Servo Chatter

Palmerston North Aeroneers
www.aeroneers.com

Model Aeroplane Flying Display

PN Aeroneers Model Flying Club

Open Day
Sunday 7 April 10 a.m. to 4 p.m.

Static and flying displays of many types of model aeroplanes:
*Aerobatics *Warbirds *Gliders *Jets *Helicopters

Combat Highlight:
High speed battles using home made cheap (and disposable) SPAD plastic aeroplanes. No quarter given!

BBQ sausages, tea & coffee, and cold drinks on sale.

Our Modelport is located at the western end of Spur Road.
From Taonui drive 8 km north right through Colyton then take the first left on to Spur Road.
There is plenty of parking but wear your old farm shoes.
www.aeroneers.com

Entry Fee: Gold Coin Donation

Contents

PRESIDENTIAL PONDERINGS

PRESIDENT'S REPORT

We have had a great spell of summer weather and the flying strip is very dry. These conditions bring the flies and they seem to land on your nose just as you are trying to land (no spare hands here).

Sunday saw the first "Tomboy" competition and a mass launch was had with pilots calling out their name as their Tomboy came back to earth.

February means that the Club's AGM is upon us. If anyone wants to put their name in the hat please let the Secretary know.

There are possibly three new members looking to join the Club and if they do I am sure that we will make them welcome.

See you at the field.

Peter Vining
President

February 2013

CLUB CAPTAIN

BATTERY UNIVERSITY

All about Chargers

The performance and longevity of rechargeable batteries are to a large extent governed by the quality of the charger. In a price-competitive world, battery chargers are often given low priority, especially as consumer products. Choosing a quality charger is important considering the cost of battery replacement and the frustration poorly performing batteries create. The charger should serve as a quintessential master and guardian angel to protect the environment and save money by extending battery life.

There are two varieties of chargers: the personal chargers and the fleet chargers. For cell phones, laptops, tablets or digital cameras, manufacturers include personal chargers. These are made for one battery type, are economically priced and perform well when used for the application intended.

The fleet charger serves employees in a team environment and often has multiple bays. The original equipment manufacturer (OEM) sells the chargers and third parties also provide them. While the OEMs meet the basic requirements, third-party manufacturers often include special features, such as a discharge function for battery conditioning and calibration.

Some manufacturers of third-party chargers have become creative and offer advanced charge methods for lead- and nickel-based batteries. While pulse charging may be beneficial for nickel-based batteries, this method is not recommended for Li-ion.

The voltage peaks are too high and cause havoc with the protection circuit. Battery manufacturers do not support alternative charging methods and say that pulse charging could shorten the life of Li-ion. There are many valuable additional features for chargers, and hot- and cold-temperature protection is one. Below freezing, the charger lowers or prevents charge depending on the type of battery. When hot, the charger only engages when the battery temperature has normalized to a safe level. Advanced lead acid chargers offer temperature-controlled voltage thresholds, as well as adjustments to optimize charging for aging batteries.

Some chargers, including Cadex chargers, feature a wake-up feature or “boost” to allow charging Li-ion batteries that have fallen asleep. This can occur if a Li-ion battery is stored in a discharged condition and self-discharge has depressed the voltage to the cut-off point. Regular chargers read these batteries as unserviceable and the packs are discarded. The boost feature applies a small charge current to activate the protection circuit to 2.20–2.90V/ cell, at which point a normal charge commences. Caution should be applied not to boost lithium-based batteries back to life that have dwelled below 1.5V/cell for a week or longer.

There are two common charge methods, which are voltage limiting (VL) and current limiting (CL). Lead- and lithium-based chargers cap the voltage at a fixed threshold. When reaching the cut-off voltage, the battery begins to saturate and the current drops while receiving the remaining charge on its own timetable. Full charge detection occurs when the current drops to a designated level.

