April

The EFO Officers 2013

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The Next Meeting:
Thur., April 11, 7:30 p.m., Ken Myers’ house (address above)

No Mailed Ampeer Subscriptions

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What’s In This Issue:
- Review of Hobby King’s Turnigy G25 710Kv Outrunner -
- Upcoming Keith Shaw Birthday Party Electric Fly-in 2013 - February EFO Meeting -
- Hacker A50-12S Motor Review - Announcing the 29th Annual Mid-America Electric Flies - Upcoming Events

Review of Hobby King’s Turnigy G25 710Kv Outrunner

By Ken Myers

Dave Stacer loaned me a Turnigy G25 710Kv outrunner to test and add to the Drive Calculator database (http://www.drivecalc.de). The motor has now been added to the current Drive Calculator database.

Dave did not supply a prop adapter, so there is no information on it in the specifications and weights.

I do not take motors apart to inspect their construction, but the exterior was nicely finished. It has a 5mm shaft diameter, which is good for this size motor.

The first table shows the supplier’s data and the second table is a comparison between the supplier’s data and measured data.

The specifications from Hobby King, the supplier, are in the HK column and the measured data in the other columns.

Hobby King states that the Kv is 710. It was measured as 738 using a drill press and mathematical calculations and Drive Calculator calculated a Kv of 740.

Generically it is a 3554-740, 185g.

It is a 10 pole motor. The number of poles is important when using a phase tachometer, which attaches to the motor.
leads to ‘read’ the RPM, using devices such as the Hyperion Emeter 2 (http://www.rcdude.com/servlet/the-Accessories-cln-Gadgets/Categories) or Eagle Tree Systems eLogger (http://www3.towerhobbies.com/cgi-bin/WTI0097p?P=SM&CATEGORY=&MANUFACTURER=ETR).

To clarify what poles are, Eagle Tree Systems notes:
“To calibrate the RPM sensor, you need to know the number of “poles” your brushless motor has. This information is normally supplied by the motor manufacturer. (It wasn’t for this motor! KM) The term “poles” refers to the number of magnets in the motor (NOT the number of stator teeth, “legs,” or “hammerheads.”) For example, if you have an outrunner with 10 teeth on the stator and 14 magnets in the flux ring, the motor has 14 poles. Note that most (but not all) in-runner motors are two pole motors.

If you are uncertain about the number of poles, or want to verify you calculated correctly, a hand-held tachometer can be used to compare the RPM value displayed real-time by your recorder, in a bench test (assuming it is safe for you to do this). Real-time display is available in Recorder USB Live Mode, on the eLogger PowerPanel, or with the Seagull Wireless Dashboard. (This had to be done for this motor: KM) If the value displayed is incorrect, you can change the poles setting to adjust the displayed RPM value. For example, if your handheld tachometer reads 4000 RPM, and your Eagle Tree data shows the maximum RPM of 8000, you would need to double the number of poles to “2”.”

Eagle Tree Web site:
http://www.eagletreesystems.com/support/Manuals/brushless-rpm.pdf

The last table shows Drive Calculator ESTIMATES for the approximate performance at an elevation of 287m or 940 ft. AMSL and a temperature of 24-deg C or 75-deg F. Always use a power meter to determine whether the prop is appropriate for the elevation and temperature it will be used at. In general, lower elevations and ambient temperatures raise the amp draw!

Note: The 11x10E prop with a 4S LiPo pack and the 10x7E prop used with a 5S LiPo pack exceed the recommended maximum motor watts in of 600, as recommended by the supplier.

Four and five cell “A123” 2300mAh packs would be appropriate for use with this motor.
The Pin/watts in, estimated thrust and pitch speed from the table suggests the power system’s application.

This motor is also supplied with a supplier’s stated Kv of 610 (http://www.hobbyking.com/hobbyking/store/__19023__Turnigy_G25_Brushless_Outrunner_610kv.html?gclid=CJuru9OWu7UCFSNqMgodoC4AaA) and 870 (http://www.hobbyking.com/hobbyking/store/__14401__Turnigy_G25_Brushless_Outrunner_870kv_.html).

The G25 on the test stand

Upcoming Keith Shaw Birthday Party Electric Fly-in 2013

The Balsa Butchers will once again be hosting the “Keith Shaw Birthday Party Electric Fly-In” at their field near Coldwater, MI. The event will take place on June 8 and 9, 2013.

Contest Director: Dave Grife - E-mail: grifesd@yahoo.com or Phone: 517.279.8445
Please e-mail or call with any questions.

