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January	The EFO Officers	2019
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No Mailed Ampeer Subscriptions	The Next EFO Flying Meeting: Wed., Jan. 9, 7:30 p.m., Ken Myers' house (see address above)	

**What's In This Issue:**  
 More On the Introduction Glider - More On Setting Up Control Throws - Indoor Flying 2019 - Pack Test and Comparative IR Using IR Three Meters - Fall Restoration Project, PT-3, and Other News - A Thanks and GREAT Contribution to the AMA Museum - A Question Regarding Flight Timing - Problems Setting Up an Electric Glider With a Retracting Power Pod - Upcoming Events

**More On the Introduction Glider**  
 From Plenny Bates Via Email

Plenny told us about his new glider in the December 2018 issue.

<http://theampeer.org/ampeer/ampdec18/ampdec18.htm>

He sent along another email to share where he purchased it.

\*\*\*\*\*

The Place is Hoellein in Germany. The URL is

[https://www.hoelleinshop.com/Planes-Helicopters-Quadcopters/Planes/Electric-gliders/Hoellein/INSIDE-F5J-low-priced-starter-model-for-F5J-2866mm.htm?shop=hoellein\\_e&SessionId=&a=article&ProdNr=GRU2016&t=49301&c=12327&p=12327](https://www.hoelleinshop.com/Planes-Helicopters-Quadcopters/Planes/Electric-gliders/Hoellein/INSIDE-F5J-low-priced-starter-model-for-F5J-2866mm.htm?shop=hoellein_e&SessionId=&a=article&ProdNr=GRU2016&t=49301&c=12327&p=12327)

The prices are with VAT and that will come off. We chose air shipping. As I remember, the cost was about US \$57, but that was for one, to I guess, any number of kits. We ordered 7 kits and paid only \$57 for all.

We also bought some other things. Most bought the recommended Hacker motor, spinner, prop, middle part etc. I was going to use Dymond D60 servos but had Hyperion so used plastic geared ones for

rudder and elevator and metal gears for flaps.

I got the Introduction so as to have no ailerons. If you get the Inside you have 4 ailerons.

We did only a very few changes in construction. If wanted I can elaborate on what we changed.

If you are adding more than a few grams, you have not made an improvement. I think I may have added 5 grams. With the other changes (from the plans and instructions) I am sure that I took more than that out.

If you have anyone interested have them email me. I have a few suggestions that they may want to act on before they buy.

Plenny  
 plennyjb@gmail.com

**More On Setting Up Control Throws**

From Andy Kunz Via RC Groups

<https://www.rcgroups.com/forums/showpost.php?p=40385805&postcount=136>  
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Hi Ken,

I finally got around to reading the September issue, and would like to answer your question about the holes in servo arms and control horns.

<http://theampeer.org/ampeer/ampsep18/ampsep18.htm#ARMS>

Rather than looking at the linear change, I suggest you consider the rotation in degrees and ratios.

A servo will typically rotate 60° for normal 100% travel (1100us to 1900us pulse range), or 90° for 150% rotation (900us to 2100us). As you have shown, the holes in the output arm are often spaced the same for opposing arms, and about halfway between them for the alternate arms. This is not always the case, so one should take care to measure each side so he knows.

A control horn for a surface similarly has multiple holes spaced about the same as they are on the servo side. The difference with a control horn is that the pivot point can be typically anywhere from the base of the control horn to the far side of the surface (or beyond, for flaps and special things like gear doors).

For simplicity I will assume that you will pick a value ranging from 0 to let's say 1/4" (typical surface thickness) and that there is no geometric differential (the holes in the control horn lie on the perpendicular to the hinge point of rotation, and the output arm of the servo is likewise perpendicular to the line of travel at center). For the sake of argument, I'll use 0 (meaning that the hinge is probably tape or covering and the control horn is on the same side).

With that foundation understood, let's pick some numbers.

