October
2024

HAMILTON MODEL AERO CLUB

Flight Lines

***Cover Page:* Grant poses with his SU31 "stick" aerobatic aircraft.**

***Photo:* Brian Holden**

FLIGHT LINES

HAMILTON MODEL AERO CLUB INC.

October 2024

www.hamiltonmac.org.nz

PATRON Graeme Bradley –Retired and living a well-deserved life of luxury

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NEXT CLUB NIGHT: Wednesday, 11 December

VENUE: Beerescourt Bowling Club
68a Maeroa Road - Hamilton

Club Themed Flying Day: Float Plane Day @ Lake Kainui (Lake D)
9.00am - 4.00pm

Presidents Report

Grant

Spring has sprung and so has the wet and windy stuff… no surprises there, yet we always seem to have a group of people out there that seem to think the weather is warmer, colder, windier, calmer, wetter, drier than it used to be…ah what short memories we have!!! Proof that Spring is here came via organisers postponing the Aerobatics Primer event for two weekends in a row before finally getting a weather break on the third Saturday. A report resides elsewhere in the Bulletin from that.

Our own Electric Fun Fly Day faired quite a bit better with a good turnout of models and pilots and pretty good flying conditions.

Lyndon and I took turns flying our new co-owned electric powered Tucano whilst designing a flight sequence to use in a scale competition. It's lots of fun to fly and even Wayne gave it the big thumbs up.

Co-owners. If one crashes it, does the other have to pay too?

The other reason I ended up only flying the Tucano was that I left the Transmitter at home for my electric F3A Pattern model…Doh!!

The other notable flight for the day came from Bryce with his Tauranga Auction Special twin engine transport aircraft which made a very successful maiden flight. Well done Bryce.

Bryce's C160 Transport Plane

This and next month there are several events coming up on the calendar, but the most notable for HMAC will be our Float plane day at Lake Kainui this coming weekend. The gates will be open as usual from 9am-4pm and the weather will be perfect!!! The club rescue boat will be on hand to sort out any mishaps and engine out landings. Other notable events close to home are the LMANZ Large Model Rally at Waharoa on 19-20th October and Warbirds over Waharoa on the 2nd November. As always, keep the club web calendar handy in your favorite's list to see what's coming up or changed.

September's club night sported our annual Buy/Sell/Swap evening which saw a significantly smaller selection of items brought along for sale this year. Is this a sign of the economic times maybe, or do we just rely more on social media and online sales etc. these days. Nonetheless, it was a great night which included a quick slide show of my Pacific Airshow Gold Coast photos followed by a very entertaining and detailed talk by Frazer Briggs on his recently completed trip to China to fly in the World F3A Aerobatics Series. Frazer covered the flying competition, but the teams' cultural experiences were probably the most amusing part of the talk. And yes, he would go back again.

Note there are no club nights now until our Xmas meeting on Wed 11th December.

Now, a big welcome to our newest members joining our flying club family this year. Jono, Philippa & Emma Bailey join as a family. Likewise, James and Marie Cockeram. Rudi Weideman has joined us in the last month. Both James and Rudi have flown previously in South Africa and have been showing us their skills, even if they claim to be a little bit rusty. Finally, but by no means last, a warm welcome to James Powell who joins us looking to enjoy the benefits of club membership. Welcome all.

On the other side of club membership, we would like to acknowledge the passing of Ken Couling who was a long-time member of the club from the mid-1980s if I recall correctly. Ken sadly passed away this month having been in ill health for some time. Ken will be most noted for his station wagon that sported the number plate "Kuza". I never did venture to ask why 😉

The last time Sel was in hospital

Also, we wish Sel Melville well on his recovery after spending a few days in Hospital with ill health. We all hope to see you back out flying again soon Sel.

Well, on that note I will wrap up my column for another month. I will be busy flying the Pattern and IMAC Aerobatics competitions in the next couple of weeks plus float planes of course. Yah, it's daylight savings now and summer is on its way, it only gets better every day.

Play safe and remember, Safe Flying is No Accident

Cheers Grant

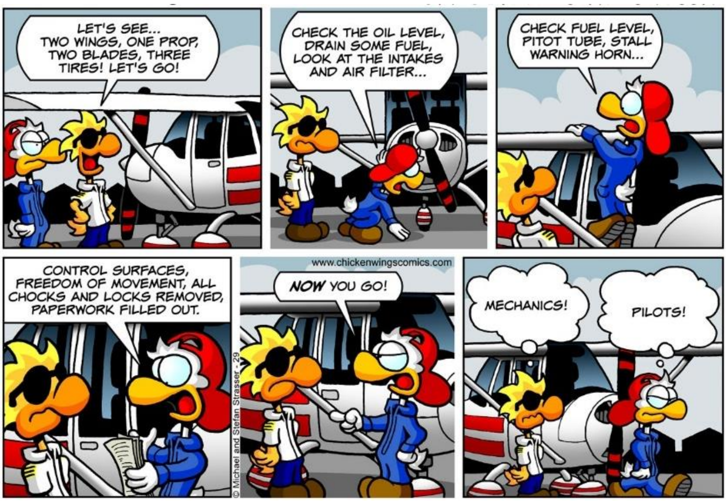
Editors Ramble

Dave

As I write this it is frightening to think it's only eleven weeks till Christmas. I haven't even put my order in to Santa yet but fear not as since the original days of Covid, courier companies everywhere it seems have found another gear and over the past couple of months I have received parcels from Australia, China (thinking it was coming from NZ) and the States in record time. So, I have time to buy something else before Xmas much to the other half's angst.

This month we have the story version of Frazer's trip to China. A great read and adventure to boot. Bruce Pickering reports on the Dornier 28 and an interesting read from Wayne Cartwright about electric motors and what the numbers mean. Not something I see the I.C. diehards being attracted to unless the Greens get in and make everyone cycle to the field with your plane in tow and carrying a bag full of batteries. You read it here first.

All this and plenty more. Happy reading, especially you Sel. Get well soon.



A F3A story from China

Frazer

Chapter One: Warm Beverages and Model Planes

Flazer Bliggs stood at the Auckland Airport check-in counter, hands on his hips, staring at the oversized model box. He'd done this countless times—checked in that very box at airports across the world, from the US to Europe. But this was a first.

The Air China staff looked at the box like it was a UFO. The young woman behind the counter, brow furrowed, tilted her head at him. "This is too large."

Flazer forced a smile. "It's 19 kilograms. It fits. Trust me."

Behind her, two more staff members appeared, both eyeing the box with a mixture of concern and confusion. They exchanged a few quick words in Mandarin. One of them picked up a phone.

Flazer sighed, glancing at the time. His flight to Beijing was in two hours, and this model plane—this *2-meter-long, 20-year-old* model plane—had been through more airports than most of these staffers had. He leaned forward on the counter, hands clasped. "Look, I've checked this on 777s before. The plane can handle it."

"Sir," the woman said, shaking her head. "I'm not sure…"

Just then, an Air New Zealand staff member in high-vis swooped in, eyes on the model box. "Ah, there you are! We've been talking about your box." He gave Flazer a conspiratorial grin. "It'll fit, mate. Don't worry."

Relief washed over Flazer. "I knew it would."

An hour later, as he passed through security, his phone buzzed. A text from the airline: *Hello, box fit on plane.*

He chuckled. “Who would’ve thought?”

Two days later, Flazer found himself back at Beijing Airport, this time surrounded by a gaggle of international pilots. It was like a reunion of old mates, plus a few new faces. He slung his bag over his shoulder and glanced around the crowd. There were Lassi from Finland, Onda and Suzuki from Japan, and even Juan from Spain, a YouTube regular in the F3A community. The familiar hum of excitement filled the air, the same buzz he always felt before a major competition.

“Flazer!” Ross Craighead’s voice boomed from behind him. Flazer turned just as Ross, a Kiwi legend in his own right, pulled him into a bear hug. “You ready for this?” Ross asked, grinning from ear to ear.

“As ready as I’ll ever be,” Flazer replied, his eyes scanning the sea of model boxes being loaded onto a small truck. “Is that my box?” he asked, nodding toward a particularly large one.

Ross laughed. “I hope so. Otherwise, we’re all in trouble.”

