BRISBANE VALLEY FLYER

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BRISBANE VALLEY SPORT AVIATION CLUB INC

www.bvsac.com.au

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From the Club

Greetings members,

Firstly -- welcome to 2023.

I hope that you all have had a very relaxed Christmas and New Year and have been able to take time with your families, friends and loved ones and I am sure, like me, that you, too, are hoping that 2023 will be a better year for everyone.

In regard to the Club, we held the 2022 Christmas party late last year and the day turned out to be a very good event. The number of members attending was excellent and a great time was had by the families and their guests. The food, too, was great and no one left hungry.

Our next meeting will be held on Saturday the 4th March and will be in the club house. As usual, it will be followed by the usual BBQ lunch. We all enjoy seeing as many of our members attending as possible for a bit of fun and fellowship.

Best wishes

Peter Ratcliffe
President BVSAC

Why Fly a Stabilised Approach in a Lightie?

By Rob Knight

I have seen/read many pieces on how to make good landings in an aeroplane. Mostly they were worth the time to read them, but a few were merely to allow the writer to expound dubious and random thoughts that were scarcely relevant. The good ones mentioned the need to start a landing process (at the point of flare) from a "stabilised approach". However, the general definitions relating to the term are designed to fit commercial operations and IFR ops rather than fun-flying in lighties under VFR rules. So, is the term even relevant to us flying light, single engined aeroplanes?

The answer is an emphatic, YES! But there are qualifications - so let's have a look at the term and its application and benefits to us.

Firstly, let's define what we are talking about. A stabilised approach for us ins one where the approach is at a relatively constant angle, the airspeed is constant at the required value, and where the directional control inputs have the runway in the correct position in the windscreen for the wind conditions, and the approach/landing technique being used.

I can hear a rising wail of protest – "But I always make my approaches like that" – ringing in my computer. And, YES, I agree that we do, when

1. The circumstances and conditions are normal; where we are not under undue (and likely unexpected) pressures, and
2. the traffic conditions are favourable.

Note that the continuation of an unstabilised approach when landing may result in the aircraft arriving at the runway threshold too high, too fast, out of alignment with the runway centre-line, incorrectly configured or otherwise unprepared for the intended landing. The result are obvious – aeroplane damage due to non-fully-controlled touch-down, loss of directional control leading to runway departure, and, potentially, injury to persons, or damage to the aircraft or airfield installations.

However, in regard to any pilot's potential for making an unstabilised approach, herein lies a serious trap, pilot competency, proficiency, and currency are all jokers-in-the-pack that every pilot flies with as these factors can have a major influence on a pilot at the most inconvenient place and time. Making a good, stable approach is potentially one way of ensuring an approach does not become one of those inconvenient times.

Taking a common example of training to avoid this issue, when you were taught to fly circuits, you were most likely taught to set the aeroplane up for the approach either at, or soon after turning base leg. In other words – at the beginning of the descent. This taught you to make a stabilised approach, as you had plenty of time to sort out the approach angle at the correct airspeed, and with the correct power applied for the desired angle, and with the aeroplane trimmed for no stick pressure. This method gives you plenty of time to make any necessary changes to compensate for atmospheric issue along the descending flight path to arrive at the flare at the desired point on the runway, without being stressed. As long as this procedure is being strictly adhered to, there is unlikely to ever be a problem. But human's will be humans, and that's a problem for some but more of that, later.

Now, take a professional light aircraft pilot – one who flies the aircraft for a living. He's not a "fun" pilot, as many light aircraft pilots are. As an instructor, he may spend a mere 30 minutes driving to and from the airfield, but up to 6 hours daily logged as flight time in an aircraft. An AG pilot will do even more than that when the weather is clement. For example, my logbook shows one period, in 1973, where I flew 54.8 hours over a 5-day period doing a flying scholarship exercise for the International Scouting Foundation Jamboree, at Tokoroa in New Zealand. With this sort of practice forced on you, you can stabilise an approach in 2 seconds at 100 feet if required.

Now I fly for fun. I don't have the pressures of "the next student" booking, or the next hopper-full of fertiliser to load, so I am back to stabilising my approaches earlier than as I turn finals at 50 feet AGL To do so, I'd need a lot of practice and the need to do it so now I am happy to sort the aircraft out when I turn base, as I would have my student's do. However, should I ever need it, in the unlikely event of a fire in the air perhaps, then rest assured that I'd be right there at 50 feet again, closing the throttle, adjusting flaps and trimming, simultaneously, whilst, at the same time, I am planning on exactly where to roll out of the turn so I can be lined up with my required landing path. Obviously, to successfully do this, I simply cannot afford to make a single mistake because I have no time to see an error, decide how to fix it, and then apply the controls to remedy the error whilst also flying the aeroplane successfully in the remaining 20 seconds or so before my wheels touch.

But EVERY PILOT IS DIFERENT! No training course or rating/endorsement is available to qualify a pilot for carrying out unstabilised approaches so pilots can only self-qualify, and this has obvious and serious issues inherent with it. A pilot MUST have a realistic idea of their actual capabilities and pilots are not renowned for accurate self-analysis. To compound this, parameters change over time, modified by time since qualifying, currency/recent flight experience, and total/recent flight experience on the aircraft type being flown.

What are the benefits of a non-stabilised approach? None, except a small time saving, there is no benefit to the average flying-for-fun pilot. There's no advantage for an instructor, either, for that matter. It's only setting a hellava bad example to the student. The only pilot to whom this type of approach is a good idea is crop-dusting. When spreading solids, in my time a 3-minute turn around between sorties was normal and we often flew up to ten operating hours in a day . That's 20 approaches per hour and a grand total of 200 approaches for the day. To save 20 seconds per approach saves more than an hour every such day (1.1 hours, actually) and we were paid a bonus for getting the job done in less than the standard or quoted time. At a standard payload for my Fletcher of 12 CWT (12 hundredweight or 1344 lbs (610 kg). Therefore, if we spread 610 kg every 3 minutes (20.5 trips), another 1.6 operating hours in a day equals an extra 12.5 metric tones per day. This paid bonuses. However, unless you are extremely current, have several thousand hours of recent flying in your logbook/s AND a tangible benefit is doing so, avoid unstabilised approaches. The only benefit would be in the level of your showing off, and, if you miss, the embarrassment of public failure when doing so.

Me in my Fletcher, in 1970

The hazards of not flying a stabilised approach can be easily seen in the following accidental examples. Note that none had bad weather conditions

In 1978, a Piper PA-24 Comanche, was transiting the controlled airspace between Auckland International Airport (Mangere) and Ardmore, a lateral distance of a mere 8nm. I was in the Ardmore circuit for runway 21 in a Victa 100 with a student when I heard the aircraft's joining call. I knew the pilot – we'd flown BFRs over the years and never had issues with his competency.

