HCRC Flyer

AMA Chapter #341

May 2019

Figure US P-40 Warhawk shooting down an enemy Japanese VAL.

ATTENTION!

We encourage any comments as well as content for monthly issues Please email alanhcrc@gmail.com for submissions.

Thank you.

The club encourages all our members to visit the club's Facebook page and check out the latest content, announcements and club event's www.facebook.com/groups/148353592007739. Also check out the clubs website at www.hampshirecountyrc.com

Hampshire County Radio Controllers
Business Meeting – April 4, 2019
MINUTES

The meeting was brought to order at 7pm by Mike Shaw and, as this was our last indoor meeting until Fall, pizza had been ordered for the members so the meeting was on pause for about fifteen minutes. The meeting resumed and attendance was taken by the secretary. Eighteen members reported present with a guest from W. Hatfield, John (Pat) O'Grady who is applying for membership. Next, a motion was heard to waive the reading of the minutes. M/S/P Up next, Treasurer Ron gave the financial report for the month of March reviewing all items of expense and income. M/S/P Pres. Mike then reviewed items of OLD BUSINESS including: indoor flying during the winter at a Hadley church on three occasions for a number of club pilots and mention again of the items of field equipment given to the club from the former SPARKS r/c club. The secretary gave a quick briefing on the need for club members to be aware of the possibility of flood conditions in the Ct. River Valley during this time of year. He keeps watch on a National Weather Service web site which gives reports 2-3 times daily on river levels from a gauge located in Northampton. As he explained, certain high levels in the past have caused the club to move equipment to higher levels on the property and that we must be prepared to do it quickly, if necessary. Mike, at this time, went over the plans for the field clean-up on Saturday (13th) by giving a summary of tasks (weather permitting) to be completed and tools needed: brush burning, table painting, trash removal, building the new bleachers, signs/flag/medical kit ,frequency pins out and rolling of the field. Under NEW BUSINESS he also discussed the Events Committee's recommendation for a Swap Meet event for some date in the Fall. Al Crawford and Santiago are heading up that effort. Ed Kopec gave us a rundown of an event coming on June 8th (Saturday) at the Westover Metropolitan Airport – "Run The Runway" it's called and will be a car show and warbird display. (A brochure is posted on the field bulletin board for additional information.) Before a 30 minute introductory presentation by Tom Tenerowicz on building and flying r/c models, two new membership applications were voted upon that included Pat O'Grady from West Hatfield and Donald Murach from Springfield. The vote was unanimous and they were both given applause and a hearty club welcome. At this time also, a free raffle of 4 r/c related items was completed along with the regular 50/50 drawing.
Tom T. began his presentation with a little background on how he got interested in the hobby, at the tender age of 10-12, starting with profile models, U-Control and then into R/C. His purpose tonight was to introduce some of the newer members to the building and flying of model aircraft. His program was both entertaining and informative with examples and plans available as visuals. His outline contained two, type written pages available to all: (1) Things to consider when building and (2) Tools to consider - He would be glad to share these by email: tjt167@comcast.net or the secretary has them at: gordonlauder@comcast.net

Meeting adjourned at 9:30 pm.
Respectfully submitted,
Gordie Lauder, Secretary

Upcoming Events:

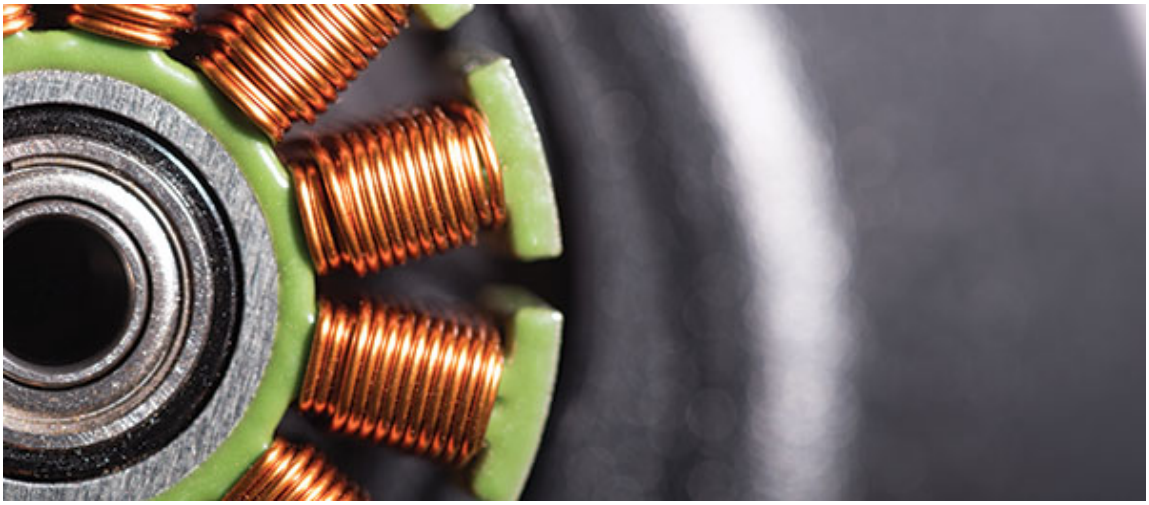
May 2nd :Monthly club business meeting Florence VFW 7pm
May 4th: Franklin County RC swap meet 82 Industrial Blvd, Turners Falls, MA,01376
June 1st :HCRC Family Day/Open House (Rain Date of June 2nd)
June 8th : "Run The Runway" @ Westover Metropolitan Airport