They boarded a bus for the six-hour ride west to Datong City. Flazer leaned his head against the window, watching the sprawling landscape blur past. The sun beat down from a cloudless sky, and already he could feel the heat creeping in.

“Mate,” Flazer said, turning to Ross, “they said everything was sorted—accommodation, food, even the drinks. But, uh, they didn’t mention that the drinks wouldn’t be cold.”

Ross raised an eyebrow. “Warm beer?”

“Warm *everything*. It’s 30 degrees out here, and they hand me a warm cola.” Flazer shook his head. “It’s madness.”

Ross chuckled. “You’ll survive.”

The regional airport in Datong was massive, a place that hosted everything from ballooning to skydiving and, most importantly, aeromodelling. The accommodations were basic but functional, and the models had their own giant hangar. Flazer breathed a sigh of relief as he watched his plane being unloaded, still in one piece.

"You see this?" Flazer called out to Ross as they approached the hangar. "No more assembling and disassembling. Once it's together, it stays that way all week."

Ross nodded approvingly. "No more messing up the ailerons, eh?"

"Not this time, mate."

By the time practice day rolled around, the heat had cranked up even further. Thin air, 1000 feet altitude—it felt like flying in the high desert. Flazer adjusted the throws, upped the expo, and switched to his lightest battery packs. The first few flights felt sluggish, but after a while, his model responded like it always did: smooth, precise, and predictable.

As he lined up for another practice round, Trina, his partner, appeared at his side, waving her phone.

"I've got us booked for a tea ceremony tomorrow," she said, beaming.

Flazer grimaced. "More tea?"

"Don't worry, you'll love it. And afterward, the Great Wall."

"Now you're talking." He smiled, giving her a quick peck on the cheek before turning back to his plane. "But no more warm drinks, okay?"

The opening ceremony was as grand as it was long. Flazer shifted uncomfortably in his seat as speech after speech droned on, each one meticulously translated into English. The sun blazed overhead, and he could feel beads of sweat running down the back of his neck.

Ross leaned over, whispering, “Reckon this’ll ever end?”

“Only when we melt,” Flazer muttered back. Just as he thought he couldn’t take another speech, a loud *BOOM* filled the air, and fireworks erupted behind the stage, sending clouds of colored smoke into the sky.

“Finally,” Ross said with a grin. “Now it’s a party.”

But the weather had other plans. By the afternoon, dark clouds rolled in, and soon, the storm hit with full force. Flazer watched as the massive stage collapsed under the wind, and gazebos went flying down the runway like paper kites.

“Here we go,” Flazer said, rolling up his sleeves as a small truck arrived, loaded with more gazebos. The driver, an old man with no teeth, gestured wildly in Chinese, clearly confused about where to go.

Flazer stepped forward, playing his favorite game of charades. “This way, mate!” he called out, pointing toward the flight line. The driver looked at him blankly before giving a toothless grin and following his lead.

When the competition finally kicked off, it was everything Flazer had hoped for—and more. Pilots from all over the world, including China, had gathered for the event. Even with the language barrier, there was an unspoken bond among them. Modellers were modellers, no matter where they were from.

On the first day of competition, Flazer flew clean, making it into the top 10. But the weather had one last trick up its sleeve. As he prepared for the final round, the wind picked up, gusting at 20 knots, and the sky turned a menacing shade of grey.

“Just like home,” Flazer muttered to Ross, who stood beside him as his caller.

Ross grinned. “Lean into it, mate. You’ve got this.”

Flazer nodded, taking a deep breath as he stepped up to the flight line. His plane soared into the air, fighting against the wind, but he kept it steady, correcting for every gust, every shift. When he landed, he felt the familiar rush of accomplishment.

“Seventh place,” Ross said, clapping him on the back. “Not bad.”

“I’ll take it,” Flazer replied, grinning.

The competition may have been over, but the adventure wasn’t. Flazer and Trina had a few more days to explore, including a high-speed trip to Xi’an on a bullet train, where they marveled at the Terracotta Army—elbows out, pushing through the throngs of tourists.

"China's been amazing," Flazer said as they stood in front of the Great Wall a few days later, the sun setting behind them.

Trina smiled. "Even with the warm drinks?"

Flazer laughed. "Even with the warm drinks. Though, next time, I'm bringing a cooler."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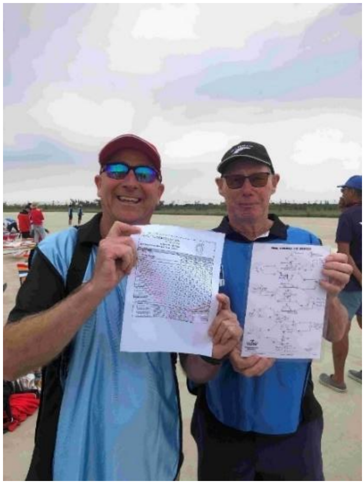


Anthem
Bi Slide

MISSING COX BABY BEE .020 AT CLUB NIGHT SEPTEMBER

BRING BUY AND SELL EVENING

I BOUGHT ALONG SOME ITEMS TO SELL ON CLUB NIGHT

INCLUDING THE COX MOTOR SELLING FOR $40.

IT HAD NOT SOLD BY THE TIME WE WERE HAVING A CUP OF TEA ETC.

I STILL SAW IT ON THE TABLE AND AROUND 10.15 PM I DECIDED TO

PUT MY UNSOLD ITEMS BACK IN THE VAN TO GO HOME.

BY THAT STAGE THE MOTOR HAD DISAPPEARED FROM THE TABLE, NO PAYMENT WAS MADE TO ME.

I DO NOT WANT TO KNOW WHO TOOK THE MOTOR IF IT WAS BY ACCIDENT, BUT I WOULD LIKE EITHER THE MOTOR RETURNED BY POST OR PAYMENT OF THE $40

THANK YOU

ALAN ROWSON

Aerobatics Primer Day

Frazer

The Aerobatics Primer intro / coaching day at Waharoa last Saturday gone went well. We had enough in attendance that out of a 20 bag of burgers, only 4 were left … so that's always a good way to gauge how many guys were there on the day.

I had a look at Aunties photo, and I counted 8 guys there with a range of sport models all keen to learn some new skills, plus we had a bunch of helpers, and the usual peanut gallery watching it all go down.

It was a bit breezy a times, but at least it was down the strip. We ran through the intricacies of the NZ Clubman sequence with a stick plane, followed by a live demo with a foamie Extra 300.

Then it was time for the guys to just get out there and have a go. Those flying the 30 / 50cc gassers seemed to handle the windy conditions a little better than the electric guys. The Electric guys were going through batteries as fast as they could charge them, and drinking lots of coffee in between !! A successful day, and I'm sure some of these guys will come and fly Clubman at the next local event. We shall see !!

I think a coaching day like this is something we might need to keep on the calendar as a lead in to the Aerobatics competition calendar, because it looks like a good way to kick things off.

As a result, I've added a bunch of new email addresses to our aerobatics email list, so some of you might be seeing a message like this from me in the near future.

And also, some photos have been posted on the Facebook page.

Click here: [(1) RC Aerobatics NZ | Facebook]

Frazer

Ray Baxendine

Fraser Brodie


300
EXTRA

Coastal Aeromodelling News Report

Malcolm Foster, the Marine Modeller

Greetings from Whakatane.

Spring has certainly pushed the grass up faster here in the Bay recently. It puts more stress on takeoffs and landings, especially with warbirds. A lot of nose-overs. I have maidened the new Thunderbolt and done a short run-in on the new OS 65LA. There's definitely lots of power there. After takeoff I quickly came to understand that I wouldn't have enough down elevator or right aileron trim. It was a bit uncomfortable flying a fast warbird around holding so much trim in. Anyway, tomorrow it's ready for round two, trim sorted, grass cut short (thanks to Dave)

I have also created a smallish glow-powered biplane, which is fun to fly, especially while I'm fiddling with the incidence on the upper and lower wings. Decalage, it's called. But did you also know decalage has an interesting meaning in the realm of psychology? "the non-simultaneous attainment of different but closely related operational abilities" And this term in itself comes from the French "a gap, or lag". Anyone know an old lag? How long's he been out of the big house? Why am I talking such rubbish? Must be spring fever.