It was late in the day and he was in a hurry. The runway in use was 21 and the Control Tower offered him a straight in approach for 07. There was minimal wind and he made a good choice of accepting their offer. I looked and found him, low and fast, about a mile short of the threshold and as we turned final for 21 he touched down leaving a trail of white-painted, shredded aluminium behind him – his wheels were still retracted. Later it was shown that the propeller was set for cruise RPM so adding power to go-around would not have necessarily been without issue either.

Result: Big red face, big, Big embarrassment, and big, Big, BIG increase in insurance premium, plus the loss of the PA-24 for several months.

In a Cessna 152, engaged in a CPL cross-country Flight test for a budding commercial pilot, I noticed that the pilot wandered off track on the leg from Tauranga to Hamilton, in New Zealand. As examiner, I was required to sit and watch, no law had been broken and there was no danger in the error so no action was required from me except to assess the pilot and his subsequent actions. To his credit, he did recognise the issue and made the appropriate 1 in 60 rule calculation and revised his in-flight nav plan. However, he never settled down again and was still agitated when we advised the Hamilton tower that we were 5 miles and gave a circuit join time. The tower responded by giving him clearance to join down-wind for 36, the main, bitumen runway.

The pilot declined, and requested clearance to join right base for grass 25, the cross runway. The tower, sounding surprised, cleared him, advising him there was no other traffic and advising the surface wind which indicated that we had a substantial cross wind.

Ever the mere observer, I sat and waited for the disaster to unfold. He stuffed the nose down and eased the power, diving onto right base and turning finals low, fast and doing his down-wind checks. About 100 feet short of the fence, drifting seriously and uncorrected to port, he applied carb heat and closed the throttle. He waited for the airspeed to fall below VFE with his hand on the electric flap control (still drifting and now nearing the left side runway margin), watching the ASI rather than what was happening just outside the cockpit. On reaching VFE, he applied full flap and banked towards the centre of the runway. He was trying to trim, his right hand frantically jerk-winding the trim-wheel as the right wheel hit the runway and we bounced. He decided we needed to go around but still had carb heat on and, instead of hitting the power and then sorting out the heat control, he looked down and pushed the carb heat to OFF. We bounced again, harder this time, on both wheels, but the airspeed was falling rapidly and the next impact, if it occurred, would be damaging at best. I had no option but to take the aeroplane off him, and ever-so-gently, effectively carry out a full-flap stall recovery at 20 feet. After flying it away, I directed him to call the tower and join downwind in the conventional manner. Later, he could give no reason for his unconventional approach method.

Result: Big red face, big, Big embarrassment, and bad, undesirable and permanent remarks on the flight test report I was required to submit to NZCAA outlining my decision to fail the candidate. These reports remain attached to a pilot's CAA file for as long as that pilot hold a license.

Message – WHY carry out an unstabilised approach if there is absolutely no practical advantage, and a seriously raised chance of a mishap. A competent pilot gives him/herself time to ensure that their aircraft is set up correctly, and they have time to counter unanticipated issues.

I rest my case……….

Designing the Cessna 180

By Harry Clements, August 2012. Published in Air Facts Journal

A Tale of Two Tails

When I joined Cessna as an undergraduate engineer in the fall of 1951, the Model 180 and Model 310 were paper airplanes – meaning preliminary design had been completed, detail design was well underway, and first flights were scheduled for somewhat under a year for the former, and just past the next year for the latter. I got to do some work on both airplanes during that time, but the action on the 180 had to be more immediate.

Even an inexperienced engineer like myself knew that the changes to make the 180 a high-performance version of the established 170 were going to move the CG range forward and make three pointing more difficult, but incidentally provide a desirably better longitudinal stability within the allowable CG range than its predecessor had.

In flight test good longitudinal stability is shown by requiring increasing stick pull force to reduce speeds incrementally from a trimmed condition, and increased stick push force to achieve ever higher speeds from that same trimmed, zero force, speed.

The original Cessna 180 was a more powerful version of the 170.

The reason the CG on the 180 was going to be further forward than on the 170 was because a larger engine, constant speed propeller, and adjustable cooling air outlet (cowling) flaps were going to put extra weight in at the nose. Thus, I did some analysis of an adjustable stabilizer that could increase the download at the tail for better three-point landing capability, and that feature was incorporated in the design.

But flying the airplane showed that that wasn't enough, so an extension to the elevator (of a few tried) was added on the prototype configuration to improve the ability to obtain good landings, which is of course more demanding at forward CGs. Static structural tests of that empennage had shown the elevator to be strong enough, but that deflections under load were quite large. But this was a strength test, not a deflection test, and it passed FAA (actually it was still the CAA back then) scrutiny.

So, flight certification of the prototype 180 proceeded and also passed FAA scrutiny, but there was one odd result that bothered me a lot. The demonstrated longitudinal stability was generally as great as it was supposed to be, but at just the high-speed end of the required cruise condition test, the forces tapered off and became essentially neutral, meaning it took only a forward movement of the stick, or wheel, but no additional force, to attain a somewhat higher dive speed. That did not disqualify the airplane, because it was over a very limited high-speed range that it occurred, but I worried that actual force reversal might have resulted at a speed higher than then required to be tested, or an expansion of the CG range might have made the condition unacceptable to the FAA. And, naturally, I wanted to know why this force levelling "at the margin" at high speed happened.

But I couldn't think of any aerodynamic, or aerodynamic configuration, reason for this condition to occur. So, I hypothesized that it must be due to that flimsy elevator extension, which under the high dynamic pressure associated with velocities well above level flight cruise speed would bend a little, act like a trim tab, and reduce the stick force. But who would believe there could be structural flexure problems in the 150 mph (130 knots) range of speed on a stout general aviation model destined, among other things, to be a bush airplane?

Well, we could have addressed this with strategically placed strain gauges on the tail and an orderly arrangement of the resulting flight test data, but we were a cost-conscious crew, so I quite cleverly conceived of a simple, conclusive and easy to conduct test that would prove my theory. I would take long thin pencil leads, which were readily available for the metal drafting pencils used back then, and carefully tape them on the surface perpendicular to the trailing edge all along the elevator. The stability of the cruise condition would be flight tested as before, and I just knew that at high speed the elevator would deflect, break the pencil leads, and upon landing I would remove the tape, inspect the leads and show everybody they were fractured and I was right.

I guess, because it was my idea, I was allowed to fly the test. But we decided to be conservative and at the same time show that the about to come on line production 180 configuration suffered the same problem as the prototype. So, we took a production stabilizer off the line and installed it on the prototype airplane for flight testing the proof of both things.

I flew the test according to the regulations and was so excited about my, soon to be realized, analytical triumph that on landing I couldn't abide the time taxiing back to the experimental hangar, so pulled off the runway, stopped the engine, set the brakes (I think) and ran back to the tail.

I carefully peeled off the tape and found – all the pencil leads perfectly straight, completely intact and ready to be used for the next drawing that came up.

Let's say I was a bit disillusioned, and unsure how I could face everybody back at the hangar, so I quietly went inside and, as I should, plotted up the data, and it showed – no force levelling at even the highest speed I had flown, and it was a higher speed than that required for certification! I then remembered that I was pushing pretty hard at that speed, but I guess in all the excitement it hadn't dawned on me that it was a departure from the expected.

