GPS

IFR Approved GPS

To be approved for IFR operations a GPS must be

- Designed for aircraft use
- permanently mounted in the aircraft
  The FAA not only required the GPS system to be approved but also the installation
  The installer must
- Be an appropriately qualified tech
- Follow specific procedures
- Conduct specific post installation tests
- Complete the aircraft logbook entries

Current Database

To operate safely IFR you need to update your charts and other information

- more frequently than for VFR operations
- this includes the database
  The FAA requires you to have current GPS database if you are going to fly instrument approaches
  IF your database isn't current
- you can still use IFR approved GPS for the enroute and terminal parts of your flight
  - as long as you verify that the data in your database for your route is valid
  To check the database on the G1000
- look at the splash screen when the g1000 first turns on
- review the date information for the Navigation Database

Receiver Autonomous Integrity Monitoring (RAIM)

When the GPS determines your current position it normally needs 4 satellites
Your GPS receiver verifies the integrity or usability of the signals it receives from the GPS satellites through RAIM.

Raim

- is the equivalent to the "flag" on a VOR indicator
- needs a minimum of five satellites in view

    - or four and a barometric altimeter
    - this ensures the signals are reliable
- this is called "Fault Detection"
- needs 6 satellites in view
    - or five and baro aiding to
        - isolate a corrupt satellite signal and
        - remove the corrupt satellite from the navigation solution
            - this is called fault exclusion

Baro Aiding

- uses digital data from the pressure altimeter to substitute for an additional satellite and provides additional
    - Redundancy and RAIM capability
    - this increases the navigation coverage of the GPS

RAIM Warning Messages

There are two types
- one indicates there are not enough satellites available to provide RAIM
- you will see something like RAIM not available
- this tells you that your position is not guaranteed
The other indicates that RAIM has detected a potential error that exceeds the requirements of the current phase of flight

- you will see something like "RAIM position error"
- Phases of flight and their protection limits are
    - 4 NM for oceanic
    - 2 NM for enroute
    - 1 NM for terminal
    - 0.3 for non precision approaches

RAIM Prediction

- uses computers to estimate
    - the number of satellites available
    - the geometric pattern of the satellites
        - at a specific location
        - at a specific time
    - If there will be enough satellites

    - in the right places
- Should be verified as part of your GPS preflight planning

Wide Area Augmentation System

If your receiver has Wide area augmentation system capability

- It recieves correction signals from an additional satellite and will automatically
  - correct for errors
  - exclude a failed satellite from the position solution
  Wide Area Augmentation System (WAAS)

GPS Notams

GPS has its own NOTAM system
GPS Notams list satellite outages

- you wont know if they affect unless you get a RAIM prediction for your route and arrival
  Required Navigation Performance

WAAS Video Notes
Wide Area Augmentation System (WAAS)