Torque Back

Vol. 12 No. 01 February - April 2012

Volume or Volts ?

The news letter of the Hobart Model Aero Club inc.

www.hobartmodelaeroclub.org.au

EDITOR TORQUES

Re :- errors and some perhaps different information in the club magazine

Dear readers,

As editor of the club magazine in order to keep the content interesting and diverse I search the internet's vastness to bring to you articles of interest. Due to copyright issues I choose not to or more correctly **can not** modify any content that is not written by myself. As I have done in the last three editions I have simply cut and pasted other author content seeking permission to do so, this brings with it the errors and perhaps differences on the way things are done here in our club. So next time you feel that there is something that is incorrect or needs clarifying please feel free to write to the editor ***gels@netspasce.net.au*** and I will publish it in "**Torque-ative"** letters to the Editor column. As I would like to any-way.

So please be aware of this and if you have any issues, please by all means feel free to take over the editorship of the magazine. For some of you, you may not be unaware as to what goes into producing this publication. I spend many an hour collating the content and laying it up to produce what I hoped at the begin was a complete change of appearance of the newsletter (this is not to belittle the fine efforts of the previous editor(s) in anyway shape nor form).

Just back to the torque-ative letters to the editor column, may I encourage the readership to contribute to the new column as some have already as its there for you.

Your humbled Editor

MYSTERY TORQUE

Who is this familiar face?

Ask around the club members and I am sure that there is one person in particular that will most definitely know the answer. You have been more likely than not to have met him and had a conversation with him. Read more about this dashing gentleman on page 9.

IN THIS ISSUE

Hobart Model Aero Club inc.
PO Box 1117
Rosny Park 7018.

In the next Edition

AEROBATIC TORQUE

Fun Fly Aerobatics

12 January 2012
By: CD Tony Gray.

The fourth of Jan the scheduled day was cancelled due to forecast high winds. The event was rescheduled to Sat 12, it was an excellent day with light winds from the South.

There was a total of nine entries. Four manoeuvres were flown in any order, these were, two loops, two rolls, cuban eight, inverted and the landing, these were capably judged by Jack Tonks and Peter Ralph. Gavin flew his Swallow before the event and was on his landing approach, about four feet above the strip ,it rolled inverted ,this model has had numerous flights at his property, I don't think it snap rolled ?? The order of flying was drawn by Colleen Tonks.Tony Gray was first to fly, as soon as the swallow left the ground it was turning left, it was trimmed and managed to complete the circuit for landing, the ailerons were reflexed up to shorten the landing, at that point any control ceased, another swallow bites the dust. Probably only one aileron was working.

Aircraft entered were Peter Ederle , Piper Cub Saito 80. Peter only flew one round and probably would have won if he had completed the second round. Willem Minnabo took first place with an Ugly Stick, Supertiger 45.

Second place was Geoff Leverton with his Fascination, GMS47. Third place Greg Hall , Yak. Peter Allen, Yak YS 110. Tony Gray Adrenalin YS110 ,flew without the canopy.

Mike Rutledge had an electric powered Curare 14x7 prop . Gavin Hallam , Swallow OS 90. Peter McGuiness, Tiger 40 , with a Magnum 46 .Prizes were presented for first and second , Peter McGuiness received the encouragement award. Thanks must go to the judges , Colleen Tonks and val and Bill Gregory for their assistance. A great time was had by all (nearly all). Next time we will add a manoeuvre of your choice . CD Tony Gray.

Colleen Tonks for lunch and Val and Bill Gregory (Val cleaned the BBQ)

PATTERN COMPETITION RESULTS

February 11 2012

	Round 1		Round 2		Overall	
W. Minnebo	57	(2)	68	(1)	125	(1)
G. Leverton	56	(3)	63	(2)	119	(2)
G. Hall	54	(4)	63	(2)	117	(3)
P. Allen	51	(6)	59	(4)	110	(4)
P. McGuinness	54	(4)	46	(6)	100	(5)
T. Gray	39	(8)	48	(5)	87	(6)
M.Rutledge	43	(7)	44	(7)	87	(6)
P. Ederle	65	(1)	DNS	(8)	65	(8)
G. Hallam	DNS	(9)	DNS	(9)	0	(9)

MEMBER PROFILE—BILL GREGORY

The first model memories for Bill are from the family farm at Bream Creek. The model was a Kiel Kraft Outlaw free flight model. Bill`s father never managed to get it to fly properly, presumably it being too heavy due to over enthusiastic work with the paintbrush. Bill also can clearly remember himself and his brother being taken to a model show at the Hobart City Hall when around the age of twelve or fourteen years. He was most impressed by the indoor control line flying and the equally noisy tethered racing cars.

Around that time Bill got into sailing. Yacht racing became a major sport/hobby for the next fifty or so years. Another of Bill`s hobbies is architecture. Bill has found, as have others, that a sailing/racing background is very useful asset when flying model aircraft. He has found the heightened awareness of the effects of the wind make model flying so much safer and easier in less than favourable conditions.

Bill first worked at the Electrolytic Zinc Company as a draughtsman. He then qualified as a pattern maker. Several years later he qualified in project management which meant he spent extended periods of time working on ships as well as in all sorts of out of the way places around the world.

On approaching retirement the modelling bug re emerged. McCann's Model Shop gave him the name of Hobart model aircraft clubs. Several months later while looking to purchase some modelling accessories he came in contact with a chap called Garth Wilmot. After being filled in on the excellent facilities available at HMAC , Bill became a member.

Bill has now had his Bronze Wings since July 2011, and is really enjoying himself. No crashes and no written off models says it all.

His latest model is a low wing Seagull .40 and Bill has decided it is his favourite model. He still has his .60 and .40 sized trainers. He is using the .40 model to practice aerobatics. The latest project is an Eflite Advance 25E which he is getting ready for the big tour when he and wife Valerie visit the mainland.

Long term, Bill is aiming for his Gold Wings and would also like to do some instructing.

Bill`s Words of Wisdom. Be sure to get a proper trainer to learn with. There are some other types of models sold as suitable for training, but as Bill found out, in reality, there is no substitute for the tried and tested traditional trainer. If you are under thirty you can learn on .40 trainer. Do use a .40 sized engine.

Over thirty??...a .60 size trainer is the only way to go. A Sky Raider or Tiger .60 is a good choice. For learners, a .46 sized engine (Super Tigers are his favourite engines), has more than enough power for the above .60 sized models.

FIELD TORQUE—14TH JAN 2012

Bill Jennings
Model:- Dornier. Power YS

Phil Harrington
Selection of his electric models

David Ellis
Model:- Edge

Chris Rowe
Model:- Wing Power:- Electric
240vAC

Control-line models

Greg Hall
Model:- CAP 232 and his
Powered Glider

FIELD TORQUE CONT..