And then I found out, and I think nobody in Flight Test knew, that the structures guys had gotten together with the detail designers and added a stiffener on the production elevators. Not to solve our non-problem, but just to reduce the deflections encountered on the static test of the prototype tail. I took all this as solid, convincing proof that my theory was, after all, absolutely correct.

We decided that I would do further testing with the production horizontal on the prototype, which included all the conditions for certification, and found that with the stiffened production tail the CG range could be greatly expanded and still meet all requirements – though I don't think that placard change was made for some time, if ever. For good measure I extended the speed range tested in the cruise condition to over 200 mph IAS (from trim at about 150 mph (130 knots)) and found it took over forty pounds of pressure to keep the airplane diving that fast!

So, the two tails of the title looked the same when installed on the 180 prototype, but performed very differently when tested, causing me some anxiety. But my short-lived trauma ended up letting it be determined that the longitudinal stability on the 180 was really as good as we had always expected it to be – and at any, or should I say every, speed.

As we worked with the 180 we ran up on another challenge. One of the first things you check in the flight program for a new airplane is for the presence of carbon monoxide, chemically identified as CO, in the cabin, because it is a noxious gas that in enough concentration can cause dizziness, illness, feinting, and even death. And from the very first the 180 showed a concentration of CO that well exceeded the minuscule amounts allowed by the FAA, but not so much that flights couldn't be conducted if proper precautions were taken.

Since the onset of carbon monoxide "poisoning" caused disorientation, a test of its presence was whether the affected person could legibly write his own signature. So, the pilot and I would periodically write our name and show it to the other person to see if it was too squiggly. (In retrospect that was kind of silly, because if one of us was affected enough to write squiggly the other by then probably wouldn't have been able to tell the difference anyway. But it made us more comfortable.)

And, as long as we were comfortable enough to continue, limiting the CO level was not expected to be a big problem. After all, engines are the source of engine exhaust, which always contain CO, so we were pretty certain where our CO was coming from – that big new 180 engine right in front of us. The typical solution for a single-engine configuration is to seal the firewall, which had already been done on the prototype, but obviously not well enough.

So, we had it done again, and expected that this time they would do it right. On checking it in flight, we found the new sealing hadn't reduced the CO concentration even one molecule. We asked for an inspection, and related adding to the sealing – and the result was still the same, no lowering of the CO level. This was a puzzlement, since we thought the exhaust from that engine had to have been completely isolated by that last improvement. We did continue flying, and checking signature squiggliness, but with growing unease. But soon we had put enough hours on the plane to require a routine periodic weight-and-balance check on the aircraft, to be sure the ballasting and testing and things hadn't somehow gotten those parameters out of whack.

Weight and balance checks were a ritual observed by the flight crew, the project engineer, weight-and-balance people and, of course, the Experimental ground crew. On the single-engine airplanes (all we had at that time), it was done by putting slings on the fuselage and lifting the airplane off the ground so huge scales could get the weight components and their moment arms, and by calculation locate the CG, and the above talented group was there to witness it.

As the airplane was lifted to be sure it was high enough to be free of the ground, the bottom of the fuselage came into view. And there, coming out of the cowl flap area, were two thin streams of exhaust residue, following the fuselage bottom to the rear of the airplane, then moving upward and disappearing into the cavity in which the adjustable stabilizer moved.

Our thoughts changed rapidly from weight and balance to noxious gases, and we all looked at one another, knowingly, but – I swear – nobody said a word. Nobody spoke because we all knew instinctively what had to be done. It was obvious that the pressure inside the cabin in flight was below atmospheric, not unusual, but there was a path for that exhaust originating in the engine compartment to come out of the cowling, flow back along the bottom of the fuselage, enter the fuselage at the lightly sealed cavity accommodating the adjustable stabilizer, then flow forward inside the fuselage, accumulating in the cabin and creating the problem we could not fathom the cause of.

Sealing a small bulkhead at the rear of the fuselage was easy compared to doing it on the firewall, and, on our first flight following that, the CO reading in the cabin was zero. We later found the same result, zero CO, with even a routine, production sealing of the firewall. We had followed common practices of design, highly and correctly suspected the source of the carbon monoxide measured, but never conceived how it could get into the airplane's breathing space where the flight crew sat, which bothered us a lot. Until it revealed itself. And our silence spoke volumes.

1953 C180 instrument panel

Late model C180 panel

Cessna 180 in Africa

Cessna 180 in Alaska

Cessna 180 in Australia

Cessna 180 in New Zealand

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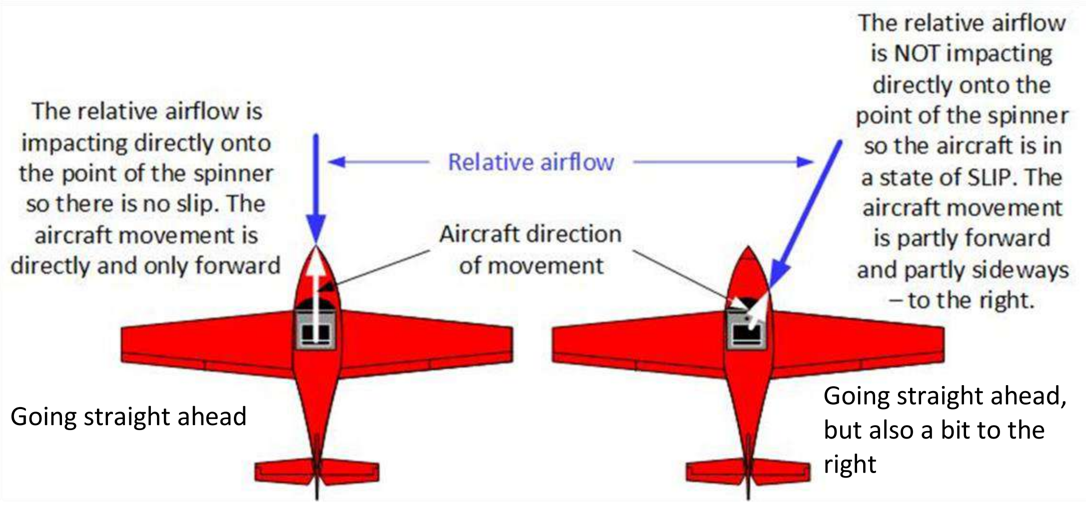
Slipping and Just Skidding Around – Fun for All

By Rob Knight

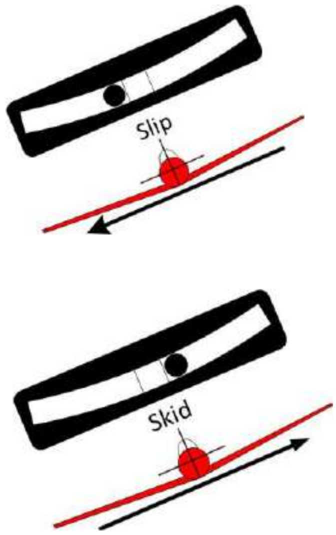
To understand what we are talking about, we need to ascertain three things. The first – what is a sideslip, the second is why would we want to sideslip, and lastly, how do we do a sideslip.

