BRISBANE VALLEY FLYER

February - 2021

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

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Beechcraft Staggerwing VH-UXP doing a wheeler landing at Omaka in New Zealand – see page 3

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From the Club

Hello everyone,

Welcome to a brand-new year. We are hoping that it will be better than the last.

The committee hope that you all had a Merry Christmas and a safe and happy new year.

We ended the year with the usual Christmas party and it was very well attended this year with 28 members and guests attending. At the end of the day, we still had plenty of food left over so no one went hungry.

It was good to see the members all interacting with each other and just kicking back and enjoying the time together. Some pix of the Christmas Party are overleaf

As we start the New Year one of the first things to get out of the way will be the postponed Annual general meeting and this will be held during the March meeting.

Our first meeting for the year will be held on Saturday 6th of February.

As we have discussed at previous meeting, we are still looking for ideas for club activities that we all can participate in. So please come to the meetings and share your ideas so we can get some into action.

All of the committee members are hoping to see you all at the next club meeting on the 6th of February. See you all there.

All the best

Peter Ratcliffe

BVSAC President

To Wheel or 3 Point? Is That a Real Question?

By Rob Knight

When landing a taildragger, it's the million-dollar question — to three-point it, or wheel it on. Are fully stalled three pointers better or safer than wheelers? Or is it the other way around? I've seen arguments between senior flying instructors and serious fall-outs between otherwise good friends over which is the better technique and when each technique should be applied. Seriously – what the hell does it matter. So long as a pilot is competent at carrying out both landing types, then, if one day the one they prefer doesn't work, they can simply go around and on the next landing using the OTHER technique.

Pilots that train in nosewheel aircraft actually use the tail down wheeler technique, where they are taught to land the aircraft in a controlled touchdown as the aeroplane settles, usually unstalled, onto its main wheels: but here the similarity stops. The centre of gravity being ahead of the main wheels in a nosewheel aircraft causes the aeroplane's descent inertia to pull the nose down onto the runway which reduces the angle of attack and thus reduce lift. This is a stable action as the automatically decreased lift encourages the aeroplane to stay on the round and finish its ground roll. In a tailwheel aircraft, the centre of gravity is behind the main wheels, and that makes a world of difference. Now, as the wheels descend and touch, the downward movement of the aeroplane stops, but the centre of gravity behind the main wheels doesn't and the tail is pulled down which pitches the nose up, increasing the angle of attack and thus the lift. So, aided and abetted by the rebounding suspension, with plenty of lift, the aircraft flies off (or "bounces off") which can be the start of a bad day. The centre of gravity being *behind* the main wheels, *makes the taildragger unstable in yaw when its wheels are on the ground*. Let's see what taildragger landings are all about.

There are also nearly an infinite number of versions of wheel landings, although they can be broken down to being considered tail-high, with the aeroplane pretty much horizontal, and tail-low where the tailwheel is relatively low, but not touching, the runway as the landing occurs. No matter what, if the tailwheel does not touch the runway (as a result of the pilot's intentional act) until some very definite time after the mains, it's a wheel landing.

The landing where the mains touch and then occurs a smacking sound of the tailwheel impacting terra firm doesn't have a name beyond either "Oops", or "Oh, #$%^". It is generated in a number of ways: an attempt at a wheel landing in which the pilot doesn't release the back pressure on the stick when the mains touch, a wheel landing with a descent rate that is not arrested and in which the pilot allows the tail to continue going down after the mains make contact, or by an incomplete flare when going for a three-point arrival. No matter what the cause, the effect can rapidly become a bounding, bouncing, scary gyration as the aeroplane hops from tailwheel to main gear. If the pilot attempts to arrest things by thrashing the stick back and forth trying to turn the exercise back into a wheel landing, the most common consequence is much further unpleasantness, becoming amazingly loud as components of the aeroplane other than the wheels make contact with the planet. There are two good cures to this "crow hopping": full aft stick to keep the tail down, or a go-around. Experience and judgment are the only answers to the question of "Which should I do in that situation?" It may be possible to smoothly pull the stick all the way aft and hold it in position (along with full aileron deflection into the wind); however, if you're eating up runway or if there is any directional uncertainty, a go-around is probably the better manoeuvre.

In This Corner, The Advantages of Three-Point Landings

Minimum energy at touchdown has a heck of a lot going for it, assuming the aeroplane has flight controls that remain effective at that speed and the pilot is willing to put them to use. The aeroplane's kinetic energy has to be dissipated at some point in the landing sequence. So, as a general rule, the less kinetic energy we have to shed when we touch the runway, the less likely we are to come to a stop in a disagreeable fashion. A few hours reading internet sourced landing accident reports cause one to come to the depressing conclusion that most landing accidents involve failure of the loose nut on the stick to appropriately deal with the energy of the aeroplane during the landing roll. We can usually get the aeroplane onto the runway but then lose it, rather than lose it before we get to the runway. Thus, by definition, it's not so much a landing issue, but rather a roll-out problem – that transitional part of the alighting process between the wheels touching the runway at or close to the stall speed, to where the aircraft can clear the landing area at walking speed.


A Pitts S-1S s doing a 3 pointer at Watts Bridge

The three-point landing has the aerodynamic benefit of lots of drag during the initial portion of the landing roll. The aeroplane is pitched up, with the underside of the wings, fuselage, and tailplane surfaces helping slow you down nicely—remember the drag curves and how sharply they go up as you approach the stall, well, they don't suddenly go to zero on touchdown. Full flaps add agreeably to that drag, helping you slow down quickly in three-point attitude.

Because you had to position the ailerons and rudder to avoid drift prior to touchdown, they are probably going to be deflected in the correct directions when you do touch, so all that is needed is to smoothly move the ailerons to the stop and to be alive with the rudder to continue proceeding in the desired direction. The rudder may rapidly lose effectiveness due to deceleration and being blanked by the fuselage; however, a firmly pinned tailwheel should do a great deal to compensate for the loss of that aerodynamic control, especially if the landing is made on an unpaved surface where the drag of the tailwheel is a major benefit. An added benefit is that by the time the aeroplane has decelerated to the point where the aerodynamic effectiveness of the rudder is iffy, the brakes (assuming the aeroplane has them) have become quite effective, and their use will assist in control of the rollout.

A three-point landing is pretty forgiving of mistakes during the flare, making it especially useful for pilots with less tailwheel experience or for high-time pilots just getting used to a new type or who haven't flown a great deal recently. So long as the stick is kept all the way aft, the aeroplane may or may not bounce, and, even if it does, a little power will suffice to let it down more gently the second time. The aeroplane is not likely to get into any kind of oscillation in such circumstances and the pilot is free to concentrate on the more important landing variable: directional control.

Sure, the three-point landing has shortcomings. On a windy day the pitch attitude of the aircraft immediately after touchdown means that a gust can put it back into the air. That is usually only a source of discomfort; holding the stick full aft and applying a bit of power to cushion the descent will correct things. However, in a crosswind, that event can start the aeroplane drifting sideways, something much more serious and which must be corrected prior to touching down again.

The time involved in flaring to land in three-point attitude can lead to directional control problems in a strong crosswind. In some aeroplanes, particularly if the pilot is not willing to put the ailerons to the stop or has tacked on some extra speed on final, directional control can be challenging during the flare. Done correctly, a three-point touchdown in a crosswind means that the aeroplane is going to initially alight tailwheel first or at the same time as the upwind main gear, and it's going to roll along in that attitude for a few moments. It's perfectly controllable, but it may feel a bit odd.

While the three-point landing is probably better for most aeroplanes and pilots who haven't been flying a great deal recently, there are some aeroplane specific exceptions to the general rule. There are aeroplanes that are far easier to wheel land than to three-point, such as the Globe/Temco Swift, the Beech 18 and DC-3. Pilots who want to do three-point landings in those had better be very current and quite good. It's also wise to be lucky that day.

In the Other Corner – The Benefits of Wheel Landings

By design, a wheel landing can put significant weight on the main landing gear immediately because the angle of attack is reduced by the pilot upon touchdown. The amount of weight is proportional to the amount by which the angle of attack is reduced, so the aeroplane is probably not going to bounce back into the air in the event of a gust. Of course, there is a trade-off, it may be more affected by gusts from the standpoint of directional control than if the tail is firmly on the ground, particularly as airspeed diminishes.

There is a shorter period of time during which the aeroplane is decelerating in the flare than in a three-point landing, so it is easier to avoid drift prior to touchdown.


De Havilland Chipmunk doing a wheeler

In a strong, gusty crosswind a more advanced pilot can land the aeroplane (depending on the type) in nearly level flight attitude and may be able to go to a negative angle of attack, or one so low that virtually all of the aeroplane's weight is on the main landing gear, allowing for heavy braking immediately. It has to be kept in mind that braking with the tail up is a very advanced procedure and, done incorrectly, will result in serious damage to the aeroplane and injury or death to the occupants. I have seen videos of Cessna 180s and 185s flown by Alaskan bush pilots who have developed a very impressive short-field technique using an almost constant pitch attitude on short final, with descent controlled with power and the landing taking place simultaneously with application of brakes to keep the aeroplane firmly on the ground. Again, it is a very advanced technique to be learned from one schooled in the procedure and substantial time experience on that specific type and one only used when necessity dictates

Because the pilot makes the decision when to lower the tail in a wheeler, he/she can take maximum advantage of the relative effectiveness of flight versus rolling controls during rollout. A pilot who knows the aeroplane can keep the tail in the air, making maximum use of the airflow around the rudder and vertical fin for directional control, until such time as the aeroplane has slowed to the point where better directional control is available via the tailwheel, and lower the tail at that moment.

Despite the assertions of some purists, wheel landings do have some shortcomings. Although the approach speed for a wheel landing is exactly the same as for a three-point landing, the touchdown itself is at a higher speed because the aeroplane is, as yet, unstalled; it hasn't floated and washed speed off, as will occur in a 3 pointer. This extra speed can be a negative once the wheels are on the on the ground as it requires that the pilot have the skill, and that the aircraft have sufficiently effective controls to manage the energy of the aeroplane and directional control while slowing to a stop.

Another potential shortcoming of a wheeler landing is the effect of the hardness/firmness of the runway surface. A wheeler landing can result in an upside-down aeroplane if the field is soft. A soft surface will add vast quantities of drag to the tires and wheels and, if the nose-over force is greater than the ability of the tailplane/elevator to counter it, a bloody nose is the minimum inevitable result. If in doubt about runway surface hardness, three-point the aeroplane or find another runway.

If there is any sort of descent rate at touchdown, there is a tendency for the tail to continue downward, increasing the angle of attack and bouncing the aeroplane back into the air. Most bounces on wheel landings are not due to the landing gear, they are due to an increase in angle of attack. A bounced wheel landing can be trouble as the natural tendency is to push the stick forward to try and catch the aeroplane and "pin" it on the runway. The pilot gets precisely 180 degrees out of phase with the aeroplane, leading to pilot-induced oscillation (PIO), which can quickly generate a bent aeroplane and worse.

However, there is one situation where a wheeler is virtually mandatory. That is when landing on an uphill slope. It may be impossible to get the attitude necessary to carry out any other type of landing due to the angle of the slope and the well-known effects of gravity

OK, which is Safer?

It appears that the entire issue boils down to three major variables (in addition to the manufacturer's guidelines) that must be taken into consideration by the pilot before deciding on the type of landing to make in any given weather conditions: 1) The overall skill level of the pilot; 2) the type of aeroplane being flown; and—probably the most important variable—3) whether the pilot has had recent (within a few weeks) experience in the specific aeroplane being flown.

