the Ampeer

July The EFO Officers 2006

President:
Ken Myers
5256 Wildcat Rd.
Croswell, MI 48422
Phone: 810.679.3238

Vice-President:
Richard Utkan
240 Cabinet
Milford, MI 48381
Phone: 248.685.1705

Secretary/Treasurer:
Rick Sawicki
5089 Ledgewood Ct. W.
Commerce Twp., MI 48382
Phone: 248.685.7056

Board of Director:
David Stacer
16575 Brookland Blvd.
Northville, MI 48167
Phone: 248.924.2324

Board of Director:
Jack Lemon
8908 Sandy Ridge Dr.
White Lake, MI 48386
Phone: 248.698.4683

Ampeer Editor:
Ken Myers
5256 Wildcat Rd.
Croswell, MI 48422
Phone: 810.679.3238

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The Next Meeting:
Date: Sat. & Sun., July 8 & 9 **Time:** 9:00 a.m.
Place: Midwest RC 5 Mi. Rd. Flying Field, Northville Twp. MI

What's In This Issue:

Attention Wannabe Micro Flyers

John Worth has a brand-new INTRO TO INDOOR RC GUIDE. It is free online and can be found at this URL: http://www.cloud9rc.com/indoorflying.asp

It includes an excellent article "INDOOR RC – THE BASICS OF" by Bob Aberle. Check it out if you want to get into the "tiny" stuff.

Bob Benjamin Inducted Into the AMA Hall of Fame

I just received word that the designer of the TigerCat, TigerKitten, Miss Kitty and Baby Kitty has been inducted in the AMA Hall of Fame. Bob took up the electric flight challenge in 1988. In 1990 he began to participate in R/C scale competition against glow-powered planes. In 1998 he earned the position of 1st Alternate to the F4C team with his Astro 90 powered 1/4 scale 1941 Taylorcraft. In 1999 he became the first modeler to compete at TOP GUN using electric power. He took the Taylorcraft to TOP GUN in 2000 and placed Fifth in the Designer Scale Class. This was the first time an electric powered airplane finished "in the money" (top 5) at TOP GUN.

To learn more about this great electric flight pioneer and scale modeler, visit http://www.rcmodel.com. You can check out the plans he has available. If you love to build, and love sport planes, you can't beat his Cat/Kitten "family" of sport planes!

Congratulations Bob!

Upcoming Mid-America Electric Flies!

July 8 & 9, 2006
Midwest RC Society 5 Mile Road Flying Field
Just West of Plymouth, MI 48170
Registration open 9:00 Each Day
Flying Starts at 10:00 both days
AMA Required
CD: Ken Myers kmyersefo@aol.com
Phone: 810-679-3238
CD: Keith Shaw (734) 973-6309
Pilot's Potluck Saturday Night
Mostly Open Flying
Lots of Scale Planes!

Low Cell Detect Circuit Two

By Bob Kopski
25 W. End Dr.
Lansdale, PA 19446

This offering is an **expansion** of the June '06 *Ampeer* article entitled "Building the Low Cell Detect Circuit". That article - **for advanced hobbyists** - described a simple circuit assembly (LCDC) to be used in conjunction with Li-Po powered Electrics for the purpose of monitoring pack voltage cell-by-cell in flight. When the first cell within a pack declines to a predetermined ("detect") level, the LCDC acts to gradually retard throttle to preclude that cell (and hence the pack as a whole) from being over discharged. In effect, the LCDC is a much better LVC (low voltage cutoff) than that found in the typical ESC. Graphical representation of its operation can be found in the April '06 *Ampeer*.

Because this is an extension to the June reference, **it is important to carefully reference and review the June article before executing this version** - integrating the two offerings. This approach permit's a more compact presentation now.

The June LCDC used a "detect" level of approximately 3.1 volts / cell (V/C). However, there is growing interest in using higher V/C values. This installment describes how to modify the original circuit for optional V/C values. The available range of V/C values are shown in tabular form in the accompanying schematic diagram. All these have actually been flown. The choice is yours to make, and can be changed later as your preferences change.