I have a servo with holes centered at 8.5mm ("A") and 11.0mm ("B") on one arm, 8.0mm ("C") and 10.5mm ("D") on the opposing arm, and at 8mm ("E") and 11mm ("F") on the other two arms (this is a standard JR arm).

My control horn has holes at 7.25mm ("a"), 10.35mm ("b"), 13.60mm ("c"), and 16.75mm ("d") (it's a DuBro #107).

Now it's a simple matter to do the math to find the possible ratiometric options available to me with these two lever arms. Mixing and matching the

letter combinations, we get A/a, A/b, A/c, A/d, B/a, B/b, B/c, B/d, and so on through F/d. Some of those combinations will be >1 (meaning you get more angular deflection than the servo) and some less (less surface rotation than servo rotation). The attached spreadsheet includes all that data for these two items.

		Control Horn			
		a	b	c	d
Servo		7.25	10.35	13.6	16.75
A	8.50	1.1724	0.8213	0.6250	0.5075
B	11.00	1.5172	1.0628	0.8088	0.6567
C	8.00	1.1034	0.7729	0.5882	0.4776
D	10.50	1.4483	1.0145	0.7721	0.6269
E	8.00	1.1034	0.7729	0.5882	0.4776
F	11.00	1.5172	1.0628	0.8088	0.6567

Since you know the rotation of the servo in degrees, and the rotation of the control surface (easy to calculate if you know the chord of the surface and the deflection in linear units), you can likewise do that math to find the ratio. Then you just look up the ratio in your table to find the pair that will give you the value most closely.

At this point it's a good idea to inject some basic setup information:

1. For servo life (spreading the wear across more surface area) it is best to maximize your servo travel to access all the range (150%).
2. For best repeatability it is recommended to have the connection as close to the servo center point as possible, and as far out on the surface horn as possible. This will minimize the effects of poor servo centering and control linkage play.
3. For use with the table, that means you in general want to select entries greater than 1. You may need a longer control horn on your surface. They're cheap - splurge!

Where this really comes in handy is with a carb, and that's probably why it wasn't so obvious to you as a long-time electric-only user. Carbs don't have many holes to pick from, and they have a pretty good amount of rotation, but fortunately most are not that critical about small differences. And you really want to be able to get the full range of travel to have both full power and engine kill.

Andy

## 2019 Indoor Flying Season, Southeast Michigan

**Tuesdays, October 30 through April 16, 10 a.m. - 1 p.m.**

The Best Indoor Flying Venue in Metro-Detroit

### Ultimate Soccer Arenas

867 South Blvd.

Pontiac, MI 48341

Single Flying Session - \$10

Any 5 Session Punch Card - \$40

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All pilots MUST have proof of AMA Membership

**Note:** If you are not an Academy of Model Aeronautics member, a special 3 month trial AMA membership is available.

<https://www.modelaircraft.org/membership/enroll>

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**Wednesdays, November 7 through April 24, 12:30 p.m. - 2:30 p.m.**

Legacy Center

9299 Goble Drive

Brighton, MI 48116

**Drop in Flying Session - \$10**

**Spectators Welcomed and free**

There may be exceptions or changes around the holidays.

**Keep up to date by checking our website.**

**Hamburg Flyers Radio Control Club**

<http://hamburgflyers.org/forum/>

## Pack Test and Comparative IR Using Three IR Meters

By Ken Myers

## What's Up With All the Talk About a Battery's Internal Resistance (IR)?

In his Electric column, in the December 2018 issue of Model Aviation, Greg Gimlick started his discussion of several ways to obtain a battery's calculated internal resistance. Part 2 will be in his column in the February 2019 issue.

I also have discussed a battery's internal resistance, and how to measure it, in the September 2017 and October 2017 issues of the *Ampeer*.

