

The National FAA Safety Team Presents

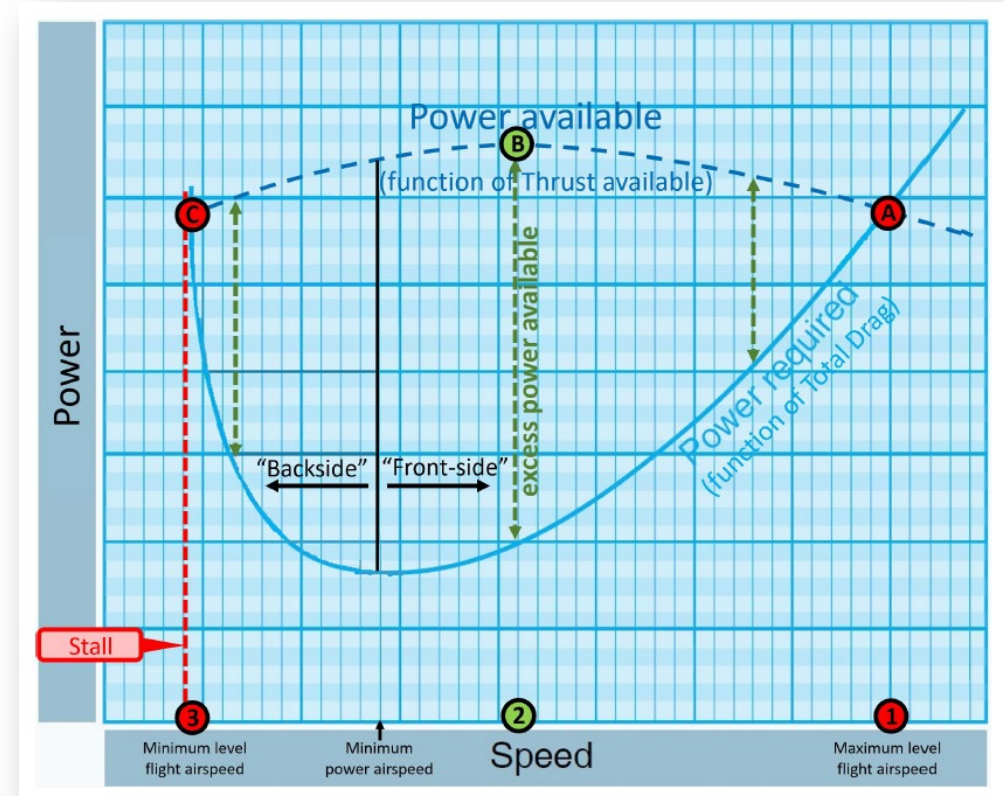
Energy Management



Federal Aviation
Administration

Presented to: Utah Aeronautics Conference 2024
By: Rex Shoell SLC FSDO FAAS Team
Date: May 21st 2024
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Produced by:
The National FAA Safety Team (FAAS Team)



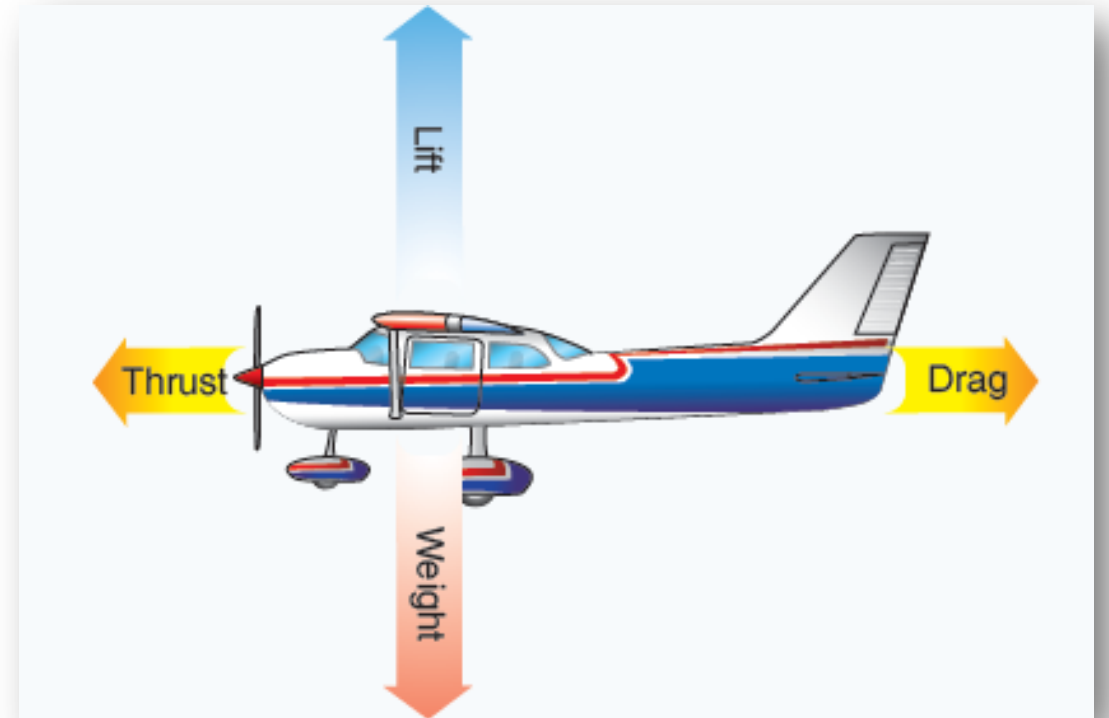
Welcome

- Exits
- Restrooms
- Emergency Evacuation
- Sponsor Acknowledgment
- Silence phones