In a slip an aeroplane is in an aerodynamic state where it is not flying in the same direction in which the spinner is pointing. The aircraft is, instead, moving forward and moving a little sideways at the same time. Another way of describing this condition is to state that when there is no slip the relative airflow directly impacts the front of the aircraft, on the very point of the spinner so to speak. If that relative airflow impact at any point other than the point of the spinner, the aircraft must be in a slip condition.



Note that the aircraft is not in coordinated flight (the balance ball will not be centred) and therefore is flying inefficiently.

Pilots experience slip (and skid) when turning, and fail to apply correct and/or coordinated rudder to balance their adverse yaw from aileron drag, whilst the aileron is actually applied when entering or exiting a turn. For any given angle of bank and airspeed, there is but one rate of turn for balanced flight (no slip or skid). Too steep an angle of bank for the rate of turn (such as holding top rudder whilst banked) will result in a slip indication with the ball out on the bottom side.



Aircraft viewed from behind

If too much bottom rudder is applied (or the angle of bank is too low for the turn rate, a skid will result and the slip/skid balance ball will indicate this by the ball being out on the top side. In this situation, the rate of turn is too great for the angle of bank and the aeroplane skids in much the same way as does a car taking a bend too fast – it skids OUT of the turn.

Correcting the issue of slip and skid as indicated by the balance ball, is as easy as "stepping on it"! An old instructor's instruction still works -if the ball is out to the left (as in the slip illustration above, apply sufficient left rudder to press the ball back into the centre, between the index lines. Of course, the opposite, for skid, is just as simple. Step on the ball – in this case the right rudder.

However, while this slip (or skid) is a mere misdemeanour, in most situations, knowing how to induce slip can be a powerful tool in a pilot's toolbox of flying skills.

In the past, when most light training type aeroplanes were not fitted with such sophisticated systems as flap, slipping was taught as a specific air exercise during the normal progression of a trainee pilot through the syllabus. The lesson included a ground briefing, an air exercise, a debriefing for the student by the instructor, and an entry into the trainee's logbook to indicate the completion of that exercise. But the now universal provision of flaps as basic equipment in all modern trainers has removed the necessity for the specific lesson and, indeed, some modern aeroplanes are forbidden in their Flight Manuals (or POHs) from slipping when flaps are lowered, the delivery of this lesson has virtually disappeared and the loss is a sad one.

The lesson, both classroom and cockpit, included the Principles of Flight details for the exercise, the control movements to achieve a slip and control it, and any hazards the exercise contains.

In a slip condition, the aeroplane is moving forward and sideways (left/right, or port/starboard) at the same time. It is the sideways part that is of particular interest to us here, as it increases the form drag, the part of total drag causes by the shape of an object and its frontal area. An aeroplane coming towards you, front-on, has a very much smaller frontal area than one coming towards you sideways (to use the extreme).

Considering the potential drag resulting from the two profiles above, it's obvious that the sideways profile will create far more drag than the head-on one.

Remember your gliding lesson where you learned that an aeroplane is at its most efficient when it's lift to drag ratio is at its best – generally around 10:1 for a light aeroplane. Slipping (or skidding), and presenting part of the side of the aeroplane to the airflow adds greatly to the drag forces and reduces the lift a little so the aeroplane's lift/drag shifts almost exponentially into the inefficient side, and in level flight, the airspeed will decay dramatically. However, in a glide/descent, where we are not maintaining height, we maintain our airspeed by lowering the nose and this will result is an accelerated angle of descent.

How do we make an aircraft side slip?

I recall Jack Larsen, my first instructor to cover this exercise with me, to "Push the stick into one corner, and the rudder into the other". With qualifications, his technique is perfect. We apply aileron in the direction in which we want to slip (i.e., left aileron to slip to the left) and right rudder (to limit or control the nose yawing left as the aeroplane tries to weathercock). The aeroplane will now be flying with crossed controls (left wing down and right rudder being held). In level flight, the airspeed will diminish and a little added back pressure will be required to hold the altitude whilst at that lower speed. If the pilot wants a slipping turn, he only needs to apply a little rudder and allow the nose to slowly yaw in the direction of the lower wing. If a straight, forward slip is desired, then applying sufficient right rudder to maintain a constant direction will keep the aeroplane flying in a constant direction to get that forward slip desired. Note that adding too much rudder will see the nose yawing to the right with the left wing down. This is skidding. It will feel very uncomfortable, and is guaranteed to make passengers airsick very quickly, and you, too, perhaps.

In any type of slip we can get errors in our airspeed indications. The ASI pressure data sources require accurate pitot pressure and static pressure values and, in a slip or skid, these will be compromised. The pitot pressure because the pitot tube now has the free airflow blowing partly across its mouth instead of parallel to it so will indicate a lower pitot (dynamic) pressure. In regard to the static pressure system, if the particular aeroplane is fitted with two static vents (one on the left side – one on the right) the static pressure may not be compromised but many light aircraft have the vent only on one side. and the static pressure will most definitely cause errors in the ASI reading. When only a single static vent is provided, if that aircraft side is facing into the slip, the static pressure will indicate an apparent rise which will, in itself, cause an under-reading of the value on the ASI.

The pitot tube. When the opening does not point directly into the airflow, the tube recognizes a reduced dynamic pressure so the ASI will read a lower than correct airspeed.

ALW, GR-912, Static vent, right side only.

There are four particular applications of slip to a pilot. The first two are the most common applications.

1. Slip can be used to counter drift when landing cross-wind.
2. Slip can be used when approaching to land to steepen the approach angle or to allow the runway to remain visible in aircraft with an elongated nose section.
3. Slip can be used to quickly reduce airspeed after the flare when landing very short (don't try this at home, or without adequate training and/or experience).
4. Slip can be used to either raise a wing, or lower a wing, that's in the way of the subject when carrying out aerial photography or improving forward visibility of the ground.

LANDING ACROSS THE WIND:

A pilot is landing on runway 36 where the surface W/V is 090/10 knots. This means the aircraft will suffer left drift at the flare and in the float unless the pilot compensates for this sideways component of the aeroplane's movement. Slip into the wind will achieve this and the standard patter to successfully and safely achieve this is, "Keep the nose straight down the runway with rudder, and use the ailerons to bank and land on the windward wheel first".

ON APPROACH, WITH OR WITHOUT FLAPS EXTENDED, THE AIRCRAFT PROCEEDING ON A CONSTANT HEADING (GENERALLY ON BASE LEG, OR THE FINAL APPROACH LEG):

Often called a "forward slip" because no heading change is desired or accepted, the crossed-control condition increases the drag substantially and thus steepening the approach angle whilst the slip is maintained.