The original schematic and board layout information still applies - but it's been "added to" as shown in the revised attached drawings (http://members.aol.com/dublinel/lcdc2brd1.PDF). Basically, LCDC2 differs by the addition of two resistors per section (cell) as depicted in BOLD in the accompanying layout drawing. LCDC2 can be built new from scratch or the original LCDC can be updated by simply removing 3 wire jumpers on the board, putting resistors (Ra) in their place, and adding resistors Rb (= 4.7K) as new parts in previously unused board holes.

Operation of LCDC2 is much the same as described in June. The added resistors serve to adjust the IC1 - IC3 reference voltage levels upwards to produce new, higher values of V/C. Incidentally, several readers have built and flown both the original and this version. One has even expanded this 3-cell design to both 4 and 5 cell versions.

PARTS LIST

Use the Parts List from reference article, except:

Change the 500 ohm pot to 1K ohm (Mouser 31VA301-F). Delete one 22K and one 2.2K _ watt resistors. Add one more 100 ohm resistor. Also added to the Parts List are your choice of Ra, and three 4.7K _ watt resistors.

TESTING LCDC2

As before, it is strongly advised NOT to connect your newly assembled circuit to a Li-Po "cold turkey", but rather first perform the testing below. The test setup described in June is still applicable, but the detail procedure has been simplified for version 2. **(Use ONLY the original test regimen for the original LCDC design ONLY!) DO USE the June article as general guideline**, proceed as below:

RESISTANCE CHECKS

The first tests are performed with the ohmmeter function of your DMM. For each step below, the ohmmeter is to be connected twice – i.e., do each test with normal and then reversed meter leads. (This means there are two resistance measurements for each step below.)

Use the appropriate ohmmeter range to test wires:

1 - 4	~0 ohms
3 - 6	~0
2 - 3	6.5K - 7.4K
4 - 5	4.4K - 5K
1 - 3	settles between 50 - 60K

Use highest ohmmeter range to test wires:

A - 3	open circuit
A - B	5.26 + Ra, within 5%
B - C	5.26 + Ra, within 5%
C - D	5.26 + Ra, within 5%

Any discrepancies must be resolved before proceeding.

VOLTAGE CHECKS

Be sure you understand and assemble the "Source" as described in June. Use the appropriate DC voltage range of your DMM to perform the following tests.

(1) Connect Source (+) to a 10 K resistor and the other resistor lead to wire 1. Connect Source (-) to wire 3. First note the actual 18V Source voltage and then measure the voltage from wire 3 to wire 1. This voltage is to be 28% +/- 3% of the Source value.

Perform ALL following tests expeditiously because the current demand on the 18-volt battery is fairly high. (Read through it all first so you know "where you're going"!)

(2) Connect the Source (+) lead to a 100 Ohm resistor and the other resistor lead to wire D. Connect Source (-) to wire A. Measure the voltage across the 100 Ohm resistor - it should be between 1.7 and 2 volts. The actual value will be influenced some by your choice of Ra and the condition of your 18 volt battery under this load.

Any discrepancies must be resolved before proceeding, but if all is OK, immediately proceed to ----

SIMULATED PERFORMANCE TESTS

The "signal" test procedure for LCDC2 is the same as described in June (except the pot is changed). Of course, the "detect" voltage levels now should be the values you chose with resistor Ra. Don't forget the temporary test clip lead jumper from wire 3 to wire A (some did!)

As before, the pot adjustment will be very "touchy" and the detect voltage range for full servo movement is quite narrow. Some readers who built the original LCDC elected to use a multi-turn trimmer pot to make this easier to do.

In measuring the "detect" voltage value, note that the measured value may vary slightly depending on the test signal pulse width (servo position). If you watch closely enough, you will find the V/C to be slightly (10's of mV) higher at full throttle compared with low throttle stick position. This is normal. Just confirm that the V/C from cell to cell positions are nominally your chosen value and nominally the same for a given servo position. (I like to use mid-range servo throw.) Disconnect the Source.

ACTUAL PERFORMANCE TESTS

If all above is OK, then be sure to read and follow the June text as you proceed to deploy your LCDC2 - including the "final test" part. Please write if you have any questions. Some earlier readers have done this, are now successfully flying LCDCs, and their Li-Po batteries are MUCH happier - they say!

In this regard, I am grateful for their willing spirit to get an "early start". They proved-out both the original LCDC design and the LCDC2 version. This means you have more than just my (biased but truthful) word to go on!

