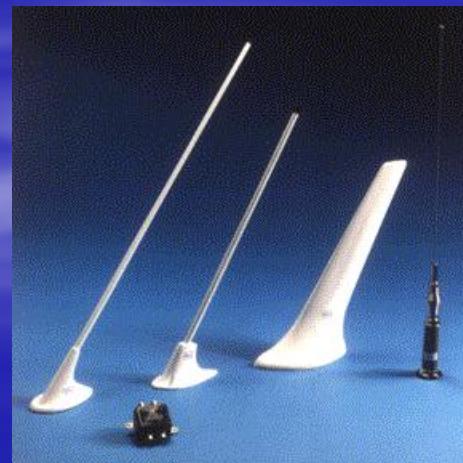
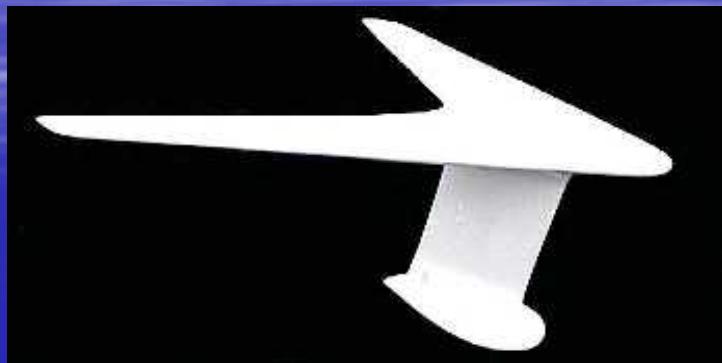


AEROSPACE AVIONICS

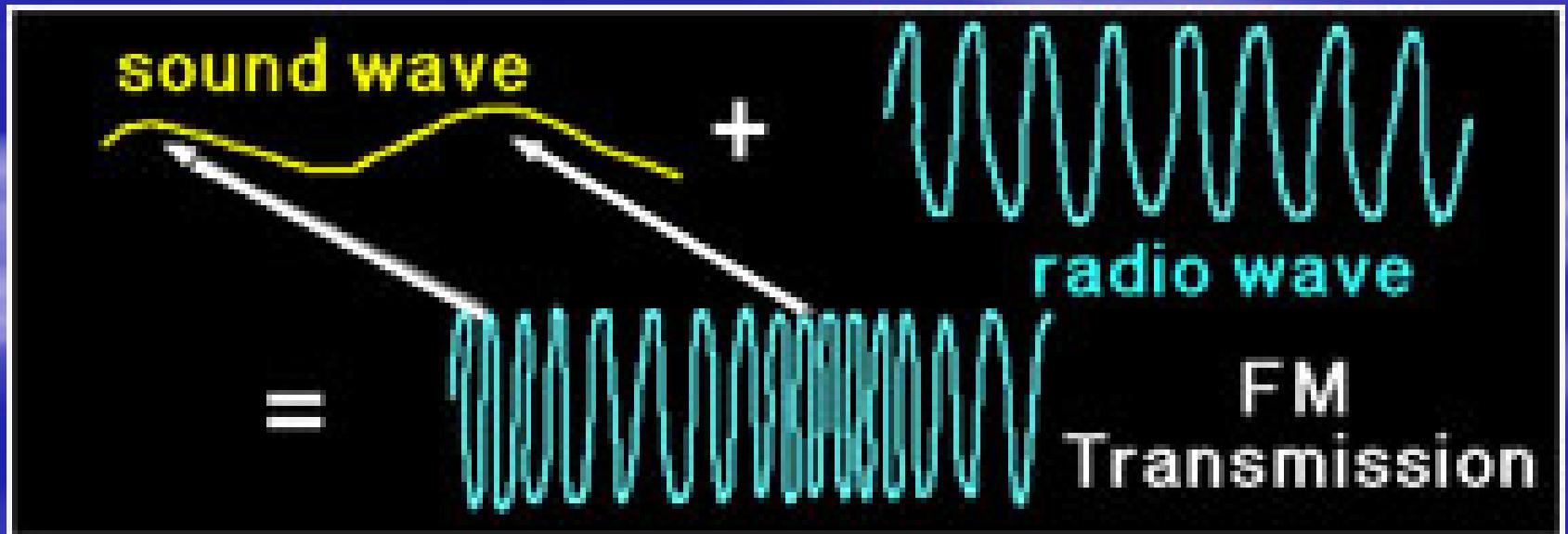


Aircraft antennas



Frequency modulation (FM)

- In frequency modulation, the frequency or phase of the carrier wave is changed. There is no change in power of the signal.



