the Ampeer

July | The EFO Officers | 2012

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The Next Meeting:
Sat. & Sun., July 7 & 8, Mid-Am - info in this issue

What's In This Issue:

Can the Data From the Castle Creations' Phoenix ICE 50 (8S) Be Used to Collect Inputs for Drive Calculator (http://www.drivecalc.de)?

By Ken Myers

Forward

I received my Castle Creations' Phoenix Ice 50 (8S) in August 2011. It is currently used in a "club trainer" plane and mated with an O.S. Motor OMA-3025-750 outrunner and 4S "A123" 2300mAh battery pack.

When I first received it, I did not use the onboard logging capability of the Ice 50 to record the data to enter into Drive Calculator, a computer power system modeling program. I used my Emeter II to collect the data. I was in a "hurry" to get the "club trainer" flying and knew the procedure for data collecting for input into Drive Calculator using the Emeter II.

This was not my first experience with a data logging electronic speed control (ESC). I reported on the Jeti Spin 44 and optional Jeti Spin Box in November of 2006. (http://www.rcgroups.com/forums/showpost.php?p=6472770&postcount=8) I was "underwhelmed" with its performance because it appeared to lack the accuracy I was desiring for data input into Drive Calculator.

Equipment Used for the Comparative Testing

Radio Shack 22-168A Multimeter (no longer available)
Hobbico Digital Mini-Tach (http://www3.towerhobbies.com/cgi-bin/wti0001p?&I=LXPT32&P=ML)
Emeter II (2) & Remote Data Unit (RDU) (http://www.allerc.com/hyperion-emeter-version-2-and-rdu-set-p-4323.html)
Castle Creations' Phoenix ICE 50 (8S) (http://www.castlecreations.com/products/phoenix_ice.html)

Ice 50 Set-up

Throttle:
Vehicle Type: Airplane
Throttle Type: Auto-Calibrate Endpoints
Throttle Response: Medium (5)

Brake:
Brake Strength: 0% Disabled
Cutoff:
Cutoff Voltage: 9.0v
Voltage Cutoff Type: Soft Cutoff
Current Limiting: Normal (70A)
Current Cutoff Type: Soft Cutoff
Motor:
Motor Start Power: Low (39)
Motor Timing: Low (0)
Direction Forward
PWM Rate: Outrunner Mode
Other:
Power-On Beep Enabled
Link Live Enable: Disabled
BEC Voltage: 5.0V
Logging:
Yes – Battery Voltage
Yes, on some tests – Battery Ripple
Yes – Battery Current
Yes, on some tests – Controller Temperature
Yes – Controller Input Throttle
Yes – Controller Motor Power Output
Yes – Motor RPM
Sample Frequency: 2 Sample/sec
Ice 50 Software V4.01 (Beta)
Castle Link Graph Viewer V3.51.05

Motor used during testing: O.S. Motor OMA-3825-750 outrunner
Batteries used during testing: 3S "A123" 2300mah, 4S "A123" 2300mAh, 12-volt Marine/RV deep cycle

Procedures:
1.) The Emeter II data log, a type of csv (comma-seperated values) file, and the Ice 50 data.csv file were opened in a spreadsheet for viewing and comparing.
2.) The Multimeter data, and later tachometer data, were recorded on paper during the various test runs.
3.) The hook-up order for the voltage readings were the battery, Emeter II RDU, Multimeter set to volts, Ice 50.
4.) The amperage readings hook-up order was the battery, Multimeter set to amps, Emeter II RDU, Ice 50.
5.) 30-amp Anderson Power Pole (APP) connectors were used on all test instruments, except when taking voltage readings with the Multimeter. For the multimeter voltage readings, pins were inserted into the positive and negative wires and the multimeter clips attached to the pins.

Day 1

If anything could go wrong, it did on this day. I hadn't thought through a good plan for testing, and it was somewhat random with very scattered results.