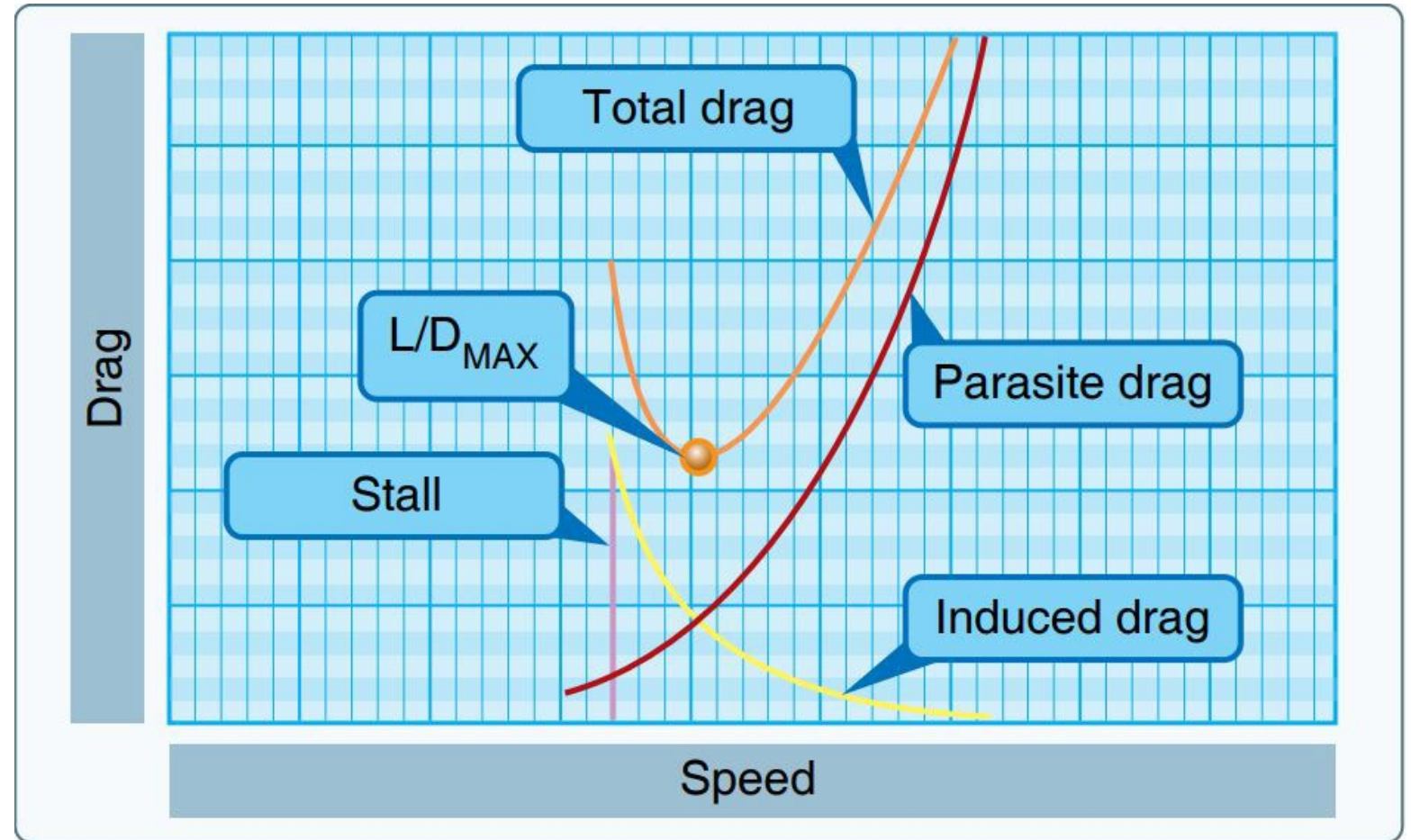
Terminology

- **4 Forces**
- **Drag**
 - Induced
 - Parasitic



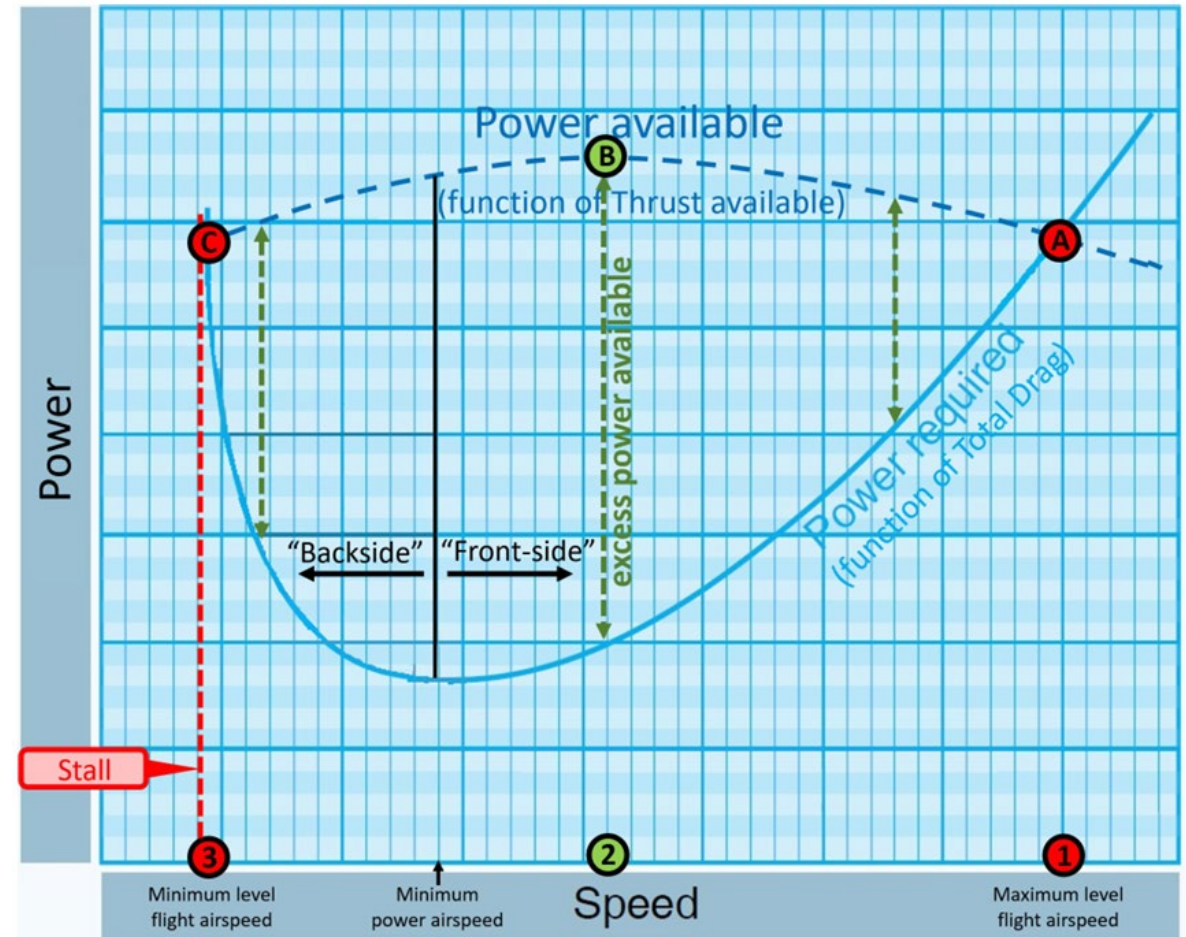
Terminology

- **Drag**
 - Parasitic
 - Induced



Excess Power Available

- **Drag increases at the square of speed**
 - If we double our speed we'll quadruple our drag
 - There is a point where no excess power is available to go faster (A)



