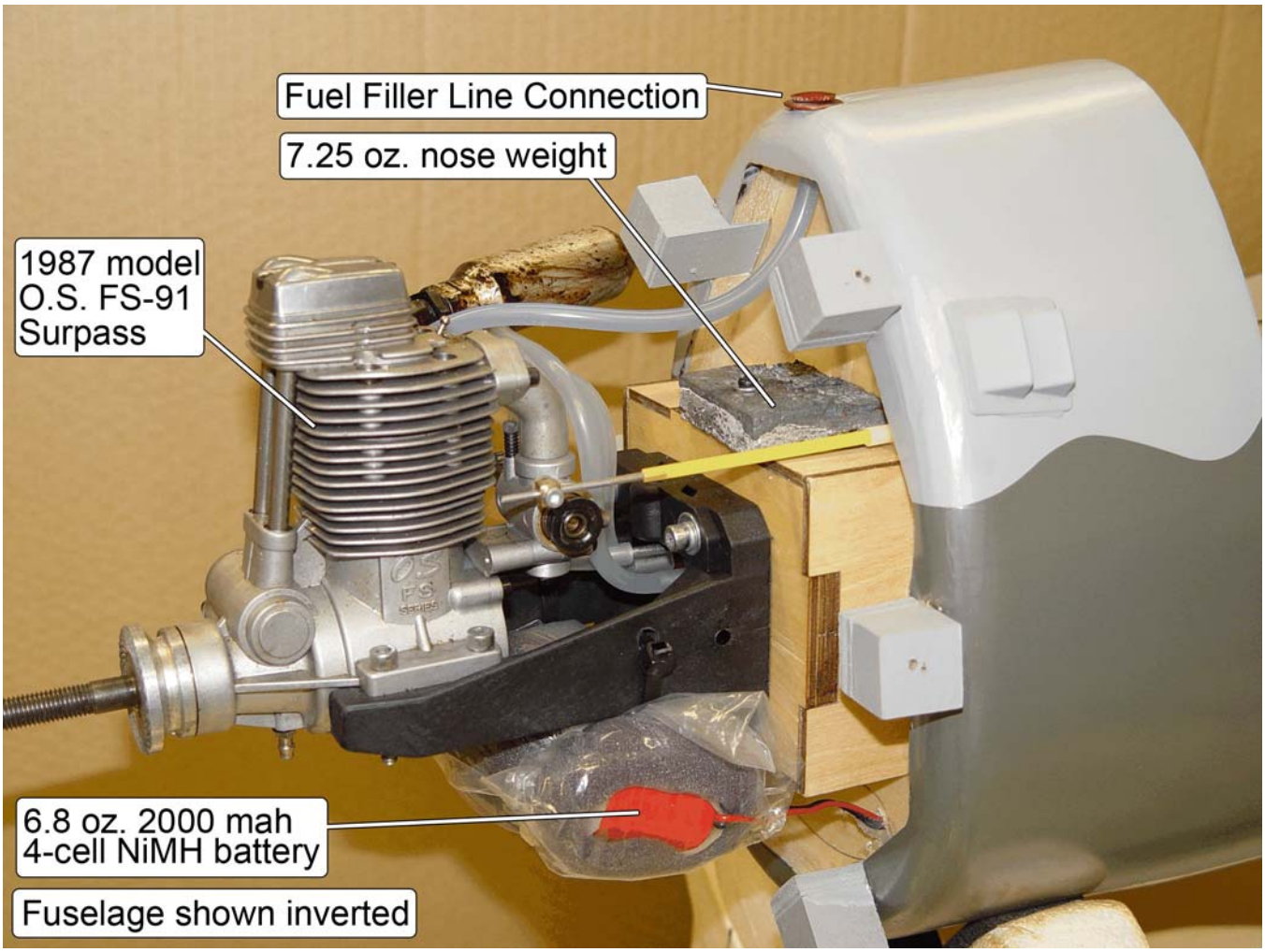
When applying the "stars 'n bars" to each side of the fuselage, we have to cut each marking to fit on and around the air outlet. If you'll align the markings carefully with the plastic outlet, the forward part of the "bar" will fit right into the vent. I discovered this too late for my left side, but I took full advantage of it on the right side.