BATTERY UNIVERSITY

Nickel-based batteries, on the other hand, charge with a controlled current and the voltage is allowed to fluctuate freely. This can be compared to lifting a weight with an elastic band. The slight voltage drop after a steady rise indicates a fully charged battery. The voltage drop method works well in terminating the fast charge, however, the charger should include other safeguards to respond to anomalies such as shorted or mismatched cells. Most batteries and chargers also include temperature sensors to end the charge if the temperature exceeds a safe level.

A temperature rise is normal, especially when nickel-based batteries move towards full-charge state. When in "ready" mode, the battery must cool down to room temperature. Heat causes stress and prolonged exposure to elevated temperature shortens battery life. If the temperature remains above ambient, the charger is not performing right and the battery should be removed when "ready" appears. Extended trickle charge also inflicts damage, and nickel-based batteries should not be left in the charger for more than a few days.

A lithium-based battery should not get warm in a charger and if this happens, the battery or charger might be faulty. Discontinue using the battery and/or charger. Li−ion chargers do not apply a trickle charge and disconnect the battery electrically when fully charged. If these packs are left in the charger for a few weeks, a recharge may occur when the open circuit voltage drops below a set threshold. It is not necessary to remove Li-ion from the charger when full; however, if not used for a week or more, it is better to remove them and recharge before use.

A mobile phone charger draws about 2 watts on charge, while a laptop on charge takes close to 100 watts. The standby current must be low and Energy Star offers mobile phone chargers drawing 30mW or less five stars for high efficiency; 30–150mW earns four stars, 150–250mW three stars, and 250–350mW two stars. The industry average is 300mW on no-load consumption and this gets one star; higher than 500mW earns no stars. Low standby wattage is only possible with small chargers, such as the four billion mobile phone chargers that are mostly plugged in.

Simple Guidelines When Buying a Charger

- Use the correct charger for the battery chemistry. Most chargers serve one chemistry only.
- The battery voltage must agree with the charger. Do not charge if different.
- Within reason, the Ah rating of a battery can be higher or lower than specified. A larger battery will take longer to charge than a smaller one and vice versa.
- The higher the amperage of the charger, the shorter the charge time will be. There are limitations as to how fast a battery can be charged.
- Accurate charge termination and correct trickle charge prolong battery life.
- When fully saturated, a lead acid charger should switch to a lower voltage; a nickel-based charger should have a trickle charge NiMH; a Li-ion charger provides no trickle charge.
- Chargers should have a temperature override to end charge on a malfunctioning battery.
- Observe the temperature of the charger and battery. Lead acid batteries stay cool during charge; nickel-based batteries elevate the temperature towards the end of charge and should cool down after charge; Li-ion batteries should stay cool throughout charge.

To be continued…

HOW DO WINGS WORK? CONTINUED

MODEL AIRPLANES, THE BERNOULLI EQUATION, AND THE COANDA EFFECT © 1994 by Jef Raskin (who played major role in development of first Apple Mac)

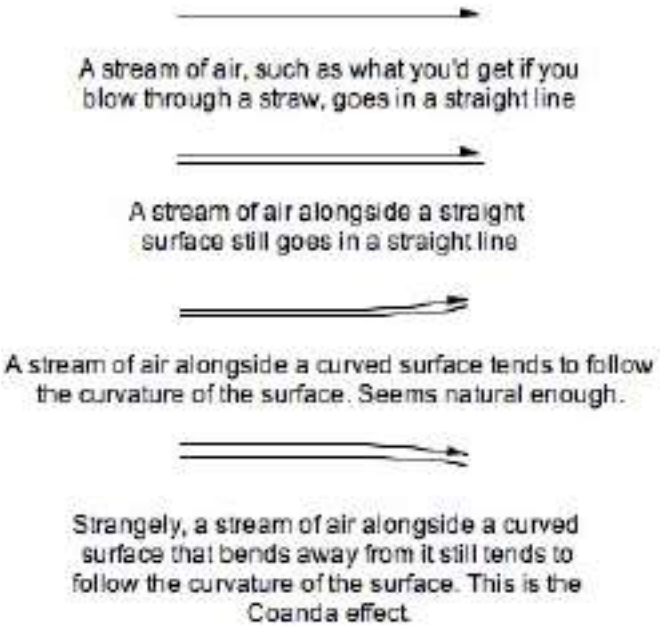
Continued from last month:

THE COANDA EFFECT

(*note that the coanda effect is being exploited to increase downforce on Formula One grand prix cars - Editor)*

If a stream of water is flowing along a solid surface which is curved slightly away from the stream, the water will tend to follow the surface. This is an example of the Coanda effect and is easily demonstrated by holding the back of a spoon vertically under a thin stream of water from a faucet. If you hold the spoon so that it can swing, you will feel it being pulled toward the stream of water. The effect has limits: if you use a sphere instead of a spoon, you will find that the water will only follow a part of the way around. Further, if the surface is too sharply curved, the water will not follow but will just bend a bit and break away from the surface.

The Coanda effect works with any of our usual fluids, such as air at usual temperatures, pressures, and speeds. I make these qualifications because (to give a few examples) liquid helium, gasses at extremes of low or high pressure or temperature, and fluids at supersonic speeds often behave rather differently. Fortunately, we don't have to worry about all of those extremes with model planes.



Another thing we don't have to wonder about is why the Coanda effect works, we can take it as an experimental fact. But I hope your curiosity is unsatisfied on this point and that you will seek further.

A word often used to describe the Coanda effect is to say that the airstream is "entrained" by the surface. One advantage of discussing lift and drag in terms of the Coanda effect is that we can visualize the forces involved in a rather straightforward way. The common explanation (and the methods used in serious texts on aerodynamics) are anything but clear in showing how the motion of the air is physically coupled to the wing. This is partly because much of the approach taken in the 1920s was shaped by the need for the resulting differential equations (mostly based on the Kutta-Joukowski theorem) to have closed-form solutions or to yield useful numerical results with paper-and-pencil methods. Modern approaches use computers and are based on only slightly more intuitive constructs. We will now develop an alternative way of visualizing lift that makes predicting the basic phenomena associated with it easier.

A MENTAL MODEL OF HOW A WING GENERATES LIFT AND DRAG

As is typical of physicists, I have often spoken of the air moving past the wing. In aircraft wings usually move through the air. It makes no real difference, as flying a slow plane into the wind so that the plane's ground speed is zero demonstrates. So I will speak of the airplane moving or the wind moving

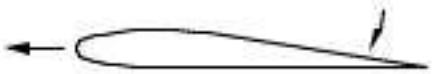
HOW DO WINGS WORK?

whichever makes the point more clearly at the time. In the next illustration , it becomes convenient to look at the air from the point of view of a moving airplane.

the air molecules, attracted to the surface, are pulled down.

Think of the wing moving to the left, with the air standing still. The air moves toward the wing much as if it was attached to the wing with invisible rubber bands. It is often helpful to think of lift as the action of the rubber bands that are pulling the wing up.

Another detail is important: the air gets pulled along in the direction of the wing's motion as well. So the action is really more like the following picture



The air is pulled forward as well as down by the motion of the wing.

If you were in a canoe and tried pulling someone in the water toward you with a rope, your canoe would move toward the person. It is classic action and reaction. You move a mass of air down and the wing moves up. This is a useful visualization of the lift generated by the top of the wing.

As the diagram suggests, the wing has also spent some of its energy, necessarily, in moving the air forward. The imaginary rubber bands pull it back some. That's a way to think about the drag that is caused by the lift the wing generates. Lift cannot be had without drag. The acceleration of the air around the sharper curvature near the front of the top of the wing also imparts a downward and forward component to the motion of the molecules of air (actually a slowing of their upward and backward motion, which is equivalent) and thus contributes to lift. The bottom of the wing is easier to understand, and an explanation is left to the reader.