Note: All of the data on spreadsheets is available upon request. Email me at kmyersefo@theampeer.org.

Test 1 A resting voltage test showed that the voltage displayed on the Multimeter and Emeter II were very close, while the Ice 50 voltage was substantially lower. Two battery packs were used on Day 1. The first two measurements were taken using a 3S "A123" 2300mAh battery pack and the third test used a 4S "A123" battery pack.
Slide the pointer onto the gauge assembly and use a small wheel collar to keep it in place.

Test 2 was a no load motor run voltage test. Once again the Ice 50 recorded less voltage than the other two instruments.

Test 3 was a no load amperage test, and the results were quite surprising. The Multimeter and Emeter II showed approximately the same amp draw while the Ice 50 showed almost all readings at 0.0 amps in the .csv file.

Test 4, a voltage test, captured no relevant data.

Test 4a was a light load (Graupner 8x6 Nylon prop) amperage test. The data showed quite a difference in the amp draw between the Ice 50 and the other two meters.

Note: I was learning the methodology to use to get comparison numbers, so a lot of the values in this series are quite questionable.

Test 4b was the first RPM capture. It alerted me to the fact that the Emeter II RPM, read by the phase tachometer through the RDU, and Ice 50 could be somewhat close.

Conclusions from Day 1 Testing

I needed a better procedure to capture relevant data. The Multimeter and Emeter II tracked quite closely and both were different from the logged data of the Ice 50. Averaging the data was a very poor idea for comparison purposes. Deleting some of the data files was very foolish!

Day 2

A procedure was created to follow during the testing. A procedure sheet was used to record the Multimeter and Tachometer readings.

Only the 4S “A123” 2300mAh pack was used for testing on Day 2. The actual numbers recorded are on my spreadsheets.

Log 1 showed that the idle voltage was once again very similar on the Multimeter and Emeter II and lower in the Ice 50 data file. The no load voltage data showed the same trend; Emeter II and Multimeter similar, Ice 50 lower.

Log 2, the no load amp draw log, confirmed that the Multimeter and Emeter II were tracking together and that the Ice 50 data file was almost all zeros, except for an occasional few digits here and there with no discernible pattern.

Log 3, the light load amp test, showed the Multimeter and Emeter II reading about the same while the Ice 50 recorded a lower amp draw.

Log 4, a light load test, showed a surprise. The Multimeter was used to read volts during this test. Again the Multimeter and Emeter II supplied similar voltage readings with the Ice 50 capturing a lower voltage. The amperage, which was recorded only by the Emeter II and Ice 50 showed the Emeter II capturing a higher amp draw than the Ice 50. With the Multimeter removed from the system, both the Emeter II and Ice 50 captured higher amps than in Log 3 with the Multimeter, set to amps, inline. This indicated a high resistance in the Multimeter when used as an ammeter. Once again the RPMs tracked very closely on the Tachometer, Emeter II data and Ice 50 data.

Log 5 was a heavier load test using an APC 12x6E prop. The Multimeter was used to read the voltage and the Tachometer to read RPM along with the data captured by the Emeter II and Ice 50. Not surprisingly, the Emeter II and Multimeter showed approximately the same voltage and Ice 50 a lower voltage. The Ice 50 captured a higher amperage number than the Emeter II capture. This was the opposite of the low load test. Once again, the RPMs and Watts In (Pin) were about the only consistent values.

Note: By the conclusion of the testing, I found that as the load lightened, the Ice 50's amp capture would drop to equal or below the Emeter II capture. Also, as the load increased, the Ice 50's amp capture would exceed the Emeter II capture.

Day 3 April 23, 2012

After looking over the first two series of tests, it was apparent that the Multimeter and Tachometer results were close to the Emeter II logged data. From what I called **Logs 3** and **4** on **Day 2** of the testing, it was also apparent that the Multimeter had a very large resistance when used as an ammeter.

For the next set of tests the Multimeter and tachometer were not used, as they appeared to yield very much the same readings as the Emeter II.

