BRISBANE VALLEY FLYER

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BRISBANE VALLEY SPORT AVIATION CLUB INC

www.bvsac.com.au

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VH-XYG, an immaculate classic GC-1B Globe Swift, at Watts Bridge 2014

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FRONT COVER

Globe Swift. Taken at Watts Bridge in May 2014.

From the Club

Hello all,

The weather is starting to get a little cooler so good flying is coming up.

The next Watts for breakfast is scheduled for Sunday the 3rd April so please put it into your diary. This will be a fundraiser to support the flood damage that has occurred to the Murwillumbah and Northern Rivers Aero Clubs that have been hard hit, so please try to give some support. All proceeds are to be donated and there will also be a raffle on the day.

The committee has been hard at work trying to keep up with mowing and edging around the clubhouse and the hanger areas. (When it rains the grass grows).

The next club meeting will be on the 9th of April, so come along for some good fellowship.

Peter Ratcliffe

President BVSAC

Notes on Loooow – Level, and *Slopee* Operations

By Rob Knight

Note that the following notes are just that – notes to provide a clearer picture of aeroplane low level and sloping strip operations. All values and percentage changes depicted in this article are rough figures only to provide explanation of the concepts that I am describing. Because of the variations in pilot and in aeroplane performance, landing/take-off surface issues, as well as atmospheric considerations, no values are absolute or guaranteed in any way.

All pilots operating at low level MUST realise that there is no room whatsoever for sloppy aircraft handling or inattention. This is not a lesson on how it may be done; it's merely a treatise on some of the issues pilots training in these operations encounter.

As part of my instructing career, I was involved in training wannabe crop duster/topdressing pilots to operate onto and from sloping airstrips. Some slopes were gentle about 3% (1.5) degrees to about 40% (22 degrees). Like most other endeavours in life, difficulty in this aspect of flying generally diminishes in inverse proportion to the budding pilot's training and experience, the degree modified by the individual's attitude.

However, new low-level and strip pilots did have a number of common issues to overcome and these are just as common today as they were then. The most common ones included:

- A failure to keep straight with rudder (used aileron instead).
- Failures to trim the aeroplane accurately,
- Flying approaches too high and too fast,
- Losing the strip and not being able to find it again,
- Getting so low in a valley the aeroplane had insufficient climb angle ability to get back up to the strip in the distance/room available,
- Making inadvertent slipping or skidding turns because they interpreted drift seen on the ground incorrectly,
- Failing to recognise the increased turn radius required when turning downwind and more.

In such an unforgiving environment, any one of these issues is potentially catastrophic and all stem from a lack of application of basic principles and knowledge that experienced strip pilots consider fundamental.

The first of these principles is that airspeed and turn radius are interrelated. Turn radius for a given bank angle is proportional to the square of the airspeed. By decreasing the airspeed, a pilot reduces the area needed to turn.

Take a situation where, at 130 kts in a 30° bank, the turn radius is 2600 feet. With a radius of 2600ft, the diameter will then be 5200 feet which is the minimum lateral distance that pilot must have available to reverse his flight direction. In other words, , the aeroplane will need a valley almost a mile wide to execute this 180° turn. If the valley being flown in is only 3/4 of a mile wide – an early termination of the flight is inevitable. However, decreasing the airspeed to 70 kts will reduce the radius of the turn to a mere 755 feet, which means the pilot can turn through a 180° in about a 1/4 -mile diameter, or in less than half the width of the same ¾ mile wide valley.

Remember, these figures are theoretical examples only - there is neither provision in this simplistic depiction for air density issues or wind effects (up/down drafts, drift etc) nor pilot handling issues such as slip/skid control which can also have profound effects on the radius of turns. However, to confirm my figures, you can check using http://www.csgnetwork.com/aircraftturninfocalc.html.

A further benefit of lower airspeed in turns is that there is more time to see obstacles and hazards, and also to decide on and commence any necessary avoidance options. After all, it's not a lot of help when you are dodging a tree and fly into a power line that you didn't have time to see. That could ruin your whole day!

Next, for very good reasons, except in emergencies, it's unwise to exceed a medium angle of bank when flying in valleys, especially when down low in steep sided ones. When manoeuvring in constricted valleys, ALL of the higher terrain is above and beside the aeroplane, and the pilot does not have the visual horizon reference to which they are accustomed. For most beginners this is extremely disorienting and confusing, making it decidedly hazardous to bank and yank because they will then be eyeball to eyeball with spatial disorientation. Also, increasing the bank angle beyond 30° rapidly increases the load factor and thus the aeroplane's stall speed if height is to be maintained and there is none to lose.

It can now be more easily seen that slowing down is a key factor to flying in constricted areas, and using a lower bank angle to turn. The lower airspeed that allows the pilot to operate the aeroplane within markedly less geography also allows lesser bank angles necessary to manoeuvre. But, there's more.

The lower bank angle has yet another advantage - in high winged aeroplanes the inside wing usually blocks all view in the direction of turn and shallow bank angles make it easier to diminish this issue.

Another necessary skill is to be able to set the aeroplane up to fly a power-on, steady, steep angled approach to a precisely located flare point. I use 'steady' meaning an approach that has the aeroplane trimmed and in a position where minimum input of all controls (including power) will result in a safe approach to the flare. Unnecessary control input during the approach will indicate piloting judgement errors.

A major part of this judgement lies in determining the necessary attitude and power to provide the desired approach airspeed, and approach angle for the aeroplane at its current weight and centre of gravity position. A steep approach angle provides obstacle clearance with less travel distance and keeps the runway in better view. An experienced and aware pilot sets the aeroplane up for the approach and then, whilst checking the airspeed indicator regularly for confirmation, listens and uses the feel of the aeroplane to alert them of any changes to the airspeed status.

Brain Free

This leads to what is arguably the most important ability of all. This ability is paramount in all flights but is EXTRA important in operations at low level and when in unfamiliar situations. This is the knack of being able to make the appropriate inputs to control roll, pitch and yaw without devoting brain time to it. Pilots that still can't keep straight with rudder without having to think about it are a danger because there is no room here for sloppy flying. There are plenty of these pilots, wobbling woefully around at altitude where it clearly doesn't matter, but if they are ever forced to fly low their lack of this intrinsic skill becomes a very real liability. *See my piece, "Yaw is no Yawning Matter", in the BVSAC Flyer Issue 29, published for September 2015. This piece was published as a video by the AOPA USA, and the Flyer published issue is available on the BVSAC website if you want to refresh your memory.*

Sloping Strip Operations

In teaching low level operation and strip flying, much emphasis is put on operating the aeroplane at reduced airspeeds as stated previously. For practicality I use a speed range not exceeding Vx (best rate of climb speed) and not less than Vy (best angle of climb speed). The skills that I want to see are the pilot's quick attainment and maintenance of the desired airspeed (aircraft trimmed) and of the correct attitude, power, and airspeed to use for an appropriate approach into a strip. Many airstrips are one way only so, once the aeroplane is committed, there are no go-around options; the pilot MUST know how to set up and execute the required approach.

In naturally positioning their aeroplane, almost all inexperienced left-seat pilots choose to fly up the middle of a valley. While this may appear safer, it isn't because there's no room to manoeuvre (there is only half the potential room to turn) and often considerable turbulence. Flying up the windward side of the valley in the wind shadow area is preferable to avoid the inevitable downdraft caused by the wind descending into the valley on the lee side.

If a ridge must be crossed, the pilot needs to know to fly across it at an angle of less than 90° to the ridge. This makes a turn away quicker if an excessive downdraft is encountered or the pilot changes their mind for any other reason. Another consideration is, if possible, to avoid flying away from the airstrip and/or having to turn around a vision-blocking bluff to make an approach. Such locations where these dangers are prevalent are not suitable for training or use **OR** by other than already experienced strip/low level pilots who can fly the aeroplane without having to think about their actions in doing so.

