BRISBANE VALLEY FLYER

December 2024

BRISBANE VALLEY SPORT AVIATION CLUB INC

Watts Bridge Memorial Airfield, Cressbrook-Caboonbah Road, Toogoolawah, Q'ld 4313.

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A Merry Christmas and Prosperous New Year to all BVSAC members and friends.

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Our website - **bvsac.com.au**

Greetings Members,

As the year winds down, we want to update you on a few things. All meetings are finished for this year, and our next meeting will be on the 1st of February, 2025, at the club house.

We've been busy with lots of work at and around the club house, including mowing, trimming, and continuing the extension project, which is progressing very well.

We also have our Christmas Party scheduled for the 7th of December at the Esk Grand Hotel. We'll gather at 11:30 am for a noon lunch. The Club will cover the first $25 for you, and you can order whatever you like for any extras. Please RSVP by the 30/11/2024 for catering purposes.

We look forward to seeing you there. For those who cannot join us, we wish you and your family all the best for Christmas and a Happy New Year.

Thank you all for your support this past year.

Best regards,

Peter Ratcliffe

President BVSAC

The Sneaky Stall – Part 3

By Rob Knight

The first two parts of this trilogy confronted what a stall is, how/why it occurs, and factors that may modify the aeroplane's IAS when the stall occurs. In this part, I want to talk about aeroplane reaction to the stall, and the returning of the aeroplane to a normal flight condition. In this piece, the term stick is synonymous with yoke.

You will have noticed that I used the phrase *returning the aeroplane to normal flight.* This is important because the word *recovery* has insidious undertones. We are not ill, we are not in imminent danger (if the stall is pilot intentional), the aeroplane is not going to become uncontrollable so there is nothing to recover from and there is absolutely no point or benefit from becoming stressed about it. Instead, we are merely going to return to normal, effective flight in a cool, planned and receptive manner.

Whilst not intending to negate the seriousness of the stalling exercise, it does need to be treated with some degree of nonchalance. It is no more dangerous than carrying out a turn or a glide. Stalls in themselves don't hurt, or kill planes, or people; it's only some factor after the stall has occurred that will bring a rising crescendo of disaster such as an arrival at ground level. Stalls carried out at a safe height will always allow room for errors in the return to normal flight that take a bit more height loss to effect so doing stalls at the legally required heights will always allow for a safety factor and no-one should get stressed.

Inadvertent stalls at low level are DANGEROUS.

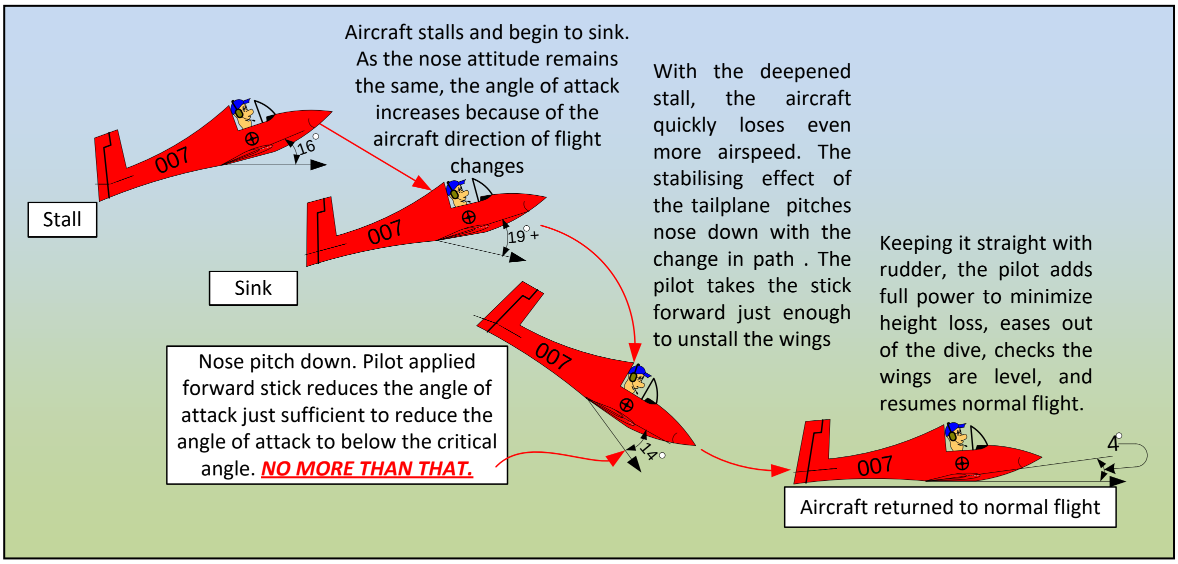
So – don't get into a stall at low level!

Learning how to carry them out at altitude will enable you to more easily avoid one at low level.

If a pilot is filled with trepidation at the thought of stalling, it will adversely affect their ability to make a considered and rational response to the aeroplane's needs. Instead, the pilot will be gripping the stick too tightly to feel any subtle signals from the controls and the mind frozen, just waiting for the first sign of the stall so they can jam that stick forward and get the hell out of here.

So, what is really necessary to return a stalled aeroplane to normal flight post stall? Let's deal with a wings level stall. The aeroplane has begun to buffet as the airflow breaks away over the upper surface, or the aircraft has begun to sink (mush). The simple answer is to gently take the stick forward JUST sufficient to unstall. This is NOT a savage jab to the firewall in panic mode, just a gentle easing forward of the stick. If an aeroplane stalled at 16° angle of attack, reducing the angle of attack to just 13° or 14° will unstall it. This also stops the frightening negative G loading with a stick slammed forward to about zero° angle of attack.

Let's see what is happening to the aeroplane immediately post stall. Accepting that the lift diminishes dramatically, it is easy to understand that the aeroplane will begin to sink and this action can change everything as it will further increase the angle of attack. However, provided the Cente of Gravity is not aft of its aft limit, the angle of attack cannot naturally remain high as the centre of pressure moves rearwards along the chord line at the stall and this will cause the nose to pitch down automatically. If the pilot pushes the stick forward too aggressively at this point, the combination of the elevator-caused pitch change and the Centre of Pressure movement will have shades and loose change floating around the cockpit like confetti.



As the aeroplane sinks, its flight path must change and so the angle of attack will naturally increase further if the nose attitude is maintained. However, this is at the time the pilot is easing forward on the stick to unstall so the nose is pitching down and no adverse reaction should be anticipated. Notice in the sketch above, the change in attitude in the two middle images. There is a substantial change in the aeroplane's attitude, but only a small change in the angle of attack.

It is vitally important that pilots are aware that this concentration on the stick, controlling pitch and thus angle of attack, is not the sole application of piloting skills necessary. We have not mentioned the maintenance of yaw control and the need to use minimum aileron. These are a given at all times.

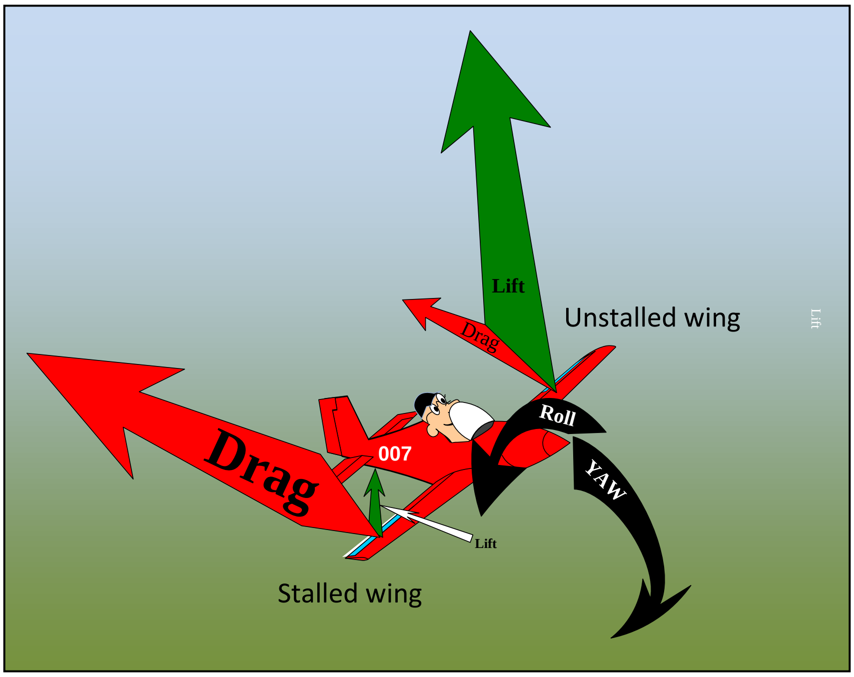
But it is these givens that can be the undoing of this oh-so-simple exercise. As depicted above, a simple stall and return to normal flight, when the wings are level and there is no uncorrected yaw is a walk in the park. Such a sweet stall occurs when both wings stall at the same time. There is no asymmetric lift to roll the aeroplane, and no disproportionate change to the drag experienced by each wing to yaw the nose sideways and down as happens when one wing stalls before the other. So, what can cause one wing to stall before the other? Ignoring damage and airframe ice, there are several things that can trigger this. Not in any specific order, a list of common triggers would contain:

1. Weight distribution between the wings (one wing heavier than the other),
2. Different angles of attack on each wing (using aileron at the point of stall),
3. Propeller torque (when power is applied at the point of stall),
4. Yaw at the point of stall.