Final hints. Be sure to disconnect the balance connectors (as you do the power connectors) from the Li-Po at end-of-flight. LCDC and LCDC2 work best for programmable throttle ranges between 1.1 mSec and 1.9 mSec. (Non-programmable Tx's normally fall within this range.) The tabulated V/C values are "nominal" and perfectly adequate - I have "the whole range" in use in my own planes. Be advised that ESC's differ somewhat in how they react to LCDC influence. Most I have are very smooth reacting. I have one that tends to "wobble" slightly (barely audible) when under final LCDC control. This may be more noticeable in gear drive systems.

Also note that - unlike some approaches to cell by cell monitoring - the LCDC WILL NOT suddenly stop your motor - you have plenty of warning because RPM will smoothly, gradually decline below flyable levels but in any case YOU always remain in control! I've always experienced plenty of "go-round" opportunity for safe landing.

In closing - know that I will not let you fail provided you give me the chance to help with any LCDC "issues" you may experience.

Have fun - that's what the hobby is for!

Bob

CAP 232 ARTF Review

Mike Southwood (UK)
michael.southwood@ntlworld.com

I've attached a review for my latest electric, A CAP 232.

One of my model club pals is importing a group of models from China. Not something I approve of, especially as the quality of build and covering is so good. But it does give me something to do building up the prototypes and flying some of them. Most of my builds have gone to professional flyers to be flown at shows this year, but I am given one model as payment for my work. This time I chose the CAP 232.

Other models, all about the same size and quality, are a Spitfire, Extra 300, and a Mustang. All have built up well and quickly. I have put a lot of extra time and effort to make my CAP something special. I did discover, the hard way, that despite being designed and cut to use all Tower Pro 5 gram servos, they are neither powerful enough nor accurate, making flying a problem. The show models all have Tower Pro 9-gram servos. They are the same price but twice the torque.

Mike Southwood
UK.

Wing Span: 920mm - 36.6"
Length: 850mm - 35"
Wing Area: 19dm^2 – 294.5 sq.in.

A small company called RCM Direct has started to import (*Into England. KM*) high quality ARTF models from China. I have had the pleasure of assembling three of these in the last few weeks. They are the, Spitfire, Extra 300 and the subject of the review, the CAP 232.

These are small, lightweight electric models, made from laser cut ply and balsa. They are covered in an iron on film, possibly Pro Film. The Cap 232 is fully trimmed and comes in two versions. One is a 3D model with transparent wing covering. It does not have spats supplied and is therefore slightly lighter than the blue and white version shown here. The choice of equipment is yours. For this review model, I used the following components, all supplied by RCM Direct.

Servos:

Four servos are required. I tried both Tower Pro 5g (SG50) and SuperTec NARO. Almost the same size and dropped straight in to the provided holes. Either extension leads and a "Y" lead are required, or spare wire and heat shrink. (*See notes about these servos in this review. KM)*

Motor:

The TowerPro 2409-12T 1570Kv Outrunner Brushless Motor had the shaft pressed through to allow rear mounting directly on the motor support box.

Motor Specifications:
Weight: 68g / 2.4oz
Io: 1.2A (10v)
Working current: 7A – 20A (efficiency higher than 75%)
Prop: APC 8x4.5
11,100RPM @ 10V, 20A. Thrust 805gram.

ESC:
Tower Pro 30/40A ESC. 30 amp constant, 40 amp burst.
BEC: 2amps. Li-Poly 3 cells. Optional brake. Weight 21 grams

Battery:
RCM Direct 1600 Li-Po.

Radio:
E – sky 6 channel – 35Mhz Receiver for UK.
Weight 12 grams, standard crystal.

THE MODEL comes in a good-sized box with the separate wing panels, fuselage and tail parts bagged. The cowl is a superb lightweight GRP moulding. Other parts such as fittings, wheels, nuts and bolts etc are bagged and taped securely. All components are of good quality. Some people might not like the turret fittings for one end of each control rod, but they do work.

All of the covering is completed and is of a quality I could not match.