The Vital Flyover
NEVER fly onto an airstrip without doing a fly-over, your life may depend on it. In fact, this is good policy for any airfield that is new.

If the strip slopes, do the fly-over down the slope using at least the Vx for the aircraft but no more than the Vy. Experienced pilots often do more than just a single pass; they do several runs to make sure their data is good. After all, why waste time – you're a long time dead? When doing a fly-over, to guestimate the runway length in metres, I use 60 kts airspeed and note carefully the number of seconds it takes to complete the fly-over. Multiplying that number of seconds by 30 will give me a workable strip length. Thus, if 300 metres was the minimum length required, the time to fly the length of the strip had better take me at least 10 seconds.

Also note the altimeter reading when crossing the top of the strip and the bottom. Check the surface wind direction if any clues are available (wind shadow areas on dams/lakes are on the upwind side of the water, cloud shadows etc). Remember that the wind velocity may differ between the top of a sloping airstrip and the bottom where the flare will take place. Check for mobile surface obstacles such as cattle/sheep/deer: being non-affixed, these move so are harder to dodge. Check the runway surface for slope changes, drains, wash-outs, fences etc, as well as boulders or wet patches. Take special note of the terrain relevant to the approach line and the overshoot line (if an overshoot is possible.) Plan the approach path and, where available, the overshoot path. Also identify a go-around point if the strip slope and the surrounding terrain permit it. An overshoot might be possible if action is initiated early enough in the approach, so select a geographic overshoot point where one is possible. Be mindful that sometimes airstrips are a commitment as soon as the approach is initiated. If the terrain will stop you getting out – this is REAL commitment so misjudgements are not forgivable. This is not a video game – there are no spare 'lives' if you stuff-up.

Correct approach Angle
A constant feature of inexperienced pilots flying onto sloping strips is setting up approaches that are too high. This is a judgement call and only practice helps. If the altitude of the flare point has been estimated during the fly-over, a level, or near level, approach may be available to ease, somewhat, any judgement crisis. Wherever possible, keep the strip in sight. If the aircraft is properly configured and established for a steady approach, flying a normal circuit pattern is straightforward but the proximity of rising terrain adjacent to many strips precludes this. This terrain issue causes serious stress as most pilots are hesitant to get down into a valley.

To operate in such areas, it must be accepted that the aeroplane will be flying much closer to the terrain than untrained pilots are accustomed. It must be accepted that the high terrain renders all attitude indicators completely irrelevant. The horizon is now inevitably above the top of the windscreen in level flight.

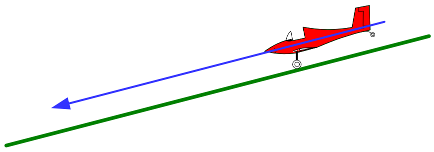
The bottom line is to know your aeroplane, know yourself, and to have acquired the knowledge and experience to help maximize precision, control, performance and safety when operating aeroplanes in terrain restricted or obstacle restricted areas.

This is an immensely broad subject and impossible to adequately cover in a few pages of text. All I can hope to do is give you, the reader, a taste of the issues that confront a pilot at low level and when flying onto and off short and sloping strips. The number of potential question it raises vastly outnumbers the number of available answers but the following may answer some of the FAQs. Note that the following are a conceptual guide ONLY and too many other unmentioned factors are present for them to be conclusive. Always be guided by caution – except in an emergency, to not go into an airstrip will always be successful.

Sloping Runway Operations

Take-Offs – calculating effective runway length adjusted for down-hill slope

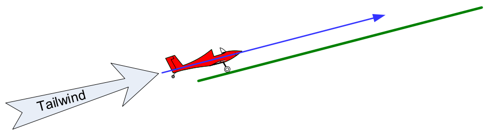
Rule of Thumb (DOWN HILL ONLY): when considering the effect of runway gradient, every 1.0% grade equals approximately 10% change in effective runway length. Therefore, we can use the following quick calc to ascertain the effective runway length available:



- A 3% gradient.= 30% increase in effective runway length = 500' + (.3 x 500). This will equate to an effective length of 650'.
- A 5% gradient.= 50% increase in effective runway length = 500' + (.5 x 500). This will equate to an effective length of 750'.
- A 10% gradient.= 100% increase in effective runway length = 500' + (1 x 500). This will equate to an effective length of 1000'.

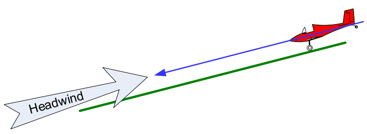
Landing uphill with a tailwind:

Planning to land with a tailwind should be done with great care. Because a 10% increase in groundspeed results in a 20% increase in landing distance, even light tailwinds will greatly increase the resulting landing ground roll. If the runway ends in a drop-off, such as on top of a plateau or along a riverbank, and a tailwind landing is made, the pilot should anticipate an updraft over the drop-off on short final. This updraft can cause the aeroplane to balloon or float further down the runway before making its touchdown, and could be problematic depending on runway length and gradient. Additionally, when landing with a tailwind the pilot will have to fly a steeper approach to compensate for increased groundspeed, which can cause visual illusions that hinder judgment of height and distance relative to a sloping runway. Remember those illusions that I brought to your attention in the Flyer, Issue 41. At low level an understanding of these illusions really counts. Land with a tailwind at YOUR own risk. Remember, it's not just the surface wind that counts, it's also the tailwind on approach that can spell disaster.



Landing Downhill With a headwind

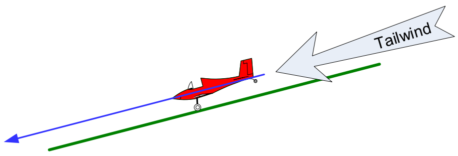
A strong headwind is required to overcome the increase in landing roll that a downhill landing creates; if the wind is strong enough to cancel the effects of a large downhill slope, expect serious turbulence on the approach, particularly if there are obstacles such as trees or buildings. If a faster airspeed is used for the approach to compensate for gusts and turbulence, the increase in



groundspeed will further lengthen the landing roll. Also, when landing downhill the plane will float, and float, and float. Pilots may find it hard to touch down because the ground keeps dropping out from under the aeroplane. Once on the ground the pilot must count on brakes to stop because they are going downhill. Heavier aeroplanes have more inertia and can be very hard to stop indeed. In AG training I NEVER even demonstrated downhill landings let alone let a low-time left-seater to try one in my aeroplane.

DOWNHILL TAKE-OFF WITH A TAILWIND:

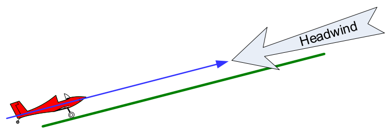
Considering that a 10% increase in groundspeed requirement increases the take-off roll by 20%, and every 1.0% of runway down-slope equals approximately 10% more effective runway, it takes about 1.0% down-slope to counter every 2 to 3 kts of tailwind for most GA aeroplanes and the same should be considered likely in RA Ultralights. Thus, a 6 to 10 kt tailwind would require at least a 3.0% down-slope to neutralize the effects of wind. If the down-sloping runway ends in a drop-off, the plane may become airborne or fly in ground effect, but will encounter a downdraft over the drop-off once it leaves the runway.



Turbulence will often accompany this downdraft, and water below will amplify it. This can be a sticky situation, especially when flying around rugged terrain whether at the same level or in beside a river bed. If no turns can be made and the departure must be flown with a tailwind due to terrain, downdrafts and turbulence may continue along the departure path. The only option a pilot has is to lower the nose and maintain airspeed and try to remain clear of the terrain.

UPHILL TAKE-OFF WITH A HEADWIND:

Based on the relationships of groundspeed and gradient, an aeroplane will generally require a significant headwind to counteract more than a slight uphill slope. If the runway is short, choose a take-off abort point; if the aeroplane is not in ground effect and accelerating by that point it may not out climb the gradient. Aborting a take-off uphill provides more rapid deceleration and less distance than a runway without slope. Anticipate wind shear/gradient and turbulence over trees or obstacles after departure. Also, when taking off uphill, chances are the terrain beyond the departure end of the airstrip rises, and may exceed the climb capability of the aircraft. Not a good choice if any other option exists.