Antennas

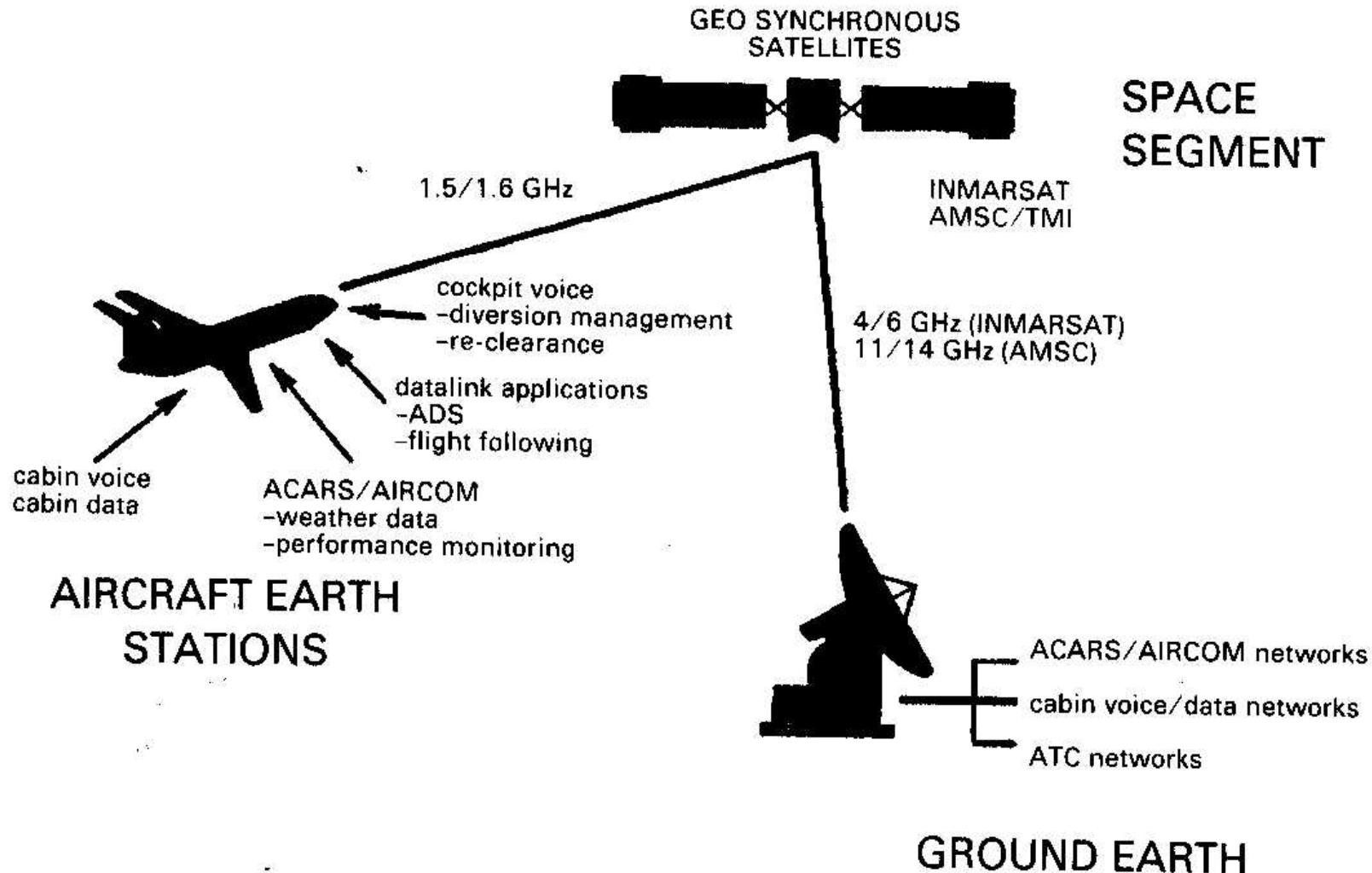


VHF COM

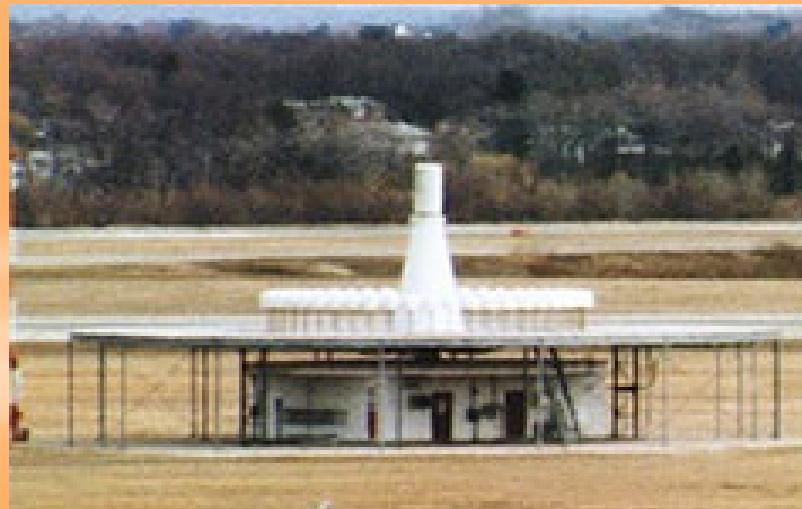


HF COM

SATCOM

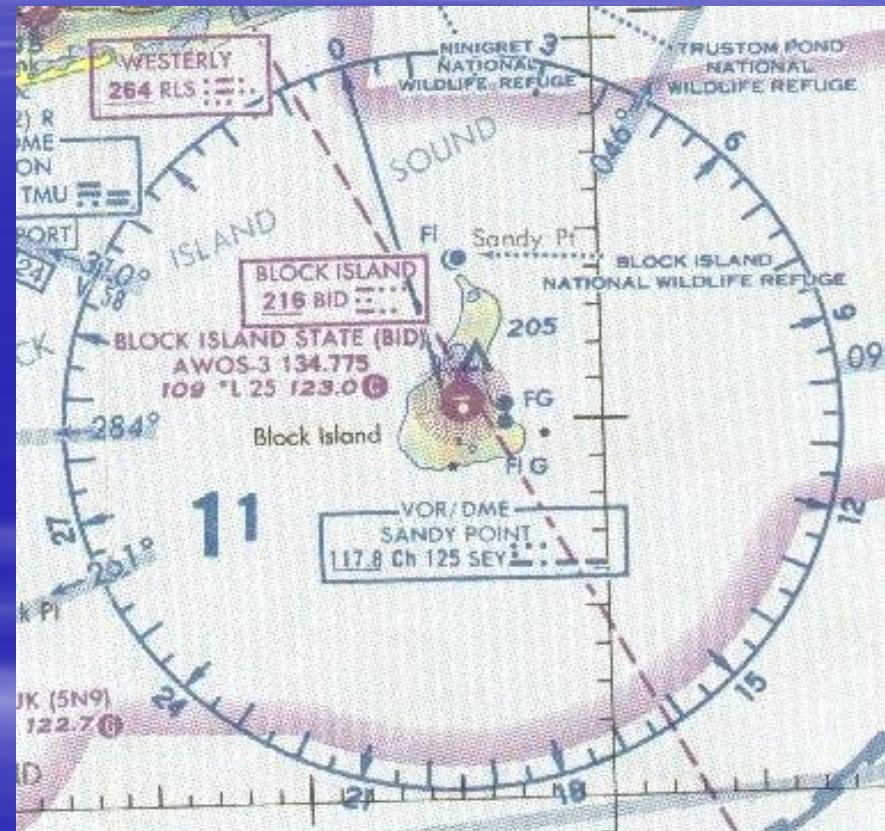


VHF OMNIRANGE (VOR) NAVIGATION SYSTEM



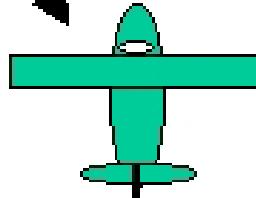
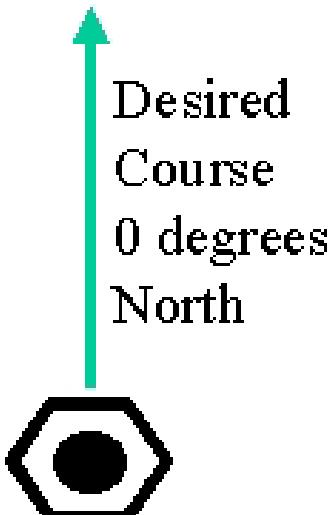
VOR Operation

- VOR ground stations transmits signals (**radials**) through 360° (omni directional).
- This extensive system of ground facilities consists of several hundreds ground stations



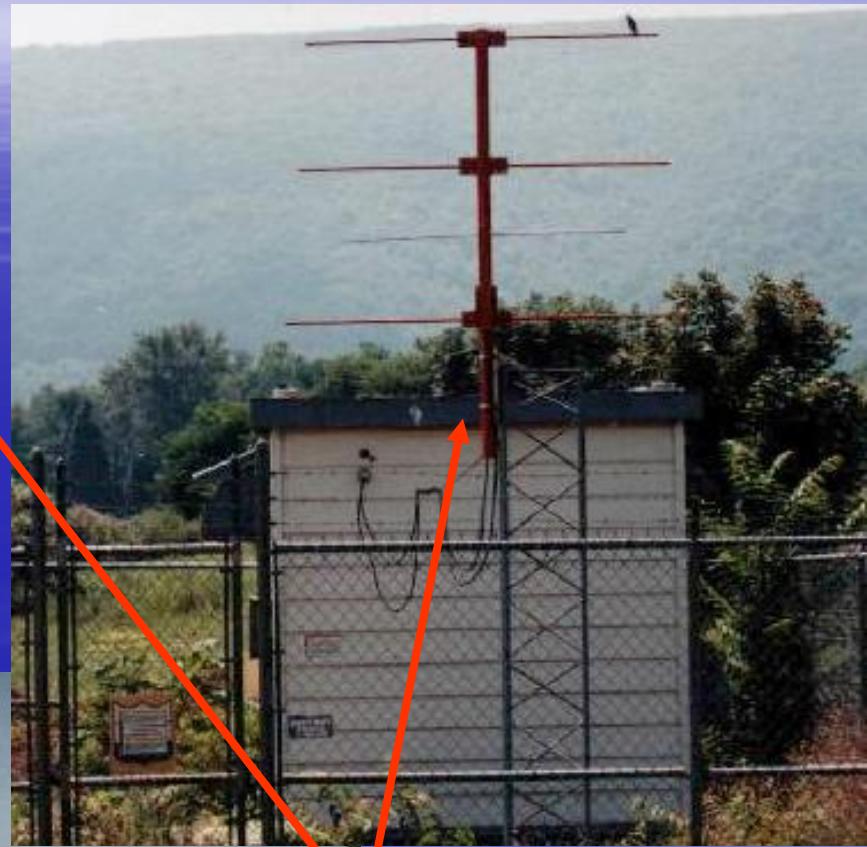
VOR indications

This aircraft is on course, so the needle is centered.



This aircraft is off course to the right, so the needle swings toward the proper course.