Oh no! I took a break for that terrible habit of mine called "sleeping", and when I came back the next morning, all four "stars 'n bars" stickers had loose edges that had curled up and away from the model's surfaces! And before you even ask, yes, I had cleaned all the appropriate areas with rubbing alcohol before applying the stickers. With little other choice, I just pressed the loose edges back down, but they came loose again, although to a much lesser extent, the following day. I'll keep an eye on them to see if their adhesion continues to improve.

Not only do the instructions give recommended control surface throws for all four surface types, they're given in inches, millimeters, and angular degrees! Cool!

With the model now completely assembled except for the battery, receiver, and receiver switch, it was time for that ever critical step, checking and setting the CG. As I lifted the inverted model with my fingertips at the suggested CG point on the wing (4-1/8" behind the leading edge, right next to the fuselage), the first thing that crossed my mind was a 250 lb. swimmer wearing a thong at the beach. (Go ahead and try erasing *that* image from your mind!) Even with a 2 oz. composite propeller installed, and my oversize 6.8 oz. battery positioned right at the firewall, my model was *very* tail heavy! I swear, if I'd had one on hand I'd have immediately swapped out the FS-91 Surpass for a heavier FS-120. I have an idle Saito FA-115, but it's no heavier than the FS-91, and it won't accept the kit's special P-47 spinner nut! Hmm... is that old rule about checking the CG with an empty fuel tank *really* important?

Now regretting having already installed the 2.1 oz. pilot figure 6.5" behind the CG, I began working on making the nose heavier. First I wrapped the 6.8 oz. battery in foam, stuffed it into a plastic bag, and used four zip-ties to fasten it to the motor mount, a full 3" *ahead* of the firewall. Since their combined weight of 0.7 oz. seems insignificant, I conveniently installed the receiver and switch. Then, with everything put back together again, I started pouring lead shot into a mixing cup taped at the firewall while constantly monitoring the CG. When it finally balanced properly, I moved the weight cup to my



postal scales and read 206 grams, about 7.25 oz. If using a normal size battery like that shown in the instructions, and/or had I installed the battery where the instructions suggest, I'd be looking at adding well over a half-pound of dead weight. Man I wish I'd had an FS-120 on hand! In fact, with that big, 7.5" wide cowl, even a 1.30 or 1.60 twin would be nice!

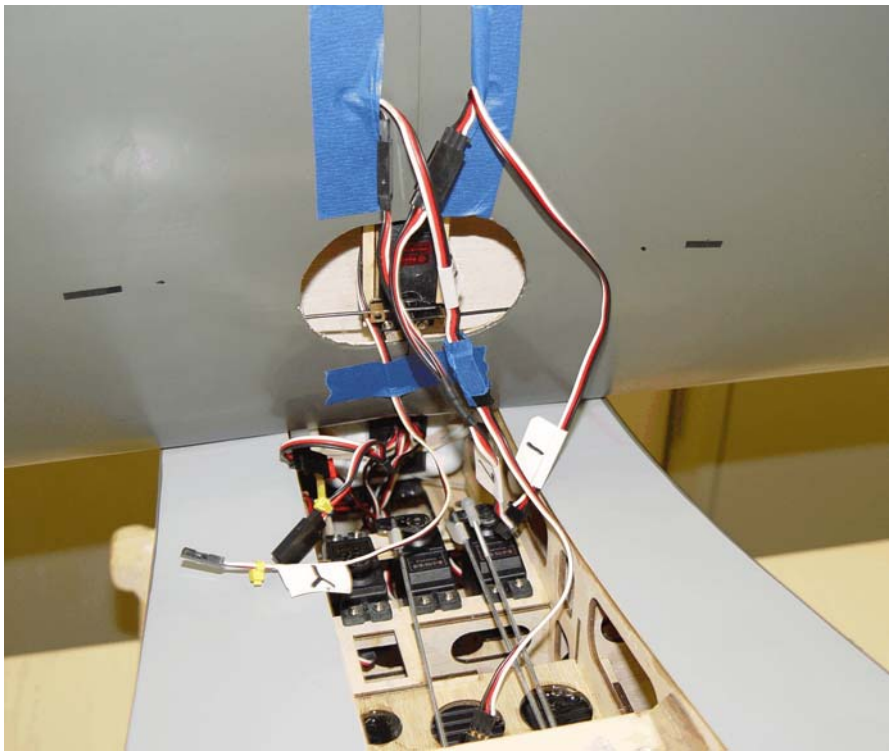
Okay, now balanced and complete, what does it weigh? My postal scales indicated 170 oz. (10 lbs. and 10 oz.). Since the 2.1 oz. pilot figure required an equal amount in the nose for balance, if we subtract that 4.2 oz., the total weight would have been 2 oz. under the maximum recommended weight of 10.5 lbs. As it is, however, I'm 2 oz. over.

