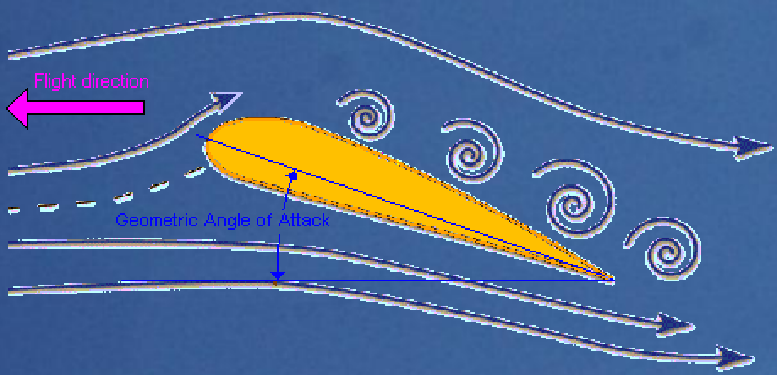
Torque Back

The news letter of the Hobart Model Aero Club inc.

Mum's in the Maz



Continuation of Aerodynamics...

Look inside for club news and articles

www.hobartmodelaeroclub.org.au

Vol. 12 No. 04

September- October 2012

CREW TORQUE

Club Committee

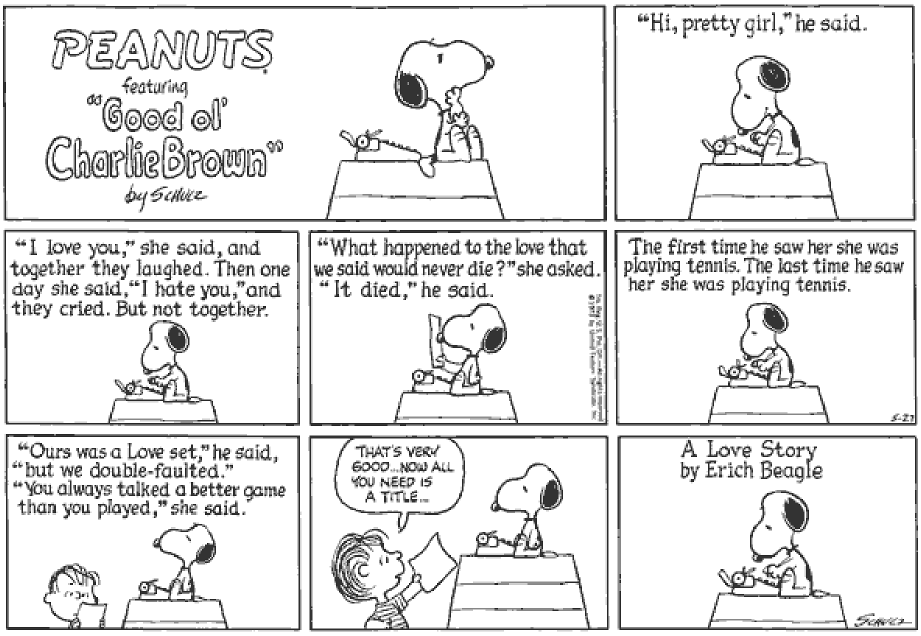
Captain: Tony Gray
(President)

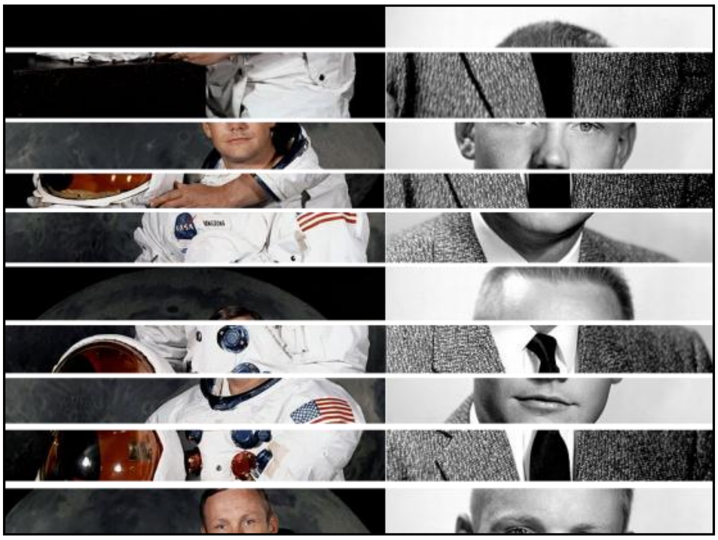
Co-Pilot: Mike Rutledge
(Vice President)

Purser: William Deal
(Treasurer)

Spare Co-pilot: Tony Sheppard
(Secretary)

Cabin Crew: Bob McAllister, Phil Harrington, Nils Powell
(Committee)





Who or what is/was he? What did he do?

Cover picture: model Chris Rowe's Turbulent.

IN THIS ISSUE

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

In the next Edition

COCKPIT TORQUE

Road / Driveway.

Bill Jennings has approached the council to see if they are willing to assist with the repair and maintenance of our driveway to the car park and clubhouse. He got a very good reception and it appears as though they are happy to help. Tony Sheppard has followed up Bill's request with a written request. Council has to maintain the gravel road leading to Kelly Field and they may be willing to maintain our drive at the same time.

We have invited the property officer, Tracy Sparks, to join us for the scale day.

The Strip.

The strip seems to be in good repair and the bird scarer is keeping the birds away. The growing season is nearly here so we shall have to do some more mowing. As well as the strip the pit area and the clubhouse area will need to be maintained. We have a few volunteers to assist with the mowing, but more would be welcome. We are happy to introduce members to the mower any time.

A big thank you to Bob Morrison for his work over the past few months.

Replacement of 12 volt batteries.

The club uses 4 rather expensive 12 volt batteries. Two for the battery charging station in the shed and two for the computer in the club house. Three of these batteries have died. We have replaced one battery and now have two good batteries on the re-charge station.

As there has not been much training and due to the cost of the batteries we have not yet replaced the batteries that power the computer (flight sim.).

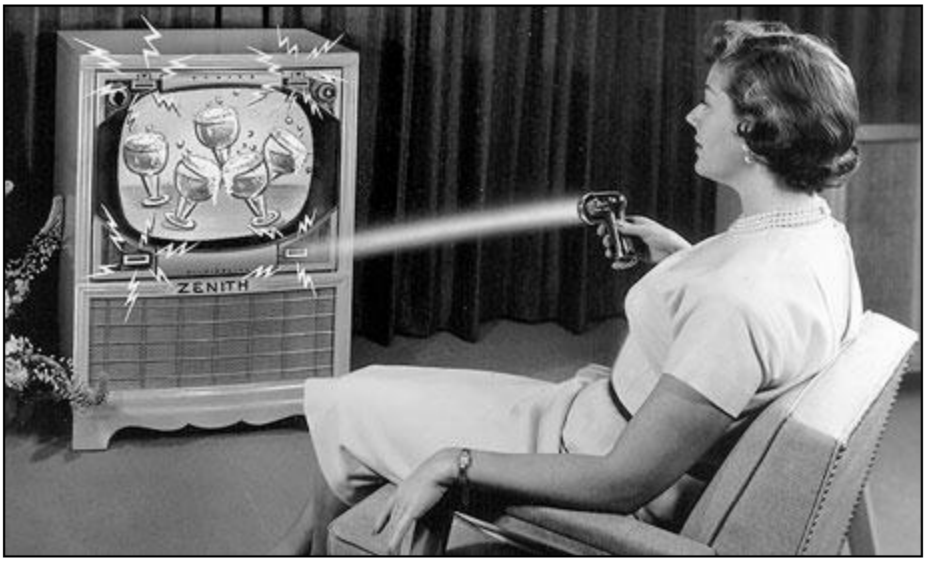
Training.

Nils has advised that there has not been much training over the recent past due to the weather.

New members who require training please contact Nils who will be happy to arrange some training. If you already have a relationship with an instructor please continue on with that arrangement.

I am reluctant to publish phone numbers or email addresses in the newsletter so if you don't have contact details please contact one of the committee members.