Energy instruments



- Tach, Manifold Pressure, Torque Meter

- Airspeed and Altimeter



Energy Management



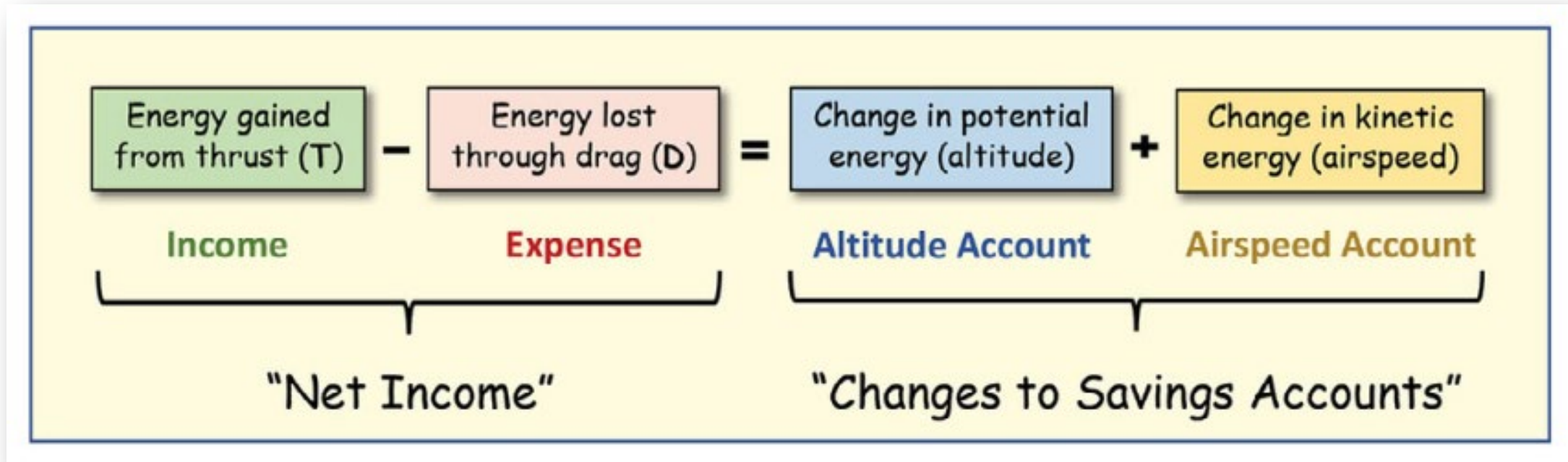
- **Kinetic Energy - Airspeed**



Potential Energy - Altitude



More on managing energy



Energy controls

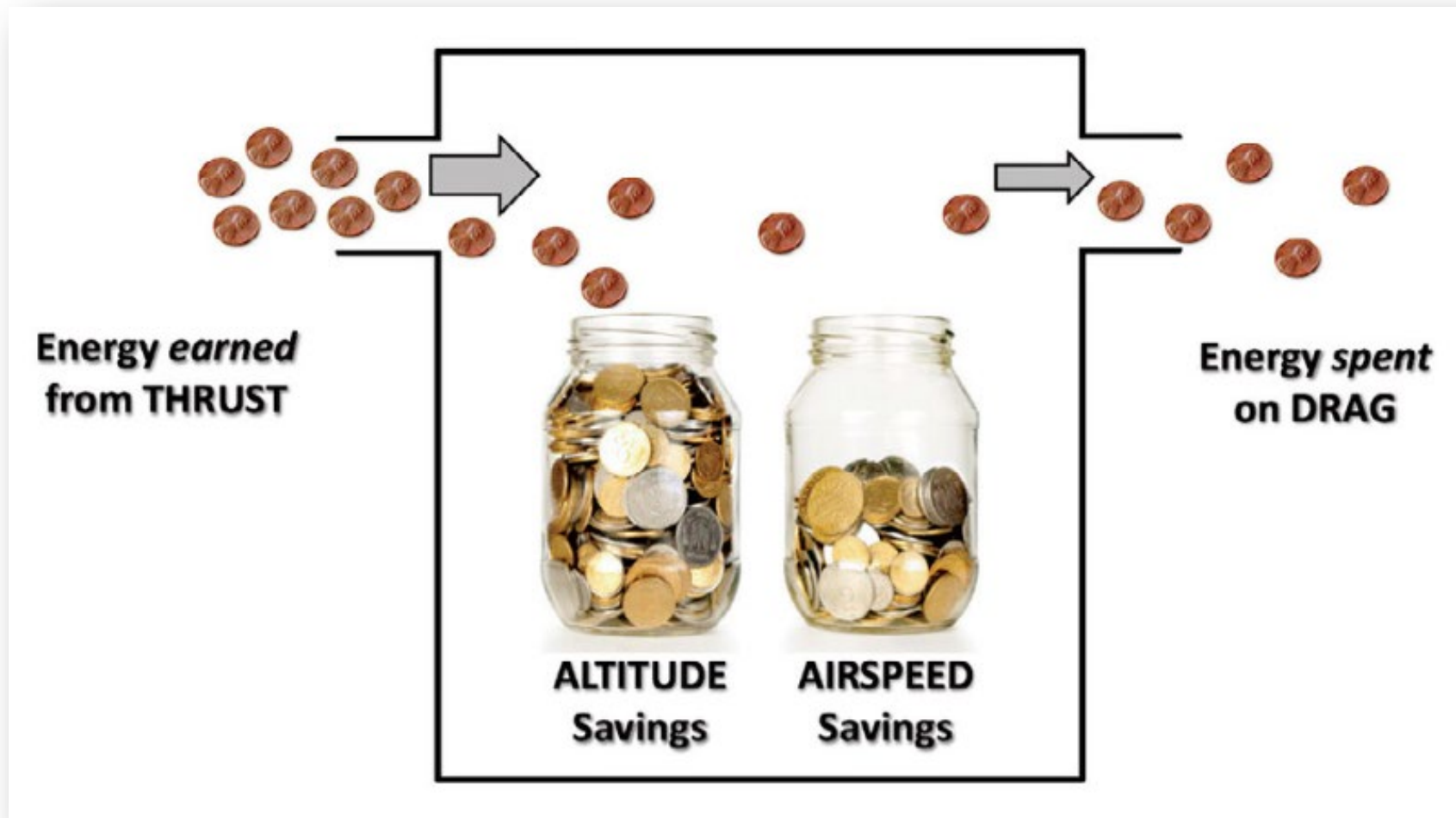
- **Throttle**
 - Total energy regulator