Mike & Bill
Model:- Dreaming about their next one

Stuart Smith
Model:- Hurricane Power E-Flight 480

Peter Ederlie
Model:- Bloody Big

Tony Gray
Model:- Swallow (Front) Power YS110
Model :- Pegasus Power:- YS 45

Peter Ralph
Model:- ALPS 1700E

Gary Spratling
New Member

FIELD TORQUE CONT

CIRCLE TORQUE

Control-line Flying Sat 3/3/12

We had some LMAC members attend on 3rd of March. They brought with them their “”Rat racers” plus other models. In this event you fly with two or three in the circle and do as many laps as possible with one pit stop (usually 5 minutes). The model is about 650mm span solid balsa wing with profile fuselage powered by 2.5 cc plain bearing glow motor with a muffler and an engine cut out operated by full down elevator. Peter Allen and Tony Gray represented HMAC on the day. There will be a full report in the next edition of Torque Back

To the right are models from Peter Allen red, Mike Hawkins white and Dave Christian pink

Note:- To all you control-line boys (and girls) please note the next issue is focusing on your aspect of the hobby, so content from you would be very much appreciated. It can be from all over the state I don't mind as it seems to be only a small band of you flyers. Please feel free to contribute anything. Ed...

FIELD TORQUE CONT

This is a Voodo combat flying wing built by William deal about 30 years ago, finished by Peter Allen,OS30 powered. Geoff Leverton holding the model after a successful flight .

L-R Williem Minnabo, Peter Allen, Tony Gray, Geoff Leverton, Mike Rutledge, Peter Ralph and Gavin Hallam.

COCKOPIT TORQUE

We have had **another overfly of the Northern property** , they may have been doing some training with horses. The model concerned was an electric model and would normally not have been heard. No IC planes had been flown at the time of the incident .If you think a pilot is over flying say so (in a nice manner)
Tony Gray

News from 4th of February

It is true that things go bump in the night and it is also true that things can also go bump in the air too, to the testament of both Phil Harrington and David Ellis can attest too, as a mid air incident occurred between them.

It was a rather sad thing to see a graceful glider plummet toward the ground. That is just what happened with a mid air collision between a glider and YAK 54 Thankfully the glider was not a write off, far from it some minor repairs and Phil thinks it may be up next weekend again and the YAK well it took some searching for the impact site, but seems too have been a wing tip to wing tip accident.

Oh, how easy it can happen.

The good news is that both the pilots survived the crash :-).

—x—

Whoops !! Not again !

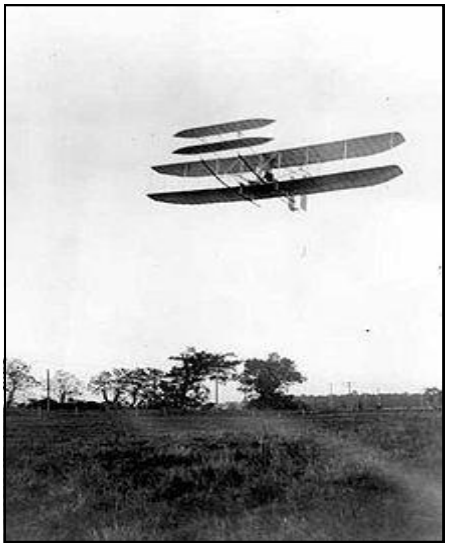
Three pilots were flying together and climbing fully aware of the other aircraft positions when they was a BANG ! Jack thought that his canopy had come off and told the other pilots so. The source of the noise was only apparent once all aircraft had landed and the inspection had begun.

Peter Allen's YAK had munched it's way into the tailplane of Geoff Leverton's aircraft that he was going to fly in the fun fly aerobatics.

INSTRUCTOR TORQUE

It has been seven months since I last wrote for this news letter on training matters at HMAC. I have kept in touch with events during my travels in China and Finland via email, but even so, on my return, it was a pleasant surprise to see the excellent set up that is in place for the training aircraft, the radios and their charging gear. Once having been "educated" in how every thing worked, and then over the last month, using the gear on several occasions, it seems we have a system that is simple and easy to use, and which makes the training both easier and more efficient for the pupils as well as the instructors. Through looking to the long term successful future of model flying, by putting an efficient training regime in place, the committee and the instructors surely have placed the HMAC in good stead to maintain its membership by ensuring that any newcomers can learn to fly competently in a reasonable amount of time. The days of struggling for a year or eighteen months, and usually involving a few crashes, to gain Bronze Wings standard are long gone.

Speaking of Bronze Wings, congratulations are in order for Gary Spratling, Felix Bainbridge, and Ronan Baxter who recently reached the required standard. Even though the club has an adequate number of well qualified and very able instructors, I would urge members to aim for Gold Wings and then an instructors certificate. Firstly it is prudent to ensure that we always have adequate numbers of instructors, and secondly I can assure all that there is nothing like training a student to improve concentration and sharpen up ones reflexes.



Wright Flyer II

Saw a little model flying in China while living in Fushun. Flying took place on a military base in the country side north of the city of Fushun. Only problem was getting there due to not having a car. Contrary to the misconceptions that seem to abound in Australia, China is a very free and relaxed society. The guard house never showed any interest or even checked on the "foreigner" coming in as a guest with the other modelers. One afternoon we were asked to move to the next field. The soldiers were more interested in watching the models than in listening to their officers trying to instruct them in the use of artillery. Helicopters are very common and more popular than fixed wing models. Kite flying is extremely popular and they are flown every where, even in the cities.

Peter Ralph CFI

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EVENTS FOR 2012

EVENT CALENDAR - 2011/12		
Date	HMAC	LMAC
Sat 17/03/2012		Tomboy/OT
Sun 14/04/2012	Tomboys / ladies day	
Sat 21/04/2012		Scale Day
Sun 5/05/2012	Stand-off Scale	

Apologies for the later than usual publication, My plan was to get it out earlier, then I thought it would be better to bring it into line with the calendar year.

Ed.

Who is this very handsome pilot flying a DH82 for some fashion shots many, many years ago. I used to borrow this aircraft from the owner to amuse myself on warm days off and it provided some interesting flights - one with Miss Australia in the front whilst we formatted on a photo plane. Her first flight, extremely frightened, she was but putty in my grubby hands when her hero got her back on the ground safely. One where I nearly lost a passenger overboard doing aerobatics when the seat belt failed, that one was serious and gave me nightmares for weeks. Another when a pilot mate (?) decided it was amusing to climb out to the wing tip and sit there. These antics stopped when a lady sighted us and thinking she was observing a disaster in the making, reported it to the police who met us when we landed. We got away with it due to the clearly unlikely truth in the report which we ridiculed. Happy days, when men were men, girls were girls and pilots really didn't know what the hell they were!