If a pilot is not current, or does not have a lot of tailwheel time, and if there is not a strong or gusty crosswind (each individual pilot has to define strong), a three-point landing may be the better way to go. There is less kinetic energy to deal with during the rollout, and flaring at the wrong height or making a hard landing is no big deal, so the pilot can concentrate on just one variable, directional control. It is the more conservative landing in most aeroplanes, and when in doubt, the conservative approach to dealing with a moving object is often the better one.

If there is a strong or gusty crosswind, a wheeler may hold the advantage as the aircraft touches down under full flying control and all the pilot needs to do is keep straight and hold the tail up for better rudder authority until he/she lowers the tail so the tail wheel takes over the command of straightness in the rollout as the airspeed diminishes and the rudder becomes ineffective. If the pilot is not experienced, current and in practice, or the conditions become extreme for that pilot's skill and confidence levels, the safer way is to postpone the flight or find a runway into the wind—or even, perhaps, land on a taxiway oriented into the wind.

Note well that a pilot, regardless of experience level, should be prepared to make a go-around any time things are not going as planned during the flare, or the rollout, or if there is any question about directional control. In addition, as a general rule practiced by some, if a wheel landing is bounced twice, it should be abandoned and a three-point landing or a go-around conducted.

If the pilot is experienced, current and knows the aeroplane, a wheel landing may be safer unless the runway is soft. Face it—a wheel landing requires expert manipulation and dissipation of the considerable force involved with that collection of metal hurtling along a runway while balanced on two wheels—full aileron into the wind to take advantage of adverse aileron yaw for direction control and judgment as to when to lower the tailwheel. Nevertheless, a good pilot can use the skills developed over time to handle that energy by using the aerodynamic and rolling controls to cause the aeroplane to go precisely where and decelerate when desired. While an aeroplane with very effective controls may be difficult to learn to operate (it's tougher to fly a Pitts than an Ercoupe), the effort of learning and keeping one's skills honed is amply rewarded by the ability to make that aeroplane do things that others cannot. One of those rewards is to be able to land safely in strong, adverse winds. That ability comes with a known risk: Improper handling of those controls will result in tearing up the aeroplane and the people inside.

It All Boils Down To…..

We all know that tailwheel aeroplanes require more skill and judgment to land than nosewheel aeroplanes. The accident reports reflect that fact rather boldly. It means that those who fly tailwheel aeroplanes need to be willing to self-asses their skill level constantly, be willing to examine the variables facing any landing, and use their educated judgment. Whether a three-point or wheel landing is safer in a particular aeroplane is not ever going to be a simple question. It is an issue that has to be resolved by each individual pilot for the conditions he or she faces at any given time—with respect for the manufacturer's guidelines. It looks to me as if the question of whether rolling it on the mains or three-pointing the aeroplane is going to lead to a safe landing is one that is only answered after a frank appraisal of one's skills while considering the type of aeroplane and the recency of one's experience.

But No-One Asked the Aeroplane Which Method It Prefers

So far this has all been about US, the Human element in this discussion. Let's hear from the Aeroplane

Obviously, there are impact forces when we land. Nosewheel or tailwheel, these forces have been taken into account by the designer/manufacturer and we can only hope their got their sums right.

There are considerable differences in the impact forces applied to the airframe when we land 3 point compared to a wheeler. As John Hoyt states in his excellent book, *As the Pro Flies*, wheeler landings result, in the main, in far less stress being applied to the undercarriage as well as the attachment points of it to the aeroplane structure.

Experiments conducted to measure the G loadings when 3 pointer and wheelers were being assessed indicated that up to 4 G was experienced during tests made by experienced and competent pilots carrying out 3 pointer (full stalled) landings Compared to wheeler landings, 4 G is high as the equivalent wheeler landing forces resulted in only 1.7G, dictating that a far lower structural load is carried by the airframe doing wheelers. Note that a perfect landing would, using the G Loading assessment, only incur a 1 G load so the wheelers were only 0.7G higher. That is significant in terms of stress on the aircraft structure.

My Conclusions

Pilots should be competent in both landing methods. They should feel free to try the technique they prefer and be prepared to go around if there appears to be an issue with either the approach/ landing, or the technique they chose. Going around re-sets the scale to zero so they can try the alternative method, or decide to land on another runway, or even another airfield. The available options remain and their safety is more assured. In other words, they can try them both, just not at the same time.

Happy Flying

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The $20 An Hour Cessna 172 Experiment

By Jay O'Donnell

When I learned to fly in the 1980s, the school's fleet was comprised of already decade-old Cessna 172s, most of which clearly showed their age and the toll of countless training manoeuvres, hard landings, and check rides. The seats and interiors were already well-worn and faded, seat belts stained and produced odours of the many previous occupants, plastic dashboards cracked and re-glued multiple times, the original 1960s NAV/COM radios scratchy with often only one properly functioning, not to mention the multiple cowling screw heads stripped from a decade of inspections, oil changes, and engine overhauls.

Back then I paid $45 per hour, wet, for a 172. The CFI cost me another $15-$20/hour depending if VFR or IFR training, and there was no requirement to have your own renter's insurance (the FBO did offer a $3/hr option that would limit max deductible to $500, but few took then up on the offer). My PPL cost me about $3,500 total, including check ride and even a shiny new Peltor folding headset. There were plenty of planes to rent at numerous small airports due to "trickle-down economics" tax laws that made lease-backs make financial sense. Cessna was producing the same 172s at a rate of over 2,000 a year to pacify demand of FBOs, flight schools, flying clubs, as well as personal buyers—who viewed the price tag of about $17,000 as feasible.

Thirty years later the same airplanes are at flying schools all across the US

Over three decades later, my daughter expressed interest in learning to fly, and I started calling around to flight schools to figure out where to begin. Although I had a GA background and built time as a CFI, I've been flying for the airlines for three decades and have been absent from the GA scene, which I mistakenly assumed had long evolved and would now seem foreign to me.

After just a few calls, nothing had seemed to change except that the same 1970 vintage 172s were now renting out at $115-$125 per hour. Even more unbelievable was that the same engines were used and still required leaded gas—the EPA and FAA seemed hell-bent on eliminating lead's poisonous emissions in the early 1980s. Somehow aviation became an inverted pricing model compared to all other industries, wherein the older and more worn a plane is, the more it cost to rent, and remained immune from any emissions rules that required all other engine industries to evolve.

Quickly calculating aircraft rental cost alone for a 60-hour private pilot program in my head, it was obvious that there had to be another way. I looked into experimental kit planes, but I had neither the time nor facility to build it, and was uncomfortable buying a completed homebuilt with little way of knowing how or who put it together.

So, I began looking into buying a certified plane, but quickly realized there wasn't all that much savings considering cost of ownership, let alone what I deemed to be ridiculous prices for 40-year-old aircraft in mostly original condition. What used to cost me $45/hour to simply rent and walk away—leaving the ownership cost to some owner who would write it off their tax return—now would cost over $60/hour just for the engine direct operating cost (fuel, oil, overhaul reserves). The engine cost was the real deal breaker, and there had to be some alternative.

The only alternative engines I could find for the 172 were diesel engines that cost over $100,000 for the conversion, and offered little in operating cost savings. My background in marine engineering reminded me how the boat industry develops powerplants. Even the largest marine engine manufacturers use mass-produced automotive engines that they modify for the boat mission, an engineering process I was more than familiar with. This process, called marinization, allows the relatively small marine engine segment access to the newest technologies, state of the art quality control of some of the world's most successful companies, and at a lower cost of goods then they could even dream of if vertically developing their own product.

I wondered if the same process could work for aircraft engines, and began the experiment of designing and modifying a V8 aluminium marine engine to meet FAA Part 23 and 33 requirements, then install it onto a Cessna 172 airframe. (This wasn't an original concept, as I discovered. Toyota and Porsche actually certified modified versions of their car engines, but quickly closed the program for a number of practical reasons).

Almost two years later, with seemingly never-ending obstacles along the way, FAA regulatory hoops to jump through, and even a few small engine fires during ground test, our 1969 Cessna 172K lifted off for its first flight. Regardless of my experience as a former FAA designated engineering representative (DER) and flight test pilot, I admit questioning the logic of bolting a V8 to a Cessna during that first take-off, especially without a parachute. But the 210 HP Skyhawk flew off with far better take-off and climb performance than the original POH said it should have, even with our hand carved wooden prop designed to reduce noise.


A new approach to aircraft engines

Vibration meters read normal, air/fuel ratios remained almost perfect, and the several temperature sensors throughout the engine remained as designed. Our redundant electronic fuel injection system worked seamlessly—restarting the windmilling engine within one second after intentionally failing the main ignition and fuel systems. The backup fuel pump also operated as designed, automatically and immediately returning fuel pressure to normal after pulling of the main pump circuit breaker. The alternator circuit produced enough power with just windmilling prop rotation to power the backup ignition system and restart the engine with both batteries off line. The aircraft flew just as any 172, and the absence of mixture and carb heat controls made it noticeably easier to operate.

After about 30 minutes of working through the first flight test plan, it seemed that not only could an experimental-certified hybrid work economically, it could work in lower noise and tailpipe emissions, all while producing better performance.

We continued to improve the design over the next two years to make the aircraft quieter, more efficient, safer, and cheaper to fly. We hired the same engineering firm that worked with the automotive manufacturers on the same EFI system that we use in our design, starting from scratch with blank engine controllers and custom calibration programming specific to the aircraft mission. We worked with certified propeller manufactures to develop even quieter and more efficient designs over the 200-hour flight test plan.

Currently, our 172 costs about 1/3 less to fly (fuel, oil, reserves) compared to the original engine. At current car gas prices, average cost is less than $19/hr, compared to the $62/hr with the original O-320 engine. Added features, such as the digital engine display that monitors over 75 engine parameters and alerts the pilot when something is out of the norm, further reduces workload and distractions. We added the ability to connect to the engine controller by WiFi for reading fault codes, engine logs, and performing remote troubleshooting and tuning to support the product from anywhere in the world.

My daughter has logged steep turns, stalls, slow flight, and touch and goes, and I figure her private pilot aircraft cost should be south of $1,500 for about 60 hours when taking the check ride planned on her 17th birthday. We look forward to building time flying to air shows as soon as things return to pre-Covid norms, and exhibiting that there are practical alternatives out there for GA to reignite by thinking outside the certified box.

That ain't no Lycoming under them there covers!

The project received a FAA G1 issue paper for an STC to install the engine on other 172s, but certification cost requires outside investor funding and we have not found the right partner yet. Certification brings a lot of product liability baggage as well, so simply operating a 172 or other certified piston aircraft in the experimental category may be the answer for many. Our FAA experimental operating limitations are about the same as an amateur-built aircraft, and we don't plan on leasing it back, renting, chartering, or even landing at any class B airports, all of which are prohibited for experimentals. So, for a personal or equity based flying club (where club members own a fraction of the aircraft), there is little compromise, negatives of which are eclipsed by the 60% lower operating cost.

So, practical solutions to what ills GA may be more of a compromise between certified and experimental, rather than to simply continue waiting for one industry to come up with a solution. With just one engine design, we eliminated need for leaded gas, decreased pilot workload of managing archaic engine controls and monitoring gauges, all while increasing performance and reducing cost to a level that most would-be aviators can afford. It may not be a perfect solution, but aviation has a long history of design compromises to produce practical solutions.

