# RC REPORT ONLINE!

September 2010 Issue 290

**Where were you 9 years ago? We cannot forget, so get your flag out and remember on Saturday, September 11, 2010!**

# OFFICE NOTES

Welcome to September and the first issue that includes Office Notes.

This column will be written by either Tony or myself and will just be a venue to share with all of you what is going on at RC Report Online. As always, questions are always welcome and we will do our very best to answer any that come our way with promptness and honesty.

Ed Moorman is still recovery from some recent health issues, so his column is still missing this month. ☹ We have heard from him recently and he is on the mend. Continue to pray for a full recovery! Ed, we really miss you in the pages of RC Report Online


Dick Pettit is back this month with an encore farewell column. After much thought on his part, he has decided not to continue writing for us. I am sure many of you will miss him! Wishing you all that you deserve in life and your writing career, Dick! Thanks for your contributions during your time with RC Report Online!

Even though we have had to say goodbye to some columnists recently, our commitment to RC Report Online and to you, our subscribers, is still very strong. Tony and I are working diligently to try and improve the magazine and our situation during this time of transition and financial uncertainty. We deeply appreciate your support! Our subscribers and columnists, both past and present, are why we are still here; why we continue to strive to move forward!

Julia Coberly

# RC REPORT ONLINE

# THE OILY HAND BRIAN WINCH

THE OILY HAND: Covering engine topics and working with metal for models. Send your comments or questions to: oilyhand@bigpond.net.au or write to Brian Winch, 33 Hillview Pde, Lurnea NSW 2170, Australia. International Response coupon (Post Office) required if you want a written reply.

BEARING BUZZ

All model engines have a shaft bearing of which there are, mainly, two types. The first, and most common in the early days, is the sleeve bearing, or more commonly known as the plain bearing.

**Photo 1: Very rare Channel Island Special from years back. Four stoke, spark ignition and sleeve front bearing.**

In the sleeve bearing department there are, in the main, three types and the reference is to the type of metal used for the sleeve. The early style and lowest cost type is where the crankshaft runs in the aluminum alloy casting from which the crankcase is molded. This is still seen in some engines these days, but the

alloy metal used is or can be of a much higher grade providing a really good bearing surface compared to some of the very early engines. With a fine finished and hardened crankshaft you can expect quite a good life from this basic shaft bearing, but you must not skimp on the oil content of the fuel. A low viscosity oil is more suitable due to its migrating properties and that it will not 'glue' the shaft in the bearing sleeve during a period of engine storage. Almost any of the current synthetic oils are quite suitable, but I certainly do not recommend castor oil based on a lot of years experience using these engines and having to free up other modelers' engines that have become glued tight.

The other two types of sleeve bearings are bronze or cast iron. Other metals can be and have been used, but the main success is with these two metals due to wear qualities, low coefficient of friction and a thermal expansion very close to the aluminum alloy used for the case. Let's look at this expansion business for a moment. The sleeve is a tube that fits into a

tube, that is, the bored tube in the front housing. When heated, the tubes, like a simple metal washer, are subjected to the 'donut' effect.

**Photo 2: These poor little conrods have been 'donuted' as I mentioned. The one on the far right is how the damaged OS rod should look.**

As the heat is absorbed the washer or tube expands to a greater diameter, and with this, so does the hole in the middle. The donut dough is dropped into the boiling hot oil and it rapidly expands. The outer diameter is much larger, but unfortunately for donut lovers, so is the hole; which, generally speaking, is inedible and has no taste. While we're in this area, consider the big end of the connecting rod (conrod) of your engine when you run it lean and the heat builds up. Really, the rod cannot 'seize' as such as the hole gets bigger. What does happen is that the expanded clearances and the detonation forces on the rod cause metal to be scraped off the surface of the hole and this builds up into a lump or peak. Bugger! You've blown a rod. This is why old cars of way back that had a zillion miles on the clock would throw a rod, or as was commonly said, seized a rod. The fact was the Babbitt or white metal bearing shell was worn out so much the rod rattled severely on the crank and things screwed up into lumpy bits before delivering the swan song of 'crankle - clatter - ping and doink'. This happened to me 50 years back on the day our son was born. Dropped Shirley at the hospital (Dads couldn't stay in those days.), turned the car around, and as I exited the hospital gates; I heard that nasty sound of a conrod poking holes in the engine block. The big end had locked up and the rod broke. Bugger and poop!

Okay, we slipped off the sleeve bearing a bit, but all of this is engine related and worthy of conversation.

The front housing of the engine case is very accurately bored to produce a straight hole that is a little smaller than the outer diameter of the sleeve to be fitted. This is to allow for a press fit with enough size interference to prevent the sleeve coming out regardless of how hot the engine case gets to be. Surprising how small the interference fit needs to be to be effective. If you consider the pressed in crankpin as in Magnum (and other) engines, the difference in size needs be only a mere 0.03 millimeter or 0.001" imperial, that's one thousandth of an inch! Depending on the types of metal the interference will vary slightly from the crankpin example, but not by much. (Did you know that most motorcycle and hand tool engines have pressed in crankpins? That large, double counterweight petrol engine you have in your super size model has a pressed in crankpin.) Okay, okay, stick to the topic (I do tend to wander at times. It's the age, you see). Right then, the sleeve or solid rod is pressed into the case (You can do the job with heat and cold - heat the case, freeze the sleeve and fit 'em together; called a shrink fit.), and is then bored and honed or accurately polished to bearing size. With a lot of use as the engine ages it will

dribble a bit out the front (Don't we all?) and this is due to a bit of 'bell mouthing' of the sleeve. Due to the gyroscopic force imposed on the shaft by the propeller and your aircraft maneuvers, the shaft flexes all directions through the 36☺ degree rotation path. Eventually this flexing and imposed load wears the front and rear of the sleeve, and we then have the bell mouth wear effect; the diameter at the ends of the tube are larger than the middle section. The end shapes are shaped like a bell or the end of a trumpet. By this time the engine has seen a lot of service and is very tired so; bid a tearful goodbye as you throw it in the recycled metal bin. (Moan… I really loved that engine)

RATTLE MY CAGE

Now we come to the big selling point (drum roll and chant) "dual ball bearings". Big deal! About the only factor in their favor is that they can be replaced. These days with such outstanding machining capabilities in industry, a shaft in a good sleeve bearing is capable of the same speed as one in ball bearings. A fine example of this is the bronze sleeve O.S. LA series and the Thunder Tiger 18 and 28 engines subject of a review in this issue. Note the RPM I recorded. The shaft action is as smooth as a baby's bum. A sleeve won't rust, rattle or fall to pieces and send hard metal bits on a destructive journey through your engine. A ball bearing will! As well the bearing cages can (and do) break allowing little balls to run free and tip-toe through your tulips. Well, actually, they race and tear through the engine's dining room, up the passage into the bedroom and jump up and down on the piston causing all types of horror scenes. Quite often one will make a break for it and try to jump out the exhaust window, usually, the rising piston catches it in the act and squeezes it tight against the edge of the liner port and that stops its travel and everything else as well. No, no, I am not anti ball bearing engines. I like all forms of engineering and ball bearings are beautiful moving works of art.

**Photo 3: When two ball bearings are fitted, the case is either shaped for the job or bulked up like this Saito which utilizes the bulk area for the cam gear between the two bearings.**

They roll and glide, spin and turn, can whiz up to incredible speed (according to the grade of bearing) and are happy with little more than a hint of lubrication. If you want to feel something really smooth, try a linear ball bearing. They are something else! What I am jumping around in my cage about is the hype in advertising where a big deal is made of an engine having 'dual ball bearings'. Stiffen the crows, mate, how long is it since you saw a model engine with one ball bearing? Those days are just about gone with the sinking of the Ark. We did have engines with one ball bearing in the rear and then a sleeve bearing. The rear bearing was for the thrust load and a bit of stabilization of the counterweight end of the shaft. Some engines even had a rear ball bearing and a needle bearing for the front or even something so simple as an O ring that did

nothing more than stop the oil seeping out. Enya made a couple of single bearing engines in latter years, but the front housing had a super slick sleeve bearing fitted. Going way back, there were very small engines that boasted a single ball bearing and a front sleeve section, but this would have been bought about in some way due to the small bearing required for the front which would have been very expensive and, probably, of dubious quality.

THE TYPES

Generally speaking, we are seeing only high grade bearings used in our engines these days. Fortunately the days of 'square ball' bearings, very low grade that felt like the balls were square, are gone as all the manufacturers now realize that our engines are not kid's toys; but a precision item needing precision parts. I carry out a lot of warranty and general engine repairs, and I do still see a couple of problem areas on reasonably rare occasions. I'm not really keen on open bearings being used in model engines (More on that later.), but that is not the problem. What I do find is bearings fitted too tightly. Either too tight in the housing, where they fit in the case, or too tight on the shaft. There is so little resistance in a ball bearing that super tight fits in our engines are not required and certainly not good practice. I have had 'new out of box' engines sent on warranty that felt gravelly when the shaft was turned. You could actually feel each ball bumping as it turned much akin to when you rotate the shaft of a very high performance electric motor and you feel the magnetic pulls. In engineering there is a measurement known as commercial tolerance. An item to be manufactured will be designed to work with X amount plus or X amount minus above or below the default size. An example: let's say you have to make a metal washer for a 6mm bolt. The drawing will give a bore size of 6.3 mm -plus 1mm, minus1mm. You could make the hole 6.4 mm or 6.2 mm and it would still fit the bolt. Of course the tolerances used in our engines are way below this example and probably in the general area of 0.00X or 0.000X mm. Okay then, the cavity for the rear bearing in the engine case is machined to bottom tolerance, the smallest dimension allowed on the drawing. The same type of tolerance applies to the manufacturing of ball bearings and the bearing grabbed out of the barrel, so to speak, for this particular engine is the largest diameter allowed on the drawing. We now have the largest bearing being pressed into the smallest hole. Couple this up with a really tight bearing fit on the crankshaft and we have a gravelly bearing. The minute clearance (measured in microns - I millionth part of a meter) of the balls in the races (inner and outer rings) has been squeezed out and the balls are now unable to spin as they rotate. Obviously other factors apply here such as tool wear not being compensated for or a few components slipping past the inspector's check and turning up either beyond or below the allowed tolerance. I have heard bearings squeal (Their balls were being crushed; moan!) as they were pressed into the housing cavity and that is too tight for our model engines. Maybe in a later article we might talk about rectifying this problem, but you need to have your wits about you to do the job. For the time being, if you feel the lumpy or gravelly feeling as you turn the shaft around SEVERAL TIMES (Don't mistake this for the feeling of the cams in a four stroke.) you should have a talk to the supplier of the engine with consideration to having it checked out by a

person who knows what they are looking for before firing it up.

As I said, I am not overly keen on open bearings in model engines. The three main types of bearings are open - the balls and cage are visible on both sides, shielded - a metal cover is fitted both sides and sealed where a rubber shield (red, brown or black) is fitted both sides. Sometimes one shield or seal is removed by the manufacturer fitting the bearing. The metal shield bearing stops most grit and other foreign items entering and it is lubricated by the engine oil as the shield does not seal right down to the small race (ring). A sealed bearing is … sealed! It has a special grease inside and it is lubricated for life and quite suitable for the range of RPM our engine might get up to. A sealed bearing on the front stops dust and such being sucked into the engine and prevents oil leaking out. A shielded bearing on the rear of the shaft stops most 'things' getting into the bearing and, in the event of a collapse type failure, the bits of ball and cage stay within the metal 'bag' and do not travel through the engine creating havoc as they go. The difference in cost between open, shielded and sealed is so little it would not be a concern to the home mechanic, but it is a consideration for manufacturers. Let's say the difference is 10 cents. A manufacturer producing 10,000 engines would reduce the cost of the engines by $2,000 (2 bearings per engine - 4 per each four stroke with bearings on the camshaft) and pass the savings on to you, the purchaser. In this highly competitive world; cents count!

THE TESTS

By gripping the front end of the engine crankshaft and exerting SIDEWAYS force, not back and forwards; you can detect any bearing wear that is if your ears haven't already alerted you. There will be no movement felt if the bearings are good. Remember what I said about the super small clearance in bearings? Even C3 grade bearings as is used in some extra high performance engines (pylon for example) do not exhibit movement to the casual 'feeler'. You can do the same test by rocking the prop, but make certain you are not feeling back and forth movement which indicates easy fit bearings as is becoming quite common in engines these days. In this the shaft will actually slide in the bearing but, when running, the transfer of force and slight heat expansion will spin the balls in the races. Done well, I prefer this type of fit.

Righto then, the bearings are cactus (buggered or stuffed - whatever) and you feel up to changing them. A block of hardwood, a piece of bent metal, a wood dowel and an electric heat gun (a thick cloth or heat shield gloves are an asset here) will do the job. Sit the stripped down engine on the end (end grain up) of the wood block and place the (bent metal) folded sheet of steel, aluminum or whatever like an open book behind the engine. This is to retain the heat and ensure even heating. Blast away with the heat gun (I use the paint stripper type; can't hurt the engine.) until you see bubbles in the oily joints. With gloved hand (or thick cloth) grab the engine and bang the rear end on the block until the bearing falls out. If it does not move, heat it again and repeat the banging. Poke the previously checked for size dowel up the front end (Dowel must be a little longer than the engine case.) and bang on the end of the dowel with the wood block to dislodge the front bearing. Cool and clean all parts.