Nils Powell.

TORQUE -ATIVE

The Members Forum

Welcome to a new column. These columns are you for you to fill. I have no intention in editing the content as it will be you that speaks not me Ed.

Dear Editor,

Just a few lines to correct some errors in the previous newsletter article (from an outside source), on how to do aerobatics. Firstly the paragraph headed "INVERTED FLIGHT"

This statement, quote "Because the RC airplane is inverted, every control input will be opposite to what it is when the plane is flying normally", is complete rubbish. The facts are that all control inputs are exactly the same as needed for normal flight **except** for the elevator, where the control input needed **is** the opposite to normal flight. Having taught several Gold Wings aspirants over the years, to fly inverted, and eventually getting them to a standard where they can fly five or six circuits inverted, I am certain I do know which way the controls work. The writer of the article obviously has never flown inverted or he would be aware of the above.

Another piece of bad advice is suggesting that looping into or out of inverted flight is acceptable. Wrong!! The only proper way for learners, is to roll into or out of inverted flight. Apart from the safety aspect of little change in altitude, it instills a good habit into the pupil which will in the future prevent the dreaded "wrong way elevator input" when trying inverted flight. . The latter error often results in a completely confused pilot and a model completely out of control, heading who knows where, but usually towards the ground at high speed. If there is inadequate altitude the model is in a million bits before the pilot has time to blink. Very spectacular though.

There was an omission in the instructions regarding a loop. The words "close the throttle," should follow "After the RC aircraft`s nose starts to point downwards," and precede "and gradually decrease the amount of up elevator etc.

The drawing relating to the loop is inaccurate. Might be some thing our junior members could look into.

Peter Ralph CFI Southern Tasmania

— x—

Dear Editor,

Can any member recognise, understand, or otherwise decipher the use for the item below?

Came in the tool kit pictured as a gift from one of my suppliers. The knife is not part of it (as far as I know) but gives an idea of size. The aluminium plate is grooved to allow locking sideways extension via the two screws on top but otherwise there is no other holding or fastening device on it

Cheers
Nils

— x—

Dear Ed,

On a Wednesday I am offering to bring my BBQ and supply some hamburgers and salad (I think this included bread and dead horse too Ed.) Please call me (Not me the Ed) if you are interested. I would appreciate if you could contribute $2.50 each to cover the cost of putting the BBQ on.

Bill Gregory

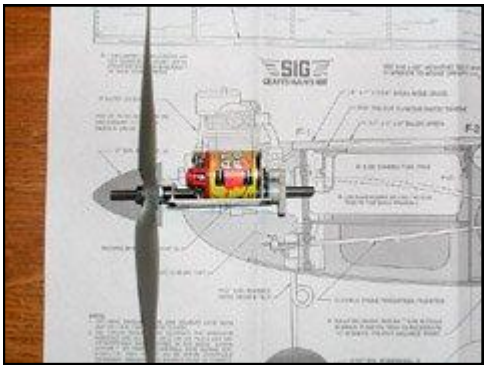
TECH TORQUE

Conversion From Glow to Electric

http://www.stefanv.com/rcstuff/qf200303.html

It is 2002, electric flight is more popular than ever, and as a result, there is a wide selection of designed-for-electric kits and almost-ready-to-fly (ARF) models for the hobbyist to chose from. Available models range in size from park flyers to quarter-scale, although the most common models seem to be those in the Speed-400 size range (typically about 16 to 20 oz, intended for small 6 or 7 cell battery packs). Perhaps almost as common are 05/Speed-600 sized models (about 44 to 52 oz, intended for larger 7 cell battery packs).

This Anthem dual-motor gearbox could be bolted directly to a glow engine mount, although I will probably install hardwood rails in the cowl sides instead. Despite electric flight's popularity however, the selection of available glow powered models is bigger, especially in the larger sizes. For the modeler wanting something the size of a .40 sized glow model, the selection is more limited. This leaves one with the option of either building from scratch, or converting a glow kit or ARF.



This Anthem dual-motor gearbox could be bolted directly to a glow engine mount, although I will probably install hardwood rails in the cowl sides instead.

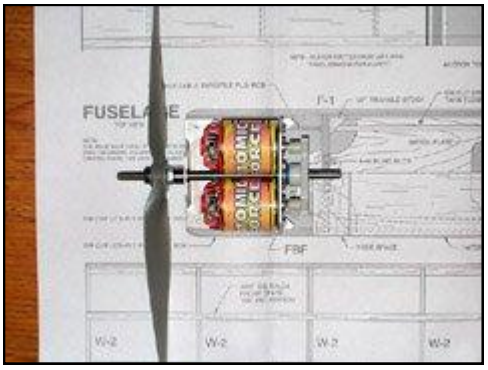
Planning

Glow kits are not designed with electric power in mind, and usually require extensive modifications if one wants to end up with a satisfactory electric model. Although it is tempting to dive into kit construction (or ARF modification), it's worthwhile spending some time planning the conversion before setting to work. This is best done with a copy of the plan and instruction book in front of you, along with a red pencil (preferably an erasable one).

Motor Mounting

Most glow engines are installed either by bolting them to a firewall, or by bolting them to a pair of wooden rails inside the aircraft's cowl. Most electric motors cannot be installed in this way.

The easiest mounting method for many motors is to bolt them to the back of a firewall, with the motor shaft protruding through. Doing this in a glow model will require moving the firewall forward, so that the motor shaft ends up in the same location as the intended glow engine's shaft would have.



The Anthem gearbox fits exactly between the Sig *Mid*Star 40*'s cowl sides. Very little work will be needed to replace the glow engine with electric power.

If the motor is large enough, it can be placed on the glow engine mounting rails, and held there with nylon cable ties or a steel cable clamp. Metal clamshell mounts are also available for some motors to facilitate attachment to a glow engine mount.

If using a geared or belt driven motor, the gearbox or belt-drive might have mounting holes allowing it to be bolted to a glow engine mount (the Modelair-Tech belt-drivers work well this way). It may be necessary to make a hole in the firewall for the motor to pass through.

There are many mounting methods available, and I discussed some of them in detail in the May 2002 issue of Sailplane & Electric Modeler (the former name of QuietFlyer magazine). Examine the plans carefully, and choose a mounting method suitable for the motor that will work in the model you are building.

TECH TORQUE

Battery Installation

A glow model's fuel tank remains in the plane, and only a tiny hole is required for a fuel filler tube (and a vent tube). An electric's fuel is the battery pack, which is usually made removable so that one can change packs between flights instead of waiting for the pack to cool and then recharging it in the plane.

