Stan/Eval Newsletter
CIVIL AIR PATROL
UNITED STATES AIR FORCE AUXILIARY
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Pulling the prop after engine failure (LtCol S. Lipson TXWG)
Pilots, who have flown more complex aircraft, might be familiar with the concept of "feathering the prop" during an engine out situation. The idea is that by twisting the blades into a more vertical position with respect to airflow, drag is reduced (increasing glide ratio or performance while on one engine). This is effective in an aircraft designed to allow propellers to feather. It stops windmilling, which is a major source of drag.

Some instructors (and pilots) extrapolate that technique to our more modest aircraft (namely our C182, GA8, and MT7 aircraft – anything with a constant speed non-feathering propeller) by moving the propeller control to "low RPM / High pitch" during a simulated or actual emergency. This is taught to reduce propeller drag and extend the glide. Indeed, this works in a simulated emergency where the engine is still running and producing oil pressure.

Thanks to work from LtCol Rick McElroy, we've now confirmed this is typically NOT effective in a real emergency. After contacting Textron Aviation, in a truly windmilling situation (no engine power), there is not enough oil pressure to change the blade angle. The prop governor's minimum setting is around 1100 RPM which means nothing happens when you move the blue knob when windmilling. To get more RPM with a dead engine you need to push the nose down defeating the attempt to hold best glide. Working with the propeller control just causes an unneeded distraction. Most importantly, if you rely on this technique from a simulated environment (where there is residual engine power), you will end up with a mis-guided judgement of just what your airplane can actually do. This also explains why pulling the prop is not an item on the engine failure checklist.

There might be a few isolated circumstances where it could work, with partial power, but in general it won't. At idle power, pulling the prop isn't going to hurt anything. There is no prohibition against practicing with the two techniques. It also might be incredibly informative to see how much drag your propeller ***really*** causes when windmilling, but don't mistake that extra glide-ratio with anything you'd see in a true engine-out scenario.

Taking Off and Landing with a Tailwind

Taking off or landing with a tailwind is usually a bad idea but may be necessary in some very specific instances. Traffic, runway slope, ATC or terrain are a few considerations that might invite a tailwind operation. A recent article in "Flying Lessons Weekly" provides some rules of thumb for tailwind takeoffs and landings that might surprise pilots but are good rules of thumb to follow. Most Pilot's Operating Handbooks (POHs) will carry at least some caution or warning about tailwind takeoffs and landings. Combine the recommendations of a few and you can derive some good rules of thumb about tailwind takeoffs and landings, so you can decide if it's worth the risk.

For example, the Cessna 182S POH gives some guidance on the relative effects of a tailwind versus the "conventional" headwind takeoff. Note 3 from the Takeoff Distance performance chart tells us that we should decrease the takeoff distance we derive from using the chart by 10% for every nine knots of headwind. But it also tells us to increase takeoff distance by 10% for every two knots of tailwind component.

Put another way, a tailwind component has almost five times the negative performance effect as a comparable headwind component. If you normally take off into the wind to improve takeoff performance, you want to avoid taking off with a tailwind because the performance will be significantly impaired.

SECTION 5
PERFORMANCE

CESSNA
MODEL 182T NAV III
GFC 700 AFCS

**SHORT FIELD TAKEOFF DISTANCE
AT 3100 POUNDS**

CONDITIONS:
Flaps 20°
2400 RPM, Full Throttle and mixture set prior to brake release.
Cowl Flaps OPEN
Paved, Level, Dry Runway — Lift Off: 49 KIAS
Zero Wind — Speed at 50 Feet: 58 KIAS

Pressure Altitude - Feet	0°C		10°C		20°C		30°C		40°C	
	Gnd Roll Feet	Total Feet To Clear 50 Foot Obst	Gnd Roll Feet	Total Feet To Clear 50 Foot Obst	Gnd Roll Feet	Total Feet To Clear 50 Foot Obst	Gnd Roll Feet	Total Feet To Clear 50 Foot Obst	Gnd Roll Feet	Total Feet To Clear 50 Foot Obst
Sea Level	715	1365	765	1460	825	1570	885	1680	945	1800
1000	775	1490	835	1600	900	1720	965	1845	1030	1980
2000	850	1635	915	1760	980	1890	1055	2035	1130	2190
3000	925	1800	995	1940	1070	2090	1150	2255	1235	2435
4000	1015	1990	1090	2150	1175	2325	1260	2515	1355	2720
5000	1110	2210	1195	2395	1290	2595	1385	2820	1485	3070
6000	1220	2470	1315	2690	1415	2930	1520	3200	1635	3510
7000	1340	2785	1445	3045	1560	3345	1675	3685	---	---
8000	1480	3175	1595	3500	1720	3880	---	---	---	---

NOTE

- Short field technique as specified in Section 4.
- Prior to takeoff, the mixture should be leaned to the Maximum Power Fuel Flow schedule in a full throttle, static run-up.
- Decrease distances 10% for each 9 knots headwind. For operation with tail winds up to 10 knots, increase distances by 10% for each 2 knots.
- Where distance value have been deleted, climb performance after lift-off is less than 150 FPM at takeoff speed.
- For operation on dry, grass runway, increase distances by 15% of the "ground roll" figure.

Figure 5-6 (Sheet 1 of 3)

Cessna gives us similar guidance for landings with a tailwind. The Landing Distance chart contains a similar nearly five-to-one difference between landing distance improvement with a headwind component and increased landing distance with a tailwind.