Anyway, the little biplane is quite fun, but the Norvel 15 is a bit problematic - takes forever to throttle up after you've made the control input on the transmitter, and I can tell you, it's no fun trying to predict several seconds in advance when you're going to want an increase in power. I might just have to swap it out for a reliable old OS 15LA. The construction is based on a triangle of useful modelling materials - Balsa, Aluminium, Depron. I don't care that that spells "Bad", it went together really well. Admittedly I recycled the top wing from another earlier plane, but in this day and age "recycling " and "upcycling" are the current buzz words. In that vein, the aluminium is recycled from a beer can. Some in the club might remember my X-Plane design, which the HMAC committee was kind enough to award the most unusual design of 2010 trophy. Well, it's still flying like a dream. And the OS 25LA up front always starts first flick and runs like a sewing machine. Now that's what I call fun to fly.

Another plane I've been fiddling about with is my own-design electric Spitfire, which I also wrote about last newsletter. Well, it spat the dummy soon after I had written that it was all fixed up and flying nicely. It **was** flying nicely, but that insidious demon "vibration" was lurking, not in the wings (theatrical pun there) but in the bloody motor mount again. For the second time in so many weeks I found the electric motor suddenly "missing" in midair. Stupid of me, so now as well as balancing everything I have made a nice thick ply motor mount, and there are braces on the braces. I'll let you know if it "Spits" the dummy again!

May your glowplugs burn bright (but not toooo bright) until next time,

Malcolm

Electric fun fly day

A pictorial of last month's hugely successful fun fly day at the field. Electric and good weather. What more could you wish for?

Some I.C. planes snuck in


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TRANSALL

Aircraft I Dream About— the Dornier 28

Bruce Pickering

Claude Dornier was born on May 14, 1884, in Bavaria, to a French wine importer and his German wife. He grew up fascinated with science. After graduating from university Dornier moved to Munich and got a job at an engineering company. Three years later he started working for Luftschiffbau Zeppelin. Eventually he attracted the attention of Count Ferdinand von Zeppelin, who made him his scientific designer, with the assignment of improving the strength of light metals.

In 1923, following Zeppelin's failure, Dornier procured their workshop and began manufacturing metal flying boats under the name Flugzeugwerke (aircraft factory). Because the Treaty of Versailles restricted constructing aircraft, he had some of his designs built elsewhere; in Switzerland, Japan, and Italy. With the advent of the Nazi party in the 1930s, Dornier started again to build aircraft in Germany. During World War II, he established a repair and testing facility. When aircraft manufacturing was forbidden in Germany following the war he again was forced to relocate to Spain and then to Switzerland. There the company provided aeronautical consultancy services until they were able to return to Germany in 1954.

Following their return to Germany Dornier was re-established in the industry with the successful STOL *Do-27* and *Do-28* utility aircraft. The *Dornier 28* was designed as a twin engine STOL light utility aircraft. Based on the very successful *Do-27*, which in turn had its origins in the *Do-25*, as much as possible of the *Do-27* was used to reduce development and productions costs.

The *Do-28* was fitted with two engines in pods attached to stub wings mounted low on the fuselage. Originally fitted with 180hp four cylinder Lycoming engines, tests highlighted that the aircraft could not maintain altitude on one engine so production aircraft, called *Do-28A*, were fitted with 250hp engines. Later, this was increased further to 290hp, in variant *Do-28B*. Locating the main undercarriage below the engines allowed a much wider stance than on the narrow-tracked *Do-27*. To reduce drag models *28A* and *28B* had wheel spats fitted to the fixed undercarriage. The wingspan was increased as well. Entry to the cabin is through two huge gull wing windows over the stub wings.

At 9 metres long, with a wingspan of 13.8 metres, the aircraft had a maximum speed of 290 kph at sea level. Economical cruising speed was 240 kph and slow flight minimum speed was just 76 kph, giving it respectable STOL characteristics. Empty weight was 1,796 kg, and loaded weight was 2,722 kg.

Of all metal construction the structure was kept simple. All airframe components were arranged to be easy to repair or replace. The large cabin accommodates six passengers on two bench seats. To provide the desired STOL qualities the strutless high wing sported several high lift devices. These included fixed leading edge slats, and large trailing edge double slotted Fowler flaps that deflected forty five degrees. Additionally, the inner section of the double slotted Frise ailerons were lowered with the flaps, effectively making them flaperons. At the same time, the outer section of the ailerons moved upwards.

Sixty *Do-28A*’s were produced and a further sixty *Do-28B*’s were built—production ending in 1966. The aircraft served in a variety of roles, including military and civilian. Used for a diversity of purposes, including bush flying in the heat of Africa to the extreme cold of Greenland, as well as covert operations during the Vietnam war, medical evacuation, and passenger transport, it proved to be popular. One even found a home in New Zealand in 1996, where it did very little flying and spent most of its time dismantled in storage until it was offered for sale in 2016. Reportedly, several are still flying in various parts of the world.

What was it like to fly? Among other things pilots report that the flight station is roomy and comfortable, controls fall readily to hand, slow steep turns are benign, and the aircraft can be easily trimmed to fly hands off. It is said that every manoeuvre is predictable and easy to accomplish via the well harmonised controls and easy to scan instruments. STOL capabilities are excellent.

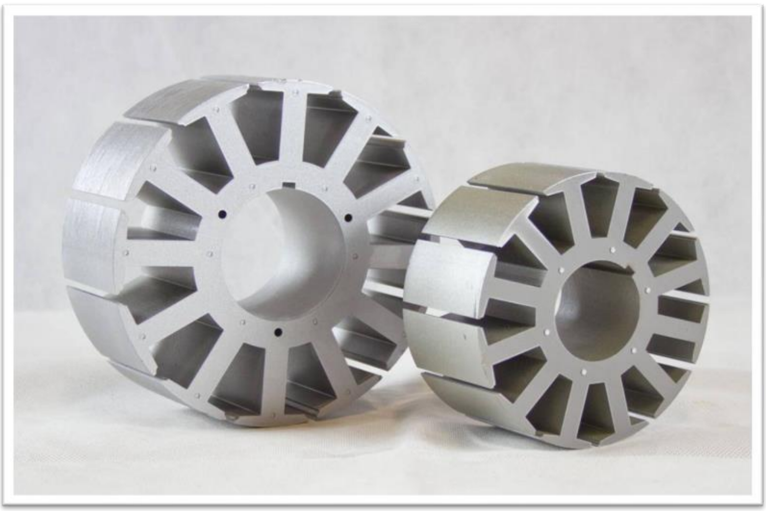
Would the *Dornier-28* make a good model? There are a lot of features that would make this unique twin an attractive, albeit somewhat challenging, project.

Motor Part Numbers: What do they mean?

Article courtesy Wayne Cartwright

When you get started using Electric Power Systems, one of the most confusing things you must deal with is all the different ways that motor companies use to describe and number their motors. Some use external dimensions, while others use stator dimensions. Some companies size their motors by comparing them to equivalent glow engines while others make up a numbering system that has nothing to do with the size or power of the motor. This can make it extremely confusing to compare a motor from one manufacturer to another with any degree of certainty. To be able to clear up a lot of the mysteries surrounding this problem, we will look at several of the different numbering systems that are currently being used and how they compare to one another.

With any brushless motor, the part of the motor that makes the power is the stator. The stator is made from a stack of steel laminations, most typically with 12 individual stator pole segments, and looks like the examples shown below.



These stators are wrapped with enamel coated copper wire to make each pole of the stator into an electromagnet. The Speed Controller then switches the power from the battery to each of the magnet poles in a rotary sequence, and then the magnets that are glued to the inside surface of the rotor can get attracted to, and then chase, the rotating magnetic field as it spins around the stator. An example of a typical wound stator and rotor assembly are shown in the next photo.

When you look at motors from various manufacturers, you can have 4 different motors, all with different numbering schemes, that sound like completely different motors, but are all physically the same size. The next photo shows 4 different motors from 4 different manufactures, with completely different model numbers, that are all based around a stator that is 28mm in diameter by 26mm in length.

The Cobra motor uses the stator size for its part number, followed by the number of turns of wire per stator pole pair. The Rimfire motor uses the name of the type of plane it is designed to go in, namely EF1 class pylon racers. The Turnigy motor uses the external dimensions of the motor, followed by the number of turns of wire per individual pole, and the E-Flite motor name gives no indication of motor size, it simply suggests that it makes about the same power as a .25 size 2-stroke glow engine.