Club Committee



http://www.guardian.co.uk/media/mediamonkeyblog/2012/may/23/tv-remote-control-inventor-dies

TECH TORQUE

Those mysterious crashes with no clear cause.

We've all had them, the model spirals in on close finals or lift off and when we reach what's left, all the controls work and yet we know pilot error was unlikely. Apart from the model looking like a panel beaters rubbish tin nothing points to any cause.

I've been looking at this and suggest there is a reasonable possibility that the loss of control in some cases could be sheeted home to low battery power. "Nah" you say - I charged them before flight and everything worked after the crash.

Well - read on. I've been using those HKing receiver battery monitors - they cost under $2 and have 7 LEDs to indicate charge. I charged the battery on my Dragon Lady then didn't get to fly for about 7 days when the weather turned bad. When I finally made it to Kf the 3rd LED was showing which I measured with a decent meter at 5.1V - plenty for a couple of short flights I thought. Had one flight without any problem and prepared for the second - LEDs still showing the same.

For some reason I managed to let the tail wheel drop into a crack in the ground locking the rudder so when I checked the controls the rudder servo was locked. To my surprise the 3rd green LED immediately went out and the red LED came on. Released the tailwheel and back to the status quo ie the third green on.

Gave any thought of further flights away and when I got home checked to see what the hell was going on. My immediate thought was a crook battery so I cycled it a couple of times. Being a nominal 800mA NiCd pack I could draw a bit over 700mA from full which took over an hour at 500mA and it absorbed about 850mA on charge. So the pack looked good.

I've read about the draw servos make on batteries but decided to check for myself. Idle current is sub 100mA but when active the current draw can vary wildly from around 150mA on a free control surface to over 500mA if the flight control is stiff to move or locked. If the model has either flaps or retracts these can put a fair load on servos pushing up the current draw. Even a fairly stiff control surface will cause a significant load but the other thing is how many controls are active at the one time even if the hinges and geometry allow free movement. Added to this by the time you fit 2 aileron, one rudder, and two elevator servos and possibly flap and wheel circuits, if all or most are operating simultaneously even with good geometry the load on the battery for a moment can rise dramatically.

Ok - so let's propose an idea. You are on an approach after a couple of previous flights, and the battery is no longer at full charge, a gust gets the model and all three controls are working hard when suddenly it swings off and because it's close to the ground it's time to think of your next new model. You check later and everything works.

As I see it it is quite possible battery voltage dropped for a second or due to the immediate, temporary load and the receiver browned out. Sure, if you'd been higher all would have been well. As the load dropped and the voltage rose again you may not have even noticed the glitch, but just for that couple of seconds you were on failsafe and close to the ground.

It's just a suspicion but quite possibly explains some crashes. The answer? First, make sure the battery is freshly charged and probably more important, make sure if it is a bigger model that receiver battery capacity is big enough to handle all expected loads - the old sub 1000 mAh nicads are no longer adequate for the more complex models of today.

Nils Powell
Acting CFI

TECH TORQUE CONT.

Following last issues discussion on 2.4GHz radio equipment I received several emails from members both asking and telling me of their experience in using this frequency.

I've edited the letters with permission to encompass the main areas of interest.

The single aerial receivers of any make in the 2.4 GHz frequency range are normally designated for "park flyers" which translates as short range. FRSky actually give a range limit of 500M for their single antenna receivers, which when you think about it is pretty far away for a small models. This is probably where the null that occurs when the aerial is actually pointing at the model becomes a factor. If ever you think this is happening always turn to get the antenna broadside onto the model and turn it for home. At all times the transmitter antenna should be broadside on to the model. Try it when you do a range check - point the antenna directly at the model when walking away and note the point at which you loose coms. Then turn the antenna sideways to the model and keep walking until coms are lost. When I do this there is a significant range difference of about 50% .

To see just how good or bad the single antenna receivers are and using an FrSky park flyer receiver, Greg and I flew my foam wing to the far SW corner of the field and as high as we could sensibly see it. This was done without any problem though hardly to be recommended.

I guess overhead is another area where the antenna could inadvertently end up being pointed at the model but I would hope that sticking to the height limit of 400 feet the comms link would be maintained however this is where the receiver installation may also play a part with the possibility that inboard electrics may be shielding the antenna. As far as model antenna alignment is concerned try and set them so that at least one antenna will have a clear line to the transmitter at any point in the flight. The usual instruction is to keep them at right angles to each other which is fair enough but if you can get them sticking out of the fuselage as well that's a good move. Incidentally - the actual antenna is approx 35mm long and is the shiny piece of cable at the end, any extra length is feed in cable and can be any reasonable length not forming any part of signal capture.

The club rules require both a range check and that failsafe be engaged before the days flying. There is some subtlety involved in the range check and once you have established the distance away you can go before com links are lost in future checks any reduction in the range expected should be cause for investigation. Failsafe also needs a mention. This is a method of ensuring the controls on the model go to a predetermined position if communication is lost, usually after about a second or so. The idea is to try and ensure we don't have a flyaway. The normal thing unless specifically set is for the controls to maintain the last position received and the throttle to go to zero.

I'm using 45 degrees from vertical as a good compromise, but the main thing is keeping the antenna sideways on to the model but I should acknowledge that whilst this does affect range checks, on full power in any sensible visual range, antenna alignment should not be a problem unless other factors intervene but why take the chance? .

Safe flying
Nils
Acting CFI

TORQUE-A-TIVE LETTERS TO THE EDITOR

Four crashes in four weeks due to radio failure; it happened to me, but it might easily have been you .....

Now for the second half of the story!

In a previous Letter to the Editor, I described the unfortunate succession of radio malfunctions I experienced earlier this year, and the procedures that I had subsequently adopted in an attempt to minimise the probability of more such problems in the future. Three months later it is all too apparent that whilst “brown outs” can certainly be caused by inadvertently pointing your transmitter aerial directly towards your model, and improved transmitter handling practices may well be effective in reducing the number of such events, the adoption of such procedures alone will not unfortunately prevent future “brown outs” from happening.

Before discussing what actually happened during that the last three months, perhaps I should reiterate that all of the “brown outs” that I previously experienced, occurred whilst using my Spektrum DX7 transmitter with “parkflyer” micro receivers that are of unknown origin and fitted with a single 25mm aerial. No such problems have been experienced whilst flying my two models fitted with Spektrum full range receivers or, in retrospect, with my Wild Wing which has a Spektrum AR6100E parkflyer receiver with two 25mm aerials aligned in what appears to be a centre tapped arrangement. The particular significance of the latter detail will become evident in due course!

As I should of course have realised from the very beginning; if optimal radio communication is to be preserved between a pilot and a model, particularly one equipped with a low cost parkflyer receiver, not only should the transmitter aerial never be pointed at the model but, equally importantly, the receiver aerial should never be allowed to point directly at the transmitter. That however, is of course far more easily said, than done! Thankfully, the belated realisation that there might perhaps be a systematic problem with my various micro receiver installations finally dawned, not whilst actually flying one of my models, but as a direct result of my previous decision to conduct a full range check at the beginning of every flying session. Yes, although it is still a bit of a pain, that exercise has in fact proved surprisingly educational, as you are about to learn!

Shortly after my previous Letter was published, I once again arrived at Kelly field with my Tomboy. The model was still equipped with its original low cost parkflyer receiver, and its single 25mm aerial remained horizontally located against the side of the fuselage. The transmitter aerial was set in the optimum vertical position previously described, and a range check very carefully conducted, with both control surfaces seen to be responding correctly. The model was launched and away it went, circling upwards in classic free flight Tomboy style but, a couple of minutes later whilst gliding in lazy circles at about 200 feet, yet another “brown out” caused the model to once again drop its wing and spiral earthward in an almost vertical dive!

To say the least, it was now glaringly obvious that simply setting the transmitter aerial in its optimum position and carrying out a range check, were definitely not the magic solution to “brown out” problems that I had previously imagined they might have been! The Tomboy was taken home and put away on a shelf next to the Incubus where, I decided, they would both remain until I had identified an effective solution to what was now becoming a truly frustrating problem!