I've also noticed an unsightly little problem. Even though both are locked in the fully retracted position, the retract unit in my left wing panel allows the wheel and leg to drop about 3/16" inch. This is going to create more drag on the left side in flight, but we'll just have to wait and see what happens.

Now here's a complaint about something I see time and time again with today's ARF's, seemingly from almost every manufacturer. We're given short little control horns (3/4" in this case), *and* we're told to use the outer holes in our servo arms. This almost always results in far, far more control surface travel than recommended. In this kit, for example, even after moving the elevator pushrod connection to the innermost hole on the elevator servo arm, to achieve the recommended control surface throw (1/2" high, 3/8" low) I had to use the transmitter to reduce servo travel to 50% for high rate, and 35% for low rate. And it was even worse while the pushrod was attached to the servo arm's

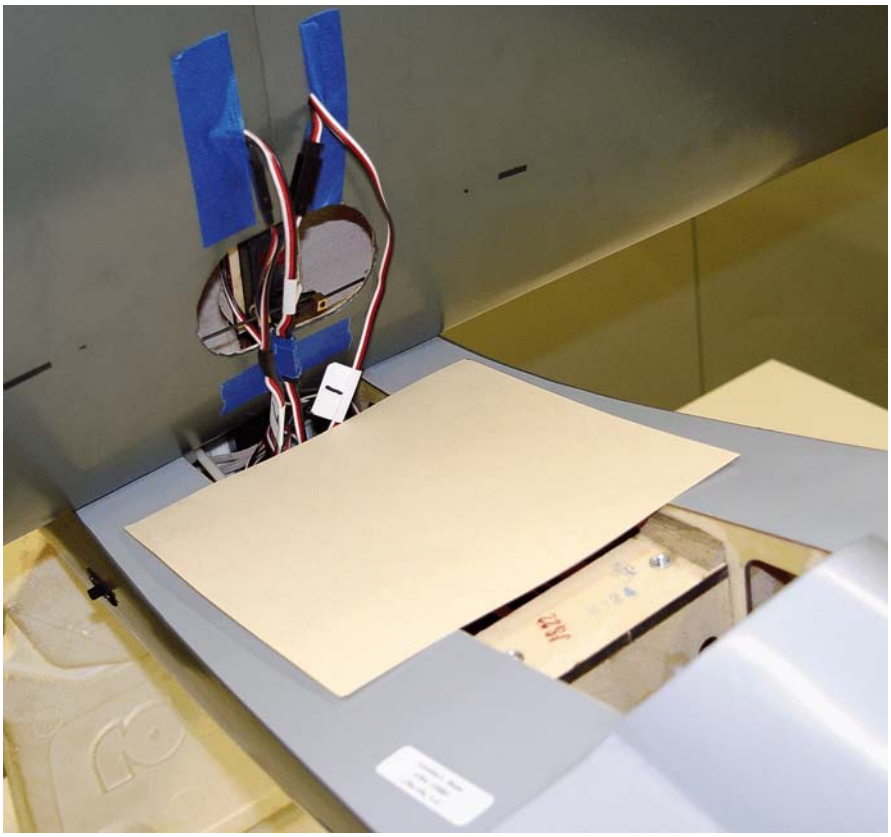
outer hole! This means I'm using only 1/2 the servo's travel in high rate, and only 1/3 of the servo travel in low rate. This also means I'm losing a *ton* of servo resolution! Instead of 1024 possible servo positions, I now have only 512 (on high rate) and 341 (on low rate) possible positions. Since more servo travel and more servo resolution improves control response, control surface centering, and servo life, reduced travel and resolution mean exactly the opposite! In this kit's case we can't use the inner holes on the rudder and aileron servo arms due to pushrod interference, so the only solution to this problem is to use longer control horns. We'll test fly it like it is, but if I keep this model for myself, the aileron, elevator, and rudder control horns will be replaced with longer (probably 1-1/4") control horns.