To check the bearings requires a bit of experience if they are not obviously loose and lumpy. How smooth should a bearing feel? How much movement should we feel? They should feel smooth as talcum powder on glass and absolutely no movement. Try my method for occasional bearing fitters. Clean the bearing until there is no oil or goo anywhere on or in it. The spray sold for cleaning 'nitro' R/C cars is ideal, as is brake or carburetor cleaner from (full size) car accessory shops. Let the bearing dry clean then fit it onto a wooden dowel, pop stick or any thin wood piece that will retain it in place. Hold the wood lightly between thumb and forefinger and spin the bearing. Like the resonance of a violin you will hear any whirring sound and feel any gritty movement. A new bearing will run dead smooth and only the slightest whisper of sound will be heard with it close to your ear. Any whirring sound or gritty feeling spells the end for that bearing - bin it!

NEW ONES IN

To fit replacement bearings you need two dowels, a vice, same wood block - shield - heat gun - cloth, a large clean metal washer, a metal tube and a drop of thin oil. The washer will be just a little larger than the front bearing; the tube will fit over and be slightly longer that the crankshaft protruding out the front of the engine and one large dowel that will fit in the rear of the engine will be mounted in the vice. For a 2 stroke, the new bearings are in a fold of clean cloth with the rear one fitted in position on the clean crankshaft. Heat the engine case until it is wet finger sizzling hot (Don't burn your finger; be careful.), hold with cloth or heat proof glove and carefully fit the shaft and rear bearing (That has a slick of oil on the outer ring.) using the second dowel to tap it right down if needs be. Generally the bearing will drop right into place. Sit the case on the dowel in the vice with the dowel inside against the counterweight of the shaft then fit the front bearing. Place the washer on top then the short tube and carefully bump the bearing right into its case using the hardwood block as a driver. For a 4 stroke engine, fit the front bearing onto the crankshaft and use this to fit the bearing into the hot front bearing section. When the front bearing is fitted, fit the rear bearing as described above.

The reason for the different procedures for 2 and 4 stroke engines is due to the plain bearing section in a 2 stroke around the carburetor manifold in the front housing acting as a true guide for the shaft so the rear bearing fits dead square. This section is not in a 4 stroke, and without it; the bearing might cut into the housing and become stuck hard. The fitted front bearing provides a truing guide for the shaft when fitting the rear bearing.

I have a large aluminum heat sink with a flat surface on my bench, and I would then place the hot item on this to cool very rapidly. When you have cooled your case, spin the shaft and ensure it spins quite freely, or just a little drag if a sealed front bearing is fitted. All you need do now is remember how all the rest of the parts go together.

I SCREAM

Do you folks have Mr. Whippy ice-cream vans on your island? If not, Mr. Whippy vans drive around all areas playing dreadful music to alert kids (and others) that they are in the area to sell whipped type (soft cone) ice-cream. Kids race out, buy a cone of the soft stuff and then lick the

top while it dribbles over the side and out the bottom all over their clothes. Well, the resident 'fool' (weird workshop assistant) is addicted to this type of confection, and every time he hears the music in the street; he drops whatever he is doing, races out and buys a large cone which he consumes with obvious delight. Yesterday he had removed all his upper clothing so he could glue a metal ring into his belly button cavity with Zap instant CA. Yes, read it again! He was going to GLUE a metal ring into his navel!!! He had made a giant set of bat like wings to attach to his arms that were connected across his back with a length of bungee cord, the rubber cord for launching gliders. On the underside he had two bungee cords - one from each wing tip - and these he was going to connect to the metal ring IN HIS NAVEL! He reckoned on the cords acting against each other to flap the wings so he could launch himself like some strange pterodactyl. Anyway, he had just poured a sizable amount of Zap into his navel cavity when the dreaded music sounded. Mr. Whippy was in the street. He raced out, and as the van stopped, he leaned against the side to check the displayed menu inside to see what topping he would have; M&M's, chocolate chips, fairy top, crushed nuts, etc. He made his choice and went to move back, but yes, you guessed it. He was stuck tight to the side of the van. The Zap had oozed out all over the front of his belly and he was, now, homogenous with the van. The driver said he would have to stay there until he finished his rounds (He was trying to make some money selling the ice-cream.) and then he would see about getting him off the side of the van; somehow. Last I saw was the van disappearing over the far hill, music slowly fading and the fool stuck to the side; running frantically sideways like a crab racing across the hot sand towards the ocean. Sure looked funny! I just wondering how the Mr. Whippy man will get him unstuck from the van, and will the paint come off with him?

Well, I'm off downstairs to tell my dogs that Julia's dog has a page in the magazine and all they do is catch mice, so that's the lot from WINCH - THE WHEREVER WIZ.

# PROP CUTS CHRIS HANDEGARD

FOR THE COMBAT ENTHUSIAST and FIGHTER PILOT WANNABEE

Hi gang, and greetings from Florida, the Sunshine State! It's August, and the month has been one of the hottest on record down here. The only thing worse than baking in the sun is when all that solar energy cooks up a tropical storm or even the dreaded hurricane. I have flown combat in some pretty windy conditions but when the house next door is not next door anymore, all bets are off!

BE THERE OR BE SQUARE

Events for September are: 9/4 "Battle for Blue Ridge" SSC, 2948, Bedford, VA. 9/4, 5 "Dogfight Over Dovre II" Lim B, SSC, New Auburn, WI. 9/4 "Wings Over Malheur Butte" Open B, Scale. Malheur Butte, Ontario, OR. 9/11, 12 "Bushwhacked Fall Furball" Open B, SSC, Scale 2948, West Palm Beach, FL. 9/18 "Fall Sussex Streamer Cuts" SSC, Scale 2948, Seaford, DE. 9/18 "Richardson Fall Combat" SSC, Scale 2948, Lucas, TX.

Events for October are: 10/9 "MARKS Fall Shootout" SSC, Salisbury, MD. 10/17 "Tundra Terror II" SSC, Green Bay, WI., 10/22-10/24 "Texoma Nationals" 2948, SSC, Open B, Sherman, TX. 10/30 "Frenzy at Freestate" SSC, 2948, Laurel, MD.

As fall approaches you may see a decline in number of contests listed in your area, especially if you live in more northern latitudes of the country, so don't miss out! Sign up, suit

up and show up! Here's the link to go to the RCCA's event calendar and sign up: http://rccombat.net/events/index.asp.

Signing up online prior to the contest date should be done as soon as possible. This helps the event coordinators and contest directors get all the needed supplies, manpower and club resources to make the event run smoothly. Also the scores of those who pre-register are recorded more easily by the National Points System (NPS) score keeper, Randy Hodges, when you sign up online before the contest. Seeing the names of other pilots you may know or want to compete with is a good draw to encourage participation, so don't be shy! Sign up early!

Be there or be square!

EVENTS DEBRIEF

Tangerine Combat Challenge

A total of 12 pilots showed up in Orlando, Florida, to do battle over the skies of host club RCACF, the Radio Control Association of Central Florida. The field is well suited to combat, and with a terrain that slopes gently down and away from the flight line made for some unique low-level dogfights that took place below the level upon which we were actually standing!

**Photo 1: Tangerine 2948 Pilots Group Photo "Pictured L-R Don Fourson, Craig Buttery, Jim Nadaskay, Kenny Clements, Bob Loescher, Matt Chontos, Ted Cwikiel, Chris Handegard."**

Arriving at the field on Friday the day before the contest to get the event set up, Linda, love of my life, and I were greeted by a thunderstorm that lasted nearly until dark. A foreboding way to start things off, but Saturday and Sunday were without a single drop of rainfall! I managed to get 2 test flights on a brand new twin engine prototype of the Japanese "Gekko" a WWII fighter plane. More on that later in this article.

Day one dawned hot and very humid. So much so that we found our dennecrepe streamers falling off in the high speed Open B class which started things off. Forestry tape is the standby material for wet days and while there was no actual rainfall or even a cloud in the sky, we were forced to fly the entire Open B class on Orange Forestry tape.

Later tests in the day found the humidity still too high for crepe. Orange is a high visibility color under most circumstances but we found that in a bright sky or with the sun in your eyes, it is pretty hard to see. Next time I will have red forestry tape on hand as it is recommended to be a little better for visibility.

TIP FOR USING FORESTRY TAPE: Before unrolling it, take a sharp hobby knife or sharp razor knife and cut halfway through the material from the center of the roll to the outside of the roll. This puts a nick halfway through the tape at regular intervals when it is unrolled. The stuff is still harder than dennecrepe to cut, but if you don't do this pre-scoring it is darn near impossible to cut!


**Photo 2: Open B Group Photo "Open B Pilots L-R Standing: Jim Nadaskay, Matt Chontos, Glenn Gelatt, Chris Handegard, Curtis Switzer, Richard Engel, Kneeling: Kenny Clements, Nick Windsor, Bob Loescher, Craig Buttery**

After 10 full rounds of competition, young Kenny Clements (14) came out on top with Craig Buttery close behind for second place. The heat and oppressive humidity were a definite factor impacting the pilots also, and we took frequent 5 minute breaks to be sure everyone stayed hydrated and got out of the sun a little. Nonetheless, a couple of the guys bowed out early due to feeling the heat, literally!

Next up was the scale combat class officially called 2548, but since they changed the rules to increase motor size from .25 to a max of .29 I just call it what it is, 2948 Scale Combat. Eight pilots is a full field and we flew all up for 5 rounds to finish the day out. The day had dried out a bit so we were able to go back to using crepe for the last 5 rounds.

**Photo 3: "Craig Buttery and the author holding 2 scale fighters. I am on the left with a twin engine J1N1-S "Gekko" and Craig is holding his BulletProof Models P-47 Thunderbolt, the "Jug"**

Sunday, day 2, and another full schedule of 15 rounds was planned. First order of business was to finish the remaining 5 rounds of scale combat class. Having forgotten the streamer drop off of yesterday morning and hoping the lower speeds of 2948 would not cause crepe paper to fall off, we all launched with dennecrepe streamers for round 6 to start the day. That didn't last long at all, but one plane had its streamer fall off before start combat was announced, so we scratched that attempt, called end combat right away and everyone landed to re-equip with forestry tape, which we used to finish out scale.

**Photo 4: Scale Combat Furball "Only 3 planes left at the end of the scale competition when I flew my twin Gekko prototype for a baptism under fire.**

Scale combat is one of my favorite classes and the added realism of airplanes that closely resemble WWII fighters is well worth the extra effort, in my opinion, of building and flying them.

Now, for 10 rounds of SSC to finish the contest. By now the day has dried up enough and the slower speeds of SSC planes allowed us to use dennecrepe for the remainder of the contest.

Photo 5: SSC Group L-R Glenn Gelatt, Bob Loescher, Matt Chontos, Chris Handegard, Kenney Clements, Craig Buttery, Ted Cwikiel

There was no shortage of mid-air bump and grind in this event! SSC is supposed to stand for "Slow, Survivable Combat", but in reality the slower speed coupled with highly maneuverable planes seems to bring them into contact at least as much if not more than other classes! At least going slower limits the damage potential somewhat! Once again the heat took a toll on the pilots and a couple retired early to escape it. We felt like little strips of bacon sizzling on that hot asphalt runway!

You may have noticed that the photos show many of the same guys each time in each class, or at least I hope you noticed. An event like this which featured more than one class or style of combat, in this case 3 different classes, affords an opportunity to get maximum bang for you travel buck. That was intentional to be sure. I always favor events that give me more than one class to rack up points in and build for each class so as to come well equipped. It's what I call DOING IT LIKE YOU MEAN IT!

One highlight of the event was the debut of Craig Buttery's new prototype Open combat design he calls the "Zapdos". I got to test fly it at home before we went to Orlando and found it to be an outstanding flyer with straight tracking and a superior turning radius. A real contest winner! The design borrows its tail configuration from the renowned Avenger combat model, but Craig redesigned just about everything else. It has a very short coupled tail with full flying horizontal stab, but resembles a flying wing more than a conventionally configured plane.

Photo 6: Craig Buttery demonstrating perfect form as he launches his own design "Zapdos" combat model

For the event debrief with more photos go to

http://rccombat.net/forum/viewtopic.php?f=21&t=13552.

And also be sure to check out the Palomar Flyers Combat Forum at http://pfcombat.hyperboards.com/index.php for some cool combat tips, event debriefs and discussion forums.

FROM THE BENCH

This month I have to be brief due to the hectic schedule that has me directing and competing in 2 combat contests and sandwiched in between them a pylon race which I am also a director of and racing in; egad! I have been busier than a one-armed paper hanger!