A week later I again arrived at Kelly field; this time with my Wild Wing. The Spektrum A6100E receiver in this model is also mounted horizontally, in a manner that once again places the twin aerials in line and parallel to the longitudinal axis of the model. The transmitter was configured for optimum performance and a range check very carefully carried out. This time however, alarm bells started ringing when, at about 30 metres distant from the model, the control responses were seen to falter. Finally the penny finally dropped! Whilst carrying out the range check I was facing the Wing head on so that I could watch the movement of both elevons at the same time and, in that position, I was of course also standing directly in line with the two receiver aerials resulting in a “brown out” situation. This situation was simply confirmed by moving a couple of steps to either side, whereupon normal control responses were immediately resumed.

TORQUE-A-TIVE CONT...

The results of this range test were somewhat confusing. Whilst the test had obviously confirmed that inadvertent alignment of the receiver aerial with the transmitter could result in a "brown out", how could I have completed more than 100 successful flights with the model, without experiencing a single control problem? In this regard it is significant that I almost always fly the Wing in circuits, at low altitude and at half throttle, and every such circuit would clearly create at least two potential opportunities for "brown outs" to occur! Subsequent perusal of the information sheet provided with the AR6100E revealed the answer; this receiver features "Smartsafe" failsafe programming which, it is claimed ... *will, in the event of a loss of signal, drive the throttle to low speed and maintain the remaining controls in their last known position.* Obviously the Spektrum "Smartsafe" system has been working overtime with my Wing!

Whilst it was now apparent that "brown outs" could for most practical purposes, be simply avoided by using a Spektrum AR6100E receiver, I still felt reluctant to give up on the two low cost parkflyer receivers used in the Tomboy and Incubus, and I decided to proceed by investigating the effect of relocating the receiver and its aerial in the Tomboy. Tomboys and the like, are of course fundamentally designed to fly safe reliable circuits rather than aerobatics, and it finally occurred to me that mounting the receiver with its single antenna vertical rather than horizontal, was the obvious way to go. At the very least, this would ensure continual exposure of the full length of the receiver aerial to the transmitted signal, at every point in any circuit, just as long as the model remains more or less upright and is never allowed to fly directly overhead!

The modification took two minutes and, a week or so later, the Tomboy was back at Kelly field with its receiver aerial now positioned vertically in the fuselage. After four successful flights, without any suggestion of any "brown out" problems, I felt sufficiently confident to return home and, for the first time, consider just how similar modifications might perhaps be made to the Incubus! That did indeed pose some significant structural modification but, by the time the next Tomboy competition day was upon us, all was completed and both models thankfully completed several uneventful flights.

Dare I hope that perhaps the problem has finally been solved? We shall of course see but, in the meantime, I felt it worthwhile that I provide club members with an account of my recent experience, in the hope that it might perhaps be of some assistance should they too be unlucky enough to encounter similar problems with models equipped with 2.4 ghtz parkflyer receivers.

Happy Landings

Chris Rowe

http://www.nasa.gov/topics/history/features/snoopy.html

SCALE TORQUE

STAND OFF SCALE HMAC .

KELLY FIELD SUNDAY 28th OCTOBER 2012

The club has previously held two Stand Off Scale events . These have been well attended and there was a good roll up of models of all sizes . This event is open to all clubs. It is basically a fun fly event .Static judging will be from 5 meters for smallish models and slightly further for larger models.
The models will be judged on Take-off; realism in the air; landing circuit; landing.

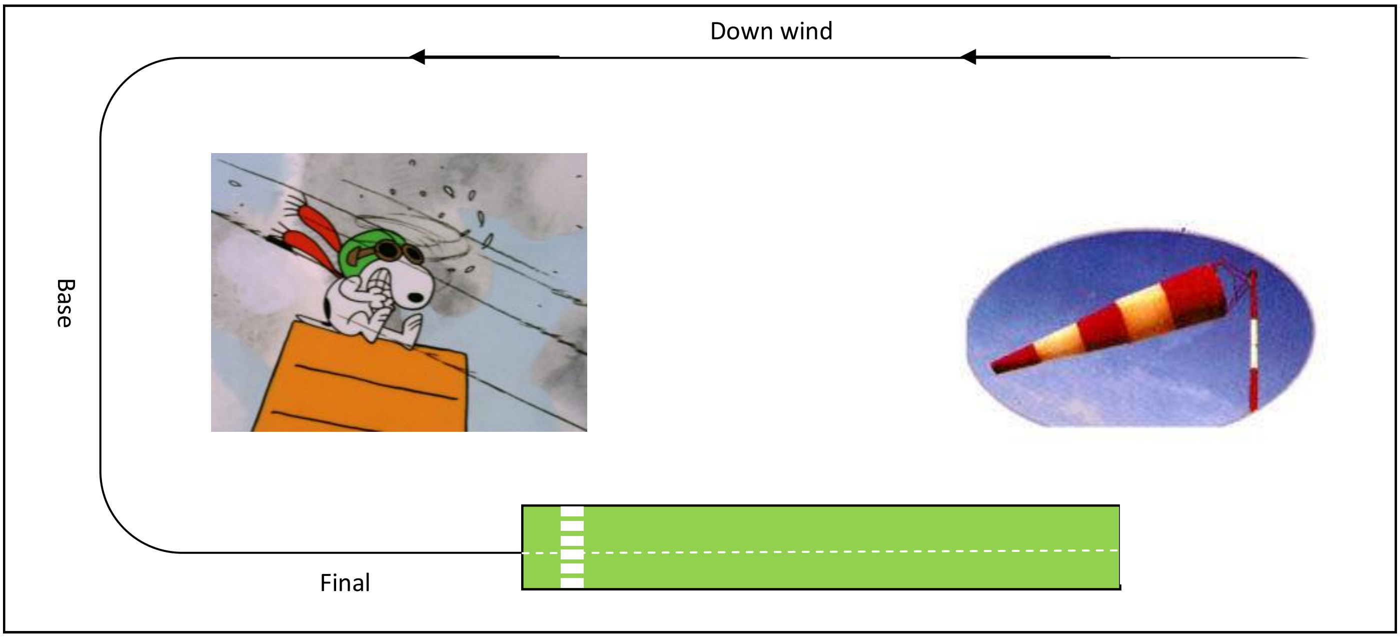
After take-off you will fly about 4 or 5circuits of the field in a manner and speed representing the full size aircraft. You will be required to fly 3 legs of a circuit. As part of your landing circuit; downwind, turn onto Base and lose height, turn onto final and continue to lose height and carry out your landing. If you realize that you model is not positioned for a good landing EG off line or too high, you can go around and be judged on the next landing , you will still be judged on your first landing circuit . Large model, large circuit , to be of size to suit the approx scale of the model.

The landing circuit for full size aircraft is to join the circuit on the downwind leg at1000 ft , not loosing any height , turn 90 degrees onto base loose 500ft, turn 90 degrees onto final and lose height to land.

Model and pilot registration from 9-15 am onward, start flying 10 am . In the previous events some pilots entered more than one model. This will depend on the number of entries we receive. Tony Gray and Bill Jennings will handle the organisation on the day. Lunch will be available courtesy Colleens Canteen.

For more info

Tony Gray 62681111 or tonyrgray@internode .on.net or Bill Jennings 62951941 or savinabill@westnet.com.au,
let us know by Wed 24 Oct



AEROBATIC TORQUE

Aerobatic day Saturday 15 September 2012

After the rain and wind of the last few weeks, we were blessed with sunshine and light and variable winds. The two Northern entrants claimed that they were bringing the good weather, maybe they did?

List of entrants and their finishing position in the competition

Phil Harrington

Max and Doug Keating had 3D models, they thought it was more of a fun fly. Max had a broken ankle and sat on a chair to fly his model.

The two judges were kept busy and they did an admiral job as always. Mike Rutledge communicated the flyers intentions to the judges, Bill Deal kept the flow of models and pilots to the ready area. Nils Powell also assisted with the model and pilot registration.