The experiments with the miniature wind tunnel described earlier are readily understood in terms of the Coanda effect: the downward-curved wing entrained the airflow to move downward, and a force upward is developed in reaction. The upward-curved (concave) airfoil entrained the airflow to move upwards, and a force downward was the result. The lumpy wing generates a lot of drag by moving air molecules up and down repeatedly. This eats up energy (by generating frictional heat) but doesn't create a net downward motion of the air and therefore doesn't create a net upward movement of the wing. It is easy, based on the Coanda effect, to visualize why angle of attack (the fore-and-aft tilt of the wing, as illustrated earlier) is crucially important to a symmetrical airfoil, why planes can fly inverted, why flat and thin wings work, and why Experiment 1 with its convex and concave strips of paper works as it does.

What has been presented so far is by no means a physical account of lift and drag, but it does tend to give a good picture of the phenomena. We will now use this grasp to get a reasonable hold on the spinning ball problem.

To be continued…

"THERE IS ALWAYS ONE MORE WAY TO SKIN A TOMCAT"

There is always one more way to skin a Tomcat than to acupuncture it with pins and needles.

The traditional way to make a model plane is to pin the balsa stringers and frame parts down over a full sized plan and thus hold the bits in place while the UHU glue sets overnight. I made my Tomboy without the use of pins and with the aid of a few jigs held in place by G clamps.

First I made a pair of curved formers from 5mm customwood to match the elevations of the fuselage stringers. I then laminated the stringers/longerons from two pieces of cedar 2.4mm x 4.75mm and glued them together with PVA up against the formers. The laminated cedar stringers are far stronger than bent or kerfed balsawood, they look neater and they allowed the corners to be rounded off for a nice finish.

I then clamped the formers over the plan which was protected by a sheet of plastic film kindly provided by President Pete. Building the framework inside this jig was easy since the pieces could be jammed exactly into the correct places, glued with PVA and left to set. I built extra framework into my fuse because I thought the design was too fragile, especially at the wing

THERE IS ALWAYS ONE MORE WAY TO SKIN A TOMCAT"

attachment points. In hindsight I did not need to add this extra bracing as, at this point in time, I did not realise that Solarfilm was so strong, never having used it before.

Having built the two fuselage sides I then glued the frames onto the port side with the aid of 3 square blocks of wood which enabled the frames to be both held in place and held exactly square to the sides. After the PVA had set I glued the starboard side onto the frames using the same blocks of pine. I then clamped the fuselage between two straight lengths of 3 x 1 pine and glued the aft point of the fuse together exactly in the centre between the timbers.

I made the wing panels and the tailplane by a similar method. I machined a length of scrap pine to 50mm x 12mm and cut it up into short lengths to match the sizes of the spaces between the ribs of the wing and the tailplane. I made leading and trailing edge pieces from cedar, again because I felt that the design was too fragile in balsawood. I clamped each wing panel exactly square and straight between two timber straight edges and a pair of end blocks, with the ribs held exactly by the spacers, and glued the LE & TE in place. Next day I glued the spars in place and held the wing panels down to ensure they set free of twist.

I built the fin onto the fuse with a gap underneath into which I could later slide the completed tailplane and screw it into place. I wanted to cover the tailplane in one piece in order to make a neater job and to save all the work and mess involved in trying to cover into an inside 90* corner. Again this was because I had never before attempted plastic shrink film covering. I

THERE IS ALWAYS ONE MORE WAY TO SKIN A TOMCAT"

added two pine blocks to the tailplane LE & TE through which I could later screw down the finished tailplane.

I made my first Solarfilm covering attempts on the tailplane. My first three attempts were failures. On my first attempt I did not allow enough cover over the tips which I had painted. PV had advised me to shrink the covering by use of the iron rather than a heat gun, but I could not get the damned film to shrink, so I tried the hair drier which did not work either. So I took the wrinkled article to the factory and attacked it with the heat gun which instantly pulled the film off the tips (expletive deleted). Second attempt – provided more cover over the tips, aimed heat gun, distorted the framework and pulled the covering off the tips again. Third attempt – bent the TE and broke a rib – not mine, Tomboy's. Third attempt – decided to try again to shrink with the iron, which operation worked perfectly! I then realised that my first shrinking attempt with the iron had failed because I had turned the iron off when I had left the room for some interruption. Insert expletive.

