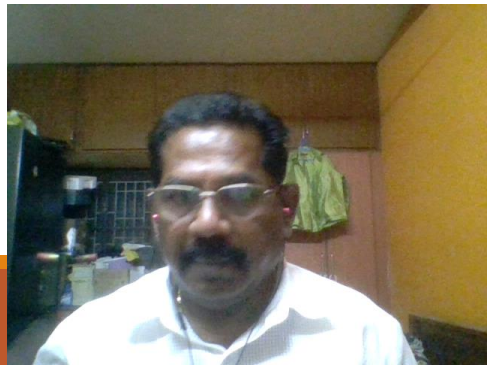
AIRCRAFT INSTRUMENTS - Altimeters

DR. M.ELANGOVAN

PROFESSOR, ,DEPARTMENT OF AEROSPACE ENGINEERING

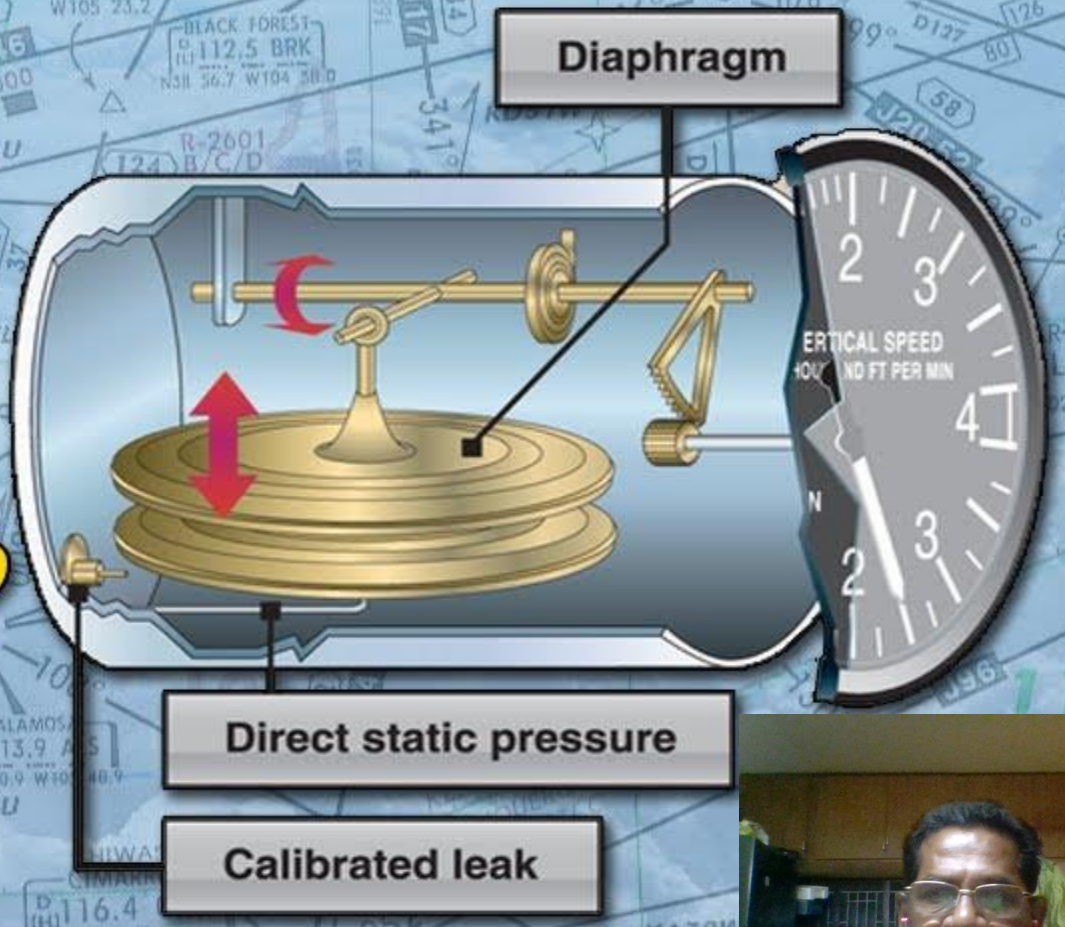
SNS COLLEGE OF TECHNOLOGY



THE ALTIMETER

Altimeters

HOW DOES IT WORK?