When the heading is allowed to change, always inwards and towards the lower wing, we are in a "slipping turn". The same results will be achieved as for the forward slip above. A slipping turn can be entered at any time except for final approach when it would be a forward slip. As stated above, the length of the nose section of the airframe of some aeroplane designs can be so extensive that there is little forward visibility when making a straight-line approach, in such cases, a slip is required to keep the runway in sight.

REDUCING AIRSPEED:

Drag is the enemy of airspeed so, if a pilot wants to reduce airspeed, he/she can use the high drag in a slip condition to pull the speed off the ASI quickly. Note that the aeroplane MUST NOT BE SLIPPING as it touches – it will be a bad day if that occurs because you may convert your fixed gear machine to a retractable.

CLEARING WINGS FROM THE SUBJECT AREA WHEN DOING AERIAL PHOTOGRAPHY:

This is simply a matter of raising or lowering a wing to see the subject being photographed whilst simultaneously maintaining directional control with coarse use of the rudder. Again, this requires either training or experience (preferably BOTH) before using the technique whilst flying in close formation.

NOTES AND WARNINGS:

Unless your plane has an explicit prohibition on slipping with flaps extended, in the Flight Manual, or the POH, (also note that any such prohibition should also be displayed on a placard on the instrument panel), there's no earthly reason not to use slip as-and-when it is desired and appropriate. In fact, there are plenty of good reasons for doing it, especially when making landings over obstructions. I'd suggest getting some good help if you feel that you lack experience, and wish to start sharpening your skills.

Whilst engaged in all forms and types of slip or skids, the aeroplane will experience airspeed indicator errors, yes, you need to learn to fly an attitude where you can assess your airspeed instead of merely reading a dial i.e., keep the aircraft's nose attitude in the right place for the airspeed to remain where it should regardless of the ASI reading. Just keep the nose where it belongs, and you'll be fine.

A slip is a crossed-controls manoeuvre, in which case a stall will not likely exhibit the usual characteristics of the slow deceleration, levelled wings, aircraft-in-balance stalls, with which you are familiar. The stall may occur with no (or very little) warning, and the wing may instantly and viscously, without warning, drop. In older aircraft designs, a spin is a high possibility. Ensure your airspeed remains adequate or ensure that your dues to St Christopher are paid up.

SUMMARY:

All slips and skids):

- Are cross controlled manoeuvres.
- Need to be accomplished with adequate airspeed, and caution-exercised NOT to exceed critical AOA and stall, or any other limitation such as V_{FE}.
- Cause more drag to be felt by the aeroplane.
- Will cause an increased descent rate unless all slip is removed OR power is applied.
- Should be practiced first, and at higher and safe altitudes.
- Should be entered slowly.
- Are essential manoeuvres for pilots to understand and master regardless of what aircraft you are flying.

Note that:

- In a slip, the rate of descent is primarily controlled by the angle of bank. Available rudder authority will determine how effective or aggressive the aeroplane may be slipped.
- Your airspeed indicator will not be accurate in a slip for the reasons already given. **Never completely rely on the ASI in a slip!**
- Do not continually reduce airspeed in an attempt to lose altitude more quickly, as this may result in a cross-controlled stall. Instead, if you find yourself needing to increase the rate of

descent, *lower the nose.* This will increase both the rate of descent and airspeed. As airspeed increases, more rudder authority will become available, allowing you to increase bank and so increase the slip.

- When using a forward slip to lose altitude, *always recover from the slip* and reduce the rate of descent before touchdown! Touching down at a high rate of descent, in a cross-controlled condition, is going to ruin your day and seriously damage the immediate resale value of your aircraft!
- To recover from a slip or skid, Just step on the ball sufficientl to put the ball back into the middle whilst levelling the wings with aileron and maintaining an appropriate attitude for the situation.
- Before performing slips to lose altitude on final, practice them at a high, safe altitude with your instructor. Use those rudder pedals and feel the airplane, it will tell you all you need to know!

If you have any questions in regard the slip and skid topic or exercises, feel free to contact me (Rob Knight, 0400 89 3632 or email me at kni.rob@bigpond,com) so I can discuss it further and ease your mind.

Note that there is seldom a flight where I don't use slip at some stage to aid precision in my flying and my flying judgement.

Note that slipping and tracking are entirely different. Watch this space next month for an explanation.

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

IKEA is now selling Christmas trees. It's gonna be a long night...

You don't get a body like mine overnight. It takes years of moderate alcoholism, neglect, and numerous damaging behaviors.

The black charger I want-

Black charger I have-

I don't mean to brag, but I've got a purebread cat

Electric Zenith CH 750 Completes First Flight

By Kate O'Connor. Published by AVwebflash January 30, 2023

Image by NUNCATS

A Zenith CH 750 Cruzer kit aircraft powered by an electric motor has completed its first flight at England's Old Buckenham Aerodrome (EGSV). The CH 750 was built and flown by U.K.-based non-profit organization NUNCATS, which partnered with kit manufacturer Zenith Aircraft Company and several investors for the project. According to Zenith, the flight is the first in a test program that will "establish range, endurance, payload and performance figures in different battery/weight configurations."

"While we all know that today's battery technology will not permit the range and endurance available with ICE [internal combustion engines], there are some clear advantages of electric power in addition to the more obvious sustainability claims," said Zenith president Sebastien Heintz. "The simplicity of electric motors has the potential to make light aircraft propulsion systems more reliable and easier to install and maintain […] and near-instantly available torque of electric power can further improve upon the STOL (short take-off and landing) performance of Zenith kit aircraft designs."

Founded in 2019, NUNCATS has been building its electric CH 750 for three years. The organization says it plans to use the aircraft to transport doctors, teachers and medical supplies to remote communities in Africa. NUNCATS is also partnering with charter company SaxonAir, the International Aviation Academy Norwich (IAAN), Action Community Enterprises (ACE), East Coast College and Vattenfall on a second electric CH 750 that is being built by IAAN students.

AVweb's Editor-in-Chief. She is a private pilot, certificated aircraft dispatcher, and graduate of Embry-Riddle Aeronautical University.

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

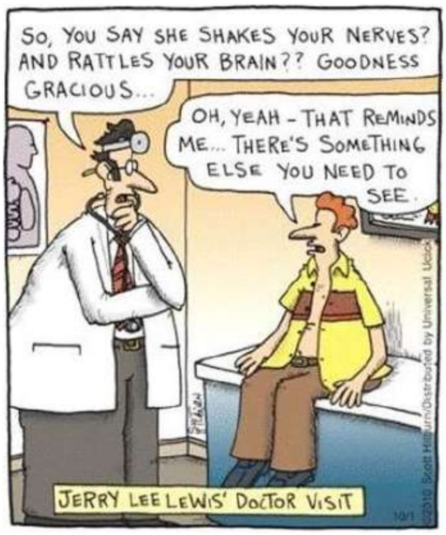
FLY-IN Invites Looming

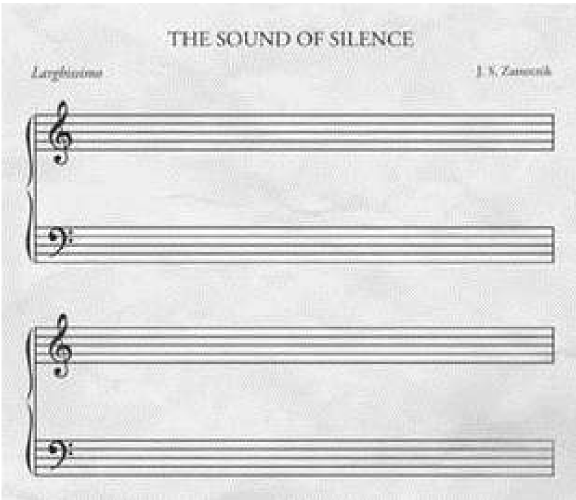
WHERE	EVENT	WHEN
Murgon (Angelfield) (YMRG)	Burnett Flyers Breakfast Fly-in	**Find Next Planned EVENT Sunday 09 April. Confirm details at: http://www.burnettflyers.org/?p=508**