Airplane of the month (May): Yokosuka Ohka II (Cherry Blossom)

The **Yokosuka MXY-7 *Ohka*** ("cherry blossom")was a purpose-built, rocket-powered human-guided *kamikaze* attack aircraft[1] employed by Japan against Allied ships towards the end of World War II. United States sailors gave the aircraft the nickname Baka (バカ, "fool" or "idiot"). Some 755 of these aircraft were built as a single seat air launched rocket propelled suicide attack aircraft. Presumably one of the four Baka Aircraft brought back to the UK for evaluation, (shown above) all of which survive to this day. One of these (it is not known which) was captured by the RAF at Seletar Singapore and later examined at Farnborough.

Article for your enjoyment submitted by Ron Paul

Brushless Motor Basics



Written by Greg Gimlick
Selecting the Correct Motor
As seen in the Winter 2019 issue of Park Pilot

This motor primer is designed to help a normal, everyday park pilot feel comfortable choosing a motor for his or her new project or replacing a motor in an existing airplane. If you can buy an exact replacement part, easy peasy, but what if you can't? What if you've built or acquired an airplane with no motor? You need some basic understanding, and that's why I'm here!

Keep it simple: Longtime electric fliers sometimes muddy the waters by wanting to lay out all sorts of information regarding torque constants, winding types, armature turns, magnet types, and everything else engineers consider when designing motors. Fortunately, they don't really need to know all of that stuff.

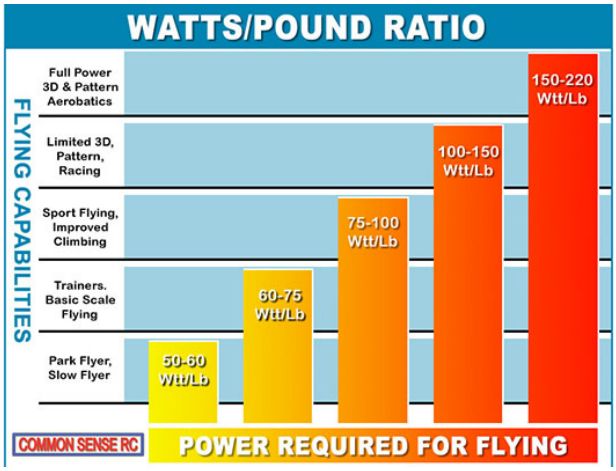
They do need to know how much power is needed. For that, I like the chart from Common Sense RC (commonsenserc.com). It's simple to understand and provides a good base from which to start.

The sample airplane: For the purpose of this tutorial, let's assume I have a simple, ready-to-fly sport model that weighs 3 pounds. I want it to be sporty and capable of solid aerobatics so I will need roughly 100 watts per pound, according to the chart.

I know I want to have approximately 300 watts of power (3 pounds x 100 watts per pound = 300). This is my starting point—it's all downhill from here. I also want to fly for roughly 6 minutes, and expect to use a common 3S LiPo battery pack found in many airplanes of this size.

Step by step: The main part is figured out and I merely need to work the math a bit to get the details nailed down. It's easy!

Power (watts) is amps times volts. I know that the 3S pack will provide 11.1 volts under load and I want 300 watts, so I only need to know current (amps). Three hundred watts divided by 11.1 volts = 27 amps, which would be a full-throttle setting, and I know that the average current over the course of a flight is approximately 66% of the full-throttle setting. Two-thirds of the 27 amps would average 18 amps for the flight.



This chart shows watts-per-pound recommendations, courtesy of Common Sense RC.

When figuring what pack is needed to achieve the current demands and flight time expectation, I need to do a bit more math. I don't want to completely discharge the battery, so I don't use 100% of the battery capacity. I want to leave roughly 20% in the pack at the end of the flight, so I'll use 80% as a guideline.