Pilot	Model	Power	Type	Comments
Steve Reece	Yak 55, 2.6m span	100 cc twin	ARF	
Lyall Glover	Skyleader	Supertigre 51	Kit	
Tony Sheppard	Extra 300	Eflite 36	ARF	
Peter Allen	Hk Slick	hacker13012xl.	ARF	
Michael Van Niekerk	Super Chipmunk	OS120	Scratch built	Equal place with Andrew
Andrew McEntyre	Spot On	Emax Electric		
Tony Gray	Pegasus	YS45	Scratch built	Equal place with Dave
Dave Ellis	Yak	30cc petrol	ARF	
Phil Harrington	Fun World	Electric	ARF	
Max Keating	Twister 3D	Glow	ARF	
Doug Keating	Funtana 3D	Glow	ARF	

The flying routine was four manoeuvres and landing. They are relatively easy to do on any day at the field. It was found on the day not so easy when you have to make up your mind as to, are you ready, pass your message to the judges “eg” two rolls, then position the middle of the two rolls in front of the judges. Seven out of the eleven flyers scored higher on the second round. Colleen's canteen served up 35 mini meals. Colleen had to feed about a dozen more than catered for. After lunch the prizes were presented to the winning trio. First Steve Reece, second Lyall Glover, third Tony Sheppard. First prize was a Hyperion 3D model suitable for 40 to 50 motor. This was generously donated by a member who wishes to remain anonymous. Second was a Thermos flask; Third a litre of fuel and a clunk tank.

Tony Gray . CD.

Jack and Colleen's son, John Tonks a former HMAC club member has just won the Australian Masters in Aerobatics .

Geoff and Jack keeping an eye on the aerobatics
Next time you see these two fellas be nice to them.

AEROBATICS TORQUE CONT...

Photos at the Field

Pits - Michael Van Niekerk, Graeme Scobie and visitors

Doug Keating - Funtana X

Peter Allen's Slick

Steve Reece
Everything grows bigger and better up north.
from Phoenix Flyers

Aqua-batics

Andrew McEntyre - Spot On

TOMBOY TORQUE

Tomboy Competition – HMAC Kelly Field 29th July 2012

Attempting a competition in July is pushing your luck and only the brave (or foolish) turned out on a cold July day to face the starter. Although very cold we did have some luck with a lull in the breeze and we finally made a start around 11.00am.

It was good to welcome Merv & Owen Cameron and Ross Blackwell from LMCA, I think somebody must have given them a rather optimistic weather forecast. We had Peter Allen & John Jongbloed with MPJ powered Tomboys and Chris Rowe also with a Tomboy but powered with an original Mills 0.75.

Mike Rutledge & Ross Blackwell turned out with MPJ powered Courtesans, a Vic Smeed design, rather like a "rounded" Tomboy.

Merv & Owen had their familiar Merlin powered Tomster / Sportsters. Both recorded consistent flights, surprisingly as Merv spent some time "flying" Owen's model instead of his own. Fortunately it didn't end in tears!

With the proceedings underway it was obvious that Mike's Courtesan was in a class of it's own with the MPJ performing faultlessly, daylight was second place. Unfortunately Ross had no luck at all with his Courtesan, and struggled to get a decent motor run.

Red face of the day award to Jack Tonks, who had his new Tomboy all ready to go, however a flat transmitter battery finished the day before it started. A good job Colleen looks after you Jack.

As noted Mike's Courtesan was simply supreme, with JJ, PA and Owen all improving in the later rounds. A couple of unknown bods were last seen heading for Mike's Courtesan with a mallet, something about altering the trim.

Following the excellent BBQ lunch, with special thanks to Colleen, the day was "rounded" off with some control line flying and despite the challenging conditions it turned out to be a most enjoyable day.

We should have several new models ready for the next event with Bob McAllister's Tomboy nearing completion.

Stay tuned for details of the next "Tomboy" fun event

William Deal – Tomboy Event Co-ordinator

1st place Mike Rutlidge

L to R :- Merv Cameron, Ross Blackwell, Chris Rowe, Peter Allen, Mike R, Owen Cameron, John Jongbloed

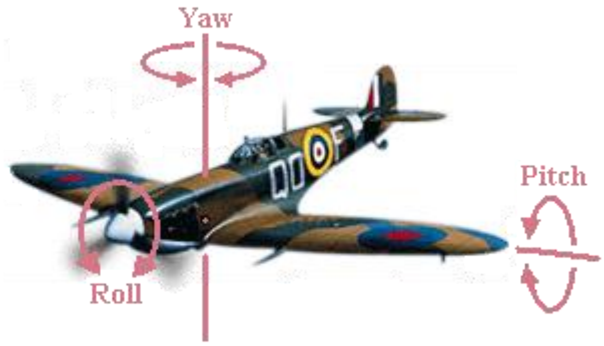
FEATURE TORQUE CONT FROM 1203

Aerodynamics *(Continued from 1203)*

http://adamone.rchomepage.com/index2.htm

Stability Concepts

The aircraft's response to momentary disturbance is associated with its inherent degree of stability built in by the designer, in each of the three axes, and occurring without any reaction from the pilot. There is another condition affecting flight, which is the aircraft's state of trim or equilibrium (where the net sum of all forces equals zero). Some aircraft can be trimmed by the pilot to fly 'hands off' for straight and level flight, for climb or for descent. Free flight models generally have to rely on the state of trim built in by the designer and adjusted by the rigger, while the remote controlled models have some form of trim devices which are adjustable during the flight. An aircraft's stability is expressed in relation to each axis: lateral stability (stability in roll), directional stability (stability in yaw) and longitudinal stability (stability in pitch). Lateral and directional stabilities are inter-dependent.



Stability may be defined as follows:
- Positive stability: tends to return to original condition after a disturbance.
- Negative stability: tends to increase the disturbance.
- Neutral stability: remains at the new condition.

- Static stability: refers to the aircraft's initial response to a disturbance. A statically unstable aircraft will uniformly depart from a condition of equilibrium.

- Dynamic stability: refers to the aircraft's ability to damp out oscillations, which depends on how fast or how slow it responds to a disturbance. A dynamically unstable aircraft will (after a disturbance) start oscillating with increasing amplitude. A dynamically neutrally stable aircraft will continue oscillating after a disturbance but the amplitude of the oscillations will not change.

So, a statically stable aircraft may be dynamically unstable. Dynamic instability may be prevented by an even distribution of weight inside the fuselage, avoiding too much weight concentration at the extremities or at the CG. Also, control surfaces' max throws may affect the flight stability, since a too much control throw may cause instability, e.g. Pilot Induced Oscillations (PIO).

Static stability is proportional to the stabiliser area and the tail moment. You get double static stability if you double the tail area or double the tail moment. Dynamic stability is also proportional to the stabiliser area but increases with the square of the tail moment, which means that you get four times the dynamic stability if you double the tail arm length.

However, making the tail arm longer or encreasing the stabiliser area will move the mass of the aircraft towards the rear, which may also mean the need to make the nose longer in order to minimize the weight required to balance the aircraft...

A totally stable aircraft will return, more or less immediately, to its trimmed state without pilot intervention. However, such an aircraft is rare and not much desirable. We usually want an aircraft just to be reasonably stable so it is easy to fly. If it is too stable, it tends to be sluggish in manoeuvring, exhibiting too slow response on the controls.

FEATURE TORQUE CONT.

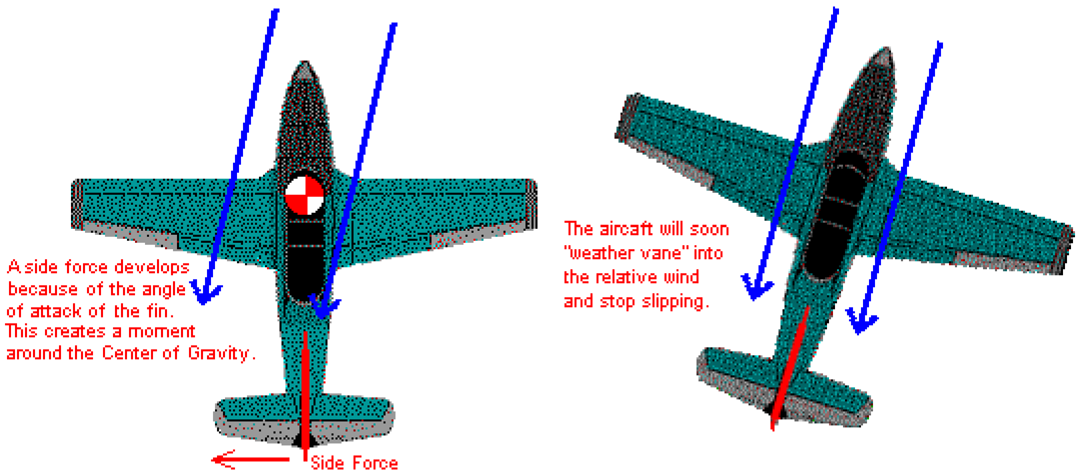
Too much instability is also an undesirable characteristic, except where an extremely manoeuvrable aircraft is needed and the instability can be continually corrected by on-board 'fly-by-wire' computers rather than the pilot, such as a supersonic air superiority fighter.