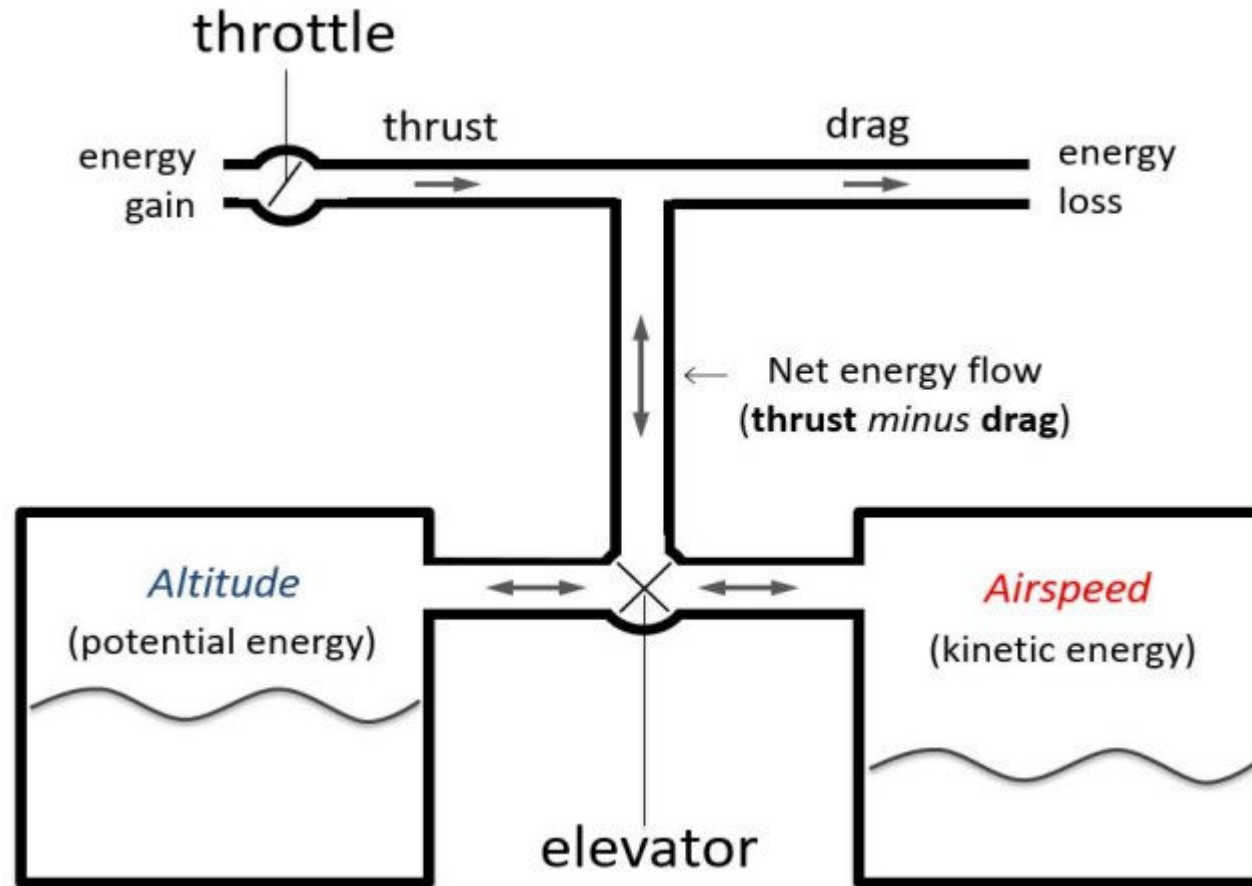
- **Elevator**
 - Energy exchanger

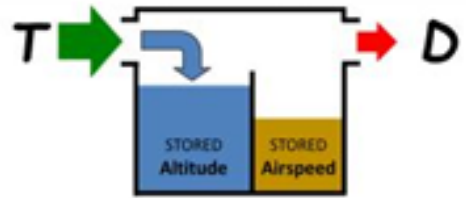
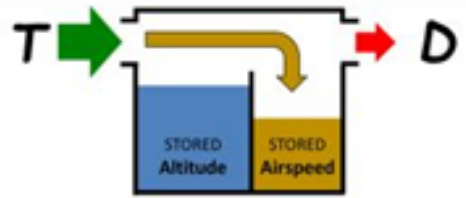
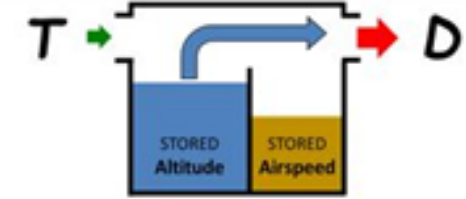


Energy banking



Energy controls



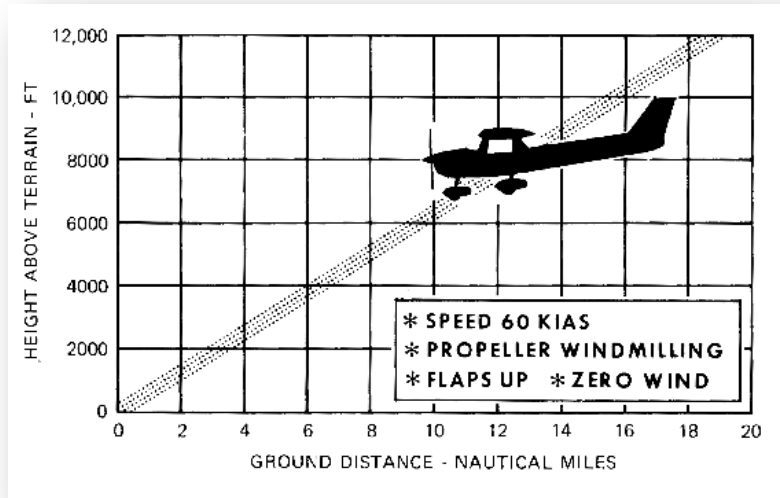
Energy Transaction Examples		Net Energy Change (T - D)	Change in Stored Energy		Resulting Aircraft Condition
			Altitude	Airspeed	
A		> 0	Increase	No change	Climb at constant airspeed
B		> 0	No change	Increase	Acceleration at constant altitude
C		< 0	Decrease	No change	Descent at constant airspeed



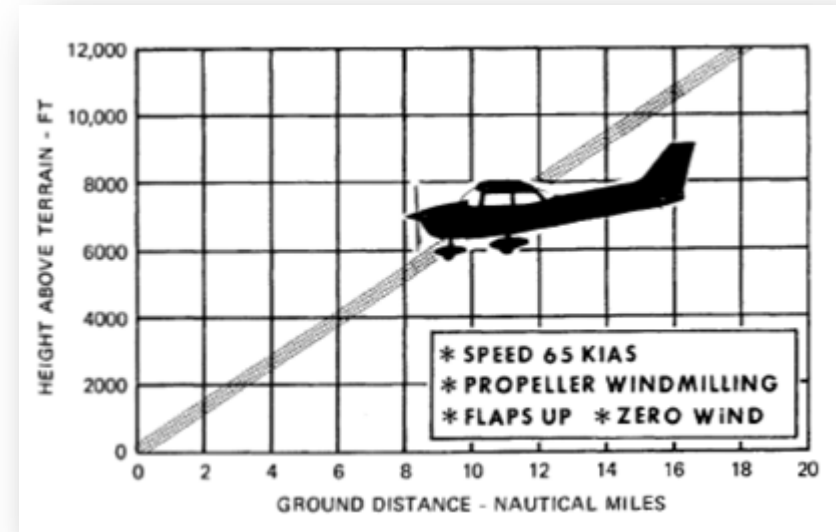
Energy Transaction Examples		Net Energy Change (T - D)	Change in Stored Energy		Resulting Aircraft Condition
			Altitude	Airspeed	
D		< 0	No change	Decrease	Deceleration at constant altitude
E		= 0	No change	No change	Constant altitude and airspeed
F		= 0	Increase	Decrease	Climb and deceleration



How far can you glide?



~1.5 NM per 1,000 Ft. AGL



While we're at it

- **Power off Approaches and Landings**
- **Best Glide Speed**
 - Greatest distance (in calm air)
- **Minimum Sink**
 - Speed to fly for greatest time



Distance

- **Maximum range speed (V_g)**
 - Greatest distance covered for altitude lost
 - Best glide speed
 - Often half way between V_x & V_y
 - Decreases when weight is below MTOW