A 12v Marine/RV Deep cycle was used to provide a power supply that didn't drop in voltage as quickly as the “A123” packs. In practice, this didn't seem to be the case with the 12v battery being used for the testing.

A new prop, the APC 13x8E, was added to the testing for a bit heavier load.

Two sets of data were collected. The first set used the 12v Marine/RV deep cycle battery connected to the RDU of the Emeter II and then the Ice 50 and the second set of data was collected with the battery connected to the Ice 50 without the Emeter II RDU.

The data from all three tests were saved to a spreadsheet, which is available upon request. The extraneous data from the beginning and end of the logged files was deleted to simplify the data viewing.

Test 1 – no load (maximum recorded values presented here – all values shown on the spreadsheet)
Emeter II: 12.68v, 1.4 amps, 10,097 RPM
Ice 50 in line with Emeter II: 12.52v, 0.4 amps, 10,023 RPM
Ice 50 to battery: 12.81v, 0.4 amps, 10,163 RPM

The Ice 50 in line with Emeter II showed exactly the same voltage and amp draw through the whole data log; 12.52v and 0.4 amps. The RPM values did drop as expected, even while the voltage was recorded as 12.52 throughout the test. The amp draw remaining the same was not expected, as it is typical for both the voltage and amperage to drop during the test run of the motor, as it did for the Emeter II.

With the Ice 50 hooked directly to the battery the data showed only one voltage drop from 12.81v to 12.67v where it remained for the remainder of the data capture. The amps remained the same at 0.4, but the RPM dropped through the run as expected.

Dropping RPM is an indication of dropping voltage; 10,198 RPM at beginning to 10,127 RPM at the end. A voltage drop of 0.088v should have shown up as 12.58v at the end of the run.

The Emeter II RPM went from 10,097 to 10,062 for a voltage drop of 0.043v; 12.68v beginning of run minus 0.043v equals 12.637v, which is where the Emeter II data was at the end of the run.

Test 2 (APC 13x8E prop)(maximum recorded values presented here)
Emeter II: 10.75v, 30.5 amps, 7148 RPM, (volts * amps) 327.875 <u>watts in</u>
Ice 50 in line with Emeter II: 10.58v, 31.3 amps, 7097 RPM, 331.154 <u>watts in</u>
Ice 50 to battery: 10.88v, 32.1 amps, 7237 RPM, 349.248 <u>watts in</u>

With just a small RPM difference (about 1%), the watts **out** are similar, when the Emeter II was inline with the Ice 50, and therefore so must be the <u>watts in</u>. A prop requires a certain amount of power to turn at a given RPM.

For illustration purposes, the Drive Calculator derived estimates are used here.
Drive Calculator Predictions for the O.S. OMA-3825-750 motor (http://www.theampeer.org/OMA-3825-750/OMA-3825-750.htm), at approximately the same RPM, in bold, recorded data in italics:
Emeter II: 10.6 Vin, 29.6 amps, 7072 RPM, 250.7 Pout, 314.0 Pin
Emeter II: 10.6 Vin, 30.0 amps, 7080 RPM, NA Pout, 318.0 Pin

Ice 50: 10.28 Vin, 28.2 amps, 6896 RPM, 232.3 Pout, 289.9 Pin
Ice 50 w/Emeter II: 10.73v, 31.3 amps, 7079 RPM, NA Pout, 321.8 Pin

The captured data was identical for the data capture of the Ice 50 with and without the Emeter II in line.

The Drive Calculator estimates are similar to the Emeter II logged data, but a bit different from the Ice 50 data. This was to be expected as the Emeter II was used to capture the data for Drive Calculator input.

The 318 <u>watts in</u> of the Emeter II at 10.6v and 322 <u>watts in</u> of the Ice 50 at 10.28v, a 1.2% difference, are close even though the volts in (Vin) have a 3.1% difference.