The Marker Ground Station



Antenna

Approach lights

Marker beacons

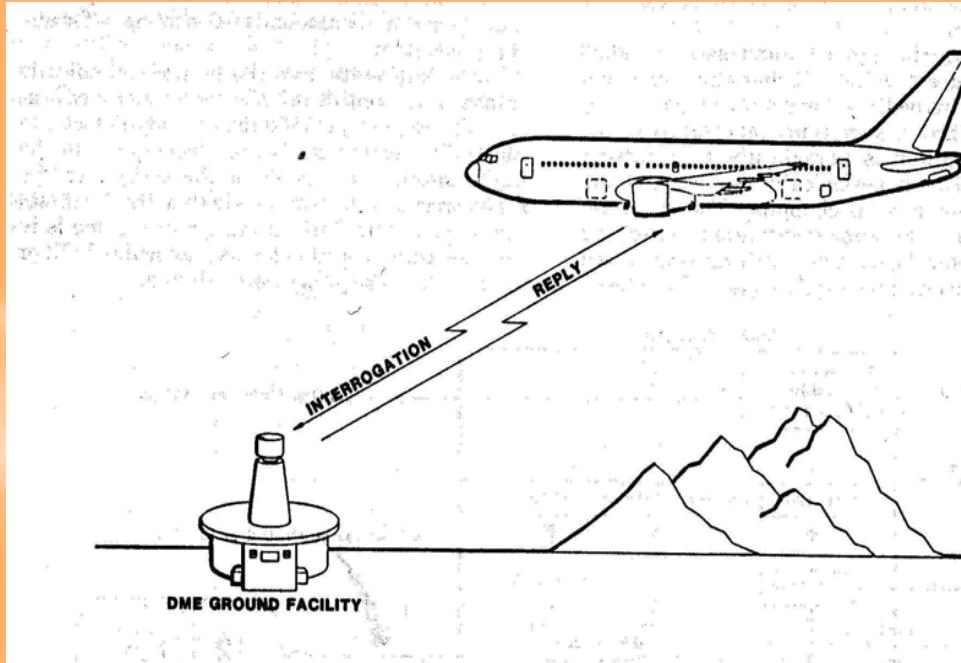
Inner Marker
White Light
3000 HZ Modulation
Located at the numbers
Only at CAT III Airports.

Outer Marker
Blue Light
400 HZ Modulation
Located approximately
5 miles from the end of
the runway.

Flight Path (Glidepath)

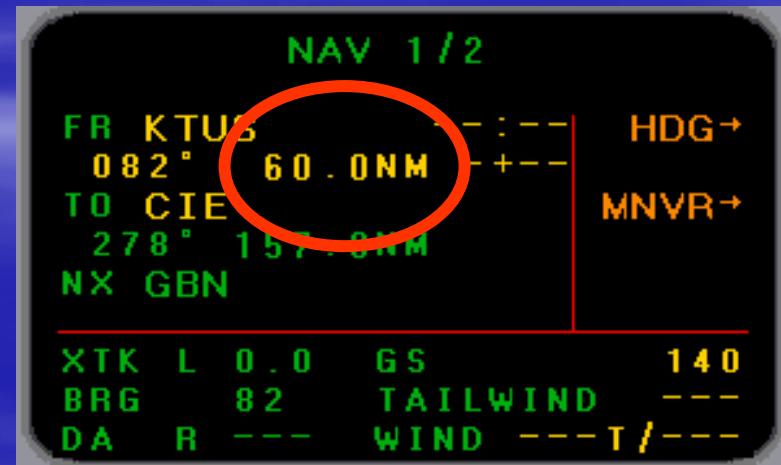
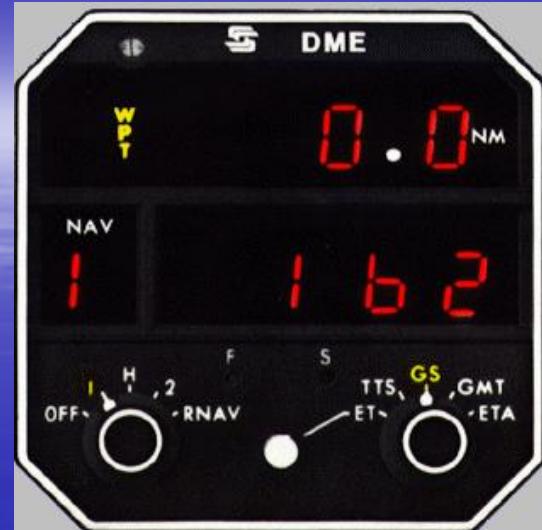


DISTANCE MEASURING EQUIPMENT (DME)

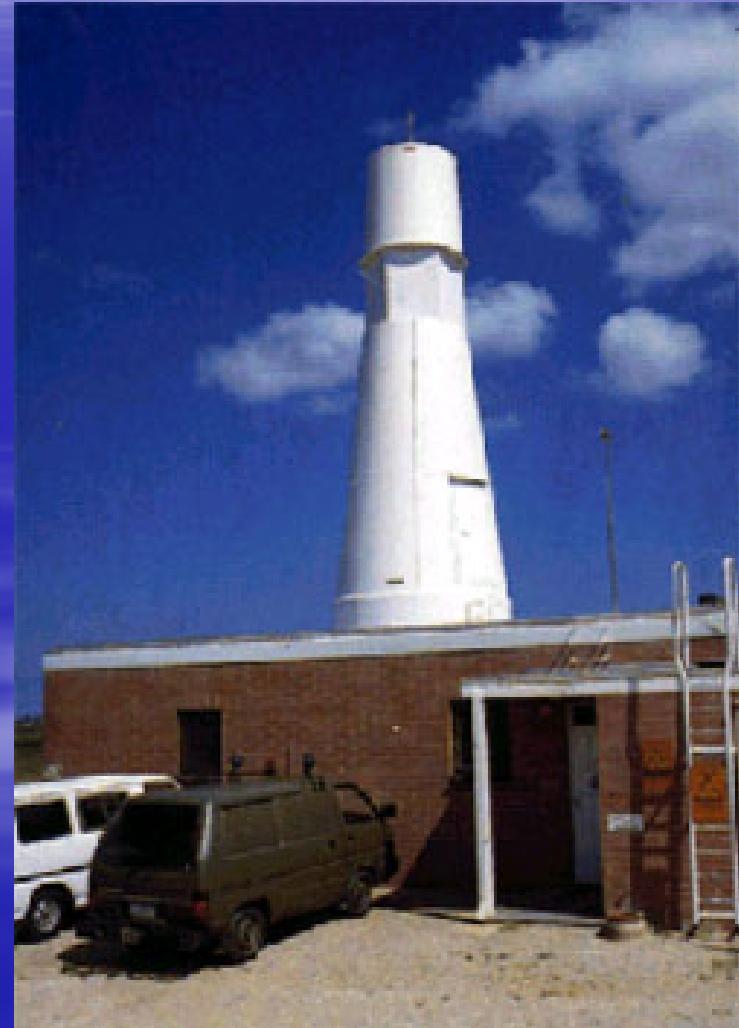


Indicator

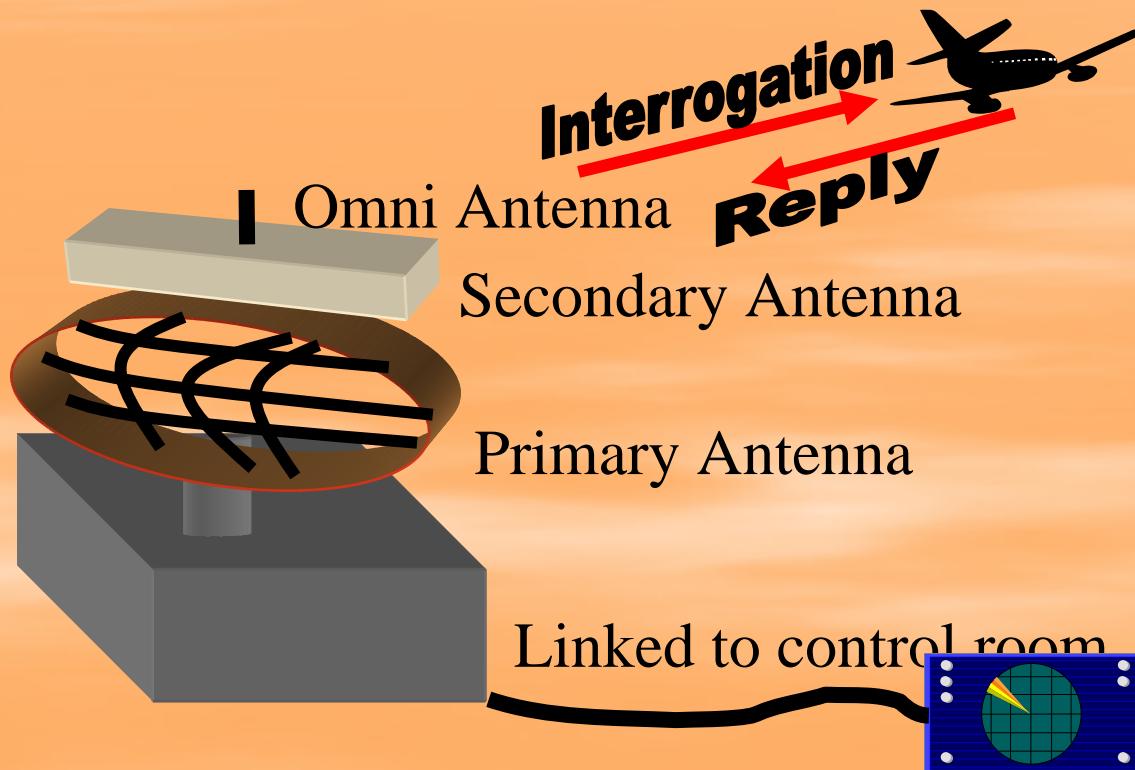
- Styles
 - self contained
 - integrated
- Warning flag
- Self Test
- Digital



