

Density Altitude

Turns Bold Pilots into Old Pilots If you Survive !!

It's that time of the year as the temperatures warm up to review the nemesis to us pilots– **Density Altitude**. It won't be long before we're in the 90's and a couple years ago it had almost reached 100°F in early June. At that time, Caldwell was reporting a Density Altitude of 5200'. McCall reached 77°F at 6 PM, resulting in a DA of 7150'. Many of you have seen the effects of DA (along with some poor decision making) in the 2012 Bruce Meadows accident on YouTube. If you want to see a great example of the effects of DA, watch this video: [Bruce Meadows Accident](#)

Here are some things to keep in mind as Density Altitude goes up:

- Power is Reduced
- Lift is Reduced
- Prop performance is reduced

Resulting in:

- Longer Take off Distance.
- Climb performance reduced
- Longer Landing distances
- Lighter loads.

A normally aspirated engine loses approximately 3.5% BHP per 1000' increase in DA from Sea Level. So if you were leaving McCall at DA 7150', the 230HP C182 would be putting out 75% available HP on take-off or 173HP. Our new powerful 160HP C172's would be at 120HP. That assumes that you are leaned for maximum performance.

Takeoff Rules of Thumb:

- A 10% increase in gross weight results in 20% increase in takeoff distance.
- A 10 % decrease in power will increase takeoff distance by 20%
- At a given gross weight, each 1000' increase in DA will cause a 10 % increase in takeoff distance.
- **If you have not reached 70% of Vx IAS by 50% of the runway - ABORT**

Landing Rules of Thumb:

- A 10% increase in IAS will cause a 20% increase in landing distance.
- Landing distance increases approximately 5 % per 1000' increase in DA above Sea Level.

Don't be fooled by what looks to be the "right" ground speed for rotating on takeoff and fairing on final. As DA goes up, true air speeds/ground speeds go up and can be deceiving and possibly result in a stall if you do not pay attention to IAS – Indicated Air Speed. You need to take off and land at the appropriate IAS.

Vx and Vy change as DA goes up and change with weight. Some POH's indicate this in their performance tables, some do not. For every 1000' increase in altitude Vx increases approximately 0.5 mph and Vy decreases 0.66 mph. Also remember Vx & Vy speeds decrease as weight decreases. Vx and Vy can be reduced 1/2 of the percent of weight reduction. If weight is reduced by 5% from gross weight, Vx and Vy can be reduced 2 1/2 %. Consult the respective POH for exact numbers when published.

The Vx and Vy numbers in the checklists are for Sea Level and Gross weight conditions. Performance will be affected if you do not use the appropriate Vx and Vy for the respective weight and DA conditions. When pitching for Vx – don't focus on the air speed indicator – it lags actual airspeed – know the pitch attitude that results in Vx

The weight and balance program on the club computers (and available to download from the T-Craft web page) have tables at the bottom for each bird that show the Vspeed changes with respect to take off and landing weight, and at different density altitudes.

Don't forget to lean properly for maximum power and also proper tire inflation – every little bit helps. We have a compressor in the hanger and a tire gauge near the key lock box.

This is the time of the year to dig out the POH and review takeoff, rate of climb and landing performance numbers and the appropriate takeoff and landing procedures and speeds, especially at higher elevation strips. We're all getting old enough – let's not be bold also.

A quick reference chart provided by the Idaho Division of Aeronautics

DENSITY ALTITUDE:

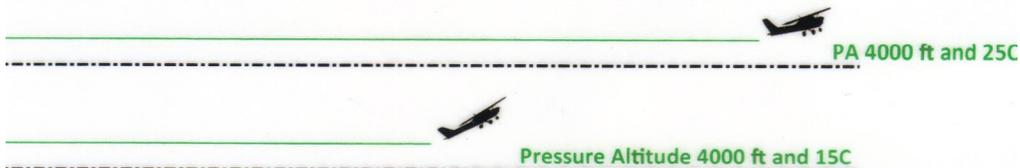
Have you checked your performance today?

(OAT)
Outside Air Temperature

* (PA) Pressure Altitude Ft.	0C	5C	10C	15C	20C	25C	30C	35C	40C
2000				2480	3080	3680	4280	4880	5480
3000			3120	3720	4320	4920	5520	6120	6720
4000			4360	4960	5560	6160	6760	7360	7960
5000		5000	5600	6200	6800	7400	8000	8600	9200
6000		6240	6840	7440	8040	8640	9240	9840	10440
7000		7480	8080	8680	9280	9880	10480	11080	11680
8000	8120	8720	9320	9920	10520	11120	11720	12320	12920

Density Altitude (in red)

Rule of Thumb: For every 1 degree C, Density Altitude increases 120ft



How will a hot and humid day affect your airplane?

- It will increase your take-off distance
- It will reduce your climb performance
- It will increase your landing distance

Refer to the performance section in your airplanes Pilot Operating Handbook (POH)

Enjoy your Flight in Idaho.....safely!

Always Safety First!

Density Altitude Calculator

Derived from US National Weather Service Formula

**Obtain PA at airport by setting 2992 in the Kollsman window of the aircraft altimeter*

Dan Etter

Idaho Division of Aeronautics

(208) 334-8777 Office

(208) 631-5613 Mobile

dan.etter@itd.idaho.gov

*Fly Safe Fly Smart, Have Fun, AND don't do anything Stupid.
Jim Hudson
T-Craft Safety & Membership Director*