I always use great caution when mixing wind and runway gradient. Many runways with gradients have surrounding obstacles and terrain that can exacerbate the effects of downdrafts, wind shear, and turbulence on approach and departure. On short runways, especially with obstacles in the approach or departure path, landing and taking off with more than a light wind is seldom a good idea and only likely to be appreciated by the aeroplane repair shop guys.

UPHILL TAKE-OFF WITH A TAILWIND:

Who in their right mind ………. Let's just not go there!

Please note carefully that this is not the end of this story. Sloping strips also provide serious illusions that cause hazardous misjudgements and potentially lethal situations in approach angles when landing. However, these situations and characteristics are for another day.

Happy flying

Remember: *you don't HAVE to take-off, but, if you do THEN YOU WILL HAVE TO LAND.* So, think carefully before you execute the optional former which then dictates the compulsory latter!

Cessna 150, a Trainer for the Ages.

Published: December 18, 2005. **Updated:** October 29, 2019

Cheap to buy and operate, the 150/152 series has proven to the worth of its design.

To this day, when many people think of light aircraft, the venerable Piper Cub comes to mind. But most in the active ranks of pilots today have never flown one. What they have flown, however, is the Cessna 150 or 152, which long ago eclipsed the Piper Cub as the most-flown two-place GA aircraft.

Although we have no data to prove it, we wouldn't be at all surprised if the Cessna 150/152 still flies more training hours than any other model, despite the advent of newer trainers, such as Diamonds well-regarded Katana.

Although it hasn't been made for two decades, the 150/152 still plays a mainstay role in pilot training, chiefly because it still does what it always did, namely providing an affordable, easy-to-maintain platform that anyone can fly.

MODEL HISTORY

While Piper established itself with the Cub prior to and after World War II, Cessna joined the market later, first with the Cessna 120 and later the 140, which stayed in the model line until the early 1950s. Although only hardcore Cessna aficionados know it, the Cessna 172 actually predates the Cessna 150, which first appeared in 1959.

Cessna 150A

Unlike the 140, the 150 was created solely with the training market in mind to tap into what was then a booming market. By modern standards, the first 150s look a bit frumpy, with their squared- off tails and a turtledeck-style fuselage, with no rear window. But it was not to stay that way for long. In 1961, the first of many changes in the model began, starting with moving the gear struts aft two inches, curing the airplanes tail heaviness. Ten years later, tubular gear legs with a wider track were added.

In 1964, the rear window appeared and, of course; it needed a snappy marketing moniker, thus was born Omni Vision. The stodgy straight tail went away in 1964, replaced by the swept-back tail, giving the airplane a more rakish look.

The overall dimensions of the airplane haven't changed much but its max gross weight has. The 150 began life as a 1500-pound(680kg) airplane but by 1978, the gross weight had been bumped up to 1670 pounds (757.5kg) for the 152. For a two-place airplane, that's a big hike but, as is usually the case, there wasn't much payload gain due to rising empty weight.

Anyone who learned to fly in a 150 will remember the cockpit as cramped and narrow and that never changed. But Cessna did bow the doors out slightly and trimmed the center console to provide more side-to-side legroom.

The baggage compartment was also enlarged several times and one option included a rear child seat. The baggage area could accommodate up to 120 pounds (54.5kg) of kids and/or bags, so it was suitable for a toddler and a day bag, but little else. But for a small airplane, the baggage area is rather generous.

In 1975, a larger fin and rudder were added and before that, electric flaps were installed. Previously, the flaps had been manually operated and some pilots complained that electrics were a step backward. (We agree.)

ENGINE CHANGES

The Cessna 150 first appeared with a 100-HP Continental O-200, a reliable and easy-to-maintain engine that matched the airframe nicely. When 80/87 gas began to fade from the market in 1978, displaced by 100LL, Cessna switched to the 110-HP Lycoming O-235 that provided more power and boosted the TBO from 1800 hours to 2000 hours and eventually 2400 hours.

As the 150 morphed into the 152, there were other changes, including a 28-volt electrical system, a one-piece cowling, a McCauley gull-wing prop, an oil cooler and redesigned fuel tanks. Sum total of changes? About 40 pounds (18kg) more useful load than the original Cessna 150 had, but fully 60 pounds (27kg) less than a 1948 Cessna 140 could heft. The airplanes performance was about equal to the 150 it replaced, but the engine was susceptible to severe lead fouling when burning 100LL and the 28-volt electrical system was a nuisance.

Also, the 152 turned out to have some significant warts. Early models were hard to start because of weak spark and lack of a priming plunger. Cessna added impulse coupling on both magnetos to improve this, plus direct priming for each cylinder. Mechanics complained about having to remove the prop to de-cowl the engine so Cessna added a split cowl. In 1981, the Lyc got a spin-on oil filter as standard, rather than the old rock screen. In 1983, Cessna and Lycoming tackled the lead fouling issue by replacing the O-235-L2C engine with the N2C variant, which the model had until it was discontinued in 1985.

Except for troublesome starter drives, the Continental O-200 used in the Cessna 150 was a reliable and robust engine that could be counted to make the 1800-hour TBO, if not beyond. The Lycoming O-235L2C was supposed to achieve three goals: Solve the O-200s lead problem, boost power a bit to increase the payload and offset the 15 percent gain in empty weight and last, reduce noise. The higher compression O-235 Lyc delivered its 110 HP at 2550 RPM rather than the O-200s 2750 RPM.

Did Cessna hit the mark? Not really, say operators familiar with both airplanes. In its favour, the Lyc had no starter problems, but if the engine/prop was quieter, you'd hardly notice. Owners complained about high parts prices for the O-235-including pistons and valves, the latter being sodium filled for improved cooling.

And the lead problem? Still there, say owners. The O-235 accumulated lead deposits in every nook and cranny and lead fouling of plugs became such a problem that Champion developed a special extended-electrode spark plug for this engine, the REM37BY. Mechanics say even with careful leaning, the plugs must be removed and cleaned as often as every 25 hours. In Service Instruction 1418, Lycoming explains a procedure whereby cylinders can be blast-cleaned with walnut shells without removal for top-end overhaul. Prior to this, operators found that early tops were needed due to lead fouling of the cylinders.

One positive aspect of the Lycoming engine is its TBO-a whopping 2400 hours. If you can keep the thing from choking with lead, it may actually reach that impressive limit. Some owners use TCP additive to help control lead. Also, thanks to intense competition in the engine overhaul field, overhaul prices remain quite affordable, on the order of $10,000.

Cessna 150L Aerobat

Unique to the mass-market trainer, Cessna offered two additional versions of both the 150 and 152. The Aerobat and a seaplane conversion, which appeared in 1968. There are still a few of these models running around, some even used on the water. The seaplane was, by most accounts, a decent little water taxi, although no one would mistake it for a Beaver. It couldn't haul much and with limited power, it took a while to unstick from the water.

Cessna 152 Aerobat and Texas Taildragger

The Aerobat version-which first appeared in the 150 in 1970-made a much bigger splash, although not in the water. In those days, aerobatic training was all but impossible so when the Cessna Aerobats, with their flashy checkerboard paint, showed up on the rental line, many renters responded enthusiastically. Some 5 percent of the 150/152 fleet is acrobatically capable, after a fashion.

We're not talking Extra 300 type performance, of course. Aerobatic purists sniff at the Aerobat because it has control wheels, not a stick. Any manoeuvre that requires climbing back to altitude will require a plodding climb to get back in the perch. Still, the Aerobat was and is an affordable gateway into the world of aerobatics. The Aerobat commanded a price premium when new-about $1500 to $2000-and that's still true on the used market.