My bench project this month is a prototype for BulletProof Models scale combat design of the Japanese J1N1-S Gekko (Allied code name "Irving") WWII fighter.

Photo 7: J1N1 Gekko top view

I built the prototype pictured above in the time between Monday evening and 4a.m. Friday morning after pulling an all-nighter to finish it up. Then it came to the Tangerine Combat Challenge for engine break in, test flights and a round of competition to prove the design. Mon. – Fri. morning was actual construction time from first cut of foam to putting on charge for next day flying. I had spent some considerable time already doing my design and drawing in autocad of the shapes I would have to cut out of foam so I had a pretty good idea of what to do when the hotwire made its first pass through raw material.

Equipped with 2 Magnum .15XLS motors and weighing 4 lbs. it flies quite nicely and turns well. Wing span: 60", length 42", Speed: YEAH BUDDY! I was very happy with the performance of the prototype. I may have inadvertently let a couple degrees of down thrust get built into the engine nacelles, requiring some noticeable uptrim to compensate but otherwise it's a design I plan to replicate. I would call this one a potential contest winner.

When I build the next one does anyone want to see a detailed build article on constructing a 2948 twin out of foam? Then you'd better send me an e-mail so I know someone out there is reading this!

Photo 8: J1N1 Gekko side view

Another new design unveiled at the Tangerine was Craig Buttery's outstanding original concept, the "ZAPD☺S". I was able to get a test flight on it before the meet and found it to be very nimble and light on the wing. Turns on a dime and gives 9 cents change! Very impressive, and we hope to see more of the Zapdos. I understand Craig is planning to kit it as well as building more for his own contest use.

The Zapdos borrows the tail group design from the proven "Avenger" combat plane but from there Craig revamped the airframe to resemble a flying wing more than a conventional tail setup. The result is a cleaner, shorter tail moment and very good in both the positive and negative pitch directions. I really liked it!

Photo 9: Outstanding new combat design by Craig buttery, the "ZAPDOS"

Here's one more nifty tip from my friend Craig Buttery who found a super cool use for the "shucks" or unused portion of a foam block that the fuselage is cut from in most kits made of blue foam. He took the shucks and fashioned them into a cradle that fits like a glove around the airplane to stabilize them during handling and transport. This will help to protect the fuse and keep the tail from being leaning on something and being deformed in transit.

Photo 10: Airplane transport cradle from unused fuselage foam block "shucks" by Craig Buttery

Well, that's it for this month gang; I hope you enjoyed it and am looking forward to hearing your comments at chandegard@peersonaudio.com. Don't forget to clear your guns before you engage and check your six o'clock frequently!

# To C or not to C, that is the question?

Now we have talked about C ratings on LiPo battery packs in the past, but now it's time to dig a little deeper. I have been asked more times than I can count what the differences are from a 20C LiPo battery pack and 25C LiPo battery pack. I am going to show the differences between three different C rated LiPo packs. I am going to compare the differences in physical size, weight, cost and performance.

## I have gathered three Hyperion 4S 3300 mAh packs with different C ratings.


| Hyperion 4S LiPo Pack | Weight in Grams | Dimensions: LxWxH in mm | Wire Gauge | Local Hobby Shop Price RCHobbies Huntsville, Al | Mail Order Price www.empirerc.com |
|---|---|---|---|---|---|
| **CX G3 25C pack** | 358 grams | 134.5x42.75x28.75 | 12 AWG | $78.99 | $76.95 |
| **VX G3 35C pack** | 367 grams | 134x42.3x29.9 | 12 AWG | $94.99 | $94.95 |
| **EX G3 45C Pack** | 361 grams | 135.5x42.3x30.0 | 12 AWG | $104.00 | $103.95 |

Table 1

All these packs have a C rating that is the maximum you can draw from the pack continuously (in theory). Continuously is the key here. The 25C pack is 33 00mAh, so that means that you can do the math and calculate (25x3.3Ahr=82.5 Amps) that I can run at full throttle the entire flight as long as I am not exceeding 82.5 amps. Now these packs have an additional C rating, usually called a burst rating. The CX G3 series pack burst rating is 45C. So math again says (45x3.3Ahr=148.5 Amps) that we can safely run at up to 148.5 amps for a short time. Now I have not been able to locate the "Press Release" from Hyperion regarding how long a short time is, but most other manufactures agree that a short 30 second burst followed by one minute of runtime at a rate less than the continuous C rating of the battery. So if I am going to fly for 3☺ seconds at the 148.5 amp burst rating, I then need to fly at less than 82.5 amps for at least a minute before I go to full throttle again.

In Table 1 you can see the physical dimensions of all three packs and the pricing from my local hobby shop and from an online mail order website. Considering the differential in weight is only 9 grams, weight should not be a consideration when choosing from the three packs. The same holds true when you see that the physical dimensions are also nearly identical. Now we can move on the cost comparison of the three packs. The 35C packs costs about 17.5% more than the 25C pack and the 45C pack costs about 10% more than the 35C pack and nearly 32% more than the 25C pack! So based on size and weight, the 25C is by far the best buy of the bunch, but that is only a small piece in this C puzzle. Let's move on to the real world testing.

Okay, now for test setup. First I am going to run a test with an E-flite Power 90 that I have on hand. Now this motor is rated for 6-8 LiPo cells, but I am going to run each four cell pack through a full throttle run until the ESC reaches the voltage cutoff point. Now I am running a large APC 21x13W prop on it. Normally this would be an oversize prop for the motor, but in that I am only using four cells, the wattage and amps will be relatively low. All packs were recharged with the same Hyperion DUO 3 balancing charger before each test. Now I will not be stressing these batteries at all during these runs. I simply want to record run time and temperatures before and after each run. (Table **2**) The first run yields similar rpm, and runtimes for all three packs at an average load of only 38.3 amps. I believe this is a good number because of the great number of kits out there are running in this amp range. The table reflects the beginning run and ending run temperature of each pack. All packs were run with the same prop and motor setup. The full throttle runtimes do not vary by more than 10 seconds, so once again the difference in C rating is not an significant a factor In runtime because all packs are rated at 3300 mAh. The higher C packs resulted in only slightly more RPM and the final cell temperatures are very acceptable for a full throttle run to ESC voltage cutoff.

| C-Rating | Temp Start/finish | RPM | AMPS | Final cell voltage | Runtime Min:Sec |
|---|---|---|---|---|---|
| **45 C Pack** | 80.5 degrees F<br>112.5 degrees F | 3750 Max RPM | 38.7 Amps Max | 12.29 volts-Cells at rest | 5:54 |
| | | | | | |
| **35C Pack** | 80.5 degrees F<br>115.5 degrees F | 3750 Max RPM | 38.6 Amps Max | 12.72 volts-Cells at rest | 6:04 |
| | | | | | |
| **25C Pack** | 80.5 degrees F<br>113 degrees | 3700 Max RPM | 37.58 Amps Max | 12.46 volts-Cells at rest | 5:57 |

Table 2

For the second test I am going to go to an even bigger prop. I mean it's BIG!! Now I have installed a 26x15 Carbon fiber beauty from Mejlick! Now this should increase the current that is pulled from the packs to the limit of the motor. First I will run the 25C pack, then the 35C pack and finally the 45C pack. Let's have a look at the results. During the second test I found that the rise in temperature of each pack was considerably higher than the first test. While this is to be expected, I did have the packs directly in the prop wash and was elevated slightly off the table to allow airflow under the pack as well. I would say that you could not have more airflow over the packs if they were installed in a plane. 59.3 amps average draw across the three packs yields temperatures approaching the maximum cell temperature that we want to see. The 25C pack showed the lowest after run temperature of 121 degrees, but the highest temperature of 132 degrees was from the 35C pack. Now Table 3 shows all the results from this test.

| C-Rating | Temp Start/finish | RPM | AMPS | Final cell voltage | Runtime Min:Sec |
|---|---|---|---|---|---|
| **45 C Pack** | 76.1 degrees F<br>124 degrees F | 3275 Max RPM | 60.9 Amps Max | 12.41 volts-Cells at rest | 3:35 |
| | | | | | |
| **35C Pack** | 76 degrees F<br>132 degrees F | 3175 Max RPM | 59.1 Amps Max | 12.71 volts-Cells at rest | 3:52 |
| | | | | | |
| **25C Pack** | 76.5 degrees F<br>121 degrees | 3025 Max RPM | 58.6 Amps Max | 12.63 volts-Cells at rest | 3:52 |

Table 3

Looking at the final cell temperatures I believe that any increase in current draw would not allow for a true test of continuous current on the packs. The temperature increase of the pack would cause overheating and damage to the pack before the test is completed. Remember that the C rating is supposed to allow this rate to be pulled out of the pack until the pack reached a cutoff voltage of 3.0 Volts per cell. 120 to 125 degrees F is the maximum you every want to see after a flight. What does this say about the C ratings on the batteries? Well the 25C pack should be able to supply 82.5 amps, yet the pack is reached 121 degrees with only a 58 amp load on it! The 35C pack should be able to supply 115 amps, yet the pack overheated with only 59.1 amps! The 45C pack should be able to supply 148 amps yet it reached the 124 degrees and was loaded less than half its C rating! Does this mean that these are bad packs? Of course not. I use Hyperion almost exclusively and have been very happy with their performance. This test simply means that you have to use a little caution when you see these amazing C ratings on packs these days. My recommendation is this: the higher C packs did provide slightly more RPM in both tests. So yes, more C rating does allow for more performance, but I recommend that you look at these packs as 25C packs. Then you can ask yourself if it is worth a few more dollars for that additional few RPM.

Tony Coberly

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# THE BIG PICTURE DICK PETTIT

*First of all, I would like to apologize for not submitting a monthly column last time. I have my reasons and they are between me, myself and I. Next, I want to wish Tony and Julia all the luck they deserve in trying to keep R/C REPORT Online going for many more issues.* ***(There really should be a smiley here, but I just couldn't bring myself to do it! Julia)*** *And finally, I want to say this to all our loyal readers, both from the "printed days" and those who follow us online. It is with deep regret that I must submit notice that will effectively terminate my affiliation with R/C REPORT Online. I have been a Contributing Editor for more than 20 years and have enjoyed meeting people, exchanging photos and ideas and trying to provide honest and truthful reviews and opinions to the readership. It has been an honor and a privilege to work with all of you for the past 20+ years, and I wish you and the remaining authors all the luck in the world.*

*Thanks for the memories!* ☺ *Dick*

Now for my final "Big Picture"

It's been hot and I didn't make it to several local flying events, but I have heard that lots of you haven't been heading out into the scorching heat (for this time of year around here that is) and I can't say that I blame you. Maybe we'll have an early fall.

This month I'll show you a couple of planes I saw at a local Open House event and I'll reprint an article from a major ARF distributor all about the benefits and shortcomings of using gasoline engines on your models.

Let's get started.

THUNDERIN' THUNDERBOLT

One of my good friends, Robert Underwood from High Point, NC, arrived at a local Open House event with this beautiful Republic P-47 Razorback, seen in PHOTO 1.

Photo 1: Robert Underwood, High Point, NC, and his Top Flite P-47 Razorback

Built from a Top Flite kit, Robert converted it to the razorback version just because he liked the way it looked. The P-47 is powered by a Cunningham version of the popular Zenoah G-62 and the plane is finished using fiberglass and west Systems epoxy covered with Klass Kote paints. The 26.5 pound model has over 50 flights and uses Robart retracts. Robert, I like the razorback version, too!

INTRODUCTION TO GASOLINE MODEL AIRCRAFT ENGINES

Gasoline engines are now popular for use on larger model aircraft. They have the advantage of long life, low cost of operation, and adaptability to larger sizes. Making the transition from glow fuel engines to gasoline will be easier with an understanding of the basics of using small gas engines.

Why Gasoline? Is it right for me?

A glow fuel engine consumes roughly twice the amount of fuel that is used by a gasoline engine of the same size. (PHOTO 2) The practicality of glow engines stops with aircraft above about 15 pounds. At that point the quantities of fuel that must be carried, and the cost of that fuel, become significant problems. A 1.80 cubic inch glow engine will consume 1.5 to 2 ounces of fuel per minute. That works out to something like 1 ½ hours of flying on a gallon of fuel. At $15 per gallon (rough price of a gallon of glow fuel at the local hobby shop) it's costing about $1.50 for a 10 minute flight.


Photo 2: Glow fuel cost vs. gasoline cost

Warning! Gasoline is highly flammable and can be dangerous if not handled properly. Follow all the recommendations on the gas can and at the gas pump, keep a fire extinguisher handy at all times, and do not allow gas fumes to accumulate in a closed space. Gasoline can explode and kill you. A stray spark can cause a disaster.

For models weighing less than 10 pounds total, a glow-fueled engine is almost certainly the right choice. In smaller planes the power and simplicity of glow engines cannot be beat. The cost of the fuel, and the weight, are insignificant drawbacks. A .40 size engine uses so little fuel that the cost is negligible, and the extra weight of a gas engine's ignition system would be a major drawback.