In all cases, the amount of power that any motor can make is directly proportional to the surface area of the stator assembly, since this is where all the magnetic interaction takes place. Because of this, the most sensible way to describe the size and power output of a motor is to give the dimensions of the stator. Typically, in this numbering scheme, the stator size is represented by a 4-digit number, where the first two digits give the diameter of the stator in millimeters and the last two digits give the overall length of the stator, also in millimeters. For example, a 3520 motor would have a stator that is 35mm in diameter by 20mm in length. For larger motors, over 99mm in diameter, additional digits are used. In this case, a large multirotor motor that has a stator which is 120mm in diameter by 20mm in length would have a part number like 12020.

Most of the better motor manufacturers such as BadAss, Scorpion, Cobra, KDE, AXI and Tempest, to name a few, use this stator size numbering scheme to describe the size of their motors. With motors that use this numbering scheme it is relatively easy to compare one brand of motor to another. Motors with the same stator size and similar Kv values will make similar output power.

The next common numbering scheme for motors uses the external dimensions of the motor. Again, this is normally a 4-digit number, with the first 2 digits giving the outside diameter of the rotor can of the motor and the last 2 digits giving the over length of the motor, from the back mounting face to the front of the motor. A lot of motor companies such as EMP, RimFire, Leopard, NTM, Turnigy and others use this numbering scheme. While this numbering scheme does work, it is prone to many inaccuracies. If a motor has a longer rear housing, or if the front end has a raised bump on it for centering the prop adapter, different companies chose different external points to measure to, which leads to confusion. Because of this, you could have a 3538 motor, a 3536 motor and a 3540 motor that all have a 28mm x 20mm stator inside, and therefore all make about the same power, but the different part numbers make them sound like they are different size motors.

Describing a motor by the stator size would be the closest thing to the way internal combustion engines are sized by the cubic inches or liters of piston displacement. Using the external dimensions of a motor really does not tell you about the energy producing potential of a motor. A good example of this would be going to a car show. If you ask a guy what size engine he has in his car, and he says that it is a 327 cubic inch V8, you know exactly what size engine he has. If you go to another guy and ask him what size engine he has, and he tells you that it is 22 inches long and 23 inches wide and 20 inches tall, you have no idea of the motor size or power output whatsoever. One key parameter that can let you know if two motors are the same "size" is the weight of the motor. No matter how you name it, any motor made with 2826 size stator is going to weigh roughly the same as any other motor made with a 2826 size stator, since they all have similar parts inside. If one company's 2826 motor weighs 171 grams, and another company's 3548 motor weighs 169 grams, then you can be pretty sure that they are physically the same size motor, and will produce similar power.

Where people run into problems is when they are trying to compare two brands of motors where one is

using stator size, while the other is using external dimensions. They buy a kit that calls out an inexpensive import 2826 size motor, and then want to use a better-quality motor, so they get a 2826 from another vendor. When the motor arrives, they discover that it is WAY larger than they were expecting and does not fit in the airplane. A cheaper 2826 motor will have External dimensions of 28mm in diameter by 26mm in length. However, inside this motor, there is normally a stator that measures only 22mm in diameter by 8mm in length. To properly compare this motor to the other brand, that uses stator size, you should actually buy a 2208 size motor. This is where the weight of the motor can tell you if the motors are the same size or not.

For example, a Dualsky 2826-10 motor, that uses external dimensions for its model number, weighs just 43 grams and has a Kv value of 2200 RPM/Volt. If you look a Cobra 2826/10 motor, it weighs 171 grams and has a Kv value of 930 RPM/Volt. Obviously, these are two completely different motors, and are not interchangeable with one another!

If you look at the Cobra 2208/20 motor you will see that it weighs 46 grams and has a Kv value of 2000 RPM/Volt, making it a very close match to the Dualsky 2826 motor because it has the same size stator.

The next thing to look at is the Kv value of a motor. The Kv of a motor is not called Kilovolts as many people mistakenly refer to it. Kv is an engineering term that means the Voltage Constant of the motor and is expressed in units of RPM/Volt. Kv by itself tells you nothing about the power output of a motor, it simply states how fast the motor spins, in a no-load condition, with respect to the voltage applied to the motor. For example, if you have a motor that has a Kv value of 960 RPM/Volt, and you power it from a 3-cell LiPo battery that makes 11.1 volts, at full throttle, with no load applied, the motor will spin at approximately 960 x 11.1 or 10,656 RPM. The actual speed the motor spins at will vary a bit, depending on the ESC that is used to power the motor and the timing value set in the ESC.

The Kv value of a motor is usually represented in one of a few different ways. First, on motors like the BadAss, KDE and Tempest brands, the Kv value is explicitly stated as a dash number after the stator size. For example, a BA-2820-910Kv motor has a stator that is 28mm in diameter by 20mm in length and has a Kv value of 910 RPM per volt.

The next expression of the Kv value of the motor is given by the number of turns of wire wrapped around each individual stator pole of the motor. Dualsky and Suppo are two companies that use this numbering scheme, and these motors have part numbers such as 2830EA-10 or A2212/6 respectively. On these motors, the dash number at the end of the motor size number really does not tell you anything about the Kv value of the motor, it simply tells you how many turns of wire are wrapped around each stator pole. You must look up the actual Kv value in a specification table for the motor. Also, the Kv value given by the number of turns varies with every different stator size, so there is no consistency in this numbering scheme. Many companies will get around this by putting both the turns count and the actual Kv value of the motor, either on a sticker or by laser engraving directly on the motor.

Other companies will give the part number as the number of turns per pair of stator poles. Cobra motors and AXI motors are 2 of the companies that use this numbering method and have part numbers like C-2820/10 which means that the stator size is 28mm in diameter by 20mm in length, and there are 10 turns of wire per pair of poles or 5 turns per pole. These turn numbers are almost always even values like 8, 10, 12 or 14 and every pole has the same number of turns, with each being half of the number shown. Occasionally you will need a motor with a K value that is in between what you could get going from one even number to the next. In rare cases you will see a motor that uses the pole pair turns designation, but it is an odd number, one example is the Cobra C-2217/7. In this case in each pole pair, one pole will have 3 turns and the other will 4 turns. This provides a Kv value roughly half-way between what you would get in a 6-turn versus an 8-turn motor.

Further confusing the motor numbering issues are companies that use a type of hybrid numbering scheme that gives mixed information about the motor. Hacker motors use a numbering scheme like this with part numbers such as A20-26M or A30-14L. In these motors, the A means that it is an Airplane motor. The first two digits gives the diameter of the motor stator in millimeters. The next two numbers, after the dash, gives the number of turns of wire wrapped around each pole pair, and the letter at the end gives a relative length of the stator in that family of motors. For this S, M, L and XL are used to signify Small, Medium, Large and Extra-Large stator length. Further adding to the confusion is the fact that the length of the S, M, L and XL stators is different for each diameter of stator, so you need to go to the owner’s manual and hope to find those values or resort to taking the motor apart and actually measuring the length of the stator with a ruler or set of calipers.

Torque motors is another brand that uses a mixed hybrid numbering scheme with part numbers such as 2830T/1095 or 2814T/820. In these part numbers, the first 2 digits is the diameter of the stator in millimeters and the next 2 digits followed by the letter T means that the motor has that many turns of wire per pole pair. No reference to stator length is given at all in these part numbers. Finally, the number after the slash indicates the Kv value of the motor in RPM/Volt. This causes confusion with modelers that want to use a different motor than the one recommended for their kit, and then buy another brand with a similar part number. For example, the Torque 2814T/820 motor actually has a 28x20mm stator in it with a 14-turn wind per pole pair. If someone buys a 2814 motor from another company with a Kv close to 820 RPM/Volt, when they get it they discover that it is 2/3 the size of the Torque motor and therefore only makes about 2/3 the amount of power. In this case looking at the motor weight tells the tale. The Torque 2814T/820 motor weighs 143 grams. If you look at the weight of an AXI 2814/20 motor, which has a Kv value of 840 RPM/Volt, it only weighs 106 grams, so it is obviously a smaller motor. The proper match for the Torque motor from AXI would be the 2820/14 motor, which has a Kv value of 860 and weighs 148 grams.