Editor's Note:

Exactly the same situation exists in New Zealand. See Article next page.

The Conversion of Automotive Engines to Aviation Applications in New Zealand

Fletcher FU-24 ZK-BHG (c/n 9) fitted with a 10.5 litre Ford V8 truck engine in 2000

The FU-24 Fletcher was an American design produced by the Fletcher Aviation Corporation in the United States of America. In 1966 the Corporation ceased to be involved in the aviation manufacturing industry and the rights to build the FU-024 went to Pacific Aerospace in New Zealand.

ZK-BHG with its 225 hp Continental in operation in 1956

Aircraft Type:
Single-seat agricultural monoplane

Power Plant:
Original 225 hp Continental O470E.
Subsequent – see article below

Over the years, in order to reduce the cost of operating an agricultural aircraft, operators have fitted a number of engines to the Fletcher FU-24 series and these have included converted motor vehicle and truck engines.

Pacific Aerospace turbine powered Cresco

In 1995 Fieldair of Palmerston North fitted a 410 kw (550 hp) Chevrolet eight-cylinder VEE engine to ZK-EMO (c/n 266), stating it was more efficient, had a slower turning propeller than the Cresco, produced about 2,200 lb static thrust, had similar operational fuel consumption as the Lycoming IO-720, and had overhaul costs a third of the IO-720. This aircraft became known as the Fieldair Fletcher FU-24-550, and it was announced in 1994 the company's fleet of 21 Fletchers would be converted to the new power-plant.

ZK-EGP (c/n 238), an FU-24-450, was temporarily registered ZK-USU and flown by Cliff Tait from Christchurch, NZ to Sydney, NSW in 14 hrs 35 mins on 9 September 1978 to commemorate Charles Kingsford Smith's 14 hrs 25 mins crossing of the Tasman Sea on 10/11 September 1928 in the Fokker F.VII3/m Southern Cross. The aircraft refuelled and returned immediately, making the double crossing in a total of 27 hours. In March 1979 it became VH-MXD for a short period before returning to New Zealand to become ZK-EGP.

In the 1990s costs of engine overhauls for the Lycoming IO-720 engine, an eight-cylinder horizontally-opposed air-cooled unit, led operators to find an alternative and companies looked at converting large automotive derived units. In 1993 Super Air Ltd in New Zealand made application for the Civil Aviation Authority (CAA) to accept a 37 per cent increase in power for take-off with a five-minute limitation with no changes required to the aircraft envelope. A similar project was undertaken by Fieldair Ltd using another engine type but only the conversion of the Super Air aircraft took place and neither project proceeded to the certification phase.

ZK-BHG has had an interesting history. It was the ninth Fletcher FU-24 built and was one of 13 airframes imported to New Zealand by James Aviation Ltd of Hamilton. It was registered to Cable-Price Corporation Ltd on 24 March 1955 and fitted with a 168 kw (225 hp) Continental O-470E engine. It later went to Robertson Air Services Ltd of Hamilton but was retired for a period in May 1986. In September 1988 it went to Custom Blend Feeds and Fertilizers Ltd. In May 1997 it was obtained by Super Air Ltd and was fitted with a 10.5 litre Ford V-8 engine, receiving certification with this engine in January 2000, making its first flight with this engine on the 23 January of that year.

The engine installation was designed so the engine power went through a chain drive and through a reduction gearbox but after further development this was changed to a geared drive. During its development it was initially fitted with electronic ignition but this was not a success and it was reverted to standard ignition. It was fitted with dual main wheels on the undercarriage but in due course these were reverted to single wheels. However, it seems this installation was not particularly successful and it, along with a number of other aircraft, was fitted with a Walter M601-D11NZ turbine. In this configuration it first flew on 28 November 2003. The aircraft was retired again in 2013 and the registration cancelled in July 2014.

Another aircraft in the series has been fitted with a V-8 diesel engine by Phoenix Aviation of Gore, NZ. William Patterson, a shareholder of Phoenix Aviation, obtained ZK-EUD (c/n 285) and installed a large German diesel engine on his farm at Waikaia, north of Gore. This engine produced about 224 kw (300 hp). The installation was carried out but seems not to have been successful as it is not believed to have flown. The aircraft was last noted stored at Gore.

In October / November 2018 Fletcher Fu-24-954 ZK-EUC (c/n 283) at Gore, was fitted with a German Raikhlin Engine Developments V-12 RED A03 turbocharged diesel engine providing 373 kw (500 hp). This engine has also been installed in Europe in the Yak 152 supplied to the Russian Air Force.

Further variants of the Fletcher FU-24 series have included the Fletcher FU-24 Tofura with a Pratt & Whitney PT6A-11AG engine of 410 kw (550 shp), the Fletcher Falcon with an LTP101-700A engine of 400 kw (537 shp) and the FU-24-550 with a converted Chevrolet V-8 engine.

Check out these two video clips and watch an automotive-powered Fletcher operating

youtube.com/watch?v=Y_l980oQ-Wc

https://www.youtube.com/watch?v=oeqWSNTGFoY

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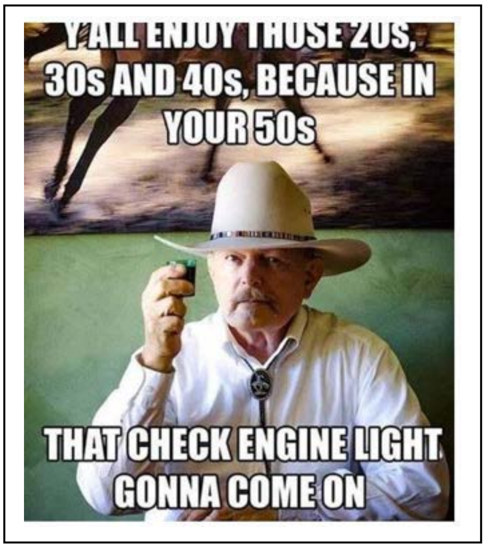

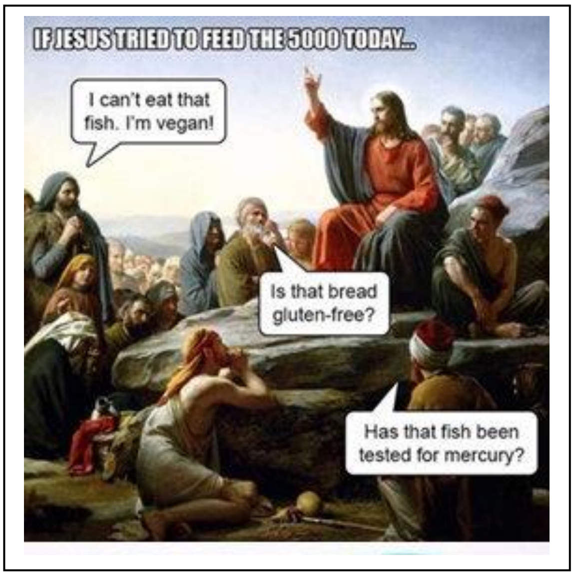

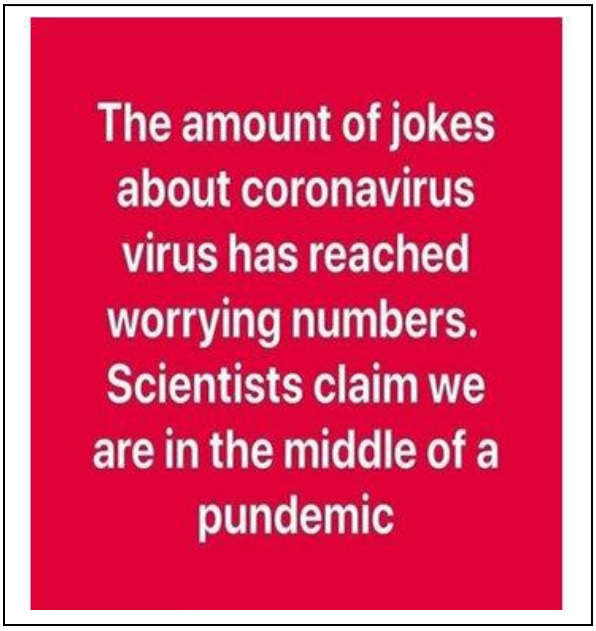

The OLDFIELD BABY LAKES Biplane

From an Article by Budd Davisson, Air Progress, June, 1977[1]

Adapted by Rob Knight

It's a bit strange, like you've just taken the acne queen of the wall flowers to a sock hop (do they still have those things?) . . and liked it! I feel like I should be saying something like, ''Yeah, but she's got a great personality!", defending my having been seen cavorting with a toad-like bipe that slinks around on its belly. I mean, even the folks that love the Baby Lakes have to admit that it looks a bit dumpy/homely/squashed/frumpy when parked next to something like a Starduster or a Pitts, or even my one-eyed Volkswagen. (I take that back; nothing looks worse than my VW.) But even though she may not be too great on looks and is a little wobbly around the knees, she's got it where it counts . . . upstairs, and I don't mean her intellectual capacity.

A Baby Lakes in Australia

The Baby Lakes is one of those aeroplanes that seems to have been around for at least a generation of homebuilders but has somehow never caught on. It was supposedly a scaled down Great Lakes, but in reality, there is nothing about it that is even slightly Great Lakes with the possible exception of the swept upper wing panels. I think the only persons who can look at it and see a similarity to the original 2T-1A is the designer, Barney Oldfield (his real name, honest!) and the current plans hustler for the aeroplane, Harvey Swack). Even so, Swack prefers to ignore the aeroplane's possible Great Lakes heritage and calls it the Baby Lakes, having dropped the ''Great' somewhere along the line. Quite honestly, until very recently, I always thought it should be called the Not-So-Great Lakes. Its looks have always turned me off, but then I always have gone for racier things . . . like my VW, for instance.

It was, therefore, not an entirely unbiased pilot who strapped his normal sized butt into a less-than-normal-sized aeroplane to go flying Baby Lake's style. Fudge!! I thought (or words to that effect), I already know how this thing flies—stodgy, just the way it looks. I mean after all, how well can an aeroplane fly, that, in this particular version at least, looks like a sway-back butterfly with its nose stuck in a thimble. Like I said, I already had my mind made up how this thing was going to fly. Once again, the kid is proven wrong!

The whole concept upon which the Baby Lakes is based can be summed up in one-word economy. Oldfield wanted to design an aeroplane that used a minimum of materials, burned little gas, took no skill to build or fly but still gave good performance. Naturally, when you mix all that stuff together there is one other word that becomes a guiding concept . . . little. And it is. The top wing is barely shoulder high to a slouching writer and a good-sized pooch could back up and do something obscene into the cockpit without even stretching. There have been other biplanes with about the same size sixteen-foot wings, but I don't know of any that scrunch so close to the ground. Swack told me one of the reasons the aeroplane has such a short gear is that its

The Baby lakes IS a baby indeed, barely shoulder high ground angle is several degrees short of the stall angle, so it's always flown into the ground. That may be so, but it certainly makes for an unusual looking aeroplane.

So, as I wiggled down into the cockpit, I reassessed my knowledge and opinions of the aeroplane and totally unimpressed myself. Dick Blair, who loaned me N91H, leaned over my shoulder to grab his sectionals, while I was strapping in, and muttered something about how comfortable the cockpit was. I looked at Dick, a little incredulous that he should think I could possibly be comfortable. Then I wiggled around a bit and found that I did have a reasonable amount of room. I wasn't exactly rattling around in the cockpit, but I wasn't folded up like a two-dollar wallet either. I'm a very normal sized 5'10" and fit into the Lakes okay, but I'd have to say that a few things would have to be bent to accept anybody much bigger. I remember seeing a past publisher of Air Progress flying a Baby Lakes and at 6'4", he looked like a giraffe on a roller skate. He had to leave his entire left arm outside the cockpit, working the throttle by reaching down inside.