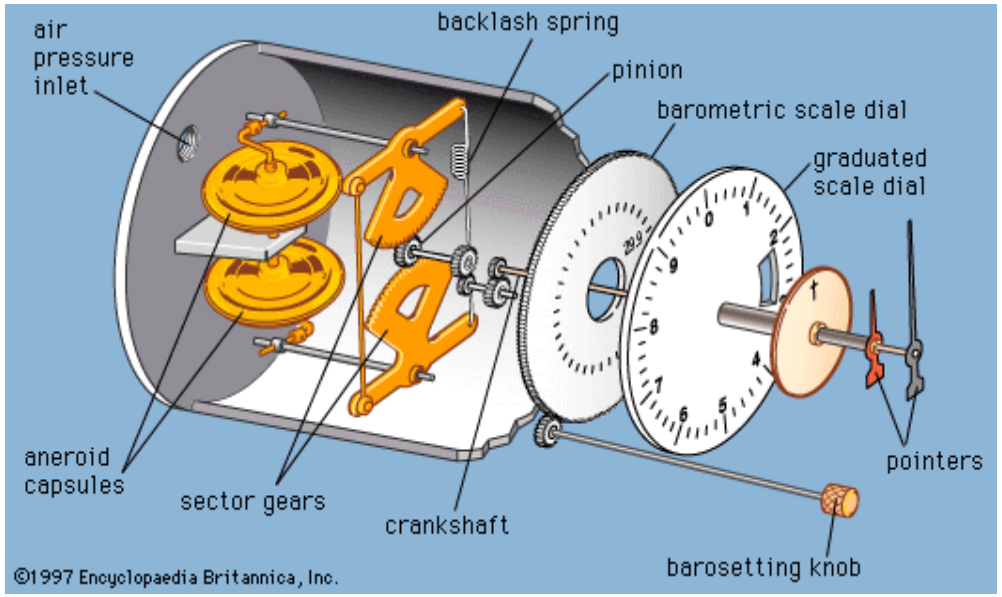


The Two Main Types of Altimeters

- Pilots rely on two main types of altimeters for altitude measurement:
  - **Barometric Altimeter:** The traditional type, utilizing air pressure to determine altitude.
  - **Radio Altimeter:** Employs radio waves to measure the distance between the aircraft and the ground below.

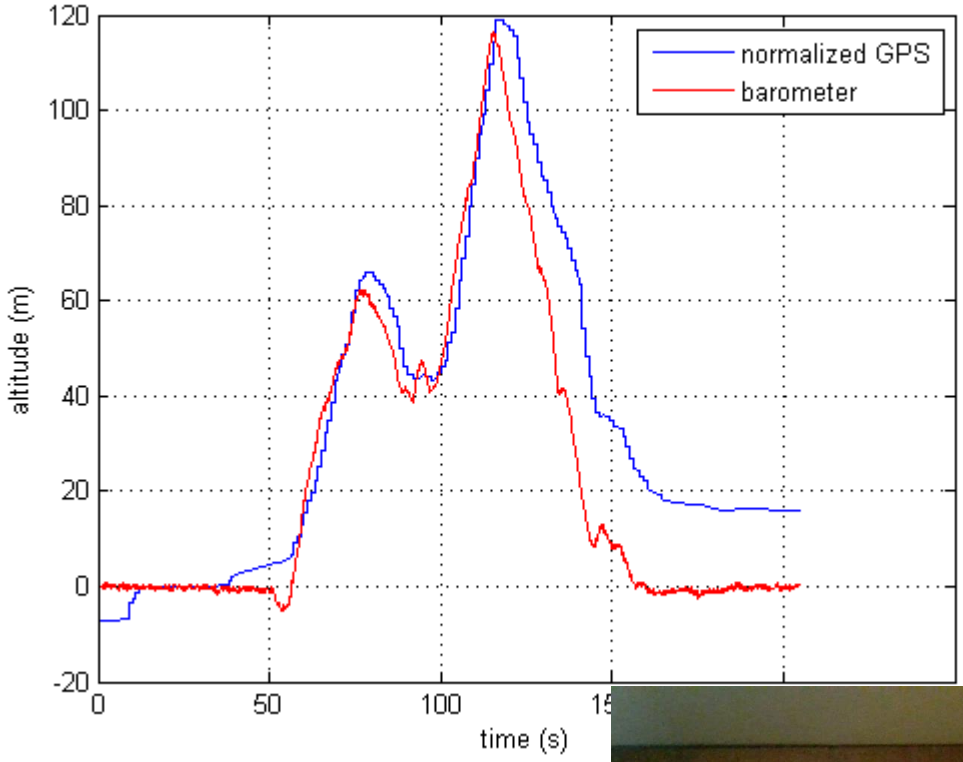
Barometric Altimeters: The Power of Air Pressure

- Barometric altimeters function based on the principle that atmospheric pressure decreases with increasing altitude.
- A sealed aneroid capsule within the altimeter expands or contracts as air pressure changes.
- This movement of the capsule is linked to the altimeter's dial, displaying the corresponding altitude.