VOR/DME Ground station



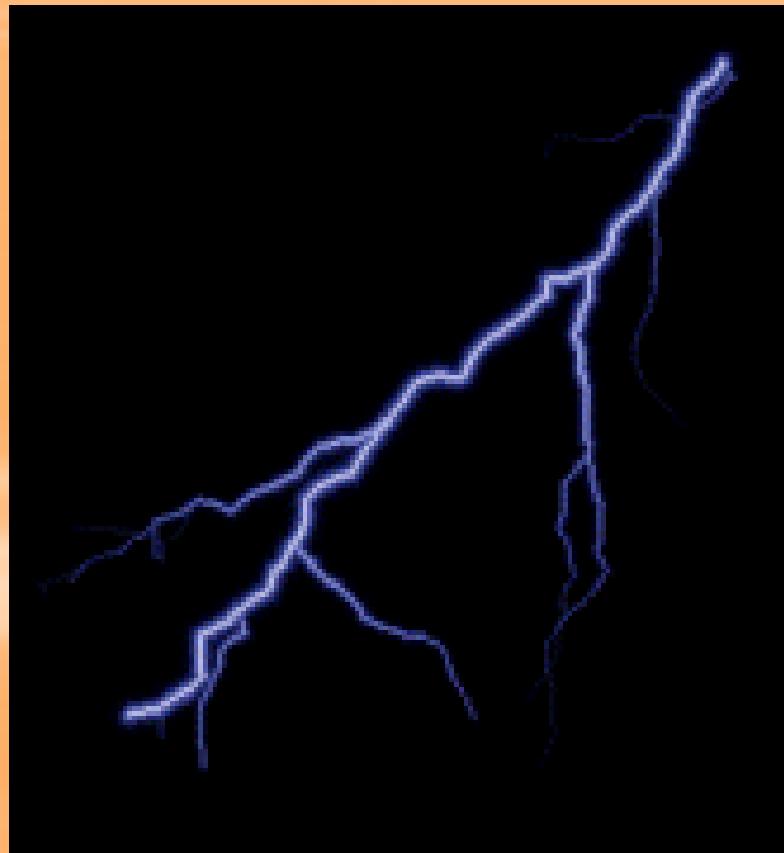
AIR TRAFFIC CONTROL (ATC) TRANSPONDER



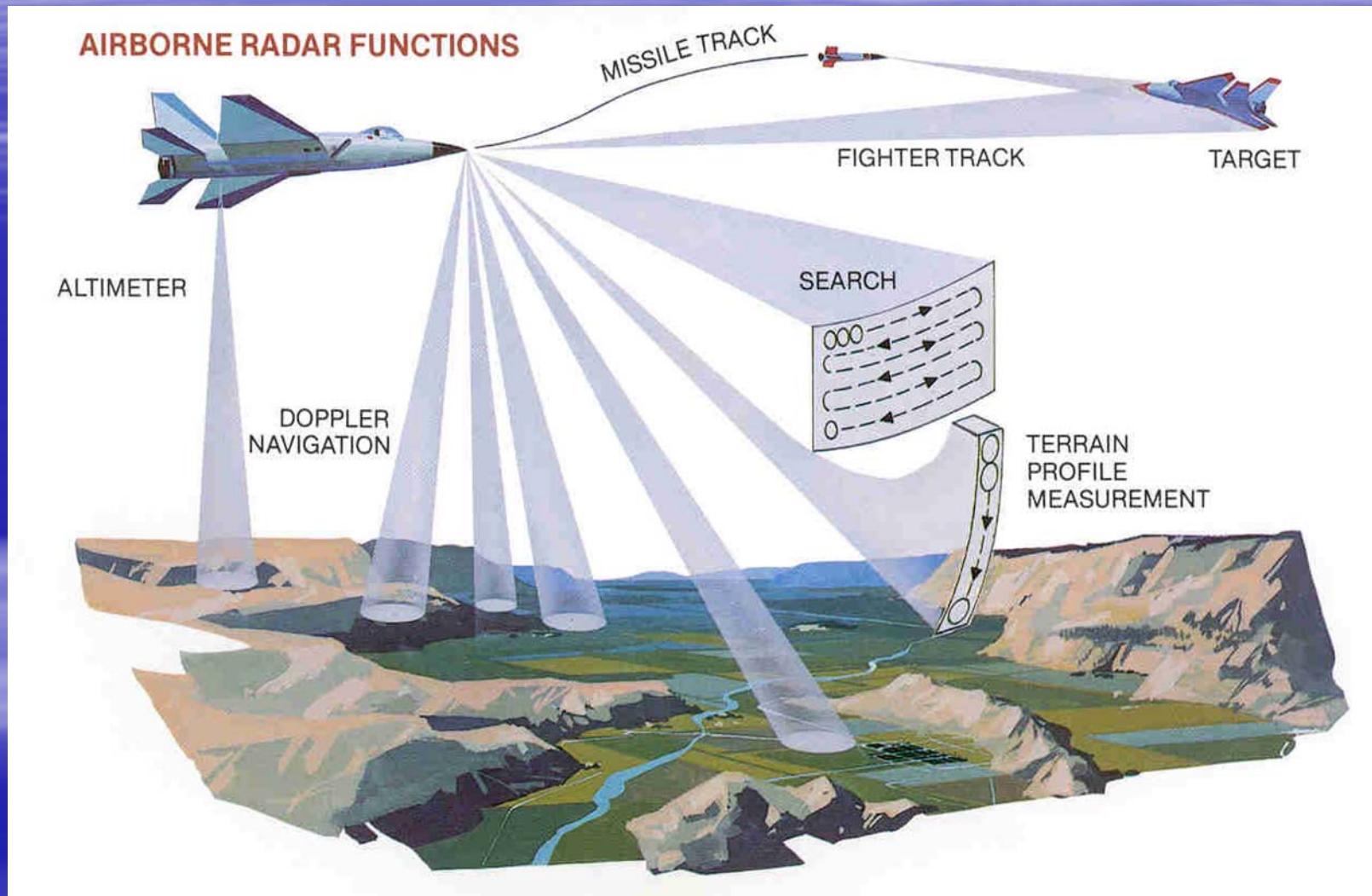
Ground station



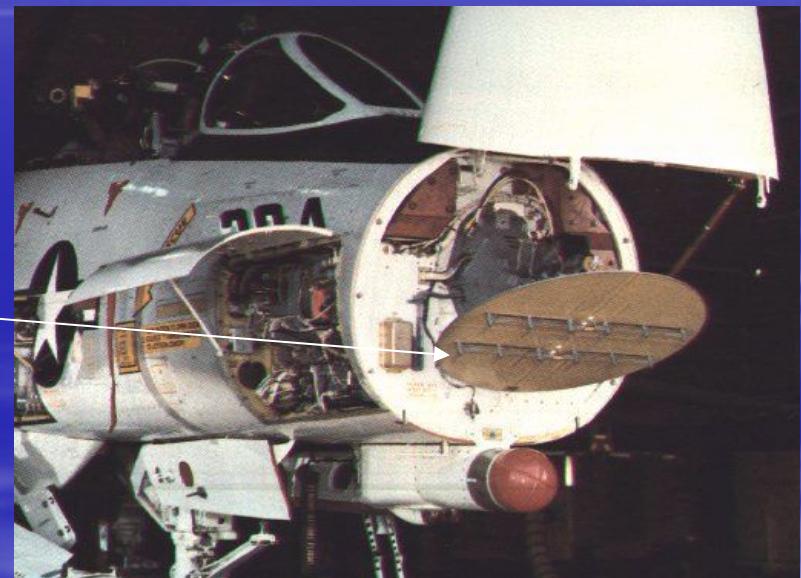
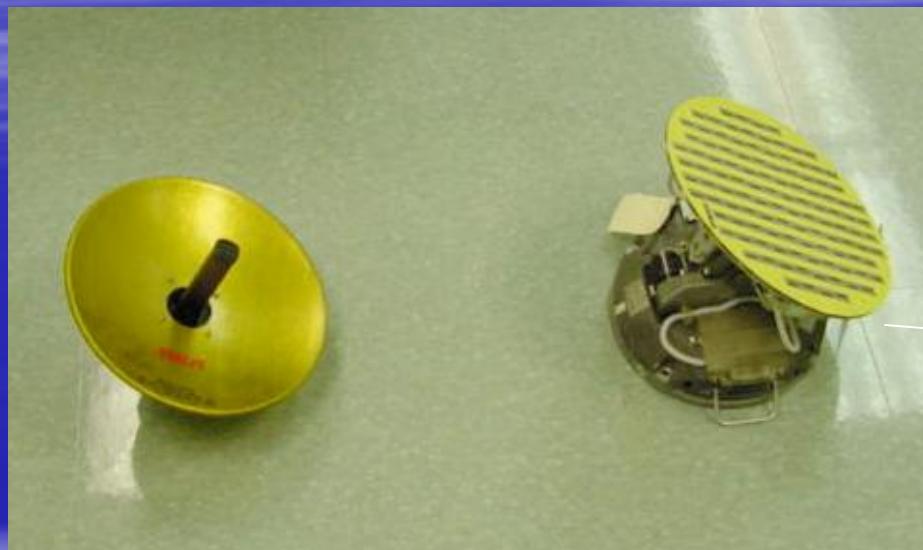
WEATHER RADAR