The rest of the covering job went without a hitch and I was chuffed with both the ease of covering and the completed job. It was then that I realised the strength of modern plastic film covering which has encouraged me to consider a possible departure from coreflute wings and plywood fuses at some future date. To this end I have accumulated three old kitsets to add to my endless list of projects – a SIG 'Liberty Sport', a 'Powerhouse 60' 2.1m Vintage and a SIG 'Riser 100' 2.54m Sailplane. To quote from a Dennis the Menace cartoon I have; *"God put me on the earth to achieve a certain number of things, right now I am so far behind I will never die."*

Ladderman 20/2/13

Thanks Ladderman. Makes my job so much easier to receive a high quality contribution like this. Much appreciated. Editor.

Glider Report

2-metre Competition

Twelve members turned out to compete in the first 2-metre contest for 2013. The weather was fine and hot, with a light breeze from the northwest so there should be plenty of lift about – or so we thought! There was some, but we all struck infernal sink in at least one flight which reduced the times considerably, as shown in the results below. Three rounds were flown, 3 min, 4 min and 5min.

Results:

	3min. target	4min. target	5min. Target	Total
Wayne Bilham	3:01/50	1:24/50	4:54/50	707
Merv Matthews	3:03/50	1:43/50	4:36/50	706
Simon Tansley	1:58/50	2:31/50	3:42/50	641
Phil Pearpoint	3:15/-	2:54/-	3:45/50	614
Bruce Withell	2:08/50	3:53/50	1:18/50	589
Bradley Pearpoint	3:01/50	3:13/-	1:45/50	577
Mike Randell	2:44/50	1:42/50	2:11/50	547
David James	3:03/50	1:58/-	1:56/50	511
Brian Dickons	3:00/-	1:46/-	1:53/50	449
Bruce Woodfield	2:18/-	2:38/-	1:19/50	425
Peter Vining	1:50/50	0:42/-	1:58/50	370
Kevin Burrows	1:50/-	2:41/-	1:01/-	332

Many thanks to those who returned the bungee so promptly, keeping two timekeepers busy and enabling three rounds to be completed within two hours.

Happy gliding

Merv

THE WIRE POST.....

THIS JUST IN FROM THE WIRE POST:-

A redneck, a preacher, and a lawyer are travelling in a car when it breaks down in front of a farm. They ask the farmer if they could spend the night.

The farmer said, "Sure, but my guest room only has room for two. One of you will have to sleep in the barn."

The preacher says, "I don't mind being with God's animals. I will sleep in the barn."

An hour later, there's a knock on the guest room door.

It's the preacher. He says, "I can't stand that noisy chicken. Could I switch with one of you?"

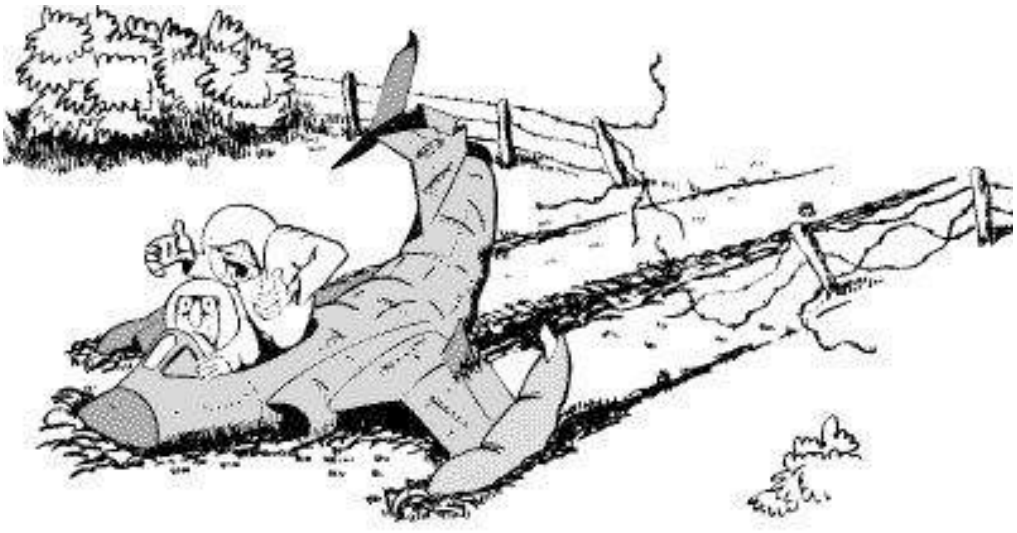
The redneck says, "There are always loud animals back in Alabama I can take it."