When Eco Warrior activists glued themselves to the floor of a Volkswagen plant in Germany, the factory management sent all their workers home for the rest of the day, and turned the lights out.

When they returned the following morning, the activists, still glued to the floor, complained that they had to piss & shit their pants.

What a shame......





German police attitude to Eco warrior glueing his hand to the road. Finding it difficult to remove his hand, they dig up the part of the road his hand is stuck to, and release him......... sort yourself out now........brilliant!

Life is so confusing. How can a laser be a light when everyone knows that it is a Japanese shaving device

Proposed Fly-Ins

Two flying safaris are currently being proposed, one towards the desert from Brisbane, and the other north, along the Coral Sea coast to a river.

Dawn over the Dam - Charlotte Plains

A group trip to Charlotte Plains (remember it was being planned during Covid – well that and the mouse plague caused that to be deferred). The proposal has been reopened and discussions are underway to collect details (of fees and other costs) which can then be relayed to those interested.

In Hot Water - Bore drain swim – very therapeutic

Charlotte Plains is a most photogenic sheep station parked 25nm west of Cunnamulla township. Catering for farm stayers, it also boasts a 900 metre plus dirt runway, uncharted, but designated as YCHA, and hot swims in the bore drains. The colours of the landscape and flora are stupendous, and a delight to any photographer, budding ort otherwise. Accommodation is tent-under-the wing, or something more substantial by arrangement. MOGAS may be available by arrangement.

The other proposed trip is a suggested weekend (or more if you wish) trip to Baffle Creek Retreat, about 30nm NNW Bundaberg. It has a charted airstrip (designated OZBKR) which has an elevation of "0" as it's right on Baffle Creek. Its runway (13/30) has a stated length of 710 metres of grass and gravel.

Google Earth screen grab of Baffle Creek area and strip

The idea is to either fly in for their muster weekend on 14/15 July, or select another date for a fishing weekend.

Take your own fishing rods, and fuel is available at the local servo. If successful, this would make a good annual trip with a fishing competition to boot.

Current details and information on both these trips can be obtained from Rob Knight. Call **0400 89 3632**, or email: *kni.rob@bigpond.com*.

Bede XBD-2: Experimental Prototype for Unique Technologies

From an article by Jason McDowell

An undated slide showing the unique Bede XBD-2 during testing. [Courtesy: Jason McDowell]

Most aircraft engineers, tasked with designing a new STOL aircraft, wouldn't opt to drill 160,000 holes in the wing and utilize two piston engines to drive a single pusher propeller.

But then again, most engineers aren't Jim Bede.

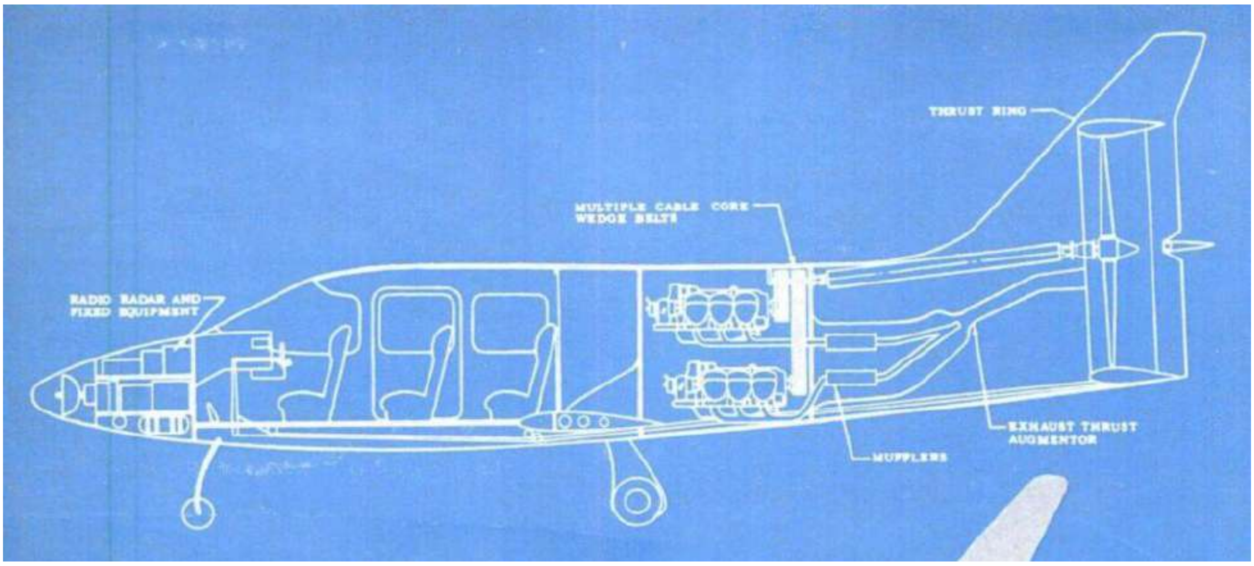
While still enrolled in the aeronautical engineering program at Wichita University, Bede designed an aircraft that would incorporate a number of unique technologies. His vision was to integrate these technologies to provide superior performance to existing designs. Integrating new systems and complexity into an entirely new aircraft design, however, would prove to be challenging even for him.

Bede started with an entirely clean-sheet design. Envisioning an eventual family of multiple aircraft varying in size and passenger capacity, he began with an experimental prototype of the Bede BD-2, which he called the XBD-2. Intended as a proof-of-concept and testbed and first flown in July of 1961, it was boxier and more utilitarian than the sleek, streamlined concepts he endeavoured to build, but it would function well for its intended purpose.

At first glance, even an experienced pilot or engineer might not guess the XBD-2 is a twin-engine aircraft. But it is, and two 145 horsepower six-cylinder Continental O-300s are snugly nestled in the aft fuselage, stacked one above the other. While such an engine configuration is decidedly unconventional, Bede was of the opinion that it offered several advantages.

Most obviously, housing the engines within the fuselage provides for a clean wing, undisturbed by engine nacelles and far more aerodynamically efficient. From a controllability perspective, an engine failure would be a non-event, as there would be no risk of asymmetric thrust. The lack of engine nacelles helped to reduce overall drag, enabling an 18:1 glide ratio.