Performance and Handling

The trainer market has evolved considerably since the 150 first appeared and although modern trainers such as the Diamond Katana have improved the breed, the 150/152 still has better than credible performance and handling traits. Interestingly, some flight schools report that although many students take intro rides in the sexy Katana, they transition to a 152 or 172.

Why? Probably because the 152s higher weight gives it a somewhat solider feel than the Katana has and pricewise, 152s remain competitive to buy and operate, so the hourly rental is less. But the Katana cruises faster than the 152 and uses a bit more fuel. Its a marginally better climber than the Katana A1, with its 80-HP Rotax engine, but the C1 Katana, with its Continental IO-240, outdoes both the 152 and the A1 Katana.

Top speed for the 152 is given as 109 knots, same as the Tomahawk and two knots faster than the plodding Skipper. In the real world, owners say they go slower. course, 152s go slower. Much slower. The airplane seems happiest at 90 to 95 knots, a realistic speed in our view.

Handling is what it is, which is predictable, with relatively light control forces and no nasty stall habits. The Cessna 150/152s slow flight characteristics are so utterly benign that they nearly qualify as STOL airplanes. The large flaps-even when limited to 30 degrees-are quite effective, although they do generate quite a nose-down trim moment. This is easily handled, although the control forces escalate somewhat. Students have to be taught to watch for abrupt nose-ups when applying full power for a go- around, training that prepares them nicely to transition into the Cessna 172, which has the same characteristic.

Landing a 150/152 is easy enough to teach and learn, to a point. And that point is often exceeded, since runway fender benders are the most common type of accident suffered by the 150/152 series and other trainers, for that matter. The model is an excellent crosswind trainer, since it has an effective rudder.

The airplane is comfortable with an approach speed of 60 knots or slower, but it will easily tolerate higher speeds, because those draggy flaps bleed off excess airspeed in a heartbeat. Land it fast and it will bounce. (Any pre-buy should include a specific check of the logs for landing damage that included nosewheel work or firewall damage.)

Operators tell us the 152s runway performance is good, especially if the airplane is light. It's not as good when heavy on a hot day. With a portly CFI and student aboard, more than a few 152s have trimmed the trees off the end of runways.

Speaking of payload, the 150/152 essentially carries what other popular trainers do. At 528 pounds (240kg) useful, it carries a bit more than the Katana but a bit less than the Skipper and Tomahawk. Before the model got fat, however, some E/F/G 150s topped 600 pounds (272kg) in load carrying capability.

Where the 152 shines, however, is on load flexibility. With a fuel capacity of 39 gallons, it has better range with a single pilot than either the Tomahawk or the Skipper. Does this really matter? Maybe. These aircraft are, after all, trainers, and one of the skills student pilots learn early on is how to run out of gas. In our view, the more gas aboard, the less likelihood of a fuel exhaustion event.

Cabin and Ergonomics

Cabin comfort is not much of a consideration in two-place trainers. Lessons are short and there’s no point in pretending there’s enough room in the airplane for plush seats. The 150/152 is so narrow that even pilots of moderate size will bump shoulders. Two big guys will be miserable. Although the seat height is quite low, the legroom is excellent.

In 1979, thicker seat padding became standard, but it helps only a little. Many owners have had the seats re-padded or carry a pillow or two to make them more tolerable. Noise level is quite high, due to the proximity of the cabin to the engine compartment, but the advent of noise-canceling headsets and intercoms has rendered this moot. Ventilation in the 150/152 is via the standard Cessna pull vents in the wing roots, plus in most models the windows open for taxi and can also be opened in flight. During the winter, this can be a mixed blessing and some operators tape off the root vents to reduce drafts. If the heater is well-maintained, it will get the job done.

Maintenance

Owners who use the 150/152 for personal use-and many do-can count on literally years of service from the engine, if they’re operated enough to keep corrosion at bay and leaned to avoid lead build-up. In general, these are simple airframes that don’t require much maintenance. However, any that have been used extensively as trainers-as most have-should be inspected carefully for hard landing damage, especially in the nose gear/firewall bulkhead area. Wrote owner Ed Park of Aliso Viejo, California, Unless the guy that you bought the airplane from spent a bunch of time and money fixing up that 20-year-old airplane and fixing/replacing/repairing a lot of things, you can expect that you will be that person if you are conscientious about your maintenance.

Cessna 152 instrument panel

The 150/152 series has what we would call an average list of ADs, none of which are particularly onerous or expensive. The major safety-related item is the seat track AD, which prevents the seat from unlocking and sliding rearward. Most aircraft should have had this done long ago. Owners report that annuals are thrifty-in the $800 to $1200 range, depending on parts needed. Since the airplane is so simple, owner-assist annuals are a good bet.

Mods, Owner Groups

The 150 can be given a huge power boost and even turned into a taildragger, as quite a few have been. AvCon Conversions (800-872-0988) and Bush’s Conversions (800-752-0748) do both engine and tailwheel mods. AvCon also has flap gap seal kits and Bush offers flap and aileron seals. AvCon also has a STOL kit. Both the AvCon and Bush’s kit puts a 150-HP or 160-HP Lycoming in place of the 100 HP Continental. No surprise that this jacks the cruise speed up 140 MPH (121kts) and the climb rate to more than 1000 FPM.

Horton, Inc. (800-835-2051) sells STOL kits for the 150/152. In addition to Bush’s tailwheel conversion, Aircraft Conversion Technologies (916-645-3264) supplies landing gear kits for a tailwheel conversion that's supposed to increase speed by 8 to 10 MPH by eliminating drag. Met-Co-Aire sells wingtips for the 150 series, reach them at 714-870-4610 or www.metcoaire.com. O&N sells aux fuel tanks for the Cessna 150/152. Contact www.onaircraft.com, or 570-945-3769.

A company in Washington, Air Mods N.W., sells an engine conversion for 152s that includes a new prop that boosts climb and take-off performance by allowing the Lycoming O-235 to spin up to 2800 RPM. It also has higher compression ratio to supposedly decreases lead fouling.

Two organizations of note are the Cessna Pilots Association and the Cessna 150-152 Club. CPAs Santa Maria, California HQ is the fount of all things Cessna and members rave about its technical services. Contact CPA at 805-922-2580 or on the Web at www.cessna.org.

The Cessna 150-152 Club has a monthly newsletter that's an excellent clearing house for information, parts, mods, maintenance and service tips. Contact the club at 805-461-1958 or www.cessna150-152club.com. For a detailed book on flying and operating Cessna 150s, contact Arman Publishing at www.Cessna150book.com.

Owner Feedback

I was 38 when I got my private pilot license and I'm now 40. I started my training in 152s at a local flight school at John Wayne Airport in Orange County, California. During training, I purchased my first airplane, a 1975 172M that was in very good condition, an all-original low-hour plane. I enjoyed this airplane but realized that flying it compared to flight school 152s was like flying a bus.

Granted, there was more space inside, larger payload and four seats, but it just wasn't as fun as flying a 152 for the type of flying I was doing: VFR, usually single pilot.

I got rid of the 172 in favour of a Grumman AA5B Tiger, but like the 172M, it was low hours, in very good condition, all original and very expensive relative to the 172M. I sold this airplane (at a handsome profit) and bought a 152.

Ultimately, I settled on the 152 for a few reasons: Like the other airplanes, it was very economical from a maintenance standpoint. Unlike the other airplanes, it was very economical from a gas and insurance standpoint. It fit my mission, but unlike the 172, it was fun to fly, light on the controls and very responsive, especially with a single pilot on board.

To sum it up, I bought the 152 after trying the other airplanes because it was easily affordable, although I would not go as far as to say painlessly affordable. It handles well, its light on the controls and is fun to fly and looks good, as long as it has its pants on. It provides reasonable range, speed and climb.

I would not expect to pay more than $600 to $1000 on maintenance/annual outside of oil changes and waxing/washing products. Insurance runs $695 for $30,000 of coverage. My airplane uses an average of 5 to 5.75 gallons of fuel per hour of flight so it's pretty economical on the gas.