ASSEMBLING: The instructions are very poor. They consist mostly of photographs, but do not make it clear that two servos are required for the wing. You need to have had some experience to build this one and the others from this supplier to realize that. The manual shows one central servo and torque rods, but

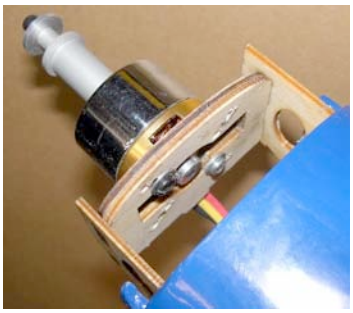
the wing has holes for two servos and pull strings to get the servo wires through.

The wing is easy. A ply joiner, laser cut, fits perfectly in the tube built in to each wing panel. I sanded off the laser burn and the root rib, just to give the adhesive a key. Although the instructions specify epoxy, I used (and always use) waterproof PVA woodworking adhesive. Normally I fit the servos before joining, but this time I did not. I did cut the covering away from servo holes and wire holes. For my entire cutting out of the covering over openings, I used a small soldering iron. I find this makes a neat job and seals the covering around the hole. With a well-coated joiner and glue on the root ribs, the two panels slid together, a perfect match. A small clamp on the front wing peg and an elastic band around the rear pulled the two halves together and held them until the glue had set overnight, resulting in a perfectly straight and true wing. Any excess glue, after the joining, can be removed with water, unlike Epoxy!

The aileron servos dropped straight in. The wires were extended and pulled through using the cord, which was taped in the wing. I could have used servo extensions, but chose to solder and heat shrink my own extension, which then became a "Y" lead. It saved a little weight and will not pull out!

Unfortunately the kit was missing one horn set, and my scrap box had nothing small enough to match. I did have plenty of servo arms; so I cut two down and epoxied them into the ailerons. They look better than bolted through horns.

FUSELAGE: Again I used my little solder iron to cut out the servo holes and the fin and elevator slots.



The motor mounting comes as laser cut plywood pieces or a square stick. The manual does not explain anything about this. If I used a motor with a gearbox and stick mount, it would be easy to use this and throw away the ply pieces. My motor is a rear mount type outrunner. It was best to assemble and glue the plywood mounting box. Nothing tells you which pieces to use or how to assemble them, but by trail and error it was achieved. One point to watch is that there is built in side thrust, so if you assemble the wrong parts on the side, you point left not right. The final result was very good and the cowl fit perfectly over the motor with just the right gap to the back of the spinner.

Servos are fitted at the tail and again fitted the holes perfectly. I was slightly worried that the little Supertec Naro servos might not have enough power, but to use the 9-gram type would require opening up the holes and would add 8 grams extra weight in the tail. Wires again were extended. The fin and stabiliser were positioned. They fitted the machined slots perfectly and were glued with super glue (Cyno).

The elevator joiner wire is best put in with the stabiliser. It can be inserted if you forget, but it may damage the slot.

The elevator and rudder are fitted with furry plastic hinges, which went in perfectly and were secured with superglue (Cyno). Even the joiner holes were pre drilled. Don't forget to fit the skid to the rudder before gluing the hinges!

The supplied canopy is trimmed and painted, but is clear. Although it is nice looking through it at the superb laser cut formers etc, I decided that it would look better if it were painted black. I just sprayed the inside with black car paint. An undercarriage is supplied with lovely spats, but this was left off as I fly from grass and it would not last long.

RADIO: The lightweight e-sky 6-channel receiver was fixed on a 1/16" hard balsa sheet with back-to-back tape glued across the fuselage. All connections to the motor, ESC and battery were soldered and heat shrunk to 3mm gold plated tubular connectors. I followed my normal pattern by fitting the male connectors upstream so that the fully covered battery connectors could not short out, or the output from the ESC. A battery tray is provided, as is Velcro fastener tape. I glued the tray in the front of the fuselage with PVA. Then primed the tray surface with UHU as there is no large flat surface, it being cut out with lightening holes.

FINAL ASSEMBLY: The holes are pre-drilled in the wing and were exactly positioned to enter the pre-fitted captive nuts. The fit of the wing was excellent. All that remained was to position the battery pack and set the balance by moving the pack.