Lateral stability is achieved through dihedral, sweepback, keel effect and proper distribution of weight. The dihedral angle is the angle that each wing makes with the horizontal (see Wing Geometry). If a disturbance causes one wing to drop, the lower wing will receive more lift and the aircraft will roll back into the horizontal level.

A sweptback wing is one in which the leading edge slopes backward. When a disturbance causes an aircraft with sweepback to slip or drop a wing, the low wing presents its leading edge at an angle more perpendicular to the relative airflow. As a result, the low wing acquires more lift and rises, restoring the aircraft to its original flight attitude.

The keel effect occurs with high wing aircraft. These are laterally stable simply because the wings are attached in a high position on the fuselage, making the fuselage behave like a keel. When the aircraft is disturbed and one wing dips, the fuselage weight acts like a pendulum returning the aircraft to the horizontal level.

The tail fin determines the **directional stability**. If a gust of wind strikes the aircraft from the right it will be in a slip and the fin will get an angle of attack causing the aircraft to yaw until the slip is eliminated.



Longitudinal stability depends on the location of the centre of gravity, the stabiliser area and how far the stabiliser is placed from the main wing. Most aircraft would be completely unstable without the horizontal stabiliser.

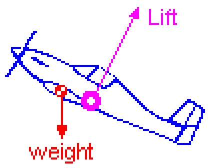
Non-symmetrical cambered airfoils have a higher lift coefficient, but they also have a negative pitching moment (Cm) tending to pitch nose-down, and thus being statically unstable, which requires the counter moment produced by the horizontal stabiliser to get adequate longitudinal stability. The stabiliser provides the same function in longitudinal stability as the fin does in directional stability.

FEATURE TORQUE CONT.

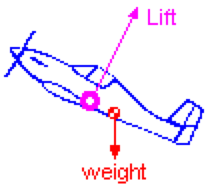
Symmetrical (zero camber) airfoils have normally a zero pitching moment, resulting in neutral stability, which means the aircraft goes wherever you point it. Reflexed airfoils (with trailing edge bent up) have a positive pitching moment making them naturally stable, they are often used with flying wings (without the horizontal stabiliser).

It is of crucial importance that the aircraft's **Centre of Gravity (CG)** is located at the right point, so that a stable and controllable flight can be achieved. In order to achieve a good longitudinal stability, the CG should be ahead of the **Neutral Point (NP)**, which is the Aerodynamic Centre of the whole aircraft. NP is the position through which all the net lift increments act for a change in angle of attack. The major contributors are the main wing, stabiliser surfaces and fuselage.

The bigger the stabiliser area in relationship to the wing area and the longer the tail moment arm relative to the wing chord, the farther aft the NP will be and the farther aft the CG may be, provided it's kept ahead of the NP for stability.



When the CG is ahead of NP the weight tends to correct the upset = Stable



When the CG is behind NP the weight worsens the uppset = Unstable

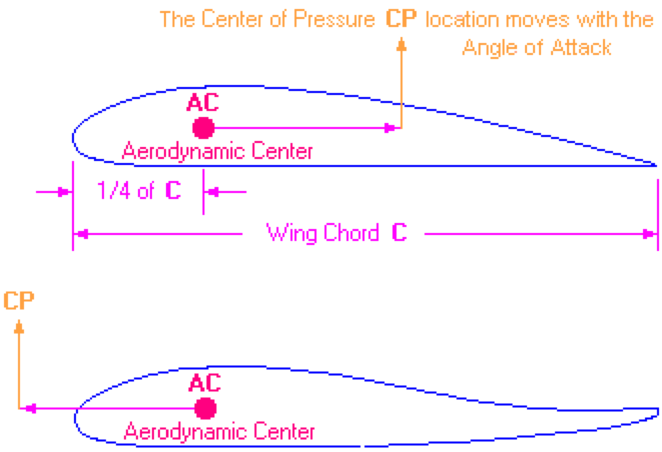
The angle of the fuselage to the direction of flight affects its drag, but has little effect on the pitch trim unless both the projected area of the fuselage and its angle to the direction of flight are quite large.

A **tail-heavy** aircraft will be more unstable and susceptible to stall at low speed e. g. during the landing approach. A **nose-heavy** aircraft will be more difficult to take-off from the ground and to gain altitude and will tend to drop its nose when the throttle is reduced. It also requires higher speed in order to land safely.

The angle between the wing chord line and the stabiliser chord line is called the **Longitudinal Dihedral (LD)** or decalage.
For a given centre of gravity, there is a LD angle that results in a certain trimmed flight speed and pitch attitude. If the LD angle is increased the plane will take on a more nose up pitch attitude, whereas with a decreased LD angle the plane will take on a more nose down pitch attitude. There is also the **Angle of Incidence**, which is the angle of a flying surface related to a common reference line drawn by the designer along the fuselage. The designer might want this reference line to be level when the plane is flying at level flight or when the fuselage is in it's lowest drag position. The purpose of the reference line is to make it easier to set up the relationships among the thrust, the wing and the stabiliser incidence angles. Thus, the Longitudinal Dihedral and the Angle of Incidence are interdependent.

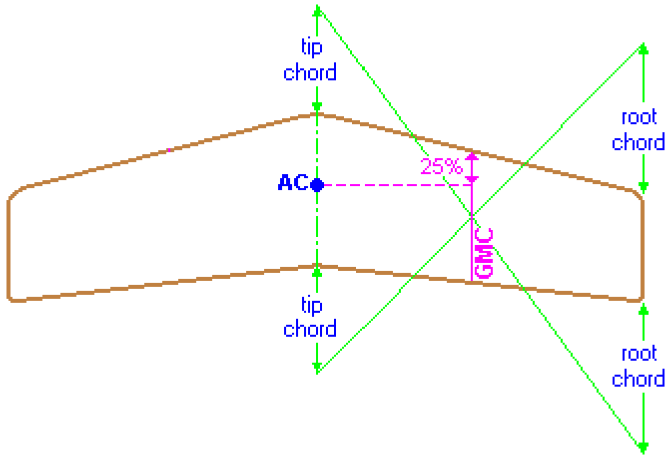
Longitudinal stability is also improved if the stabiliser is situated so that it lies outside the influence of the main wing downwash. Stabilisers are therefore often staggered and mounted at a different height in order to improve their stabilising effectiveness.

It has been found both experimentally and theoretically that, if the aerodynamic force is applied at a location 1/4 from the leading edge of a rectangular wing at subsonic speed, the magnitude of the aerodynamic moment remains nearly constant even when the angle of attack changes. This location is called the wing's **Aerodynamic Centre AC**. (At supersonic speed, the aerodynamic centre is near 1/2 of the chord).



Aircraft without stabiliser use a Reflexed Airfoil where CP may lie ahead of AC

FEATURE TORQUE CONT.



In order to obtain a good Longitudinal Stability the **Centre of Gravity CG** should be close to the main wings' **Aerodynamic Centre AC**. For wings with other than rectangular form (such as triangular, trapezoidal, compound, etc.) we have to find the **Mean Aerodynamic Chord - MAC**, which is the average for the whole wing. The MAC calculation requires rather complicated mathematics, so a simpler method called 'Geometric Mean Chord' GMC or 'Standard Mean Chord' SMC may be used as shown on the drawings below. MAC is only slightly bigger than GMC except for sharply tapered wings. Taper ratio = tip chord/root chord.