<http://theampeer.org/ampeer/ampsep17/ampsep17.htm#IR>

<http://theampeer.org/ampeer/ampoct17/ampoct17.htm#IR>

If you need more background, these articles should be helpful;

Lithium Polymer Battery Technology: An Introduction by Frank Siegart

<http://theampeer.org/lipo-intro/lipo-intro.html>

And

Learning About LiPo Batteries by Ken Myers

<http://theampeer.org/Learning-LiPo/Learning-LiPo.html>

But why bother? What does this number suggest? Who cares?

The internal resistance of the cells, resistance of their interconnects, resistance of the battery lead wire and connectors, as well the resistance of the wire lead length to the electronic speed control (ESC) determines the input voltage at the ESC. The final 'output' voltage, the RPM of the motor, is determined by the resistance losses in the ESC and motor, and the final 'output voltage times the motor's  $K_v$  determines the RPM.

The chosen prop determines the load seen by the circuit and measured in amps.

As previously noted, the whole battery pack's IR is not just the sum of just the individual cells' internal resistances, but the total of the resistances up to the point where the input voltage is being measured, which is usually between the battery and ESC.

Therefore, the battery's IR, plus the wire and connectors resistance will be greater than the sum of the individual cell's IR, but the sum of the individual cell's IR will indicate what voltage drop can be expected as a given amp draw.

### Example:

A device is used to determine the individual cell's resistances. The device could be a charger,

one of the commercially available IR meters or a DIY IR meter. The voltage drop, under load, can be measured using some type of power meter, once the load is applied. The power meter displays the loaded current, in amps, at that loaded voltage.

To keep the math as simple as possible, the numbers reflect only easily rounded values, not real world values.

The resting voltage of the battery pack is 4.2V per cell and 3 cells are connected in series. The resultant voltage is  $4.2V * 3$  or 12.6V.

If there were no losses, the 12.6V would 'enter' the ESC.

The sum of the three cell individual measurements, for this example, is 24mOhm or 0.024Ohms.

If the power meter noted the load as 10A, the voltage drop through just the three cells would be  $0.024\text{Ohms} * 10A = 0.24V$

Using those numbers, the input voltage at the ESC would be  $12.6V - 0.24V = 12.36V$ .

The actual voltage shown by the power meter would be lower than 12.36V because of the rest of the resistances.

And then

At a measured 20 Amp draw the voltage drop through the three cells would be  $0.48V = 12.6V - 0.48V = 12.12V$ .

At a 30 Amp draw voltage drop through the three cells would be  $0.72V = 12.6V - 0.72V = 11.88V$ .

If an actual reading, using a power meter, was made on that pack and it showed 12V and 10 amps under load, then;  $(12.6V - 12.0V) / 10A = 0.6V / 10A = 0.06 \text{ Ohms}$ .

0.060 Ohms is much, much higher than 0.024 Ohms.

Something is out of whack here.

### **Investigating Why the Numbers Were Not Closer**

0.060 Ohms is 2.5 times higher than 0.024 Ohms. There are a myriad number of reasons the actual power meter numbers were so different from the predicted numbers based on the ohmic value.

1.) The cell interconnects, battery wires and connectors could have a much higher resistance than might be expected. That is not too likely, but could be possible.

2.) The amp draw test was conducted a much lower temperature than when the individual cells were tested.

3.) The power meter and device to read the ohmic values are not calibrated closely together.

4.) The device used to make the ohmic test yielded inaccurate results.

For the sake of simplicity, we'll assume that points 1 - 3 are not true, because the load test was conducted at about the same ambient temperature as when the ohmic test was done, the pack was sized and has lead sizes appropriate for the load and the meters used have been calibrated to each other.

A second device that yields ohmic values for cells could be used to 'retest' the pack.

If the second device, used under the same conditions as the first's measurements, yielded a total IR for the three cells of 50mOhm or 0.05 Ohms. That value is a little over two times higher than the first.

The math:

$$0.05 \text{ Ohms} * 10 \text{ amps} = 0.5V$$

$$12.6V - 0.5V = 12.1V$$

The example's power meter's reading was 12V at 10 amps. There is only a 0.1V difference in what was predicted for the voltage and what was measured.