From 10 to 15 pounds, it's a toss of the coin, which one do you like. The gas engine costs a bit more to start with, and probably weighs a little more, but not so much more that it is not practical. The costs of fueling a large (1.20 and up) glow engine can be a drawback, where the cost of gas is almost zero. When you get past 15 pounds, there's no choice to be made, gas power is the only practical choice. There are a few large multi-cylinder glow engines, but for every day flying they are not practical and are used mostly with scale aircraft requiring realistic looking engines, usually radial or opposed twin. So to summarize, if you want to fly giant scale, you will need to become familiar with gasoline engines.

How do I select a gas engine?

There is always a small loss of power when using gasoline as a fuel over alcohol, which is the primary ingredient in glow fuel. Alcohol/air mixed at the optimum ratio produces roughly 10% more energy when oxidized (burned) than does gasoline, and it takes almost twice as much alcohol by volume to mix properly with an equivalent amount of air. So you get a little more power from an engine but consume twice the fuel. And Nitromethane can be added to alcohol to increase power further; this is not true with gasoline. So we need to use a larger (displacement) engine with gas to get the same power as a glow engine. The equivalent to a 1.8 cubic inch glow engine (30 cc)* will be approximately a 2.4 cubic inch, or 40 cc, displacement. This is a very rough equivalence, but the relationship will hold for engines of similar type. There are good and not so good engines in both categories. With gasoline, there are three types of engines

A. Purpose built engines specifically designed for model aircraft and UAVs.

B. Hybrid engines that use industrial parts with purpose built foundations.

C. Converted industrial engines like chain saw and weed-eater engines

Examples of engines in Category A are 3W (from Germany) ZDZ (Czech Republic), and DA (Desert Aircraft, American made).

Engines in Category B include Brison, Zenoah, older BME engines, and half dozen less well-known brands.

Recently there has been a large influx of inexpensive Chinese engines in small and large displacements. Most of these fall into category B, hybrid engines. And most of these Chinese hybrids are extremely cheap, both in price and quality. For the most part I recommend that you stay away from the really cheap motors.

These all fall into the "throwaway" category, if something goes wrong it's probably cheaper to throw it away than to try to repair it, especially if your time is worth anything. Poor machine work, poor quality materials, and poor design usually mean an engine that will be very frustrating.

Many of these engines are very good, specifically the 3mm TOC-53 and the DL-50.

These are both "Category A" engines, built specifically for model airplanes. They are both more or less copied from other successful engines. The T☺C-53 uses parts that are similar in most respects to the 3W 106, the same cylinder, piston, etc. While it is different in many respects, the TOC-53 looks like it could be in the 3W catalog. The DL-50 is patterned after the DA-50. Some parts will even inter-change, though there are also significant differences. Engines in Group C are really not suitable for applications requiring high power to weight ratios; they are generally restricted to sport models. There are lots of converted Ryobi and Homelite 2 stroke engines around, but they don't produce power to weight in the same league as the other types of engines. We want to select an engine for our plane that will provide the best flight characteristics and installation available. Interestingly, we really don't care about the displacement of the engine, that's something that is totally irrelevant to engine selection. What we care about is physical size, weight, vibration, cooling and suitability for use. Pay close attention to the weight of an engine and its power output, almost everything else is irrelevant. We do want to be concerned about physical size and how much vibration is generated, but in 2007 most of the purpose-built gas engines available are of excellent quality and are not considered "shakers".

What's available?

Assuming we are staying within groups A and B, there are still several engine type variations on the market. Let's discuss what's available before getting into how to choose.

Things to select from include ignition type (magneto or electronic or hybrid), induction method (piston port, reed valve, rotary valve), carburetor location, (side, bottom, or rear) and exhaust location (side exhaust or rear exhaust). Briefly, here's what this all means.

Electronic Ignitions


**Photo 3: Typical Electronic Ignition unit used on many gasoline engines**

Electronic ignitions are separate boxes, (PHOTO 3) powered by batteries and triggered by a magnetic pickup on the crankshaft. They are easy to hand start and are very light-weight. They take more time to install (though it's not hard, just more stuff to do) and are generally the easiest to live with.

They tend to be slightly less reliable than magnetos, but are still very reliable if properly maintained. Most competition type giant scale airplanes use electronic ignitions. Electronic ignitions (in almost all cases) have the advantage of automatic ignition timing advance, which allows optimum timing at all speeds. Without some type of spark advance mechanism (electronic or mechanical) the engine will either be hard to start (fully advanced) or will be down on power because the spark is retarded.

Magneto ignitions are simpler, a bit heavier, and usually require some starting method like a spring or electric starter. A magneto generates its own power by moving a magnet past a coil. To do this the magnet must be moving at more than just hand cranking speed. Magnetos are very reliable but generally are not favored by competition pilots. A Zenoah G-62 is a good example of a magneto equipped engine. In many cases (like with the G62) there are kits to convert from magneto to electronic ignition. Magnetos usually have fixed spark timing, although there are a few engines (Fuji is notable) that have magnetos with advance mechanisms. Fixed spark timing means the engine will have ideal spark timing at only one RPM, usually full power. This hampers efforts to achieve easy starting, maximum power output and a smooth low idle.

A hybrid system uses a battery booster to make hand starting possible, but then uses a plain magneto when running. These have not gained great popularity. For the most part in 2007 magneto equipped engines are no longer viable because of the weight and inflexibility involved.

An exception is in warbirds, scale and tow planes where weight is not a concern and where they normally fly it full throttle most of the time. For aerobatic type planes electronic ignition with automatic timing control is the only way to go.

The right engine for the job

Let's go at this one item at a time. First, the engine must fit in the plane. That's a given. In some very tight installations like scale warbirds that model a plane with an inline engine (like a P51 Mustang) there's very little room. (Or a Bucker Jungmann seen in PHOTO 4)

Photo 4: Carburetor sticking out the side of a Bucker Jungmann cowl

You must be very careful with installations like these, lots of things can be wrong. In this case your selection may be limited. Things to worry about include overheating, too much noise (you won't be very popular at some fields if you don't have a good muffler and that takes a lot of room).

So when you choose an engine for your new bird, take a few minutes and measure the cowl width, distance from the firewall to the cowl

spinner face, look to see if there is room for the muffler you want to use, etc. A little planning here goes a long way. Often people choose an engine, and then later regret it because either it doesn't fit or it's too heavy and they spend hours and hours trying to accommodate that engine. Look before you buy. I recommend either asking someone who has done it before (often the airplane manufacturer will know what a good fit is and what is not) or wait until you have the plane and borrow the engine of your dreams and do a test fit. Or ask the vendor of the plane what engine they recommend, most of the time they will know what works best.

You will save a lot of pain.

The second point is the engine must be suitable for the job. You don't want excessive weight in an aerobatic plane, but in a big scale WW I biplane you may need a lot of weight in front just to make it balance. A high performance high RPM racing engine is great for a giant scale pylon racer, but would be useless in almost anything else. The list goes on, and once again a little planning pays off big.

Single cylinder engines have become excellent values recently. DA and 3W have some excellent singles that are lighter than twins and just as smooth, possibly even smoother. In the past as a general rule singles shook more than twins, but that is no more. The larger the engine the more it shakes, However there are many excellent single cylinder engines and a few really bad twin designs, so nothing is cast in stone. If you need anything over 100cc, you'll almost certainly be forced into a twin.

Below that many singles are excellent selections and will be roughly half the price of a twin. Consider the DA-85 to be equal in performance in the air to a DA-100 due to weight savings. Since this document is aimed primary at the aerobatic flyer, here is what is generally done. 3W sells a line of single cylinder engines that have various configurations; these are excellent engines though they tend to be heavy. 3W also sells an excellent line of twins, however these engines tend to be a little heavier and also wider, sometimes requiring openings in the cowl to clear the spark plug caps. 3W makes both bottom carb and rear carb versions, look before you buy to be sure the engine will fit in your plane. But they are very good engines, smooth and powerful. Recently 3W has release some lighter weight engines, the 106cc twin for example. But watch out, many 3W engines are HEAVY. Dealer support with 3W in the USA can be hit or miss. Some people have excellent results, others report less than stellar experiences.

Caveat Emptor

Desert Aircraft builds the only (as of today) 100% purpose built American made engines. They are light and very powerful, and smooth. Excellent engines with excellent support. The DA singles are excellent values. The Zenoah G-62 has been a very popular engine with this scale airplane and sport-flying crowd. It can be a good aerobatic engine and benefits from a conversion to electronic ignition. The G-62 has the unique characteristic of being widely available both new and used. You can do much worse than to buy a used G-62 and convert it to electronic ignition and a lightweight muffler. Zenoah also makes a very nice 80cc twin.

It uses magneto ignition and is a bit heavier than its competitors, but it's powerful and reliable and very available. For the most part I recommend against purchasing new Zenoah because for the money there are better solutions on the market, but they last seemingly forever and are quality products.

Installation

Okay, you have your plane (hopefully a Wild Hare ARF) and your engine. Now what do I do? Mounting the engine is fairly straightforward. (PHOTO 5)

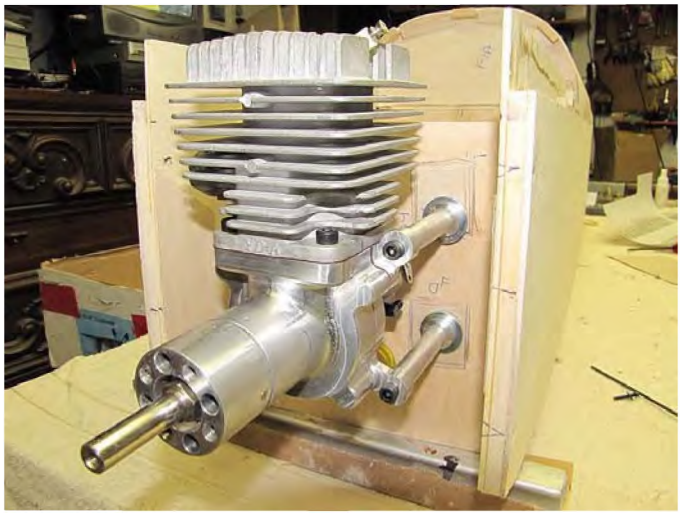


Photo 5: Typical gasoline engine mounting to firewall.

Most installers will bolt the engine rigidly to the firewall. Be sure that firewall is strong and properly glued in. Use minimum 10-32 screws to hold the assembly to the firewall. Bigger engines need bigger bolts. If you have a rear-carb engine you will need to plan for access to the carb so you can set up the throttle and choke linkage. Gas engines require the use of the choke for starting, so think about how you will open and close the choke before you start bolting and cutting.

A little planning…

You will also need to plan for emergencies. You need a kill mechanism.

What?

What happens if for some reason you cannot use the throttle? Sounds silly, but it happens to every one of us sooner or later, the throttle linkage comes loose or the servo fails and we're stuck flying around until the plane runs out of fuel.

If you are unlucky enough to have a throttle failure at partial power setting with a full gas tank, you could be out there flying for several hours, plenty of time to run down the receiver batteries which will cause a crash. Before you have this tragedy, install some kind of kill mechanism. This can be a servo actuated ignition switch, an electronic ignition switch, a fuel cutoff, or my favorite, a servo actuated choke. This solves two problems, how to operate the choke with the cowl on and how to kill a runaway engine. I use a standard servo to operate the choke; it costs about $10 and weighs almost nothing.

Fuel System

Photo 6: 24 ounce Fuel Tank and fuel lines for a typical installation

The fuel system on your gas engine is different from your glow engine. Not more complicated, actually simpler, but different. You will use the same type of tank (Du Bro makes a nice selection) but you will not need as much capacity. For a 40cc engine you will need about 12 ounces for a 15 minute flight. Larger engines need more fuel. My DA-85 engine burns about 2/3 of the 24 oz. tank in a 12 to 15 minute flight. (PHOTO 6)

Gas engine carburetors have a built in pump that draws gas from the tank. The pump operates off the pressure pulses from the engine crankcase. Don't worry about it, it's all automatic, you don't need to do anything. The pump allows you to locate the tank almost anywhere that is convenient, no need to keep it close to the engine. Normally you would want to locate the tank on or close to the airplane's CG. By doing this the plane's balance does not change as the tank empties.

You must use a gasoline resistant stopper in the tank. The ones for glow fuel will dissolve in gasoline. Same with tubing don't use silicone tubing. Use Tygon hose for gas, it doesn't get hard; it's transparent so you can see what's happening in the line. Gas fuel line doesn't need to be as large as for the equivalent glow engine. Gas engines only burn about half the volume of fuel, remember?

The tank on a gas engine is not pressurized; just leave an open vent line to the atmosphere. You might want to put a loop of vent line from the tank vent, around the rear of the tank, and then out through the lower front somewhere. This way if you tip the model over nose down with the tank full you don't drain gas out the vent. Remember that gasoline kills grass, dissolves asphalt and paint, and is generally unfriendly. It also smells bad, so the less spilled the better. Use a fuel dot or inline filler to fill the tank. Wild Hare has a custom made fuel dot that we supply with our hardware kits.