Airborne radar functions (military)



Radar Antennas



Weather Radar

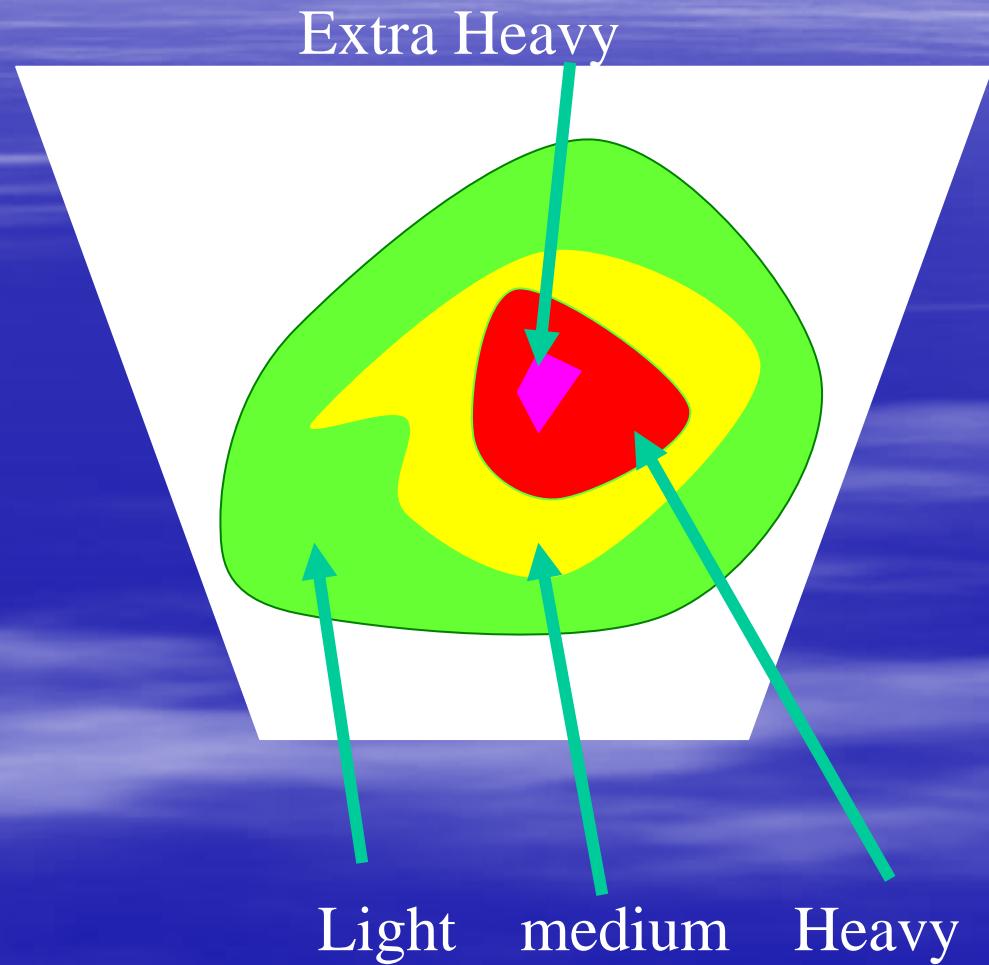
- It provides pilot with the local picture of the weather ahead and allow him to avoid undesirable weather formations.
- A maximum range is about 180 NM, but usually operated at 30-80 NM.



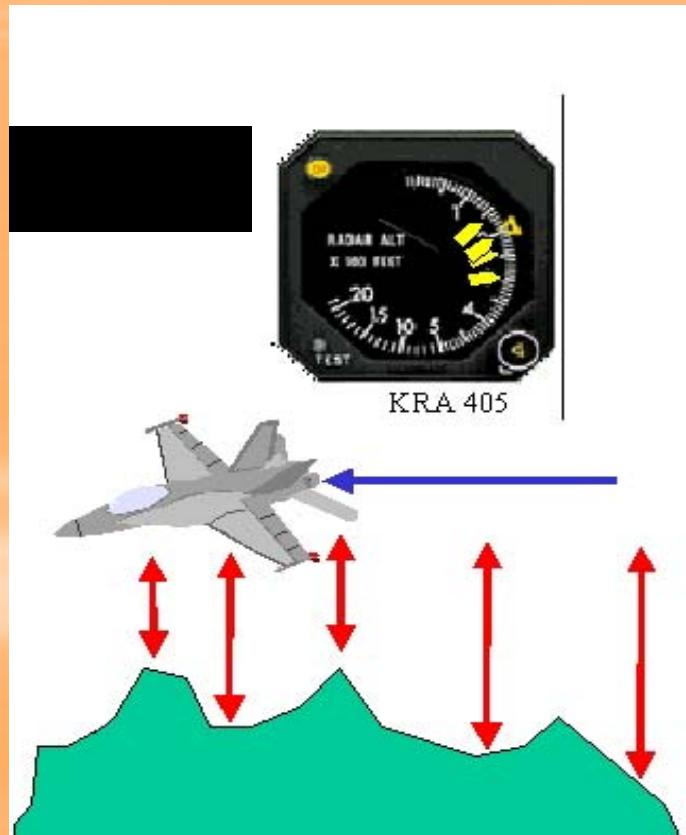
Weather radar display



Weather Radar Display

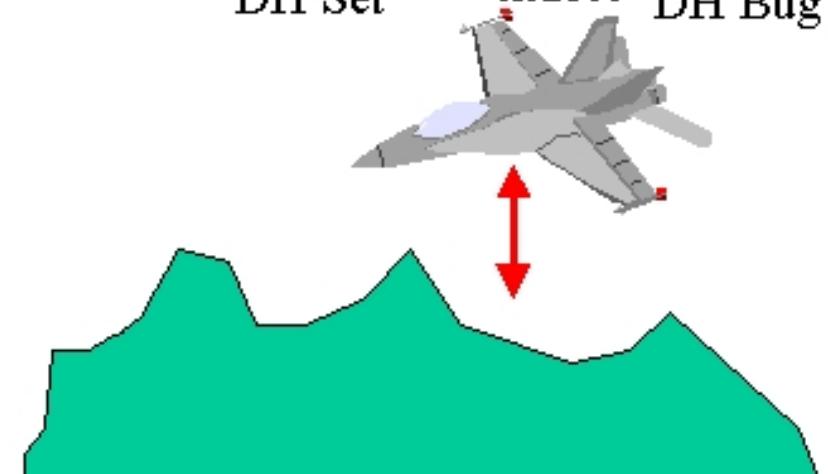
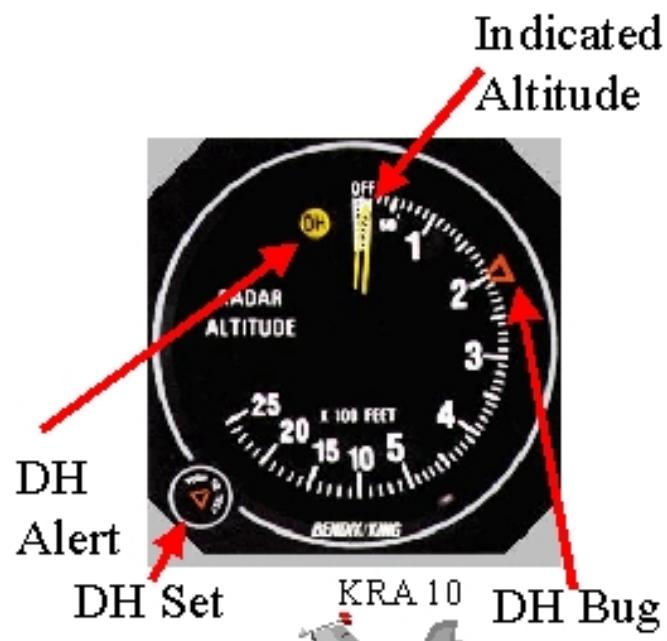