It is obvious which device, or method, yielded the closer to real world results.

### **My Testing - Real World Values**

I obtained three different total cell ohmic values, using the same battery tested under as close to identical conditions as possible, using three different devices to gather the values.

To begin the real world testing, I reviewed the use of the meters by gathering the cell IRs using the three different devices. The pack was just up from the basement, where it was resting in its LiPo Sack. The basement temperature was ~15 deg. C or 59.2 deg. F. The resting pack's voltage from basement was 11.25V using a Fluke multi-meter to read the pack voltage.

The Pack (known good): Dinogy Graphene 3S 1000mAh 70C

Pack arrived: 09/16/16

Tested upon arrival and flown in foam board planes;  
Ugly Stik, Old Fogey & Simple Cub  
43 Cycles  
Stored at 3.77V per cell

The following data was gathered:  
Revolectrix 'Honesty Meter': 68.5 mOhm  
Giles Lipo ESR Meter: 74.1 mOhm  
Vollrath DIY meter: 86.6 mOhm

Please keep in mind that these values are for a very cold LiPo pack.

The pack was charged on a Revolectrix GT500 charger to 3.95V per cell and set by my plasma TV. My plasma keeps the ambient temperature around it at a fairly constant value.

The pack was charged to only 3.95V per cell because ohmic value readings near 'full - 4.2V' and near 'empty' get a little 'whacky'. Yes, that is a scientific term.

Before the ohmic values could be tested, the pack had to have time to stabilize its voltage. The following shows how long it took to stabilize.

30 minutes by Plasma TV  
Measured each cells voltage from most negative to most positive  
Fluke: 3.937V, 3.935V, 3.935V

+15 minutes by Plasma TV  
Fluke: 3.936V, 3.934V, 3.934V

+15 minutes by Plasma TV  
Fluke: 3.935V, 3.933V, 3.933V

+15 minutes by Plasma TV  
Fluke: 3.935V, 3.933V, 3.933V

It took 1 hour and 15 minutes to stabilize. That is probably much longer than most of you would realize that it takes.

The voltage and ohmic values for each cell were obtained.

Revolectrix 'Honesty Meter' - 21.5 deg. C or 70.7 deg. F  
Pack Volts: 11.773V  
3.931V - 13.39mOhm, 3.928V - 13.66mOhm,  
3.927V - 13.66mOhm

Total Resistance of Cells: 40.71mOhm (added individual cell resistances, not what was shown on the meter.)

The pack had to be stabilized again.

+15 minutes by Plasma TV  
3.933V, 3.931V, 3.931V

+15 minutes by Plasma TV  
3.933V, 3.931V, 3.931V

It took 30 minutes to stabilize.

Next the voltage and ohmic values for each cell were obtained using the Giles meter.

Giles 21.2 deg. C or 70.2 deg. F  
Pack Volts 11.80  
3.94V - 14.68mOhm, 3.94V - 14.88mOhm, 3.94V - 14.80mOhm

Total Resistance of Cells: 44.36mOhm (added individual cell resistances, not what was shown on the meter.)

The results seemed quite similar to the 'Honesty Meter' with the Giles meter being only 1.09 times higher than 'Honesty Meter'.

The pack was once again allowed to stabilize by the plasma TV.

+15 minutes by Plasma TV  
3.931V, 3.929V, 3.930V

+15 minutes by Plasma TV  
3.931V, 3.929V, 3.930V

It took 30 minutes to stabilize.

Finally the voltage and ohmic values for each cell were obtained using the Vollrath DIY meter.

Vollrath 20.6 deg. C or 69.1 deg. F  
Pack Volts: 11.78V  
3.931V - 19.45mOhm, 3.929V - 19.81mOhm,  
3.929V - 19.99mOhm

Total Resistance of Cells: 59.25mOhm (added individual cell resistances, not what was shown on the meter.)