So, what happens when one wing stalls first? Why is the aeroplane no longer so inoffensive in its response to the stall, even if it is on one wing only?

It is a simple answer. It is because the forces to which the aeroplane is reacting are so substantial. Let's try and put some relevant figures on it and see what is happening. If an aeroplane has a 1000 kg weight and is in level flight, let's assume that it is generating 500 kg per wing. The pilot stalls it and the wings are level with no yaw. At the stall, the aeroplane loses around 80% of its lift so each wing loses 8/10ths of the lift it was providing when flying level and unstalled. Losing 80% of the original lift means that each wing is just producing 100 kg which is obviously greatly insufficient to balance the aeroplane's weight. However – and it's vitally important to understand this – the lift loss is even across the wings so there is no roll tendency generated. Consequently, the aeroplane will sink, wings level, because it no longer generates sufficient lift to maintain level flight.

But lift loss is not the only consequence of an aerodynamic stall: there is also a savage and extensive increase in aerodynamic drag, perhaps rising to 400% of the drag on the unstalled wing. In other words, if the drag on a wing at its critical angle is 160 kg, increasing the angle of attack further and stalling the wing will potentially increase the drag value to 640 kg. So, visualise this scenario; at the stall the streamline flow breaks away and is lost on just one wing. This loss in streamline flow causes the lift on that wing to drop by 400 kg and the drag on that same wing to increase to 640 kg. The aircraft will roll because we have a lift imbalance (500 kg on one wing and just 100 kg on the other), and yaw really savagely (160 kg on one wing and potentially 640 kg on the other).



The sketch on the left depicts an aeroplane experiencing a stalled starboard wing with an unstalled port wing. The roll force, generated by the imbalance in lift, is rolling the aeroplane to the right while the drag difference caused by one wing being post-stall and the other pre-stall is hauling the nose around – also to the right. This is the condition known as an incipient spin and, in old aeroplane designs, will become autorotation – i.e. a spin. In modern aeroplane designs, the development of spin from autorotation only occurs if the pilot holds pro-spin control – usually full rudder deflection in the direction that they wish to spin and simultaneous full back stick. Without these control inputs, the aeroplane normally falls out into a spiral dive which is not a stalled condition and all controls function in their normal sense. However, we have to admit that this would not be pleasant at low altitude. But it is still not an issue if the pilot simply stops the yaw with the rudder and takes the stick forward enough to reduce the angle of attack to below the critical angle. How hard is that?

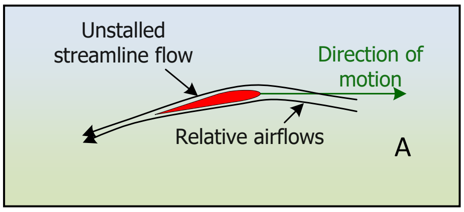
But why did one wing stall before the other? If that can be prevented then the aeroplane response is far less complex and much more easily controlled.

So how could each of these triggers lead to one wing stalling first? Primarily the answer lies in the aileron position. Triggers 1, 2, and 3 all require aileron input to keep the wings level. If one wing is heavy (trigger 1), then aileron will be required to hold that heavy wing up. To hold the wing up the aileron must be down to increase the camber and the angle of attack, both combining to provide the additional lift. It therefore stands to reason then, that if the down aileron increases the angle of attack, then the other wing, with the up aileron, will have a reduced angle of attack. Thus, the disparity in aileron induced differences in the angles of attack is greater than exists on just one wing.

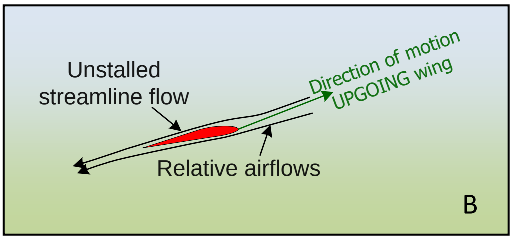
Trigger 2, caused by using aileron at high angles of attack, is something that specific dual training covers when doing advanced stalling exercises. Having spent his/her entire training to date being told to keep the wings level with aileron, a habit is now well formed and can be hard to break. It really doesn't matter if the wings aren't level at the point of unstalling to return to level flight. Priority numero-uno is to unstall FIRST, and then we can return to wings level once unstalled almost at our convenience.

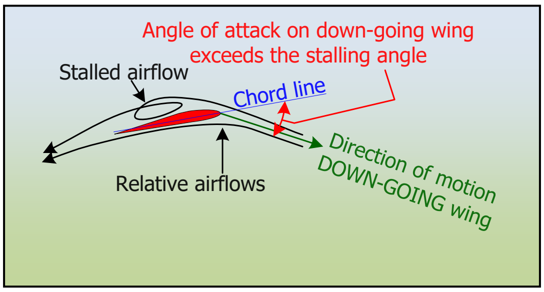
Trigger 3, the effect of propeller torque is the general reason that many aeroplanes drop a wing at the stall when power is maintained during the stalling exercise. Often this is exacerbated by having the flaps lowered as well. The cause is that in turning the propeller against the drag of the air against its blades, we get a reaction, a rotating force, acting in the opposing direction. In other words, turning the propeller clockwise when viewed from the cockpit causes the aeroplane to want to rotate anti-clockwise. To counter this, the pilot holds right aileron (stick a little to the right) which increases the angle of attack on the left (or port) wing. This wing will always have a higher angle of attack whilst this is being done so it will stall first.

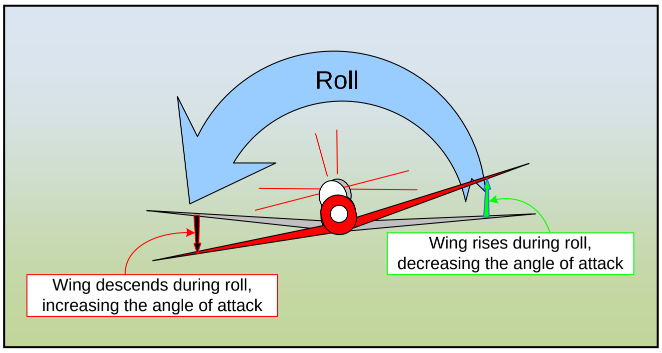
Trigger 4, yaw occurring at high angles of attack can precipitate a stall. In yawing, the airspeed of each wing differs; the outer wing accelerates and the inner decelerates. Such an airspeed differential will cause roll and from this point the pilot is stuffed. The action of rolling has the angle of attack increased on the down-going wing which deepens the stall whilst the up-going wing has a reduced angle of attack and is further from the stall.



If the pilot does nothing, the act of rolling may cause the angle of attack on the down-going wing to exceed the stalling angle. This is a result of the roll changing the direction of motion of each wing and thus it's relative airflow. See sketches A, B, C, & D.







If the pilot applies aileron to stop the roll, they will only aggravate the situation. The down going wing motion will have caused the stall anyway and adding aileron will only make it much worse. The further increase in angle of attack on the already stalled aerofoil will further reduce lift on the stalled wing and greatly increase the drag. This is likely to accelerate the autorotation rate.

So, what should the pilot do in such a circumstance? That has a really simple answer – leave the ailerons alone and follow the procedure to return to normal flight – using enough rudder to STOP any further yaw, ease the stick forward JUST enough to unstall the wings, whilst adding full power to minimise the height loss. How much simpler can it be?

As one can see when they read the last paragraph, a pilot must be able to make those three independent motions close together and this doesn't happen so easily if the pilot has a fear of the exercise. The pilot's mind must be able to see the yaw to correct it, his hand on the stick to feel the stick pressures change so just the right amount of angle of attack reduction is made (adequate but not excessive), and still remember to apply power. Once a pilot can do this, they have mastered the technique of returning to normal flight after a stall. It's NOT hard. It just takes some thought, some practice, and some careful attention to what is happening.

To summarise the technique of returning to normal flight, I would mention the following points that have assisted my students over the years:

- Hold the stick so you can feel pressure in the stick.
- Select a reference point on the horizon BEFORE reducing power to instigate the stall.
- Be prepared to apply rudder to hold the nose on that point as the power is reduced.
- Continue to hold the nose on the point as the airspeed decays.
- Be prepared to ***ease*** the stick forward to unstall *(a mighty shove just won't cut it).*
- Be prepared to ***STOP*** any further yaw at and after the stall has occurred. *(Don't bring the nose back to the point if it has yawed away as this can precipitate a stall by itself as depicted above*).
- Be fully prepared to ***ignore*** a wing sag or more substantial wing drop at the stall *(your wings being level is NOT a priority – restoring normal flight is. You can level your wings AFTER you have satisfactorily returned to normal flight. Having a wing down is not dangerous, spinning at low level is).*
- Always complete the return-to-level-flight process with the aeroplane established in a clim*b. (Then you will return to level flight from an inadvertent stall at a lower level will be completed with the aeroplane in a terrain clearing configuration as a habit.*
- Practice more stalls where you instigate a return to normal flight at the first sign of a stall buffet or onset than you do AFTER THE STALL HAS OCCURRED. *(You really do need an almost automatic reaction to check forward on the stick whilst looking for yaw to stop with rudder at any time you feel a stall might be appearing. It's funny, but most old pilots have that habit.)*

Happy flying

The Libellula Line, Part 1

By Rob Knight

The Aircraft that was backwards in going forward!