Ed Park
Aliso Viejo, California

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

"Some of the biggest cases of mistaken identity are among intellectuals who have trouble remembering that they are not God."

The Gradient Trap

By Rob Knight

The pilot assesses the approach angle. It looks good – they'll make the flare point target on the button. The ASI needle hovers over the required 60 kts, and the approach is going sweet! In less than 60 seconds the wheels will softly roll onto the runway in another great landing and the flight will be over. They hold the nose attitude and smile contentedly, thinking about the drive home from the airfield.

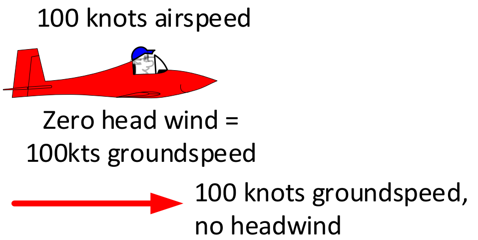
Suddenly the flare point has risen on the windscreen. There is no turbulence and the pilot hesitates for a second trying to catch up with what's happening. The flare point rises further even though the attitude hasn't changed. The pilot lifts the nose to stop the excessive sink. The stick feels light and a glance shows the ASI now reading just 45 kts. The pilot lowers the nose to correct the airspeed then looks up to see the boundary fence filling the windscreen. He snatches the stick back and shoves the throttle to the metal but the aircraft is behind its drag curve and cannot change its flight path to clear the obstacles. It collapses quickly in a nose-high attitude and impacts the ground violently. The port wing separates as the belly panels crumple and the propeller shatters. The aircraft slews viciously and stops. In the ensuing silence the smell of raw fuel pouring from the ruptured tanks becomes overpowering as the dazed pilot tries to open his door. He remembers the passenger and look sideways to see a sagging figure with blood dripping from its head. The pilot fumbles for the seat belt. If there's even just ONE single, tiny spark..........

Accident cause – wind gradient effect – the hidden potential hazard to every approach.

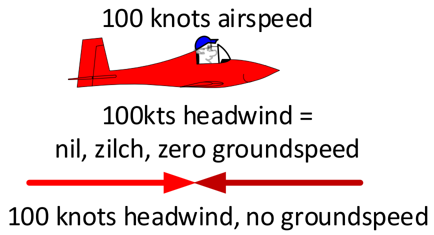
In this context wind gradient is the change in effective headwind component along the runway with changing height AGL. This change in head wind (or tail wind) component can be the result of the earth's surface friction reducing the wind speed as it flows across the landscape. In this situation, the wind speed reduction is likely greater the closer to the surface. Another frequent cause is simply a change in wind direction providing a change in headwind or tail wind component.

It's really Sir Isaac Newton's fault. In his laws of motion, he states that *a body will remain at rest or uniform motion unless acted on by an outside force*, and, as this pertains to aircraft as well as every other body on the planet, this *uniform motion* is the **groundspeed**. In still air it is simple, in flight, the airspeed and the ground speed will be the same. However, when a wind component exists, the airspeed equals the ground *modified by the head/tail wind component*.

Let's look at a simple case. An aeroplane is flying at 100 kts airspeed. If there is no headwind (the wind is calm) the aeroplane's groundspeed will be 100 kts. However, if it is flying directly into a headwind of 100 kts, it's groundspeed will be nil, zilch, zero. Now, you tell me what will happen if that headwind were to suddenly cease? What airspeed will that aeroplane retain?



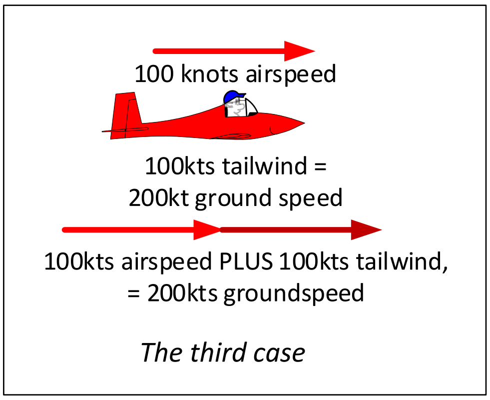
The first case



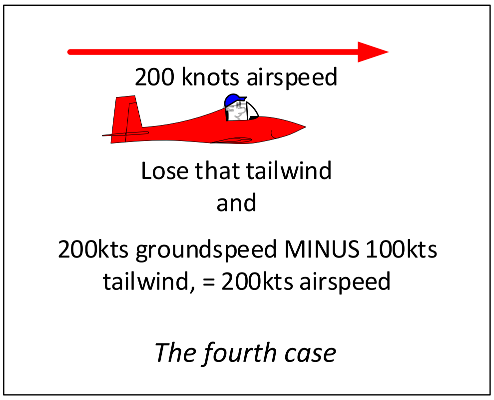
The second case

The previous illustration contains the answer 100 kts airspeed countered by 100 kts headwind equates to no groundspeed at all. The aeroplane therefore has no momentum because its mass is *NOT IN MOTION across the earth's surface*. With no groundspeed, this means that it has no inertia and the airspeed will instantly reduce to the same value as the ground speed - nil, zilch, zero. *It will have no airspeed whatsoever.*

Now let's take this one step further and examine what happens in a tail wind situation. Our same aeroplane is flying at 100 kts but this time with a tailwind of 100 kts. What will its groundspeed be, and what will its airspeed be, should that wind suddenly cease?



The third case



The fourth case

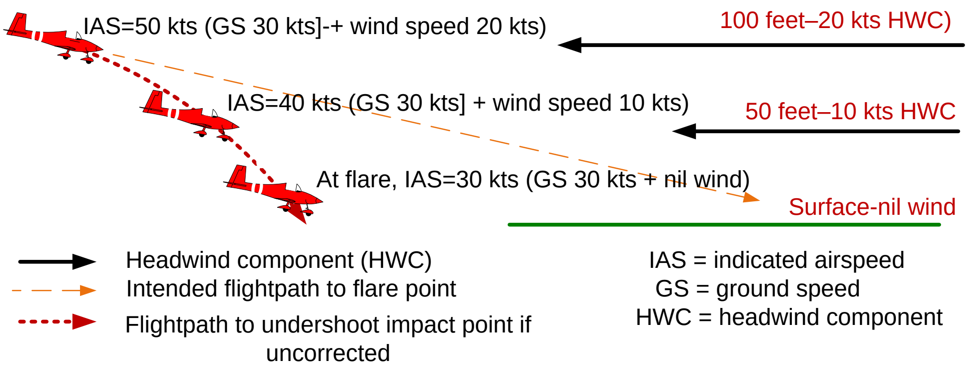
This can simply be expressed as:

- In a headwind situation, the airspeed = groundspeed PLUS the headwind component, and/or
- In a tailwind situation, the airspeed = groundspeed MINUS the tailwind component

This process in changing the airspeed with changing groundspeed is subtle. Pilots correctly see airspeed as the speed of the machine through the air but the airspeed they are seeing is not a single item; rather it is the result of the two vector quantities of ground speed and the wind component.

I present a simple case in the following sketch. An aircraft on an approach is flying at 50 kias into a 20kt headwind, so its groundspeed is a 30 kts (50-20). If the wind should suddenly cease, the aircraft would immediately suffer a 20kt reduction in its airspeed because of the loss of headwind. All that will read on the airspeed indicator is the value of the groundspeed. And that's a fact.

An aeroplane has the required IAS of 50 kts on approach, being made up of 30 kts of ground speed and 20 kts of headwind component. Descending through 50 feet, the headwind falls to 10 kts. If the pilot makes no correction, the airspeed will fall because the aeroplane will retain the 30 kt ground speed but with just 10 kts of headwind component, the IAS will have reduced to 40 kts. The aircraft is now 10 kts slower than desired.



With the lower airspeed, the lift/drag ratio will reduce and the flight path will considerably steepen.