Dick walked around up front and grabbed the prop, as I strapped on a helmet and nervously checked for any tall dogs in the area. A couple of blades lit a fire under the 90-horse Continental and I saw Blair dancing off to the side, waving me out with a smile, as if he knew something I didn't. I smiled back, weakly, and went on my way.

I'm always a little spooked when riding herd on a new mount, so, as I'm rumbling out to the runway, I do a hell of a lot of looking around. I try to memorize the position of the nose on the horizon when I'm sitting on the ground, and in the Baby Lakes, that's just about what I was doing, sitting on the ground-so doping out references to help me find the runway when I came back seemed pretty important. With such a flat ground attitude and my tusche only a foot or so off the pavement, I figured my eyeballs would be doing some rapid calculating when it came time to flair.

I must admit to being a little blasé about the cockpit familiarization and everything prior to the take-off. Even before I shoved the power forward, I had mentally crossed the little aeroplane off of the list of birds I'd be willing to own. Then, as the rpms built up, I suddenly found myself sitting up and taking notice of what was going on. For one thing, that little dude was trying to curve off the centreline to the left and I had more right rudder in it than I expected for only 90 hp worth of torque/P-factor.

When picking up the tail, I was super aware of the prop and only got the tailwheel up a couple inches. In much less time than it takes to read about it, the aeroplane scooted off the ground and wrapped the airspeed indicator around to 100 mph indicated and settled into a shallow climb. What the heck, I thought, that's no way for an ugly duckling to behave!

The Baby Great Lakes about which this article is written

While climbing out, I began honking back on the stick, trying to get 75 mph for a climb speed. Higher and higher the nose went until the needle settled on the right number and I started timing the climb. In less than a minute, I was dodging through big holes in the clouds and at the end of the minute, had gained a solid 1,700 feet. Okay, that may not be the 2,000 fpm Swack claimed for the aeroplane (I may have been climbing a little fast) but, for only 90 hp, 1,700 fpm is nearly incredible performance. No, strike the "nearly," it IS incredible performance.

As I levelled off and the speed built up, I found myself unconsciously leaning forward to avoid the downwash off the top wing. Finally, when it was trueing about 105 knots at 2,300 rpm, the wind past the windshield got so bad I thought it was going to suck my brains out through the helmet. The turbulence around the windshield made me intensely uncomfortable and I'm certain I looked like an E.A.A. version of Quasimoto from having done aerobatics while hunched forward toward the windscreen. It was the most uncomfortable ride I've had since I was forced to ride 300 miles in the back seat of a Nash Metropolitan. If I was going to really badmouth the aeroplane, the turbulence in the cockpit is where I'd start.

The real surprise of the flight was of the pleasant variety . . . a Baby Lakes does very creditable aerobatics! All of the normal inside stuff, such as rolls and loops, were as easy and smooth, if not as good looking, as (dare I say it?) my Pitts. The controls are fairly well harmonized, with maybe a bit too much rudder, and have exactly the kind of in-between pressures this kind of aeroplane should have. If they were too light, the average pilot this design is aimed at would have trouble acclimating. If the controls were too heavy, the aeroplane would be a toad to fly.

Snap rolls were simple yank-and-stomp goodies that took zero technique to master. It didn't seem to matter how you did them, so long as you kept the entry speed down for reasonable g forces. It was especially adept at snaps on the top of loops and could fly away from immelmans in which I used a half snap for recovery.

The spins were very normal, maybe a little fast and nose down, and recovery was immediate. It whips into a spin very crisply from almost any speed because the stall has a sharp enough edge to it and the rudder is so big that it doesn't need to be snapped into the spin. Even though the stall does have an edge to it with very little warning buffet, it recovers the second back pressure is released. I don't have any idea how it flies inverted because every time I touched zero g, such as in point rolls, gas wanted to come streaming out of the Cub-type wire-and-cork fuel gauge in the gas cap. Somehow, I felt that being soaked in 80 octane would take some of the fun out of flying upside down.

I doodled around for about a half hour, spending more time going up and down than back and forth and then pointed the nose back towards the airport and home. I've always noticed something when I come into the pattern in an aeroplane as unorthodox as the Baby Lakes: If there is anything unusual about the seating or visibility, it always seems most noticeable on downwind. When flying the Baby Lakes, for instance, I never really felt like I was in a tiny aeroplane until I was on downwind looking at the runway. But, with the runway beside me, I was suddenly conscious of sticking out of the aeroplane like a tall prairie dog in a short hole. I felt absolutely naked. Maybe it has something to do with being that close to the ground in such a small aeroplane. However, in any aeroplane, flying the pattern is the period during which your senses are the sharpest. I tend to fly fairly tight patterns of exactly the same size in almost all aeroplanes except those in the high-speed category, so the runway is always the same distance away when I'm on downwind. At my normal downwind distance in a Cherokee, for instance, the runway would hit the wing just outboard of the gas cap. In the Baby Lakes, the runway didn't intersect the wing at all!

The open- air visibility factor of an aeroplane is also exaggerated when flying the pattern because there is so much more to see. In making turns onto base and final in the Baby Lakes, I could see everything there was to see over the inboard top wing, which up to that point had sort of bugged me because it was only about six inches above my line of sight when level.

I flew the tight base leg which biplanes seem to like best so I wouldn't have to drag it in on power and bend it around to line up on the centreline. I held a steady 70 mph, with just a little power until I began to flare, then I squeezed the throttle closed as I felt it settling through ground effect. Since it sits so close to the ground, it has more float than you'd expect, which can work for and against you. I was feeling for the ground, trying to get my butt back down to the one-foot altitude I knew it needed, but ground effect was delaying my descent much more than I had anticipated. The net effect was that I burned off speed faster than I should have and unceremoniously plopped on from a foot or so up. The aeroplane didn't seem to mind, though, and went ahead with its business of making me do a tap dance routine on the rudder bar.

Rollout was not totally straight ahead, possibly because of a slight crosswind working on the Baby's gigantic vertical tail surfaces. Also, it's so short that any panicked rudder motions, of which I had plenty, makes you wiggle down the centreline. It doesn't swerve or careen around in big rubber burning arcs as do bigger aeroplanes that are making you work, but sort of wiggles and squiggles back and forth a few inches or so either direction.

I must admit that I was completely taken back by the amount of performance the Baby Lakes gets out of 90 hp, most of which comes from keeping the aeroplane light. The aeroplane is designed to give similar performance on all of the 65-90 hp engines, which are also the cheapest and most economical around.

The Baby Great Lakes cockpit – room is at a premium

However, in terms of pilot comfort, a few control areas and pure aesthetics, I think the aeroplane has a way to go. For one thing, I think it should be redesigned to incorporate some sort of canopy, but this would have to be done very carefully. It's extremely easy to upset the delicate balance of an aeroplane this small. Not only would the weight have to be kept to a minimum, but the additional side area would have to be taken into account and the vertical tail surfaces re-sized accordingly. I personally would like to see an exaggerated Formula One canopy and turtle deck on the aeroplane. Something like a Cassutt's flat-wrap windshield or even a blown bubble would work nicely. It would do wonders for both the comfort of the pilot and the looks of the aeroplane.

In terms of flight characteristics, I think one of the possible problem areas for new pilots would be the way in which the aeroplane jumps up on ground effect so quickly on take-off and will fly when its barely ready to. If it's allowed to get off the ground and then is pulled up out of ground effect too soon, it could easily stall or drop a wing. This is something you would get used to after a couple of take-offs, but extending the gear a little bit, just enough to bring the ground angle closer to stall and get the aeroplane up off the ground as well, would solve most of the ground effect problems. It would also make the aeroplane look a hell of a lot better.

The airframe itself would make an ideal starting point for somebody who feels like doing some minor modifications. It's well designed and proven and the drawings are easily understood. It uses almost no complicated parts or weldments and basically needs only one size of 4130 tubing and not much of that. The cost and availability of small engines means that you don't have to mortgage your kids for a powerplant and none of the subassemblies are so big that one man can't easily move them around. It's the ideal aeroplane to build in a bedroom or attic. With just a few non-structural mods, wheel pants and a spiffy paint job, it would be a great way for the average sized pilot to go aviating.

Yeh, she's not much for looks, but she sure can perform . . . and that's what counts.

SPECIFICATIONS:
Configuration: Biplane Type of construction:
Tube fuselage Wood wings Fabric covering
Engine(s)-(no., make, model, rating): Continental A-80 50-85 hp recommended 80 hp
Wingspan (ft.-in.): 16 ft. 8 in.
Cord (in.): 36 in.
Length (ft. in.): 13 ft. 9 in.
Height (ft.-in.): 4 ft. 6 in.
Wing area (sq. ft.): 86
Number of seats: 1
Gross weight (Ibs.): 850
Useful load (Ibs.): 375
Empty weight (Ibs.): 475
Fuel capacity (gal.): 12
PERFORMANCE:
Max. speed (mph) 135 Cruising speed (mph) 118 Initial climb (S.L.) (fpm) 2000 Stall speed (mph) 50
Take off run (ft.) 300 Landing run (ft.) (w/out brakes) 400
Service ceiling (ft.) 17000+
Max. range (mi.) 250

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Meet the Watfly Atlas

Want a personal-air mobility vehicle years before others will be available? A single-seat, Star-Wars-like, four-fan aircraft that can take off from the backyard, soar around the area, and then land at the golf course or marina?

WatFly's Atlas, a one-person electric vertical takeoff and landing (eVTOL) aircraft, could be the first recreational version to market. The company expects to launch the Atlas next year with an initial price tag of $150,000.

Powered by an electric engine and four turbo-fans, the Atlas will reach speeds of 125 mph. Under FAA guidelines, it will be considered a light experimental aircraft, so no pilot's license is necessary. Watfly

Watfly co-founder Gonzalo Espinoza Graham said the idea behind the Atlas was born when he saw people building oversized backyard quadcopters about five years ago. "We very quickly realized that autonomous, vertical take-off and landing, electric aircraft would be the next available step, so we got to work," he told *Robb Report*.

See https://robbreport.com/motors/aviation/personal-aircraft-new-form-of-mobility-2915678/

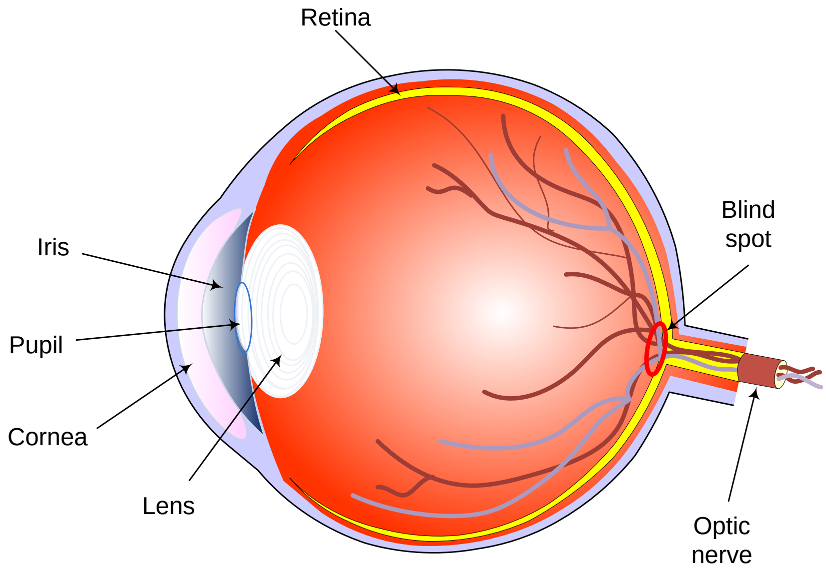
The Eyes have IT. Or do They?