(Frederick George) Miles.

Frederick George Miles (born 22 March 1903) first appeared on the English aviation manufacturing scene in the early 1930s with a series of small aeroplane designs for the light aircraft market such as it was in the day.

Known by almost everybody, even his family, merely as “Miles”, he had learned to fly in an Avro 504 before forming a business with his flying instructor and starting a flying school. His first effort towards aircraft design was to purchase an Avro “Baby” through the school, which he then modified to make it an aerobatic sports aircraft he called the “Southern Martlet”.

In 1931, after a brief period in South Africa, Miles returned to England and married “Blossom” (Maxine Freeman-Thomas), a young woman he had known for some time. She was a pilot, a designer, draughtswoman, aerodynamicist and stress engineer, and a director of a manufacturing company. She oversaw the development of a new venture - the Miles Technical School.

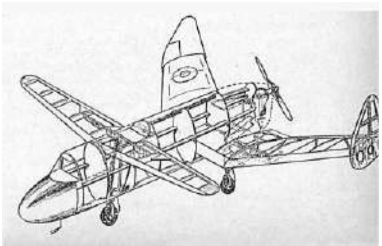
The Miles and Blossom team produced a number of notable aircraft over subsequent years. In particular, the Miles Hawk, Mohawk, and Whitney Straight, for the civil market, and the Miles Magister and Master for the RAF. In addition to these aircraft, the flying abilities and enthusiasm of Miles, and the intellectual and design capabilities of Blossom, the pair began looking at unconventional design potentials for producing specialized aircraft for specific and currently unfilled niches in the military aviation field; it was a wide market and very open field.

The couple saw potential in a set of fresh eyes examining carrier-borne aircraft. Production costs and capabilities meant that most carrier fighters were land aircraft redesigned and adapted for shipboard requirements. The fit was too often a poor one and compromise often detracted from the advantages the land-based versions enjoyed. For example, aircraft operating from carriers were required to operate off sometimes heaving decks, meaning that tail-wheeled undercarriages were at a great disadvantage in having reduced pilot forward visibility when landing and during deck taxiing, making directional control difficult, leaving nose-wheeled aircraft advantageous in maintenance, numbers written off, and personnel safety. Also, aircraft carriers used lifts to transport aircraft to and from internal storage and this meant wing span limits without folding wings and folding wings were expensive, both monetarily, and in losses to payload and added complexities in manufacture and maintenance, Obviously, then, a short spanned, short length aircraft, with tricycle undercarriage would have great advantages, especially if it was also easy and cheap to manufacture.

The unique Miles M.35 Libellula. Notice the “down” elevators on the front wing that would have provided a nose-pitch up in this aircraft.

Miles and Blossom, being aware of the critically high accident rates for carrier landings, began private venture work on unorthodox configurations to potentially solving the visibility problem and the complications of folding wings required for storage of ship-borne aircraft. They considered that, as a certain wing area was required for the aircraft weight, and span was limited, perhaps using tandem wings, one front and one at the rear, could provide the required lift from a smaller dimensioned aircraft. And so the concept of the Miles M.35 Libellula was conceived.

Mils had examined the twin-winged version of the Westland Lysander which had an added rear wing to support the weight of a rear gunner. The concept intrigued him and he believed the idea had merit in his search for a new carrier-borne aircraft.



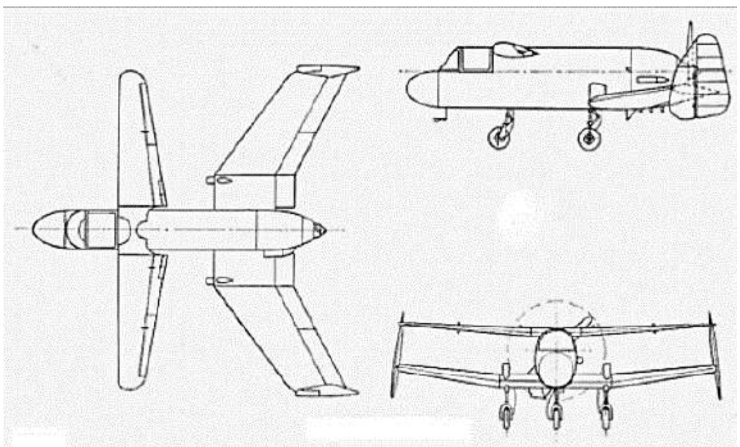
The concept of the M.35 Libellula

He and Blossom quickly put together a radical new aircraft design with two sets of wings, one main lifting wing at the rear, and a smaller one at the front. Calculations soon provided numerous other advantages in the design, one being the great expansion fore and aft of the critical centre of gravity (C of G) limits. Others were the improvement in maneuverability with the smaller airframe dimensions, the weight saving in the removal of the tailplane, which was a no-lift device, both wings could be fitted with high-lift devices which would improve the ability to produce lift at lower airspeeds substantially, and the pilot, sitting out in front would have had relatively brilliant angle of view. These, along with the tricycle undercarriage, would make for an exceptional aircraft for carrier use.

Stirred by the need to produce an aircraft quickly, the design was not tested in a wind tunnel, the company test pilot, George, Miles's brother, showing impatience, impetuosity, and substantial courage, was instrumental in this decision. His flying expertise had given him a large say in the ultimate design of the aircraft, and, along with co-designer Raymond Bournon, just six weeks later the company had the one-and-only prototype of this unorthodox (and completely unofficial and unauthorized) ready for flight.

The Miles M.35 Libellula in flight.

Built in secret because, being wartime, all work had to be authorized by the Ministry of Aircraft Production (MAP) and this wasn't, their creation was named Libellula (after the genus of butterflies having tandem wings). It was built using wood, with the ailerons fitted to the rear wings and elevators to the front. Great use was made of available constructed units – the undercarriage and wheels were standard magister, which is why the tops of the legs protruded through the upper surfaces of the of the rear wing. The twin rudders were also straight Magister, adapted to side mounting on the tips of the rear wings. A fourth wheel had been added to the rear fuselage to ensure propeller clearance of the 130 hp DH Gypsy Major engine mounted in the tail was maintained.



The Miles M.35 Libellula unique shape.

Ground runs soon exposed an issue with engine cooling in the pusher system. A quick-fix of an additional air scoop solved the problem. The finished aircraft had a wing span of just 20 feet and a length of the same, and a MTOW of 1850 lb (841 kg).

To the date of the first flight, the sole attempt at design testing had been a failed test flight of a ¼ sized wooden model towed behind another aircraft. The failure had been caused by a vertical dive into the ground after the model was released at 150 feet AGL, the company really was setting new boundaries in research in experimental aircraft designs with minimal research.

When the then company's Chief Test pilot refused to fly the aircraft, George Miles agreed to make the first flight, arguing that it was his design so he should carry the risks.

With George at the controls, pitch control, or rather a lack of it, showed there was an issue. No taxi speeds, regardless of power applied or ASI readings possible, allowed the aircraft to leave the ground, even for the briefest period.

Then, late in the day, when George had to suddenly reduce power to start braking, as the power fell suddenly away the aircraft leapt into the air. With little runway remaining, George had to allow the aircraft to settle back and only the heaviest braking stopped the aircraft over-running the remaining runway length.

After several identical occurrences, George courageously closed the throttle when the taxi speed was as high as he could achieve and, again, the aircraft leapt into the air. This time George restored power and the aircraft remained airborne. He coaxed it to about 20 feet and continued level flight at that height. So low, and with intervening trees, the aircraft was almost immediately out of sight from observers. He began a gentle left turn and almost entirely out of sight, followed an unconventional circuit and landed. He exited the aircraft, silent and shaken, and it was only via his later flight report that details emerged.

The flight may have, initially at least, appeared normal but it was really anything but. The aircraft had showed extreme, potentially catastrophic instability. The entire circuit had been an unending battle to avoid a divergent oscillation in pitch, which, at such a low altitude was a sure mark of George's mastery as a test pilot. His decision making might be in question, but not his flying ability. It was found in belated wind tunnel testing that added ballast, strategically located, reduced the instability to a point where, although present, was no longer potentially catastrophic.

