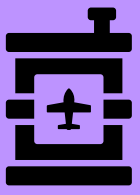
AIRCRAFT SYSTEMS

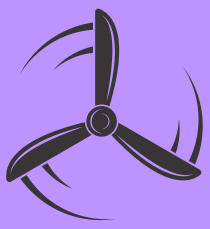
Meghan Rice CFI/CFII
Girls Love to Fly

P.A.I.G OPERATION OF SYSTEMS

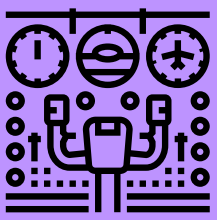
Flight Controls



Fuel, Oil, Hydraulic



Powerplant & Prop



Electrical

PA.I.G OPERATION OF SYSTEMS

01 Avionics

02 Pitot-Static

03 Vacuum System

04 De-Icing & Anti-Icing

05 Cabin Heat/Air

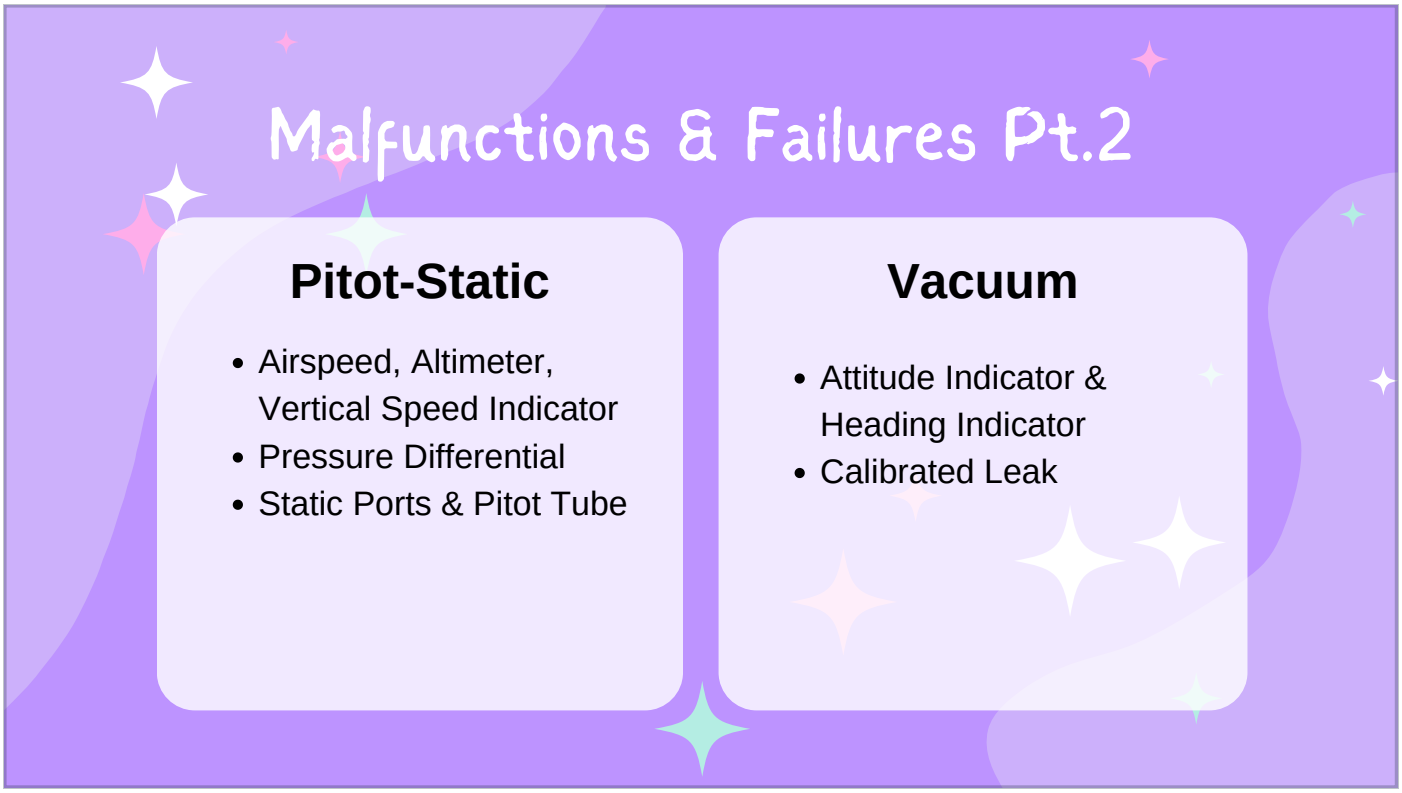
Malfunctions & Failures

Engine Failures

- Fuel Exhaustion
- Fuel Starvation
- Carb Icing
- Bad Magnetos
- Contaminated/Improper Fuel

Electrical Failures

- Over or Under Voltage
- Alternator Failure to Battery Failure
- Circuit Breakers/Fuses
- Grounding Issues



PITOT STATIC
If your pitot tube becomes blocked, there is no more ram pressure entering the tube. Any excess pressure leaks out of the drain hole, and you'll be comparing the drain hole's pressure and the static pressure. This means your airspeed indicator will be at zero, just like when you're sitting on the ramp.

Pitot And Drain Hole Blockage
Now, what happens if your drain hole is blocked in addition to the pitot tube? Think of this as trapping the air inside your pitot system. If you don't climb, descend, speed up, or slow down, your airspeed indicator will freeze on the last airspeed before the tube/drain became blocked.

This will cause your airspeed indicator to show a faster-than-normal airspeed as you climb. It will also cause it to indicate a slower-than-normal airspeed as you descend. This can be a very disorienting sensation, especially in instrument conditions.

PISTON
Intake Stroke: As the piston moves downward inside the cylinder, it creates a low-pressure area that draws air and fuel into the combustion chamber through an open intake valve.
