Stan/Eval Newsletter
CIVIL AIR PATROL
UNITED STATES AIR FORCE AUXILIARY
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Back to Basics – Landings and Takeoffs: Landings and takeoffs are considered critical phases of flight and offer the pilot lots of opportunities for bent metal, or worse still, injury or death. Every takeoff and landing is different but a good pilot will reduce the variations in these phases of flight as much as possible so that they are predictable, routine, and safe.

Takeoffs and landings are planned events. It's difficult to have a flight that doesn't involve at least one of each. Submariners keep careful track of submerges and surfacing ensuring they are equal at the end of a deployment. Pilots should also ensure the number of takeoffs equal the number of landings. Prior to takeoffs and landings, the pilot should know the runway requirements (distances, surface conditions, and so forth) and related items such as climb rates, descent rates, and weather (visibility and winds). There can always be surprises such as wildlife encroaching on the runway or other situations, but make sure the basics are planned for.

Prior to takeoff, the pilot needs to consider what actions will be taken if an emergency occurs including loss of power or loss of directional control.

Takeoff techniques vary by aircraft and type of takeoff (soft field, short field, normal) but the basics are the same. Power should be applied smoothly, controls positioned for the winds, and the aircraft kept on the centerline. As the aircraft accelerates the pilot can use a rule of thumb that says that the aircraft airspeed should be at 75% of its takeoff speed by at least halfway down the runway. The pilot should abort any takeoff that has any anomalies or if something doesn't "feel right". It's a lot easier to troubleshoot on the ground than in the air. Once the aircraft reaches Vr, climb at the appropriate airspeed (usually Vy) until a safe altitude has been reached. Don't ask me what a safe altitude is but its somewhere above the altitude of the runway.

Common takeoff errors include:

- Lack of a plan in case of loss of power or loss of directional control
- Not configuring the a/c properly for takeoff (flaps, prop, mixture, cowl flaps, and so forth)
- Allowing the a/c to drift off the centerline
- Improper positioning of the controls for the winds (or worse, the pilot is oblivious to the wind conditions!)
- Riding the brakes on takeoff
- Not rotating at an appropriate airspeed
- Not maintaining an appropriate climb attitude and airspeed after rotation (this is especially important at night or in instrument conditions)

- Not aborting the takeoff when something is not right

For landing, the old adage applies: good landings start with a good approach. A good approach will put you on final in a position from which a normal landing can be made. Once on final, stabilize the a/c on the extended centerline of the runway by either using a wing low technique or crabbing till just before touchdown.

Airspeed control is the most critical parameter for landing. The POH will designate an airspeed on final – fly this value adjusted for your actual weight and configuration. In gusty and windy conditions, you may need to fly slightly faster for better control. You may also want to land with less flaps or even no flaps in gusty conditions but check your POH. Flying the "spot" method will help you touchdown at the intended point on the runway. Reference to a VASI or electronic glide slope can also be used unless you want to land on the numbers. The a/c is flown down to just a few feet above the runway at the appropriate airspeed. A flare is then initiated, power reduced, and the aircraft held a just above the runway until touchdown. It is important that the aircraft not be allowed to drift off centerline while touching down and that the wheels be aligned with the direction of travel. Drifting on touchdown causes excessive side loads on landing gear that aren't capable of much sideward pressure. You risk damage to the tires and mechanical damage to the gear. Hold enough crosswind correction to eliminate any sideward drift and make sure the wheels are aligned with the direction of motion.

The main gear must touchdown first – nose gear landings are asking for trouble. Although many aircraft (especially heavier twins) are landed somewhat flat (again, all aircraft land main gear first – even the A380), our Cessna fleet is much happier with a pronounced nose up attitude on landing. Landing on the nose gear can cause porpoising or worse still, nose gear collapse. But don't overdo it as excessive nose up attitudes can result in a tail strike. Once the aircraft touches down, the a/c must be flown to a complete stop. Even when the aircraft is rolling on all wheels, aerodynamic forces are still acting on the aircraft and must be controlled until the aircraft is stopped. Gentle braking should be used once all the wheels are on the ground. A good pilot flies the airplane until it's tied down and chocked. Finally, be ready to go around if things don't look right. Even the best of pilots can be bested by unexpected wind gusts, unexpected runway guests, and so forth.

Common landing errors include:

- Sloppy approaches
- Poor airspeed control
- Poor crosswind correction
- Poorly executed flares resulting in ballooning, hard touchdowns and nose wheel first landings
- Not keeping the a/c on centerline
- Excessive braking resulting in tire bald spots
- Not flying the a/c until it's tied down
- Not initiating a go around when appropriate

We should initiate a go around if we do not have a stabilized approach. As we turn final, we should be on airspeed, on centerline, and have established the proper descent rate. Otherwise, go around. Go arounds cost nothing and have saved many a pilot from embarrassment.