FLYING:

With everything ready, my friend gave the model a hand launch and away she went. She was extremely

fast and very twitchy. The climb on full power was almost vertical without me trying. With some full down trim she was better, but still twitchy and easy to over control. The ailerons were not working properly and soon gave up completely, resulting in my having to dump the plane in long grass. Fortunately, with the motor off and good elevator control, the landing did no damage.

Testing and examination of the ailerons showed that, as I had suspected, the little 5-gram Tower Pro servos were not enough for the job. They were never smooth or good at centering and after this first flight they had stripped their gears.

New, powerful, servos were fitted before the next flight. I had to cut out the servo holes to fit a pair of larger Ripmax Micro Servo's, but with care this went well and the new servos were in. They provide much smoother control and plenty of power for the large ailerons.

The need for full down trim possibly meant that the plane was slightly tail heavy, but apart from increasing the throw a little I decided to try again. It would be impossible to move the battery any further forward.

For the next flight, I used a computer transmitter and set the rates to 50% with 35% exponential. This time control was good and I had no problems flying for about 10 minutes.

The final weight, with a 1600mAh Li-Poly from HiModels, is 728 grams (25.7 oz.). The change to larger wing servos has added about 20 grams, but it was necessary.

The lesson learned has been not to use indoor flyer servos for fairly large control surfaces. Possibly if I had used a pair of SuperTec Naro servos they would have been good enough, but I opted for safety at the expense of weight.

CONCLUSION: This is a superbly designed and manufactured 36.6" span CAP 232 ARTF. It is certainly not a beginner's model, as it requires quite a few minor changes and some careful work to enlarge servo holes to get 9-gram versions in. The finished model looks superb, both on the ground and in the air. The chosen motor gives about 850 grams thrust as used with a 3 cell 1600mAh Li-Poly, so we have more than 1 to 1 against the 728 grams of weight.

The building took quite a few days of spare time. Much of the time was spent soldering up all the wires to extend them, cutting out the servo mounting holes, adding reinforcement where the cowl screws go in, spraying the canopy and other "Gilding of the Lilly"!

News from "Up North"

From John Zook johnzook@voyager.net

Greetings Ken and all those at the club.

Things are moving slowly up here, but progressing nonetheless. There is more interest in electric flying in our club than last year, so I take it as a good sign. It may be that the only way we can enjoy our hobby is with E.P. the way urban crunch is moving further out every day. It's even happening up here in my area as the property adjoining our club field is up on the sales block.

Two of our club members have decided to try their hand at Electric Helicopters. Jim Maine purchased a used but very nicely done Lite machines Corona and an E-Flight Blade CX . The other member Jake Lemanski, who is around 12 or so has, been flying his CX for a while now and is quite proficient with it.

Yours truly is being sorely tempted to give it a try, but I've got so many pots on the stove now.

At Toledo I picked up an Aerocat from Model Aero and just finished that as well as getting my Seniorita ready and trying to get the time to paint the cowl for my Bowers' Fly Baby.

The Fly Baby is from a kit designed and cut by Dick Watz at Aerodrome Models. Remember them?

I bought the plane as the airframe was finished but needed some TLC to bring it back to life. I covered it with Ultracote and have it powered by a Jeti 30-3. I plan to use a 3 or 4S Li-poly. I'll have pictures when it is finished.

Meanwhile I have sent a picture or two of the Seniorita.

The final image is of Jim Maine with his plans built Race E. A very nice little plane and Jim did a great job building and covering it. The decals were made by his wife jean using commercial decal material.

Correction to June LCDC Article

The original versions (PDF & HTML) of the June 2006 *Ampeer* contained an error in a part number. Both June 2006 versions now available online have been replaced with the part number corrected.
Originally said - 610-2N3904 or equiv2N3906 PNP
Corrected to - 610-2N3906 or equiv 2N3906 PNP

Bob and I apologize for any problems this may have caused.

NEAT Fair Pilot Pre-Registration Opens
From: neatfair@optonline.net

Well ladies and gentlemen; it's that time again.

The NEAT Fair website (www.neatfair.org) is available for pilot pre-registration. This year the form is electronic, but you must send your check or MO in by snail mail. Vendors should have already gotten their invite by email. If you have not, please drop a note to: neatfair@optonline.net.

The Friday night dinner/social plans are not resolved as of this date, and may not be for some time. Please do not let this delay your signing up as a pilot as it is very possible the check for the dinner may go to a different place anyway. We will make an announcement here and on the NEAT new page as soon as plans are finalized.