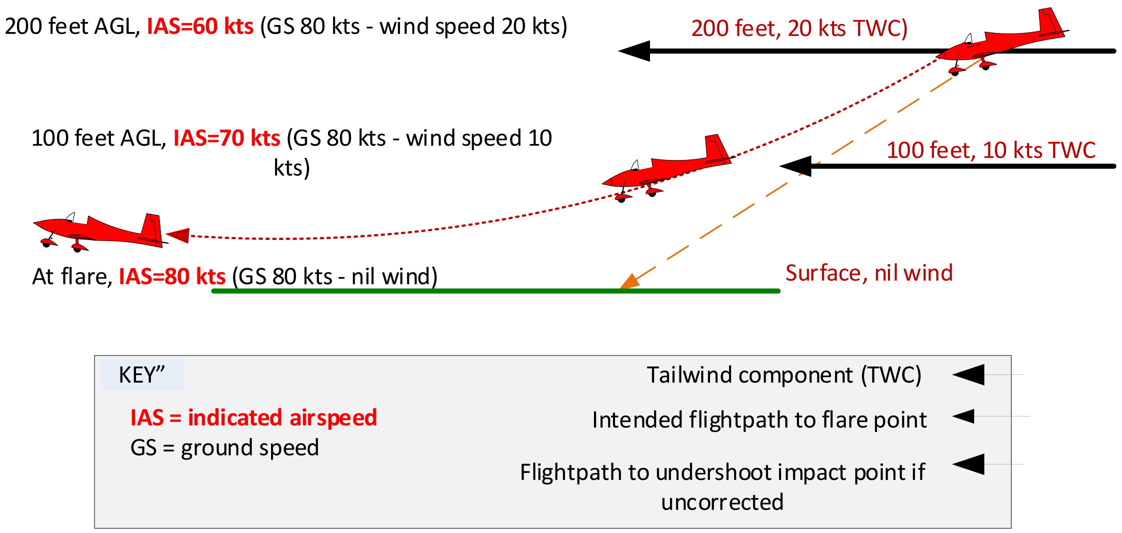
Uncorrected, after descending the last 25 feet, the aeroplane will arrive at the flare height, short of the target flare point (perhaps short of the runway) and, with the IAS indicting just 30 kts (ground speed + 0 wind), in a potential stall condition immediately the stick is pulled back to flare or to avoid impacting with the ground. At this time the situation is not recoverable; it is too late for any remedy.

Keep in mind that the aeroplane's nose attitude has not changed. Yet it is as if the world outside the cockpit has suddenly stolen nearly half the aeroplane's airspeed. In reality, with the help of physics, it has! And all pilots must be aware of the potential for this situation to occur. A headwind gradient on approach can cause an increased rate of descent and an increased angle of descent because of the inherent fall in IAS. This MUST be noticed by the pilot and the airspeed corrected with an attitude change and the approach angle corrected using a power application

So how can a pilot anticipate the occurrence of a wind gradient on approach? For a start, in reality and except when the wind is calm throughout the vertical reaches of the atmosphere, a wind gradient must always exist. This has to be, because surface friction MUST cause a reduction in wind speed the closer to the surface one looks at it, so a wise pilot will also assume there is one and be attentive on approach to the three clues – the falling IAS, reducing feel or weight in the controls, and the rising flare point in the windshield.

And how does a pilot counter the effects of such a wind gradient once its presence is noticed? Simply by lowering the nose to accelerate to the required approach airspeed, and adding sufficient power to correct and then maintain the required descent angle to the desired flare point. These actions can be done separately or simultaneously although better the latter as time is of the essence. Wary pilots watchful for the symptoms, notice the clues early and only small adjustment to attitude and power are necessary. Naturally, suspecting and anticipating the presence of a wind gradient and thus being alert for the symptoms will provide faster recognition of the existence and severity of a gradient.

However, It's a different story with a tailwind gradient.



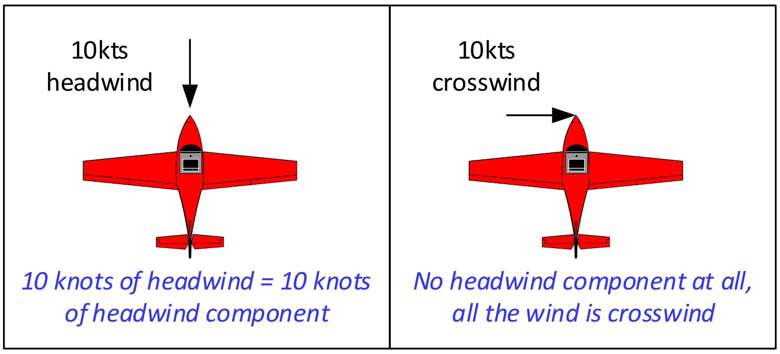
As one might expect, in tailwind gradient conditions, the reverse happens. During the approach and landing the airspeed increases, the angle of descent diminishes, and the rate of descent decreases. Instead of the aeroplane falling out of the sky, it is indeed reluctant to descend.

In the case above the aircraft started its approach at the correct airspeed of 60 kts but as the tailwind component diminishes during the aircraft's descent, the airspeed will tend to rise as the tailwind component diminishes. The pilot must raise the nose to a new attitude in an attempt to control the rising airspeed which will, in turn, cause the descent rate to decrease, which will result in the angle of descent also diminishing. This is intolerable in terms of aircraft flight path and airspeed control accuracy.

So how does a pilot avoid a tailwind component situation? Ther are but two options. Either to recognise early a potential tailwind component situation and approach for another runway direction (avoid a tailwind approach in the first place), or go around immediately the tailwind gradient is recognised and re-circuit for another runway (preferable, perhaps, the opposite end of the original intended runway).

As presented for this exercise so far, a headwind or tailwind component can be the result of a simple change in wind speed caused by terrain or upwind obstacles. But a more insidious cause can be a change in wind direction. If a headwind becomes a sudden crosswind, you have a wind gradient and your groundspeed will be influenced by it. For example, the windsock is blowing 90° across the runway but you are straight on the centreline – you are experiencing no drift at all. This is a message from the ether, **if you are listening**, that somewhere in your approach ahead you're gonna need a change in your nose attitude and power to counter the effects on your aeroplane of either a headwind or tailwind component. Somewhere, over the next short period of time, you will expect to see your aircraft either lose airspeed and begin to sink rapidly, or gain airspeed and refuse to descend and you will, MUST, inevitably, take action to correct these effects, whichever way they may act.

Let's summarise the issue. Wind gradients occur on most approaches but, because their speed change is over an extended height band, their significance is small as their results are easy and relatively naturally avoided by the pilot making small changes to attitude and power. However, A pilot's first defence against wind gradient issues is not to be complacent, be aware of their likelihood and potential, and watchful for their symptoms. The second line of defence is to act as soon as their symptoms appear and to go around immediately, without hesitation. Remember, if the decision is left too long, a go-around may not be possible.