The Flying Field will be open Friday, June 7 for early arrivals
Saturday, June 8, hours are from 9 a.m. 'til 5 p.m.
Sunday, June 9, hours are from 9 a.m. 'til 3 p.m.
Landing Fee is $10 for the weekend.

Directions: Quincy is approximately 4.5 miles east of I-69. Clizbe Road is approximately 1.6 miles east of Quincy. The Flying site is approximately 1.5 miles south of US-12 on the west side of Clizbe Road.

The February EFO Meeting

The meeting was held on the evening of February 14 at Ken’s house.
Several current projects were shared.
Roger Wilfong, brought along a couple of projects.
The first one he shared was his GM Glasscraft Rivets. It is a neat, little, go fast plane.

His second plane was a giant Lazy Bee purchased at a swap shop. He thought it was nicely done with a silk covering and that he could recover the fuselage with silk and dope, since the wing looked pretty good when he bought it.
Unfortunately, it was not to ‘bee’. He ended up having to recover the whole model.

It is powered with an Astro Flight brushless geared motor and 5 “A123” 2300mAh cells.

Richard Utkan, EFO vice-president brought his Walt Mocha ‘Or What’. It has a 60-inch wingspan and a wing area of 675 sq.in. It weighs in at 4.5 lb. (72 oz.). It is powered by an Astro Flight 25 geared and 5 “A123” 2300mAh cells.

Hank Wildman shared his latest project. He demonstrated his retracting gear unit that he intends to put in his EDF airliner. (photo - top right)

After the show and tell, Ken Myers took the folks to his basement to demonstrate how he collects motor data for input into Drive Calculator. Jim Young brought the motor. It was a Hacker A50-12S that he is planning on using in his Skybolt bipe with a 6S Li-Po pack.

After the data gathering and demonstration on how to use the collected data, the members enjoyed some refreshments.

Motor Review: Hacker A50-12S V2 Outrunner
(https://www.aero-model.com/8_69_899/Motors_Hacker-Brushless-A50-12S-V2/A50-12S%20V2.html)
By Ken Myers
February 2013

Lynn Morgan, a fellow flier at the Midwest RC Society, flies this motor in his Osiris pattern plane (http://www.3dhobbyshop.com/62-Osiris--Red_p_15388.html) using a 5S Li-Po, Castle Phoenix Ice Lite 100, and PT Models 16x10E Carbon prop. He reports 1550 static watts in at wide open throttle near the beginning of the battery discharge.

I’ve watched him fly this plane for a long time and have been very impressed by the power. I
asked him to send me one of his recent Ice 100 Lite data files from the logging ESC. I was interested in how much over the “rule of thumb” of 3 watts in per gram of motor weight he was running this motor. It’s a lot, but that’s another story for another time.

Jim Young needed to replace his Astro Flight 40G brushed motor in his Skybolt biplane. He decided to use this motor with a 6S LiPo.

He brought his motor to the February EFO meeting where we collected the data using it to input into Drive Calculator.

(http://www.drivecalc.de)

The motor is nicely produced. It comes with an excellent choice of hardware including; a collet type prop adapter, bolt-on prop adapter, “+” mount and assorted screws, nuts and bolts. The motor may be mounted to a forward mount with the ‘can’ rotating behind it or on the “+” mount with the ‘can’ rotating in front of it. The mounting options, with the included hardware, make for very versatile installations!

About Our Motor Manufacturers and Suppliers

While doing some motor research, I recently ran across this quote on RC Groups.

“Unfortunately there are a lot more "motors" than "testers with the appropriate test equipment". Since manufacturers data (if any exist) are often unreliable and don't include the necessary parameters anyway, the only way a motor becomes useful to DriveCalc is if someone tests it extensively..... even in DriveCalc, some motors are there simply because someone entered the manufacturer's Io, and maybe no-load rpm!

Cheers, Phil”

Phil is known as Dr Kiwi on RC Groups.

This motor certainly adds credence to his statement.

Compare the information provided by Hacker for these two motors; the A50-12S V2 492Kv

and the A50-14S V2 425Kv

Not only did the ‘manufacturer’ not get it right, the US importer’s specifications are extremely ‘odd’. The importer is Aero-Model, Inc.
https://www.aero-model.com/8_69_899/Motors_Hacker-Brushless-A50-12S-V2/A50-12S%20V2.html

Aero-Model is also known as Hacker Brushless USA and http://www.hackerbrushless.com.

When using the supplied data from all three sites, it is very difficult to determine how to use this motor safely.

Hacker in Germany does not give a continuous amp or burst amp rating. They hint that 70 amps might be the maximum by noting that it requires a 70-amp ESC.

