# BUSH FLYING

Rules of Thumb

## Taking off

Density height – in Australia we don't have too many high altitude aerodromes but we certainly can have some hot days. Remember that every degree hotter than standard will raise the density height by 120 feet. For example a 30 degree day at Orange will push the density height to more than 5,500 feet. Oh, and by the way, moisture also pushes up density height.

Should I take off up the hill with a headwind or down the hill with a tailwind? After all how much is 2% upslope. 1% is 1 metre in 100 metres therefore 2% is 2 metres in 100 metres or 20 metres in 1000 metres. 20 metres is around 65 feet. The height of the Aviators hangar outside the front door is about 30 feet, so 65 feet is about the height of the big gum tree outside Basair. Picture one end of the runway jacked up to the height of that tree and that will give you an idea of what 2% slope looks like. As a rule of thumb add 10% to the take-off distance required for each 1% of upslope. You can reduce the take-off distance by 5% for each 1% of down slope.

What about the wind? Most P charts only allow up to 5 knots of tailwind. The tailwind take-off distance is 110% of the nil wind take-off distance plus the tailwind value divided by the lift off speed multiplied by the nil wind take-off distance. So if the nil wind take-off distance required is 600 metres and you have 5 knots of tailwind and you normally lift off at 60 knots then you would need : 660 + (5/60 x 600) = 710 metres or nearly 20% longer.

Short grass add 10% and long grass (100mm or longer) add 30%.

Weight- an increase of 10% weight equates to a 5% increase in lift off speed, a 9% decrease in acceleration and a 21% increase in take off distance.

Is the runway long enough? If you don't have 70% of the lift off speed by half way along the runway then the answer is **NO.**

## Landing

The approach profile- a standard 3 degree glideslope equates to a descent rate of 5 x groundspeed. Eg. If you are descending at 65 knots groundspeed you should have a descent rate of 325 feet per minute.

However for a short field landing into an ALA this probably too shallow an approach angle and a descent profile of 4.5 degrees would be more appropriate, offering better visibility and making it easier to keep the aim point fixed in the windscreen. 4.5 degree approach profile equates to 8 times the groundspeed. Eg. 8 x 65 kts = 520 fpm descent rate.

If we are looking for a short final approach speed of 1.3 times the stall speed beware of the difference between calibrated and indicated airspeed. 1.3 x Vso is worked on calibrated airspeed not indicated airspeed. Calibrated airspeed is indicated airspeed corrected for installation (ie position), error and instrument error and is generally greatest at low airspeeds. The difference can be 5 to 10 kts. This is a point we might like to keep in mind when we are considering our take off safety speed.

We want to fly a stabilised approach. A stabilised approach is an attitude approach ie. a constant descent profile with the speed gradually reducing to our target approach speed at 50 feet where we will start to come into ground effect. We can achieve this visually by keeping the aim point constant in the windscreen.

Approach speed- the landing distance increases by the square of the increase in landing speed. eg. if the optimum landing speed is 50kts and we try and land at 55 kts we will soak up an additional 21% in landing distance.

Gusty wind- add half the gust strength to the approach speed eg. if the wind is 10kts gusting to 20kts add half the difference or 5kts.

Flaps- the first stages of flap mainly increase lift and help stabilise the aircraft. The final stage mainly increases drag. In gusty conditions speed can be controlled with power and the last stage of flap can be delayed until late final which will allow better control and let us place the aeroplane on our chosen touchdown point more accurately. It is also easier on the machinery rather than dragging it in with heaps of power and the flaps rattling in the tracks. Practice on smooth days and as we gain more finesse we can become more accurate. We can never do enough circuits.

## Field Inspection

Every charter pilot will do a precautionary search before going into an unknown bush strip. It is not just an emergency procedure.

Take your time. Configure the aeroplane for slow cruise. Set flaps, power and trim so the aeroplane will fly straight and level hands free. For constant speed prop aeroplanes set the pitch up to full fine so that when you want to climb or descend all you have to do is work the throttle. KISS principle. Trying to inspect a field and having to juggle power and pitch settings is too busy.

Retractable under carriage- some aeroplane are more stable with the gear out but not all. I recall having to fly a Piper Lance for 150 miles with the gear out due to a retraction problem. Not the most pleasant flight as the Lance is less stable at low speeds with the gear out. These actually fly better slowly with the gear up and more flap out. Don't forget to put it down when you are coming round to land!

## Flight Manual

All the above tips are rules of thumb. The manufacturer of your aeroplane spent many dollars test flying the plane to produce a flight manual which will direct you to obtaining the best performance from your plane.

Become familiar with the Flight Manual and fly the aeroplane by the book.

Fly safe,