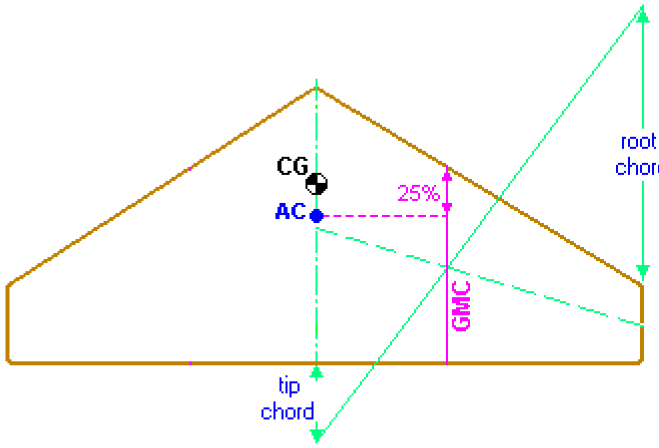
To calculate MAC of a tapered wing, the following simplified equation may be used:

MAC = root chord * 2/3 * ((1+T+T^2)/(1+T))

Where T is the wing's taper ratio.

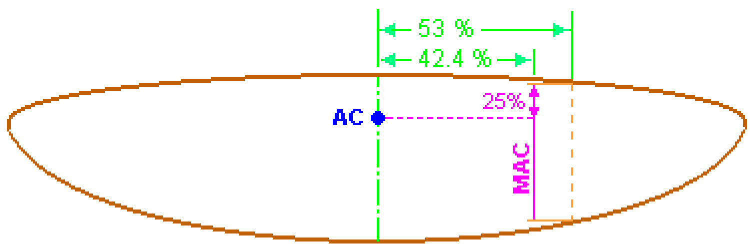
The MAC distance from the center line may be calculated as follows:

distance = half span * (1+2*T)/(3+3*T)



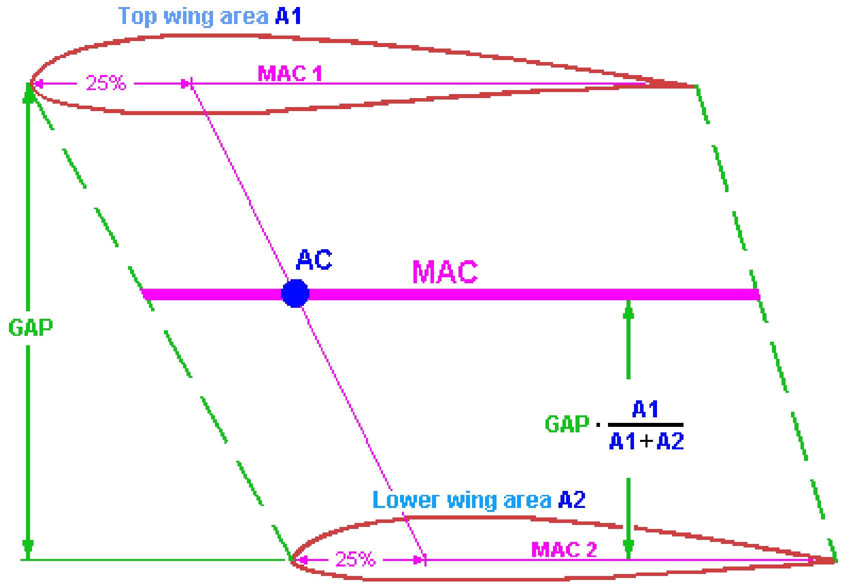
For a delta wing the **CG** should be located 10% ahead of the geometrically calculated **AC** point as shown to the right.

The MAC of an elliptical wing is 85% of the root chord and is located at 42.4% of the half wingspan from the root chord. Elliptical wing's area = pi * wingspan * root chord/4 The **AC** location for biplanes with positive stagger (top wing ahead of the bottom wing), is found according to the drawing below.



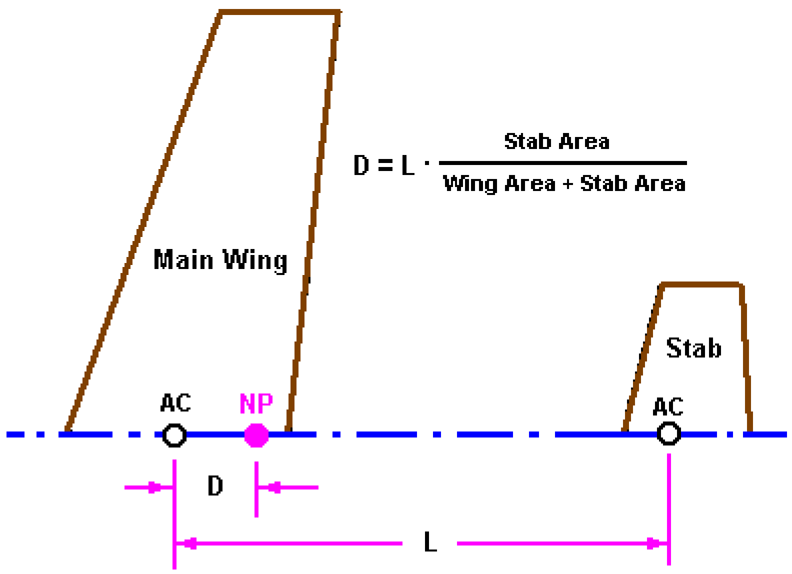
FEATURE TORQUE CONT.

For conventional designs (with main wing and horizontal stab) the **CG** location range is usually between 28% and 33% from the leading edge of the main wing's MAC, which means between about 5% and 15% ahead of the aircraft's Neutral Point **NP**. This is called the **Static Margin**, which is expressed as a percentage of MAC. When the static margin is zero (CG coincident with NP) the aircraft is considered "neutrally stable". However, for conventional designs the static margin should be between 5% and 15% of the MAC ahead of the NP.



The CG location as described above is pretty close to the wing's Aerodynamic Centre AC because the lift due to the horizontal stab has only a slightly effect on the conventional R/C models.

However, those figures may vary with other designs, as the NP location depends on the size of the main wing vs. the stab size and the distance between the main wing's AC and the stab's AC. The simplest way of locating the aircraft's NP is by using the areas of the two horizontal lifting surfaces (main wing and stab) and locate the NP proportionately along the distance between the main wing's AC point and the stab's AC point. For example, the NP distance to the main wing's AC point would be:



There are other factors, however, that make the simple formula above inaccurate. In case the two wings have different aspect ratios (different dCL/d-alpha) the NP will be closer to the one that has higher aspect ratio. Also, since the stab operates in disturbed air, the NP will be more forward than the simple formula predicts.

The figure below shows a somewhat more complex formula to locate the NP but would give a more accurate result using the so called Tail Volume Ratio, **Vbar**. This formula gives the NP position as a percentage (%) of the wing's MAC aft of the wing's AC point. There are other factors, however, that make the simple formula above inaccurate. In case the two wings have different aspect ratios (different dCL/d-alpha) the NP will be closer to the one that has higher aspect ratio. Also, since the stab operates in disturbed air, the NP will be more forward than the simple formula predicts.

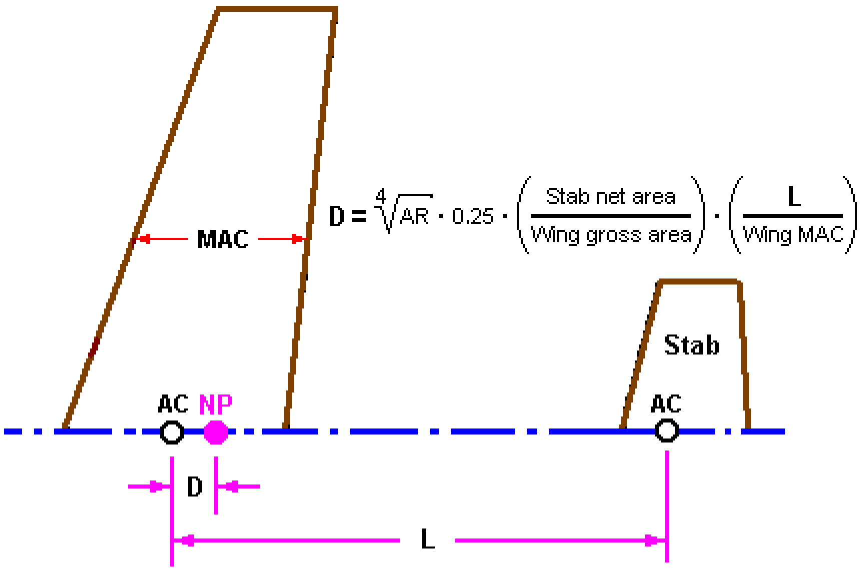
The figure below shows a somewhat more complex formula to locate the NP but would give a more accurate result using the so called Tail Volume Ratio, **Vbar**. This formula gives the NP position as a percentage (%) of the wing's MAC aft of the wing's AC point.