Aero-Model states, “Operating Current 45 Amps” and “Peak Current 70 Amps”. Esprit Model states that the maximum amp draw for 15 seconds is 55 amps.

Hacker and Esprit Model indicate that the maximum power is 1250 watts, but Aero-Model states 1700 watts.

Keep in mind that Lynn Morgan has been running his motor, with no problems, for a long time and many, many flights at a static maximum of 1550 watts. His data log shows that he very seldom reaches that peak during his pattern routine.

**Hacker Specifications and Other Motor Information**

**Weights and Measures:**

<table>
<thead>
<tr>
<th>A50 Outrunner Series</th>
<th>A50 12S</th>
</tr>
</thead>
<tbody>
<tr>
<td>Kv (rpm/V)</td>
<td>500</td>
</tr>
<tr>
<td>Max Power (W)</td>
<td>1250W</td>
</tr>
<tr>
<td>Max Amp (15sec)</td>
<td>55A</td>
</tr>
<tr>
<td>Max Efficiency</td>
<td>85%</td>
</tr>
<tr>
<td>Io (No load A)</td>
<td>2.5A</td>
</tr>
<tr>
<td>Rm (Resistance)</td>
<td>0.016Ohm</td>
</tr>
<tr>
<td>Shaft Diameter</td>
<td>6mm</td>
</tr>
<tr>
<td>Gearbox</td>
<td>N/A</td>
</tr>
<tr>
<td>Motor Diameter</td>
<td>48mm</td>
</tr>
<tr>
<td>Motor Length</td>
<td>56.8mm</td>
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<tr>
<td>Motor Weight</td>
<td>370g</td>
</tr>
<tr>
<td>Built in Fan</td>
<td>Yes</td>
</tr>
<tr>
<td>Max Rpm</td>
<td>13,000</td>
</tr>
<tr>
<td>Poles</td>
<td>14</td>
</tr>
<tr>
<td>Case</td>
<td>Outrunner</td>
</tr>
<tr>
<td>ESC Timing</td>
<td>20-25 deg</td>
</tr>
<tr>
<td>ESC Switching Freq.</td>
<td>8-16KHz</td>
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</tbody>
</table>

**Specifications:**

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Powerrange</td>
<td>max. 1250W (15 sec.)</td>
</tr>
<tr>
<td>Idle Current @ 8.4V</td>
<td>2.5A</td>
</tr>
<tr>
<td>Resistance (R)</td>
<td>0.016 Ohm</td>
</tr>
<tr>
<td>RPM/Volt (kv)</td>
<td>492 U/min-1</td>
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<tr>
<td>Weight</td>
<td>345g</td>
</tr>
<tr>
<td>Diameter</td>
<td>48.8 mm</td>
</tr>
<tr>
<td>Length</td>
<td>52 mm</td>
</tr>
<tr>
<td>Poles</td>
<td>14</td>
</tr>
<tr>
<td>recom. Speedcontroller</td>
<td>70A Brushless</td>
</tr>
<tr>
<td>recom. Timing</td>
<td>20° - 25°</td>
</tr>
<tr>
<td>Shaft Diameter</td>
<td>6 mm</td>
</tr>
</tbody>
</table>

The specifications on the Hacker Germany Web site showed a motor weight of 345g. The motor in hand weighed 373g with its leads and three 4mm bullet connectors.

The drill press measured and calculated Kv was 507.6 and Drive Calculator calculated 506.9, once the collected data was input.

The Hacker site suggested 20-deg to 25-deg of timing. The Castle Creations Ice 50 used in the data gathering was set to low/0-deg timing.

**Generic naming helps to identify similar motors.**

The correct Hacker A50-12S generic name (can diameter mm, can length mm, dash Kv, wt. in grams) is Hacker 4954-505, 370g.

**The Actual Testing**

The first test was the Kv test using a drill press. Next an Emeter II was used to gather all the data, NOT the onboard data from the Castle Creations Phoenix Ice 50 amp ESC.

Two no load runs were logged and averaged for the no load inputs into Drive Calculator. A 6S “A123” pack was used for one of the no load tests and a 6S Li-Po for the other test.

The 6S Li-Po was used to gather the loaded data.

Four props were logged, in this order, on the same battery charge, APC 10x7E, APC 11x7E, APC 12x8E and APC 13x8E. They were then averaged and used as the prop load inputs for Drive Calculator.
The testing was done in the basement in Walled Lake, MI, USA.
elevation: about 287m/942 ft.
Temperature: about 15-deg C/59-deg F
Data was submitted to Drive Calculator, Christian Perrson, in early March, 2013.