10 knots of headwind = 10 knots of headwind component

No headwind component at all, all the wind is crosswind

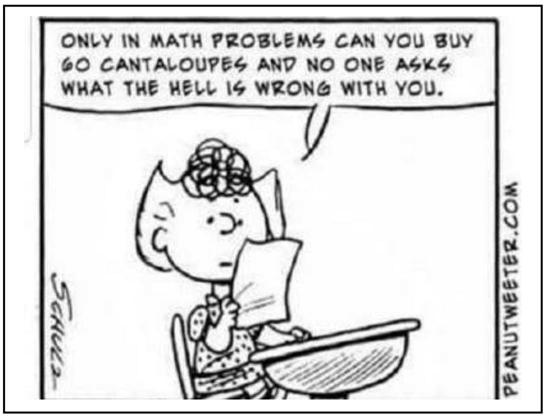
A sudden switch from a headwind to crosswind will cause a wind gradient: no longer any headwind component, all the wind is crosswind

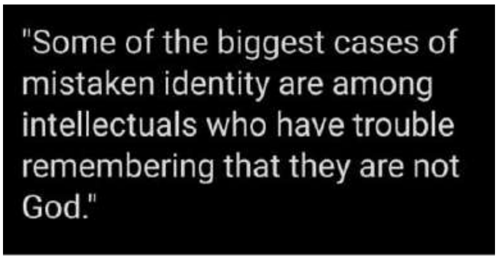
Happy Landings

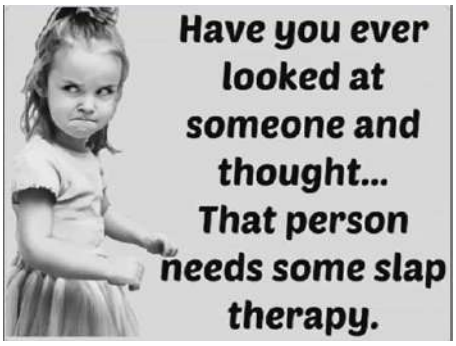
------ooOOoo ------

FLY-INS Looming

Murgon (Angelfield) (ALA)	Burnett Flyers Breakfast Fly-in	**See http://www.burnettflyers.org/?p=508**
Watts Bridge YWSG	Watts for Breakfast	**Sunday, 03rd April**







A lesser-Known Warbird – the Airspeed Horsa.

Compiled by Rob Knight

Disposable aircraft such as the Airspeed AS.51 Horsa only survive their first operation so rarely make it into the history books with lots of post operation examples lying around. However, eccentric though they may have been, they played a vital role in the D-Day landings.

Airspeed Horsa Glider

The Horsa (named after *Horsa*, the legendary 5th-century conqueror of southern Britain) was a simple glider design intended to carry military men and their equipment to places behind the enemy lines. The British, seeing the effectiveness of the German Airborne sections in the early stages of the war, decided to add an airborne contingent to their own forces. Realizing that specialised and specifically designed equipment was required, the authorities tendered Specification X.26.40 to provide a glider that could carry at least 25 infantrymen and /or field equipment, and be towed by a multi-engined military aircraft.

All fittings and wooden frames were exposed

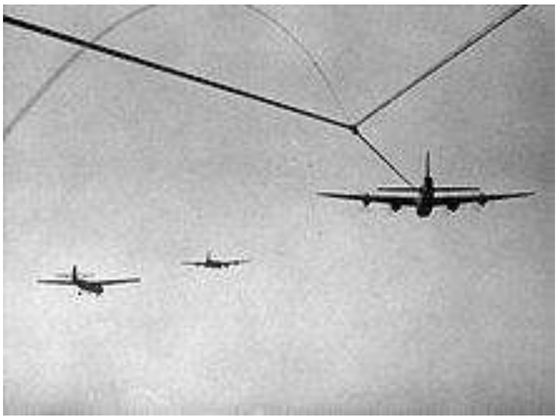
The Airspeed Company responded with their design, the AS.51, which they named the *Horsa*, taking just eleven months from the specification issue to design completion. The materials, in light of the need for metal supplies being restricted to conventional fighters and bombers, were restricted primarily to wood and the design of the parts, to relieve aircraft manufacturers, were simple enough to be manufactured by general British furniture makers. As these furniture makers were often constricted in space for such large items, they made the parts and the aircraft were "kitset built" by RAF personnel off site.

AS.51 cockpit. Even the control wheels were made from wood

The design philosophy was simple. It was just an aeroplane, but one without engines, made of wood, and covered with fabric. It was high winged with conventional single fin cruciform tail surfaces. Its wings had no dihedral and its cockpit was generously glazed to provide excellent visibility for two side by side seated pilots, each with a set of fully functioning dual controls. Perhaps the only unconventional thing about the design was its tricycle landing gear with jettisonable main wheels and struts: the aircraft was intended to be landed in operations on a rear skid and the nosewheel.

Aft of the cockpit was the hold. With exposed wooden frames of the semi monocoque constructed fuselage, side folding seating was provided for lightly armed infantry. The floor was designed to carry the loads of jeeps and light artillery, either with reduced soldier loads, or purely as equipment carriers.

The fuselage was 67 feet (20.42 metres) in length and the wings were 88 feet (26.8 2 metres) from tip to tip. The design empty weight was 8,370 lb ((3,797 kg) and its MAUP given as 15,500 lb (7,030 kg). The AS.51's max tow speed is given as 150 mph (130 kts) and its best L/D at MAUW was 100 MPH (87 kts). The Horsa could be towed by such aircraft as the Stirling, Halifax, Albemarle, or Whitley. The tow rope carried a telephone line along it for communication between the two pilots until the telephone was later replaced with a radio.



On tow, behind a Short Stirling bomber

As in all aero-tows, the glider was towed through the take-off and climb stages and pulled to the drop-zone area where the glider pilot released the tow line. Once detached the pilot(s) then made the best way they could to the actual point of designated landing, not always easy whilst under heavy enemy fire and gliding at 87 kts and having no armour plating for protection: they made a juicy target for enemy aircraft and ground gunners.

Production of the AS.51 started in 1942 and over 2000 aircraft were completed by the end of the contract period. However, flight testing began to show design faults and issues when the machines were used to carry any loads including jeeps or other wheeled equipment. A quick re-design and remedial work on the required machines was carried out. The design was released to service in North Africa and, in November of 1942, to operations against the heavy water plant in Norway.

Discharging troops, an AS.51

The design underwent several upgrades during its life. The AA.52 was a proposed bomber version but it died a natural death. The AS.58 was modified to have a sideways opening, hinged, nose section to facilitate the loading and discharging of wheeled vehicles, unlike the side door on the AS.51s.

Actual pilot reports on the handling of the Horsa are not available, the nearest is some personal notes from Lieutenant Julian R. Hall in the UISAAF.

The United States Army Air Forces (USAAF) acquired approximately 400 Horsas in a form of reverse Lend-Lease. Capable of accommodating up to 30 troop seats, the Horsa was much bigger than the 13-troop American Waco CG-4A (known as the Hadrian by the British), and thus offered greater carrying capacity.

Upon the basis of his experience, Lieutenant Hall made the following statements about the Horsa, but he was careful to state emphatically that these statements were strictly his own personal opinions:

The Horsa glider was designed in the early part of the war when not too much was known as to just what the ideal military glider would possess as far as characteristics are concerned. It is my belief that the general trend of thought was a one mission craft with not too much emphasis on aerodynamic efficiency. In other words, it was known that a military glider could not possess the characteristics of a high-performance sail plane such as is used in competitive soaring contests. It had to be a rugged type craft, and thus aerodynamic efficiency was secondary. However, the British evidently bore in mind this need of efficiency to lessen the fuel consumption of the tug and increase its range. This is displayed in their craft in that the main gear was made jettisonable and a high lift coefficient in the wing design. The general design of the Horsa is clean, excepting of course the wind shield. Here they sacrificed efficiency in design for unimpaired visibility for the pilot and co-pilot.

Characteristic. The Horsa when flown in tow using a hemp tow line presents a problem in rough air. The hemp line having very little give or shock absorbing quality, transmits the force of vertical or horizontal accelerations of the tug directly back to the glider. This tends to offset the glider from its tow position, and constant control is necessary to maintain a good position. This condition may be partially eliminated by the use of nylon in the tow lines. Usually placed in as a leader from the bridle forward, this nylon leader in effect absorbs the forces of vertical and horizontal acceleration within the nylon and thus contributes to a smoother flight. In free flight the Horsa glider is very pleasant to fly. Its control is smooth and positive. Pilots not familiar with the Horsa generally notice the absence of noise of the usual sound of rushing air. It has no vicious stall characteristics and its approach to stall is very noticeable. Its high angle of dive with full flaps is a definite advantage in landing over obstacles. The Horsa has its disadvantages also, as had any aircraft, mainly its unsatisfactory loading and unloading. Inability to control direction while on the ground rolling and its not too dependable pneumatic system are other disadvantages.

Comparison With Waco CG-4A.