Due to some logistical problems with some of our members, we are asking for pilots or spectators to donate a bit of their time to help run the show. We always get a great volunteer group to help set-up and break down, but this year we may be a bit short during the day, especially on Friday and Saturday. Tasks will include, Impound, TX registration and flight line duties.

If you would like to donate some of your time, please fill out the electronic form at: http://www.neatfair.org/worker.html.

Thanks.... and can't wait to see you all again!

Tom Hunt
Bob Aberle
2006 NEAT fair event Directors

Astro Brushless 19 Direct Drive Motor p/n 819-9T Review
By Ken Myers

Description:

Bob Boucher sent an Astro Brushless 19 Direct Drive Motor (www.astroflight.com), here after referred to as the AF 19 Direct, for me to review after a couple of articles of secondhand experience appeared in recent *Ampeers*.

Bob describes this motor as “very small” and “designed to fly 3 – 4 lb models direct drive without a gear box.” He states the weight as 4.2 oz., which it very well could be, but I found that the motor with leads and a three pin Zero Loss connector weighed 128.9g/4.55 oz. and the original prop adapter: 4.65g/0.16 oz. for a total of 133.55g/ 4.71 oz. The new, improved prop adapter with a step to fit the APC “E” series perfectly weighs 5.3g/0.19 oz. for a new total of 138.85g/4.73 oz.

Other **Astro Flight specifications** from the sheet accompanying the motor:
Diameter: 1.35 in., **Length:** 1.25 in.
Winding: 9 turns, **RPM/volt:** 1375
Resistance: 90 milliohms, **No load current:** 450 ma
Rotor Magnets: samarium cobalt
Bearings: Ball Bearings
Max Nicads: 12 cells, **Max Lithium:** 4 cells
Maximum Amps: 25, **Maximum Power:** 300 watts

Flight Testing

Since it is all about how the motor flies a model airplane, I'll start with the flight-testing.

The test flights were all done with the motor in the SR Batteries Cutie that was later converted to the AcroPro. (www.srbatteries.com) The first Cutie flight took place on a warm and windy day. The weather service reported 14 mph winds gusting to 20 mph. The ambient temperature during the testing period was between 21.1C/70F in the morning and 25.6C/78F in the afternoon.

The first flight was made using an Aeronaut 8.5x5 Glass Electro prop. The average results, using the Skyshark RC 3S1P 2100mAh Li-Po (skysharkrc.com) were 10.445 volts, 17.55 amps, 11,122.5 RPM, and 183.3 watts in. The plane was flown for 9 minutes and then the temperatures were checked. The motor was 22.8C/73F at the front of the motor near the shaft.

After recharging the pack with the Astro Flight 109 charger it showed that 1.973AH were returned to the pack. All of that AH was not flight time. I had used the pack the previous day for a few minutes when trying to get a motor mount that would work with this setup.

A balanced APC 8x6E was used for the second and third flight. The second flight was approximately 10 minutes long. The motor temperature after the flight was 27.1C/80.9F.

The third flight lasted 12 minutes and was taken mid-afternoon with the wind still blowing very hard. The motor temperature was 24.4C/75.9F. The charger returned 0.823AH to the battery.

The next day I decided that I wanted to try the APC 10x7E. I did a static test of the 10x7E with the following average results for five data captures; 9.96 volts, 28.2 amps, 8334 RPM, 281 watts in.

On the fourth flight, I decided it was time for the crash test. Forgetting that I was flying in so much wind the day before, I only ran the power up to just past the halfway point of the throttle stick and gave it a gentle toss. Before I could get my hand back to the elevator stick the Cutie nosed in at about a 50-degree angle, breaking the new mount loose. Knowing that I was going to crash, I had put on the APC 10x7E so as to get even more leverage against the shaft.

I carefully inspected and measured the shaft. Hey, this is one tough piece of steal! It appeared that it didn't bend in the slightest. **Crash tested tough!**

The motor mount was epoxied back into position.

Two hours later the fourth flight on the plane/motor combination was completed. The flight lasted 10 minutes. The motor temperature after the flight was 23.6C/74.5F and the ambient temperature was 17.7C/63.9F. After the flight the AF 109 returned 1.153AH to the battery.