COVID Vaccine Guidelines from the FAA: The FAA has come out with guidance for aviators who take the vaccine for COVID. You can read it here. The bottom line is you have to wait 48 hours after taking the vaccine before flying.

How to Miscalculate TOLD: Calculating takeoff and landing distances (TOLD) as part of flight planning is a best practice that all pilots should do. This is often required for Part 135 and Part 121 operations. The ORM that we complete before every flight requires us to consider TOLD. In CAP where we often takeoff from 5000' runways (or longer) in a C182, it seems unnecessary but it's always a good practice. Unfortunately, in some cases, the calculated TOLD creates an overly optimistic expectation of takeoff and landing performance. In a recent CAP mishap at KANP, the ORM factor for takeoff and landing distances was rated as "Good" yet the aircraft overran the 2500' strip. A post-accident calculation showed that the ORM factor was correct yet the overrun still happened.

The truth is that TOLD calculations can be a bit tricky as it is difficult to account for all factors. And of course, even if we account for all factors that's a bit of a prediction. What if conditions are not what we had assumed? As someone wiser than me once said "Prediction is very difficult especially when we try to predict the future." TOLD is the aviator's way of predicting the future.

Let's get on with miscalculating TOLD. Here is a sure-fire way to get it wrong.

Use the numbers out of the POH without thinking too much about them. This is my favorite technique to get it wrong and it has a lot of variants. Consider the following takeoff performance for a C182T NAV III (found on the next page). To make things easy assume we have a pressure attitude of 1,000' and an outside temperature of 10 degrees C. This chart says we will have a ground roll of 835 feet and can clear a 50' obstacle in 1600'. Some pilots will stop there and assume they'll match these numbers so taking off on a 1,000' runway is fine. We can be pretty certain that rarely if ever will a C182 NAV III ever perform this well. Here are just a few reasons why.

This POH assumes you are using a short field technique which most of us rarely use (except on a Form 5 check ride where it becomes clear, the last time we did one was on last year's Form 5). So, we are in trouble already. The short field technique requires the use of 20 degrees of flaps and holding the brakes. It also requires lift off at 49 KIAS (speed varies according to weight - this is at 3100 lbs. At 2300 lbs. its 42 KIAS). From what I've observed on Form 5's (myself included) lift-off is rarely at the specified airspeed (usually 5 - 10 knots faster) which extends the roll considerably. Do you know at what airspeed you need to rotate to achieve a liftoff at 49 KIAS? The POH doesn't tell you. Only the Cessna test pilots know. I do know you have to rotate prior to 49 knots to lift off at 49 knots. More like 45 knots (not correct but close). Many pilots rotate at 60 knots (resulting in a liftoff of about 65 knots) on a short field demonstration which effectively negates any advantage to this technique. When I ask them to rotate at 45 they look at me like I'm crazy. Yes, I'm crazy but follow the POH. Rotating at 60 knots no matter how you set the flaps or do a run-up does not result in a short field takeoff.

There is the little phrase at the top of the table that says: "mixture set prior to release" which we usually take to mean "full rich." Oops. Doesn't say that and doesn't mean that. The note below the table explains "Prior to takeoff, the mixture should be leaned to the Maximum Power Fuel Flow schedule in a full throttle static run-up." We all do that, right? Doubtful. When was the last time you looked up the maximum power fuel flow schedule? Gee whiz. Where is that? With the mixture full rich you probably aren't developing full power and won't achieve the takeoff distance. But over-leaning will cause other problems. Don't go there! Buried deep in the normal procedures is the advice that you need to lean for takeoff when the pressure altitude (not sure why they don't specify density altitude) is greater than 5,000'.

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.

And of course, this assumes a smooth dry runway unless you adjust for grass as specified in the note at the bottom. For a not so smooth runway, wet grass, snow, or gravel you are on your own.

How about tire pressure? These numbers were achieved with the tires inflated to the proper pressure. And of course, we check tire pressure on every preflight. If it's a few pounds low, not a

problem. Except an under-inflated tire creates additional rolling friction and adds to your takeoff run. How much? Cessna doesn't tell us but it's there.

Runway slope is a huge factor. Cessna doesn't tell us how to account for that. At best we can use a rule of thumb. One is to increase ground roll 10% for each 1% of upslope. Sparky Imeson in his Mountain Flying Bible says to increase it by 7.5% for every 1% of slope but I use 10% for simplicity. Either way, that's a lot!