Test 3 (APC 12x6E prop)(maximum recorded values presented here)
Emeter II: 11.06v, 23.5 amps, 7714 RPM, 259.91 <u>watts in</u>
Ice 50 in line with Emeter II: 10.73v, 23.9 amps, 7675 RPM, 256.447 <u>watts in</u>
Ice 50 to battery: 10.88v, 24.3 amps, 7757 RPM, 264.384 <u>watts in</u>

With only a small RPM difference, the watts **out** are quite similar and therefore the <u>watts in</u> should also be similar.

Drive Calculator Predictions, at approximately the same RPM, in bold, recorded data in italics:
Emeter II: 11.01Vin, 23.4 amps, 7674 RPM, 212.7 Pout, 258.1 Pin
Emeter II: 11.01 Vin, 23.3 amps, 7680 RPM, NA Pout, 256.533 Pin
Ice 50 w/Emeter II inline: 10.73 Vin, 22.4 amps, 7509 RPM, 198.5 Pout, 240.4 Pin

Ice 50 w/Emeter II: 10.73v, 23.9 amps, 7675 RPM, NA Pout, 256.447 Pin

Ice 50: 10.88 Vin, 23.0 amps, 7598 RPM, 206.0 Pout, 249.7 Pin
Ice 50 to battery: 10.88v, 24.3 amps, 7675 RPM, NA Pout, 264.384 Pin

Once again, the Drive Calculator estimates are similar to the Emeter II logged data but vary from the Ice 50 data.

Test 4 (Graupner 8x6 Nylon prop)(maximum recorded values presented here)
Emeter II: 12.07v, 9.5 amps, 9188 RPM, 114.665 watts in
Ice 50 in line with Emeter II: 11.92v, 9.9 amps, 9086 RPM, 118.008 watts in
Ice 50 to battery: 12.07v, 9.1 amps, 9172 RPM, 109.837 watts in

Again, with only a small RPM difference, the watts **out** are quite similar and therefore the watts in should also be similar.

Drive Calculator Predictions, at approximately the same RPM, in bold, recorded data in italics:
Emeter II: 11.97 Vin, 9.2 amps, 9132 RPM, 90.5 Pout, 110.3 Pin
Emeter II: 11.97 Vin, 9.3 amps, 9120 RPM, NA Pout, 111.3 Pin

Ice 50: 11.92 Vin, 9.2 amps, 9096 RPM, 89.5 Pout, 109.2 Pin
Ice 50: 10.73v, 9.1 amps, 9115 RPM, NA Pout, 108.5 Pin

Again, the captured data was identical for the data capture of the Ice 50 with and without the Emeter II in line.

Using the Ice 50 identical data of 11.92 Vin, Drive Calculator estimates 9.2 amps, 9096 RPM, 89.5 watts **out** of and 109.2 watts in.

At this lower amp draw, the data from the Emeter II and Ice 50 are the closest of all of the tests.

Conclusions

The Ice 50, when hooked directly to the battery, as expected, did record a higher voltage and amp draw than when the Emeter II was in line, but still not as high of a voltage as the Emeter II, except for the lower power test.

Day 4

The O.S. OMA-3825-750 outrunner was completely and carefully retested including the drill press Kv test. The results appear on the spreadsheet on the tab named 3825-750 retest. The drill press test resulted in an 805Kv.

Several days were spent trying to come up with a mathematical proof as to which data, the logged Ice 50 or Emeter II was the “most” correct. The data was very similar.

Example from Spreadsheet tab 3825-750 with the APC 12x8E prop:
Average Ice 50: 11.11 Vin, 32.2 Iin, 7529 RPM, 357.288 Pin
Average Emeter II: 11.38 Vin, 31.2 Iin, 7588 RPM, 355.003 Pin

Except for being unable to measure the Io (no load values) the Ice 50 data is close enough to the Emeter II readings to call its results acceptable for providing data that can be used to keep the power system from being overloaded, if the Ice 50 is used for the reference.