This difference requires changes to the model which could compromise its structure, since a large opening is required to get the battery pack in and out. Since a battery pack is generally much heavier than the fuel tank it replaces, it will need to be placed further back than the fuel tank, often ending up in the under-wing area. The need for an extra opening can be eliminated by removing the wing to change batteries, but this is inconvenient at the field, so a hatch just in front of the wing is often desirable.

Front view of my reworked *Fred's Special*. Cooling air enters the lower cowling, flows over the motor, over the battery, and through the fuselage.

Refer to the November 2000 issue of Sailplane & Electric Modeller for descriptions of some battery mounting methods I've found practical. When choosing a method and designing the required modifications, be careful not to weaken the structure of the model (some weakening is acceptable due to the far lower vibration levels of an electric model).

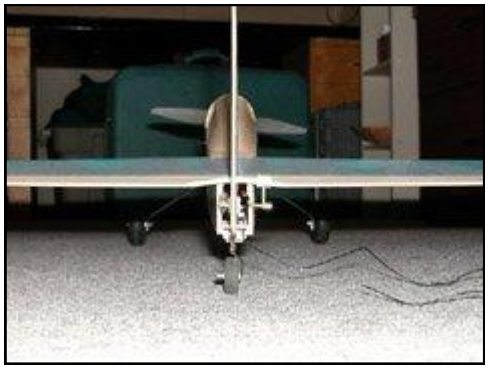
Centre of Gravity

An electric motor is approximately the same weight as an equivalent glow engine (with some variation either way), so the motor won't affect the centre of gravity (CG) much relative to the glow model. As mentioned above, the battery is much heavier, so care must be taken to locate it appropriately. This often results in other components, such as the receiver, servos, and receiver battery (if one is used) being relocated. All this must be taken into account so the completed model balances at the location indicated on the plans.

Rear view showing the open fuselage tail. The opening is rather small, but is adequate for the cooling requirements of this model.

Cooling Considerations

The only source of significant heat in a glow model is the engine, which is at the front of the model, with the cylinder head(s) protruding into the airflow (or with the airflow directed over the cylinders within a cowling). Electric power systems generate heat both in the motor, and in the battery pack. Both of these must receive adequate cooling to avoid overheating, especially in high-powered models.



Rear view showing the open fuselage tail. The opening is rather small, but is adequate for the cooling requirements of this model.

Cooling the motor is fairly straightforward in most cases, since it's in the same location a glow engine would be. Some additional ducting may be required to direct the air over the motor housing, since the source of motor heat is near its center, not in a protruding cylinder.

Battery cooling is a bit more problematic, since the battery is most often inside the model. This means that cooling air inlets and outlets are needed. To avoid excessive drag, these should smoothly direct the air into the fuselage, over the battery, and back out, without sharp corners or significant obstructions. As a rule of thumb, the outlet area should be about three times the inlet area.

TECH TORQUE

Construction

When starting from a kit, there are many changes one can make during construction to optimize the model for electric power. The main goal is to build the model lighter to make up for the additional weight of an electric power system over the glow system it is replacing. Fortunately, an electric model does not need to be quite as strong as a glow model due to the much lower levels of vibration.

Lighter Wood

The easiest way to save weight is to use lighter wood. Many .40 sized glow models have many plywood parts, some of which can be replaced with balsa wood. Candidates for replacement include fuselage sides and bulkheads (other than the ones under the wing leading and trailing edges, or the firewall).

A plywood (top) and balsa (bottom) version of the *Mid*Star 40* fuselage side. The kit-supplied plywood side weighs 2.9 oz. The balsa version weighs 0.8 oz. Replacing both sides, the top, and the bottom with balsa will save about half a pound.

Fuselage sides can be made out of stiff balsa of the same thickness as the plywood being replaced, with the grain running lengthwise. The area from the wing trailing edge to the nose should be reinforced with a doubler (an extra layer of balsa wood with the grain running vertically).

Balsa bulkhead replacements are best made from two layers of balsa wood laminated together (with CA, epoxy, or white glue), with the grains at right angles to one another.

If the model is already made of balsa wood, it might be possible to substitute lighter balsa for some parts, especially if the manufacturer hasn't taken great care in selecting the lightest suitable balsa for each part.

Holes

Compared to the air in which the model will be flying, a hole weighs nothing, so adding a hole will reduce the model's weight by that of the material taken out of the hole. In the old days, most models were constructed from sticks, with sheet balsa used only for wing ribs. This produces a very light yet strong structure.

Although sheet balsa sides might be easier to construct, much of the material serves no useful purpose. Cutting significant holes into the sheeting can substantially reduce the weight. The one thing to keep in mind however is that balsa splits easily along its grain. When that grain runs the entire length of the fuselage, it's usually strong enough to not require reinforcement (which is another reason sheet balsa sides are popular). When holes are added, it's a good idea to run some vertical grain reinforcements between the holes.

Vertical grain reinforcements between the holes in the fuselage sides will prevent splitting. Notice the smoothly rounded holes. Avoid square corners at all costs

One thing to keep in mind with holes is that stresses tend to concentrate in corners. All holes should have rounded corners, of at least a quarter inch radius. This makes covering easier too, since iron-on coverings tend to bunch up inside square corners.

poorly fitting rib-to-spar joint is not very strong. Poor parts fit is common in some kits (but not in the <I>Mid*Star 40</I> kit from the previous photos).

A poorly fitting rib-to-spar joint is not very strong. Poor parts fit is common in some kits (but not in the Mid*Star 40 kit from the previous photos).

TECH TORQUE

Minimize Glue

With cyanoacrylate adhesives (CA), excessive use of glue is less of a problem than it used to be since it's easy to apply CA sparingly. If using traditional adhesives, such as white glue or epoxy on the other hand, it isn't hard to use too much. The strongest glue joint is one where the parts fit together well, and there is just a very thin layer of glue between them. A sloppy joint filled with glue will not be as strong, and will be much heavier.

It is possible to use too much glue even with CA. Properly fitting parts can be glued with Thin CA. If the parts fit reasonably well, but not perfectly, Medium CA will produce a satisfactory joint. There's really no excuse to have joints loose enough to require Thick CA.

*A poorly fitting rib-to-spar joint is not very strong. Poor parts fit is common in some kits (but not in the Mid*Star 40 kit from the previous photos).*

Lighter Covering

The glue needed to fill the gap both weakens the structure, and adds unnecessary weight, the enemy of electric flight.