Ignition and Radio Interference

Time was when spark ignitions and radios did not get along at all. Modern ignitions and radios have no problems if all is installed properly. I have used both PCM and FM receivers with spark ignitions without problems. Just follow some simple rules.

**Note about 2.4 GHz. Radios. The manufacturers claim that these radios are immune to interference from ignitions and metal-to-metal contact. Good news, but it does not hurt to follow the rules any-way.

First, consult the ignition manufacturer's instructions and read them. There should be at least a 12-inch separation between any radio components and any ignition parts, though this is a rule of thumb that is frequently violated. I normally put my throttle and choke servos in front close to the engine and ignition with no adverse effects. Use no metal parts to make engine control linkages. At a minimum, use nylon clevises to insulate the engine from the throttle or choke pushrods. Make sure there are no metal-to-metal contacts that can rattle around when the engine starts and is running. Metal pushrods in a metal hole, metal clevises, etc. can cause radio noise and interference. Absolutely the spark plug cap must be in good condition so as not to allow any sparks to jump out to ground. I had a cap with a pinhole in it, when I got in wet grass sparks would travel through the pinhole and moisture to ground.

Make sure the ignition system is well grounded to the engine. The plug lead will have a grounded cap or a ground pigtail. The best place to ground is to the base of the spark plug; use a work type hose clamp for this. Second best is to a screw into a fin on the cylinder head. Do not solder a terminal on the ground wire, crimp it on. Solder will melt. Mount the ignition box and ignition battery in foam rubber to protect them from engine vibration. This is important; the ignition can be damaged easily.

Speaking of batteries, use a good 4.8 or 6-volt battery, NiCad or NiMH, unless otherwise specified by the manufacturer. A single cylinder engine will use up an 800-mah battery in about an hour. Twins use twice as much energy. Decide how long you want to fly and select your battery pack.

Do not use a voltage higher than specified by the manufacture, it does no good and can damage the ignition. Avoid using a voltage regulator if possible; electronic ignitions may not get full performance with an inline regulator. Better to use a simple unregulated NiMH or NiCD battery pack.

Throttle and choke control

When using a gas engine (or for that matter any engine) it's important to use a good quality servo for the throttle linkage. Sloppy throttle management can make a plane harder to fly. Don't just grab any old used servo for the throttle. While it doesn't take a lot of force to work the throttle, it's important that the servo linkage is tight and free of slop, and that the servo itself is precise and free of slop. A good ball bearing nylon-gear servo will do nicely. Don't try to save $5 here and buy a non-ball bearing servo, it can cause the throttle to be imprecise at that worst possible time. And don't allow any metal-to-metal contact, particularly do not allow a metal pushrod to make electrical contact with the engine, it can act as an antenna and radiate interference. (PHOTO 7)

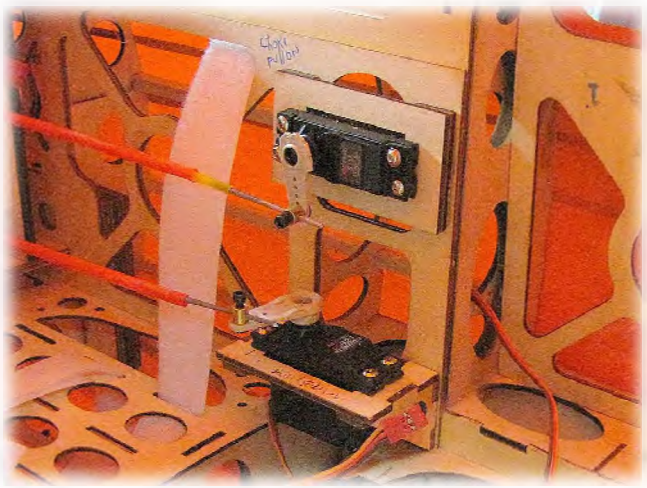


Photo 7: Throttle and choke servos use plastic control linkages to minimize ignition noise

If you choose to use a servo to drive your choke, this is where you can use your worn out servos. The choke is an all-open and all-closed affair; it has a snap that forces it one way or another. In this case it's important that the servo's travel matches that of the choke lever, otherwise what will happen is the servo will be resisting the choke spring and will draw excess current. A worn out servo is easier to adjust in this case. Ideally adjust the travel to be approximately correct, and then use your computer radio and adjust the endpoint travel (ATV is a common term) so that the servo doesn't buzz in either the open or closed position.

Don't have a computer radio? Get one. You're in the big leagues now. Get a decent radio.

* Throughout this document I use cubic inches and CCs interchangeably. They mean the same thing, they refer to the amount of air that moves through an engine in one revolution or combustion cycle, but they have different scales.

One cubic inch is equal to 16.4 cubic centimeters (cc). 10 CCs equals .061 cubic inches. Therefore a 50cc engine is 3 cubic inches. Engine displacement measurements are rarely exact; assume that any reference to size means "approximately".

(The above article is taken from the Wild Hare website: www.wildharerc.com)

COLORFUL TURBO PORTER

Another plane at the Open House flying event was this seldom seen Pilatus Turbo Porter, (PHOTO 8) assembled from a VQ ARF by Bob Sickle from Asheboro, NC.


**Photo 8: VK Models Pilatus Turbo Porter and its owner, Bob Sickle, from Asheboro, NC**

The model is powered by a Saito 150 four stroke and uses a 3 blade master Airscrew prop. The color scheme comes from the factory looking like this and the plane has working side doors that Bob uses to drop parachutists and candy. The wing fences were added by Bob just because "…they look cool…".

I asked Bob how it performs in the air and he used the word "Docile" many times. He then said it flew like, "…a Cub with gadgets…" Personally, I like gadgets too.

That's about all I have for now. Keep in touch via email or in person

See y'all at the field….

Dick!!

# TAILS FROM THE OTHER SIDE ISABELLE

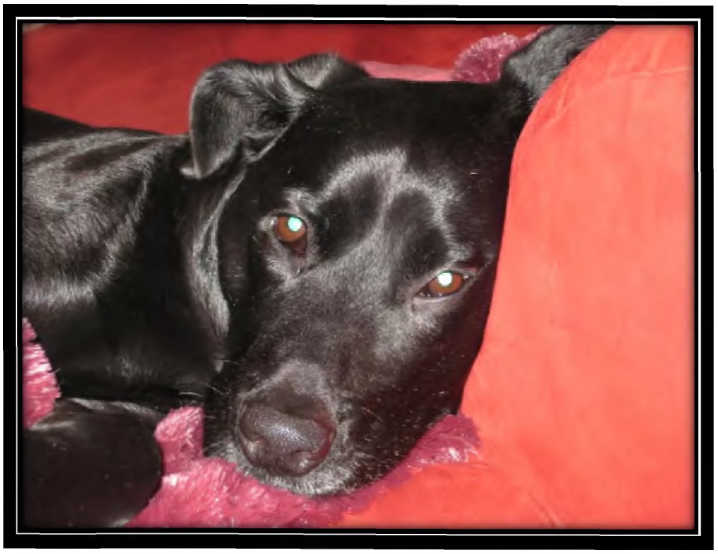
September…we are finally getting into my favorite time of year. It has cooled down considerably here in North Alabama and I can spend a little more time outside. School is in full swing, so the office is a little quieter without Cass around. I think Mom secretly misses the noise, but who I am to try and understand all of you humans? Enjoy the upcoming Labor Day weekend and keep in mind that the office will be closed on Monday, September 6.

Let's see what October holds for us, besides all the scary fun! Don't forget, for information on events in September; check out the flyers near the end of this issue!

Well, it looks like the only people flying the first week of October are the folks in the Carolinas and Illinois.

This three-day event will be held in East Bend, NC on October 1-3, 2010 at the club field. Contact Tony Simmons, CD, about the 2nd Annual Dan Santich IMAA Flight Festival. He can be reached at sonyt@aol.com. Visit www.riversiderc.com for more information.

Maybe you are fonder of South Carolina? Visit Gaston, SC, on October 2, for the 8th Annual Jim Cecil Memorial Fly In. Walter Williams is the CD, and can be reached at wwildroot@yahoo.com. Fly whatever you bring as long as it is NOT using channel 20. $10 landing fee includes lunch.



The Warbird Scramble will take place on October 3, in Streator, IL, at club field. Contact Dale Chiavene at mode1pilot2@verizon.net for more information. Or visit www.streatorrcflyers.com.

Now, the second weekend of October, I cordially invited you to wonderful Huntsville, Alabama. We will be celebrating Cassie's 16th birthday. FLY! Don't drive, 'cause you DO NOT want to be on the roads! In all seriousness, she is a pretty good driver. I have not personally been in the car with her, but Mom hasn't had a heart attack…yet.

Actually, if you were in NC last weekend, just stay and try this on October 9, in Goldsboro, NC. The ECRC 8th Annual Big Bird Fly In will be held at Randy Webber Field. Michael Stokking is the guy with information and can be contacted at mnsj109@nc.rr.com. Visit www.ecrcflyers.com for more information.

On October 16-16, the Art Watson/Dave Thomasson Memorial Big Bird Fly In will be held in Crosby, TX. Martin Mankinen is the CD, and can be reached at mmankinen@verizon.net. Visit www.propnuts.com for more information. The event is open to all flyers of 80" wingspan or true ¼ or larger aircraft. The $20 landing fee includes lunch.

Spend Halloween in Nevada for the Southwest FAI Challenge held on October 30-November 1, at El Dorado Dry Lake. William Booth is in charge of the spooky fun. Send him a big B☺O at booth@boothsuarez.com.



Hope you find this information helpful! Stay busy and stay out there in the hobby!

Event information was slim for me this month, so I need your help! Send me an email with information concerning upcoming events that you are aware of – no matter how big or small! Attach a flyer, too! If you don't tell the RC world about it, the RC world will never know to visit and fly with you in your part of the country! And don't you want to make new friends? ☺

Well, until next month,

Isabelle

# THUNDER TIGER GP-18 & 28

| | |
|---|---|
| CONFIGURATION | Two stoke - glow ignition - font intake - side exhaust |
| DISPLACEMENT | 2.93cc & 4.53cc |
| BORE | 16.2mm & 18.7mm |
| STROKE | 14.2mm & 16.5mm |
| WEIGHT | 162.2g & 221.1g |
| STATED POWER | 0.45 & 0.7 HP |
| R.P.M. RANGE | 2,500 - 17,000 |
| PROP' RANGE | 8 x 4/8 x 6 - 9 x 6/10 x 5 |
| FUEL | 5-10% nitro + 20 oil + methanol |
| SHAFT THREAD | UNF 7/32 x 32TPI - ¼ x 28TPI |
| SUPPLIED WITH | Complete tool - glowplug, instructions, decals |

AVAILABLE FROM: (W/sale) ACE HOBBY DISTRIBUTORS, Liverpool.

Retail from most hobby shops; test engines supplied by Kelletts Hobbies, Liverpool.

FOREWORD

It is very heartening to see that a manufacturer could see the need for engines of the smaller capacities, and to incorporate such a modern design. Strangely, to say 'smaller capacity' is odd in itself as many modelers chase larger and larger capacity engines - engines that could well power a motorcycle. What today is 'small' or 'large' when it comes to engines? It seems that not a week goes by we don't see or read about yet another larger capacity engine being used or entering the model market. Larger models, incredible increases in radio needs with sophisticated systems for the onboard equipment, special vehicles to carry the models to the field and all for, generally, one or two flights for the day after setting up the model then packing it up for transporting home and then the endless struggle to store the monsters. What about the great enjoyment (fun, if you like) of having a neat 'little' model, with about a meter or so span, inexpensive small engine, very simple radio gear and a small fuel canister. Fly all day, no great worries about a multi dollar crash, put the model in the back seat of a small car and hang it over your bench (or bed) complete when you get home. Next flying day you have charged the radio batteries, topped up the meager fuel canister and you have the model in the air within a couple of minutes of arriving at the field. Plain simple, good modeling enjoyment and you still have money in your pocket. That, for those who are asking is the need and pleasure of having a 'small' engine such as the pigeon pair on review. Modelers with a bit of balsa dust in their hair will know that you can still have large models that fly quite well with a small engine. Captain 'Buz' - our resident model designer and builder flew his very nice cabin job - at 80inch span - with a plain bearing .40 engine and it flew extremely well. Another need is when you think of multi engine models. Only a very large and heavy multi engine model needs large engines. Due to the propeller swing area (the circle), two engines provide a lot more flight power than a single engine equal to double the capacity of the small engine. As an example, two of the .28 engines on review would be equal to around a .72 single engine (or more) in propeller swing area. Using 10 inch props, the combined area of two equals 157 square inches. Using a 13 inch on a 72 the area is 132 square inches and the small engines will be swinging their props a fair bit faster than the .72. Okay, now that you are thinking about what you have been missing, let us examine these two little jewels.

GREEN ENGINES?