As the load gets lighter, the general trend is for the Ice 50 logged amps to drop compared to the Emeter II. As the load gets heavier, the trend is for the Ice 50 logged amps to increase compared to the Emeter II.

Example from Spreadsheet tab 3825-750 with the Graupner 8x6 Nylon prop (lightest load tested):
Average Ice 50: 11.47 Vin, 26.8 Iin, 7947 RPM, 307.396 Pin
Average Emeter II: 11.64 Vin, 25.9 Iin, 8029 RPM, 301.835 Pin

Example from Spreadsheet tab 3825-750 with the APC 13x8E prop (heaviest load tested):
Average Ice 50: 10.92 Vin, 33.4 Iin, 7316 RPM, 365.499 Pin
Average Emeter II: 11.18 Vin, 32.4 Iin, 7386 RPM, 362.101 Pin

The RDU of the Emeter II is a resistance, therefore there is a voltage drop (power loss) through it. The lower voltage logged by the Ice 50 was no surprise. The increased amperage reading was a surprise, as the amp draw should have decreased as well, due to the power loss through the RDU unit. With the added resistance of the RDU of the Emeter II the Ice data should have been lower than the data captured by the Emeter II. The power in (Pin) was always higher for the Ice 50 data.

The second test on **Day 3** was completed without the Emeter II. The Ice 50 trend continued when compared to the Emeter II; lower voltage on the Ice 50 and higher amp draw.

Example from Spreadsheet tab 12v-test with the APC 13x8E prop (no Emeter RDU inline):
Average Ice 50: 10.36 Vin, 30.7 Iin, 7032 RPM, 318.825 Pin
Average Emeter II: 10.56 Vin, 29.8 Iin, 7042 RPM, 314.456 Pin

Final test, April 29, 2012

I did another test on April 29 that confirmed the Multimeter and Emeter voltage continued to track together while the recorded voltage data of the Ice 50 was lower throughout the test.

Multimeter: resting before test 12.85 volts, end of motor run 10.26 volts, resting after testing 12.45 volts
Emeter II: resting before test 12.85 volts, end of motor run 10.25 volts, resting after testing 12.44 volts
Ice 50: resting before test 12.67 volts, end of motor run 10.28 volts, resting after testing 12.37 volts

With the test equipment on-hand, there is no way to determine which, if either, of the devices is correct.

The Ice 50 cannot be used to capture data for Drive Calculator. It does not capture no load motor testing data. The voltage it captures does not appear to be the input voltage required by Drive Calculator.

The Ice 50 does capture the amps, Pin and RPM for decent comparative tests to help in the selection of a prop that does not 'overload' the power system.

A Few Thoughts By Others On the Accuracy of the Ice Data Logging

There have been a few comments by others on the Internet about the accuracy of the Ice data logging.

March 2010, http://www.rcgroups.com/forums/showpost.php?p=14629573&postcount=6328

Thomas Porfert, Castle Creations, "I recommend using the data logging for comparative purposes, and not as exact values. You can get an idea about general trends and see how the controller reacts to different setups (IE prop size, timing advance etc.). Having a watt meter in line while bench testing to verify numbers is not a bad idea. Future software updates may improve accuracy, but please count on some variances."

May 28, 2010, battery use mAh measuring in question, http://www.rcgroups.com/forums/showthread.php?t=1251859

April 2011, screen shot comparing the Ice Graph Screen to another logging unit's screen: http://www.rcgroups.com/forums/showpost.php?p=17961922&postcount=1