An hour later, there's a knock on the guest room door.

It's the redneck. He says, "I can't stand that smelly cow! Could I switch with one of you?"

The lawyer says, "Well, I guess that leaves me."

An hour later, there's a knock on the door. It's the chicken and the cow.



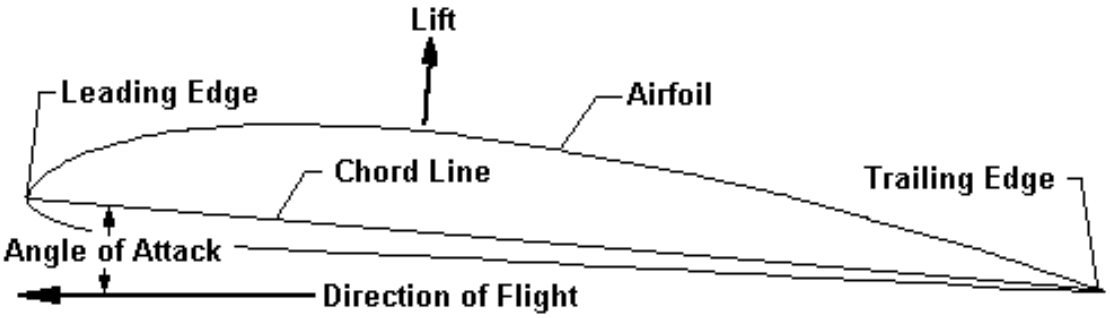
No, I did not say "I have control"

NEWBIES

A new section that will help beginners learn more about this challenging and multi-faceted hobby….

Basics of Flight
(much less technical than the above article)

A beginner should understand the basic concepts of flight. The theories behind the physics of flight are covered in many volumes of books. There are different and sometimes conflicting theories and arguments as to how airplanes fly, but the one accepted principle is that lift is generated as a result of the air pressure on the bottom of the wing being higher than the air pressure on the top of the wing.

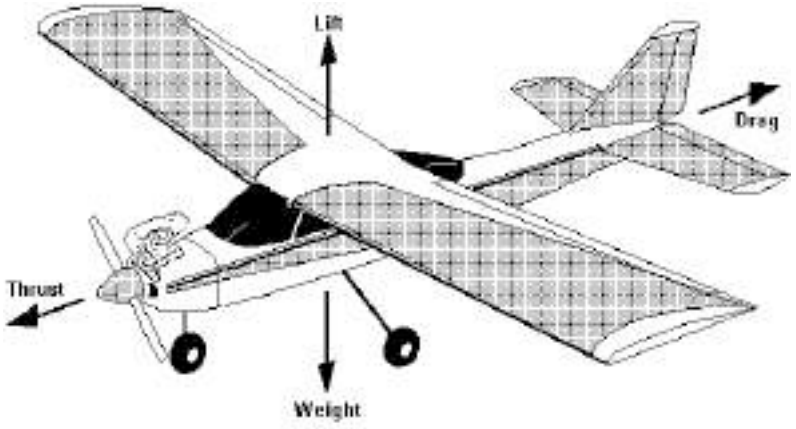


Lift Diagram

The Lift Diagram shows some of the basic terms relating to a wing section. These terms are common to R/C flight.