A system of 10 belts and multiple clutches enabled operation at any combination of engine power, and the pilot could shut one engine down completely to maximize endurance. Bede even mounted each engine on a slide-out rack, a design he claimed enabled an engine to be removed in only 30 minutes. Presumably, little time was required to decouple an engine from the system of drive belts.



The unique engine arrangement utilized a complex system of belts and clutches to enable any combination of power settings to be used for flight. [Credit: FLYING*]*

It was a complex system, but Bede wasn't finished. With the assistance of Mississippi State University's aerophysics department, he introduced further complexity to the aircraft by integrating a Boundary Layer* Control, or BLC system, into the design. Utilizing 160,000 strategically-placed pinholes in the upper wing and aileron surfaces—holes roughly 30-50 percent as large as those in a typical air hockey table—the system would draw air into the wing to create additional lift. By causing the boundary layer to stick to the wing at high angles of attack, the system effectively increased lift and lowered the stall speed.

The BLC system drew air into the wing via a pump driven by the propeller shaft. So long as the propeller was being turned by at least one engine, the BLC system would operate. Ingested air was ducted back to the engines to provide additional cooling. The system proved to be effective, lowering the stall speed from 64 mph to only 42 mph—an impressively slow speed for an airplane with a gross weight of 3,300 pounds. Bede even claimed that the system would be undeterred by rain.

The most visually notable feature of the XBD-2 is the shrouded propeller. Bede was of the opinion that the aerodynamics at the tips of a standard propeller was one of the greatest sources of inefficiency, and he claimed his testing found that "a correctly-designed shroud" would increase the static thrust of a given propeller by over 100 percent. While many would be interested in seeing figures to back up this rather extreme claim, his other claim that a shroud greatly reduces propeller noise is perhaps more palatable and easily accepted.

The basic performance figures of the XBD-2 are impressive. At 9,000 feet, max cruise speed was said to be 179 mph at 16 gallons per hour. Max rate of climb at maximum gross weight was listed as 1,050 feet per minute with both engines operating and 720 feet per minute with one engine shut down, and the service ceiling was 21,000 feet on two engines and 14,500 feet on one.

Take-off distances were similarly impressive. While the company didn't specify at what weight the numbers were achievable, they claimed only 300 feet was required for the take-off roll, and 500 feet was required to clear a 50-foot obstacle.

Ultimately, the XBD-2 logged approximately 50 hours of flight time before being permanently retired. No further derivatives were ever produced, and neither the BLC system, the coupled twin engine configuration, nor the shrouded propeller would make an appearance in any of Bede's subsequent designs. Today, the sole XBD-2 is on display at the Manitowoc County Airport in Manitowoc, Wisconsin.

The sole XBD-2, mounted as an outdoor display at the entrance to Manitowoc County Airport.

Also of note:

** The boundary layer is the layer of air immediately adjacent to the aircraft's skin surface, in which sheering action takes place. In other words, it is where the air speeds up from being stationary in contact with the skin, to flowing at full airspeed.*
In the XBD-2, the boundary layer was controlled with a suction system via 160,0000 upper wing and aileron surface holes, with diameters ranging from 0.020 to 0.029 in. A 14 in (356 mm) Joy blower pulled air through the pinholes in the surfaces, venting it in the fuselage to cool the engines.

Specs
Engines: 2 × Continental O-300-A, 145 hp (108 kW) each
Propeller: Hartzell constant speed
Wingspan: 37 ft 6 in (11.42 m)
Wing area: 150.0 sq ft (13.94 sq.m)
Aerofoil: Göttingen 549
Length: 23 ft 8 in (7.22 m)
Height: 12 ft 5 in (3.78 m)
Max take-off weight: 3,300 lb (1,497 kg)
Maximum speed: 204 mph (328 km/h, 177 kn) at sea level
Cruise speed: 179 mph (288 km/h, 156 kn) maximum at 65% power at 9,000ft (2,740 m)
Stall speed: 42 mph (68 km/h, 36 kn) with BLC (Boundary Layer Control).
Stall speed: Without BLC 64 mph (57 kn;106 km/h)
Service ceiling: 21,000 ft (6,400 m)
Rate of climb: 1,050 ft/min (5.3 m/s)
Take-off run: less than 300 ft (90 m)
Take-off distance to clear 50 ft (15.25 m): under 500 ft (152 m)
Landing distance from 50 ft (15.25 m): under 500 ft (152 m)
Seats: 4

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

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

1. Why does a magnetic compass not normally indicate true north?
   A. Because of compass deviation inherent in the mounting mechanism.
   B. Because "north" to the compass is not "north" to the maps and charts we use.
   C. Because the earth's magnetic field is rotating as the earth spins, and the compass needle is not.
   D. Because of naturally-occurring imperfections in the coverage of the earth's magnetosphere.

2. Isohyets are:
   A. figments of the writer's imagination.
   B. elevation lines on Northern European aviation charts.
   C. tables depicting performance criteria for aircraft testing.
   D. lines drawn on a weather map to indicate places of equal rainfall.

3. Taildragger aircraft experience propeller gyroscopic effect as the tail is raised. causing swing on take-off. Will a nose-wheeled aircraft also suffer gyroscopic effect when it takes-off?
   A. No, because the tail is not being raised.
   B. No, because the "P" factor is inherently less in nose-wheeled aeroplanes.
   C. Yes, at the point of rotation where the nose is raised to get airborne.
   D. Yes, because this is an inherent part of the physics of a rotating propeller which is, in effect, a gyroscope, when a force is applied to change the axis of the propeller's plane of rotation.
   E. C and D are both correct.

4. A balloonist is enjoying a flight in his balloon. The wind is 180/20 at the altitude he is operating at. In which direction will the flag on top of the balloon be pointing?
   A. 180°.
   B. 360°.
   C. It could be either.
   D. The flag will hang limp and not indicate any direction.

5. A pilot makes a 60° banked descending turn with flaps extended and power applied onto final approach at 300 feet AGL. Will he be pulling 2G?
   A. Yes, all 60° banked turns result in a rise in loading to 2G.
   B. No. Because the aircraft is descending, the lift being produced is less than in normal flight and this will result in a lower G loading.
   C. No. The application of flaps and power will cause the G loading to reduce.

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 +64 400 89 3632), or email me at kni.rob@bigpond.com.