RADIO ALTIMETER

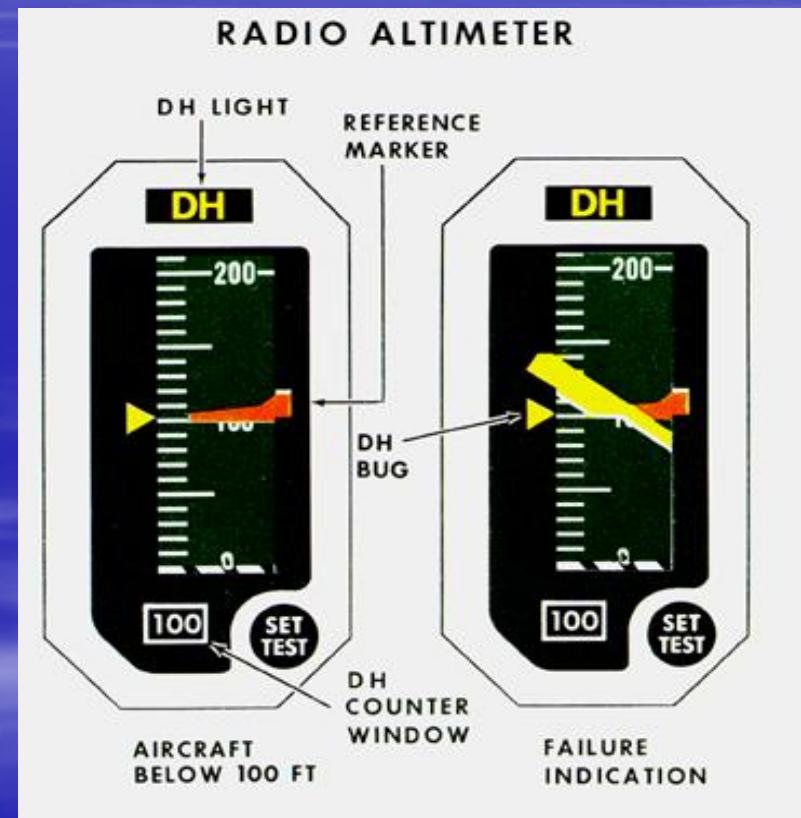
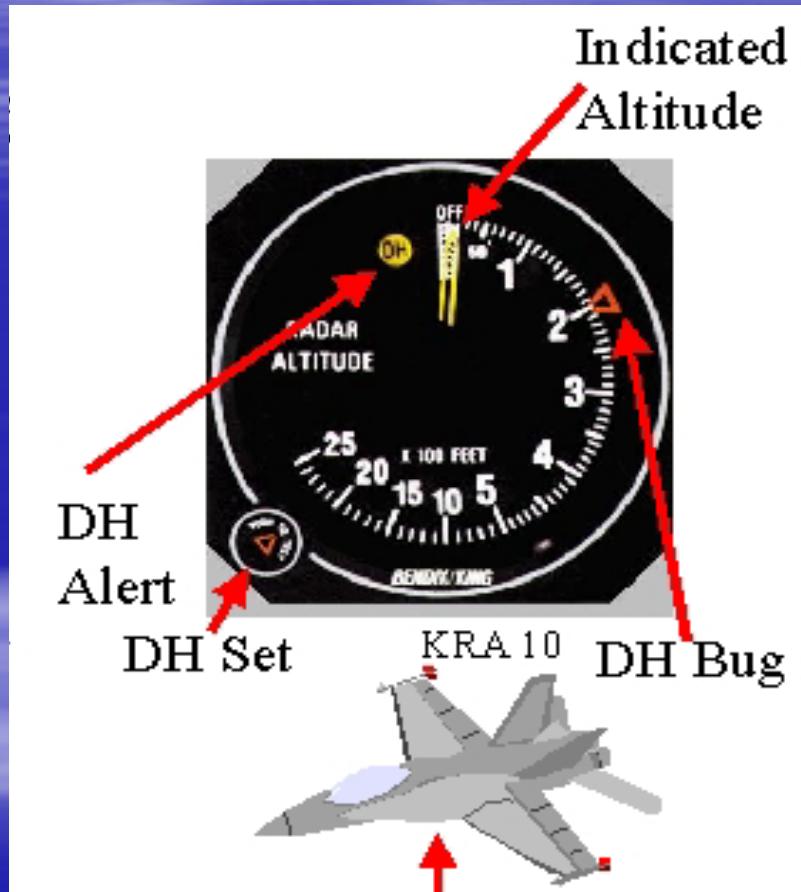


Radio altimeter's function

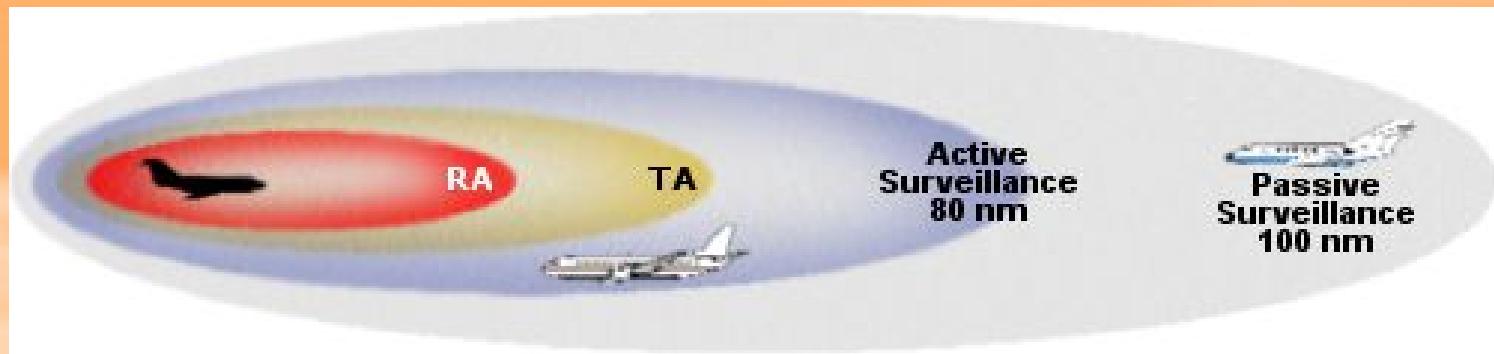
- Used on approach to indicate absolute altitude above ground, and to remind the pilots when decision height (DH) is reached.



Radio altimeter indicators



TRAFFIC COLLISION & AVOIDANCE SYSTEM (TCAS)



Function of TCAS

- Main function of TCAS is to help aircrews avoid midair collisions.
- In addition to this, TCAS also provides a backup to the air traffic control system's regular separation processes.