### **The predicted voltage drop at 10 amps:**

Revolectrix - 0.407V  
Giles —0.444V  
Vollrath - 0.593V

It would be hard to tell difference between the Revolotrix and Giles meters.

+15 minutes by Plasma TV  
3.928V, 3.926V, 3.926V

+15 minutes by Plasma TV  
3.928V, 3.926V, 3.926V

It took 30 minutes to stabilize.

### **Motor Test Using an Emeter II at 21.9 deg. C or 71.4 deg. F:**

The motor data was captured using 8 captures per second.

The data was transferred to an Excel Spreadsheet named compare-tests.xls.

I almost made a bad mistake but caught it. I almost forgot to let the pack stabilize before taking the final resting voltage reading. That is a very important number!

After the first 30 minutes I took the battery voltage readings.

3.914V, 3.911V, 3.910V

+15 minutes by Plasma TV  
3.914V, 3.911V, 3.911V

+15 minutes by Plasma TV  
3.914V, 3.911V, 3.911V

It took approximately 60 minutes to stabilize.

The motor was on for 6.5 seconds.

The highest values recorded were at 1.5 seconds into the motor run and were 11.26V and 9 amps.

At throttle shutdown, the readings were 11.11V and 8.8 amps.

The last reading is the MOST important reading, as the battery has completed 'running down' its voltage.

The resting battery voltage at the beginning of the test was 11.77V.

After stabilizing, after the test, the resting battery voltage was 11.73V at 21.2 deg. C or 70.2 deg. F.

The no load voltage drop, because of the battery "running down" is  $11.77V - 11.73V = 0.04V$ .

The Predicted Voltage Drop at 8.8 amps based on the Sum of the Cells Resistances:  
Voltage Drop Using each IR cell total.

Measured 8.8 amps at end of motor test

Revolotrix 'Honesty Meter':  $40.71m\Omega * 8.8A = 0.358248V$

Giles ESR meter:  $44.36m\Omega * 8.8A = 0.390368V$

Vollrath DIY Meter:  $59.25m\Omega * 8.8V = 0.5214V$

Actual measured voltage drop under 8.8A load:  
 $11.73$  (end voltage) -  $11.11$  (voltage under 8.8A load) =  $0.62V$

It is easy to see which device gave a closer prediction in this instance.

It is also easy to understand how using a reasonably accurate ohmic value can help in determining what will happen in the real world.

Remember the cells', and therefore the battery's, resistance is not a 'pure' resistance. The resistance changes with the temperature of the cells. It is really a moving target, yet it can still be a useful predictor of battery performance, as well as the relative health of the cells.



### **Fall Restoration Project, PT-3, and Other News** From Keith Shaw Via Email

I just finished restoring my ANCIENT Consolidated PT-3. I had it at the 1985 KRC as there is a photo of me launching it (see the photo top, left next page), but it was already old at that time. I built it in November 1971 as a rubber model from the R/N kit that I won in a drawing. It is a 36" span model of an early US military biplane trainer. It has 360 sq.in. of wing area and weighed 6.5 oz. without the rubber motor. I had many wonderfully reliable flights on it before I ever moved to Ann Arbor.





Flight Line at the Sixth Annual KRC Flight Line, mid day, September 21, 1985.

Keith Shaw at KRC with (L to R) Coulombia, PT-3, Spitfire, Banshee II, and Comet.

This month we'll cover the Sixth Annual Keystone R/C Electric Fly held in Pennsylvania in September 1985, and discuss the potential of putting a camera in your electric powered model to take ground photographs. However, I want to correct a misprint in the last edition of Silent Power regarding

Guillermo Villa Novos power factor.