Another numbering method that is used by several motor companies, such as E-Flite, RimFire, NTM and some Turnigy models, is to give the motor size by the equivalent of the 2-stroke glow engine that the motor is designed to replace. This is done to try and simplify things for people that are making the switch from glow engines to electric motors, but there are several serious problems with this naming scheme. First is the fact that electric motor will often spin larger props at lower speeds than glow engines do. Also, because electric motors tend to spin at approximately the same speed, regardless of prop size used, the amount of power they make varies dramatically with prop size. A Power 25 motor ONLY makes the power of a .25 2-stroke glow engine with certain specific combinations of battery voltage and prop size. If you put a prop on that is too small, the Power 25 motor might only make the power of a .10 glow engine, and if you put too large of a prop on it, it could make the power of a .40 glow engine, right up to the point where it overheats and burns up!

This is where the commonly used rule of thumb that says "1 cubic inch of 2-stroke glow power is roughly equal to 2000 watts of electric power" comes into play. Using this comparison, a .25 glow engine is roughly equal to a 500-watt electric motor. Likewise, a .40 glow engine would be equal to 800 watts and a .60 glow engine would be equal to 1200 watts of electric power. If you use one of these types of motors, the best thing to do is use a wattmeter in between the battery and ESC to measure the voltage and current of the system, which can then be expressed as watts of input power. If you have one company's Power 40 motor, and it is running on a 4-cell battery with a prop that pulls 55 amps of current, you can calculate the watts by multiplying the battery voltage, 14.8 volts, by the current, and 14.8 x 55 equals 814 watts, which according to our rule of thumb truly is the power of a .40 glow engine.

On the other hand, if you are using a smaller prop, and the motor is only pulling 34 amps, then the motor is making 14.8 x 34 or 503 watts of power. With this prop, your Power 40 motor is effectively making the same power as a .25 glow engine, and the performance will suffer. This is why it is critically important to have a wattmeter to measure the actual power of your electric motors, so you know what performance to expect and to see what prop is best to use on the motor.

Understanding what motor part numbers actually mean is very important when it comes to selecting a motor for a given aircraft. However, this is not the only information you need to make an informed decision about a motor purchase. There is a TON of other important information that, unfortunately, most motor manufacturers leave out when listing their motors. Quite often a motor manufacturer will simply state that a motor is "For use on 4 to 6 cells with props from 12x6 to 15x8" and nothing else.

After reading this, many beginners to electric power systems will mistakenly think, "If I use a bigger battery, the motor will make more power, so I better use a bigger prop to absorb all that power" when in fact, the exact opposite is true. When the motor spins slower, you need to use a BIGGER prop to make the required power and when the motor spins faster you need a SMALLER prop to keep from pulling too much current from the motor. In this specific example, you would probably use a 15x8 prop on 4 cells, a 13x8 or 14x7 prop on 5 cells and a 12x6 prop on 6 cells to get the motor to pull the maximum safe current so that it makes the most power.

The absolute best information available in this regard is a performance data chart that shows the real performance values of the motor with a variety of different props over a range of battery voltages. Unfortunately, only a small handful of companies take the time to measure and publish this data. It is EXTREMELY time consuming to do this, taking several days of work to test, record and compile this data into meaningful charts for each and every motor, but without this data, you are essentially shooting in the dark, randomly trying different props to figure out which one will work for your motor.

Some of the brands that do provide this level of data are BadAss, Cobra, KDE, T-Motor and Tempest. The next few pages show examples of the data charts provided by these brands of motors. With this kind of data, it becomes very easy to know the exact performance that you can expect from any given motor and prop combination, running on a specific size battery. With the information about the Input Watts, you can calculate the Watts per Pound for a given model and get a good idea of the power level that the motor and prop combination is providing. This also allows you to make sure that you are selecting the correct size and capacity of battery, as well as the correct amperage of ESC to purchase to make sure that you have a completely matched power system that will work as expected and provide hundreds of hours of trouble-free operation.

Typical BadAss Motor Performance Data Chart

BadAss BA-2310-2350 Performance Test Data

Magnets	Motor Wind	Motor Kv	No-Load Current	Motor Resistance	I Max	P Max (4S)
14-Pole	12-Turn Delta	2350 RPM/Volt	Io = 2.34 Amps @ 10v	Rm = 0.029 Ohms	42 Amps	620 W

Stator	Outside Diameter	Body Length	Total Shaft Length	Shaft Diameter	Motor Weight
12-Slot	29.1 mm, 1.146 in.	27.6 mm, 1.087 in.	46.0 mm, 1.811 in.	4.00 mm, 0.157 in.	58.2 gm, 2.05 oz

Test Data From	Input	8.0 V	10.0 V	12.0V	14.0V	Measured Kv value	Measured Rm Value
Sample Motor	Io Value	1.873 A	2.337 A	2.582 A	2.756 A	2368 RPM/Volt @ 10v	0.0293 Ohms

2-cell Li-Po Test Data

Prop Manf.	Prop Size	Li-Po Cells	Input Voltage	Motor Amps	Input Watts	Prop RPM	Pitch Speed in MPH	Thrust Grams	Thrust Ounces	Thrust Eff. Grams/W
APC	6x4-E	2	7.4	15.83	117.1	15,313	58.0	470	16.57	4.01
APC	6x4.3-E	2	7.4	21.61	159.9	14,580	59.4	649	22.90	4.06
APC	6x4.5-E	2	7.4	20.94	155.0	14,648	62.4	657	23.19	4.24
APC	6x5.5-E	2	7.4	19.58	144.9	14,844	77.3	505	17.81	3.49
APC	6x6-E	2	7.4	21.56	159.5	14,564	82.8	523	18.43	3.28
APC	7x4-E	2	7.4	25.72	190.3	13,977	52.9	811	28.60	4.26
APC	7x5-E	2	7.4	30.95	229.0	13,218	62.6	776	27.38	3.39
APC	7x6-E	2	7.4	32.06	237.2	13,068	74.3	836	29.50	3.53
APC	7x7-E	2	7.4	36.72	271.7	12,370	82.0	779	27.47	2.87
APC	8x4-E	2	7.4	34.56	255.7	12,666	48.0	1014	35.78	3.97
APC	8x6-E	2	7.4	46.19	341.8	11,363	64.6	1046	36.91	3.06

3-cell Li-Po Test Data

Prop Manf.	Prop Size	Li-Po Cells	Input Voltage	Motor Amps	Input Watts	Prop RPM	Pitch Speed in MPH	Thrust Grams	Thrust Ounces	Thrust Eff. Grams/W
APC	4.7x4.25-E	3	11.1	18.97	210.5	23,174	93.3	457	16.13	2.17
APC	4.75x4.75-E	3	11.1	21.61	239.9	22,955	103.3	462	16.29	1.92
APC	4.75x5.5-E	3	11.1	23.71	263.2	22,454	116.9	425	15.01	1.62
APC	5x4.3-E	3	11.1	25.81	286.5	21,677	88.3	782	27.57	2.73
APC	5x4.5-E	3	11.1	26.79	297.4	21,474	91.5	775	27.33	2.61
APC	5x4.6-E	3	11.1	26.82	297.7	21,509	93.7	821	28.96	2.76
APC	5x5-E	3	11.1	23.55	261.4	22,091	104.6	470	16.58	1.80
APC	5.25x4.75-E	3	11.1	26.71	296.5	21,530	96.8	649	22.89	2.19
APC	5.25x6.25-E	3	11.1	34.03	377.8	20,555	121.7	597	21.07	1.58
APC	5.5x4.5-E	3	11.1	28.24	313.4	21,804	92.9	701	24.74	2.24
APC	6x4-E	3	11.1	31.59	350.7	21,232	80.4	923	32.55	2.63
APC	6x4.3-E	3	11.1	39.91	443.0	19,840	80.8	1234	43.54	2.79
APC	6x4.5-E	3	11.1	38.22	424.3	20,143	85.8	1237	43.64	2.92
APC	6x5.5-E	3	11.1	37.07	411.5	20,331	105.9	967	34.11	2.35
APC	6x6-E	3	11.1	40.99	455.0	19,701	111.9	954	33.66	2.10
APC	7x4-E	3	11.1	50.15	556.7	18,688	70.8	1534	54.12	2.76