Subsequently, and after a stern warning from the MAP, Miles presented the concept to the Admiralty who immediately stated that an aircraft so con figured could never fly. This met with an immediate and accurate response that one could, and indeed had, and an offer was made to demonstrate the aircraft. The Admiralty then demanded to know why Miles felt that such an aircraft needed to be produced and Miles replied that it was an endeavour to reduce the lives lost in training accidents during carrier landing operations. The Admiralty's response was perhaps typical of the attitudes of military power, that "Miles should remember that it was wartime, and lives had to be sacrificed in times of war".

Miles M.35 Libellula, after its first flight on 1 May 1942. Note the flaps lowered on the rear wings.

After wind-tunnel testing, the design was improved with weight ballasting and it did fly again for research purposes. The cause of the gross instability in pitch was the arrangement of the front and rear wings, with the front ones being high and the rear low. The inevitable downwash from the front and higher high wing interfered badly with lower one. Because of the close proximity of the front and upper, and the aft and lower wings, the angle of attack of the aft and lower wing changed dramatically as the downwash behind the front wing modified its angle of attack of the aft wing causing gross instability particularly in pitch.

With designs issues appearing insurmountable, Miles put the sole example of the aircraft into a corner of a hangar and left it there. The aircraft was shelved: no further research was undertaken until the concept was revisited for an entirely different purpose and the Miles B1 heavy bomber project and the, still later, Miles M.39 Libellula medium bomber projects were conceived.

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Don't Add Clouds to Your Issues

By Rob Knight

What are clouds? Now that's a very fine question. All our lives we look at the sky and see clouds. Generally coloured anything from purple to black, to grey, to white, and even pink or orange, they can look like flat-bottomed cauliflowers, or just ragged pieces of blanket shrouding the hills, or whisps against a blue sky, they have always been a part of the world that we live in. But what are they?

We watch a kettle boiling and say that clouds of steam come from it. We say that something can cloud our judgement. If we add impurities to water, we say the water goes cloudy when it loses its transparency due to the impurities it now contains; all these various terms relate to the same thing, the humankind memories of clouds hiding the sky and hills and preventing visibility of anything behind them. As VFR[1], pilots, of necessity we need a horizon to fly, and clouds can hide the very means of our succeeding in flight and that, of course, is a very serious matter to any pilot striving for longevity exceeding about 174 seconds. So, we pilots need to have a clear understanding of clouds, especially their cause and types, and the manners in which that can influence our ability to fly aircraft.

Firstly, what is a cloud? A cloud is nothing more than a chunk of air that contains water droplets that reflect light and thus prevent light being reflected to us from any point further distant. In other words, clouds are a naturally forming aerosol of gaseous air containing minute liquid (or frozen) water droplets held in suspension.

Clouds are not restricted to any particular height. Clouds can be in contact with the ground and blot out all ability to see more than a few meters (if that) in which case we call it *fog*. If the cloud is less dense and we can discern object shapes sufficient to identify them at 1000 meters or more from us, we call it *mist*. The whole topic of clouds is more involved than many people realise.

To understand clouds, we must first have a clear understanding of what caused the phenomena we call *clouds*. As stated above, clouds of just pieces of the atmosphere (or volumes, or parcels) that contain liquid or frozen water droplets which reflect light. Comparing them with smoke from fires gives us a clearer understanding of their effect. Dense smoke can prevent all light penetrating and restrict visibility to a few metres just as dense collections of water droplets will. Less dense smoke will allow some light to come through and we can see things for some distance before we lose the ability to recognise them. Less dense collections of water droplets acts in the same way, the less dense the collection of droplets, the greater the visibility range until there is no restriction and we have air clear of smoke or water. Thus, we can see that clouds are collections of minute water droplets suspended in the atmosphere.

The natural formation of water droplets is a consequence of water vapour (a colourless, odourless, and invisible gas) being condensed as a result of cooling. Imagine the air is a sponge, just like the one in your kitchen sink; squeezing it has the same effect on its saturation level and air when it is cooled. If the sponge is dry, no amount of squeezing will cause water to run from it. This is the equivalent of *dry* air. However, if water is soaked up by the sponge, there is little change in the sponge except its weight, but squeezing it will produce water. The more water soaked up by the sponge, the less

[1] *Visual Flight Rules*.

squeezing will be necessary to see water expressed from it. Ultimately a *saturated*[2] sponge will require almost no squeezing for water to cascade from it. In another likeness with air, a saturated sponge will be darker in colour, so there is a link between the degree of saturation and its visible colour appearance.

The production of liquid water from either a sponge or air results from two factors: the degree of saturation of the air (or sponge) and the amount of cooling of the air (or squeezing of the sponge). Note that we are not at this stage talking about precipitation (rain, hail, sleet, or snow) from cloud. The droplets that form clouds from which no precipitation is falling have so little mass that gravity is ineffectual and they remain in virtual suspension.

If the atmosphere is cooled more, the air is squeezed more and ultimately it will become saturated. The temperature at which this occurs is called the *dew point* because if there is any further cooling, liquid water becomes present and reflects light. One minute we can see – and then, almost in an instant, as the air is further cooled after saturation, we can't. We see cloud instead of the landscape or skyscape. Before and at saturation point, the air was transparent – but when the saturated air is further cooled below its dew point – we can't.

For practical purposes clouds can be simply categorised into just two types – layer type clouds (stratiform) that cover areas, sometime vast areas, of the sky, and heap type clouds (cumuliform) that are individual cells. Both types of clouds can extend from ground level to the top reaches of the atmosphere, to the tropopause, where the atmosphere ceases to cool with increasing height. The height of the tropopause varies from about 55000 feet at the equator to around 28000 feet at the poles. For example, I have seen a forecast for Changi Airport in Singapore listing Cbs (thunderstorm clouds) extending from a base of 800 feet AMSL to tops at 64000 feet. Stratiform clouds, because of the means of their formation, can extend across very wide areas. They don't develop vertically in the same manner that cumuliform clouds do, but can still have a vertical thickness extending from ground level to similar heights as cumuliform clouds. The effect of both cloud types is the same – By reducing visibility and eliminating the natural horizon, they can threaten the safety and operation of aircraft, and in particular, VFR, by obscuring the horizon causing spatial disorientation and other atmospheric phenomena such as turbulence and icing of either engines or airframes

Stratiform, or *layer* type clouds, form in relatively stable conditions[3], where any vertical lifting of the air will be restricted, and they are instead, spread out horizontally. The cloud base may be quite low, if not actually touching the ground (fog or mist).

Stratiform clouds are classified by the altitude where they occur, and are grouped into 3 categories:

- High: cirrus (Ci), cirrostratus (Cs), and cirrocumulus (Cc). *Generally occurring not below 20,000 feet, all forms of cirrus clouds are made up of ice crystals as the air temperatures at those height will inevitably freeze water droplets.*
- Middle: altostratus (As) and altocumulus (Ac). *Altostratus clouds exist between 8000 and 20,000 feet while altocumulus may have a lower base, down to around 6500 feet but tops remain at around 20,000 feet.*

[2] *Saturated, in meteorology, means unable to absorb any more water.*

[3] *Nil, or limited, vertical lifting in the atmosphere*.

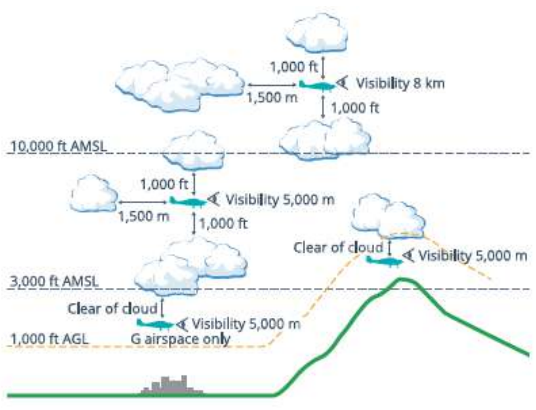
- Low: stratus (St), and nimbostratus (Ns). As stated earlier, stratus type clouds can exist from ground level to the tropopause.

Reading the list above highlights the need for a little explanation to lighten the load of understanding exactly what we are looking at. Some definitions will help.

Cirrus	In meteorology - cloud only occurring at high altitude – above 20.000 feet. There are three types of Cirrus clouds – Cirrus (Ci), Cirrostratus (CS) and Cirrocumulus (CC). No cirrus clouds produce precipitation. When the sun or moon shines through cirrus clouds, a clearly visible halo is formed by ice crystal reflections.
Alto	In meteorology – cloud forming and occurring at medium altitudes – 6500 to 20,000 feet.
Nimbus	In meteorology – precipitation (liquid water or frozen ice) produced from saturated air (cloud).

From the above table we can see that there is no term specific to low altitude clouds. This is because any clouds other than those with *alto* or *cirrus* in their names can occur at any altitude within the atmosphere. Also, the name gives an indication as to whether a pilot should expect rain or any other form of precipitation from it. Stratus indicates no precipitation but adding the suffix nimbo (meaning precipitation) the reader should interpret the cloud as one being very likely to be producing rain or sleet precipitation. More can also be read from this as, for any form of precipitation to occur, the cloud must be saturated and this will affect the cloud colour appearance. Nimbostratus (Ns) clouds with therefore likely be darker in colour than stratus (St) clouds.

