



AIRCRAFT INSTRUMENTS - True Airspeed

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NAV1 117.95 ↔ 113.00 OJC WPT _____ DIS _____ NM DTK _____ ° TRK 306° 121.500 ↔ 136.975 COM1
NAV2 108.00 117.95 136.975 118.000 COM2



TRUE AIRSPEED (TAS)



DME
NAV1
113.00
15.5 NM
15.5 NM
OJC
NAV1



REFERENCES			
TIMER	00:00:00	UP	START?
GLIDE	75KT		◀ ON ▶
Vr	59KT		◀ ON ▶
Vx	64KT		◀ ON ▶
Vy	84KT		◀ ON ▶

OAT 0°C INSET PFD DME XPDR IDENT TMR/REF NRST





Pitot tube

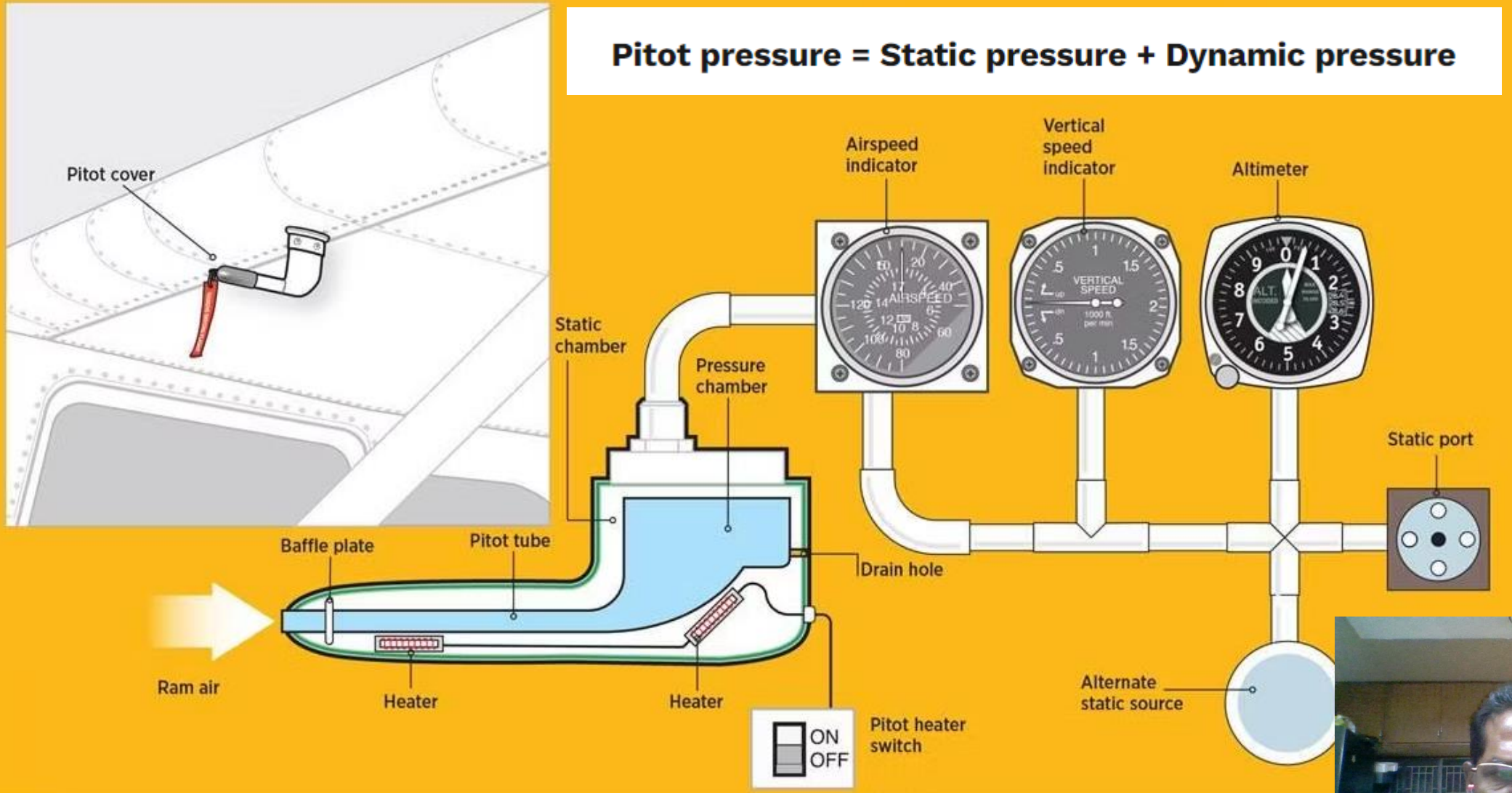


To measure the IAS, aircraft are fitted with a sensor called a [Pitot tube](#). The Pitot tube is a tube that is exposed to the airflow and can measure the **total pressure** exerted on the aircraft.





$$\text{Pitot pressure} = \text{Static pressure} + \text{Dynamic pressure}$$





What is True Airspeed (TAS)?

