

WAAS Has Runway in Sight

FAA has made a significant step toward satellite navigation by commissioning WAAS

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Following a three-year delay to correct software problems, the FAA has commissioned the Wide Area Augmentation System to refine Global Positioning System guidance for en route navigation and approaches.

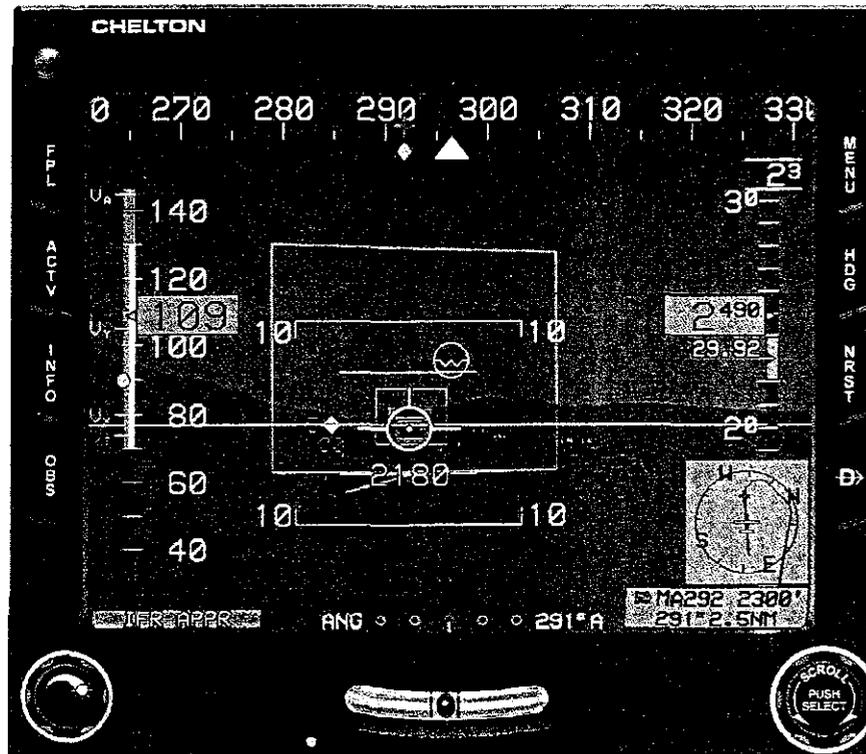
WAAS employs a ground-based network of stations to monitor GPS signals and relay corrections via satellite to receivers on aircraft. The \$2.5-billion system (including all life-cycle costs through 2020) has been nearly a decade in the making, but inaugurates an era of greater utility from satellite navigation for civil use. FAA Administrator Marion Blakey said the start-up of WAAS is "a critical first step" in providing improved satellite navigation capability for civil aviation. Raytheon is the prime contractor.

General aviation, corporate, air taxi and regional airline operators are expected to benefit the most from this augmentation to GPS signals. FAA officials say the accuracy is 1-1.5 meters compared with the 7-10 meters (vertical and horizontal) civil users obtain with GPS without augmentation.

THE MAJOR AIRLINES are well-served by instrument landing systems (ILS) at the busiest airports and are expected to be slow to equip themselves for WAAS navigation. However, when it comes to operations into airports that rely on non-precision approaches, the lower minimums of WAAS precision approaches may make sense for schedule-driven carriers. Airline pilots fly these approach procedures so infrequently they often execute them poorly, according to one air navigation expert. WAAS' ILS-like guidance capability would make it much easier to fly correctly.

As of last week, there were 500 GPS approaches certified for use at 200 airports in the U.S., but only two avionics companies are shipping WAAS equipment to customers: Chelton Flight Systems of Boise, Idaho, and Salem, Ore.-based UPS Aviation Technologies. Olathe, Kan.-based Garmin is expected to make a retrofit module available for its GPS navigation systems that would allow 25,000 or more general aviation

Chelton Flight Systems EFIS with 3D highway-in-the-sky navigation provides approach guidance ("fly-through" target boxes) keyed to GPS WAAS.



aircraft to be quickly upgraded for WAAS approaches. Other avionics makers are expected to quickly develop WAAS-capable GPS receivers.

There are three types of approach procedures possible with WAAS, but only the first was ready for use by the system's July 10 commission date.