Cessna does give us a way to account for winds. Kind of. What is missing is that we usually teach rotation at a speed that is half the gust factor faster than normal rotation. What does that do to takeoff roll? (Hint: it doesn't decrease the roll).

We could go on and on but the point is that the performance tables in a POH are the best you can hope for and you probably will never achieve POH performance be it takeoff, landing, climb, or endurance. Rather than give up however, most pilots have some useful rules of thumb that accounts for lots of factors both known and unknown.

A common rule of thumb is to take the predicted takeoff roll and double it. Some use the distance over a 50' obstacle as the takeoff roll. Others will take the predicted takeoff roll and add the landing roll. All are conservative and should keep you out of trouble in most cases. There are lots more out there that you can use. But the idea is to do the calculation based on the POH and then increase it significantly to account for all the knowns and unknowns.

So much for takeoffs. How about landings? We have many of the same factors for landing that result in us not being able to get very close to the predicted numbers. Wind, runway surface, runway slope, and so forth. The biggest factor that I see commonly is that you may be able to achieve a "short" landing roll but that means little if you can't touch down at the beginning of the runway. So you always have to add to your landing roll the distance from the threshold you can reasonably expect to touch down. It would be reckless in most cases to try and land right at the beginning of the runway as landing just a few feet short would bend metal. Another factor is that the POH assumes "maximum braking" which I don't recommend unless absolutely necessary as the probability of a spotted tire is very high. So again, a rule of thumb is to double landing distances as we did with takeoff distances adding a couple of hundred feet to account for not landing at the edge of the runway.

In a recent "Vectors for Safety", Gene Benson writes: "The daily ASIAS report seems to indicate an increase in runway overruns for all flavors and sizes of airplanes. Apparently, the same trend is being seen in Canada. The Canadian Transportation Safety Board (TSB) has placed runway overruns on its "Watchlist 2020" which was released on Oct. 29. This is disturbing since most of the US has not yet seen runways contaminated with snow or ice."

Airspeed control for landing is critical. Some pilots "add a few knots" to their approach speed for "safety". This results in more float and extends the roll. Not sure that is increasing safety. If we look at the Cessna POH for the C182 NAV III the short field landing distances assume 60 KIAS at 50 feet (and full flaps). Despite some pilots' fear of stalling on short final (something we certainly want to avoid), 60 KIAS provides a good margin over the full flap stalling speed of 41 KIAS (which is actually 49 KCAS). Many use the normal approach speed of 65 KIAS for which there is no performance table. What I have found is that for a Cessna 182, 5 more knots add about 20% to the landing roll. Your experience may vary.

If you want to formalize TOLD, there are many TOLD cards out there. FltPlan.com has a good one, ForeFlight has them, you can buy them online, or you can make up one yourself. Its good discipline but choose one you will actually use. Most require too many details that are not useful. Stick to the basics. But just remember, don't let a calculation fool you into thinking you

are going to achieve whatever you calculate. Add a healthy margin to any calculated number from the POH to account for what you don't know.A good discipline if you really want to understand how difficult it is to predict takeoff or landing distances is to do the following. For every flight, calculate as best you can what the takeoff distance and landing distance you will achieve. (This is not to be confused with how much runway you will accept. You may reasonably expect a takeoff roll of 800' but don't accept an 800' runway!). Then see what your actual landing and takeoff performance really is (you can count the stripes on the runway on takeoff or landing to estimate actual distance). Then try to figure out why your actual distances are different from the calculated distances. Its a great learning experience and will do two things for you. First it will give you a good appreciation for how different the actual performance is from the predicted. Secondly, it will greatly improve your ability to predict actual TOLD performance. Fly safe!

Medical Emergencies: As pilots, much of our training is how to handle emergencies. But the emergencies we train for are things like engine failures, electrical fires, control anomalies, and so forth. But as CAP pilots and crew members we also need to worry about medical emergencies that could incapacitate the pilot or crew member. An engine failure is easy to recognize, but would you know if your fellow crew member was having a stroke or heart attack? Or worse still, you are the one experiencing some disabling medical event? Most of us aren't trained doctors, nurses, or EMTs. Some may have had some first aid training but that's about it. So, it might be useful to review two of the more common medical events that we might encounter when in the air ignoring non-life-threatening conditions such as air sickness or sinus pain induced by rapid altitude changes.