FEATURE TORQUE CONT.

For those who are not so keen on formulas and calculations there is the Aircraft Centre of Gravity Calculator, which automatically calculates the CG location as well as other useful parameters based on the formula above.

For Canards check the link below: Canard Centre of Gravity Calculator

For further equations on how to find the proper CG location with different wing shapes and design configurations including Canards, check here.

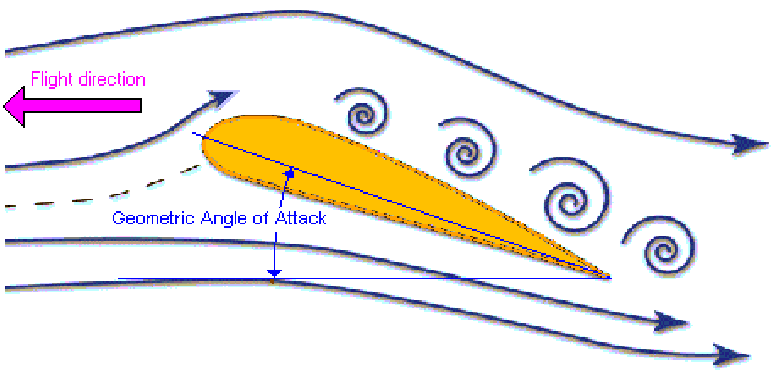


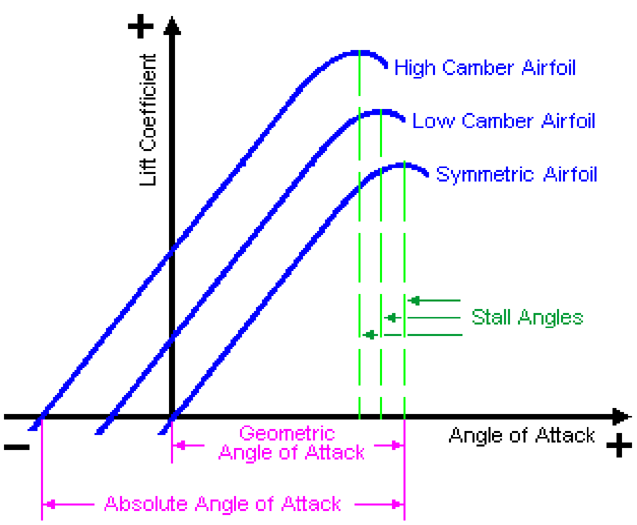
Stall and Spin

One of the first questions a pilot might ask, when converting to a new aircraft type, is "What's the stall speed?"
The reason for the enquiry is that usually, but not always, the approach speed chosen for landing is 1.3 times the stall speed. Stall is an undesirable phenomenon in which the aircraft wings produce an increased air resistance and decreased lift, which may cause an aircraft to crash.

The stall occurs when the airflow separates from the upper wing surface. It happens when a plane is under too great an **Angle of Attack** (AoA). For light aircraft, without high-lift devices, the critical angle is usually around 16°.The picture below shows a stalled aerofoil:

Geometric Angle of Attack is the angle between the airfoil chord line and the direction of flight. The Angle of Attack is also known as Alpha. The angle of attack measured relative to zero coefficient of lift is called the Absolute Angle of Attack (Absolute AoA). There's also the Pitch Angle, which is measured with respect to the horizon.





For symmetric aerofoils the Absolute AoA is equal to the Geometric AoA, whereas for asymmetric cambered) aerofoils these two angles are different, since these airfoils still produce lift at zero Geometric Angle of Attack as shown below. For airfoils of one family the symmetric airfoil stalls at a higher Geometric AoA compared with the cambered airfoil, however the cambered airfoil has higher lift coefficient and stalls at a higher Absolute AoA.

As mentioned in the chapter Forces in Flight, the lift force is proportional to the density of the air **r**, the square of the airspeed **V**, the type of airfoil and to the wing's area according to the formula:

Lift force = 0.5 * **r** * **V**^{2} * wing's lift coefficient * wing area

HISTORY TORQUES

Article from Australian Model Hobbies magazine December 1950

—*Photo courtesy "Mercury," Hobart.*

BEAUTY AND THE BEAST. Two of the prettier sides of aeromodelling — a scale Thunderbolt, built by Arthur "Seaweed" Wylde, of Sydney, and an Intruder Mosquito, built by Neil Stewart, of S.A. "Seaweed's" model provided the most spectacular scale crash possible to see during the Scale Event at the last Nationals. Pat Hiscox and Jackie Walter are holding the models. The Beast in our trio is the Jet. A vicious, unpredictable thing, it is the least attractive of all models, but is the most spectacular when in the air. Preparing David Reynolds Jet are D. Smith, R. Wheeler and L. Baxter, members of the Hobart M.A.C. The model flew at 95 m.p.h.

Club News (cont.)

Next month we are holding our Club's competition and with good weather we will be able to give you a detailed report.

All correspondence to Box 2278, G.P.O., Sydney.

ARTHUR LARRITT,
Publications Officer.

Tasmania.

HOBART MODEL AERO CLUB

We here are 100 per cent. control fliers due to lack of suitable free flight grounds.

On the Monday holiday of 12th June the H.M.A.C. in conjunction with the Launceston Club staged a public demonstration at Clare Street Oval, Hobart. Over 40 models were flown and the meeting was attended by over 1,000 spectators. The greater majority of models flown were stunt jobs. Our leading stunt fliers, Geoff and Bert Leverton, flew Yulon 30 powered models. Reg Wilson, Garth Wilmot, and Bruce Synott, flying Frog 500 powered stunt jobs, helped to give the spectators plenty of thrills.

Only two Class B speed models made an appearance, Bruce Synott's McCoy 29 Little Rocket which did not get airborne and the Leverton Twin's Eta 29 speed model which made two excellent flights at 98 m.p.h. The highlight of the demonstration was the first flight of David Reynold's Squirt powered by a Juggernaut Redhead, which reached a speed of 95 m.p.h.

Dave Jacobs, from Launceston, pleased the crowd when his big sidewinder Tempest stunt model shed the outboard wing after a loop.

On 30th July we flew off the Bridges' Stunt Trophy, which resulted in an outright win by Geoff Leverton, who flew a 350 sq. in. Yulon model through every manoeuvre in the schedule (Plymouth Rules) in a most polished manner. He was followed by Bert Leverton flying a similar model. Bruce Synott was third. Manoeuvres were called by public address system to each contestant in a manner similar to the Nationals and was judged by Dave Christian and D. Reynolds. Mr. Bridges, the donor, presented a fine trophy.

Coming events here include a demonstration at the Royal Show in October and a trip to Launceston in early November. Stunt flying is dominating everything else at present. Success seems to come mostly from Class B motors such as Yulons and Frog 500s. Best spoken of stunt motors are the Yulon, Frog 500 and Atwood Champion/Glodevil. A number making good progress have Atwood engines on the way form the States. D. Reynolds is our lone jet flier and expects to push the speed up soon with the arrival of a Dynajet and Super Squirt Kit. Royce Wheeler is perhaps our unluckiest modeller, writing off three Atwood models in quick succession, including a Super Zilch without getting anywhere. Those flying 5 c.c. stunters have been building "crash proof" models lately, and it is not uncommon to see these jobs time and time again bounce in full bore crashes. This seems to have come from plenty of block round the nose and spruce spars and edges in the wings. With the emphasis on stunt, racing motors are "out," and Tempests and Eta 29s are hard to dispose of and some modellers have trouble in selling highly regarded McCoys, etc.