No, wait. I've changed my mind. I'm going to go ahead and replace the elevator control horn right now so I can give you the resulting figures. I'm removing the 3/4" control horn, whose outer hole is only 21/32" from its base. Okay, done. Now I'm installing a 1-5/16" tall horn, and I'll connect the pushrod to the outer hole which is 1-1/4" from its base. Okay, done. Now my elevator control horn "lever length" is 90% (19/32") longer than before, so the servo will travel a lot farther to get the same amount of elevator travel. Okay, now I'm re-setting the recommended control throws (1/2" on high rate, and 3/8" on low). Well sure enough, now I'm using 90% of the servo's travel on high rate, and 60% of its travel on low rate. That's an 80% improvement on high, and over 70% better on low! Much better! And the only cost was the difference in price between a 3/4" and a 1-5/16" control horn. But is there a downside to this? Only that the longer control horn is more visible and thus somewhat more unsightly than the shorter horn. Paint it gray to match the surrounding area, though, and that problem would disappear. It pains me now to realize how easily I could have made so many ARF models fly better.



Note how the wires from the wing can fall into and jam the fuselage servos and/or linkages. See the next photo for a simple fix.

My Top Flite P-47 Thunderbolt was then ready to fly... until I saw an old problem that needed a new fix. The wing has four servo leads (one for each aileron servo, one for the two flap servos, and one for the retract servo) that have to be connected to the receiver. This mess of wires could easily fall onto the three fuselage servos and linkages (see photo above), possibly causing a pushrod to jam. To prevent that from happening, I cut a 7" square "shield" from a thin cardboard file folder (weight 0.2 oz.). Now as I install the wing on the fuselage and plug in the four connections, I tape the cardboard shield onto the wide wing saddle, directly over the fuselage servos (see photo on next page). The wing's mess of wiring then rest son the cardboard shield, safely



The thin cardboard shield keeps the wing servo wiring out of the fuselage servos and linkages.

separated from the fuselage servos and linkages.

FLYING

THE TOP FLITE ARF P-47

The Rocket City Radio Controllers' annual Warbird Fly-In was to begin at 9:00 a.m. on July 18. This not only meant that I had to have the model ready to fly by 8 (to complete its maiden flight before being flown at a sanctioned event), I also had to telephonically drag Tony out of bed by 7, in order to bring him to full consciousness and get him to the flying site on time... hopefully dressed. (When awakened, Tony is no rocket scientist, trust me.) So naturally I called him at 6:30. Knowing Tony's work habits, he'd probably had an hour's sleep by then. Well, the phone rang a long time before it was answered, so I'm assuming that he was deep in REM. You and I might dream about Anna Faris in a bikini, but Tony's more likely to dream about putting an extra cell (or more!) into each of his LiPo powered models. Instead of the normal, warm and friendly "Hello" we expect when someone answers the phone, what I heard was a mumbled warning that unless the city's emergency evacuation routes were already clogged with vehicles fleeing some terrible disaster, I'd be facing a disaster of a much more personal kind. First I reminded him that the warbird event began at 9:00 a.m. There was a long pause, during which I imagined him double-checking the shell count in a large caliber pistol. He then informed me that I had not justified living past noon, which was roughly what time he'd be there. So then I reminded him that we had to complete the new P-47's maiden flight before the sanctioned event began. There was another long pause. Then, "Yeah, okay... be there soon."

I'm guessing that he swallowed at least one Red Bull on the way, because he was alert and smiling when he arrived. Even more important, he wasn't carrying anything that might conceal a large caliber pistol.