Stratus clouds are like heavy, white to off-white or light-grey blankets that hang around the hills after a wet night, or when a general air mass is saturated. The edges of stratus cloud are usually ragged and, whilst usually slow to form and clear away, may under some circumstances, form very quickly, descending as the air below them is cooled by their falling rain/sleet beneath, and developing faster than an aircraft below them can descend to remain in clear air.



VFRG Requirements for minim flight visibility and minimum distances between aircraft and cloud

Let's move on to Cumuloform clouds. Cumulo – accumulate, or heap up – are clouds with a propensity to grow vertically more quickly than they grow horizontally. Instead of covering vast areas like blankets they are isolated cells and the largest of them (tropical thunderstorms (or Cb) are generally less than 20 nautical miles across.

All types of cumulus clouds are formed by atmospheric instability.

To VFR pilots, all clouds are to be avoided and the law provides minimum visibility for flight and distances from cloud.

Happy Flying

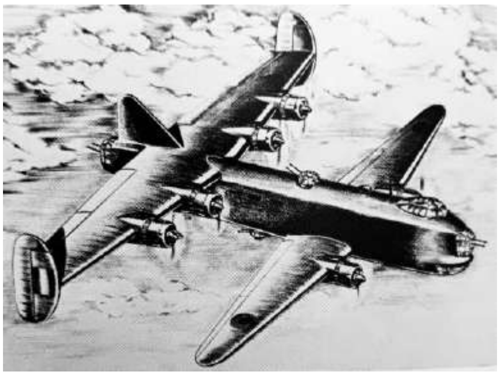
------ ooOOoo ------

The Libellula Line, Part 2

By Rob Knight

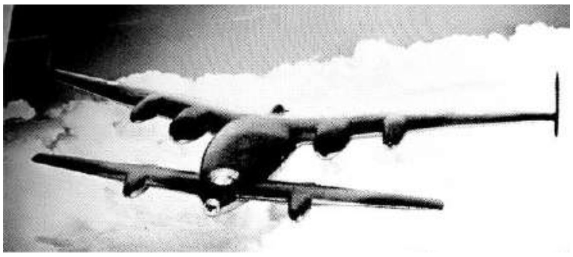
The second brainstorm of the Miles Aircraft company, after the failure of their M.35 Libellula, an intended design for a carrier-borne attack fighter with tandem wings, was a multi-engined heavy bomber. Miles calculated that, if the forward wing carried 40% of the MTOW[4], an aircraft with similar dimensions to the current bomber designs and with the same numbered crew, would be able to carry a vastly increased bomb load.

Miles produced a proposal to build the Miles B1 Bomber. Initially the proposal was for a six engined aircraft using Bristol Centaurus radials, with a maximum take-off weight of some 150,000 lb (68,000 kg). The aircraft would have an empty weight of around 99, 000 lb (45,000 kg), and thus a bomb load of 51,000 lb (23,000 kg). The design would have a radius of action of 1,330 nm making all of Germany and Italy withing a non-stop range. As Wellington bombers were the heaviest bombers available to the RAF at that time, Miles pointed out in their proposal that a mere 25 B1s would carry the same bomb load as 300 Wellingtons, and require only 200 crew members instead of the 1800 crew members that many Wellingtons would require.



A sketch of the Bristol Centaurus engined proposed Miles B1 bomber of 1943.

A second version of the proposed B1 had eight RR Merlins, two doubled up in single nacelles on the rear wing, , and changed the setting of the wings so they were both on the same plane.



A sketch of the ultimately proposed Merlin powered Miles B1 bomber of 1943.

Alas, Miles' proposal was rejected as the work on producing the Avro Lancaster was too far advanced for the B1 to be cost-effective. But the idea still didn't die.

Ever vigilant for possible special aircraft designs, Don Brown of Miles Aircraft saw a proposal for a high altitude, fast, lightly armed bomber and the Libellula concept was on again.

A 1500 nm mile range at 15000 feet with a 4000lb bomb load were the essential requirements and, once again, Miles Aircraft hit the drawing boards. The extended C of G range and small target area would be definite advantages in this arena as well as the shipboard fighter schemes of the past.

The slim lines of the 5/8ths scale M.39B with two DH Gypsy Major 140 hp engines.

The Miles M.39B bomber.

[4] *MTOW – Maximum take-off weight.*

In light of the data being gathered with the continued testing of the Miles M.35 fighter concept, several fundamental aspects of the tandem wing design needed revision. The ratio of front and rear wing areas being one such task and so after consideration, the proportions of the respective wings was changed from 1:2 in the M.35, to 1:3 in the new design. Also, the positioning of the wings was reversed. In the M.35. the front wing was high and the rear wing low, the new design had the front wing positioned low and the rear wing high to avoid the issue of the downwash behind the front wing adversely affecting the relative airflow relevant to the larger rear wing. This had the added advantage of the new design's wing-mounted twin engines now having adequate propeller clearance without requiring a fourth wheel.

Designated as a Miles M.39B, the new design was proposed to be powered by three jet engines as designed by Frank Whittle. However, as these were not likely to be initially available, in view of the high-altitude requirement, either six Bristol Hercules VIIIs radial engines or eight RR Merlin 60 engines were set as alternatives to the desired jets.

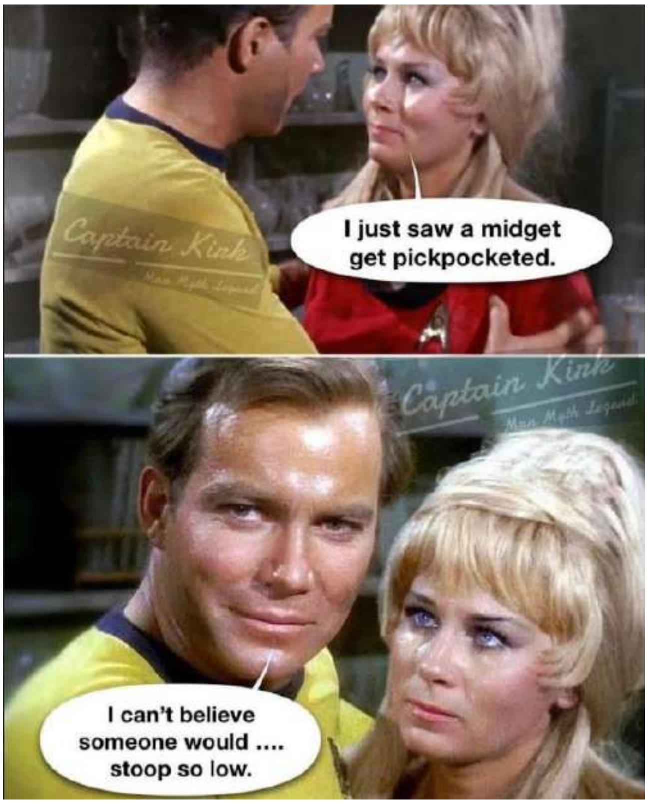
The prototype Miles M.39B during taxi trials.

Miles built a 5/8ths scaled down M.39B to generate data supporting a final design for the M.39 to meet the design Specification B.11/41 Ultimately, in this design, the high aspect ratio wings were provided with elevators fitted to the inboard trailing edges and the flaps to the outboard sections. The rear wing carried flaps fitted to the inboard trailing edges and ailerons on the outboard. A most unusual configuration - but this was no conventional aircraft.

The Miles M.39B first flew on 22 July 1943. This time the aircraft showed pleasing handling characteristics and it coincided with interest by the authorities toward unorthodox designs for large aircraft. The MAP agreed a development contract and purchase of the M.39B which Miles continued testing, generating more flight data. They submitted an improved M.39 design in early 1944. Meanwhile, the sole M.39B passed to the Royal Aircraft Establishment at Farnborough in 1944, where it carried the serial number SR392. However, the M.39B suffered two accidents caused by landing with the undercarriage still retracted: once by pilot error, the second by malfunction. As it was being repaired, it was reported that the pilot had to land, as bailing out was not an option due to the proximity of the propellers to the cockpit. After repair it sat, unused, until it was broken up after the full-sized bomber project was cancelled. With the imminently anticipated arrival of the DH Mosquito, the authorities decided that all design proposals for the given specification would be withdraws as they were now surplus to requirements. Finally, the design and research of the Miles Libellula concept and series died when the M.39 project was cancelled and the sole Miles M.39B was broken up. The Libellula era was at an end.

The Miles M.39B during taxi trials.