**Power Factor Revisited**

In the October 1985 issue of RCM I discussed the Power Factor Equation derived by Guillermo Villa Novos of Mexico City, Mexico. As it turns out the weight (W) and the wing loading (W<sub>L</sub>) variables were transposed in the equation that accompanied the text. The correct equation is as follows:

$$\text{Power Factor} = \frac{Z \times P \left( \frac{R}{1000} \right)^2}{A \times W \sqrt{\frac{W_L}{L_w}}}$$

I have received a lot of calls and letters about this goof up and I hope that this will straighten it out.

**KRC Electric Fly**

I made the long drive from my home in Ohio to participate in my third KRC Electric Fly in the last four years. I got in late Friday evening and was up at the crack of dawn for the short drive to the KRC flying field located behind SPS Technologies Plant in Hatfield, Pennsylvania. Once we got to the field it was evident that this was going to be

a great Fly In. The weatherman cooperated and provided calm winds and temperatures in the low 70s. Both days were overcast but there was a tremendous amount of thermal activity which made for nice electric powered sailplane flying. As in the past, the sky was filled with all kinds of electric models and a number of hawks (full scale) sent by the thermal god to point out the boomers.

There were over 60 fliers who flew and displayed about 125 electric powered models of every size and shape imaginable. They came to Hatfield from 28 states or provinces of Canada including visitors from California, Texas, and Florida. All had a great time due to the efforts of the KRC club under the direction of John Hickey, their president. It is estimated that nearly 300 visitors and guests visited this event during the two days of flying.

In attendance were John Worth, the A.M.A. Executive Director, Eva Bible, a District III Associate Vice President, Joe Utasi of Jomar, Les Adams of Adams Electronics, Ted Davy of Davy Systems, and Dwight Holley of Holley's Silent Flight.

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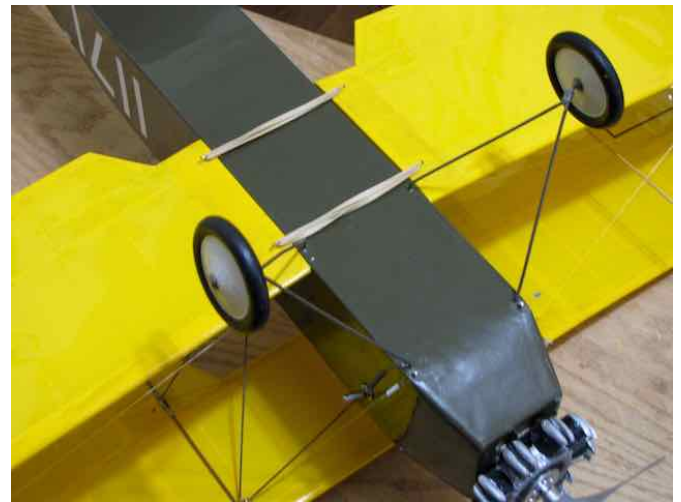
Keith launches the Astro 020 powered Consolidated PT-3 for some slow speed, low altitude barnstorming.



Keith Shaw with his Spitfire and Woody Blanchard with his B-24 prior to WW II war bird fly over.



Woody Blanchard with his nice looking B-24 powered by four Astro 035 motors. Note the scale like three bladed props.



When it was flying with two s-22 servos, a stripped-down 2 channel receiver, a 100 mAh Rx pack, an Astro 02 and three nicads, it weighed a portly 19 oz., **but now has slimmed down to 9 oz without battery.** That's not bad considering the original FF was about 9 oz with the three (?) loops of 1/4" flat rubber motor!



The previous heavy brushed motor and battery were far forward, so unfortunately with the modern light stuff in it it came out tail heavy. Instead of using a 400mAh 2S LiPo and having to add lead in the nose, I opted for two of the small 1100mAh A123 cells. The weigh three ounces instead of one ounce, but have more than three times the usable capacity. The total weight is now 12 oz.

I flew it yesterday (Nov. 25, 2018) after finally completing all the fall yard work. It just fluffs around with good agility and is much happier after the diet.

Somewhere in there the Telco CO2 motor appeared and I converted it for several more years of FF.