Jim had hoped to use this motor with a Castle Creations Ice 50-amp ESC and an APC 13x8E prop.
An APC 13x8E was the last one used for data gathering and was recorded at 21.37v (3.56v per cell), 48.5 amps and 9377 RPM. With Drive Calculator inputs of 22.2v and a change of temperature to 24-deg C/75-deg F the prediction for the APC 13x8E is 22.2v, 49.3A and 9692 RPM.

This could be okay with Jim’s 50-amp ESC, but I suggested that he might want to try an APC 13x6.5E first. Drive Calculator, set to 75 degrees F and our elevation, predicts an amp draw in the low to mid-40s and an RPM in the neighborhood of 9900. This yields a pitch speed of about 61 mph, which is plenty fast enough for this biplane.

In a phone conversation with Keith Shaw a few days later, he suggested an APC 14x7E, if prop clearance allows. Drive Calculator, at our elevation and 75-deg F predicts 22.2v, 54 amps and 9570 RPM. Actual power meter testing should be done with this prop and then it’s up Jim whether he wants to push his ESC or not.

A report on what prop Jim Young decides to use will be in an upcoming issue of the Ampeer, once the weather breaks here in southeastern Michigan.

With the data for this motor now in Drive Calculator, various battery and prop combinations can be tried at elevations and temperatures appropriate to where and how the motor will be used.

An APC 16x10E was noted with an asterisk in the 5S example props. It is there to ‘represent’ Lynn’s 16x10 carbon prop and to show that these examples should be on the conservative side.

I have created prop charts for 4S, 7S and 8S Li-Po batteries that MIGHT work without over taxing the motor.

Again, if you decide to go out of range, be sure to use a power meter and be willing so suffer any
I have been using O.S. Motor outrunners recently, and have had good success with them.

After looking this Hacker A50-12S over and testing it, I think I may be adding some Hacker Outrunners to my fleet soon.

I was very impressed with the complete hardware package and especially having both the bolt-on and collet type prop adapters provided.

This is a photo of the Osiris pattern plane designed by Andrew Jesky and previously mentioned. The equipment recommended by Andrew at the 3D Hobby Shop Web site works very well in it.


29th Annual Mid-America Electric Flies 2013
At the 7 Mile Road MRCS Field
AMA Sanctioned
Saturday, July 13 & Sunday, July 14
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 2013 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.

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

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Upcoming E-vents

**Tuesdays through March 26** - Indoor flying at the Ultimate Soccer Arenas, Pontiac, MI, 11 a.m. - 1 p.m.

**April 3, Wednesday, 7 p.m.**, HORIZON Hobby Pre-Toledo Visit at Ultimate Soccer Arenas. This is always interesting! Joe Hass, 248-321-7934 or visit www.skymasters.org.

**April 5th, 6th, & 7th**, The Toledo RC Expo, SeaGate Centre, 401 Jefferson Avenue Toledo, Ohio 43604, Web site information at http://www.toledoshow.com

**April 11, Thursday**, Monthly indoor EFO meeting, 7:30, Ken Myers house, 1911 Bradshaw Ct., Commerce Township, MI 48390, 248-669-8124. Everyone with an interest is welcome.

**May 18 & 19, Sat. & Sun.**, RCCD Watts Over Wetzel (WOW) 8th Annual All Electric Fly-In, Directions and Flyer, contact Mike Pavlock (586)-295-3053 or Email WOW Contest Director at wattsoverwetzel@gmail.com

**June 8 & 9**, Keith Shaw Birthday Party Electric Fly-in 2013, Balsa Butchers field near Coldwater, MI. Contest Director: Dave Grife - E-mail grifesd@yahoo.com or Phone: 517.279.8445, Flying Field will be open Friday, June 7 for early arrivals, Saturday, hours are from 9 a.m. 'til 5 p.m., Sunday, hours are from 9 a.m. 'til 3 p.m., Landing Fee is $10 for the weekend.

**July 13 & 14**, 29th Annual Mid-America Electric Flies, Midwest RC Society, 7 Mile Rd. Flying Field, contact kmyersefo@theampeer.org or 248-669-8124

Think Spring!!!

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The Ampeer/Ken Myers
1911 Bradshaw Ct.
Commerce Twp., MI  48390

http://www.theampeer.org

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**The Next Monthly Meeting:**
**Date:** Thursday, April 11, 2013  **Time:** 7:30 p.m.
**Place:** Ken Myers’ house (address above)