Models can be covered with many different materials, ranging from the traditional doped silk or silkspan, to modern iron-on heat-shrink coverings. Different coverings have different weights, but one can't always compare the weights directly. Some aircraft have components designed to obtain some of their strength from the covering material, and substituting a lighter covering may not always be appropriate.

In general, use the lightest covering you can find that is strong enough to serve its purpose on your model. Fabric-like iron-on coverings (like Solartex for example) are usually much heavier than polyester film coverings (such as Monokote), which in turn are heavier than polyethylene films (such as Solarfilm). The heavier coverings are also proportionally stronger.

There are some coverings, such as Micafilm or Fibafilm, which are both very strong, and very light. The two just mentioned are not self-adhesive, and require that the structure being covered first be painted with a heat-sensitive adhesive such as Sig Stix-It. This is more work, but results in a lighter model because the adhesive is only applied where it is needed, instead of on the entire back surface of the covering material.

Flying

A well thought out and implemented electric model can fly as well as its glow-powered counterpart. One should keep in mind however that most glow models are overpowered. Comparing a typical .40 sized trainer to a full-scale trainer aircraft (such as a Cessna 152), one notices drastically different performance. Most glow models can get off the ground in unrealistically short distances, and climb at steep angles.

Fly Realistically

For the beginner, this excess power can sometimes help get the plane out of a tight spot. On the other hand, too much power tends to reduce the need to actually learn to "fly" the plane. It becomes more like a video game than a model of an aircraft.

If your intent is to build a model that flies in a realistic, scale-like manner (even if it is not a scale model of a particular full-size aircraft), you may require less power than the manufacturer's glow engine

A precisely fitting joint like this one requires only a drop of thin CA, and is extremely strong.

might suggest. A power system that delivers approximately 50 Watts per pound of ready-to-fly aircraft weight will already provide better than scale performance for an average civilian aircraft model.

Learn to fly the model "on the wing" instead of "on the prop". Use the throttle to adjust power to the task at hand instead of boring holes in the sky at full throttle.

This is not to say that one can't model a high-performance plane with electric power, but only that not all planes need to be high-performance ones.

Choosing an Electric Flight Power System

http://www.stefanv.com/rcstuff/qf200103.html

Over the years, a number of rules of thumb have been proposed to help the electric flyer choose a power system for his or her plane. This month, I'm going to attempt to consolidate some of these rules and provide a recipe for power system selection.

Some Rules of Thumb

This is probably the best known rule, and I believe it was originated by well known electric flight guru Keith Shaw. It states that for reasonable sport performance, a plane's power system should have at least 40W of power per pound of airplane for basic sport flying, or 70W per pound for strong aerobatic capabilities. These figures are input power, which is the power entering the motor (Volts times Amps), and assume a motor that is about 75% efficient. It also assumes that you've chosen a propeller that (a) causes the motor to draw that amount of power efficiently, and (b) is well suited to the flight characteristics of the aircraft.

Another rule is that the chosen propeller should result in a pitch speed equal to 2½ to 3 times the aircraft's stall speed. I mentioned this rule briefly in last month's article as well.

A third rule concerns the thrust needed for different kinds of flight. The more thrust you have, the steeper your plane can climb (so long as the motor and propeller are still operating efficiently). Minimally, thrust should be 1/4 of the plane's weight, but 1/3 to 1/2 is better. A thrust greater than or equal to weight will give unlimited vertical performance.

A twin-motored, tricycle-geared, electric conversion of the Sig LT-25. This one is powered by two geared Kyosho Atomic Force ferrite car motors, together drawing about 27A from 14 cells (380W). It weighs 105 oz. Good quality props and ball-bearing gearboxes help minimize inefficiencies and maximize output power.

Putting It All Together

So how do these rules all fit together? As we'll soon see, the Watts per pound rule is really a simplified summary of the combination of the other two rules.

As electric flyers, most of us know that power (measured in Watts) is equal to current (in Amps) times voltage (in Volts). For an electric power system, this is the "input power", namely the power going into the motor.

Power is also equal to force times velocity, or in model airplane terms, thrust times pitch speed. For this value to be in Watts, thrust must be measured in Newtons (N), and pitch speed in metres per second (m/s). This however is "output" power, which is the ability to make the plane move. There are two or three power-robbing numbers between input power and output power, and these are motor efficiency, propeller efficiency, and gearbox efficiency if a gearbox is being used.

Efficiencies are usually expressed as a percentage, such as 80%. If a motor is 80% efficient, then only 80% of the input power makes it to the shaft (i.e. output power = input power x 0.80). We now have a formula relating input power to output power:

TECH TORQUE

POUT = PIN x EMOT x EGEAR x EPROP

Let's set that equation aside for now. Since output power is also equal to thrust times pitch speed, we can write:

POUT = Thrust x VPITCH

At this point, we are still dealing with Newtons and metres per second on the right side, but if we introduce a conversion factor, we can use ounces and mph:

POUT = 1/8 x Thrust x VPITCH

We now have a formula to compute the required output power given the desired thrust and pitch speed. One of our rules of thumb suggested thrust should be 1/4 to 1/2 of the plane's weight, but what should the pitch speed be?

Another rule of thumb stated that pitch speed should be about 2½ to 3 times stall speed. Last month we talked about stall speed, and I stated that stall speed (in mph) was approximately equal to 4.4 times the square root of the wing loading (in oz/sq.ft):

VSTALL = 4.4 x SQRT (Weight/Area)

Now that we have a way to estimate stall speed, we can compute the desired pitch speed by multiplying by 2½ to 3.

This leads to a recipe for choosing a power system.

The Recipe

Now that we have a formula for determining how much power we need, we can develop a recipe for choosing a power system:

Power System Recipe

1. Based on the weight of the model and the desired performance, determine how much thrust you need (about 1/4 of the plane's weight for a sedate flyer, 1/2 the weight for a sport flyer, or even more for a high-powered aerobat).

2. Based on the wing loading, determine the stall speed, and multiply this by 2½ (for a sport flyer) to 3 (for an aerobat) to determine the pitch speed you need.

3. Multiply the thrust (in oz) and pitch speed (in mph), and divide by 8 to determine the required output power (in W).

4. If you plan to use a gearbox, estimate gearbox efficiency. This is also hard to estimate, but gearboxes are generally 90% to 95% efficient.

5. Using the efficiencies you estimated in steps 4 through 6, calculate the required input power to achieve the output power you calculated in step 3. Do this by dividing the output power by the product of the efficiencies (expressed as decimal fractions).

6. Determine how many cells you need by dividing the input power from step 7 by the current you wish to run at (a NiCd cell provides about 1V at typical e-flight current levels). With 2000mAh cells, 25A will give reasonable flight times. With 600mAh to 1000mAh cells typically used in Speed 400 models, 10A will give reasonable times and remain within the abilities of the motor.