Thunder Tiger list these as 'green' engines; not because of color or fuel used, but due to the method of manufacture which does, really, harkens back to my (and many other senior modelers) starting days. Many early engines were assembled without the use of bolts or screws; the parts threaded into each other. Certainly a simple method of manufacture and one that needs less energy and materials to produce, which in our energy and resource conscious times, is very important. To my eye it also makes for a very neat engine; no head or backplate bolts needed and all parts are neatly fitted and simple to assemble with one simple tool. Another 'green' factor is the muffler assembly where we see a real effort at taming the sound (more on this later). As we examine the parts you will see several more interesting factors that combine to make for a very

interesting engine. As for performance - outstanding in all respects. Simple to run, start, tune and mount; no nasty habits when starting or tuning and clean as a whistle after quite a lot of bench running. Checking my bench notes taken at the time of run testing, I recorded that the day was very cold - 13 degrees - and the 28 was a bit tight at the top of the stroke. It fired, but would not catch in 5 or 6 flicks so I spun it, without plug power, with a starter to warm up the insides. After a brief spin, I then connected the plug power, gave it one flick and it was off and running. From then on it started quite well when hot, but lapsed back into its old habits if I let the engine cool right down. The problem slowly resolved itself after a reasonable amount of running and it became quite bouncy on the flick and starting was not a problem. Again I refer you to the weather conditions of 13 degrees and 90% humidity on the test day of 23.6.10. Not a great day for engine running. When I began the various prop tests I found the main needle about ¼ turn broad; no change for ¼ turn, depending on the prop size used. Tuning was very easy with a good warning if things were getting into the lean side and no change on the tachometer. The RPM was quite stable for a small engine, the transition was very rapid and smooth, the supplied glow plug, TT-R2, was a perfect match for my 10% nitro fuel and it provided a very reliable idle. Again, cold day, but the engine does cool quite rapidly and I put this down to 1. the small metal mass and 2. the generous finning on the barrel and head. Certainly good for cowled operation of scale models. My final note was that I found the engines very easy to use and both of them to be very reliable. I test for this by using a small hand held tank on a reasonable long fuel line and I move the tank around to simulate some rather wild flying. Once or twice the engine would 'splut' quickly, but neither engine stopped running.

Okay, let's check out the 'greenery'.

OUTSIDE PARTS

The maincase is made up of the crankcase section, front housing, finned cylinder, exhaust manifold, carburetor body, beam mounts and radial mount all in one quite clean and neat casting. The main bearing for the crankshaft is a full length bronze sleeve that is super slick, as the RPM will attest, and it has a lubrication channel cut in for about ¾ of its length. The air bleed type carburetor body is part of the casting and the front support web is an integral part of the carby body; light and strong. The exhaust manifold has a forward section internal opening into an expansion chamber area to which the muffler is attached using bolts through the engine manifold threading into the muffler manifold. Extra sealing is provided by a thick gasket. The beam mounts are interesting in that they have four outward facing slots instead of holes for the mounting screws; tolerance for movement if required. The radial mount is a three bolt pattern and very substantial at 6.7mm thick; no flexing here. A little above the manifold and at the rear of the cylinder is a small stopped hole with an even smaller 'hole' in the centre of the base. The inner 'hole' is actually a very small roll pin (split steel tube section) that intrudes into the inner section where it serves as a locater for the cylinder liner (correct orientation of porting). The inner machining is of a very high quality and indicating that a tough aluminum alloy has been used for the casting. Both the internal rear and upper internal cylinder is threaded (same thread

size) for the cylinder head and the rear cover of the crankcase. The supplied compound tool will loosen and tighten both parts…quite easily.

The rear cover is just a tad over 18mm long with an external thread on the rear half and it seals via a fuel proof O ring. Slots in the rear section allow the use of a straight section as on the spanner for moving removal and replacement purposes. The maximum length has been used to reduce the crankcase volume as much as possible, a desired requirement for a high performance engine; it is for 'volumetric efficiency' as part of the fuel gas pumping done by the downward travel of the piston (positive pressure).

The cylinder head is moved (wound in or out) with the use of the 'C' section of the spanner and it locks down onto a head (or plug) button into which the glow plug is fitted. This is another high performance feature and it allows for those modelers who experiment with head shapes, plug depths, combustion chamber shapes and compression ratios to try different aspects by, simply, fitting a different head button; a simple lathe job to manufacture. One 0.4mm aluminum shim is fitted under the button on the stock engines. All nice and neat.

INSIDE PARTS

The cylinder liner is brass and all over nickel plated; a very slippery customer. Porting is enormous as is the top lip at 4.3mm thick; no distortion here. In the top lip (rim) is a small slot that locates on the small pin I noted in the cylinder and the fit of the liner is a snug, slip fit into the cylinder.

Easy to see that piston is fully machined from tough (high silicone content) aluminum alloy (you can see the tell-tale peppery finish), the gudgeon bosses are quite generous (good support) and the hole for the hollow gudgeon pin is stepped one side and a Teflon button insert in the other side of the pin prevents it rubbing on the liner wall.

The connecting rod (conrod) is also fully machined from stock aluminum alloy and bushed both ends with quite thick walled bronze bushes (approx. 1mm thick section). While there is an oil hole in the big end eye, there is none in the little end eye. I don't see this as a problem with the very smooth fits of the parts and, certainly, nothing untoward was evident on close examination after disassembly.

As with the rest of the engine, the crankshaft is a superb job. It is very finely machined on all surfaces, extremely finely finished on the bearing surface of the journal and the crankpin, absolutely dead smooth flow pattern in the intake port, well formed thread on the propeller end and all head treated to very hard/tough. A very nice job worthy of a close examination in my photo. The cast, 22mm diameter prop drive hub is well knurled and locates on the shaft using the 'D' pattern drive, the prop washer is 4mm thick (no buckling here) and the thread is standard AF (Across the Flats) for each shaft thread. A ☺.23mm shim washer fits on the shaft between the drive hub and the nose of the front housing to prevent rub wear; don't neglect to keep it there as it prevents wear at the front and damage to the back cover when the shaft is pushed back during starting.

CARBYAND MUFFLER

As mentioned, the carby is part of the maincase so all we have to examine is the throttle rotor

and this is a very fine finished steel item with the adjustable throttle arm attached with a Phillips head bolt. I noted that the operation of the throttle was very smooth with no untoward end movement.

The muffler is a bit of a surprise and here we see some very good work has been done to tame the exhaust sound without choking the engine. The muffler body is the common two piece style with a locatable rear outlet and that is sealed with a heat proof O ring. A 120mm 3mm bolt and Nyloc nut holds the parts together. Inside is a very interesting fabricated (build up of parts) cone that is 41mm long with four 4mm holes spaced equally around the largest diameter. A sealing/locating rim of aluminum brazed to the larger diameter and a 15mm disc to the small end. This cools and redirects the gas flow for a very efficient sound reduction without any choking of the engine. An interesting design and top marks to the company for this assistance in reducing engine sound and so, possible helping to save flying fields. Good work.

Well, all neat and nice, highly recommended if you have the need for a friendly, well made small engine so let us now check the prop figures of both engines for a bit of a surprise.

## PROPELLER FIGURES

28 Engine

SCIMITAR

8 x 6 16,094****

MASTER

9 x 4 14,822

SCIMITAR

9 x 6 13,181

APC

9 x 7 12,254

TT CYCLONE

10 x 5.5 13,054 2,039 Idle

APC

10 x 6 10,791

18 Engine

APC

7 x 3 21,400****

TAIPAN

7 x 6 14,691

APC

8 x 4 15,290- 2050 Idle

ISHIPLA

8 x 4.5 13,513

GRAUPNER CAM

8 x 6 12,000

MASTER

8 x 6 13,489

# E-flite Extra 300 32e ARF


| | |
|---|---|
| Model: | E-flite Extra 300 32e ARF |
| **Airplane Type:** | 3D Aerobatic |
| **Manufacturer:** | E-flite |
| **Distributor:** | Horizon Hobby, Inc.<br>4105 Fieldstone Rd.<br>Champaign, Il 61822<br>1-877-504-0233 |
| **Suggested Retail Price:** | $274.99 |
| **Typical Street Price:** | $199.99 |
| **Wing Span Advertised:** | 52.5" |
| **Measured:** | 52.5" |
| **Wing Area Advertised:** | 542 sq. in. |
| **Measured:** | 520.9 sq. in. |
| **Advertised Weight:** | 4.40-4.6 lbs.<br>Completed weight 4.60 lbs |
| **Airfoil:** | Symmetrical |
| **Wing Structure:** | Built up balsa |
| **Wing Joiner Method:** | Carbon fiber tube |
| **Fuselage Structure:** | Built up balsa |
| **Fuselage Length:** | Advertised: 49.0"<br>Measured: 50.5" |

**Pushrod Type :** Music wire
**Pushrods Installed:** N
**Hinges Included:** CA
**Hinges Installed:** N
**Radio Included:** None
**Recommended Controls:** 4 (Ail, El, Rud, Throt)
**Motor Included:** None
**Recommended Motor:** E-flite Power 32 size Brushless outrunner
**Motor Mount Installed:** Y
**Motor Mount Type:** Plywood box
**Battery Included:** None
**Recommended Battery:** 4cell LiPo 3800mAh
**Landing Gear Installed:** N
**Wheels Included:** Yes
**Recommended Wheels:** Included
**Assembly Instructions:** 36 Pages, 11"x8"
**Hardware:** SAE
**Hardware Included:** Landing gear, axles, wheel collars, main wheels, tail wheel, aileron pushrods, clevises, elevator torque rod and pushrod
Items Needed To Complete: 2.25in spinner, Prop, 32 size brushless motor, 60 Amp ESC, 4- mini servos 40+ ounce torque, one 18in servo extension, two six inch servo extensions, 4+ channel receiver, Transmitter and four cell LiPo battery 3000+mAhr.
**Covering Material:** Ultracote
**Estimated Assembly Time:** 6 hours
**Estimated Skills Required:** Experienced
**Drilling Required:** Servo screw holes, CA hinges
**Adhesives Required:** Thin CA Glue, 30 Minute Epoxy
**Assembly Tools Required:** Hobby knife, drill and bits, adjustable wrenches, various Allen wrenches, #2 Phillips screw driver

## COMPLETED MODEL

**Finished Weight:** 4.60 lbs. ( 73.6oz.)
**Wing Loading:** 20.38 oz./sq.ft.
**Motor Used:** E-flite Power 32
**Propeller Used:** APC 14x7
**Propshaft to Ground:** 8.75" (held level)
**Speed Controller Used:** Castle Creations Ice 50 Lite* (Too Small, need 60 amp)
**Battery Used:** Hyperion CX G3 4S 3300mAh
Radio Used: Spektrum AR7000 Rx, two JR MN48 mini servos on ailerons, two Hitec HS225 BB servos.
**Covering/Finishing Used:** N/A
Special Items: None

**CHEERS** – Great hardware kit, very complete instructions, lightweight and insane power system

**JEERS** – No exit holes for cooling air

E-flite and Mike McConville have teamed up and we have a new Extra 300 in a 32 size for electric only. The Extra 300 32e ARF is basically a 40 size IMAA capable model that is has a very simple power system that allows the performance of a 33% size model in a compact and fun size. Let's get started and build this Extra.

I am going to use the recommend E-flite Power 32 brushless motor as recommended on the box and in the instructions. I have used this motor before on my Deuces Wild that I still have. This motor is powerful and reliable, so I have no worries here. Now I am short on 60 amp brushless speed controllers, so I will try to use my Castle Creations Ice 50 Lite from the file cabinet and try it out. If the magic smoke gets let out, well that's my fault, not the planes! I plan to use a 4-Cell 3300mAr Hyperion EX G3 for power for the plane. I am using two of the

recommended JR MN48 servos on the ailerons and I will use a similar Hitec Hs-225 BB for a bit more power and speed on the rudder and elevator. I am using Mercury brand CA glues and EpoGrip brand epoxy where needed throughout the build process.

First things first, read the entire manual before you start building the plane. This is always the best way to start. I think that if you order your model or go to your local hobby shop and buy it, you will more than likely not start on it until the next day. This leaves you plenty of time to sit in your recliner or in your favorite chair and read the 36 pages in this manual. Okay, let's get going.