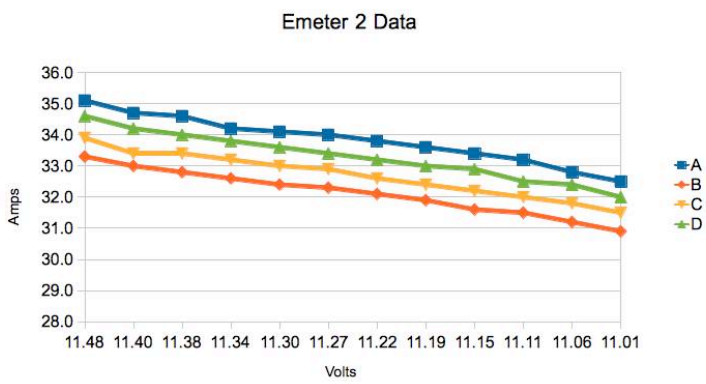
November 2011, Is Castle craetions data logging accurate? http://www.rcgroups.com/forums/showthread.php?t=1542846

Final Thoughts

I will continue to use the Emeter II for capturing data for input into Drive Calculator.

The Ice data logging capabilities are good enough for a modeler with no other means of measuring amps, to see that the power system is within safe operating limits and to get an approximate RPM.

A Propeller Quiz
By Ken Myers



The graph above shows the amp draw data for two APC 13x6.5E thin electric props and two APC 13x8E thin electric props as recorded by an Emeter 2 at similar voltages. The props are labeled A, B, C, and D for the quiz. Use the lines below to indicate which prop you believe is represented by each line in the graph. Remember there are two of each prop.

A: _________________ B: _________________
C. _________________ D: _________________

The graph on page 10 shows the correct answers.

Why the Quiz?

During testing for input data for Drive Calculator (http://www.drivecalc.de) for the O.S. Motors OMA 3825-750 outrunner, and while collecting data for the previous article comparing the data capture of an Ice 50 to the Emeter II, an anomaly arose. The APC 13x6.5E appeared to draw more amps and turn at a lower RPM than the APC 13x8E.

There is **NOT** a lot of pitch difference between a 6.5" pitch and an 8" pitch. While the watts in (Pin) and watts **out** (Pout) should be somewhat close, the expected result was that the 13x8E would yield slightly higher Pin and Pout and slightly lower RPM on the same motor, ESC and battery as the 13x6.5E.

The exact opposite proved to be TRUE!

The data was double and triple checked under the same testing conditions and appeared to be true and very consistent.

The props' geometry were checked. At first, a Prather Prop Pitch gauge was used to check the pitch of each prop. Unfortunately, the gauge does not work very well with the under cambered APC E props. No consistent results could be achieved using the gauge.

During the first phase of the testing, only the props named APC 13x6.5E and APC 13x8E were compared and measured. When no logical explanation could be found, two more props were introduced into the testing and measuring. They were named APC 13x6.5E2 and APC 13x8E2.

A somewhat accurate way was devised to measure the pitch of all four props that involved some accurate measuring and a bit of trigonometry.

The Test Props Physical Characteristics

All four props say "APC C-2" on the hubs and all four hubs have a diameter of 0.8 in./20.32mm.
13x6.5E wt. 26.25g, hub thickness 0.37 in./ 9.398mm, measured pitch 6.6"
13x6.5E2 wt. 24.9g, hub thickness 0.34 in./ 8.636mm, measured pitch 6.4"
13x8E wt. 33.65g, hub thickness 0.48 in./ 12.192mm, measured pitch 7.5"
13x8E2 wt. 33.3g, hub thickness 0.47 in./ 11.938mm, measured pitch 7.5"
Note: the hub thickness for the 13x8E props was triple checked. There is a 0.01" difference.

Test Instruments and Procedures

Data was captured by the Castle Creations Ice 50 amp ESC and the Emeter II (2). The data was logged onto a spreadsheet.
http://www.theampeer.org/ampjul12/ampjul12.htm/13-inch-compare-6-5-to-8.xls

All testing was completed in the basement with the temperature at about 60-deg F/15.5-deg C for all tests.

The same motor, O.S. 3825-750, ESC, CC Ice 50, and battery, 4S "A123" 2300mAh, were used for all of the data gathering.