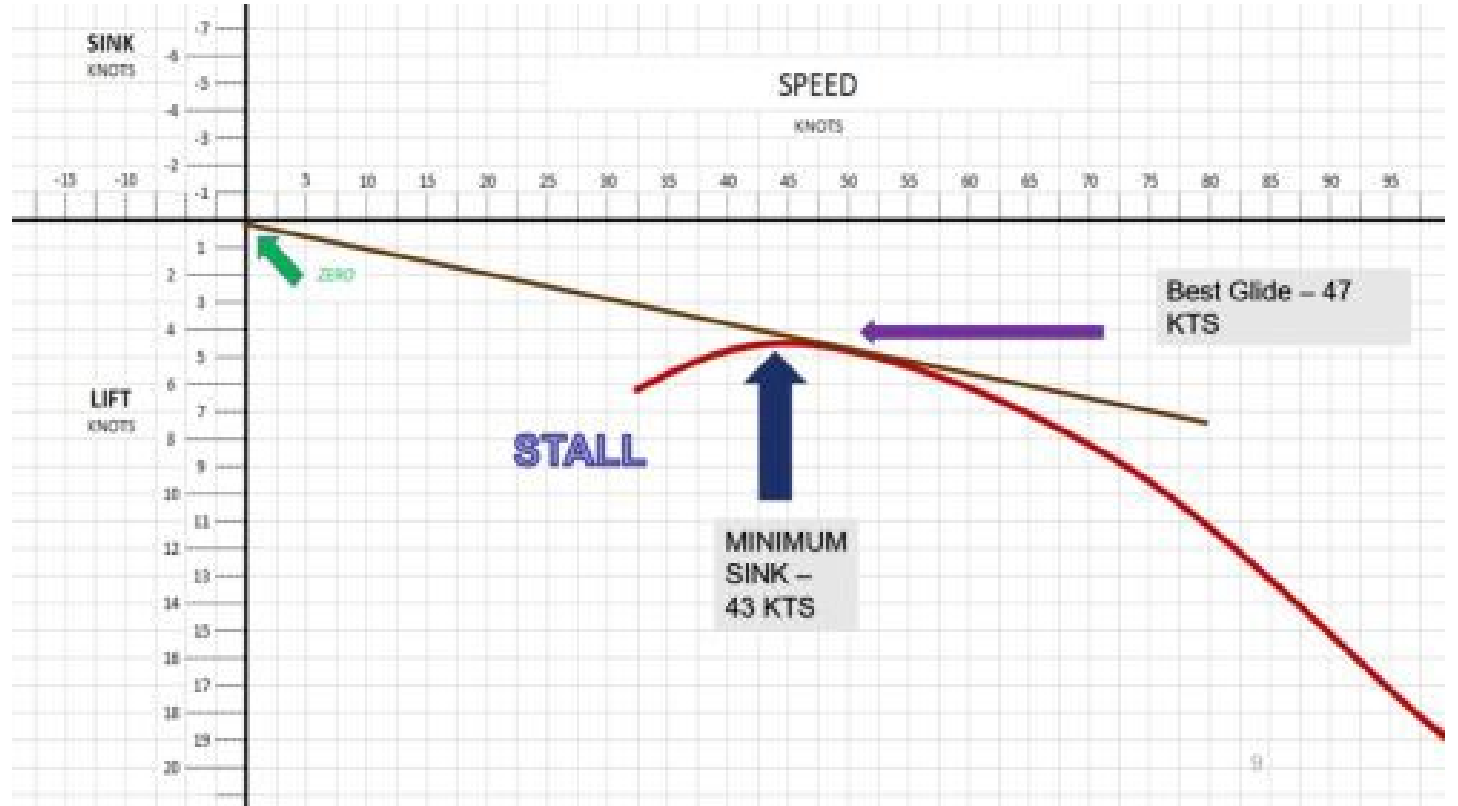
Aircraft	V_x	Best Glide	V_y
C172	53	65	73
AA5A	78	83	91
PA 28 161	63	73	79



Time

- **Minimum sink speed**
 - Lowest rate of descent
 - Slightly slower than V_g
 - Rarely cited in POH