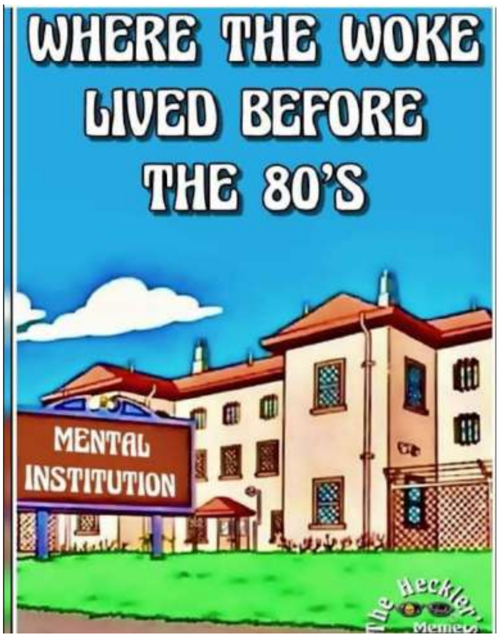
------ ooOOoo ------

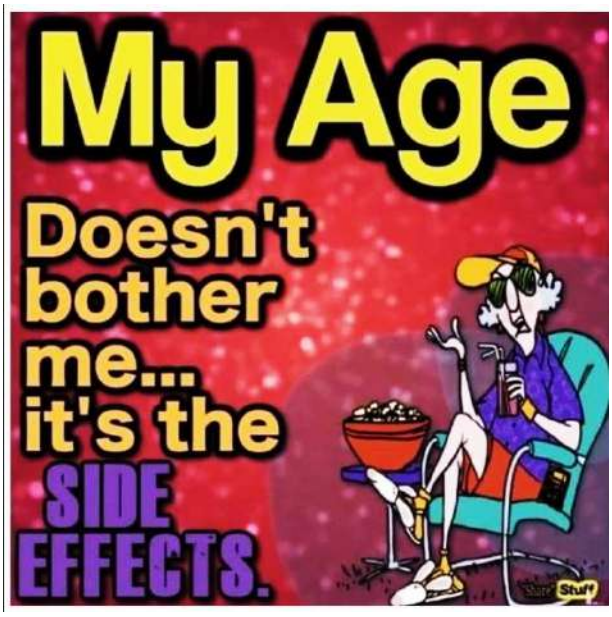


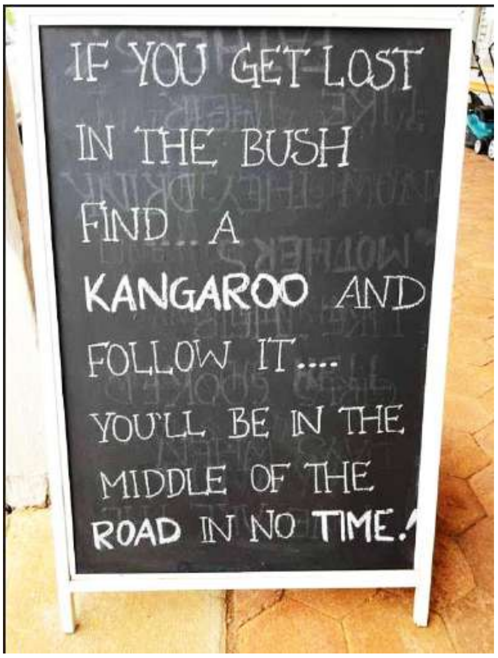
My wife shouted at me that I had finally gone too far and had pushed all her buttons.
This was far from the truth as I still couldn't find her mute button!

FLY-INS Looming

WHERE	EVENT	WHEN
Murgon (Angelfield) (YMRG)	Burnett Flyers Breakfast Fly-in	**Find Next Planned EVENT AT** http://www.burnettflyers.org/?p=508







The Days of Our Lives (From a Flying Instructor's perspective).

By Rob Knight

Girdial first entered my logbook in May, 1976 for a PPL renewal. Trained elsewhere, he was a very pleasant man, working for Tip Top Ice Cream in Mt Wellington, as a production manager and was very sociable. He arranged for the Club to enjoy a number of trips through the factory with, of course, copious sample of their product.

Over the next couple of years Girdial and I became quite good friends. Like us, he too was married with two kids and he and his family came and had meals with us on occasion. Twice I did PPL renewals for him so we knew each other for at least four years.

Tragedy struck in 1979 Fully authorised, he flew off in ZK-DLU, the Club's T3A. after a briefing on the passage of the short, sharp CBs we had passing through the area from the south. He took off with his neighbour's son on a local flight to celebrate the lad's 16th birthday. I was flying when I heard ATC call DLU several times to be met with silence. ATC then called me, in CGM, another Victa 100, requesting that I to return to the Club immediately.

I walked into a loud silence. Looking around at the sombre faces, I asked who was in Lima Uniform and what were they doing: Girdial Singh, I was told, had gone out with a passenger, and had not returned. He was not answering either the Club base-radio calls or responding to ATC, so I asked for the authorisation details for the flight.

He had been authorised with instructions to remain west of Bombay to avoid patches of low cloud being experienced East of that locality. Whilst we were talking about possibilities the phone rang. It was the Police and they asked for the CFI. As that was my role for that time, I took the call.

A light aircraft, painted white, yellow, and blue, was seen by multiple witnesses to crash in bad weather east of Bombay. It occurred close to a group of about forty young girls on a local pony club ride. They had seen the aircraft "buzzing" low in a valley before disappearing into the cloud above it, then tumbling back out of the cloud, striking the side of a hill and disintegrating into pieces.

The Police met me as arranged, and took me in a land rover up to the crash site. The aircraft had impacted at close to a 90° angle to the hillside, burying the remains of the propeller boss over a metre underground. The impact had been immense. The young passenger was bent forward, still strapped into his right-hand seat, but Girdial's seat was empty. When I looked inside on the left, a shoe was jammed in the twisted rudder pedal, part of his bloodied foot was still in it.

The police requested I identify the body so we walked up the slope to a crumpled tarpaulin. They drew it back and I was able to identify my friend. I commented that his body was too short; thought he'd lost his legs, but the Constable showed me that his hips had been driven up into his armpits by the impact. By then I was in complete shock. The police provided transport back to the club, on the way stopping at the local Police Station for me to sign the official identification of the body paperwork. As I had never met the passenger, this unfortunately fell to the family.

Back at the Aero Club, my friend and mentor, Lew Day, re-arranged my bookings to cover the inevitable Police interviews those associated with the NZ-CAA for their inevitable accident investigation. I arranged for a delegation from the club to return to the crash site and secure the wreckage as it was the Club's responsibility to secure it until the insurance company took possession after our claim was made.

Now, over half a century later, I can still see the hillside and smell the odour of death, the burning smell of avgas, and the silence that hung in the air. For me, it has been unforgettable!

Girdial's accident had no given cause. He flew into an area he was instructed to remain clear of and he killed himself and his innocent passenger because he didn't follow the advice of a more experienced pilot – his authorising instructor.

------ ooOOoo ------

WTF - The World's Worst Aircraft – The Avro Manchester 1939

By Rob Knight

The ill-fated Avro Manchester.

Built to a specification for a medium bomber with the added complication of the potential for catapult launching at maximum take-off weight and the ability to dive-bomb, was built to be extremely strong but this had the added side effect of creating a high wing loading. In addition, it was to be powered by the Rolls Royce Vulture engine, still in development, and one of Rolls Royce's only declared absolute failures. These engines were never suitable and suffered overheating with the tendency to catch fire without warning, or come to a crashing stop because of mechanical part fatigue. This engine was, in effect, two engines, with one inverted above the other. But the con-rods were common so each con-rod served two pistons, one in each engine. This caused rapid fatigue resulting in common and sudden catastrophic failure with broken con-rods piercing crankcases with monotonous regularity leading not just to damaged engines and substantial repairs needed, but also to resulting engine fires which could and did cause severe damage to airframes and cost human lives.

Few squadrons were supplied with Manchester in light of their appalling performance as a piece of military equipment. Those that were, suffered appalling losses and frequent groundings for modifications. No. 207 Squadron at Waddington in Lincolnshire, was the first to be equipped with the aircraft and over a period of just a few weeks, lost almost all its aircrews to the aircraft malfunctions and malperformance. Over all, Avro Manchesters served the RAF for just 21 months before being withdrawn from all operations. 202 aircraft had been delivered, and of these, 136 had been written off in combat or as a result of accidents. This horrendous casualty rate represents over 67% of the supplied aircraft being lost in operations.

SPECIFICATIONS:

Crew:	7.	Powerplant:	2 X 1760 hp Rolls-Royce Vulture engines
Max airspeed:	230 knots	Wing span:	27.46 m
Height:	5.94	Max. Weight:	22,680 kg

The Manchester with its original central tail fin


The dreaded Avro Manchester. It gave better service to the Germans than the British.

------ ooOOoo ------

The German Albatross DIII

By Rob Knight

Albatros DIII.

The Albatros D.III was a biplane fighter aircraft used by the Imperial German Army Air Service during WWI. A modified licensed version was built by Oeffag for the Austro-Hungarian Air Service. The D.III was flown by many top German aces, including Wilhelm Frankl, Erich Löwenhardt, Manfred von Richthofen, Karl Emil Schäfer, Ernst Udet, and Kurt Wolff, and Austro-Hungarians like Godwin von Brumowski. It was the preeminent fighter during the period of German aerial dominance known as "Bloody April", 1917.