About 1975 I handmade a tiny regen receiver and pulse rudder actuator powered by two N alkaline cells, but the extra weight reduced the climb on CO2 to just above zero, so after a few marginal flights it was converted to a PeeWee .020. However the plane was covered with Japanese tissue and nitrate dope, so I brushed on a thinned coat of HobbyPoxy clear paint for fuel proofing.

About 1981 it was converted to electric (and RE control) with an Astro ferrite 02 and three 600mAh nicads and that is what flew with at the 1985 KRC.

Needless to say the tissue eventually disintegrated and has hung on the wall in sad tatters. It was a ROYAL pain to try to get the tissue off as the epoxy clear would not allow any release thinners to penetrate, so I spent six tedious days carefully sanding the fragile structure.

It has been recovered with ParkLite film and sports a 15gm out runner.

I flew it for 15 minutes off the driveway at a local park and did about 20 touch-and-goes and even a couple of loops and stall turns. Recharging the pack put in 420mAh, so it could easily do half-hour flights.

About the only change I made last night was to add a few degrees of down thrust, but probably won't be able to test it out until spring.

I am working on one other small restoration project that should be done in a few days, then it will be time to start the drawings for this year's Toledo project. I have decided to model Bill



N888U | Copyright by john simo - crew chief | Airport-Data.com



Air-Britain Photographic Images Collection

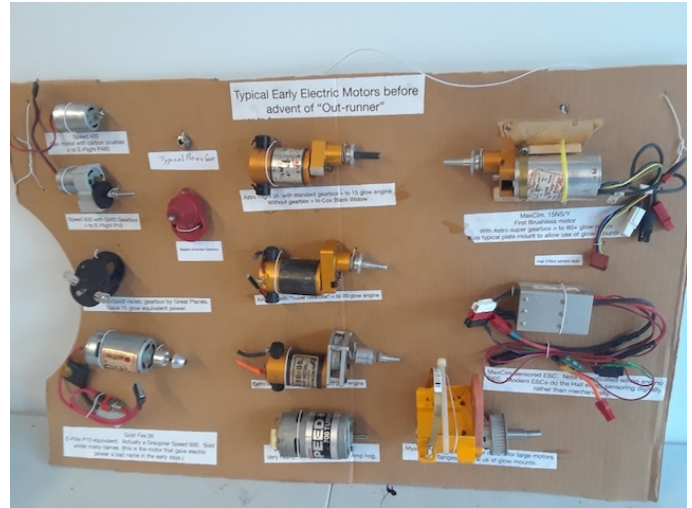
© Mike Ody Collection via George Trussell

Barber's ultra-rare airshow Curtiss Falcon, as I have been given access to many photos of it from a mutual friend. The scale will be 1/5.5, giving 76" span with 800 sq.in. wing area and about a kilowatt power system. The Falcon is the only non-bred (not Extra, Cap, Sukoi, Yak, etc.) plane I every saw do a vertical eight from the bottom and a vertical 4-point roll.

Keith

## A Thanks and Thanks for a GREAT Contribution to the AMA Museum From Walt Thing Via Email

Thanks for posting my Puddle Master question in the Ampeer and more thanks to Joe Hass for the answer. An 05 on a PM?! Must be a rocket ship!



Ken,

I put together the attached display of older motors for a "Retro Day" at our club (Fox Valley Aero Club). I was stunned at the lack of knowledge of the development of e-power so I decided to offer the display to the AMA. The link below shows the result.

<https://amablog.modelaircraft.org/amamuseum/2018/11/14/new-addition-electric-motors/>

## A Question Regarding Flight Timing

From Larry Lisowski Via Email

[l.lisowski@sbcglobal.net](mailto:l.lisowski@sbcglobal.net)

*While Larry's question doesn't directly relate to electric flight, there could be some electric flight applications provided by the answer to his question.*  
KM

Hi Ken,

I am a pylon racer and I am trying to come up with a consistent cadence device that I can use to prompt me when to turn around the pylon 1 on each lap. I have an iPhone and the voice record would be perfect if I could figure out how to activate it while I am flying. The problem is, the iPhone has a touch



screen and you need to be looking at it in order to see the start button.