We can begin to develop some rules of thumb:

- Each knot of headwind component on takeoff improves takeoff performance by roughly one percent, while each knot of tailwind component degrades performance by three to five percent. Tailwinds are three to five times as detrimental to takeoff as headwinds are an improvement.
- While each one knot of headwind component improves landing performance by about one percent, each knot of tailwind component degrades landing distance by about three to five percent. Tailwinds are roughly three to five times as effective at altering landing performance than headwinds…and the alteration is not in your favor.
- In almost all cases, then, there is a very good reason for avoiding tailwind takeoffs and landings, even if it makes more sense for the direction of flight on departure or arrival.

One other aspect to taking off with a tailwind is the climb out. Because your ground speed is higher, your climb angle is shallower making obstacle avoidance a bit more challenging. So, it's not just ground roll we need to consider, but obstacle clearance as well.

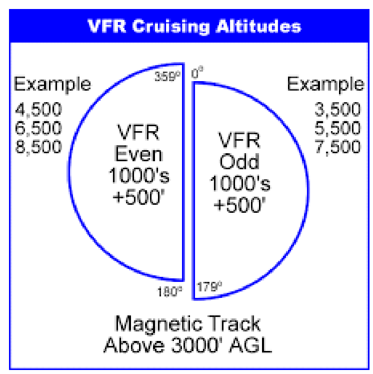
Back to Basics: VFR Altitudes

When planning a VFR flight, we should consider what altitude to fly for each phase of flight. There are various considerations.

- There is the familiar hemispherical rule (FAR Part 91.159) which states that for westbound directions (180 – 359 degrees) we should fly even thousands plus 500. So that would mean 4500 or 6500 and so forth. East bound flights should fly odd thousands plus 500 (3500, 5500, etc.). This rule does not apply below 3000 feet AGL. However, although not mandatory, it lessens the chance of midair collisions by keeping opposing traffic at different altitudes. Remember that it's based on course (track), not heading.

- In high density traffic areas, some pilots recommend flying either 100' above or below these cardinal altitudes to further reduce the probability of midair collision (this assumes everyone else is flying the cardinal altitudes so it's not clear if this is a really good idea).

- Approaching various types of airspaces provides other constraints for VFR altitudes. For example, approaching Richmond VA, you must fly higher than 4200' MSL to remain clear of the Class C airspace or fly under 1400' MSL to fly under the outer ring.



- When flying the pattern, the traffic pattern altitude (TPA) is usually published in the AFD. If no published TPA exists, fly 1000' AGL, if practicable. If you are at a towered airport, ATC may specify a particular altitude for either takeoff or landing.

- When departing VFR at night, from an airport, follow the obstacle departure procedure (ODP) associated with that airport. Most airports have ODP's and the ODP will save your life as it ensures terrain clearance. If no ODP is published, study your sectional carefully or talk to local pilots about the best way to depart and altitudes to maintain.

- A night VFR flight should consider the minimum elevation figures (MEF's). Those are the altitudes you see on sectionals that ensure terrain clearance. Unless you are very familiar with your route, choose an altitude greater than the MEF to avoid hitting anything.

- If you really aren't sure where you are, but think you are in the Continental United States, consider that Mt Whitney at 14,494' is the highest point (sans towers and trees). If you fly higher than 14,494' and hit terrain, it means you are not in the Continental US.

- CAP has other constraints on VFR altitudes. CAPR 70-1 prohibits sustained flight (e.g., this doesn't apply for takeoff, landing or any operation where safety dictates otherwise) during the day, below 1000' AGL or during the night, below 2000' AGL. If you are a Cadet Orientation Pilot, there are additional altitude restrictions associated with orientation flights.

- Finally, VFR altitudes to fly should consider wind and fuel efficiency. Pick an altitude consistent with safety and operational concerns that minimizes any headwinds and maximizes any tailwinds. Most non turbo charged piston GA aircraft are most efficient between 7000 and 8000 feet MSL (but check your POH).

Runway Incursion (P. Corman, Mooney Flyer)

As you have probably read, there was a scary runway incursion at JFK between a Delta and an American Airlines aircraft. The American jet (Boeing 777) crossed the runway that the Delta jet (Boeing 737) was departing. The tower caught it and twice told the Delta pilot to cancel the clearance for takeoff. The Delta 737 was able to stop without an incident, but Wow! Apparently, there were approximately 1,400 runway incursions last year, with most of them occurring at towered airports – which makes sense. At towered airports, there are more aircraft and probably more runways, but it is still a serious problem that seems easily avoidable. So, let's go over a few things, starting with the runway boundaries. It's marked as shown here to the right. If you are on the side of the two solid lines, you are NOT in the runway environment. If you are on the dashed lines side, then you are still on the runway and should exit directly without delay, unless instructed otherwise by ATC. The way to remember this is with the expression "Dash across the lines." There are two ways you can cause a runway incursion. The first is to enter the runway at the threshold without a clearance from the tower. Clearances have only two forms:

- ➢ Cleared for Takeoff
- ➢ Line Up and Wait

Both clearances require you to acknowledge the clearance, including your call sign, before entering the runway. For instance, "Mooney 77 Victor, line up and wait." The other runway incursion occurs when you cross a runway (active or not) without ATC clearance. In this instance you will hear "Cleared to cross runway X". *(Ed note: Landing on the wrong runway is a third)*. Again, you need to acknowledge the clearance with your call sign. This clearance is often given with taxiway directions as well. At JFK, the American 777 called ATC to confirm whether they had clearance to cross the runway.

The items to remember here are simple. Do NOT enter a runway environment without getting a clearance and acknowledge the clearance with your call sign.
(Editor’s note: The Mooney Flyer is a great resource for general piloting skills. Although focused on Mooney's, there are a lot of articles that apply to all general aviation.)

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