Compression: piston moves back up and squeezes the mixture
Power/Combustion Stroke: With the air-fuel mix compressed, a spark plug ignites it. This causes an explosion that forces the piston downward, creating the power that eventually turns the propelle r.
Exhaust Stroke: After the power stroke, the piston moves back upward, pushing the burned gases (exhaust) out of an open exhaust valve, resetting the chamber for the next intake stroke.

TURBO
Gas Generation: Similar to jet engines, turboprop engines start with the compression of air in the engine's inlet, driven by an axial or centrifugal compressor. This compressed air then mixes with fuel and ignites in a combustion chamber, creating a high-speed stream of exhaust gases.
Power Turbine: Unlike jet engines, the majority of the energy in this exhaust doesn't exit the back of a turboprop engine. Instead, these gases flow over a set of turbines, causing them to spin.
Reduction Gearbox: The spinning turbines are connected to a shaft, which runs through a reduction gearbox. This is a critical component – it slows down the high RPM (revolutions per minute) of the turbine to a speed that is suitable for propeller operation.
Turning the Propeller: After the reduction gearbox, the now appropriately paced rotational energy turns the propeller. It's the spinning propeller, not the jet of exhaust, that provides most of the thrust in a turboprop engine.
Variable Pitch Control: Most turboprop engines are connected to propellers that have variable

pitch control, which means the angle of the propeller blades can be changed. This allows for more precise and efficient control of the aircraft’s thrust and performance at different speeds and altitude s.