4-cell Li-Po Test Data

Prop Manf.	Prop Size	Li-Po Cells	Input Voltage	Motor Amps	Input Watts	Prop RPM	Pitch Speed in MPH	Thrust Grams	Thrust Ounces	Thrust Eff. Grams/W
APC	4.1x4.1-E	4	14.8	19.88	294.3	31,372	121.8	535	18.85	1.82
APC	4.5x4.1-E	4	14.8	25.74	381.0	30,433	118.2	739	26.06	1.94
APC	4.7x4.25-E	4	14.8	31.44	465.3	29,635	119.3	758	26.73	1.63
APC	4.75x4.75-E	4	14.8	35.23	521.4	28,982	130.4	745	26.29	1.43
APC	4.75x5.5-E	4	14.8	38.01	562.5	28,484	148.4	688	24.28	1.22
APC	5x4.3-E	4	14.8	44.75	662.3	27,600	112.4	1277	45.04	1.93
APC	5x4.5-E	4	14.8	47.67	705.4	27,150	115.7	1259	44.40	1.78
APC	5x4.6-E	4	14.8	46.13	682.7	27,321	119.0	1355	47.80	1.99
APC	5x5-E	4	14.8	39.24	580.8	28,253	133.8	759	26.78	1.31
APC	5.25x4.75-E	4	14.8	46.24	684.3	26,804	120.6	1034	36.46	1.51
APC	5.5x4.5-E	4	14.8	46.41	686.9	27,400	116.8	1114	39.28	1.62

Typical Cobra Motor Performance Data Chart

Cobra C2814/10 Motor Propeller Data

Motor Wind	Motor Kv	No-Load Current	Motor Resistance	I Max	P Max (3S)
10-Turn Delta	1700 RPM/Volt	Io = 2.06 Amps @ 10v	Rm = 0.024 Ohms	48 Amps	530 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	6x4-E	11.1	13.79	153.1	16,583	62.8	608	21.45	3.97
APC	6x5.5-E	11.1	17.24	191.4	16,243	84.6	642	22.65	3.35
APC	7x4-E	11.1	23.22	257.7	15,652	59.3	1045	36.86	4.05
APC	7x5-E	11.1	29.55	328.0	15,038	71.2	1068	37.67	3.26
APC	7x6-E	11.1	30.61	339.7	14,918	84.8	1138	40.14	3.35
APC	8x4-E	11.1	34.41	381.9	14,567	55.2	1431	50.48	3.75
APC	8x6-E	11.1	50.17	556.8	13,026	74.0	1507	53.16	2.71
APC	9x4.5-E	11.1	46.23	513.2	13,410	57.1	1917	67.62	3.74

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	23.49	347.7	21,348	80.9	1017	35.87	2.93
APC	6x5.5-E	14.8	28.89	427.6	20,711	107.9	1043	36.79	2.44
APC	7x4-E	14.8	40.23	595.4	19,494	73.8	1707	60.21	2.87

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)

Typical KDE Multirotor Motor Performance Data Chart

MOTOR VERSION	VOLTAGE LiHV [V]	PROPELLER SIZE	THROTTLE RANGE	AMPERAGE [A] (LOWER IS BETTER)	POWER INPUT [W] (LOWER IS BETTER)	POWER INPUT [hp]	THRUST OUTPUT [g] (HIGHER IS BETTER)	THRUST OUTPUT [N]	THRUST OUTPUT [lb]	RPM [rev/min] (HIGHER IS BETTER)	EFFICIENCY [g/W] (HIGHER IS BETTER)	EFFICIENCY [lb/hp]
KDE5215XF-435 (435Kv) KDEXF-UAS95HVC S.R. ENABLED	15.4V (4S) 17.4V MAX	18.5" x 6.3 DUAL-EDN (KDE)	25.0%	2.0	34	0.05	370	3.63	0.82	1880	10.88	17.89
			37.5%	3.9	67	0.09	680	6.67	1.50	2520	10.15	16.69
			50.0%	6.8	118	0.16	1100	10.79	2.43	3220	9.32	15.33
			62.5%	11.3	196	0.26	1600	15.69	3.53	3840	8.16	13.42
			75.0%	17.4	302	0.40	2170	21.28	4.78	4440	7.19	11.81
			87.5%	24.9	433	0.58	2810	27.56	6.19	5840	6.49	10.67
			100.0%	33.9	589	0.79	3650	35.79	8.05	6800	6.20	10.19
		18.5" x 6.3 TRIPLE-EDN (KDE)	25.0%	2.2	38	0.05	460	4.51	1.01	1800	12.11	19.90
			37.5%	4.6	80	0.11	830	8.14	1.83	2480	10.38	17.06
			50.0%	8.6	149	0.20	1310	12.85	2.89	3040	8.79	14.45
			62.5%	14.5	252	0.34	1900	18.63	4.19	3660	7.54	12.40
			75.0%	22.6	393	0.53	2560	25.11	5.64	4280	6.51	10.71
			87.5%	31.6	549	0.74	3240	31.77	7.14	4880	5.90	9.70
			100.0%	43.5	756	1.01	4180	40.99	9.22	5360	5.53	9.09
		21.5" x 7.3 DUAL-EDN (KDE)	25.0%	3.2	55	0.07	750	7.35	1.65	1880	13.64	22.42
			37.5%	7.0	121	0.16	1330	13.04	2.93	2520	10.99	18.07
			50.0%	13.5	234	0.31	2110	20.69	4.65	3120	9.02	14.82
			62.5%	23.2	403	0.54	3030	29.71	6.68	3780	7.52	12.36
			75.0%	36.4	633	0.85	4040	39.62	8.91	4320	6.38	10.49
			87.5%	51.5	896	1.20	5150	50.50	11.35	4880	5.75	9.45
			100.0%	69.0	1200	1.61	6380	62.57	14.07	5340	5.32	8.74
	23.1V (6S) 26.1V MAX	15.5" x 5.3 DUAL-EDN (KDE)	25.0%	2.6	67	0.09	580	5.69	1.28	3180	8.66	14.23
			37.5%	5.3	138	0.19	1090	10.69	2.40	4320	7.90	12.99
			50.0%	9.3	242	0.32	1730	16.97	3.81	5400	7.15	11.75
			62.5%	14.9	388	0.52	2460	24.12	5.42	6420	6.34	10.42
			75.0%	23.6	615	0.82	3400	33.34	7.50	7580	5.53	9.09
			87.5%	33.9	884	1.19	4370	42.86	9.63	8580	4.94	8.13
			100.0%	46.6	1216	1.63	5730	56.19	12.63	9600	4.71	7.75
		15.5" x 5.3 TRIPLE-EDN (KDE)	25.0%	3.1	80	0.11	690	6.77	1.52	3060	8.63	14.18
			37.5%	6.5	169	0.23	1290	12.65	2.84	4180	7.63	12.55
			50.0%	11.4	297	0.40	2010	19.71	4.43	5160	6.77	11.13
			62.5%	18.3	477	0.64	2850	27.95	6.28	6180	5.97	9.82
			75.0%	29.6	772	1.04	3920	38.44	8.64	7240	5.08	8.35
			87.5%	42.7	1114	1.49	5040	49.43	11.11	8240	4.52	7.44
			100.0%	58.5	1526	2.05	6540	64.14	14.42	9120	4.29	7.05
		18.5" x 6.3 DUAL-EDN (KDE)	25.0%	3.9	101	0.14	990	9.71	2.18	3000	9.80	16.11
			37.5%	7.8	203	0.27	1730	16.97	3.81	3980	8.52	14.01
			50.0%	14.4	375	0.50	2670	26.18	5.89	4920	7.12	11.71
			62.5%	24.0	626	0.84	3830	37.56	8.44	5880	6.12	10.06
			75.0%	39.5	1030	1.38	5310	52.07	11.71	6900	5.16	8.48
			87.5%	58.6	1529	2.05	6850	67.18	15.10	7800	4.48	7.37
			100.0%	74.5	1944	2.61	8420	82.57	18.56	8460	4.33	7.12
	30.8V (8S) 34.8V MAX	15.5" x 5.3 DUAL-EDN (KDE)	25.0%	4.3	149	0.20	1100	10.79	2.43	4320	7.38	12.14
			37.5%	7.9	274	0.37	1840	18.04	4.06	5560	6.72	11.04
			50.0%	14.2	494	0.66	2840	27.85	6.26	6900	5.75	9.45
			62.5%	23.2	807	1.08	4080	40.01	8.99	8220	5.06	8.31
			75.0%	36.6	1273	1.71	5540	54.33	12.21	9540	4.35	7.15
			87.5%	56.1	1952	2.62	7480	73.35	16.49	10920	3.83	6.30
			100.0%	72.7	2529	3.39	9110	89.34	20.08	11880	3.60	5.92
		15.5" x 5.3 TRIPLE-EDN (KDE)	25.0%	4.8	167	0.22	1230	12.06	2.71	4040	7.37	12.11
			37.5%	9.3	323	0.43	2120	20.79	4.67	5260	6.56	10.79
			50.0%	17.9	622	0.83	3340	32.75	7.36	6640	5.37	8.83
			62.5%	29.0	1009	1.35	4690	45.99	10.34	7820	4.65	7.64
			75.0%	45.5	1583	2.12	6320	61.98	13.93	9060	3.99	6.56
			87.5%	66.0	2296	3.08	8260	81.00	18.21	10160	3.60	5.91
			100.0%	85.5	2975	3.99	9810	96.20	21.63	11060	3.30	5.42

