



SNS COLLEGE OF TECHNOLOGY

**An Autonomous Institution
Coimbatore – 35**

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Approved by AICTE , New Delhi and Affiliated to Anna University , Chennai.

DEPARTMENT OF AEROSPACE ENGINEERING

19ASO301 BASICS OF AERONAUTICAL ENGINEERING

UNIT 5 – AIRCRAFT INSTRUMENTS_1



UNIT 5 – AIRCRAFT INSTRUMENTS



- *Atmosphere*
- *Flight Instruments & Navigation Instruments*
- *Gyroscope & Accelerometer*
- *Air Speed Indicators*
- *Altimeter*



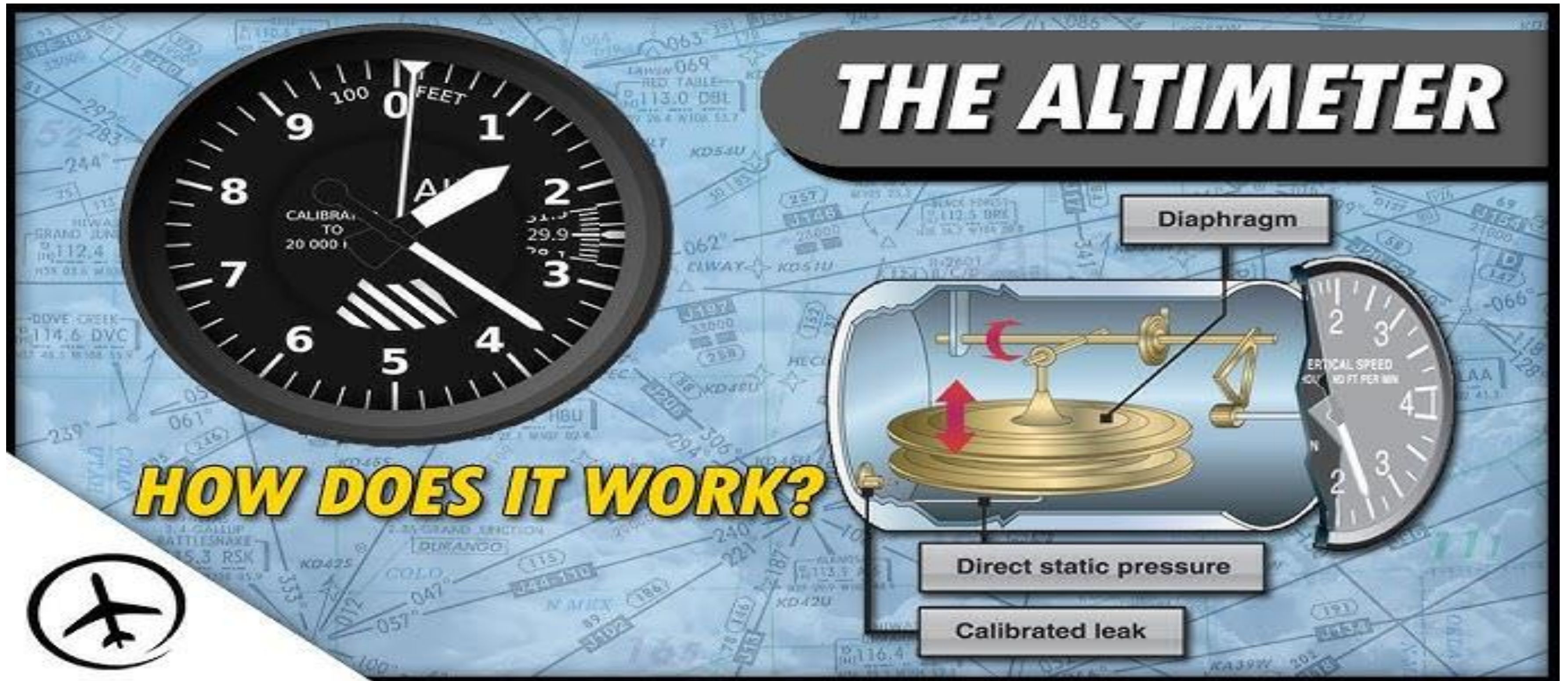
TEXT BOOK



- *Anderson. J D, “Introduction to Flight”, McGraw-Hill, 1995*
- *Richard S. Shevel, “fundamentals of Flight”, Prentice Hall, 2010*