By Rob Knight

When operating an aircraft, it's mostly a case of see and be seen. Whilst operating IFR, a pilot can be advised as to the location of other aircraft, but unless under direct ATC clearance, it's still a case of "see it, recognise it, and dodge it!

We operate under VFR which stands for VISUAL Flight rules and, although the VISUAL bit generally refers to the visual horizon, we must use our visual acumen, in the main, to avoid other aircraft. Thus, we are dependent on our MK-1 eyeballs to see and avoid others

The Basic Parts of the Eye.



The Basic Eye

NO PILOT IS EXEMPT FROM A MID-AIR COLLISION

Limitations of the Eye.

Eyes provide 80% of a human's information intake. In flight, pilots depend on their eyes to gather the basic data necessary for flying such as direction, airspeed, altitude, and air traffic in the vicinity.

Physical Eye Limitations:

Eyes, themselves, have physical limitations. These limitations include:

- Poor performance through tiredness or strain,
- Poor function in dusty conditions,
- High sensitivity to injury and to failing badly, possibly completely, if foreign bodies or lashes enter them.

Light Limitations:

Eyes use reflected light to function so anything that influences reflected light will affect eyes. Things that will influence reflected light include:

- Blind Spots (be aware of them),
- Atmospheric conditions (smoke/haze, precipitation, cloud),
- Glare (use sunglasses with clean lenses),
- Windscreen cleanliness (keep windscreen clean),
- Lighting (keep light inside the cockpit low),
- Windshield distortion and damage.

The sun is an issue worth special consideration. Glare from the sun can severely limit vision, especially when looking towards it. When landing, the sun can appear with surprising suddenness, and if it is ahead, it can result in a substantial loss of vision at a time when it is particularly important to be able to see clearly.

It is also noteworthy that haze makes objects indistinct by reducing contrast and this lower contrast makes objects seem further away than they really are. In other words, hazy objects may be closer than they appear.

Blind Spots:

Eyes have Blind Spots, areas where they provide no vision.

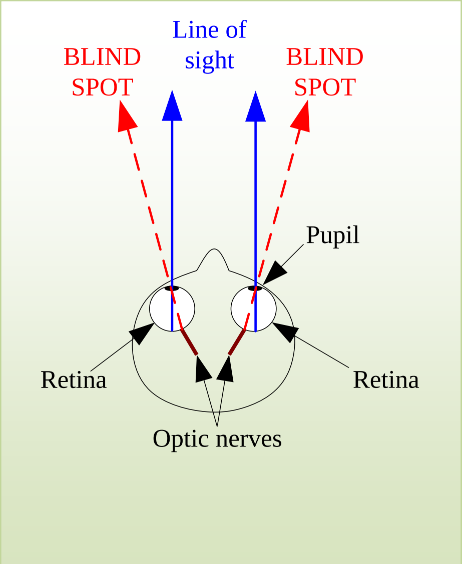
A small portion of the visual field of each eye around the optic nerve head within the retina has no light receptors and therefore, there is no image detection in this area. The blind spot of the right eye is to the right of the centre of vision and vice versa in the left eye. With both eyes open, the blind spots are not noticed because the visual fields of the two eyes overlap. Indeed, even with one eye closed, the blind spot can be difficult to detect because the brain ignores the missing portion of the image.

To see a 'blind spot (if that is possible) hold this book out at arm's length with the CROSS in front of your RIGHT eye. Block your left eye and, whilst focussing carefully on the cross but noticing the dot with the side of your eye, draw the book towards you and the dot will disappear. It really is still there on the paper but you can't see it because it is in your right eye blind spot.

Try the exercise with your left eye, too. Just put the spot in front of the centre of vision of your left eye, adjust the eye-book distance, and see the cross disappear in the side of your left eye. It works just as well on the screen as the printed page so go ahead and try it.

Blind Spot Test

If a pilot has vision impaired in one eye as can be caused by short term local reflections and/or glare, these blind spots are very relevant and can be hazardous indeed.



Blind Spots

Time to Focus Limitation:

It takes time for eyes to focus, up to two (2) seconds in some circumstances for healthy eyes to adjust to a new focal length. Considering that it takes around 10 seconds to avoid a mid-air collision, two seconds is a long time – about 20% of what time might be available.

Another focusing problem arises when there is nothing specific to focus on. This is common where there is no visible or distinct horizon. In such cases the pilot experiences empty-field myopia (staring but seeing nothing).

Field of Vision:

Another eye problem is that they have only a narrow field of vision. This is the size of the area around a focused point in which the eye can discern other objects - there is no wide-angle lens for eyes.

To catch the eye, an object is best to have motion or contrast and for aircraft in flight both these tend to be lacking. At a distance, an aircraft on a collision course appears to be motionless and it is small (initially anyway) and often has little contrast with the background. Obviously, as other aircraft are hard to see, pilots need to ensure their lookout is maximised in all respects.

Aviation Environment:

Some atmospheric properties hinder good lookout. In bright conditions, glare makes it hard to see anything clearly outside and also makes scanning uncomfortable. Haze, fog/smog, precipitation and dust, all reduce the ability of eyes to see what needs to be seen.

Scanning.

Because sight is affected by so many factors, the best way to SEE and avoid collisions is for a pilot to learn how to use his/her eyes efficiently. This means understanding limitations of eyes and using appropriate scanning patterns.

Visual Scanning Techniques:

Effective scanning is vital in avoiding collisions throughout an entire flight. Even when taxiing, pilots have been known to taxi into other aircraft, drains, fences and hangars because they had their heads in the cockpit and were not looking out and scanning.

How to Scan:

There is no 'one-size-fits-all' in scanning techniques. The most important thing is for all pilots to develop a scan method that's comfortable and works for them. Good scanning requires a pilot to know how and where to concentrate his/her eyes during a scan. For example, it is obviously critical, especially in the traffic pattern, to always look out before a turn, and ensure the path is clear. A good scan before a turn whilst in the circuit should also check for traffic making a non-standard entry into the circuit as well. During the climb, if the nose obscures the flightpath ahead, good pilots make gentle clearing turns to ensure that no traffic lies hidden under the cowling. Neither do good pilots forget to scan around their approach path when on finals, as well as watching their aiming point of the runway.

In normal flight, a good scan pattern encompasses an area at least 60O left and right of your flight path and 10O above and below it. This will provide a better chance of seeing a potential collision threat and of having time to avoid it. In terms of time spent scanning, remember that the chance of spotting collision threats increases with the time spent looking outside. Effective scanning is achieved through short regular and spaced eye movements that bring successive areas of the sky into the central visual field.

To increase scan effectiveness, a pilot should shift their gaze and refocus at regular intervals.

Remember that:

- Eyes need several seconds to refocus when switching views between items in the cockpit and distant objects.
- Good scanning needs constant attention sharing with other piloting tasks. Note, though, that good scanning is easily degraded by boredom, illness, fatigue, preoccupation, and/or anxiety.

The average time needed for an outside scan is accepted as being 18-20 seconds and for an instrument panel scan, 3 seconds.

Collision Avoidance Checklist.

Collision avoidance involves more than just a proper scanning technique. A pilot might be the most conscientious scanner known to man but still be an integral part of a mid-air collision if other factors are neglected in the see-and-avoid technique.

A good Collision Avoidance Checklist will include the following items:

1. Plan ahead - remove cockpit clutter, store charts and navigation logs etc.
2. Carry appropriate sun glasses – keep lenses clean.
3. Clean windows before flight.
4. Adhere to procedures - Follow correct regulations and procedures; such as correct flight levels and proper pattern practices so you can more easily be seen and identified by other air traffic.
5. Avoid crowded airspace.
6. Compensate for blind spots - Know specifically where your aircraft blind spots are.
7. Equip to be seen - Aircraft lights can aid in avoiding collision. In high traffic density, strobe lights are often the first indication another pilot has received your presence.
8. Talk and listen - Use your eyes as well as your ears in flight. Make use of the information you gather from the radio. When a pilot reports his/her position on the CTAF they are also reporting it to you.
9. Use all available eyes - If flying with a passenger, encourage them to advise you of any aircraft they see.
10. Maintain a good scan - This is the most important part of the checklist.

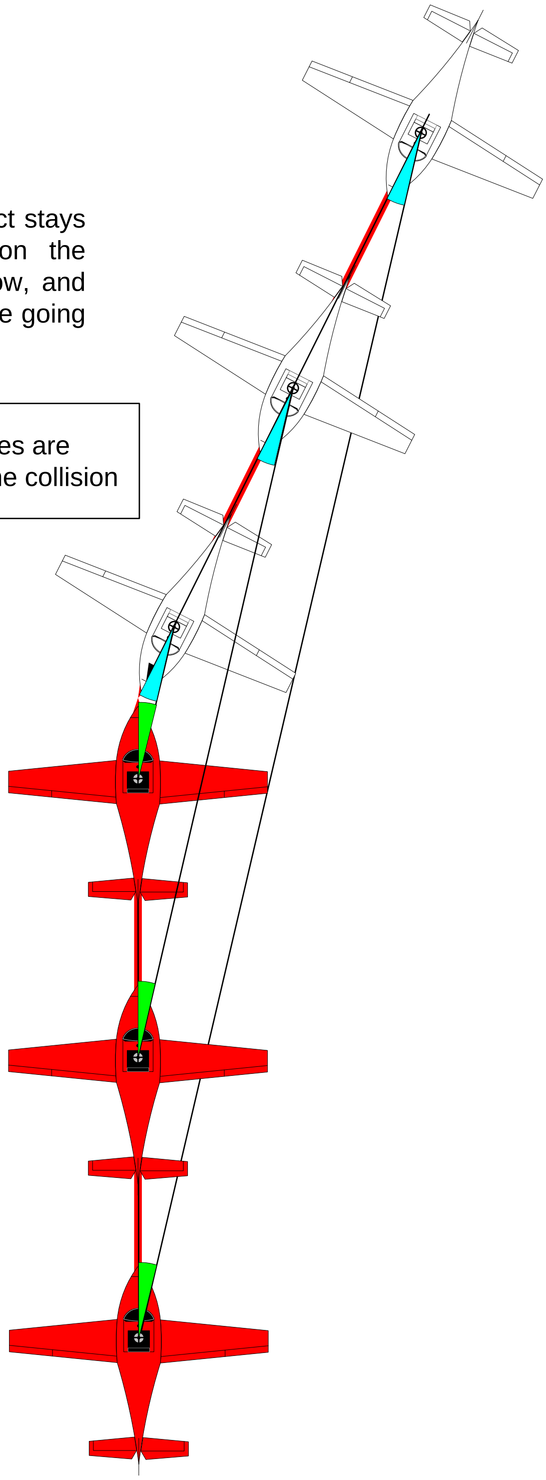
How to tell if an aircraft is on a collision course.