Before each data capture, the motor was run for 30 seconds to warm it up using a 3S "A123" 2300mAh pack.

Four sets of data were captured during the testing for each prop. The motor was run for 30 seconds, timed, and then the battery rested for 30 seconds. The motor was run again for 30 seconds with another 30 second rest period until 4 sets of data were captured from the same battery charge.

The data from the Ice 50 was “cleaned up” for use with a spreadsheet by eliminating leading symbols in the captured numbers. Nonessential data was eliminated and then the data sorted by volts. All four captures are combined into one set of data by voltage. No single capture session was over 30 seconds long.

The essential data, as well as the prop geometry calculations are found on the spreadsheet.

While it took over a month to actually devise a usable plan and measure the props, the final testing was completed within a few days of each other.

I could find no explanation as to why the prop named 13x6.5E had the highest amp draw of all four props. The one labeled 13x6.5E2 performed as expected, with an amp draw lower than either of the 13x8E props.

There is very little difference in the amount of power ‘absorbed’ by each of the four propellers statically. The amp draw difference between the two 13x6.5E props is about 5.5%, while it is only about a 1.7% difference between the two 13x8E props.

The average pitch speeds for the voltage range shown in the graph and measured pitches would be;
13x6.5E @ 7339 RPM 45.9 mph
13x6.5E2 @ 7387 RPM 44.8 mph
13x8E @ 7396 RPM 52.5 mph
13x8E2 @ 7368 RPM 52.3 mph

Which prop would fly a given plane the best? It all depends on the plane’s mission.

The Take Away

1. ALWAYS USE A POWER METER. A particular prop may give surprising results.
2. Don’t expect props used in a calculation program to provide exactly the amp draw stated in the calculation.
3. Props in the same ‘line’, from the same manufacturer, will vary. Props vary more than might be expected.

A Final Note

The spreadsheet shows some very interesting information about the data captures of the Ice 50 ESC. It clearly shows that the data captured does not drop as expected and that there appears to be some kind of program in the ESC’s computer that provides for the appearance of only certain ‘numbers’ in the data. Scrolling through the Ice 50 data for these props demonstrates this phenomena.

For example, using the 13x6.5E prop Ice 50 data shows 11.18v through 21 samples with the amps dropping from a high of 37 to a low of 33.8. The next voltage sampled is 11.03v with nothing between the 11.18v and 11.03v. The pattern shows up at all voltage levels through all of the props.

The Keith Shaw Birthday Electric Fly-in

The Coldwater, MI Balsa Butchers’ annual Keith Shaw Birthday Electric Fly-in was held on an extremely windy June 2 & 3.

The high winds did not dampen the spirits or keep many of the fliers from flying. Many planes filed the air on Saturday morning and early afternoon, but the 30 mph+ winds grounded most folks after about 1:30.

Sunday morning was a bit better, but still pretty breezy.

With the flying challenges and friends sharing the good times, it was an excellent event**!**

Mid-America Electric Flies 2012
At the 7 Mile Road MRCS Field
5th Year at This MRCS Location!
AMA Sanctioned
Saturday, July 7 & Sunday, July 8, 2012
Hosted by the:
Ann Arbor Falcons and **Electric Flyers Only**
Flying Site Provided by the:
Midwest R/C Society

Contest Directors are:
Ken Myers phone (248) 669-8124 or

kmyersefo@theampeer.org
http://www.theampeer.org for updates & info
Keith Shaw (734) 973-6309

Flying both days at the Midwest R/C Society Flying Field - 7 Mile Rd., Salem Twp., MI
Registration: 9 A.M. both days
Flying from 10 A.M. to 5 P.M. Sat. & 10 A.M. to 3 P.M. Sunday

Pilot Entry Fee $15 a day or $25 both days
Parking Donation Requested from Spectators

Saturday's Awards
Best Scale
Most Beautiful
Best Ducted Fan
Best Sport Plane
CD's Choice
Sunday's Awards
Best Scale
Most Beautiful
Best Mini-Electric
Best Multi-motor
CD's Choice

Planes Must Fly To Be Considered for Any Award
Saturday's & Sunday's Awards:
Plaques for 1st in each category

Open Flying Possible on Friday

Night Flying Possible, Weather Permitting, Friday & Saturday Nights
Refreshments available at the field both days.