Altimeters





The Two Main Types of Altimeters

Pilots rely on two main types of altimeters for altitude measurements:

- ***Barometric Altimeter:*** *The traditional type, utilizing air pressure to determine altitude.*
- ***Radio Altimeter:*** *Employs radio waves to measure the distance between the aircraft and ground below.*

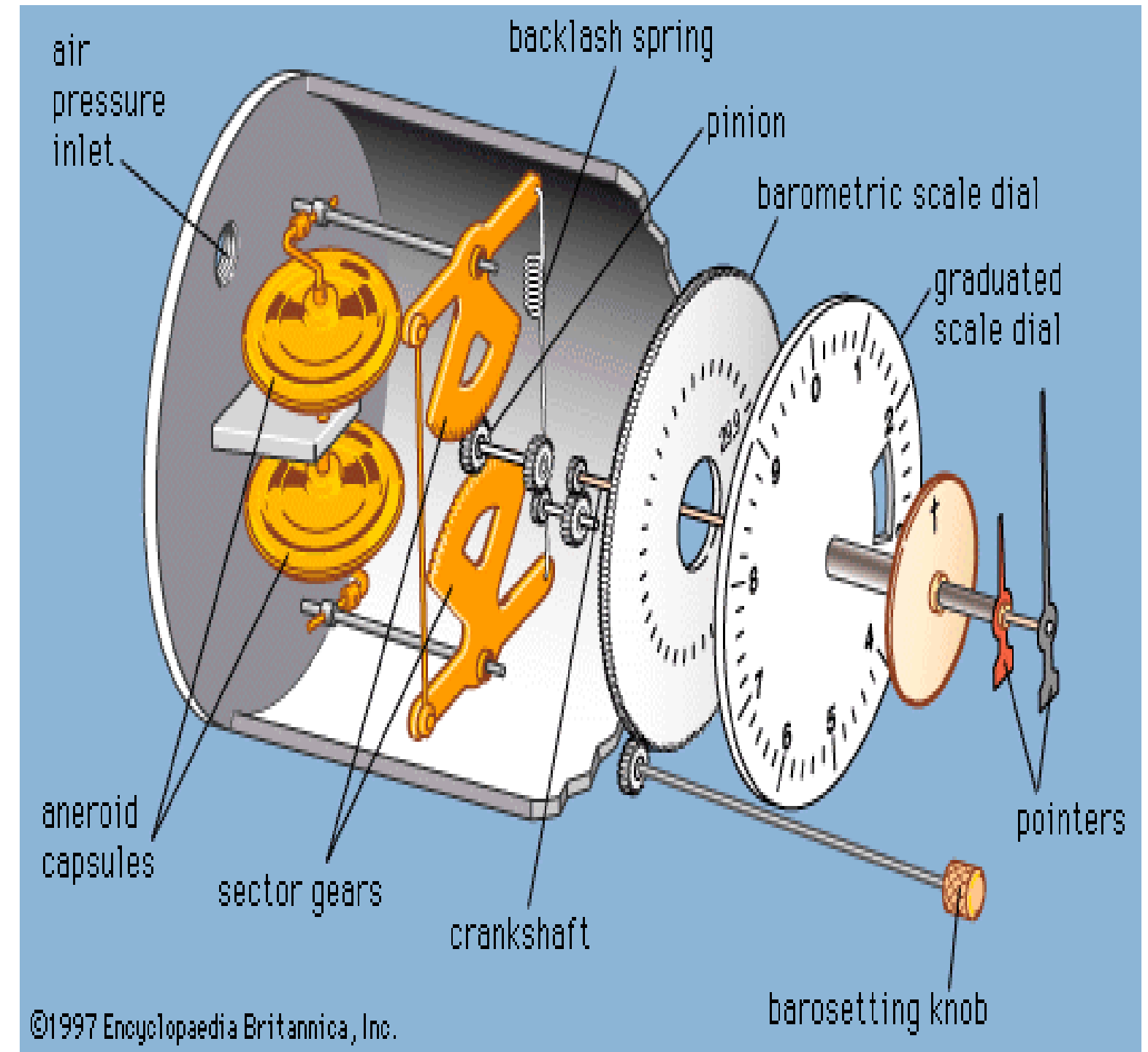




Barometric Altimeters: The power of Air Pressure



- *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



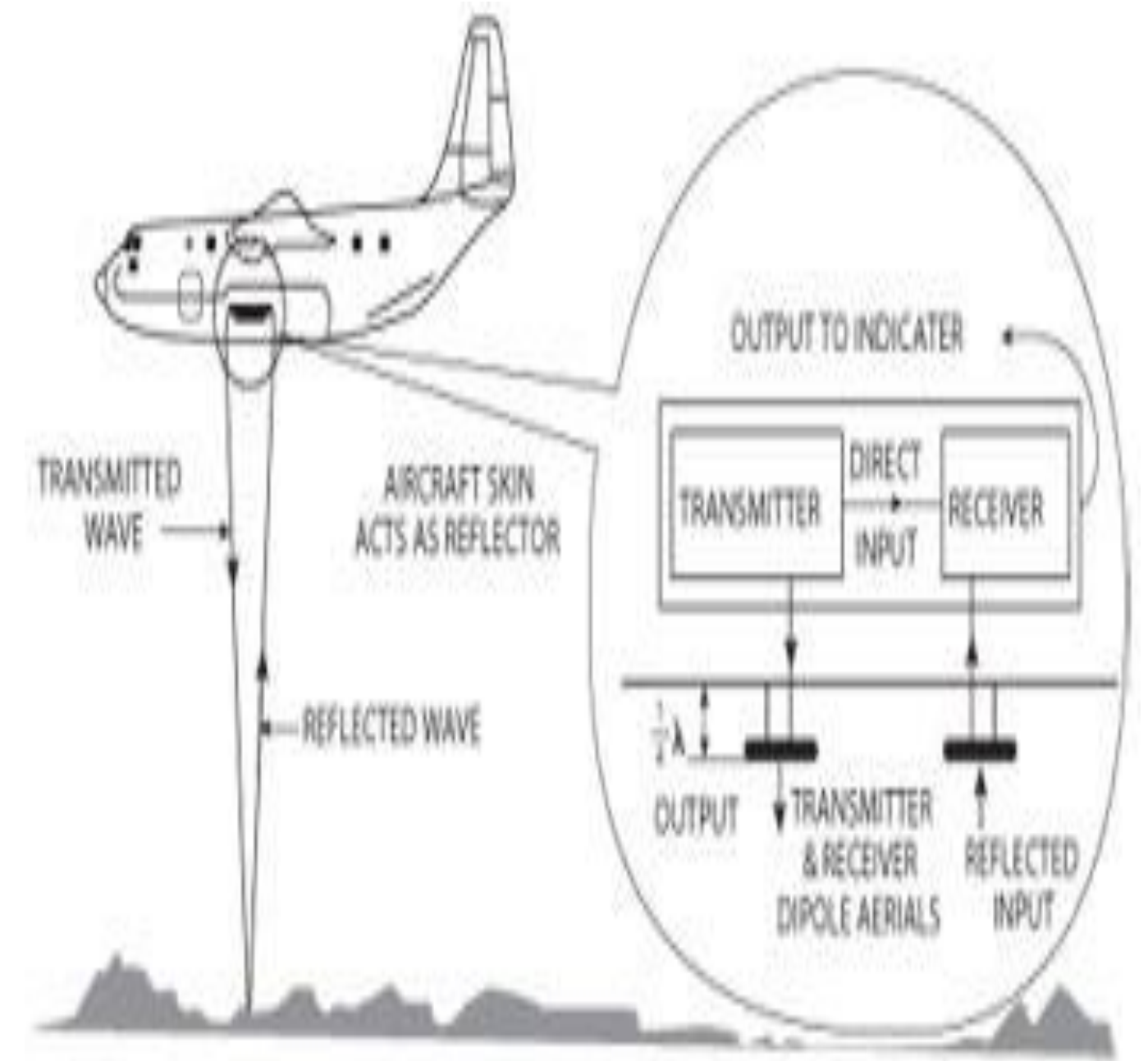
- *Barometric altimeters require calibration to ensure accurate altitude readings.*
- *Pilots set a common reference pressure based on a specific weather station or altimeter setting provided by Air Traffic Control (ATC)*
- *This ensures all aircraft in the vicinity are referencing the same pressure 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 approach, allowing pilots to initiate a safe climb.*



Barometric and Radio Altimeters



***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.*