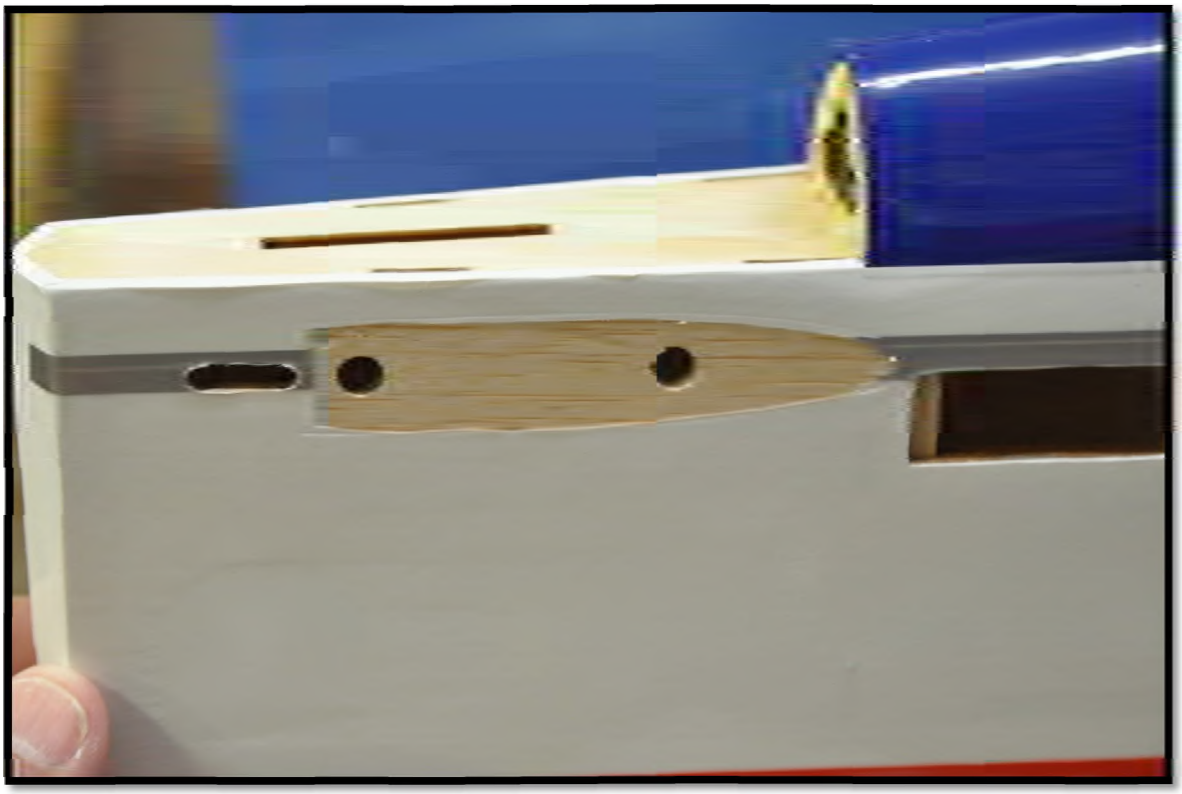
The first steps in the manual involve the installing of the ailerons with the provided CA hinges and the install the servo in the wing. Well here is the first problem. The slots for the aileron CA hinges are very, very, very tight! The instructions have us drill a small hole in the center of each hinge slot to allow the thin CA glue to penetrate into the hinge and into the balsa in the wing. The problem is that the slot is so tight that the hinge will distort when trying to insert it into the wing panel or aileron itself. Here I had to insert an Exacto knife blade into the slot and wiggle it around a bit to open up the slot a bit. We can now continue and install the aileron on each wing panel and then install the JR MN48 servo and six inch servo extension. Finally we can install the aileron control horns as provided in the kit. These control horns simply insert in the hole provided and tighten down. I do NOT hook up the servo push rods yet. I like to do all radio setup at one time later in the build process.

The next step in the instructions calls for us to install the motor onto the motor mount box. Well here is where I recommend that you skip to page 12 in the manual and install the main landing gear, wheels, and wheel pants before coming back to page 9 to install the motor. Having the landing gear on just makes things easier. Even if you have a model stand

to hold the fuselage, the landing gear makes for fewer dings and hanger rash on the fuselage.

The motor mounts to the fuselage very easily with the preinstalled, adjustable nuts captured in the firewall. The kit provides four aluminum spacers behind the X-Mount on the E-flite Power 32. The spacers allow for perfect positioning in the cowling later in the build. The motor wires need to be positioned to the bottom of the motor mount box so the ESC can be mounted to the bottom of the motor mount box. The ESC just needs some Velcro strapping to hold it to the box, and the wires are routed into the battery are in the fuselage.

With the motor mounted, and the ESC in place, the installation of the cowling could not be



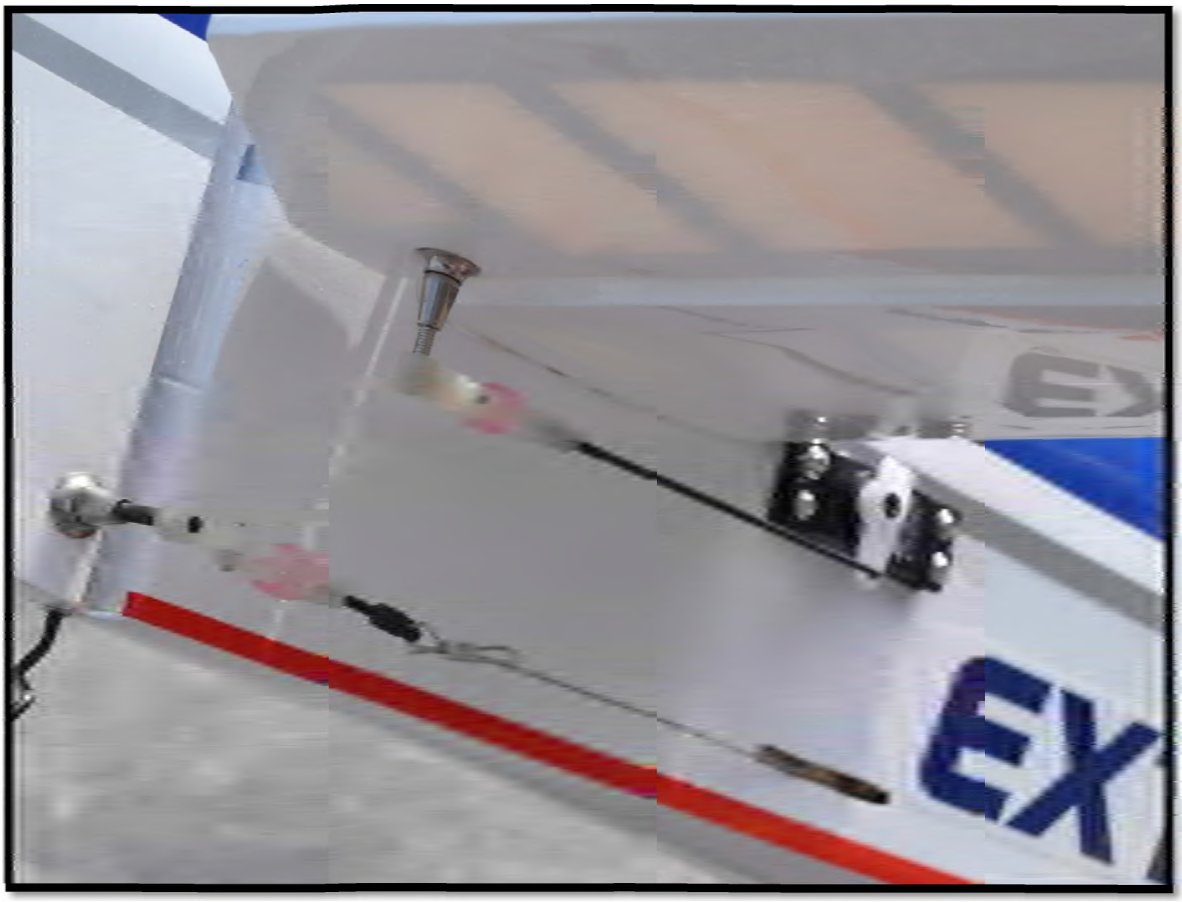
easier. The cowling simply buts onto the fuselage and two 4-40 screw hold the cowling in place from inside the battery area! No more tape, cardboard and adjustments needed. Now I can install the Dubro 2.25 inch white spinner, and APC 14x7 propeller and the front of the plane is complete. If you already installed the main landing gear you can move onto the installation of the servos in the fuselage.

The elevator and rudder servos I chose to use are the Hitec HS225BB servos. To put it simply, don't do it. These servos are slightly larger than the recommended JR MN48 servos, but will take you about one hour to install because you have to carefully widen the holes in the fuselage to accommodate them. You will need an 18 inch servo extension for the elevator servo, but you will not need an extension for the rudder servo in the center of the fuselage. Now time to install the tail feathers!

The horizontal stabilizer is installed next and this is the first time I have installed one like this. The stabilizer is compromised of two halves and joined with two carbon fiber tubes. The halves are to be installed onto the fuselage by gluing them to the fuselage, and gluing the rods into the stabilizer. Generally when I see a carbon fiber tube, this usually indicates a removable item on the plane, but that's not the case here. The horizontal stabilizer fit very well to the fuselage and the alignment was perfect. The elevator halves are installed with a torque rod and three CA hinges per half. Once again the slots are very tight for the hinges, so you will again need to use an Exacto knife to open up the slots a bit to make the hinge installation easier.

The vertical stabilizer is inserted into a slot in the fuselage and 30 minute epoxy holds it in place. A fairing piece completes the rear of the turtle deck of the fuselage. Now the rudder is installed with two hinges and the addition of the tail wheel assembly. The manual gives us many pictures and hints on ways to protect the plane glue spillage, and these tips are very clear and easy to understand. Once again these are very god instructions, and I commend E-flite once again.

Now we can start rigging up the servos in the fuselage to the rudder and the elevator. The rudder is connected to the servo in the center of the fuselage with a pull-pull cable system. The hardware provided is great here. I have used several other pull-pull systems in my two meter planes, but this system is more adjustable and very easy to use. The



instructions cover every step on installing this pull-pull system so anyone somewhat experienced with airplane building can install this system easily and quickly without problem. Now I will install the wings onto the fuselage, install the receiver and setup all the servo centering and setup the recommended throws.

Using the basic servo arms provided with JR and Hitec servos, I could not achieve the full recommended High rate in the manual, but I adjusted the high rate to the maximum I could in my Futaba 12FG with the Spektrum 9 channel Z module. There is no recommended exponential rate for this model, so I won't use any! (Guess I'll just have to be a bit careful during maiden flight.)

The canopy is not installed on the top hatch of the fuselage, so we need to glue it into place. I used a few additional button head screws to hold the canopy in place while the glue dried. I had to open the hole in the canopy to allow the latch to fully engage the top hatch.

The 4S 3300 mAh Hyperion pack is slightly lighter than the recommend 3800mAh packs, so I had to slide the pace nearly to the front of the battery area to get to the recommended CG range as stated in the manual. I ended up at 94mm from the leading edge of the wing. This is right in the middle of the recommended CG, so it's off to the field to fly this Extra 300 32e.

## Flying the Extra 300 32e

On a very nice late summer afternoon I arrived at the field with three batteries, one Extra and a radio in hand; ready to fly. (I forgot to mention the Nikon DS90 in the bag for evidence!) I already had a battery in the plane so just a donning of the neck strap, turn on the transmitter and plug in the battery and I'm ready to go. As I taxied out onto the runway it became apparent that the rudder throw would NOT be adequate, but I will address that later at the shop. Then I advanced the throttle and the little Extra leaped into the air in short order and I was off to the races. The power system is amazing, so I backed down to 1/3 throttle and trimmed out. A slight cross wind caused a bit of crab angle, but a few clicks of aileron and elevator and we are good to go! Now for the fun! (Remember when I said I'll NOT use any exponential!) The elevator is very sensitive and a full pull at full throttle will NOT give you a loop, but a

rather hard right turn to and inverted snap! Can you say Sporty!! The ailerons are quite responsive as well with a roll rate of about 540 degrees per second! Now remember that I am not quite at the recommended high rate, but I'm 80% there. The APC 14x7 is really more prop than this little plane needs, but it will give you a climb rate of about 45MPH until it's in the clouds! ( Since we are looking at 65.9 Amps and 985 watts, it's safe to say this motor is slightly under rated) Now I am using a Castle Creations Ice 50 Lite here, so I'll tell you the truth here. I did have three occasions where the ESC did shut down the motor due to an over current condition. I actually did expect it, so I was ready and simply pulled the throttle down to zero and waited a couple seconds and then powered up slowly. This was a reminder to use more throttle control and advance slowly and smoothly throughout the flight. The CG is very sporty as I mentioned and most aerobatic maneuvers are done with ease, but the 3D stuff is lacking due to the lack of full throw on the control surfaces. (For a newer pilot I would recommend adding weight or a slightly larger pack to move the CG to the very forward most recommendation of 90mm for a more comfortable feel initially. You can the move it back as you get used to the plane.) So Cuban eights, avalanches, stall turns and inverted flight is done with ease and authority. I flew for five minutes with only minimum power loss and landed on the runway under power.

The battery pack was 105 degrees F and the ambient temperature was 89 degrees F so I am happy with the current draw. I was a bit concerned in that there are no cooling holes in the fuselage to allow air to exit. The battery seemed no worse for wear, even though the ESC did shut down three times; I'm not as concerned now. I am using an undersized ESC, with only minimal cooling and I think it performed well. I am going to use a slightly smaller propeller to bring the current draw down a bit to give the ESC a break. The APC 14x7 is a great prop, but I think that it could cause you to get in trouble very quickly if you're not careful. (Remember that a 14x7 is usually used on a .91 4-stroke glow motor!) The other recommended APC 13x6.5 or perhaps even an APC 14x5 would give you plenty of thrust and just pull the speed back a bit.