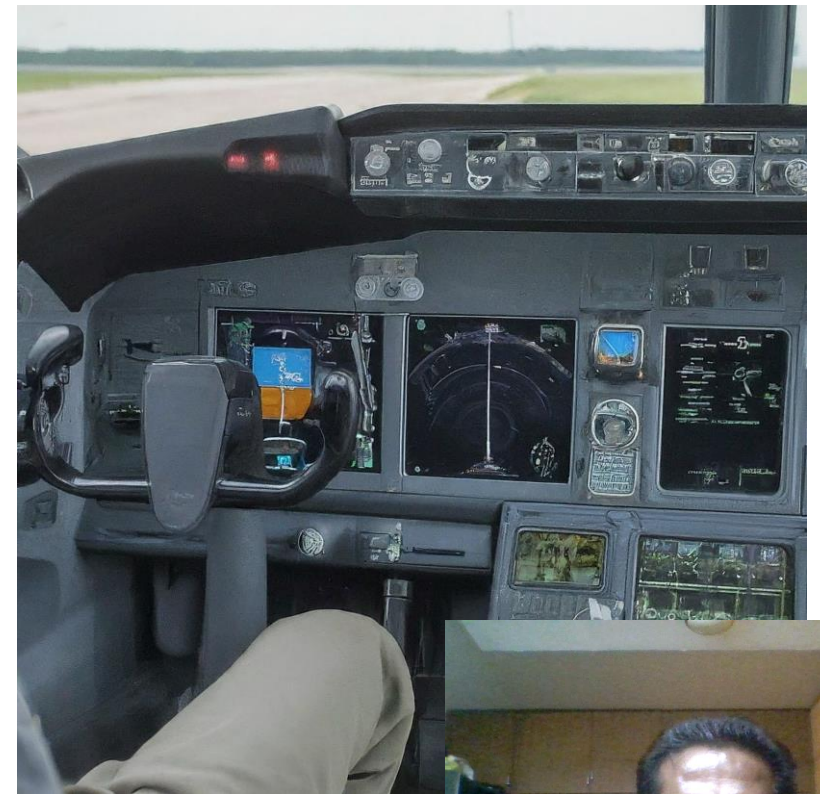
- TAS is the actual speed of an aircraft relative to the air mass it's flying through.
- It represents the true velocity of the airplane, independent of wind speed or direction.
- TAS is a crucial factor for various flight calculations, including:
 - Time en route
 - Fuel consumption
 - Range
 - Performance parameters





TAS vs. Indicated Airspeed (IAS): Understanding the Difference

- Indicated Airspeed (IAS) is what the airspeed indicator displays based on the ram air pressure acting on the pitot tube.
- TAS, however, considers the effects of air density on IAS.
- As altitude increases, air density decreases, leading to a difference between TAS and IAS ($TAS > IAS$ at higher altitudes).
- Conversely, at lower altitudes, denser air causes TAS and IAS to be closer in value





THE TRUE AIRSPEED INDICATOR: A PILOT'S ALLY

- The True Airspeed Indicator (TAS indicator) is a valuable tool for pilots to determine TAS.
- It is a mechanical or electronic device that factors in pressure altitude and outside air temperature (OAT) to calculate TAS.
- Some TAS indicators are integrated into modern avionics systems, while others are standalone instruments.
- By knowing TAS, pilots can make informed decisions regarding flight planning, performance calculations, and overall situational awareness.





Modern Methods for Determining TAS

While the True Airspeed Indicator is a valuable tool, advancements in technology have led to alternative methods for determining TAS:

- **Flight Management System (FMS):** Modern aircraft are often equipped with FMS, which can calculate TAS based on various sensor inputs and aerodynamic data.
- **GPS-based TAS calculations:** Some GPS receivers can calculate TAS by factoring in wind speed and direction derived from satellite data.





Applications of True Airspeed (TAS) in Flight Planning

TAS plays a vital role in the meticulous process of flight planning:

- **Estimating En Route Time:** Accurate TAS calculations allow pilots to determine the estimated time it will take to reach their destination.
- **Fuel Planning:** TAS is factored into fuel consumption calculations, ensuring pilots have sufficient fuel for the planned flight duration.
- **Calculating Range:** Knowing TAS enables pilots to estimate the maximum distance an aircraft can travel with a specific fuel load.





The Importance of TAS for Safe Flight Operations

Knowing TAS is paramount for ensuring safe flight operations, particularly at high speeds and altitudes:

- **Maintaining Control Characteristics:** TAS helps pilots understand how the aircraft will handle at different airspeeds, enabling them to maintain proper control throughout the flight.
- **Preventing Stalls:** By knowing the adjusted stalling speed based on TAS, pilots can prevent the aircraft from entering a dangerous stall situation.
- **Staying Within Airspeed Limits:** TAS awareness allows pilots to adhere to the speed number limitations of their aircraft, preventing them from exceeding critical air



Ground Speed