Note : *performance chart provided under the test conditions listed below. Measurements taken under alternate conditions will affect the final results.*

Location : *KDE Direct HQ Dynamometer V2 (Bend, Oregon)*
Altitude : *3730 ft (1137 m)*
Pressure : *30.3 inHg (1026 hPa)*
Temperature : *72 °F (22°C)*
Humidity : *35% (Relative)*

Typical T-Motor Multirotor Motor Performance Data Chart

Test Report			
Test Item	P60 KV170	Report NO.	P.00002

Specifications			
Internal Resistance	80mΩ	Configuration	24N28P
Shaft Diameter	6mm	Motor Dimensions	Φ69×37mm
Stator Diameter	62mm	Stator Height	15mm
AWG	16#	Cable Length	600mm
Weight Including Cables	373g	Weight Excluding Cables	343g
No.of Cells(Lipo)	6-14S	Idle Current@10v	1A
Max Continuous Power 180S	1800W	Max Continuous current 180S	38A

Load Testing Data			
Ambient Temperature	18℃	Voltage	DC Power Supplier

Item No.	Voltage (V)	Prop	Throttle	Current (A)	Power (W)	Thrust (G)	RPM	Efficiency (G/W)	Operating Temperature (℃)
P60 KV170	48	T-motor 20*6CF	50%	5.4	259.20	2116	4152	8.16	55
			55%	6.4	307.20	2371	4425	7.72	
			60%	7.7	369.60	2762	4709	7.47	
			65%	9.3	446.40	3125	5014	7.00	
			75%	13.2	633.60	4002	5626	6.32	
			85%	17.3	830.40	4821	6177	5.81	
			100%	25.4	1219.20	6246	6992	5.12	
		T-motor 22*6.6CF	50%	6.6	316.8	2801	3703	8.84	85
			55%	8.6	412.8	3312	4005	8.02	
			60%	9.9	475.2	3763	4289	7.92	
			65%	12.4	595.2	4356	4575	7.32	
			75%	17.1	820.8	5372	5091	6.54	
			85%	23.2	1113.6	6582	5635	5.91	
			100%	34	1632	8414	6374	5.16	

Notes:The test condition of temperature is motor surface temperature in 100% throttle while the motor run 10min.

Typical Tempest Motor Performance Data Chart

Tempest 2814-2100 Performance Test Data

Magnets	Motor Wind	Motor Kv	No-Load Current	Motor Resistance	I Max	P Max (4S)
14-Pole	8-Turn Delta	2100 RPM/Volt	Io = 4.17 Amps @ 10v	Rm = 0.017 Ohms	68 Amps	1010 W

Stator	Outside Diameter	Body Length	Total Shaft Length	Shaft Diameter	Motor Weight
12-Slot	35.4 mm, 1.394 in.	32.4 mm, 1.276 in.	54.8 mm, 2.157 in.	5.00 mm, 0.197 in.	109 gm, 3.84 oz

Test Data From	Input	8.0 V	10.0 V	12.0V	14.0V	Measured Kv value	Measured Rm Value
Sample Motor	Io Value	3.835 A	4.171 A	4.534 A	4.879 A	2081 RPM/Volt @ 10v	0.0170 Ohms

3-cell Li-Po Test Data

Prop Manf.	Prop Size	Li-Po Cells	Input Voltage	Motor Amps	Input Watts	Prop RPM	Pitch Speed in MPH	Thrust Grams	Thrust Ounces	Thrust Eff. Grams/W
APC	6x4.3-E	3	11.1	34.41	381.9	19,355	78.8	1157	40.81	3.03
APC	6x4.5-E	3	11.1	32.63	362.2	19,595	83.5	1152	40.64	3.18
APC	6x5.5-E	3	11.1	30.74	341.2	19,790	103.1	896	31.61	2.63
APC	6x6-E	3	11.1	35.06	389.2	19,341	109.9	897	31.64	2.30
APC	6.5x5.0-P	3	11.1	32.93	365.6	19,338	91.6	941	33.19	2.57
APC	6.5x5.5-P	3	11.1	35.08	389.4	19,250	100.3	962	33.93	2.47
APC	6.5x6.0-P	3	11.1	38.65	429.0	18,896	107.4	942	33.23	2.20
APC	6.5x6.5-P	3	11.1	40.99	455.0	18,695	115.1	882	31.11	1.94
APC	7x4-E	3	11.1	45.82	508.6	18,331	69.4	1524	53.76	3.00
APC	7x5-E	3	11.1	53.70	596.1	17,549	83.1	1434	50.58	2.41
APC	7x6-E	3	11.1	55.18	612.5	17,393	98.8	1506	53.12	2.46
APC	7x7-E	3	11.1	64.17	712.3	16,458	109.1	1402	49.45	1.97
APC	8x4-E	3	11.1	61.28	680.2	16,748	63.4	1837	64.80	2.70
MAS	6x4x3	3	11.1	27.91	309.8	20,127	76.2	1016	35.84	3.28
MAS	7x4x3	3	11.1	43.11	478.6	18,611	70.5	1454	51.29	3.04

4-cell Li-Po Test Data

Prop Manf.	Prop Size	Li-Po Cells	Input Voltage	Motor Amps	Input Watts	Prop RPM	Pitch Speed in MPH	Thrust Grams	Thrust Ounces	Thrust Eff. Grams/W
APC	5x4.3-E	4	14.8	36.39	538.5	26,285	107.0	1148	40.49	2.13
APC	5x4.5-E	4	14.8	38.75	573.5	26,034	110.9	1130	39.86	1.97
APC	5x4.6-E	4	14.8	37.78	559.1	26,121	113.8	1202	42.40	2.15
APC	6x4-E	4	14.8	43.16	638.7	25,506	96.6	1331	46.95	2.08
APC	6x4.3-E	4	14.8	55.29	818.3	24,226	98.6	1845	65.08	2.25
APC	6x4.5-E	4	14.8	50.98	754.4	24,651	105.0	1843	65.01	2.44
APC	6x5.5-E	4	14.8	50.23	743.4	24,741	128.9	1390	49.03	1.87
APC	6x6-E	4	14.8	56.31	833.3	24,156	137.3	1375	48.50	1.65
APC	6.5x5.0-P	4	14.8	53.30	788.9	24,238	114.8	1483	52.31	1.88
APC	6.5x5.5-P	4	14.8	56.50	836.2	23,963	124.8	1494	52.70	1.79
APC	6.5x6.0-P	4	14.8	61.19	905.6	23,521	133.6	1471	51.89	1.62
APC	6.5x6.5-P	4	14.8	63.73	943.2	23,230	143.0	1407	49.63	1.49
APC	7x4-E	4	14.8	76.73	1135.6	22,377	84.8	2253	79.47	1.98
MAS	6x4x3	4	14.8	43.53	644.3	25,529	96.7	1619	57.11	2.51
MAS	7x4x3	4	14.8	68.39	1012.1	23,183	87.8	2137	75.38	2.11