TCAS display integrated in navigation page



TCAS control head

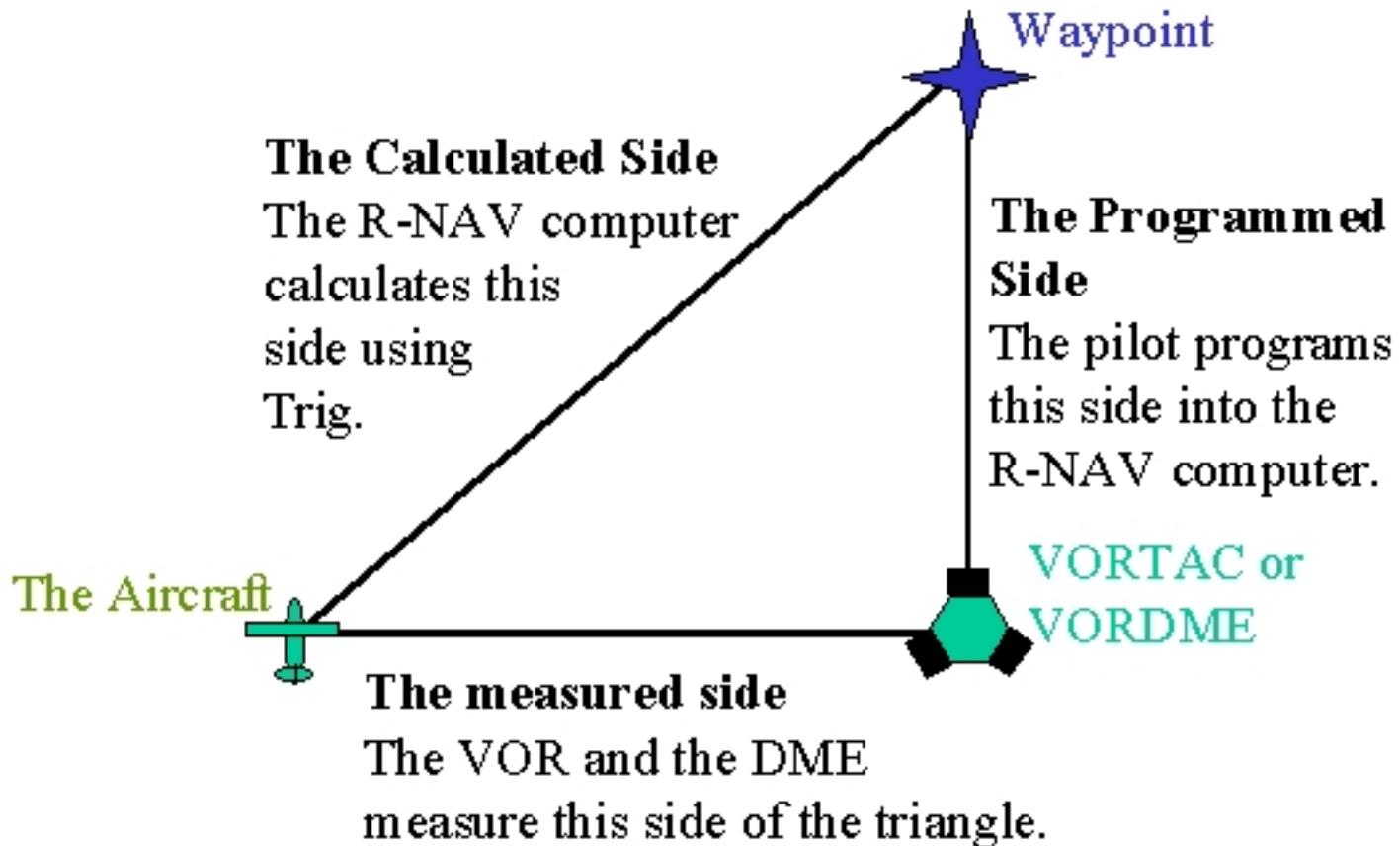


AREA NAVIGATION (RNAV) SYSTEMS

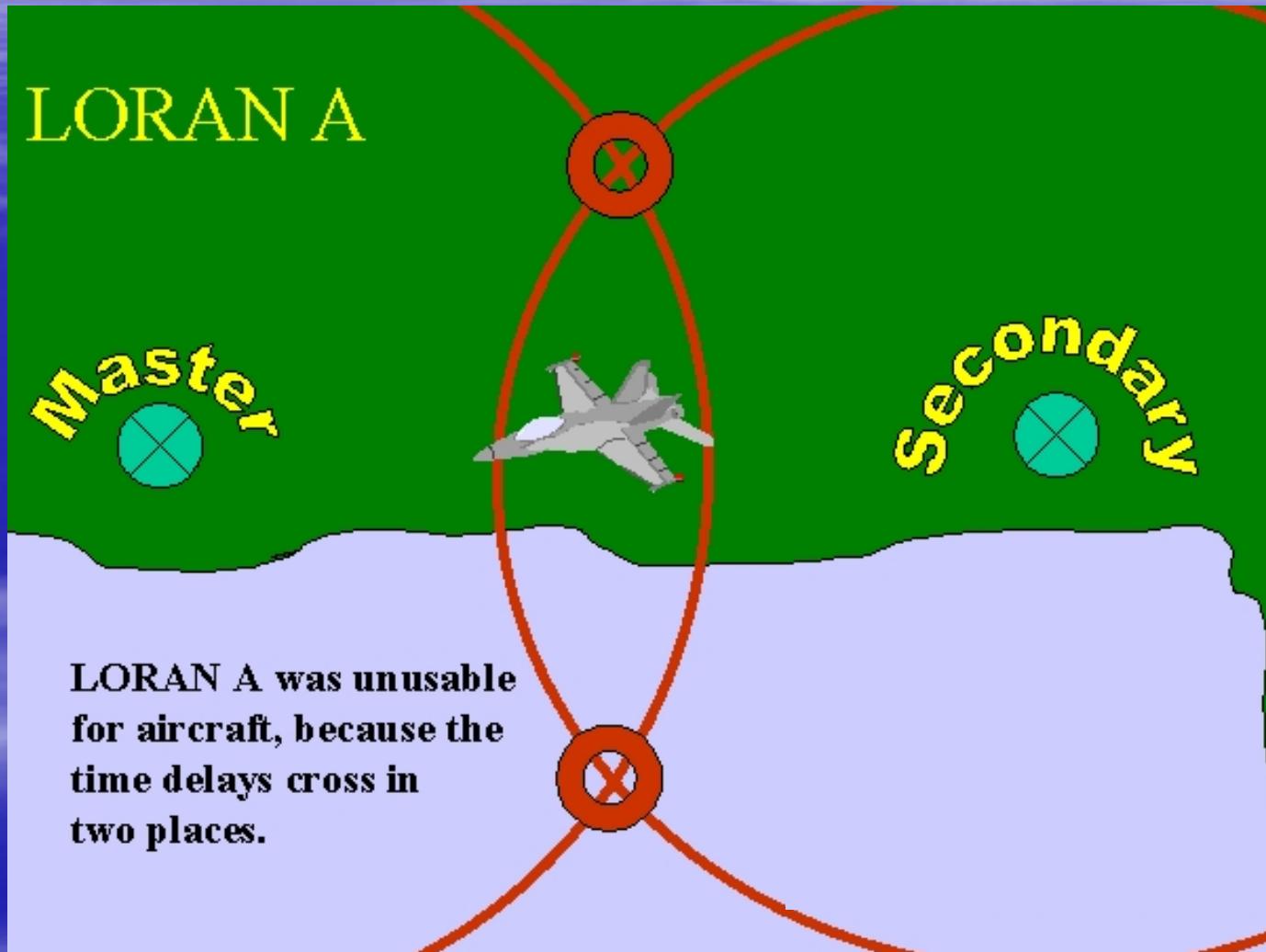


VOR/DME RNAV principle

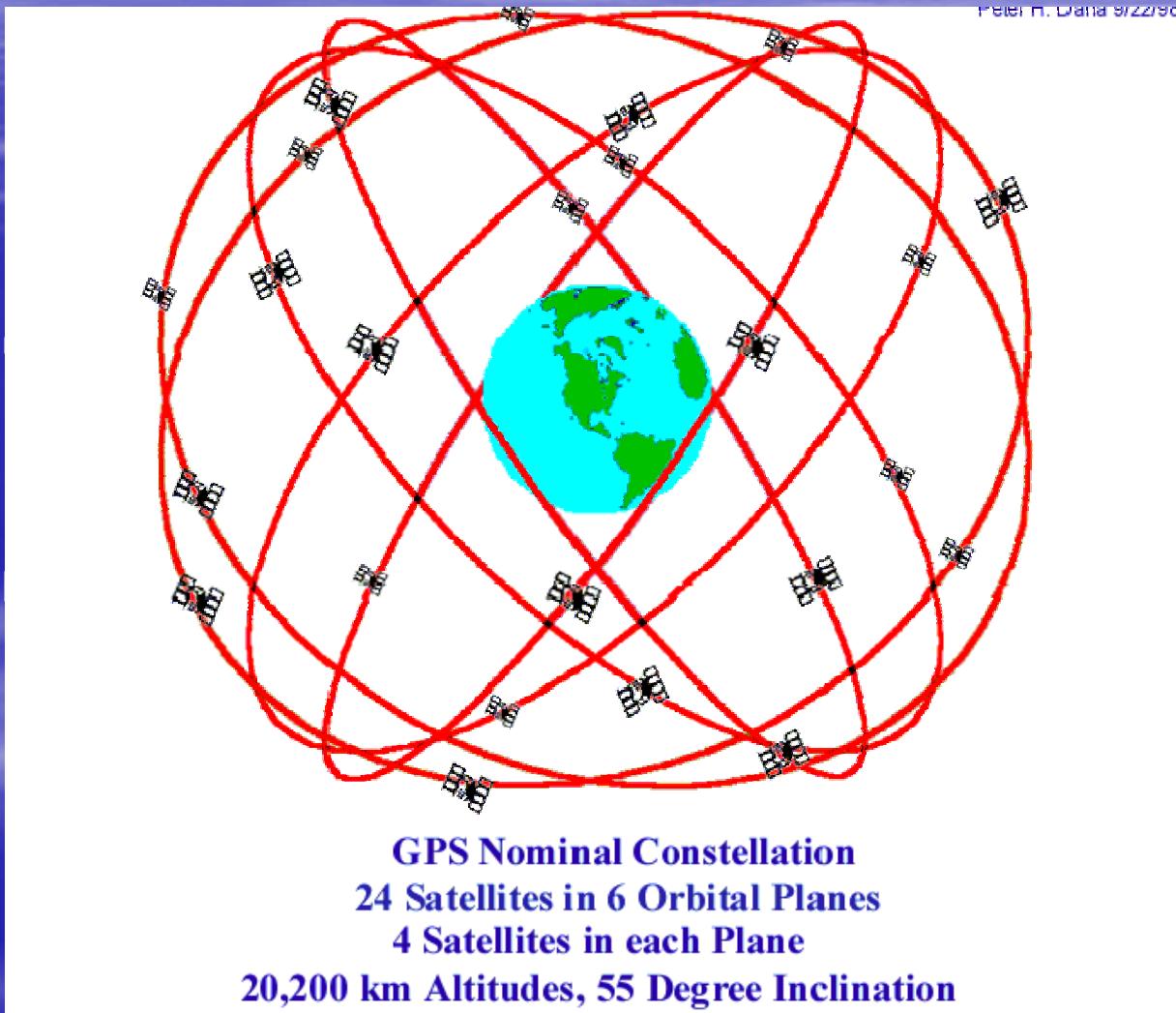