Development of the prototype D.III started in late July or early August 1916. The date of the maiden flight is unknown, but is believed to have occurred in late August or early September. Following the successful Albatros D.I and D.II series, the D.III utilized the same semi-monocoque fuselage with plywood-skinning. However, at the request of the *Idflieg* (Inspectorate of Flying Troops), the D.III adopted a sesquiplane wing arrangement broadly similar to the French Nieuport 11. In this case, the upper wingspan was extended while the lower wing was redesigned with reduced chord and a single main spar. V-shaped interplane struts replaced the previous parallel struts. For this reason, British aircrews commonly referred to the D.III as the "V-strutter." After a *Typenprüfung* (official type test) on 26 September 1916, Albatros received an order for 400 D.III aircraft, the largest German production contract to date. *Idflieg* placed additional orders for 50 aircraft in February and March 1917.

Albatros D.III fighters of Jasta 11 at Douai, France. The second closest aircraft was one of several flown by Manfred von Richthofen

The D.III entered squadron service in December 1916, and was immediately acclaimed by German pilots for its manoeuvrability and rate of climb. Two faults with the new aircraft were soon identified. Like the later models of the D.II, early D.IIIs featured a Teves und Braun aerofoil-shaped radiator in the center of the upper wing, where it tended to scald the pilot if punctured. From the 290th D.III onward, the radiator was offset to the right on production machines while others were soon moved to the right as a field modification. Aircraft deployed in Palestine used two wing radiators, to cope with the warmer climate.

A model of Lothar Von Richthofen's Albatross III.

More seriously, the new aircraft immediately began experiencing failures of the lower wing ribs and leading edge, a defect shared with the Nieuport 17. On 23 January 1917, a *Jasta* 6 pilot suffered a failure of the lower right-wing spar. On the following day, Manfred von Richthofen suffered a crack in the lower wing of his new D.III. On 27 January, the *Kogenluf* (*Kommandierender General der Luftstreitkräfte*) issued an order grounding all D.IIIs pending resolution of the wing failure problem. On 19 February, after Albatros introduced a reinforced lower wing, the *Kogenluft* rescinded the grounding order. New production D.IIIs were completed with the strengthened wing while operational D.IIIs were withdrawn to *Armee-Flugparks* for modifications, forcing *Jastas t*o use the Albatros D.II and Halberstadt D.II during the interim.

At the time, the continued wing failures were attributed to poor workmanship and materials at the Johannisthal factory. In fact, the real cause lay in the sesquiplane arrangement taken from the Nieuport. While the lower wing had sufficient strength in static tests, it was subsequently determined that the main spar was located too far aft, causing the wing to twist under aerodynamic loads. Pilots were therefore advised not to perform steep or prolonged dives in the D.III. This design flaw persisted despite attempts to rectify the problem in the D.III and succeeding Albatros D.V. Apart from its structural deficiencies, the D.III was considered pleasant and easy to fly, if somewhat heavy on the controls. The sesquiplane arrangement offered improved climb, manoeuvrability, and downward visibility compared to the preceding D.II. Like most contemporary aircraft, the D.III was prone to spinning, but recovery was straightforward

Albatros built approximately 500 D.III aircraft at its Johannisthal factory. In the spring of 1917, D.III production shifted to Albatros' subsidiary, Ostdeutsche Albatros Werke (OAW), to permit Albatros to concentrate on development and production of the D.V. Between April and August 1917, *Idflieg* issued five separate orders for a total of 840 D.IIIs. The OAW variant underwent its *Typenprüfung* in June 1917. Production commenced at the Schneidemühl factory in June and continued through December 1917. OAW aircraft were distinguishable by their larger, rounded rudders. Peak service was in November 1917, with 446 aircraft on the Western Front. The D.III did not disappear with the end of production, however. It remained in frontline service well into 1918. As of 31 August 1918, 54 D.III aircraft remained on the Western Front.

In the autumn of 1916, Oesterreichische Flugzeugfabrik AG (Oeffag) obtained a licence to build the D.III at Wiener-Neustadt. Deliveries commenced in May 1917. The aircraft were officially designated as Albatros D.III (Oeffag), but were known as Oeffag Albatros D.III in Austro-Hungary, and just Oeffag D.III in Poland.

The Oeffag aircraft were built in three main versions (series 53.2, 153, 253) using the 138, 149, or 168 kW (185, 200, or 225 hp Austro-Daimler engines respectively. The Austro-Daimlers provided improved performance over the Mercedes D.IIIa engine. For cold weather operations, Oeffag aircraft featured a winter cowling which fully enclosed the cylinder heads. Austrian pilots often removed the propeller spinner from early production aircraft, since it was prone to falling off in flight. Beginning with aircraft 112 of the series 153 production run, Oeffag introduced a new rounded nose that eliminated the spinner. Remarkably, German wind-tunnel tests showed that the simple rounded nose improved propeller efficiency and raised the top speed by 14 km/h (8.7 mph).

All Oeffag variants were armed with two 8 mm (.315 in) Schwarzlose machine guns. In most aircraft, the guns were buried in the fuselage, where they were inaccessible to the pilot. The Schwarzlose proved to be somewhat less reliable than the 7.92 mm (.312 in) LMG 08/15, mainly due to problems with the synchronization gear. The Schwarzlose also had a poor rate of fire until the 1916 model was provided with a modification developed by Ludwig Kral. At the request of pilots, the guns were relocated to the upper fuselage decking late in the series 253 production run. It helped to warm up the guns on high altitude. This created a new problem; the Schwarzlose operated via blowback and the weapon contained a cartridge oiler to prevent cases from sticking in the chamber while the extractor ripped their rims off. With guns mounted directly in front of the pilot, oil released during firing interfered with aim.

Oeffag engineers noted the wing failures of the D.III and modified the lower wing to use thicker ribs and spar flanges. These changes, as well as other detail improvements, largely resolved the structural problems that had plagued German versions of the D.III. In service, the Oeffag aircraft proved to be popular, robust, and effective. Oeffag built approximately 526 D.III aircraft between May 1917 and the Armistice (586 in total according to other publications).

After the Armistice, in early 1919 Poland bought 38 series 253 aircraft from the factory, ten more were rebuilt from wartime leftovers. Poland operated them in the Polish-Soviet War of 1919–20 in two fighter escadrilles (Nos. 7 and 13). Due to rare air encounters, they were primarily employed in ground-attack duties. The Poles thought so highly of the D.III that they sent a letter of commendation to the Oeffag factory. They remained in service until 1923. Poland also had 26 original Albatros D.III, mostly captured from former occupants, but they were withdrawn from use in December 1919 due to structural weaknesses. The new Czechoslovak Air Force also obtained and operated several Oeffag machines after the war.

In recent times. an Austrian aviation enthusiast, Koloman Mayrhofer, has completed a pair of Albatros D.III (Oeffag) series 253 reproductions. Both are equipped with vintage Austro-Daimler engines. One aircraft will be flown and operated by a non-profit organization. The second aircraft is slated for static display at the *Flugmuseum AVIATICUM*, near Wiener-Neustadt, Austria.

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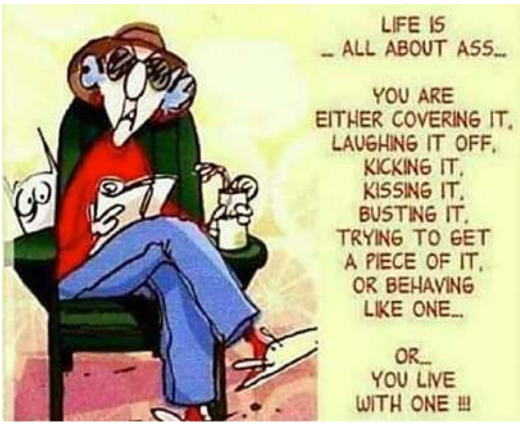
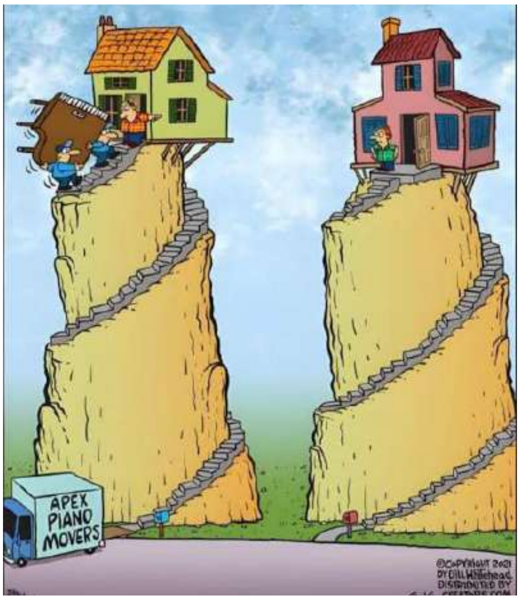
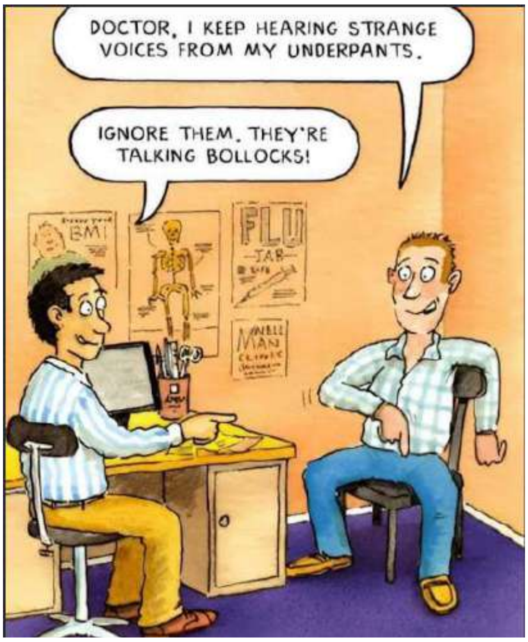






Yes, English can be weird, but it can be conquered by tough, thorough, thought, though.