TECH TORQUE

7 Select a motor that will draw the desired input power at the desired current and cell count. Many motor manufacturers provide tables giving this information. Others will be able to recommend a motor from their product line.

8. Starting with a propeller recommended by the motor manufacturer, do some bench tests to find the right propeller. What you're looking for is one that results in the desired pitch speed (from step 2) at the desired current and cell count (from steps 7 and 8). To do this, you'll need a means of measuring current and rpm. Pitch speed is approximately equal to the propeller's pitch times rpm, divided by 1000.

When you're done, you should have a power system that will provide the level of performance that you planned for. Once your plane is flying though, it's worth experimenting by altering propeller sizes and/or gear ratios. Sometimes a slightly higher pitch works better (some propellers untwist a bit in the air). Sometimes a change of propeller brand can improve performance.

An Example

Let's plug in some numbers for a simple example, a 48 oz, 3 sq.ft sport plane. We want reasonable aerobatic performance, so we'll choose a thrust of 20 oz, and a pitch speed of 2½ times the stall speed. The stall speed is about 4.4 x SQRT (48/3), or 18 mph. Pitch speed should therefore be 45 mph. This means we need about 113W of output power (45 mph x 20 oz / 8).

This plane is to be powered by a cobalt motor, which is about 80% efficient. We'll use a good quality propeller which is also about 80% efficient. That means we'll need about 177W of input power (113 / (0.8 x 0.8)). To produce a 177W at about 25A requires seven cells.

From the graph in Astroflight's Electric Motor Handbook, we can see that the Astro 05 sport motor produces about 140W of shaft power at 75% efficiency at 25A. This translates into 187W input power at 25A, which is fairly close to our 177W figure. From the same graph, we can see that a 7.5x4 propeller would draw 25A from seven cells.

The recipe applies to small models too. These Speed 400 planes draw 10A from 7 cells (70W). Due to the low efficiency of both the motor and propeller, only about 35W of useful power is produced, but that's enough to fly both models well. The one on the left has 1.5 sq.ft of wing; the one on the right has 1.9 sq.ft. Both weigh about 18 oz.

Bench testing with such a propeller would give us about 13,000 rpm. This gives a pitch speed of about 49 mph. That's slightly higher than the 45 mph we were aiming for, but still lower than 3 times the stall speed (which would be 54 mph). Since we'd be unlikely to be able to find a 7.5x4 propeller, we'd probably end up using an 8x4 instead. This would lower the rpm and hence the pitch speed.

A Larger Example

The formula works just as well for a larger model, such as a Sig LT-25. Electric conversions of this plane usually end up weighing about 96 oz, and we'll choose a thrust of 40 oz and a pitch speed of 2½ times the stall speed again for trainer-like flight. The LT-25's wing area is 5 sq.ft, so the stall speed will be about 4.4 x SQRT(100/5), or 19 mph. Pitch speed should therefore be 48 mph and we'll need 240W of output power (48 mph x 40 oz / 8).

Let's again use a cobalt motor and good quality props, so input power will need to be about 375W (240 / (0.8 x 0.8)). At about 25A, this wold require 15 cells.

The Astro 25 sport motor will use about 370W on 14 cells at 25A. That sounds close enough. The recommended prop at this current and voltage is 9x5.5, and this would turn at about 11,700 rpm, giving a pitch speed of 61 mph. This is a bit high, so we could try a 10x5 prop instead, which would turn at about 11,000 rpm, giving a pitch speed of 52 mph, which is close to what we wanted.

TECH TORQUE

Twins

This recipe can be applied just as easily to models with two (or more motors). After step 3, divide the required power by the number of motors and follow the rest of the recipe for just one motor. At step 8, divide your desired overall current by the number of motors if the motors will be wired in parallel. After step 10, multiply the number of cells by the number of motors if the motors will be wired in series. Let's briefly look at the LT-25 as a potential twin.

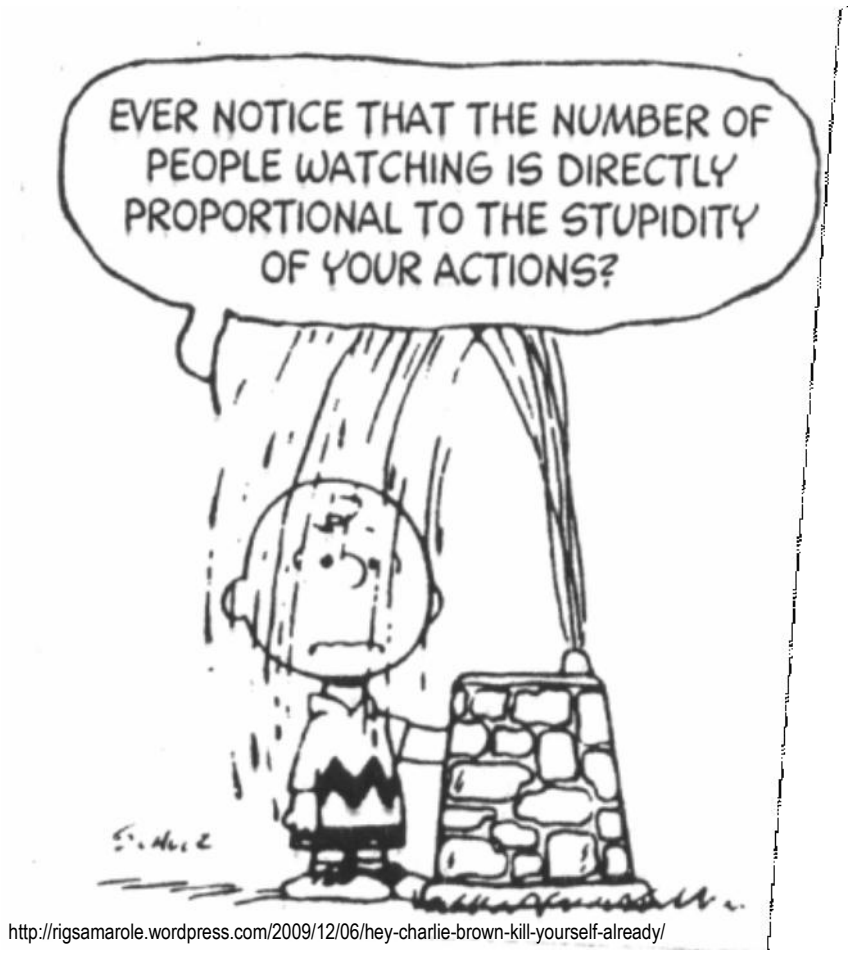
With two motors and props, each will need to produce 120W of output power (for 240W total), and each will need 200W of input power (120 / (0.8 x 0.8 x 0.95), the 0.95 is for the gearbox efficiency). From the Electric Motor Handbook again, an Astro 05G with the standard 2.38:1 gearbox will use about 200W of power on 7 cells at 25A with a 12x8 prop at about 5,400 rpm.