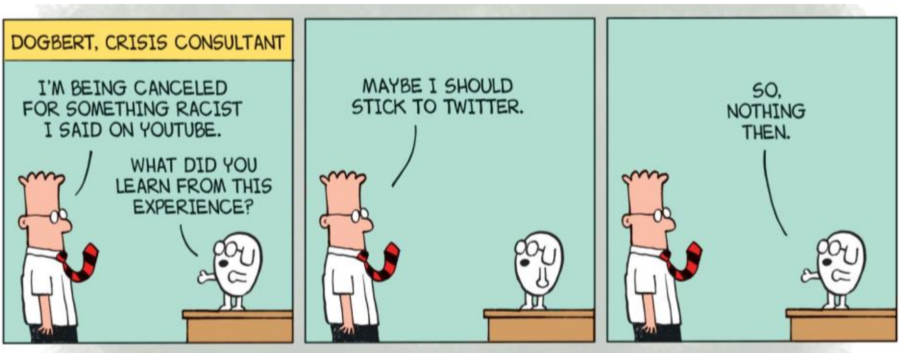
5-cell Li-Po Test Data

Prop Manf.	Prop Size	Li-Po Cells	Input Voltage	Motor Amps	Input Watts	Prop RPM	Pitch Speed in MPH	Thrust Grams	Thrust Ounces	Thrust Eff. Grams/W
APC	5x4.3-E	5	18.5	53.98	998.6	31,273	127.3	1630	57.50	1.63
APC	5x4.5-E	5	18.5	58.62	1084.4	30,758	131.1	1585	55.91	1.46
APC	5x4.6-E	5	18.5	56.34	1042.3	30,959	134.9	1707	60.21	1.64
APC	6x4-E	5	18.5	63.71	1178.6	30,066	113.9	1839	64.87	1.56
APC	6x5.5-E	5	18.5	73.71	1363.6	29,220	152.2	1880	66.31	1.38
MAS	6x4x3	5	18.5	63.38	1172.5	30,204	114.4	2063	72.77	1.76

As you can see, there are a lot of lot of different ways that motor manufactures use to describe the physical size and power output of their motors. Once you understand these differences, and know exactly what to look for, it does start to make sense and then becomes easier to cross reference one motor brand to another when picking out a motor. Obviously, the more data that a specific motor company provides about their products, the easier it is to make sure that you are getting the right motor for your specific application.

Learning all the details that go with electric power systems can be a bit challenging at first, but once you have an understanding about all the different terminology and numbering schemes used to name motors, the process to get the correct motor becomes fairly easy.

Wayne assembling his electric aerobatic aircraft



Some more field day action

Alans Super Cruiser before it stalled on take-off. All repaired now.

Getting ready for flight

Lyle's turbo prop

New member Rudi Weideman with his Cessna

Aces of Stick Squadron
Lyle 75 four stroke, Gordon 55 2 stroke,
Wayne 1000 amp motor

Grant seen here with his Stick SU 31

Gordon

What goes up

Must come down

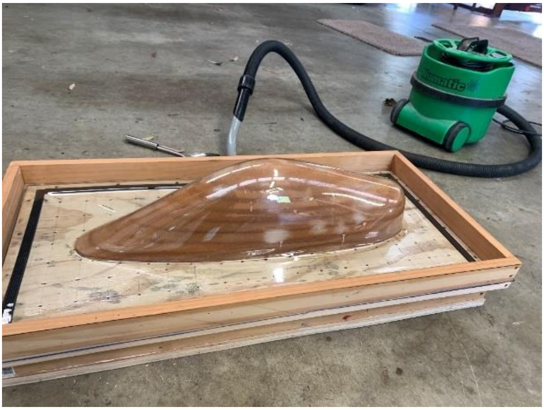
Sagitta 1/3 Scale Re-build

Stuart Ward

Twelve months ago, a friend handed me a large wooden scale glider that was in the incorrect number of pieces. The glider is a Sagitta 1/3 scale designed by Gilles Schmitt. It had suffered from a 90° landing. One of the wing panels was in two pieces and the fuse had many cracks. The canopy was a write off.

After some considerable time procrastinating, I figured that the time had come to do the repair. The wing repair was easy. All the spars, leading edge and trailing edge were spliced with similar wood at 12:1.

The biggest challenge was the making of a new canopy. I could not buy one so I had to make one. I don't think it turned out too bad.



The finished article, nicely completed and ready to fly once again

(1) Tomboy Extended wingspan 43 " with Floats suitable for the annual International R O W Tomboy challenge each year fitted with Genuine English Mills .75cc Diesel

motor with original gas tank. Never flown....$180.00

(2) **Porterfield Zephyr** scratch Built from plan Fabric Heatshrink 65" span 4channel Electric Motor & ESC 3 servos & Rx needs 3S Lipo. Never flown.$180

Contact Al Ward if interested

(3) I am selling the following RC Aircraft:

PICA Balsa KIT T-28 Trojan (Built and Never Flown)

80 Inch Wingspan, Flaps, Robart Retracts,

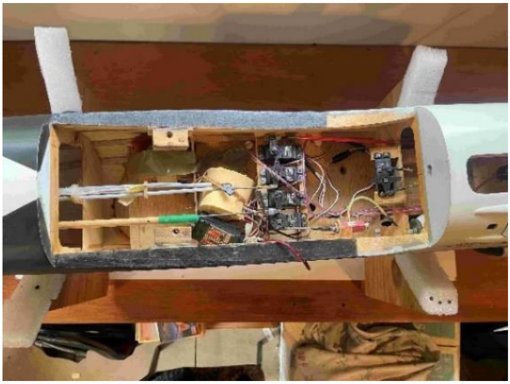
G2300 MKII Super Tigre Engine (New)

Please See Attached Photos. The Aircraft can be viewed in Pukekohe.

I am asking NZ$1,500 for this great example of a T-28 RC Aircraft.

Please contact me on my email (mmoneym09@gmail.com)

Martin Mooney



(4) FMS P51 MUSTANG 1450MM WINGSPAN

EXCELLENT CONDITION

FLYS GREAT ON 4 CELL LIPO

HAS NEW 70 AMP ESC

NEW CIRCUIT BOARD FOR RETRACTS AND NEW TAIL WHEEL RETRACT.

ONLY SELLING AS I NEED THE ROOM IN MY GARAGE.

$320

PICK UP HAMILTON

ALAN

PH 021 02593002

Parting Shot

Coming Events 2024

What's On, When and Where

October

Time	Event
Saturday, October 5	
all-day	RC Pattern Aerobatics Comp - Waharoa
Sunday, October 6	
all-day	HMAC Float Planes @Lake D (Confirmed)
Saturday, October 12	
all-day	Scale Aerobatics (IMAC) Comp - Galatea
Sunday, October 13	
all-day	Scale Aerobatics (IMAC) Comp - Galatea
Friday, October 18	
all-day	Tokoroa Jet Meeting
Saturday, October 19	
all-day	Tokoroa Jet Meeting
all-day	MANZ Large Model Rally - Waharoa

all-day	RC Pylon Racing - Airsail MAC

Sunday, October 20

all-day	Tokoroa Jet Meeting
all-day	MANZ Large Model Rally - Waharoa
all-day	RC Pylon Racing - Airsail MAC

November

Saturday, November 2

all-day	Warbirds Over Waharoa

Saturday, November 9

all-day	RC Pylon Racing - Airsail MAC

Sunday, November 10

all-day	RC Pylon Racing - Airsail MAC
all-day	HMAC - Scale Model Day (& Scale Primer Competition)

Sunday, November 17

all-day	HMAC Float Planes @Lake D (Confirmed)

Friday, November 22

all-day	RC Glider Aerotow - Matamata Goat Farm
all-day	Tokoroa Jet Meeting

Saturday, November 23

all-day	RC Glider Aerotow - Matamata Goat Farm
all-day	Tokoroa Jet Meeting

Sunday, November 24

all-day	RC Glider Aerotow - Matamata Goat Farm

Till next month, stay safe

Carry an extinguisher just in case

Please refer to the clubs website for any cancellations or additions to programmed events

Next Flight Lines November 2024 Newsletter deadline – Wednesday 6 November 2024

For further up to date event info please visit:
http://www.hamiltonmac.org.nz/