Keeping up with the Play (Test yourself – how good are you, really?)

1. What is the minimum flight visibility for VFR flight at or below 1000 feet AGL?
   A. 8000 m.
   B. 6000 m.
   C. Clear of cloud, in sight of ground or water.
   D. 5000 m.

2. The bat on a turn and slip indicator, or the aeroplane symbol on a turn indicator, actually indicates which of the following:
   A. Yaw.
   B. Slip/skid.
   C. Bank.
   D. All the above.

3. What does a litre of petrol weigh? Select the nearest option below.
   A. 7.16kg.
   B. 730g.
   C. 680g.
   D. 547g.

4. Which of the following will cause a rise in the stall speed?
   A. Easing into a dive.
   B. When in a banked level turn.
   C. When in a steady climb.
   D. When in a steady glide.

5. Considering the diurnal variation in wind velocity in the southern hemisphere, what changes are most usual in the surface wind velocity as dusk turns into night?
   A. The surface W/V backs and decreases.
   B. The surface W/V backs and increases.
   C. The surface W/V veers and increases.
   D. The surface W/V veers and decreases

See answers and explanations overleaf.

If you have any problems with these questions, see notes below, or call me (in the evening) and let's discuss them. Rob Knight: 0400 89 3632 (International +61 4 0089 3632), or email me at kni.rob@bigpond.com.

1. D is correct.
   5000 meters is the lowest legal flight visibility for normal VFR flight operations.
   See latest VFRG for confirmation/details.

2. A is correct.
   As turn and slip indicator bats, or the aeroplane symbols on a turn indicator, are empowered by a rate gyro, each indicates yaw.
   See https://en.wikipedia.org/wiki/Rate_gyro

3. B is the correct option.
   The RD of petrol is considered to be around 0.73 so a litre will weigh approximately 730 grams.

4. B is correct.

   Loading increases the force the wings are required to provide and loading increases when the aeroplane changes direction in any way. Therefore, a banked level turn will increase the loading and so increase the speed at which the aircraft will reach its critical, or stalling, angle of attack.

   As the other options, A, C and D, don't increase the loading value, they cannot influence the stall speed.

5. A is correct.
   With the onset of dusk thermal activity diminishes and the stronger, upper-level winds are not brought down to energize the surface wind which is slowed by surface friction. Thus, because surface wind speed is slowed, Coriolis effect is reduced which changes the direction from which that wind is blowing. So, in the southern hemisphere, the surface wind will veer because the speed is reduced

------ ooOOoo ------

Aircraft Books, Parts, and Tools etc.

Contact Rob on mobile – 0400 89 3632

Torque wrench

Item	Condition	Price
Used for Rotax spark plugs, sump plugs, and torquing of other Rotax engine parts.	As new	**$50.00**

Aircraft Magnetic Compass (Selling on behalf)

Item		Price
Magnetic compass: Top panel mount, needs topping up with baby oil.		**$45.00**

Propeller Parts

Item	Condition	Price
Propeller spacers, Assorted depths, all to fit Rotax 912 UL/ULS propeller flanges.	Excellent	**$100.00 each**
Spinner and propeller backing plate to suit a Kiev, 3 blade propeller, on a Rotax 912 engine flange.	Excellent	**100.00**

For all items, Contact me - on mobile – 0400 89 3632

Or email me at:

kni.rob@bigpond.com

Aircraft for Sale

Kitset - Build it Yourself

Reduced Price

$1,480.00 neg

DESCRIPTION

All of the major components needed to build your own aircraft similar to a Thruster, Cricket or MW5.

- Basic plans are included, also
- Hard to obtain 4" x 3" box section, 2 @ 4.5 metres long.
- Wing spar & lift strut material - 6 tubes of 28 dia. x 2 wall.
- 20 fibreglass ribs plus the moulds,
- 16 spar webs plus the moulds,
- 2 fibreglass flat sheets for the leading edges - 4 metres long x 1.1 metres wide.
- A ballistic parachute,
- A 4-point harness,
- Set fibreglass wheel pants, and
- More.

Box sections and tubes

Support parts – Harness etc.

A very comprehensive kit of materials

Colin Thorpe. Tel: LL **(07) 3200 1442**,

Or Mob: 0419 758 125

Ribs, tubes, spats, etc

Aircraft Grade Bolts for Sale

Aircraft AN Bolts - $500

AN3, AN4 & AN5 bolts, all bagged
- 500 bolts in total.

Today's cost – approximately **$5,500**

A list can be supplied if required

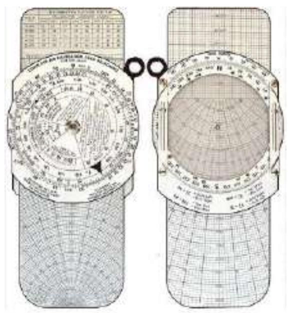
Contact Colin Thorpe –

0419 758 125

For Sale

ITEM	Condition	Price
E6B Navigation slide rule (engraved metal)	Excellent	$25.00

Contact Rob Knight, Tel: 0400 89 3632, - Email: kni.rob@bigpond.com.



Sky Dart Single Seat Ultralight for Sale.

$4,500.00 NEG

A single seat, ultralight, Taildragger. Built in 1987, this aircraft has had a single owner for the past 18 years, and is only now I am regretfully releasing it again for sale. I also have a Teenie II and am building another ultralight so I need the space.

The landed Sky Dart III rolling through at YFRH Forest Hill

TTIS airframe is 311 hours, and the engine, TTIS 312 – is just 1 hour more. Up-to-date logbooks available. 2 X 20 litres tank capacity. To be sold with new annuals completed.

It is easy to fly (for a taildragger), and a great way to accumulate cheap flying hours.

Call me to view, Bob Hyam, Telephone mobile 0418 786 496 or Landline – 07 5426 8983, or Email: bobhyam@gmail.com

Landed at McMaster Field after my flight back from Cooma just West of Canberra. In the cockpit with me is GeeBee, my dog

Single Seat T84 Thruster, disassembled and ready for rebuild.

I have a T84 single seat Thruster project in my hanger at Watts bridge.

The fuselage is on its undercarriage, the wing assemblies are folded up and the skins are with them.

Included is a fully rebuilt Rotax 503 dual ignition engine and propeller.

And, most importantly – the aircraft logbook!

Asking price $5000.00

Contact John Innes on **0417 643 610**

Morgan Cheeta Aircraft for Sale

- Registered 19-1502 and paid up until July 2025.
- Power Plant: Jabiru 2200 with the cold start kit & 1.2kw starter motor.
- Propeller: Sensenich 68" ground adjustable.
- Icom radio, 2 headsets, Sigtronics intercom.
- Flight Instruments: Airspeed indicator, altimeter, vertical speed indicator, slip/skid indicator.
- Strobe lights.
- Fat beach tyres & Matco. Brakes.
- 93 litre fuel tank.
- Leather seats.
- 100 Knots cruise.
- TTIS – 32.0 hours engine & airframe.

$38,000

Contact Colin Thorpe
Ph. 0419 758 125

Jodel D9 (Bebe) for Sale

Jodel D9, Registered 28-3503 (formerly VH-IVB)

With great reluctance I'm parting with the little Jodel as I'm simply not able to fly it often enough due to living overseas and the need to finish my Auster restoration.

Completed in 1964 by LAME Vic Bartinetti at Tumut this Jodel has around 700 hours total time on the airframe and about 300 hours on a-new-at-installation VW 1680cc Hapi conversion engine. It will be sold with a new propeller (currently in build) and current maintenance release. Currently the aircraft resides at YGYM (Gympie). Note that specific hours will be available when I return to Australia early in the New Year and can access the logbooks.

I have much history with the plane, having it bought it for the first time in 1979, then sold it, then bought it back in 2015. Email me and I will fill your inbox with stories.

I'm asking $8,000, which would include the new propeller but no radio.

Contact me by email only at kerryskyring@gmail.com

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The End (of 2024)

See you all NEXT YEAR

"The time of year when I complain about Christmas coming too early gets earlier every year."