On the second flight of the day I flew the SR Cutie as if it were an SR Batteries AcroPro, as I hadn't yet done the conversion. I kept the speed up, did a lot of looping, several vertical climbs as high as I could hold it or see it, a lot of "almost" stall turns, many rolls, and a lot of loops. The flight time was 11 minutes. The motor temperature after the flight was 42.5C/108.5F and the ambient temperature was 17.7C/63.9F. After the flight the AF 109 returned 1.918AH to the battery

On the third flight I also flew it like it was an AcroPro and even more aggressively than the second flight. The flight lasted 10 minutes. The motor temperature after the flight was 42C/107.6F, and the ambient temperature was 23.6C/74.5F. After the flight the AF 109 charger returned 1.907AH to the Skyshark 2100mAH 3S1P battery.

I now have 16 flights on the motor, mostly with the APC 8x6E. It is a remarkable motor, especially nice in the AcroPro version of this plane!

As expected, the APC 9x6E fell between the 8x6E and 10x7E as far is powering the Cutie/AcroPro through the air.

The way overpowered Cutie was a curiosity at the Keith Shaw Birthday Fly-in in Coldwater the first weekend in June. I launched it and flew it around like a stock Cutie for a while, and then I lit the afterburner on the AF 19 Direct by shoving the throttle to the stop. The motor took the then 28-ounce plane, with lots of dihedral, as vertical as I could hold it for as long as I could see it well enough to orient on it. After landing everyone wanted to know, "What have you got in that?!?"

The SR Batteries AcroPro conversion with the AF 19 Direct in it has become one of my very favorite planes to fly. It can be flown in a somewhat confined area, but it still handles the wind very well.

How was my Cutie/AcroPro changed?

The original Cutie with my modified power system of Magnetic Mayhem, Aeronaut 8.5x5 Electro prop, Jeti JES 350 35-amp controller and 6-cell RC2000 weighed 37.6 oz. Power input was approximately 168 watts in. It was a very good flier.

With the new power system of the AF 19 Direct, APC 8x6E, CC Phoenix-45 controller, and Skyshark 3S1P 2100mAh Li-Po the weight dropped to 28.32 oz. (33.5 oz. as the AcroPro with two servos and a SR 500mAh NiMH Rx pack added) with about 230 input watts. It is overpowered, but a ball to fly. This setup is awesome in the SR Batteries AcroPro!

The Motor Testing Details.

Procedure notes: I removed the prop adapter and did a drill press test. Then I ground a flat onto motor shaft for the prop shaft adapter set screw. I weighed the motor, including the leads and Zero Loss connector on a triple beam balance scale in grams. I weighed the prop adapter. Next "blue" thread lock was placed on prop adapter set screw and the adapter placed back onto shaft and the setscrew tightened. A Castle Creations Phoenix-45 ESC was used for the testing with the default settings. All of the props used for testing were balanced. I did three sets of tests in one day. I always tested from highest draw prop to lowest on same battery charge. I then recharged the battery and repeated the procedure two more times, allowing everything to cool down between the tests. The results were recorded and then entered into a spreadsheet.

Test Series: Date: May 22, 2006
Elevation: Croswell, MI 736 ft./224.3m
Generator Test: Mathematical Kv = 1321
Ambient Temperature: 12.6C/54.7F to 13.2C/55.8F
Barometric Pressure: 1021.7mb steady
Dew Point: 4C, Humidity 78%

No Load test 1: Battery: 7-cell Panasonic 2000mAh
Average Volts: 9.646 Amps: 0.82 RPM 13206
Average Volts: 9.54 Amps: 0.82 RPM 13056
Average Volts: 9.66 Amps: 0.65* RPM 12937.5

No Load test 2: Battery: 6-cell Sanyo RC 2000
Average Volts: 8.056 Amps: 0.66 RPM 10830
Average Volts: 7.956 Amps: 0.58 RPM 10674
Average Volts: 7.898 Amps: 0.52 RPM 10620

All of the loaded tests used the same 10-cell Sanyo RC1700 NiCad battery. Three test series runs were made with five data point captures per run.