Stroke: A stroke can be thought of as a "brain attack." Blood flow has been restricted to some part of the brain. The symptoms vary depending on which part of the brain is affected. Strokes can be so mild that no one notices while in other cases it results in death. Stroke is the fifth leading cause of death in this country. Recognizing it early and getting proper medical attention greatly increases the chance of survival and limiting any lasting effects from the stroke. The person having the stroke is often unaware that anything is wrong.

Stroke victims can exhibit many symptoms. Common symptoms include:

- Sudden numbness or weakness in the face, arm, or leg, especially on one side of the body
- Sudden confusion, trouble speaking, or difficulty understanding speech
- Sudden trouble seeing in one or both eyes
- Sudden trouble walking, dizziness, loss of balance, or lack of coordination
- Sudden severe headache with no known cause

If you suspect someone is having a stroke you can do the following:

- Observe if their speech is slurred and/or they have difficulty understanding you.
- Ask them to look at you and smile. If the smile is only on one side, this could indicate facial paralysis.
- Ask them to raise both arms. Again, an inability to lift both arms at the same time could indicate a stroke affecting one side.
- A sudden change in mental status – a person undergoing a stroke will often become confused (not to be confused with pilots trying to understand CAPR 70-1).

If you see any of these symptoms, declare an emergency, let ATC know you need an ambulance at the closest airport and land without delay. Time is really critical. And you are not a doctor so don't assume it's a stroke. It might be something else altogether, but those symptoms are an urgent sign this person needs help. If the stroke victim is the PIC, take control of the aircraft. Click here for an informative video.

Heart Attack: A heart attack is caused by restricted flow of blood to some part of the heart. The five major symptoms of a heart attack are:

- Chest pain or discomfort.
- Pain or discomfort in the jaw, neck, or back.
- Shortness of breath.
- Pain or discomfort in arms or shoulder.
- Feeling weak, light-headed, or faint.

As with stroke, your actions should be the same. Declare an emergency and get medical assistance to meet you on the ground at the closest available airport. Click here for more information.

CAP Flying is Different: It's important that aircrews keep in mind that flying in CAP is different from typical general aviation flying. Some of the differences include:

- In addition to the requirements that the FAA has for aircrews (pilot certificates, medicals, flight reviews, seatbelt usage, and so forth) CAP adds additional requirements including adherence to CAPR 70-1 and certain ICS requirements. Obtaining a flight release is one of the big differences.
- All CAP flying is mission oriented. There are no "pleasure" flights in CAP or just drilling holes in the sky. We may enjoy CAP flying but every flight has a mission symbol and must have an objective.
- There is a priority in the type of flights. A search and rescue mission will have precedence over a proficiency flight. Mission symbols are an indication of the priority of the particular flight.
- CAP aircraft are mission assets. Aircraft are to CAP what fire engines are to the fire department or ambulances are to the hospital. They are not club airplanes and they are not there for our personal use. We strive to keep them and their crews mission ready.
- CAP flying is generally done with an aircrew. Although some flights may just have a pilot, most have an aircrew, even if it's a cadet O ride. Crew resource management must be a part of our discipline. We don't carry passengers. We carry aircrews.
- Aircrew members have pre-defined roles, duties, and responsibilities. Pilots, observers, and scanners all have well defined tasks that they must accomplish and the skills to support them.
- CAP aircraft carry equipment specific to the CAP mission. We have special radios, we carry DF equipment, we have windows that open for photography, we have high-end camera and full motion video systems, and so forth. It's our responsibility to be able to operate this special equipment professionally and effectively.
- Although we do not have the strict procedures that the airlines use, we do insist on disciplined flying. This includes using checklists, crew briefings, the use of WMIRS, obtaining flight releases, and complying with CAPR 70-1.

Cold Weather Flying: For much of the country now temperatures are often below freezing and complicated by snow, ice, or frost on flying surfaces. It's a good idea to preheat an engine prior to start when temperatures are below freezing. Although this makes starting the engine easier a more important reason is to reduce wear on the engine. Starting a cold engine can cause excessive wear. All aerodynamic surfaces must be clear of any contaminants (frost, ice, snow). Flying with even a light frost on the wings is asking for trouble. Don't do it!. If you can't preheat and/or can't clear the aerodynamic surfaces, you should cancel your flight.

If your CAP airplane is not in a hanger, it helps a lot to clear any snow or contaminants as soon as possible and then let the sun take care of the rest. Doesn't work too well on a cloudy day but otherwise a good idea.

Articles for the National Stan Eval Newsletter: We are always looking for brief articles of interest to CAP pilots to include in this newsletter. CAP has many very experienced pilots and aircrew who have useful techniques, experiences, and tips to share. Please send your contribution to stephen.hertz@vawg.cap.gov.