For more info see ALC-629



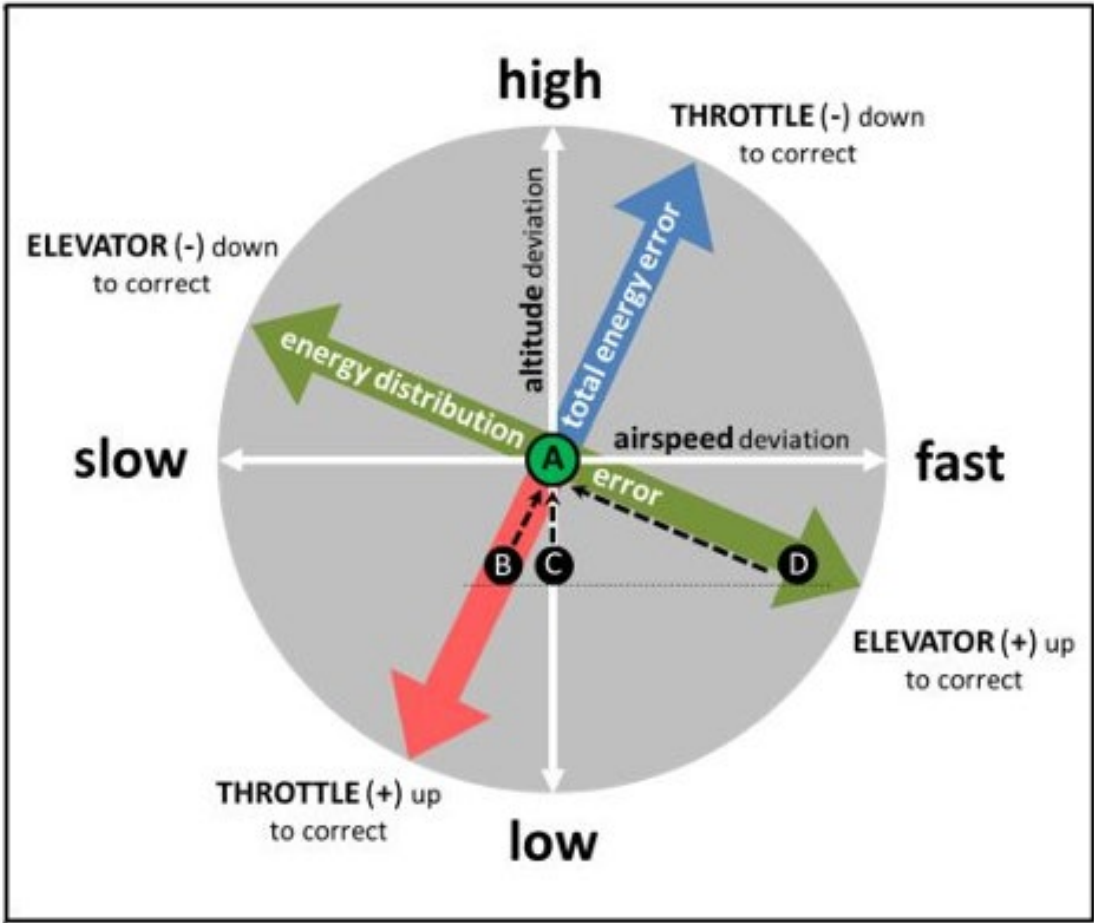
Application



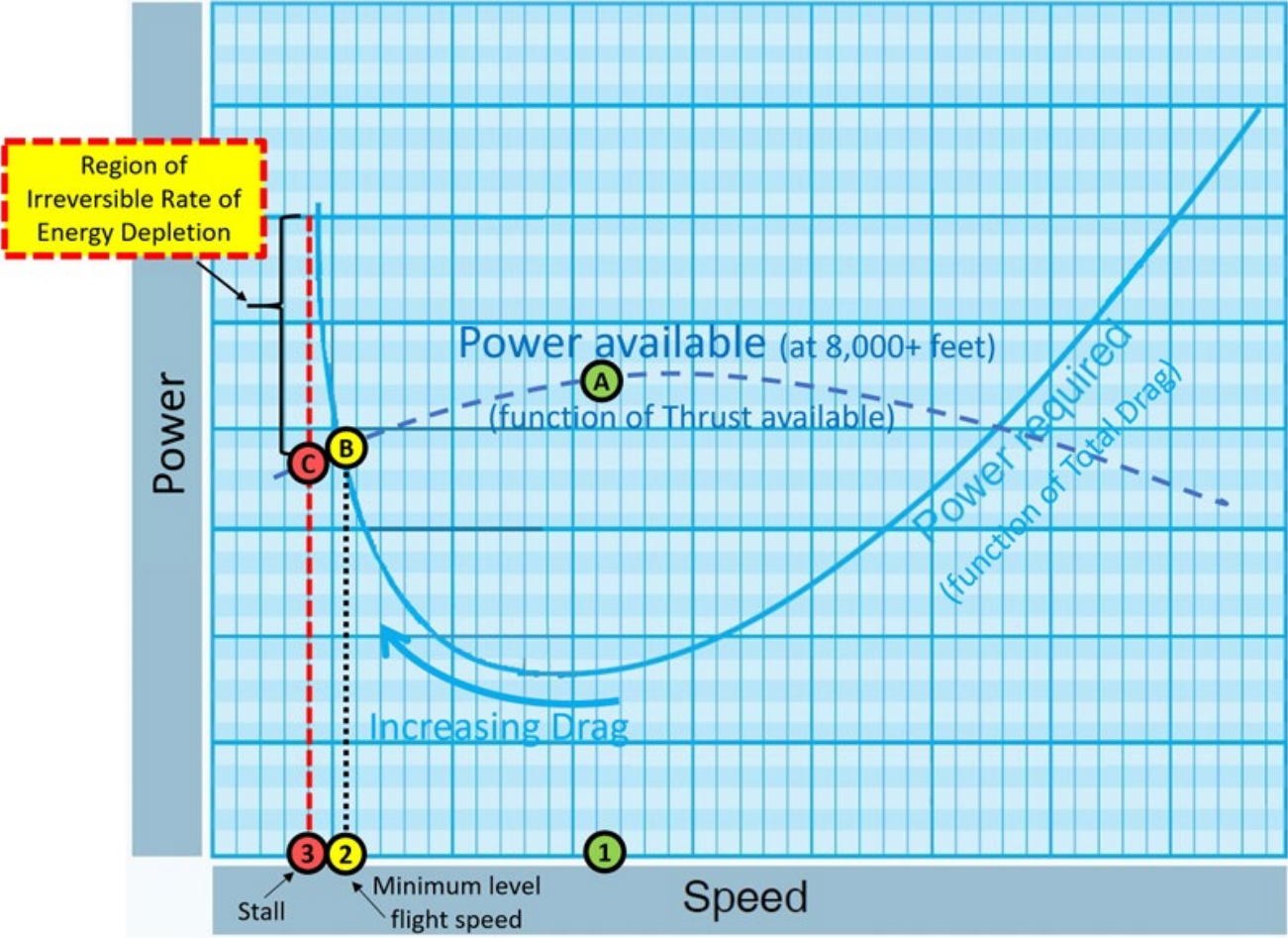
		Airspeed		
		Slower	Desired Airspeed	Faster
Altitude	Higher	(1) Total Energy: OK Potential energy: high Kinetic Energy: low	(4) Total Energy: high Potential energy: high Kinetic Energy: OK	(7) Total Energy: very high Potential energy: high Kinetic Energy: high
	Desired Altitude	(2) Total Energy: low Potential energy: OK Kinetic Energy: low	(5) Desired Energy State Total Energy: OK Potential energy: OK Kinetic Energy: OK	(8) Total Energy: high Potential energy: OK Kinetic Energy: high
	Lower	(3) Total Energy: very low Potential energy: low Kinetic Energy: low	(6) Total Energy: low Potential energy: low Kinetic Energy: OK	(9) Total Energy: OK Potential energy: low Kinetic Energy: high