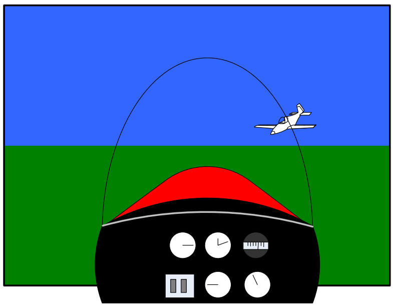
An object that will collide with an aircraft will remain in the same position in its windscreen or window and will simply grow larger. When confronted with such a situation, a pilot must change his aircraft's flight path so the other aircraft moves across the his/her vision.

The steps to take for collision avoidance are:

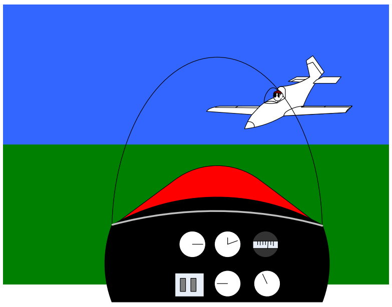
1. He/she must see the approaching object
2. He/she must recognise that it is not moving across the screen or window.
3. He/she must change his/her aircraft's flight path

If an approaching object stays in the same place on the windscreen or a window, and just gets bigger, you are going to collide with it.

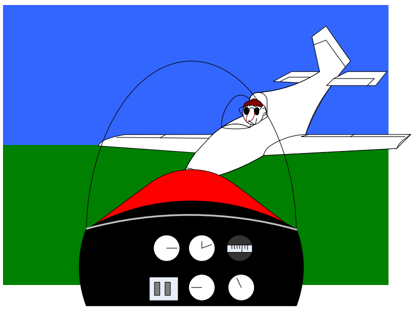




Someone should do something



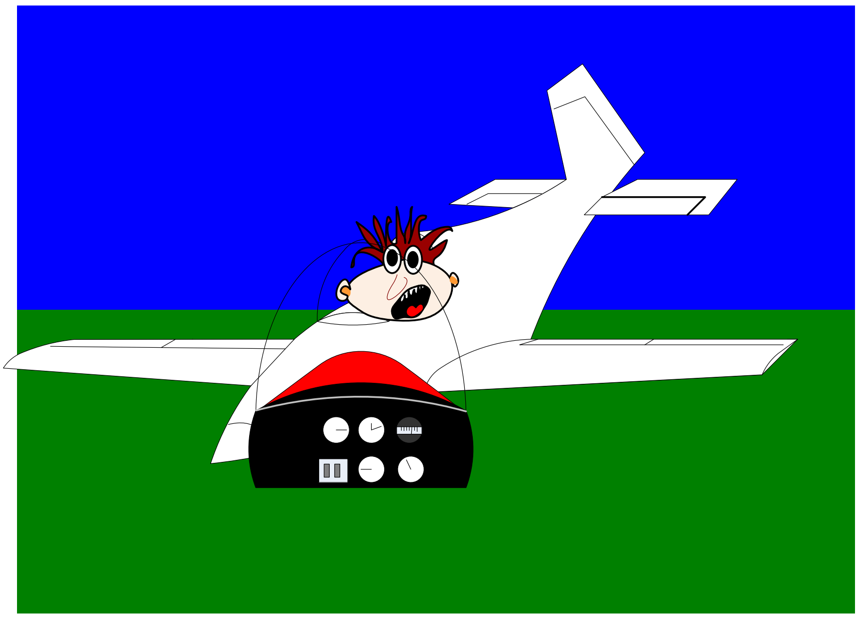
Someone should do something



Do something

TOO

LATE

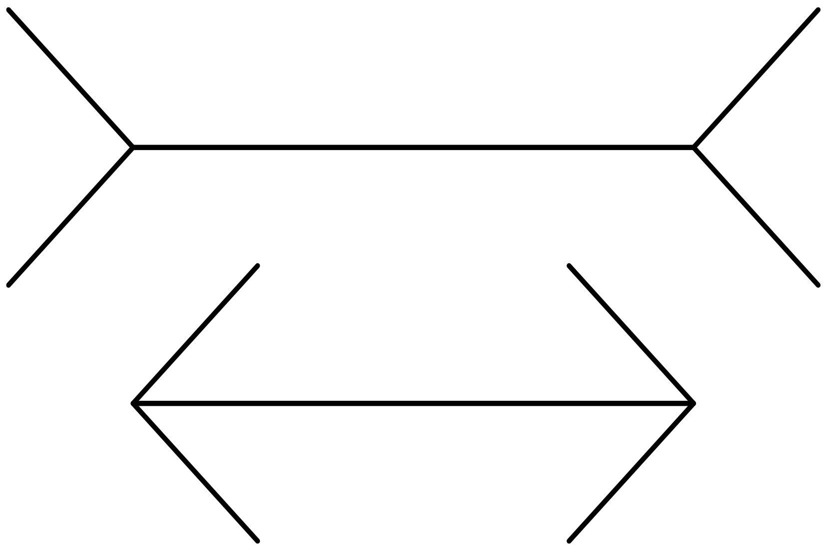


Visual illusions:

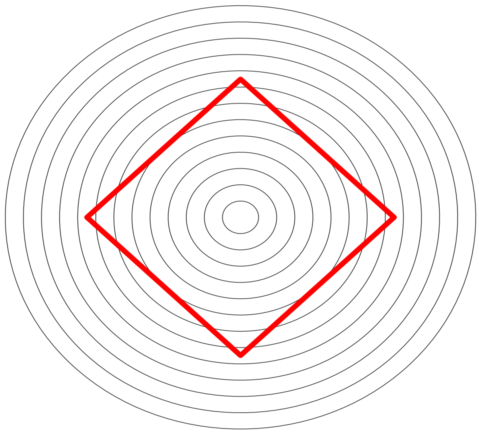
Everyone is familiar with visual illusions, with things that aren't as they appear. As young children, people learn that railway tracks don't come to a point at the horizon even though their eyes claim that they do.

Linear perspective illusions:

The two illusions below are typical of this type of illusion and demonstrate the ways in which the brain modifies what the eyes actually see and comes up with the wrong answer.



The two horizontal lines above are actually the same length.



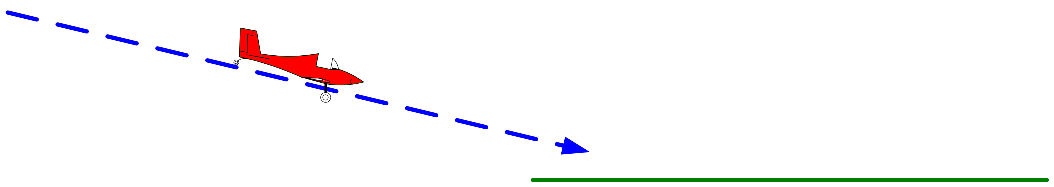
The sides of the red diamond are actually straight lines.

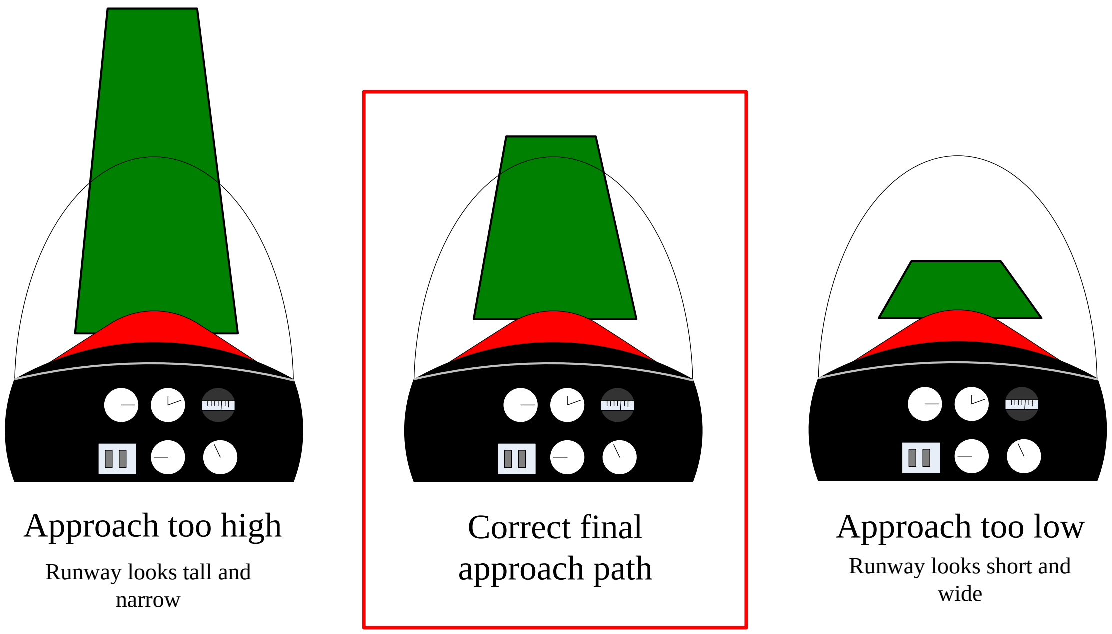
Linear Perspective Illusions in Flying:

Linear Perspective Illusions can occur on final approach and may encourage a pilot to change his/her approach slope path when it is already, in fact, quite correct. The conflict lies between what a pilot sees when on approach, and what runways have looked like from this position in the past.

Different runways have different ratios of widths to lengths and, while most are level others have upslope or downslope. Pilots learn to recognize the appearance of a normal final approach by developing and recalling a mental image of the expected relationship between the length and the width of the runway they trained on, or runways they have experienced in the past. When faced with new runway dimensions and/or new or unexpected runway slope, the appearance of a *correct* final approach may be quite different from what they recollect.

A *Normal* Approach into a Level Flat Runway.

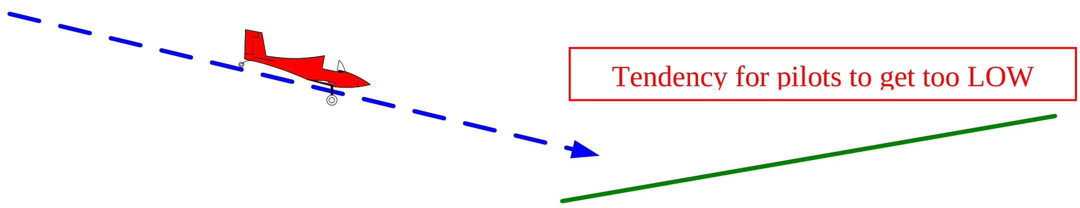


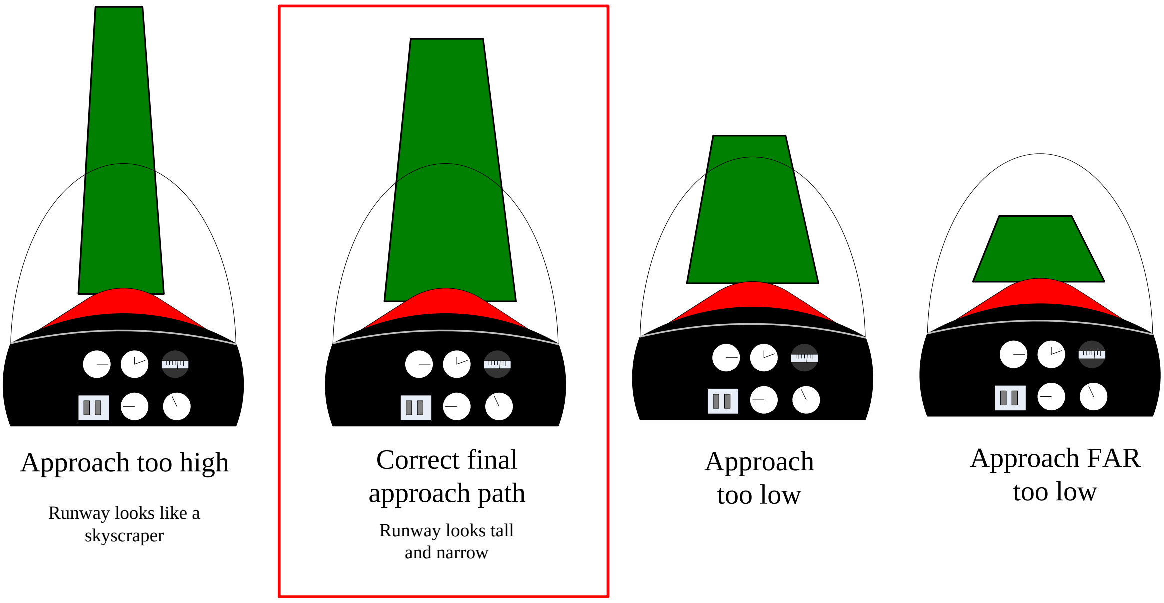


The accustomed appearance on final approach of a level, flat runway according to the pilot's memory.