I really like the E-flite Extra 300 32e for its light weight, low wing loading, and a superb power system which I have used before! The fact that Mike McConville had a hand in it is a plus because I had the chance to meet him earlier this year up in St Charles, IL. Mike is a great guy that simply loves to fly. He has a winner here and E-flite make a lot of modelers happy!

Tony Coberly
Tonyc@rcreport.net

# *Smile! You could be the next Winner!*

*O.S. .46 AX*

**O.S. .55AX**

*O.S. .75AX*

O.S. ENGINE

## Smiley Face Contest #9 2010!

**We are bringing back the smiley face contest. Throughout this issue we have placed five or more Smiley Face Figures like the one shown here (☺), but as before this page doesn't count. Write us and tell us where at least five are, and you'll be eligible for a random drawing in which the winner gets to chose from the three engine shown above. Winners will be selected by a random drawing from all the correct entries received no later than October 1, 2010. No entries will be accepted after this date. Entries must be sent via US mail or E-mail only, and reference the correct contest number in subject line or address. Hobbico employees, RC Report Online employees, columnist and advertisers are ineligible for prizes. No Purchase Required. Valid in USA and Canada only.** smileys@rcreport.net Subject line: Smiley Face Contest #9 2010

US Mail: Smiley Face Contest #9, 2010 PO Box 12051 Huntsville, Al 35815

*All terms subject to change without notice. This contest is void in any area, state, or locality where taxed or prohibited.*

*Dear Tony and Julia,*

*Did you know that it's easier to spot the little grins when you use the "zoom" feature on your screen to enlarge each page to 150 or 200% larger? I must be a slow learner since I just figured that out this summer.*

*Now I have no excuse when I find only 5 out of 9 smileys in the magazine - it might be a mental lapse or the glazed look which comes into my eyes when I drift from searching for smiles to reading one of the distracting articles - I guess that I never would have made it as an assembly line worker, looking at the same thing all day.*

*This month I found six smiley faces, on pages 8, 14, 15, 17, 33 and 37. That's enough to qualify, now all I need is more good luck than I usually have in games of chance.*

**Frank Maguire**

**South Portland, ME**

*SIX!*

**John Steed**

*Julia,*

*I'm trying my hand for the first time to find all Smiley's, but I agree with Frank Maguire and his theory. (Frank McGuire is my Father-in-Law's name-but notice Mc).*

*I have located 6 of the little booger.*

*Thank you,*

**John Morgan**

**Columbia, SC**

*Again I've been snookered. I found only 6 and I'm sure there is more. My poor old eyesight is failing me. Instead of smileys, how about dancing girls? They are easier to find, and a lot more fun. So I hope I can still qualify!*

**Howard Pascoe**

**Whitney Point, NY**

*SIX!*

**Manfred Decker**

*SIX!*

**Jim Fowler**

*Still loving the smileys! The winner will be contacted and announced in the August issue. The winner will receive his choice of one of these three engines: OS .46AX, OS .55AX, or OS .75AX. Keep searching those articles and columns.*

*Total Smileys for the August 2010, issue was 6.*

***July's Winner is Gerald Ewell, Sr. of Manchester, TN!***

***Thanks for your submission, Gerald!***

*Julia Coberly*

# Mail Call

Well folks keep your questions and comments coming. We will do our best to answer each and every question asked of us. We will continue to post a few each month for the rest of the readers to see your questions and comments.

RC Report Online Staff!

Here's a little funny sent in by my friends, Dick Sprau and Baby:

Ken and his wife Edna went to the state fair every year, and every year Ken would say, 'Edna, I'd like to ride in that helicopter.' Edna always replied, 'I know Ken, but that helicopter ride is fifty bucks, And fifty bucks is fifty bucks.'
One year Ken and Edna went to the fair, and Ken said, 'Edna, I'm 75 years old. If I don't ride that helicopter, I might never get another chance.'
To this, Edna replied, "Ken that helicopter ride is fifty bucks, and fifty bucks is fifty bucks.'
The pilot overheard the couple and said, 'Folks I'll make you a deal. I'll take the both of you for a ride. If you can stay quiet for the entire ride and don't say a word I won't charge you a penny! But if you say one word its fifty dollars.'
Ken and Edna agreed and up they went. The pilot did all kinds of fancy maneuvers, but not a word was heard....He did his daredevil tricks over and over again, but still not a word...
When they landed, the pilot turned to Ken and said, 'By golly, I did everything I could to get you to yell out, but you didn't. I'm impressed!' Ken replied, 'Well, to tell you the truth, I almost said something when Edna fell out, but you know, "fifty bucks is fifty bucks!'

This next one arrived in my personal email box from my long-time friend, Mel. I love you, girl!

A biker was riding along a California beach when suddenly the sky clouded above his head and, in a booming voice, the Lord said, "Because you have TRIED to be faithful to me in all ways, I will grant you one wish."

The biker pulled over and said, "Build a bridge to Hawaii so I can ride over anytime I want."

The Lord said, "Your request is materialistic, think of the enormous challenges for that kind of undertaking. The supports required to reach the bottom of the Pacific! The concrete and steel it would take! It will nearly exhaust several natural resources. I can do it, but it is hard for me to justify your desire for worldly things. Take a little more time and think of something that would honor and glorify me."

The biker thought about it for a long time. Finally he said, "Lord, I wish that I could understand women. I want to know how they feel inside, what they are thinking when they give the silent treatment, why they cry, what they mean when they say nothing's wrong, and how I can make a woman truly happy."

The Lord replied, "You want that bridge with two lanes or four?"

# TEXAS BEST E-JETS

**September 4, 2010 Sanction# 10-91**

**Director, Ron Colier 817-680-6227**

**Hosted by www.hawkfield.org**

**E-jet Speed runs, Carrier landings,**
**E-jet Combat and Fun Fly.**
*** Ducted Fans**
*** Prop Jets**
*** Stryker jets and wings**
**All Invited (electric only)**

**Sponsors:**
**Mikes Hobbies**
**Castle Creations**
**Roy's Hobby Shop**
**Hobby Town**

**September 4, 2010**
**landing fee $15.00 includes lunch.**
**AMA license required. Food and drinks available at the field. Vendors welcome.**

# 2010 CEDAR CREEK AERO MODELERS
# AMA SANCTIONED, CLUB #4087
# ANNUAL FALL BIG BIRD FLY AND SWAP MEET

Date: Saturday Sept 11th
Time: 8:00 AM until 4:00 PM
Location: 32.1376N, 95.9696W

At Circle R Ranch, on top of Malbard Hill, 3000' Grass Runway, home of Cedar Creek Aero Modelers Club. Located South of Malakoff, Texas

Directions: At the only traffic signal on highway 31 in Malakoff, turn south and cross rail road tracks, in a short distance the road splits, take left fork (FM 2636), then go 3.3 miles to brick gate on left, (there will be a Aero Modelers sign), go 100 yards to gate on right, proceed to hangers ½ mile from gate.

Any and all flying radio controlled models, including glow, gas, and electric powered. This includes all sizes planes, helicopters, and ballplanes. Bring your own table for swap meet. Landing fee will be $20 which includes lunch, a free raffle ticket and swap meet privileges. A multitude of prizes valued at 100's of dollars will be raffled off. Additional raffle tickets can be purchased at 6 for $5.00

Please note that Gas Turbines will NOT be allowed.

Bring your friends and fellow Pilots.

## Bartholomew County RC Fliers 3rd Annual

# Cheer Fund Charity Fly-In

## Sunday, October 10, 2010 - 9:00 AM to 4:00 PM

AMA Sanctioned Event - AMA card required

Open flying most of the day. Special flying demos Noon to 1:30

All types* RC airplane and helicopters welcome (*sorry, no jets)

Great food available for purchase.

Lots of raffle prizes!

Grass 90' x 750' runway

Landing fee $10.00
(includes lunch and raffle ticket)

Bartholomew County Remote Control Fliers

For more info, contact:
Mike Bealmear
812-350-7193 - bealmearm@comcast.net
**www.bcrcfliers.org**


Location: 3 miles east of Columbus, IN
on 25th Street at the closed landfill.
GPS - 39° 13' 30.31" N, 85° 48" 04.00 W

*All proceeds to benefit the*
**Columbus Firemen's Cheer Fund**

Our 2009 Event Sponsors:
A Main Hobbies, Arnies's Restaurant, Balsa USA, Bob Smith Inc., Castle Creations, Cermark, Claas of America, Dremel, Dynamic Balsa, Family Video, Grindstone Charley's, Hobby Town USA, Leisure Rc Models, MGA Pilots, PSP Manufacturing, Radio South, RC Report, Sig Manufaturing, Windsor Propeller Co. Ziroli Plans.

# SKSS Fall Fling 2010

## Saturday and Sunday: September 18th and 19th 2010

We are back with more F3K fun, excitement and camaraderie at our incomparable, immaculately maintained and centrally located flying field, right here in northern Delaware!

Sponsored by the Silent Knights Soaring Society at our Big Pond flying site in the White Clay Creek State Park. If you haven't seen our field you will love it. Check out the interactive photo taken by our resident photographer extraordinaire John Kirchstein, at last year's ESL TD contest.

Awards for Expert, Sportsman and Novice each day, as well as ESL points toward your yearly standing. AMA sanctioned and, most importantly, lunch will be provided.

We even found a nice, cheap place for you to stay. A Super 8 Motel that's in the beautiful college town of Newark, Delaware. The rooms are either $76 or $81 a night plus tax. Here's a link to the motel and here are the directions from the SKSS field to the Super 8 Motel.

Restaurants, bars and coeds. It's just like heaven, only better.

Register with the ESL here.

Directions to the field. Right -click on the blue, L-shaped, field and select "Directions-to-here".

Questions??? Contact the CD, Eric Teder (eric.teder@verizon.net).

## NORTHEAST AERO RADIO CONTROL CLUB
## WEST MONROE, LOUISIANA
## AMA # 2461

# FALL FUN FLY WITH BIG BIRDS

## TIGER FIELD, WEST MONROE
## SATURDAY, SEPTEMBER 18, 2010

## 10 AM UNTIL 4 PM
## BIG BIRDS ONLY - FIRST 15 MIN. OF EACH HOUR
## OPEN FLYING ALL OTHER TIMES

## NO CHARGE FOR SPECTATORS
## $10.00 PILOT FEE – AMA REQUIRED

## EXHIBITIONS
### HELICOPTERS, COMBAT, 3-D

**Concessions available.** Tiger Field is on Trade Street (formerly Enterprise Road) off New Natchitoches Road in West Monroe just west of Well Road. Contact : Randy Brown rwbrown259@bellsouth.net or 376-4081 or visit our website at WeFlyRC.net

# Sat & Sun - Sept. 4 & 5, 2010

Time: 9am – 4pm  Landing Fee: $10  Must have IMAA and AMA - Raffles, Food & Beverages

## Central CT Giant Squadron

# IMAA - New England's Biggest Best Fly-In

## 7th Annual Labor Day Giant Scale Fly-In

## District I – Mini-Fest


### Directions to Wintonbury Flying Club, Bloomfield, CT.

From I-91: Take exit 36. At end of ramp go west onto Park Ave. Proceed through 4 traffic signals (3 miles). Continue until the road takes a sharp left turn; take right fork onto Wintonbury Ave. Go ¼ mi on Wintonbury Ave. Turn at first right into the Seabury Retirement Community. Please honor Seabury's 20mph speed limit on this road. The field is at the rear of the Seabury community. Turn right onto the gravel road.


Joan Liska, IMAA Event Mgr. Phone: 860-347-0257
jliska9000@sbcglobal.net

Ron Liska, CD Phone: 860-347-0257
jliska9000@sbcglobal.net

# Toys For Tots Fun Fly

## For Radio Control Model Aircraft
## Benefits U.S. Marines Toys For Tots

Date: Saturday Sept. 25th, 2010

Registration: 9 AM

Flying: 9:30 AM - 5 PM

**Information**

- No landing fee
- In order to fly, pilots must bring a ***NEW, UNWRAPPED TOY*** that will be donated to the U.S. Marines Toys for Tots program.
- Beautiful flat 1000' grass runway with open unrestricted view of flying area.
- Hotdogs and drinks will be available for purchase.
- Tell a friend, neighbor or a relative to join us in making this a great day to fill up the bins with toys!!

**Come join us for a fun day of flying to benefit a great cause!!**

**Rules and Details**

- AMA sanctioned event. AMA & Club rules apply
- Open to any size radio control model aircraft both fixed and rotary wing
- Set Fail-Safe to go to low throttle (If you have it)

BUC-LE AERO SPORTSMEN

Location: BUC-LE Jon P. Fritzges Memorial Flying Field at the corner of Rosenberger and Kumry Rds., Quakertown, PA 18951. Visit our website for detailed directions.

**Spectators Welcome!**

**For more information, please visit our website: www.buc-le.org**