This gives a pitch speed of about 41 mph, which is not high enough. An 11x9 propeller will give about 48 mph at only slightly less current. The resulting power system would consist of two Astro 05G geared motors wired in series, two 11x9 propellers, and 14 cells.

Conclusion

A little bit of math can vastly improve your chances of successfully electrifying an airplane, whether it was designed for electric power, or is a conversion of a glow model. All the formulae I've presented are only approximations, but they'll get you close to the ideal power system for a given set of requirements. From there, you can experiment to tune things further.

FUNNY TORQUE



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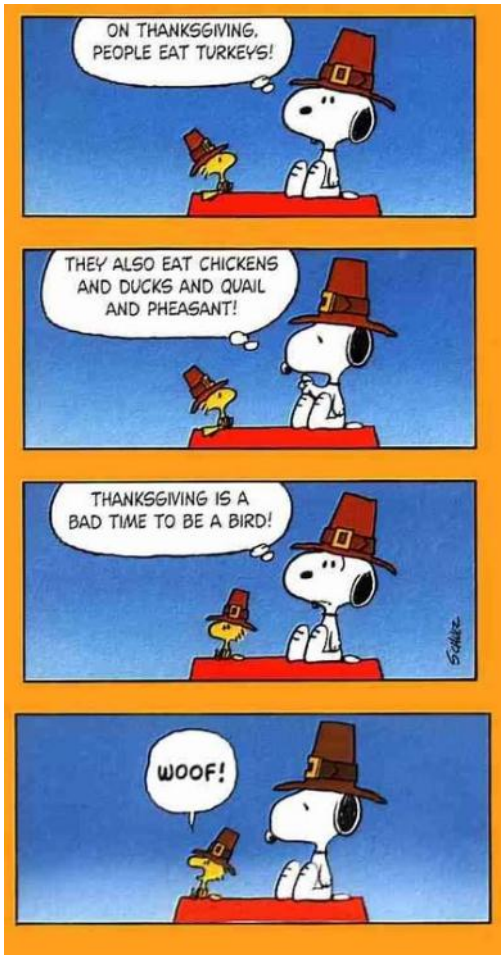


http://zagica.blogspot.com.au/2009_11_01_archive.html

FUNNY TORQUE CONT..

Youngster Gets "Wings" at Age of Four

VALID until December 31, 2000, a novel airplane license recently issued by Australian air authorities entitles four-year-old Eric Morris to operate his homemade "flying flea," shown in the photograph below. The diminutive craft, modeled after a French plane, is fitted with a gasoline engine of one and a half horsepower that allows the young pilot to taxi it along the ground as fast as twelve miles an hour.

LICENCE 1.

Not valid for carrying passengers or goods for hire or reward.

LICENCE.

Photograph of Holder.

Signature of Holder Eric F. Morris

This Private Pilot's Licence No. C0000 dated 22nd July 1937 has been issued to Eric Ainslie Morris who is hereby licensed to fly the types of flying machines referred to on page 2 of Licence, subject to the special conditions contained herein.

This Licence is valid until 31-12-2000

Given at Melbourne this 22nd day of July 1937

(Signature) James James Secretary, Civil Aviation Board.

LICENCE 2.

Not valid for carrying passengers or goods for hire or reward.

LICENCE.

Particulars.	Description.
Surname	Morris
Christian Names	Eric Ainslie
Nationality	British
Place of Birth	Geelong
Date of Birth	3-3-1930
Address	31 Cameron Road Essendon
Types of Flying Machines referred to on page 1 of Licence	Flying Flea

Initials of responsible officer.

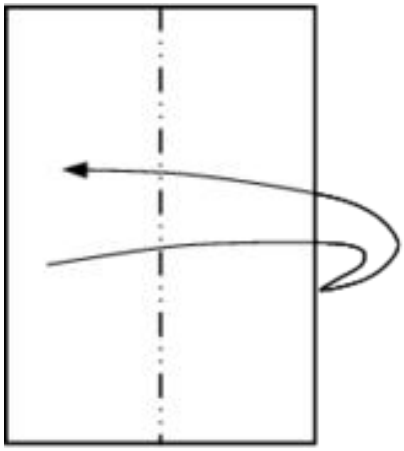
The official private license issued to the air-minded youngster

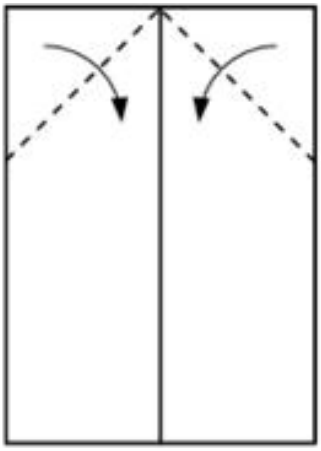
Four-year-old Eric Morris making twelve miles an hour along the ground in his plane

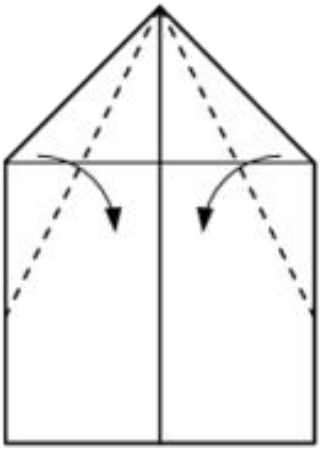
Here's one for you Martin, well rather the kids. Better than the latest acquisition. Ed.. :-)

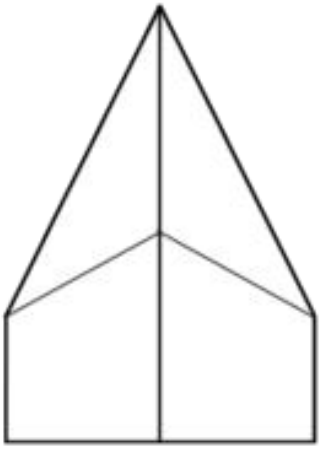
http://blog.modernmechanix.com/2007/04/19/youngster-gets-wings-at-age-of-four/ *Accessed 14/3/2012*