A *Normal* Approach into a Runway that Slopes Up-Hill.

To a pilot mentally comparing it to past level runways it looks TOO HIGH





The appearance, on final approach, of a runway that slopes Up-hill.

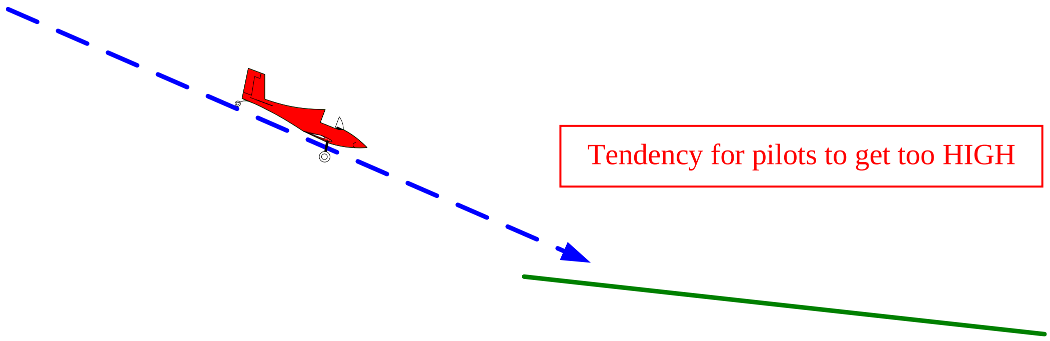
Up-hill sloping runway:

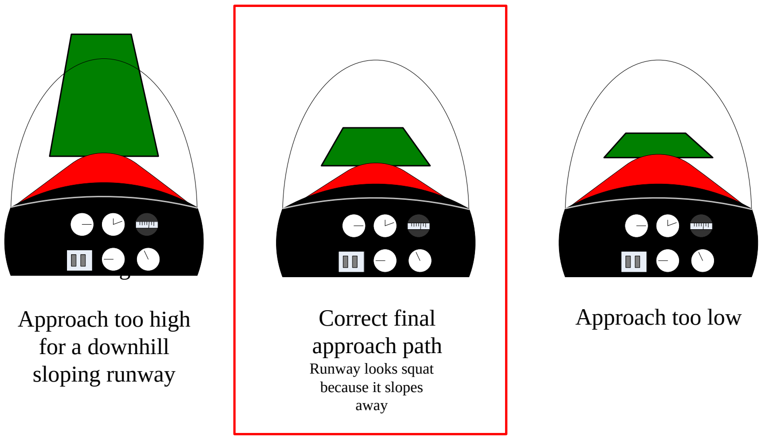
Note that the same illusion will occur on final approach for an unusually narrow runway.

The final approach to an up-hill sloping runway or to an unusually narrow or long one, may produce the visual illusion of being too high on final approach. The pilot must ignore the illusion and not adjust the approach slope. The common pilot-error is to reduce power to steepen the approach and this is likely to result in a undershoot and a ground impact short of the runway. This tends to ruin one's day somewhat!

A *Normal* Approach into a Runway that Slopes Down-Hill:

To a pilot mentally comparing it to past level runways it looks TOO LOW.





The appearance, on final approach, of a runway that slopes DOWN-hill.

Down-hill sloping:

Note that the same illusion will occur on finals for an unusually wide runway.

A final approach to a down-sloping runway may produce the visual illusion of being too low on final approach. The appearance of the landing area in these circumstances is likely to encourage an inexperienced pilot to add power to make the approach slope appear normal but this will result in the aircraft being too high. The only safe option is then to overshoot.

To continue is likely to lead to a late flare, a touchdown too far into the field with reduced braking ability because of the down-hill slope, and an over-run through the far fence at best.

These last endeavours do not endear a pilot to their insurer.

Other visual illusions:

Another illusion, called an autokinetic illusion, gives the pilot a very powerful impression that a lighted object is moving across in front of the aircraft's path when, in fact, it is quite stationary. This illusion is caused by staring at a fixed single point of light (ground light or a star) in a totally dark and featureless background. This illusion causes a completely false impression that the lighted object is on a collision course with the aircraft. You can duplicate this by staring at a lone star on a dark night and you will get the feeling it is moving across the sky.

False visual reference illusion:

A false visual reference illusion may cause a pilot to attempt to orient the aircraft in relation to a false horizon. This illusion is caused by flying over a sloping cloudbank.

Vection illusion:

This often occurs in lines of traffic. With few other visual clues, the brain 'sees' motion out of the side of the eye and reads it as applying to itself. This illusion appears as the car in the lane beside rolls slowly forward. The brain becomes confused and instantly believes that the vehicle it is in is moving backwards, particularly if the wheels of the other cars are not visible. A similar illusion can happen while taxiing an aircraft.

Conclusions:

To understand how optical illusions work, you need an understanding of how your eyes and brain work together in processing visual information. Technically, the human eye can only generate the things it sees in 2D. People are able to see the world in 3D because the brain processes the visual information it receives into 3D. Your eyes and brain usually do a good job of rendering visual information this way, but they are not infallible.

This is where optical illusions come in. Optical illusions, as illustrated here, are illusions caused by a mismatch between visual perception and reality and the best defense available is to be very aware of them and always look for corroborating details to support what you believe you are seeing.

Being aware that what you believe you are seeing may not be what the reality is should encourage you to keep an open mind and always be prepared to go around if you suspect you have an issue. Mere suspicion is quite enough to terminate an approach and to get into go-around mode.

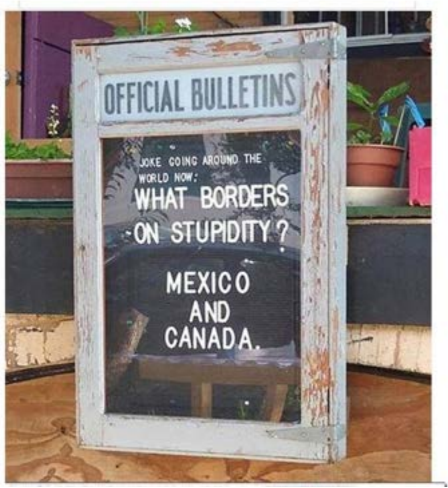
------ ooOOoo ------

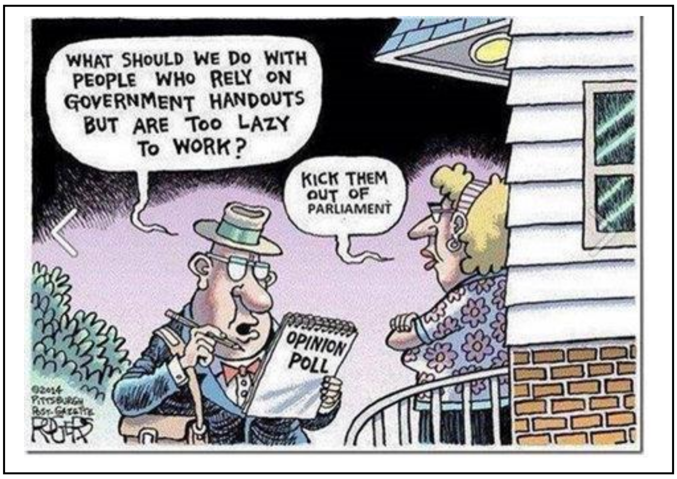
FLY-INS Looming

14 February 2021	Murgon (Angelfield) (ALA)	Burnett Flyers Breakfast Fly-in
11 April 2021	Murgon (Angelfield) (ALA)	Burnett Flyers Breakfast Fly-in
23 April 2021	Shute Harbour (YSHR)	2021 Air BP Whitsunday Fly In

Jokes

My Father laughed when I said that I wanted to be a comedian. Well, he's not laughing now!





Recently I needed a pair of AN6-14A bolts with nuts. I called Swifts and spoke to Kyleigh and Murray who quickly supplied just the two that I needed, and for just over $2.00 each. Previously, using other suppliers, I had been required to purchase nuts and bolts and other fixings in packets of 10 or 15 each. (Editor)

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

1. In regard to most aeroplanes in a spin:
   A. Its nose attitude is high, its angle of attack on at least one wing is high, and its airspeed is high.
   B. Its nose attitude is low, its angle of attack on at least one wing is low, and its airspeed is low.
   C. Its nose attitude is low, its angle of attack on at least one wing is high, and its airspeed is low.
   D. Its nose attitude is low, its angle of attack on at least one wing is low, and its airspeed is high.

2. Magnetic variation is:
   A. The angular different between true north and north as indicated by the compass in a specific location on the earth's surface.
   B. The angular different between true north and magnetic north as indicated by the earth's magnetic field in a specific location on the earth's surface.
   C. The difference between what a compass actually indicates, and what it should indicate.
   D. The difference between what a compass actually indicates, and what it should indicate, caused by residual electrical currents in the aircraft.

3. A pilot, scud running in Class G airspace, crosses a range of hills and descends under cloud in heavy rain. He estimates that he is flying at 800 feet AGL and has 3260 feet indicating on his altimeter. What VFR visibility minimum is he/she required to maintain VFR flight in that situation?
   A. 500 Metres.
   B. 1000 Metres
   C. 1500 Metres.
   D. 5000 Metres.

4. An aeroplane in a level turn provides more lift than it has mass. Why does it not climb?
   A. Because, in a turn, the stall speed increases.
   B. Because the lift produced is inclined to the vertical and is also providing the horizontal component of lift which turns the aeroplane.
   C. Because, in a turn, the airspeed decays and so lift reduces.
   D. The extra lift is used to provide the acceleration the aeroplane experiences in the turn.

5. How long will it take to complete a 360° rate 1 turn?
   A. 30 seconds.
   B. 60 seconds.
   C. 120 seconds.
   D. 240 seconds.

See answers and explanations overleaf

Answers: 1, C, 2, B, 3, D, 4, B, 5, C.

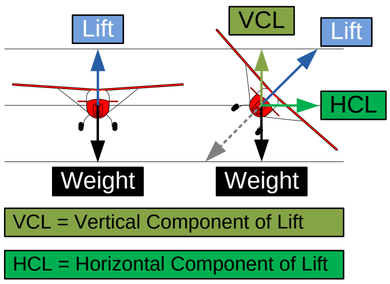
If you have any problems with these questions, See Notes below or call me (in the evening) and let's discuss them. Rob Knight: 0400 89 3632.