I thought if I knew how the button on the touch screen worked I might be able to come up with a remote switch that I could attach to the back of the transmitter or even incorporate it into one of the toggle switches on the transmitter.

I got your address from the *Ampeer* newsletter and although this is not on the subject of electric airplanes, I thought maybe with your experience you might have some ideas.

This is the gist of my dilemma and I would be delighted if you could offer any suggestions. If you need more information and it would be easier to call, you can reach me at (708) 485-6749.

Sincerely,  
Larry Lisowski

My Response:  
Hi Larry,

I believe that I understand what you are trying to do with a timer/cadence. Interesting. ;-)

I know what you mean about the iPhone and activating while while flying. Just a thought, but could you get Siri to start the recording?

I'm going to post your question in the January 2019 *Ampeer* and see if some one has a good idea for you.

Sincerely,  
Ken

### **Problems Setting Up an Electric Glider With a Retracting Power Pod**

From Mark Couling Via Email

Mark's questions are in normal font and my responses are in italics.

Ken,

Picking your brain. I have a 2m motor glider (staltos) no issues under power, climbs well and flies well at reduced power. But cut the power, motor retracts and it does a super hard stall (always) to the left (harder than any available stick input - like it hit a flagpole at the LH wing/fuse joint) dives vertically (that is the result of the stall - that that

stallith fallith), and eventually, after about 30 feet drop, you can pull out and it flies good enough as a glider. The plane is well balanced for gliding and a little nose heavy with the motor in the active position.

*Seems to me that is should be more nose heavy with the motor extended. I'd shift or add more weight forward and see what happens. KM*

Given the above can you offer me any guidance? Landings often get a "fail" and soaring is hard because I lose so much altitude at the transition!

Any thoughts or pointers?

*How is it that the landings are failing? Nose in, stall and hit wing tip, etc.*

Is it possible that the wing needs to move much faster through the air to generate enough lift but the prop is adding enough lift to hold the plane in the air (as opposed to generating lift from the wing - harrier style). Is the thrust line of the prop has become out of alignment with the thrust line of the plane? So when I drop the prop it immediately stalls to gain speed and the torque of the motor flips it hard left?

*How does the plane glide with the motor retracted from a hand launch.*

*Find some tall grass to glide into. Turn on the radio system. Give the plane a good heave towards the horizon, not up, and carefully watch the glide. If its nose wants to rise, it is tail heavy. With a glider type plane, you should be able to get a fairly long glide and be able to see what is going on. KM*

I rebuilt it during the week and tested it yesterday and again today. During the rebuild I noticed that the thrust line of motor and wing were about 5 degrees divergent, ok, gotta push stick forward to climb controllably when the motor runs. However, I also noticed that the stabilizer stationary surface was negative 5 degrees to the wing line so I put a 2 mm washer in on the front screw of the stab mount to get it parallel to the wing line and, when I flew it, it really improved both the glide and transition. Picture shows all the lines reflected on to the vertical tail surface using a laser level. One 2mm washer, huge improvement in flight!!

Thanks for being a sounding board!

### Upcoming E-vents

**Tuesdays**, 10 a.m. to 1 p.m., indoor flying, Ultimate Soccer Arenas, Pontiac, MI (info in this issue)

**Wednesdays**, 12:30 p.m. to 2:30 p.m., indoor flying, Legacy Center, Brighton, MI (info in this issue)

**January 9, 2018, Wednesday**, EFO meeting, 7:30 p.m., Ken Myers' house, Everyone with an interest is welcome.



Photo of Mark Couling's tail on his glider with angles noted.



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### The Next Monthly Meeting:

**Date:** Wed., January 9, 7:30 p.m.

**Place:** Ken Myers' house (see address above)