The Waco CG 4A Hadrian, the smaller American contemporary of the Horsa

It is my opinion that the CG-4A is a more satisfactory assault glider. My reasoning here is that the CG-4A is more manoeuvrable than the Horsa. It has no pneumatic system that could foul and increase landing hazard. The CG-4A can be slipped to dissipate altitude along with the spoiler as an alternate. The Horsa depends solely upon flap action to dissipate excess altitude. The CG-54A is more easily handled on a ground operation and for positioning prior to launching. It is more possible to retrieve by the glider pickup system. As for night operations, the CG-

4A is more suitable in that it has no flaps to change the glide angle and increase landing hazards.

Comparison With CG-13A:

It is my opinion that the CG-13A is capable of transporting greater loads than the Horsa. Larger equipment and ease of loading is another factor. Its nose loading is a definite advantage. It is in my opinion more sturdy in construction throughout and is capable of withstanding greater landing loads in training than the Horsa glider. Its troop capacity is greater and it is equipped to be used as a paratroop transport as well as its feature of aerial delivery containers. To my knowledge, the Horsa is not so equipped. The CG-13A is also more adequately equipped for emergency exit. Escape doors are easily in reach of pilot and co-pilot. It can transport the much needed 105 mm Howitzer and crew to air in an airborne assault. The Horsa has an advantage in its visibility over the CG-4A and the CG-13A. This feature is very much a necessity to a successful operation.

Waco CG-13A in the UK c.1944

Artist's sketch of an AS.58 landing on operations. Note the flaps!

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

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

1. A pilot on a cross-country flight is exactly on track and is suffering 12 degrees of port drift. Should he expect the QNH at his destination to be higher or lower than his QNH at the departure point?

   A. QNH higher at the destination.
   B. It depends on the pressure gradient.
   C. QNH Lower.
   D. Either, drift has no influence the QNH between points.

2. In flight, when a pilot lowers the flap, there is likely to be a trim change. Which of the following is the most likely cause of that trim change?

   A. The Centre of Gravity will change vertically and modify the distribution of the four forces acting on the aeroplane.
   B. The longitudinal dihedral will change.
   C. The drag line will change
   D. The Centre of Pressure will move aft along the chord line.

3. At which of the listed times should you expect GAFs to be issued?
   A. 0800AEST, 1400 AEST, 2000 AEST, 0200 AEST
   B. 0000Z, 0600Z, 1200Z, and 1800Z
   C. 0200Z, 0800Z,1400Z, and 2000Z.
   D. 2200Z, 0400Z, 1000Z, and 1600Z.
   E. A and D are both correct

4. On approach for runway 18 you are experiencing a headwind of about 20 knots with no drift and no correction is necessary to maintain your position exactly on the extended centre-line. You notice the windsock is indicating a surface wind of about 030 at 20 knots. Which of the following should you expect?
   A. A heading correction as you encounter the wind direction change.
   B. A wind gradient causing a decrease in airspeed which you will have to correct to maintain your approach speed and approach angle.
   C. Turbulence and sink that will require a power adjustment to maintain your approach angle at the elevation of the wind change.
   D. A normal approach with a heading correction at the flare.

5. A pilot flying east notices that his compass card swings when he closes the throttle and slows down whilst keeping straight. Why would this occur?
   A. The changing electric field around the aircraft as the engine slows.
   B. A failure to keep the ball centered as the airspeed decays.
   C. Gyroscopic forces on the slowing propellor causing yaw.
   D. The compass needle mounting system within the instrument and the magnetic dip angle for that location

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. A is correct. Port drift tells us that winds is from the right (starboard). This indicates that the aircraft is flying towards the centre of a high-pressure area so the QNH is likely to rise as he approaches the destination.

2. C is correct.
   Applying flaps (or retracting them) will change the position of the drag line (the line through which all the drag may be considered to act). This will change the arm of the thrust/drag couple and elevator application will be required to offset the change in the couple. The change in stick/yoke pressure will subsequently require an adjustment to the trim control to return to a trimmed condition.

3. E is correct. See the GAF User guide available at the point of GAF display.
   Option A provides the AEST equivalents of the given UTC times.

4. B is correct. A 30° change in wind direction will reduce the headwind component by 50% That reduction will reduce the airspeed (as depicted in the piece on wind gradients earlier in this publication) which will require a nose attitude change to correct and an addition of power to compensate for the steepening of the approach angle.
   See page 15 in this issue.

5. D is correct. An aircraft magnetic compass has the twin north-seeking magnets suspended beneath the compass needle/card pivot point to provide stability to the needle/compass card. Because of "dip" angle (the angle between the lines of magnetic force to which the compass aligns and the earth's surface), the compass always sits at a slight angle to the earth. The centre of gravity of the magnet will not lie directly beneath the pivot point, and when the aeroplane accelerates or decelerates, the centre of gravity lags behind due to inertia and rotates the compass card.
   The magnetic compass in an aircraft decelerating in the southern hemisphere will indicate an apparent turn to the north, and vice versa.
   The pneumonic to remember this is SAND - *"SOUTH under Acceleration – NORTH under Deceleration."*

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

Take someone on a plane and they can fly once. Push them out of the plane and they'll fly for the rest of their life.

Aircraft Books, Parts, and Tools etc.

Parts and Tools

Item	Condition	Price
VDO Volt Readout instrument	Brand New	**$70.00**
Altimeter. Simple – single hand	As new	**$50.00**
Oil Pressure indicator, (gauge and sender)	New – still in box	**$80.00**

Tow Bars

Tailwheel tow bar.	Good condition	**$50.00**

Headsets

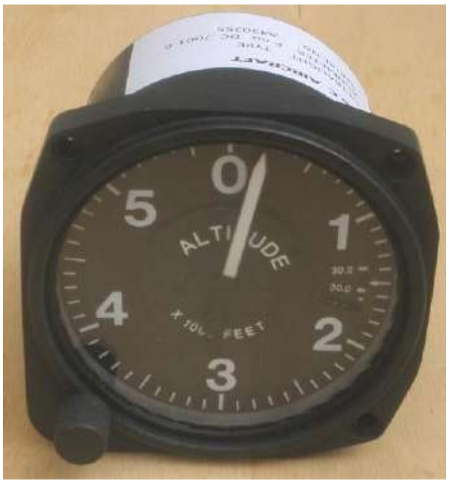
AvCom headset. Functions perfectly	Excellent	**SOLD**

Propeller Parts

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**

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**

$120.00

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 has recently been fitted with new mounting rubber, a new alternator and regulator, a new fuel pump, and jack stands. It is fully registered and ready to fly away by a lucky new owner

Hangared at Kentville in the Lockyer Valley, parties interested in this lovely and unique aircraft 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 kts at 11-12 litres/hr. The tanks hold 48 litres so it has a very reasonable range. For my approaches I use 50 kts on my initial approach down to 40 kts 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

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Slipstream Genesis for Sale

$12,000.00 neg

Imported and built 2001. Two seats side by side, powered by 80 hp 912UL Rotax, driving a Warp Drive 3 bladed prop. Cruise 70-75 kts. 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 due 10/09/22. 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 XCOM radio/intercom. Basic VFR panel with 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 - Fly it away for $14,000 neg.

Contact **Rob Knight tel. 0400 89 3632**, **or email** kni.rob@bigpond.com for details and POH.

AIRCRAFT for Sale

LIGHTWING GA-55. **$25,000.00 (Neg)**

Registered 25-0374

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

Under Offer

<u>Work performed at Lightwing Ballina:</u>

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

<u>Other work carried out:</u>

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

<u>Rotax:</u>

* Engine modifications, gearbox rebuild.

Currently hangared at Boonah in Queensland.

Contact Kevin or Natalie McDonald on 07 54638285

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.

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**

Wanted to Buy

95-10 ultralight project for newly formed syndicate in SEQ. Anything considered.

On our behalf, please contact the editor, Rob Knight, on 0400 89 3632.

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