Potluck picnic at the field on Saturday evening.

Come and join us for two days of fun and relaxed electric flying.

Come, Look, Listen, Learn - Fly Electric - Fly the Future!

Merchandise drawing for ALL entrants

To locate the Midwest R/C Society 7 Mile Rd. flying field, site of the 2012 Mid -America Electric Flies, look near top left corner of the map, where the star marks the spot, near Seven Mile Road and Currie Rd.

The field entrance is on the north side of Seven Mile Road about 1.6 Miles west of Currie Rd.
Address: 7419 Seven Mile Road, Salem Twp, MI 48167 - numbers are on the fence.

Two Hotels Added to the Hotel's List

Because of their convenient location and the easy drive to the flying field, the Comfort Suites and Holiday Inn Express in Wixom, MI have been added to the hotels' listing. They are only 10 miles northwest of the field and located near I-96 and Wixom Road. See the map-hotel .pdf for more details.
http://www.theampeer.org/map-hotels.pdf

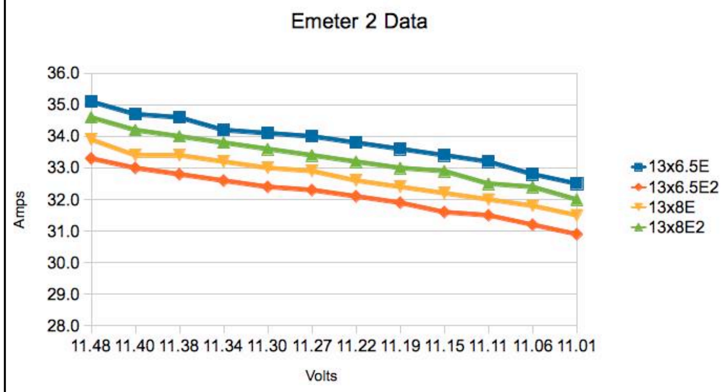
Upcoming E-vents

July 8 & 9 Mid-America Electric Flies, Midwest RC Society flying field, 7 Mile Rd., Salem Township, MI. Keith Shaw and Ken Myers CDs. Email Ken for info

July 21 & 22 Detroit Aero Modelers (DAM) Upcoming 2012 Electric Fun Fly, 9 a.m. to 4 p.m., Alex Jefferson Field in River Rouge Park, At the corner of Joy Road and Spinoza, NO LANDING FEE! Just come out and have fun!, Contest Director: Arden McConnell, phone 313-274-3185 http://www.detroitaeromodelers.com/

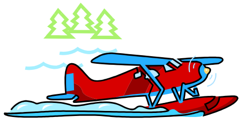
Aug. 18 Saturday, Pontiac Miniature Aircraft Club (PMAC) electric fly-in PMAC Flying Field, 9480 White Lake Rd. White Lake, MI 48386, Web site: http://www.pmac.us/.

Aug. 25 Saturday, Capital Area Radio Drone Squadron (C.A.R.D.S.) (Lansing area) RC Electric Fly-in, C.D. Marv Thompson, Location and Pre-registration at http:// www.cardsrc.com/2012/electric/



What's this graph About?

See the article "A Propeller Quiz" on page 7



The Ampeer/Ken Myers
1911 Bradshaw Ct.
Commerce Twp., MI 48390
http://www.theampeer.org

The Next Monthly Meeting:
Date: Saturday & Sunday, July 7 & 8, 2012 **Time:** 9 a.m.
Place: MRCS 7 Mile Rd. Flying Field - Mid-Am