The R-NAV Triangle



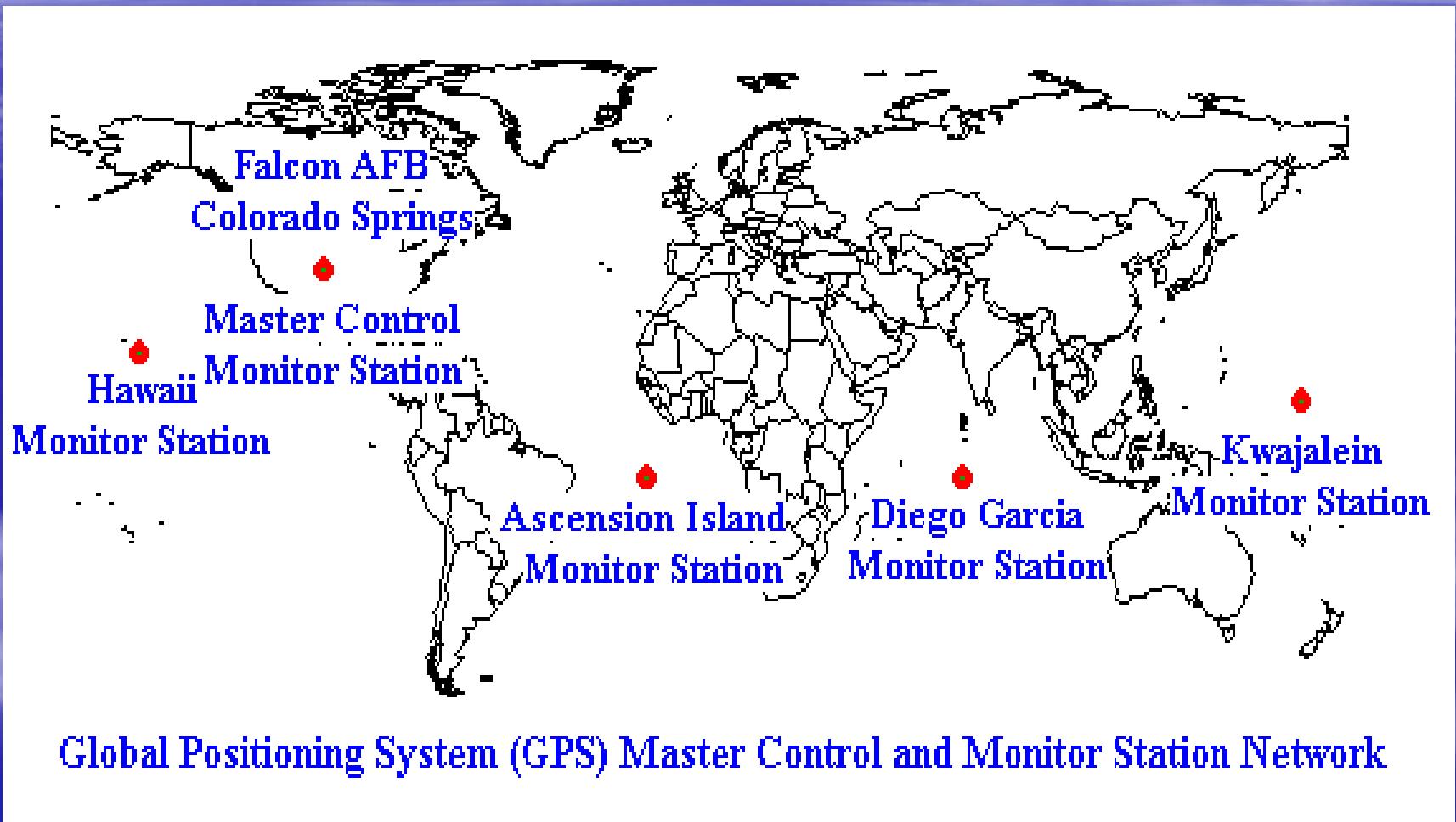
LORAN-A



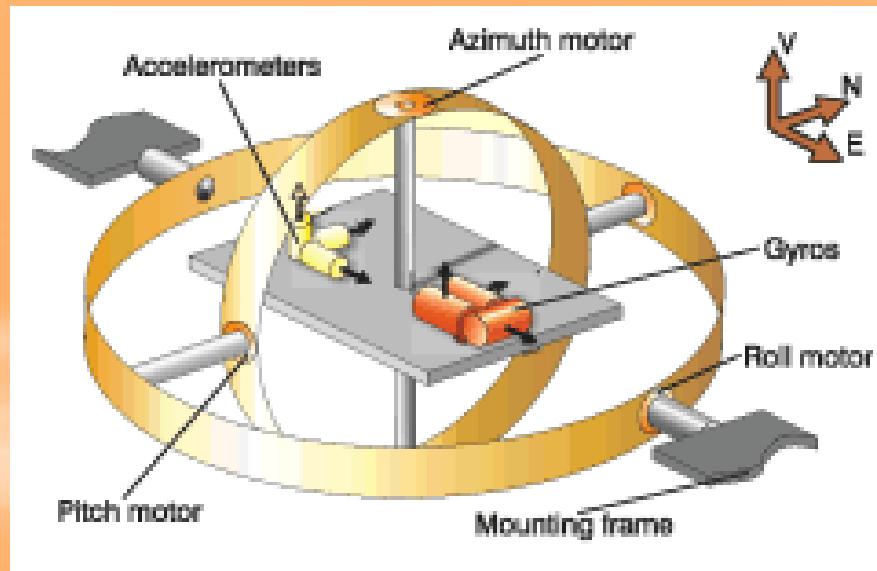
SPACE SEGMENT



Control Segment



INERTIAL NAVIGATION SYSTEM (INS)



Fighter Cockpit



Modern Airliner Cockpit