Packs are rated in milliamp hours, but instead of using the full 60 minutes, I only want 80% of that and will figure the requirement based on 48 minutes—that's 60 milliamp minutes times 80% = 48 milliamp minutes.

Using 60 and dividing that by 6 minutes to get the C-rate of discharge would drain the pack to zero, but by using 48 (80% of 60) and dividing it by 6, I get an 8C discharge rate, leaving 20% in the pack for safety.

To choose a LiPo pack, I take the average current draw for the airplane (18 amps), divide that by the discharge rate (8C), and find that a 2,250 mAh LiPo battery pack is required to achieve a 6-minute flight time. This pack size is common and economical.

Now I need to select a 300-watt motor and propeller combination that delivers what I need using the 3S 2,250 mAh LiPo pack.

The Cobra motor line on the Innov8tive Designs website (innov8tivedesigns.com) offers a 2814/12-1390 motor that is capable of 450 watts of continuous power on a 3S pack. This is a slight overkill because it can handle 40 amps continuous current when the maximum requirement is only 27 amps, but that's okay. It means I won't be burning this motor up and I'll have the ability to push it harder should I decide to increase the aerobatic capabilities of the airplane later or increase to a 4S battery pack.

The propeller selection guide for this motor shows that an APC 9 x 4.5E propeller on 3S power will pull 28.9 amps, providing 321 watts.

Cobra C2814/12 Motor Propeller Data

Motor Wind	Motor Kv	No-Load Current	Motor Resistance	I Max	P Max (3S)
12-Turn Delta	1390 RPM/Volt	Io = 1.44 Amps @ 10v	Rm = 0.030 Ohms	40 Amps	440 W

Outside Diameter	Body Length	Total Shaft Length	Shaft Diameter	Motor Weight
35.0 mm, 1.38 in.	34.1 mm, 1.34 in.	54.0 mm, 2.13 in.	5.00 mm, 0.197 in.	109 gm, 3.84 oz

Prop Manf.	Prop Size	Input Voltage	Motor Amps	Watts Input	Prop RPM	Pitch Speed	Thrust Grams	Thrust Ounces	Thrust Eff. Grams/W
APC	7x4-E	11.1	13.64	151.4	13,361	50.6	740	26.10	4.89
APC	7x5-E	11.1	17.64	195.8	12,985	61.5	775	27.34	3.96
APC	7x6-E	11.1	18.64	206.9	12,887	73.2	847	29.88	4.09
APC	8x4-E	11.1	20.78	230.6	12,700	48.1	1062	37.46	4.60
APC	8x6-E	11.1	31.14	345.6	11,716	66.6	1216	42.89	3.52
APC	8x8-E	11.1	39.36	436.9	10,961	83.0	1079	38.06	2.47
APC	9x4.5-E	11.1	28.94	321.3	11,941	50.9	1477	52.10	4.60
APC	9x6-E	11.1	33.09	367.3	11,528	65.5	1427	50.34	3.88
APC	9x7.5-E	11.1	45.90	509.5	10,253	72.8	1395	49.21	2.74
APC	10x5-E	11.1	39.26	435.8	10,967	51.9	1739	61.34	3.99
APC	10x6-E	11.1	41.43	459.8	10,745	61.1	1829	64.52	3.98

Prop Manf.	Prop Size	Input Voltage	Motor Amps	Watts Input	Prop RPM	Pitch Speed	Thrust Grams	Thrust Ounces	Thrust Eff. Grams/W
APC	6x4-E	14.8	13.62	201.5	18,164	68.8	748	26.38	3.71
APC	6x5.5-E	14.8	17.29	255.8	17,760	92.5	770	27.16	3.01
APC	7x4-E	14.8	23.66	350.1	17,063	64.6	1282	45.22	3.66
APC	7x5-E	14.8	29.87	442.0	16,394	77.6	1279	45.11	2.89
APC	7x6-E	14.8	31.12	460.6	16,260	92.4	1352	47.69	2.94
APC	8x4-E	14.8	35.42	524.2	15,764	59.7	1684	59.40	3.21
APC	8x6-E	14.8	51.00	754.8	14,043	79.8	1772	62.50	2.35
APC	9x4.5-E	14.8	46.49	688.0	14,590	62.2	2343	82.65	3.41

Propeller Chart Color Code Explanation

- The prop is to small to get good performance from the motor. (Less than 50% power)
- The prop is sized right to get good power from the motor. (50 to 80% power)
- The prop can be used, but full throttle should be kept to short bursts. (80 to 100% power)
- The prop is too big for the motor and should not be used. (Over 100% power)

The goal was 27 amps and 300 watts, so this looks to be nearly perfecy

This chart shows watts-per-pound recommendations, courtesy of Common Sense RC.