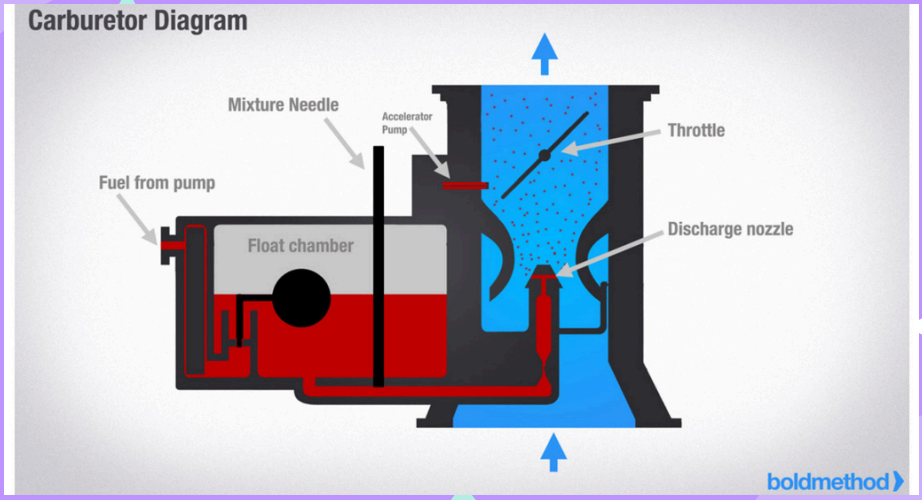
05

Engine Starting - Piston

Primer	Crankshaft Rotates
Master On	Pistons Reciprocate
Ignition START	Magnetos Spin
Starter Spins	Spark Plugs Fire
Starter Engages Flywheel	Fuel/Air Mixture Ignite

06

Carburetor



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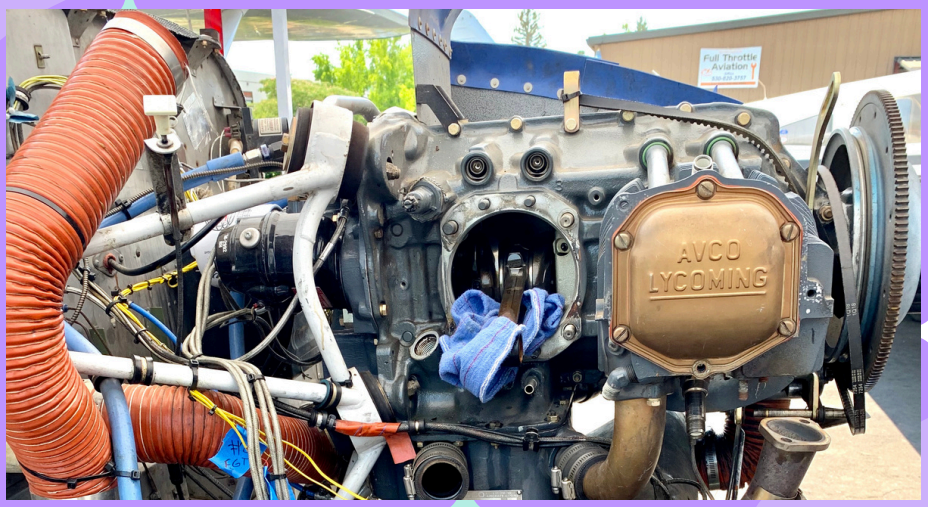
Cessna 172



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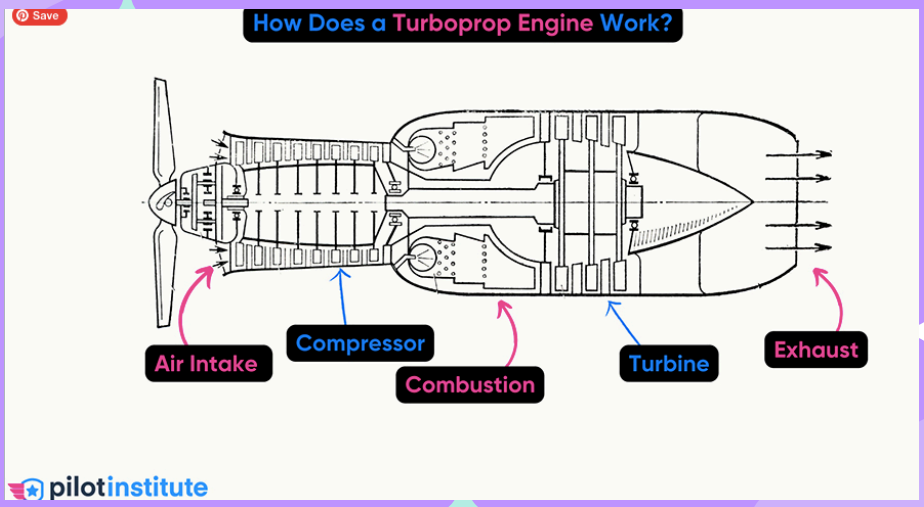
Turbo Prop




Thank You