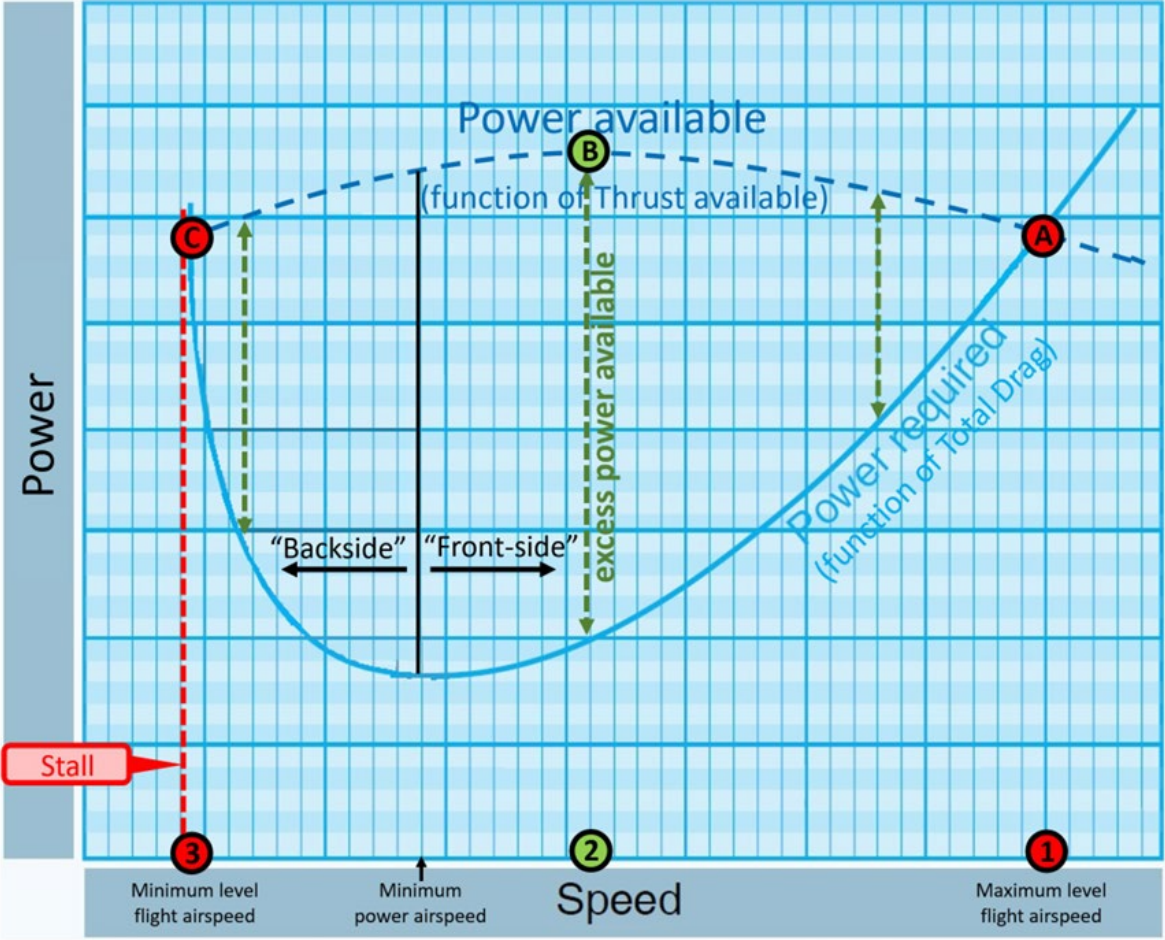
Application



Application

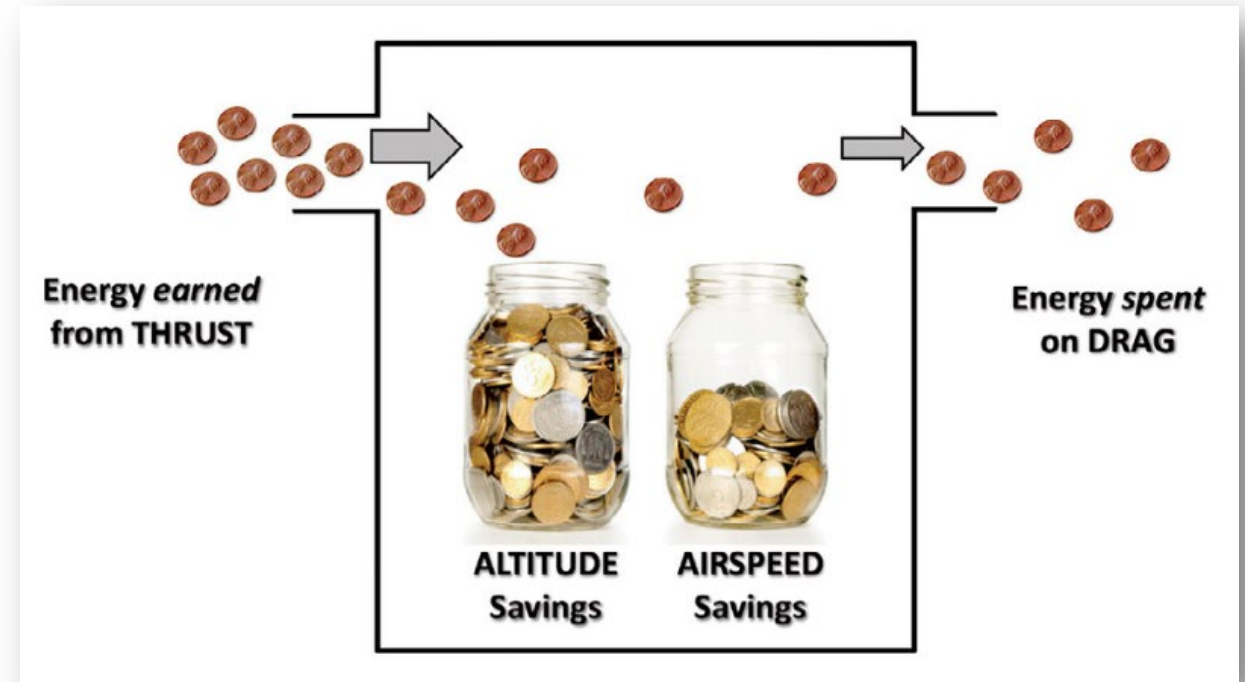


Application



Keeping energy in mind

- **Know your balance**
 - Fuel, altitude, airspeed
- **Make deposits**
 - Preparation for emergencies
- **High & Fast vs Low & Slow**



Questions?



Have you earned your *WINGS*?

- **Proficient Pilots are:**
 - Confident
 - Capable
 - Safe
- ***WINGS*** will keep you on top of your game



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