1. C is correct. A spin is a stalled condition where one wing is experiencing a deeper stall than the other. This means that one wing has less lift and more drag that the other and this imbalance of forces results in a vertical path of the aeroplane, with a low nose attitude, but high angle of attack condition (on the most stalled wing), and low airspeed.

2. B is correct. Magnetic variation is the angle on the horizontal plane between magnetic north and true north. This angle varies depending on position on the Earth's surface and changes over time.
   https://en.wikipedia.org/wiki/Magnetic_declination

3. D is correct. The VFRG states that the required visibility minimum for operations below 10,000 feet AMSL is 5000 metres. See VFRG, check out:
   VMC - non-controlled airspace – Class G.

4. B is correct.
   As indicated in the sketches on the right, when banked, the lift produced by an aeroplane's wings is inclined to the vertical and can be considered as two vector force components. The vertical component supports the weight while the horizontal component pulls the aeroplane around the turn. Thus, the excess lift is used as the turning force.



5. C is correct.
   A rate one turn provides a yaw rate of 3°/second. Thus, for 360°, it will take 120 seconds (360/3=120). Obviously, the angle of bank required to achieve this yaw rate will be determined by the TAS and the angle of bank can be calculated (somewhat loosely) by the following formula.
   Angle of Bank for Rate 1 turn = $\frac{(TAS)}{10} + 7$
   i.e., for TAS of 150 knots........ 150/10=15. 15 plus 7 = 22. Therefore, the approximate angle of bank required for a rate one turn at 150 knots = 22°.

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

What the Hell is THAT – An Avrocar

The Avro VZ9 was commonly referred to as being a “UFO” but it was more commonly known as the “Avrocar”.

Unlike most aircraft designed for military applications, the Avrocar wasn’t designed to attack enemy positions, nor was it designed to drop bombs. In fact, the Avrocar wouldn’t fly that high off the ground in most cases.

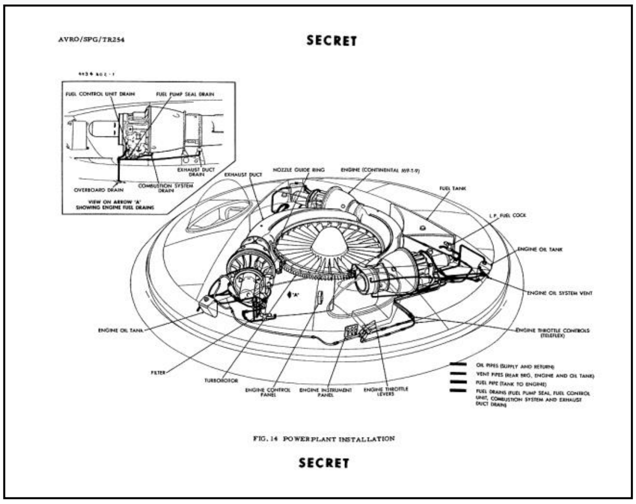
At the beginning of the Cold War, the US Army wanted a faster land vehicle than the jeeps they’d used during WWII. When they approached car manufacturers, they told them it would take years to develop a new jeep.

As such, the Army turned to the aviation industry. The result was Avro’s Canada division creating the Avrocar; however, the Army weren’t interested in it and the project was awarded elsewhere.

However, one prototype was made and is perhaps the strangest aircraft on display on display at the Royal Aviation Museum of Western Canada.

The Avrocar was a disk-shaped aircraft with the same basic shape as a frisbee, the upper surface of the disk being fairly curved, and the bottom much less so. The disk was 18 feet (5.5 m) in diameter and 3.5 feet (1.1 m) thick. The main structural truss was a large equilateral triangle, to which the various components were attached. The 124-blade "turborotor" sat in the centre of the triangle, with most of the rotor's thrust directed straight down through an opening in the lower surface, but some was bled off to power the control system running along the outer rim of the disk.[21]

Avrocar schematic from the VZ-9 manual



Power for the rotor was provided by three Continental J69-T-9 jet engines attached to the truss. Each engine had its own fuel and oil tanks and other support systems, although it was expected these would be interconnected in future models. The majority of the airframe was made of aluminium with an empty weight of 3,000 pounds (1,400 kg). The undercarriage of the Avrocar was rudimentary with three small castoring wheels mounted on "stub" shafts; a set of skids was substituted later in testing although they were not normally fitted.

Pilot control was entirely through a single side-mounted control stick. Pitch and roll were controlled through conventional fore-aft and side-to-side motions, while yaw could be controlled by twisting the stick. No mechanical linkages were used, the stick instead controlled the flow of high-pressure air around the craft, which either directly attached to various control surfaces, or indirectly through local cable linkages to replace controls that were intended to be cable-actuated (like throttle controls on the engines).

The attitude/thrust control system consisted of a large ring situated outside of the main disk, shaped roughly like a rounded triangle with the flat surface on the "inside." Viewing the craft from the side, the control flap is almost invisible, appearing in its neutral position to blend into the profile. The pilot's controls moved the ring in relation to the rest of the craft, affecting the airflow moving outward from the centre of the craft. Vertical lift could be increased by moving the entire ring down, which would produce more airflow over its upper surface, which would then bend down over this surface toward the ground. Tilting the ring resulted in asymmetric thrust for directional control.

It was discovered that the craft was inherently unstable in forward flight, as the aerodynamic centre of pressure was well forward of the centre of gravity. The Avrocar thus included a mechanical stability augmentation system that was independent of the pilot's controls. The turborotor had a fairly large angular momentum and was intended to act as a powerful gyroscope, providing a "normal" direction of flight. Control cables attached to the base of the rotor would be pulled when the craft moved in relation to the rotor, actuating the control surfaces to counteract the motion.

The vehicle was manned by a crew of two, positioned in separate cockpits squeezed into empty areas in the airframe. In practice, only one pilot was usually on board during testing; a number of flights were made with an observer in the second cockpit. Until control problems were completely solved, the Avro test pilots acquired a "touch" for the extremely sensitive control inputs and Avro Aircraft Chief Development Test Pilot Potocki was eventually able to demonstrate a "hands-off" flight. Nonetheless, Avro test pilot Peter Cope, USAF project pilot Walter J. Hodgson and NASA's Ames Research Center Chief Test Pilot Fred J. Drinkwater III, who all flew the Avrocar, considered it still a tricky vehicle to fly. Drinkwater likened a flight in it to "balancing on a beach ball. END

Aircraft Parts and Tools

Item	Condition	Price
VDO Volt Readout instrument	Brand New	**$70.00**
Toolpro 3/8 drive Torque Wrench	As new	**$50.00**
Altimeter. Simple – single hand	As new	**$50.00**
Oil Pressure indicator, (gauge and sender)	New – still in box	**$80.00**
Flight bag. 3 section (2 x zips and 1 x locking flap)	Used but good	**$100.00**

Books

Birch & Branson Vol. ! Basic Flight Training	Pre-owned but excellent condition	**$65.00**
As the Pro Flies (by John Hoyt)	Used but "mint"	**$60.00**
Fate is the Hunter (by Ernest K Gan)	Pre-owned but very good	**$45.00**

Tyres

1 only – 13cm X 5.00 – 6 tyre	Unused	**$20.00**
1 only – 13cm 4.00 – 6 tyre	Unused	**$20.00**

Headsets

AvCom headset. Functions perfectly	Excellent	**$150.00**

Contact Rob Knight via either kni.rob@bigpond.com, or **0400 89 3632**.

Altimeter for Sale

This simple altimeter I purchased at Oshkosh is now surplus to my requirements and I am seeking a new home for it.

Its face is absolutely clear, it has never been used, and the subscale is provided in “HG.

It is in as-new condition and certificated. For a copy of the certificate, and/or further details, contact **Colin Thorpe**.

Tel: LL (07) 3200 1442, or

Mob: 0419 758 125

$120

Aircraft for Sale

¾ scale replica Spitfire

$55,000 neg

This aircraft is airworthy, flown regularly, and always hangared. Registered 19-1993, it is powered by a 6 cylinder Jabiru engine (number 33a-23) with 300 hours TTIS. The airframe has logged a mere 320 hours TTIS. This delightful aircraft recently been fitted with new mounting rubber, a new alternator, and regulator, an new fuel pump and jack stands

.It handles superbly and is available for immediate collection or delivery by arrangement.

Kept at Kentville in the Lockyer Valley, interested parties should contact either:

Kev Walters on Tel. **0488540011** or

William Watson on Tel., **0447 186 336**

Aircraft For Sale

$ Make Me an Offer$

Cobham Cobra

An opportunity to buy a unique aircraft.

I now have a Foxbat, and can't to afford to keep 2 aircraft. The Cobra was advertised for about a year in Sport Pilot, with many enquiries, but no resulting sale. Rather than continuing to spend on hangarage and advertising I decided to de-register it, remove the wings, and trailer it home to my shed. I don't intend to ever fly it again so, make me an offer. It provides very cheap and enjoyable flying.

It is a one-off design, a single seater with a fully enclosed cockpit. It has a 24 foot wing-span, and is powered by a VW engine that provides sporty performance and superb handling. The airframe has logged 653 hours and the engine 553 since installation. It is easy to start, but requires hand-propping.

To see it in action go to
https://www.youtube.com/watch?v=V5Qx4csNw_A&list=PLpBv2A6hk66Tg9DiCsjEtt4o4o8ygcTju&index=1&t=22s

It cruises at around 80 knots at 11-12 litres/hr. The tanks hold 48 litres so it has a very reasonable range. For my approaches I use 50 knots on my initial approach down to 40 knots on short final. You will want a fair bit of tailwheel time.

For further details contact Tony Meggs on (02) 66891009 or tonymeggs@fastmail.fm

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

Slipstream Genesis for Sale **$14,000.00**

Kit built; it first flew in 2001. Two seats (side by side), it's powered by 80 hp 912UL Rotax, driving a Warp Drive 3 bladed prop. Cruise 70-75 knots. Empty weight 304kg, MTOW 544 kg, Payload 240 kg. Fuel tanks hold 78 litres. With fuel burn averaging 16 litres/hr, still air endurance (nil reserve) is theoretically 5 hours, or 350 nm. Aircraft always hangared. It has been set up for stock control/ mustering or photography, and is not fitted with doors. Registered until 13 October 2021, currently flying, and ready to fly away.

Total Hours Airframe: 144.6. Current, up-to-date, logbook.

Total Hours Engine: 1673.9. Annuals/100 hourly inspection done 01/09/20. Sprag clutch replaced January 2020, gearbox overhauled January 2020.Just undergone ignition system overhaul. One CDI Ignition unit replaced PLUS brand-new spare unit included in sale. Easy aircraft to maintain - everything is in the open. Comes with spare main undercarriage legs, spare main wheel, and nosewheel with other assorted spare parts included.

Fabric good, seats are good, interior is tidy. Fitted with an excellent XCOM radio/intercom, it sports a basic VFR panel and appropriate engine instruments and compass.

An article on this aircraft was published in Sport Pilot, June 2019 issue. See front cover and pilot report within.

Must sell: two aeroplanes are one too many. Quick sale – quite an aeroplane to fly away for $14,000. Contact **Rob Knight tel. 0400 89 3632**, **or email** kni.rob@bigpond.com for details and POH.