As usual, I prefer to make a new model's maiden flight without its cowl if it restricts access to the engine, and especially if it's a tail dragger that might nose over and spoil said cowl. So that's how the maiden flight was made. And again as usual, it went well. The model's ground handling was fine, and the take-off run was straight and good. Tony even eased it off the runway much like the real P-47 would ease it's tonnage into the air. I had to remind him twice where the retracts switch was, but then the wheels disappeared and the model looked great during a fly-by, even without the cowl. P-47's always have an impressive profile on fly-bys, and it always reminds me of the old war movies when the

WWII American ground soldiers cheered like crazy when the Thunderbolts arrived to drive off the German tanks.

Tony doesn't share my preference for making maiden flights without the cowl, however, so once the P-47 was trimmed and proven flightworthy, he brought it in for its first landing. That brief, first flight was very satisfying, and more than a little nerve settling. Nevertheless, there were three noteworthy results. First, the elevator required a substantial amount of up-trim to maintain level flight at roughly 3/4 throttle. Steeply banked turns also indicated that it was noticeably nose-heavy. Second, Tony said it flew heavy and rock solid, with all controls (on high rate) offering good authority all the way to touchdown. And third, his first landing was surprisingly slow and long, actually resulting in the model rolling off the end of the paved runway into the short-cut grass. Its minimum flying speed was certainly less than we'd expected from a model with a wing loading over 33 oz./sq.ft. And he hadn't even used the flaps yet!

A post-flight inspection revealed nothing in need of attention, so I installed the cowl (with dummy engine) and topped off the fuel tank. Tony made another perfect take-off, and while he merrily rowed the transmitter sticks, I labored at pressing the shutter button on the camera (poor, poor me). Sadly, at this early hour, the sun was on the other side of the runway from us, leaving the model in its own shadow. I made a mental note to get better flight shots later in the day.

Tony continued wringing out the new model, with many positive comments on its honest and solid handling. His only complaint was the maneuver-robbing nose-heavy condition. I don't recall any loops during that flight, but rolls and sustained inverted flight appeared effortless. It was partly Tony's skill as a pilot, of course, but I was still impressed with how smooth and realistic the model appeared in flight. I'd still have used an FS-120 for its extra nose weight, but it was abundantly clear that the smaller and lighter FS-91 had more than enough power for the model, now weighing over 11 lbs. with its full fuel tank.

Later that evening as I was removing the engine and radio gear from the sadly mangled and grass-stained remains, I recalled standing right beside him when Tony loudly called out that he no longer had control. I'd glanced at the transmitter and saw him shoving the sticks around, and then glanced back at the airplane as it dove uncontrollably into the ground.

Both blades of the propeller were sheared off. The engine mounts broke right behind the engine, and the oncoming firewall crushed the carburetor, perhaps aided by the 7.25 oz. lead nose weight. The battery and fuel tank were way over there, both unharmed except that the battery's connector pins had been ripped clean from their plastic connector, which was still solidly taped to the receiver switch connector. Since the main gear had been fully retracted at the time, the wheels and retract units were fine, each in their separate wing panel, one over there and one over here. The cowl and dummy engine were shreds. The entire nose of the fuselage, in fact, was in shreds. The naturally upset pilot figure was loose in the cockpit, but the undamaged canopy was still intact, as was all of the fuselage behind the wing saddle. The two-piece wing was fine too, unless you count the 87 piece center section. The poor retract servo was lying all alone, having pulled free of its connections and mount. But as I sat there at my workbench checking out the radio gear, every single piece, receiver, switch, battery, servos, and servo extensions, all worked perfectly.

This is my third model to be totally destroyed (i.e., beyond reasonable repair) while Tony was flying it. And as if that doesn't hurt enough, I have to insult my own injury by acknowledging that all three crashes were *my fault!* The E-flite AT-6 disaster wasn't due to a builder's error, but it was my fault because I kept urging Tony to fly it slower and slower into a stiff wind, hoping for a full hover about two feet off the runway, when the wind suddenly changed direction and snap-rolled the model over and into the ground.