Airfoil	The cross section of the wing
Angle of Attack	The angle between the chord line and the relative direction of flight
Chord Line	The line between the leading edge and the trailing edge of the airfoil
Direction of Flight	The relative direction of the wing in relation to still air
Leading Edge	The most forward edge of the wing
Trailing Edge	The most rearward edge of the wing

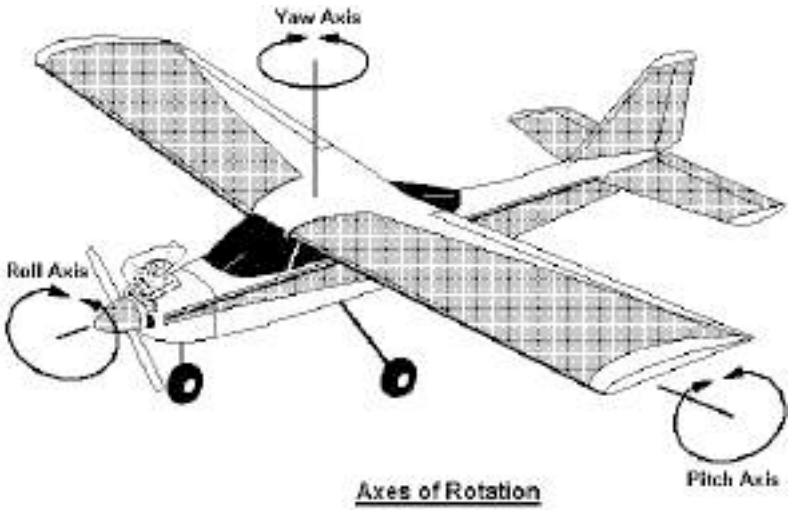
There are four (4) primary forces that act on an aircraft in flight; thrust, lift, drag, and weight. Thrust is the force applied by the combination of engine and propeller acting to pull the aircraft forward. Drag is the resistance against the aircraft by the force of the air against the forward facing surfaces. Weight is caused by gravity. In order for a constant speed to be maintained, thrust and drag must be equal. In order for a constant altitude to be maintained, lift and weight must be equal.



Flight Forces

NEWBIES

Lift increases as the velocity of the air passing over the wing increases or as the angle of attack increases as long as the flow of air over the wing remains smooth. Actual flight is attained when the force of the lift equals weight.



Axes of Rotation

An aircraft pivots about three (3) axes; the yaw or vertical axis controlled by the rudder, the pitch or lateral axis controlled by the elevator, and the roll or longitudinal axis controlled by the ailerons. It can pivot about any one of these individually or in combination based on the control surfaces that are moved and the direction of the movement.

When the rudder is moved to the right, the aircraft will rotate to the right about the yaw axis and vice versa. When the elevator is moved up, the aircraft will pitch the nose upwards. The ailerons move in opposite directions. When the left aileron is moved up and right one down, the aircraft will rotate to the left and vice versa.

COMMITTEE REPORT

AGM
This will be held on February 28th.
Members are encouraged to stand for the committee. Have your say in the running of the club. If you are interested, please complete the nomination form below:

Committee

Club Calendar for March
3rd Glider
10th Vintage
17th Sport/cub
21 Club Night - week early due to Easter. Venue to be advised.
24 Combat
31 Sport
4 April committee meeting.

✂----------

Nomination for Committee
Palmerston North Aeroneers Model Aero Club Incorporated

We nominate _____ for the

position of _____ for the

up-coming elections to be held at the Annual General Meeting of the Palmerston North Aeroneers Model Club Incorporated.

I accept my nomination above.

Signature of Nominated: _____

Signature of Nominees: _____

_____

CLUB DETAILS

Opinions expressed in this publications are those of each contributor only. The Editor and Committee reserve all right in respect of submitted material.

Contributors are reminded that the deadline for publication is the 20th of each month.

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