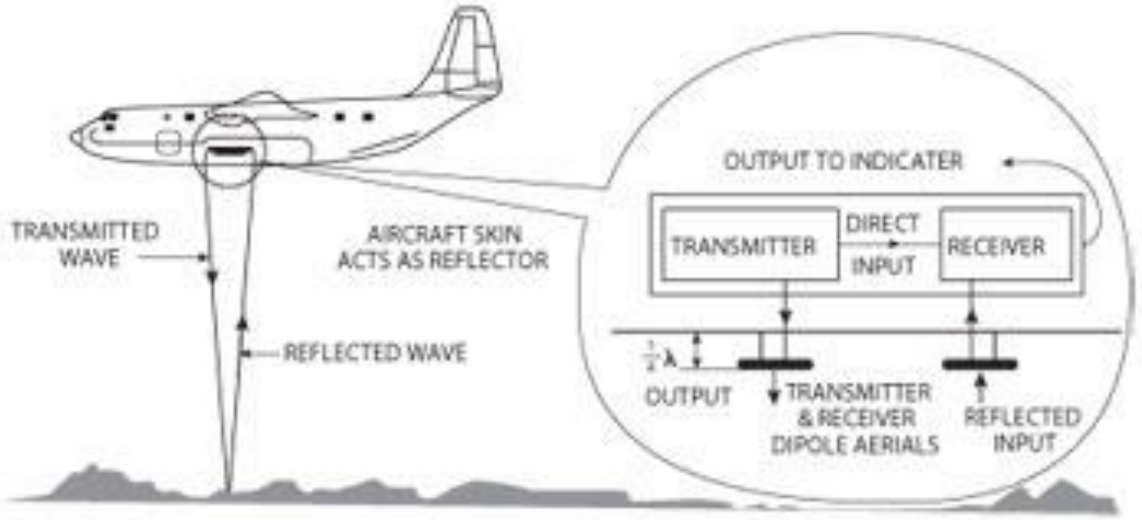
Calibrating Barometric Altimeters for Accuracy

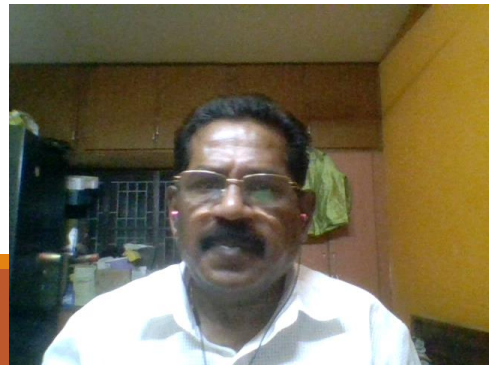
- Barometric altimeters require calibration to ensure accurate altitude readings.
- Pilots set a common reference pressure based on a specific weather station or altimeter setting provided by Air Traffic Control (ATC).
- This ensures all aircraft in the vicinity are referencing the same pressure datum, allowing for safe separation between them at different altitudes.



Radio Altimeters:

- Utilizes radio waves: Radio altimeters function by transmitting a radio wave pulse towards the ground below.
- Measures distance: The radio altimeter then measures the time it takes for the radio wave to bounce back from the ground and return to the aircraft.
- Calculates altitude: By knowing the speed of radio waves, the altimeter can calculate the distance between the aircraft and the ground, providing a highly accurate altitude reading.

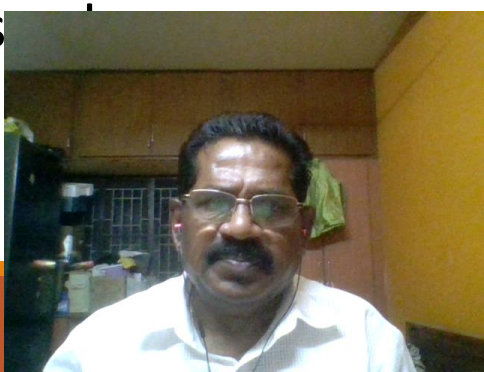




Applications of Radio Altimeters

Radio altimeters play a crucial role in various flight operations:

- **Landing guidance:** Provide precise altitude information during landing approaches, especially beneficial for low-visibility conditions.
- **Terrain following/avoidance systems:** Assist pilots in maintaining a safe distance from the ground during low-level flying, particularly useful in mountainous terrain.
- **Go-around decision-making:** Provide critical altitude data during a mis approach, allowing pilots to initiate a safe climb.



Complementing Each Other: Barometric and Radio Altimeters

Barometric and radio altimeters serve complementary purposes:

- **Barometric altimeters:** Provide a broader picture of altitude for navigation and maintaining vertical separation between aircraft.
- **Radio altimeters:** Offer high-precision altitude data crucial for low-level flight operations and landing approaches.