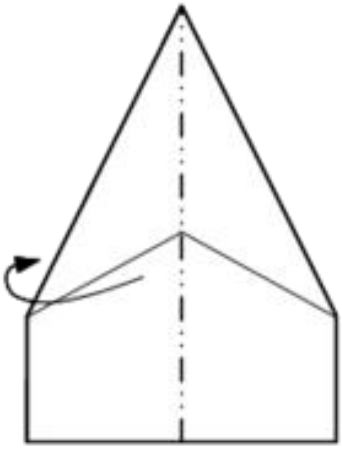
PLAN TO TORQUE

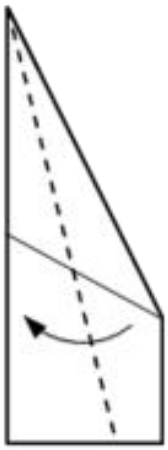


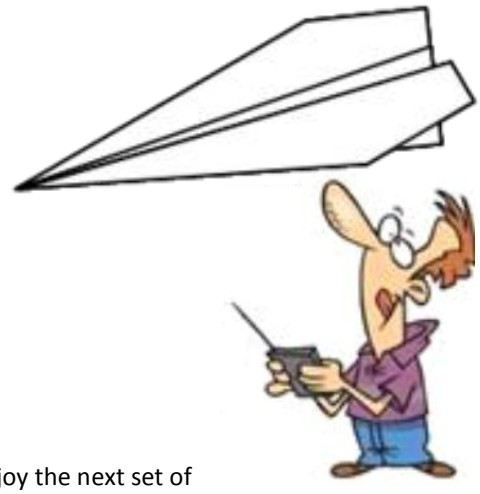












Ok, Fellas (and girls). I do have an odd sense of humour :-) I am sure you will enjoy the next set of plans in the next issue. Ed..

http://en.wikipedia.org/wiki/File:Paper_Airplane.png Accessed 14/3/2012

PUZZLING TORQUE

"I borrowed Timmy's model plane to crop dust the garden."

D	H	O	B	S	H	N	E	P	T	U	N	E	Y
U	E	J	I	H	U	N	Y	S	T	H	A	O	R
D	N	A	U	U	E	E	E	M	A	E	N	W	A
W	N	A	I	P	L	U	T	O	N	A	O	D	H
A	G	H	P	L	I	Z	O	O	E	R	U	S	U
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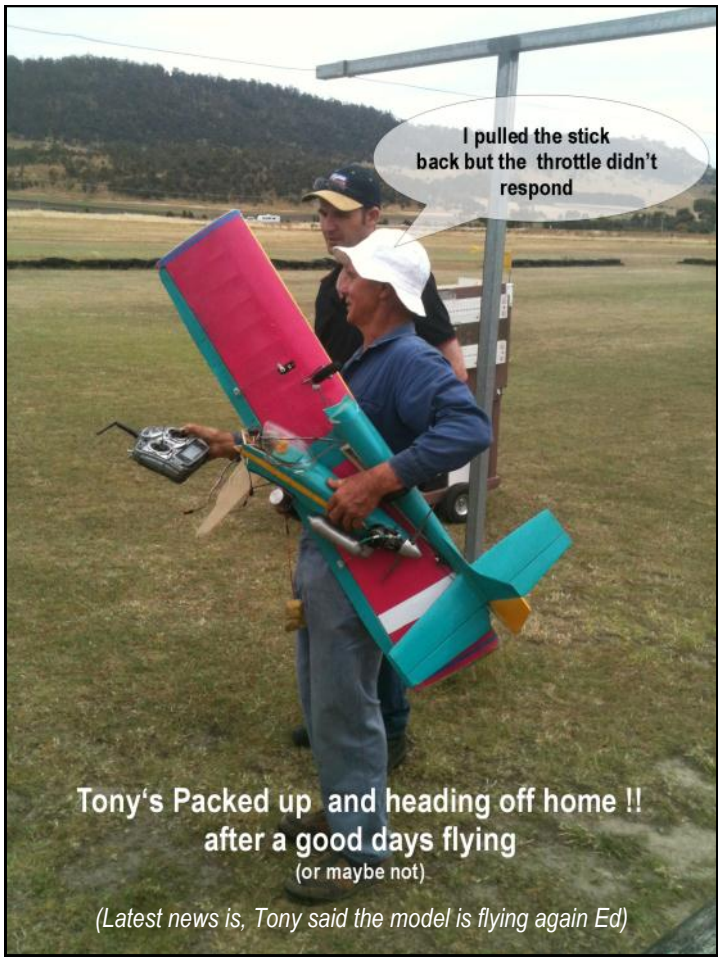
A	R	F	A	I	R	A	Y	A	O	E	I	R	H
T	O	A	I	N	I	A	B	E	A	R	N	A	E
O	I	A	T	E	O	E	N	A	A	E	H	U	A
E	D	I	D	D	O	E	D	U	T	S	E	T	S
E	S	Z	E	E	H	O	P	H	S	L	U	M	S

VENUS	EARTH	MARS	CERES
JUPITER	SATURN	NEPTUNE	URANUS
ASTEROIDS	PLUTO	DWARF	PLANET
MOON	BILL G		



This photo is published with the president's full knowledge

Sudoku

(for those who like them)

	7		1		9			8
4	3			2	6			
8					3		2	1
	2	4		6	1	5		
1		9				4		3
		6	3	4		2		
2	1		7					6
		8	5	3			7	4
5			6		8		3	

FOR SALE & WANTED

For Sale

1/5 Scale Fokker DVII

OS 60 engine, Hitec radio gear
All reasonable offers considered.
Contact: Bryce 0417 127 945
bryce_atkinson(at)netspace.net.au

Zagi wing

OS25, Hitec radio gear.
Goes like stink!
All reasonable offers considered.
Contact: Bryce 0417 127 945
bryce_atkinson(at)netspace.net.au

Sanwa VG-6000

36MHz transmitter, near new, comes with 240v charger, one receiver, no servo's. Stores 4 models.
$220.
Contact: Danny 0427 685 085

JR Receivers - NER-549X

9 channel, 36MHz, 2 of, $45 each
Contact: Stuart 6247 7423

Wanted

Electric starter motor for the club trainer

Is there anyone in the club that feels generous enough to donate a disused electric starter motor (for 60 size) that they have no use for?

PUZZLING TORQUE

That's right he was the Red Barron

Who are these people and what were they famous or infamous for?

Sudoku Solution

From page 20

6	7	2	1	5	9	3	4	8
4	3	1	8	2	6	7	9	5
8	9	5	4	7	3	6	2	1
3	2	4	9	6	1	5	8	7
1	5	9	2	8	7	4	6	3
2	1	3	7	9	4	8	5	6
7	8	6	3	4	5	2	1	9
9	6	8	5	3	2	1	7	4
5	4	7	6	1	8	9	3	2

The handsome fella in the flying suit on page 1 is Nils Powell