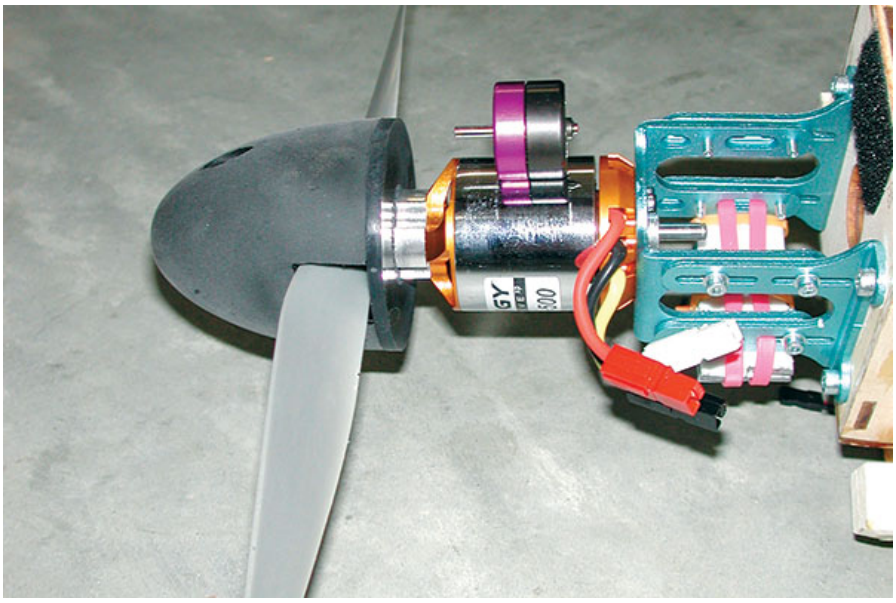
Results: A motor giving everything required and then some will power the 3-pound airplane. The math was simple and the process was easy to follow. Nothing is being pushed beyond its limit and there is plenty of room for adjusting later.

Other options: The Cobra 2814/12-1390 motor was selected, but what if I wanted to compare other options? The process is the same, but I can also reference the chart Lucien Miller has provided on the Innov8tive Designs website. In the Turnigy SK3 line is a 3536-1400 motor that is similar and would work too.

This Cobra motor has its name and information inscribed on the case. Cobra motors suggests a matching ESC, making it easy to put a system together.

What about Kv? Unlike what many think, Kv doesn't stand for kilovolt. It refers to a velocity constant that tells how many rpm a motor turns per volt with no load. Apply 11.1 volts from a standard 3S pack and you'd expect the 2814/12-1390 motor to turn 15,429 rpm with no load. Of course, efficiency, load, and other factors play into it, but for planning purposes, that's close enough.

One problem new fliers run into is when an "expert" at the field tells them Kv is all they need to know. You might as well tell someone gravity is a state of mind. Kv means nothing by itself. It's a useful tool as part of a total package, but not alone.



These two motors have the same Kv, but are obviously different in size, and consequently, capability. Don't believe people who say you only need the Kv to select a motor.

What do all of those numbers in the name mean? Some manufacturers use the size of the stator and others use the outside dimensions of the motor case to come up with the numbers. We need a way to compare them and that's where Kv and weight come in to even the playing field.

With a motor such as a Cobra 2814/12-1390, I know that the dimensions of the stator are 28 mm diameter and 14 mm length with a 12-turn design and 1,390 Kv. To find another motor similar to that, we might check out the Turnigy SK3 3536-1400. This is essentially the same motor, but the measurements reflect the case size in diameter and length, then the Kv.

If Cobra listed its motor using this naming convention, it would be roughly 3534-1390, so they are roughly the same size. Comparing the weights, the Cobra is 107 grams and the SK3 is 110 grams. With similar Kv, weight, and size, the motors are nearly the same.

These motors are disassembled to show the difference in how numbers reflect sizes. The stator (the part with wire wound around it) is much smaller than the case itself. Find out whether your motor manufacturer uses stator or case dimensions in its nomenclature.

It's important to know which method a manufacturer uses to identify its motors, otherwise you end up comparing apples to oranges. If you're not sure, compare the Kv and weights. If a kit calls for a certain size, find out whether the manufacturer means stator or motor case dimensions.

Bottom line: Don't get caught up in the "Kv only" argument. Define your requirements for the airplane and do some simple math to figure out the right motor to use. It only takes a few minutes to search manufacturers' websites for a match. Sites such as Innov8tive Designs provide the type of information that's needed to make the right choice. If a site doesn't provide the necessary information, you might want to inquire.

This is a basic course to get you going successfully. Down the road we can look more closely at details.

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Hobby World
171 Grove St. Rte. 8
Adams, MA 01220
Tel: 413-743-7223

hworld556@gmail.com

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