The other two crashes *were* builder's errors. The first souped-up Electrifly L-39 Albatros crashed because I'd given it 100 mph power without beefing up the 75 mph airframe. When the elevator fluttered so violently it tore itself off the airplane, the resulting foam litter looked like a yard sale for foam fragments. The second version was strengthened, and it flew fine at the higher speeds.

And now... I didn't actually ask Tony to fly the newly completed P-47 directly into the ground. But I might as well have, by installing the radio gear in such a way that the battery somehow became disconnected. At least that's the only explanation we can come up with. Minutes after the crash, the C-size 4-cell 2000 mah NiMH battery checked good, holding at least 4.8 volts for over two minutes during a 2 Amp draw test. The Futaba 10C transmitter was proven good by checking it out in another model, plus it was used to fly two other models later that same day. In fact, later that night every piece of radio gear pulled from the wreckage checked out good.

The battery's connection to the receiver switch was good. That much I know. The plastic connectors were still taped together, even after the battery's wires pulled the metal pins clean from its plastic connector. The only logical explanation left seems to be a loose connection between the switch and the receiver. Just how that came to pass will remain a mystery, because this is the first (and hopefully the last) time this has ever happened to me. I'm usually very careful to make sure the connections are complete, and that there's at least a little slack in the wire to prevent tension that may pull the connector loose. So even though there's no clear lesson learned here, I will unavoidably be even more careful in the future.

Okay, we made only two flights with the new Top Flite P-47, but the only thing we really failed to test was the flaps. Both take-offs were good, the ground handling and in-flight control were solid, but with a pronounced indication that the model was nose-heavy. I would have temporarily added little stick-on tail weights to gradually move the CG rearward until Tony was happy with its new balance point. Then, once we knew where we wanted the CG, the tail weights and nose weight would have been removed, and a new nose weight formed to achieve the new, flight-proven CG position.

Even without using the flaps, Tony's one landing indicated nothing but admirable handling, with a much slower than expected landing speed. The recommended control surface throws were great for a scale model, although certainly less than "Wild Man" Tony would have chosen.

So there you have it. The assembly process was not free of glitches, but nothing was encountered that would frustrate an experienced builder. I highly recommend replacing the 3/4" tall control horns (except maybe for the flaps) with 1-1/4" or 1-1/2" tall pieces for reasons already explained.

The completed model flew very well, solid, and with adequate ground handling and good in-flight control surface authority. I wish we'd completed a full stall test to see what happens when the model is forced into it, but at least we observed a surprisingly slow landing speed, even without using the flaps.

Tony suggests starting out with the CG 1/8" to 1/4" behind the suggested point, but I think it would be better to use the recommended point first, and then gradually move it back until you're happy with the results. Just keep in mind that the nose constantly gets lighter during flight, as each ounce of fuel is burned.

I apologize for the incomplete flight testing and the few, poor photos. I take full responsibiulity for the failure. Nevertheless, I think we had it airborne long enough to prove its merit, and to recommend the model if its size and design interests you. It is, after all, a Top Flite kit, and how many of those have long-remembered flaws? *-Gordon Banks*

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A Sunday school teacher was discussing the Ten Commandments with her class of five and six year olds. After explaining the commandment "Honor thy Father and thy Mother", she asked the children, "Is there a commandment that teaches us how to treat our brothers and sisters?"

