

A Primer of GPS Rules

by Harry Kraemer

GPS approaches originally were introduced in three phases. This was part of the "overlay program."

Phase I allows a pilot with an approach-certified GPS to fly an overlay approach as long as the pilot monitors the underlying approach. An overlay approach consists of GPS waypoints overlaid on an existing approach.

Phase II allows the pilot to fly an overlay approach using GPS without actively monitoring ground-based navigation aids. Ground-based navigation aids must be working, and the aircraft must have the related avionics installed and working in the aircraft. The related avionics need not be turned on.

During Phase III, instrument approach procedures are renamed with "or GPS" in the title. During this phase, ground-based navigation aids need not be operational, and the associated avionics need not be installed, operational, turned on or monitored.

But in all three phases, only those approaches in the receiver database of the GPS unit are authorized to be flown with GPS.

In addition, under each phase, if an alternate airport is required, the alternate airport must have an instrument approach other than GPS. In such a case, the associated avionics must be installed in the aircraft and working.

Finally, stand-alone approaches have become available. A stand-alone approach is easily recognizable, as it will have only "GPS" in the title, as in "GPS 5." Stand-alone approaches must be flown with a GPS receiver.

What can I legally do with my GPS? How do I know what approaches I can do with my GPS?

These are questions that often come up when I am conducting instrument training and the customer has a GPS. GPS approaches often bring the most questions.

Technical Standard Order C129 sets minimum performance standards that GPS equipment must meet to operate in the United States during en route, terminal and non-precision approach procedures. Here are a few of the requirements:

En Route and Terminal Ops:

- An updateable database.
- Fixes must be in the database.
- One-second position update.
- Manual waypoint insertion to .1 minute lat/long or .1 mile.
- Pilot-selectable CDI sensitivity, .1 mile minimum.
- RAIM integrity alarms.

Approach-Approved Ops:

- All approach fixes in database; for non-precision approaches, SIDs, STARs.
- Approach fixes stored in order of flight; can't be manually altered.
- IAF selectable by pilot.
- Approach arming within 30 miles of airport.
- Path between fixes defined as TO-TO route (meaning that when the receiver reaches one waypoint in the approach, it automatically sequences to the next until reaching the MAP).
- Receiver must autosequence approach fixes until the MAP.
- Manual interruption of autosequencing for holds and procedure turns.
- Approach turn anticipation.
- Barometric input for RAIM.
- Annunciators to indicate approach enabled, approach active, reminder for barometer setting,

change of CDI sensitivity.

- Linear CDI scaling one mile to .3 mile for approach.
- Single-pilot action to go from present position to any waypoint.
- Approach-level RAIM (10-second alarm).
- Predictive RAIM (plus/minus 15 minutes of ETA at destination).
- Hard flagging for approach when RAIM alarm is active.

In July 1998 the FAA made a policy change that allows pilots flying with IFR-certified GPS units to substitute GPS for DME and ADF avionics for all operations except during an NDB approach without an overlay.

Pilots also may use GPS in lieu of DME and ADF on all localizer approaches, as well as VOR/DME approaches. GPS also satisfies the requirement for DME at and above FL240 per FAR 91.205.

There are limitations. An NDB approach that does not have an overlay still must be flown using an ADF receiver. If an alternate airport is needed, a non-GPS approach must exist at the alternate airport. GPS cannot be substituted for DME or an ADF on an alternate approach.

DME transmitters associated with a localizer may not be retrievable from your GPS until the manufacturer incorporates them in the database. In this case, the pilot is not authorized to manually enter the coordinates.

One of the intentions of TSO C129 was to standardize IFR GPS units. Although in concept they are, a pilot must remember that significant differences exist between receivers. Being familiar with one unit does not always mean that you will be comfortable with another.