1. B is correct.
   Because "north" to the compass is not "north" to the maps and charts we use. The compass points to magnetic north, which moves around, while and the meridians of longitude printed on maps and charts are oriented with TRUE north – the earth's spin axis – which is fixed. As these two datums are not aligned congruently, the compass indicates **MAGNETIC** north and the charts, **TRUE** north. The angular difference is called VARIATION (aka magnetic declination).
   See https://en.wikipedia.org/wiki/Magnetic_declination

2. D is correct.
   Lines drawn on a weather map indicating places of equal rainfall are known as isohyets.
   See: https://about.metservice.com/our-company/learning-centre/how-to-read-weather-maps/

3. E is correct.
   A characteristic of a spinning mass, a gyroscope, is that, if a force is applied to a point on the plane of rotation (POR), the actual change to the POR will occur at 90°, in the direction of rotation, to the applied force, an action called precession. Considering a propeller rotating clockwise when viewed from the cockpit on a taildragger aircraft taking off. As the tail is raised, the change in aircraft attitude therefore results in a forward force being applied to the top of the propeller arc (the 12 o'clock position). Precession will cause that force to move 90° in the direction of rotation and apply itself to the arc in the 3 o'clock position and cause a swing to the left.
   The change in aircraft attitude as a nose-wheeled aircraft rotates on take-off also results in precession, only this time to the right because the force is now applied to the bottom of the propeller arc. Move the force 90° in the direction of rotation, and now the right side of the propeller arc wants to advance.
   If the propeller turns anti-clockwise, the direction of the nose swings will be reversed
   See: https://www.rapp.org/archives/2008/09/gyroscopic-precession/
   Note that this issue can result is severe and dangerous stall characteristics in heavy single engined aircraft trying to recover airspeed when low on approach. The power of the precession force when full power is applied can exceed the rudder authority at low speeds and an uncontrolled roll may result.

4. D is correct.
   The flag will hang limp and not indicate any direction because there will be no airspeed. wind changes groundspeed, not airspeed (except in the cases of shear or gradients which are not applicable in this case).

5. B is correct.
   If height is not being maintained, the lift required is less than the weight, so the loading will be reduced for any given angle of bank.

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

Aircraft Books, Parts, and Tools etc.

Contact Rob-on mobile – 0400 89 3632

Books (Aviation)

NEW Item	Condition		Price
Flight Briefing for Pilot ***By Birch & Bramson***	**Excellent**		**$25.00**
Mechanics of Flight ***By A. C. Kermode***	**Little used**		**$25.00**

Books (Aviation) (Selling on behalf)

NEW Item	Condition		Price
RA-Aus Pilot Certificate **Ground Training Manual (102)** ***By Dyson-Holland***	**Brand new**		**$49.00**
RA-Aus Pilot Certificate **Ground Training Manual (103)** ***By Dyson-Holland***	**Brand new**		**$49.00**

Tow Bars

Item	Condition	Price
Tailwheel tow bar.	Good condition	**$50.00**

Handheld Radios (Selling on behalf)

Item		Price
ICOM VHF Transceiver, Model: IC-A22E With • Battery, • Cigarette lighter power source, and • 240V battery charger.		**Open to Offers**
ICOM VHF Transceiver, Model: IC-A6. With 240V charger but no dock to recharge battery *(available on EBay)*		**Open to Offers**

Cockpit Electronics (Selling on behalf)

Item		Price
TRANSPAK GPS Personal Navigator Complete with • Carry bag, cigarette lighter power pack, • AA battery power pack, and • User manual.		**Open to Offers**
MAGELLAN GPS Model 315/320 With • Cigarette lighter socket power pack, and • User manual.		**Open to Offers**

Other Electronic Units (Selling on behalf)

Item		Price
PALM, model Z22, complete with • CD software, • 240V charging unit • Linking cables etc., • Still in original box.		**Open to Offers**

Other Electronic Units (Selling on behalf)

Flight Cell 2GO. Mobile phone to Headset interface • With user guide, and • Includes cable etc. See: www.flightcell.com for details		**Open to Offers**
NAVMAN. Model MY 50T automotive GOPS system With • CD, and • Cigarette Lighter socket power supply.		**Open to Offers**

Aircraft Magnetic Compass (Selling on behalf)

Item		Price
Wired for lighting • Top of panel mount, • Needs fluid replenished.		**Open to Offers**

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

$1,980.00 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.
- All instruments including,
- A Navman flow meter,
- A Powermate rectifier regulator,
- A ballistic parachute,
- A 4-point harness,
- Set fibreglass wheel pants, and
- More.

Box sections and tubes

Flow Meter, Navman, Ballistic Chute, etc

A very comprehensive kit of materials

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

Or Mob: 0419 758 125

Ribs, tubes, spats, etc

Thruster T85 Single Seater for sale.

$9,750.00 NEG

Beautiful classic ultralight single seater taildragger Thruster for sale; to good Pilot. Built in 1984, this is a reluctant sale as I inherited Skyranger V Max and two aeroplanes are too many for me.

The aircraft at Kentville

New Engine Rotax 503 Dual Ignition has only 10

Fuel tank

Instrument panel

Details

Built - 1991	Serial Number - 312
Model - Thruster 85 SG	Rego Number – 10-1312
TTIS Airframe - 638	Original logbooks - YES
Engine - *NEW* Rotax 503 DIUL	Next Annuals due – 05/11/2023
TTIS Engine – 10 hours	Propeller – Sweetapple, Wood, 2 Blades (as new)

Instruments - RPM, IAS, VSI, ALT, Hobbs meter, New Compass, CHTs, EGTs, Voltmeter & furl pressure gauge

Avionics - Dittel Radio 720C and new David Clark H10-30

Aircraft is fitted with Hydraulic Brakes. Elevator Trim. Landing Light. Strobe Beacon. Auxiliary Electric Fuel Pump.is in excellent mechanical condition and the skins are “as new”.

Offers considered. Call Tony on 0412 784 019

AIRCRAFT for Sale - LIGHTWING GA-55.

Registered 25-0374

$25,000.00 (Neg)

Engine ROTAX 912, 80HP, 853.3 Hours

Reluctant sale of this great aircraft, I have owned her from June 2004.

Excellent fabric, Red and Yellow, always hangered, and comes with the following extras:

* 2 Radios
* Lowrange GPS
* EPIRB
* Aircraft Dust Covers.
* Manuals – various
* Fuel Pressure Gauge
* Extra Tachometer
* New Headsets
* Paint
* Oil

Work performed at Lightwing Ballina:

* Wings recovered, tanks resealed, new brakes, wheel bearings and hubs, new wing tips.

Other work carried out:

* Windscreen replaced, door panel replaced, choke cables replaced, ignition upgrade.

Rotax:

* Engine modifications, gearbox rebuild.

Currently hangared at Boonah in Queensland.

Contact Kevin McDonald on 0419 607 637

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 Sky Dart III landing 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**

Aircraft Engines for Sale

Continental O200 D1B aircraft engine

Currently inhibited but complete with all accessories including,

- Magneto's,
- Carburettor,
- Alternator,
- Starter motor,
- Baffles and Exhaust system, and
- Engine mounting bolts and rubbers.

$POA

Total time 944.8 hours. Continental log book and engine log are included.

Phone John on 0417 643 610

ROTAX 582 motor.

Ex flying school, TTIS 600 hours, and running faultlessly when removed from aircraft for compulsory replacement.

No gearbox, but one may be negotiated by separate sale if required.

Interested parties should contact…..

Kev Walters on Tel. **0488540011**

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