LAUNCESTON MODEL AERO CLUB

This is our first news item, so perhaps a little history would not go amiss. The Club was formed in 1946 by five or six members, including the president of the Aeromodellers' Association of Tasmania. It has since expanded and though still small most phases of model flying have been covered.

Control line and free flight power are most popular at the moment. Team racing is commencing, most models being powered with Frog 500s.

L. Cordwell is building a 5 ft. span Pursuitier powered with a Gee-Bee 50. Charlie Jones and David Nobes are our most active free flight members at present, and have had a number of cross county flights. One Hi Ball with an E.D. Bee made a flight of 5 minutes 17 seconds.

Paul Roper has a Dynajet but so far has been unsuccessful in getting his model airborne.

The Club is holding an all control line meeting in Launceston in conjunction with the Hobart M.A.C. on 6th November.

HISTORY TORQUES CONT.

Above: A two-horn system at Bolling Field, USA, in 1921.

The building in the background is the Army War College at Fort McNair.

http://www.aqpl43.dsl.pipex.com/MUSEUM/COMMS/ear/ear.htm

FUNNY TORQUE

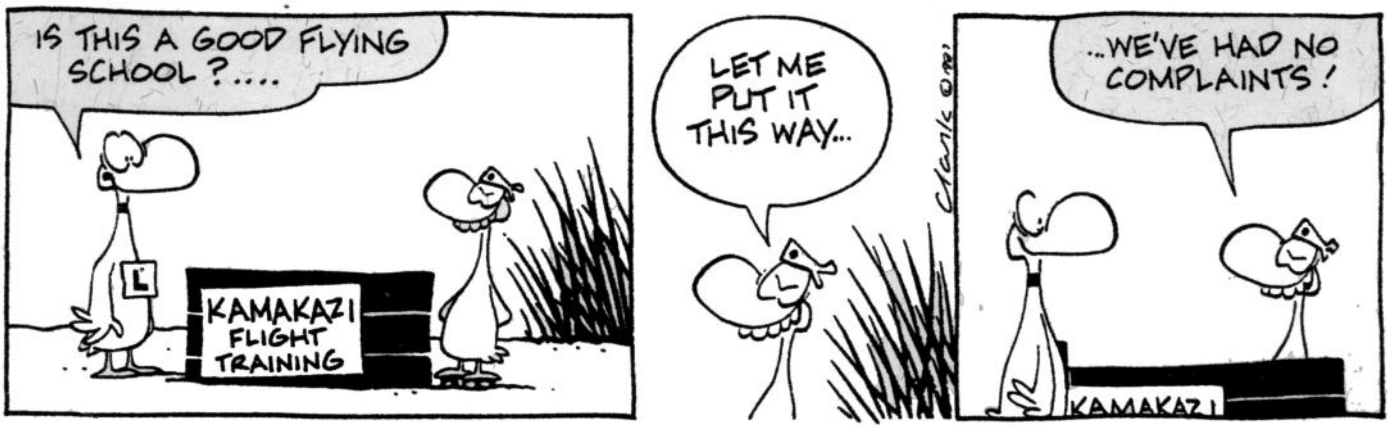
Model Lover:

She:- (Peevishly) It seems like building those silly little models is the most important part of your life.

He:- But, darling, you know very well that there's some much more important to me then building those models

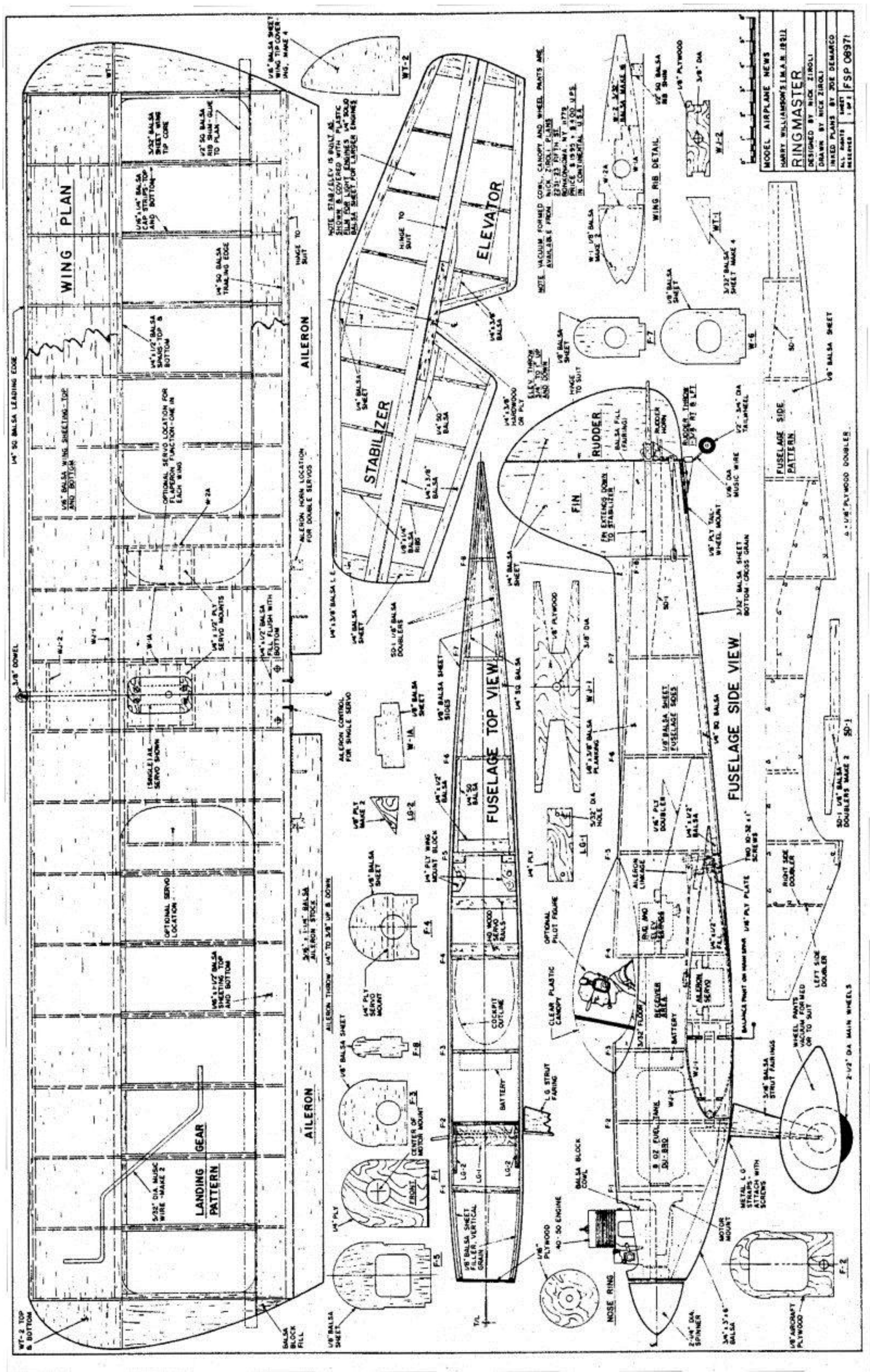
She:- (Hopefully) You mean …?

He:- Yes. Flying 'em



PLAN TORQUE

Control-line model



http://www.myhobbylinks.com/images/RINGMASTER.JPG

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 Transmitter

VC-6000, 36MHz, near new, comes with 240v charger, one receiver, no servos, Stores 4 models.

Asking $160
Phone Danny on 0427 685 085
Contact: Danny 0427 685 085

JR Receivers - NER-549X

9 channel, 36MHz, 2 of, $45 each

Contact: Stuart 6247 7423

SUDUKO Solution

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

In case you are wondering Ed can't stand Sudukos. I put them in for some

PUZZLING TORQUE

Who were these men and what had they done?

C.W.A. Scott & Tom Campbell. They had broken the record between London and Melbourne in 1934.

Charles Lindbergh?

SUDUKO

	2		3	1			5	7
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Choose a number, and place it in the grid above.

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