Load 1 test: Prop: Mfg. Description APC 10x7E
Weight: 19.8g Hub thickness: 20.3mm

Average Volts	Amps	RPM	Watts in
10.124	29.18	8244	295.54
10.492	31.20	8568	327.65
10.248	29.32	8268	300.85

Load 2 test: Prop: Mfg. Description APC 9x6E
Weight: 16.0g Hub thickness: 20.3mm (most likely the "old" version of this prop)

Average Volts	Amps	RPM	Watts in
10.404	24.86	9564	258.75
10.548	25.18	9606	265.63
10.434	24.50	9498	255.67

Load 3 test: Prop: Mfg. Description APC 8x6E
Weight: 12.2g Hub thickness: 8.8mm

Average Volts	Amps	RPM	Watts in
10.464	22.00	10128	230.26
10.626	22.66	10236	240.85
10.456	21.92	10128	229.28

Load 4 test: Prop: Mfg. Description Rev-Up 8x4
Weight: unmeasured Hub thickness: unmeasured

Average Volts	Amps	RPM	Watts in
11.048	15.28	12582	168.84
11.160	15.46	12672	172.57
10.948	14.78	12468	161.85

Conclusion:

While this motor has similar specifications to some of the current crop of Asian outrunners, the AF 19 Direct has samarium cobalt magnets that are much less susceptible to heat damage than the neodym magnets used in the outrunners. It is well built and definitely worth considering over any of the outrunners in its class, and it is priced competitively.

Addendum:

Astro Flight/Bob Boucher has now changed the AF 19 Direct data on his Web site to reflect real world data. The heading over the prop data now reads "Measured Performance on X Volts" with the X Volts being 7.0, 10.5 and 14 to reflect performance with 2, 3 and 4 Li-Po cells in series. Check it out and notice how closely his data for the 8x6E on a 3s matches mine.

Upcoming Events

July

8 - 9 Mid-America Electric Flies, Midwest RC Society Flying Field on 5 Mile Rd. west of Ridge Rd., just west of Plymouth, MI CD's Keith Shaw & Ken Myers

August

12-13 Electric Fun Fly Hosted by the Cedar Rapids Skyhawks of Cedar Rapids, Iowa. flying site located at 3125 "C" Ave. extension NE, Cedar Rapids, Iowa.
For driving instructions, please see the field map at:
216.15.238.56/skyhawks/funfly/fieldMap.html
Pilot's Fee $5.00 each day, with good catered food at the field. Proof of AMA Membership is required for pilots. Pilots briefing 9:00 a.m., Contact Event Chair Kerry Lawrence at 319-390-3570, or email at kerrylawrence@mcleodusa.net
Complete info can be found at:
www.foxcoins.com/skyhawks/funfly/index2006.html

13 Pontiac Miniature Aircraft Club Electrics over White Lake Electric Fly-in, info at pmac.us

26, Saturday BATTLE CREEK BALSA BEES 3RD ANNUAL OPEN ELECTRIC FLY, Contact Event Chair at 269-979-9272, or email at NSCALENUTS@AOL.COM, The BALSA BEES flying site is located SOUTH OF I-94 EXIT 100 (Beadle Lake Road) approx. 5 1/2 miles to D Drive South, then WEST approx. 3/4 mile. Follow Beadle Lake Road past Beadle Lake, Harper Creek High School, Binder Park Zoo. WATCH FOR THE SIGNS!!! Cell phone help will be 269-275-9272.

September

9 & 10 E-FLI-OWA, Flying commences at 08:30 AM both days, Ends at 7:00 PM on Sat. - 4:00 P.M. on Sunday. AMA Required, This will be a fun-fly only. NO competitive events. Buy, sell or trade is welcome. For more information contact: Jon "Wrong Way" McVay, 319-895-6527 or Togflier@AOL.com or visit: rc-dymond.com/efliowa

17 Radio Control Club of Detroit Electric Fly-In, into at rccd.org

The Ampeer/Ken Myers
5256 Wildcat
Croswell, MI 48422
http://members.aol.com/kmyersefo

The Next Flying Meeting:
Date: Sat. & Sun, July 8 & 9 **Time:** 9:00 a.m.
Place: Midwest RC Society 5 Mile Rd. Flying Field
Just west of Plymouth, MI between Ridge & Napier