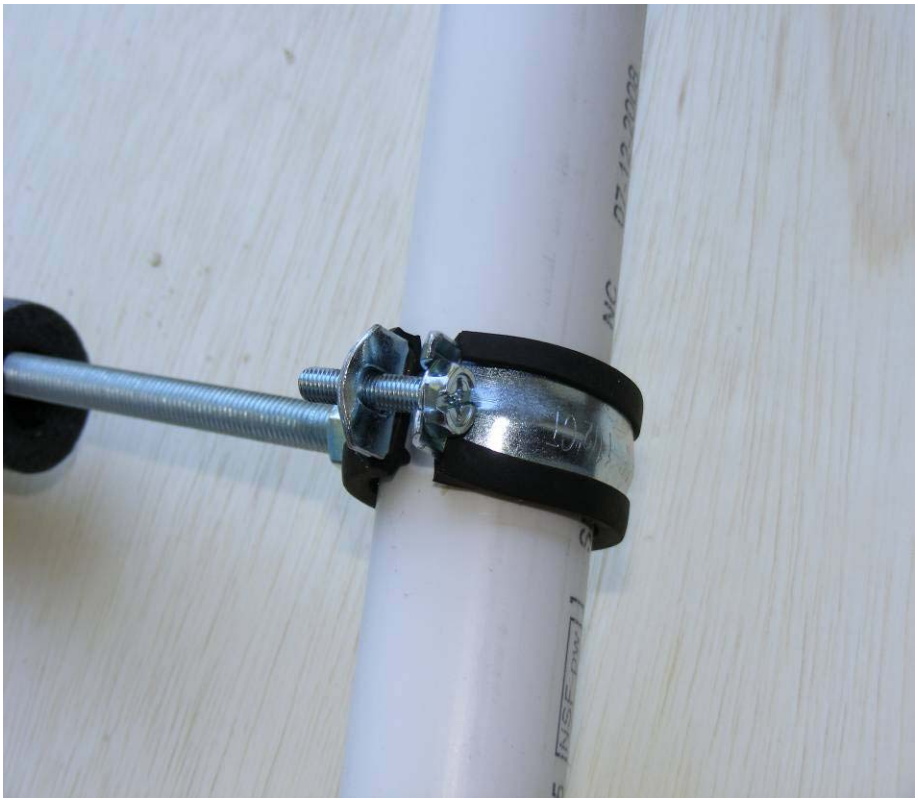
Without missing a beat, one little boy, the oldest of four children in his family, replied, "Thou shall not kill."

HangORstand

I recently received a HangOrStand ™ aircraft storage system designed and patented by Product Concepts and distributed by www.HangOrStand.com. The HangOrStand ™ is an aircraft storage system that is designed to store models vertically in your garage, basement or shop. The HangOrStand ™ is built from 1 1/4" PVC pipe with specialized HangOr ™ brackets and bolts that allow a nearly infinite adjustment along its 91" vertical PVC tubing. A standard HangOrStand ™ will allow for the storage of three different model levels depending on size and weight. This storage capacity can be extended with the purchase of additional HangOr depending on model dimensions. The HangOr's can be adjusted up or down the vertical PVC assembly as needed for your particular needs. The HangOrStand ™ can additional stand freely or hang from a ceiling support, thus the Hang"OR"Stand namesake. The HangOrStand ™ kit comes 90% assembled with very few steps to make useful.

The HangOrStand ™ instructions consist of a single 8.5x11in sheet that covers everything needed for stand assembly. Our lower legs are attached to the lower assembly and can be glued together, or alternatively screwed together with the provided sheet metal screws. Our upper assembly attaches to the lower assembly the same as the legs with glue, or per instructions, drill holes and install the sheet metal screws. Now for the neat, as a friend of mine would call, "Rinky Chinks", the HangOr's ™.

The HangOr's ™ are an interesting strap system that attaches to the vertical members of the HangOrStand ™. These straps seem simple, but I think they are boarder line genius. These straps have a rubber grommet around the edges to allow it to grip the PVC as the screws tighten to secure it to the PVC. The straps have a nut built into them to allow for a 10 inch long carriage bolt to be



tightened into. A simple water pipe insulation covers the bolts and this allows the wings to set on the HangOr's ™ without damage. We receive three sets or HangOr's to store our models.

Finally the HangORStand ™ namesake allows it to be hanged from the ceiling rafters if you would rather it not stand unassisted. We are provided with two straps that can be screwed into rafters or floor joists in a basement to secure the top of our HangOrStand.

The HangOrStand ™ is a very useful aircraft stand that can support up to 50 pounds of aircraft in a minimum of shop space. The price tag for this stand from www.HangOr-Stand.com is $69.95 plus shipping and I think this is a good value. I have built several stands and storage options in my shop, but I think this stand is a great choice, and considerably better than anything I have tried in the past.

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"I like persons better than principles, and I like persons with no principles better than anything else in the world."
Oscar Wilde