- Lateral Navigation (LNAV) with a minimum descent altitude of 400 ft. or more above the ground.

- Lateral and Vertical Navigation (LNAV/VNAV) which add glideslope-like guidance down to about 350 ft. AGL.

- LPV approach—an acronym that uses letters with no particular meaning but which defines a "near-Category 1" precision approach capability. Cat. 1 has a decision height of 200 ft. but an LPV approach allows for a 250-ft. decision height. As with Cat. 1, an LPV requires 1/2-mi. visibility for an approach to a lighted runway and 3/4-mi. visibility to a non-lighted runway.

LNAV is available now and the other two types of approaches will be phased into service over the next sever-

al months. However, it will take years for the FAA to design and certify approaches to runways at the current rate of about 300 per year. New modeling and simulation techniques could allow the FAA to accelerate that process. The goal is to provide WAAS approaches for all instrument flight rule (IFR) runways in the national airspace system. The capability of expanding to include runways that could be upgraded for IFR operations without the addition of any ground equipment is part of that goal. By way of contrast, ILS systems typically cost as much as \$1-2 million for ground equipment for each runway end.

WAAS includes 25 precisely surveyed ground stations where GPS signal data are gathered. Any errors detected, including those due to signal distortion in the ionosphere, are sent to one of three master stations for analysis. The master station then composes a correction message for broadcast via satellite to aircraft.

WAAS will also facilitate the use of lower altitudes for aircraft following in-

strument flight plans on Victor routes, particularly in Alaska. Previously these aircraft were restricted to flying no lower than the published minimum en route altitude (MEA), based on the line-of-sight reception of the VOR or NDB signals providing guidance along the route. But by using WAAS and GPS as the sole means of navigation, these aircraft can operate lower and still be safely above terrain and obstacles. In Alaska, this will be particularly useful because the old MEA restriction often put aircraft into the hazardous icing level. The first use of these procedures is underway as part of the FAA's pioneering Capstone program. Aircraft are being equipped with WAAS avionics in Capstone's Phase 2.

Daniel P. Salvano, director of the FAA office of communications, navigation and surveillance systems, said: "Unlike other ATC modernization programs that require a waterfall rollout from one facility to the next, WAAS provides

instantaneous capability nationwide."

Dan Hanlon, FAA's WAAS program manager, emphasized that the two key benefits that WAAS has over GPS are vertical guidance and improved availability of signals. With just GPS, it was possible to lose signals for up to 7 min. if the location of the satellites was not ideal. That won't happen with WAAS, he said. And pilots will be alerted to any anomalies with the GPS signals so they can adjust their approach minimums to a higher altitude.

THE FAA IS WORKING with other countries planning to establish their own WAAS systems, a move that will allow them to monitor the integrity of GPS signals for the first time. These include England, Japan, Brazil, South Korea, Mexico and Canada. Hanlon said the WAAS-compatible avionics being installed in U.S. aircraft will also work with systems being developed overseas.

The WAAS program office is also mov-

ing ahead with securing more reliable satellite coverage than the two Inmarsat 3 satellites—leased through 2007—provide. In March, Lockheed Martin was chosen to procure three new satellite leases for the future of WAAS. One Inmarsat satellite will probably be retained through 2007 while two new satellites are brought online. FAA officials said the Telesat Canada Anik F-1R, due to be launched in 2006, has just signed on for a WAAS lease. Negotiations are underway with a vendor for a second satellite.

The FAA has spent \$886 million on WAAS to date including about \$95 million for developing approach procedures. The latest \$2.5-billion cost estimate isn't exact because it includes the price of new satellite leases which are still in negotiation. The latest estimate is actually \$400 million lower than recently cited government figures, but is more than \$1.5 billion above 1994 figures—when the program started. ☐

Squeeze on Airlines

European Parliament's proposed tough rulings on overbooking are hailed and decried

PIERRE SPARACO/PARIS

European Union member states are expected to ratify the European Parliament's decision to double penalties for overbooking. The EU hopes its pending initiative will force airlines to drop—or significantly reduce—some questioned practices.

According to the new regulations, bumped passengers would receive up to 600 euros (\$680) in compensation and far better meals and/or accommodations than currently offered. The Parliament, overriding the often ineffectual rules established in 1991, is seeking all-round protection for passengers, including those on charter flights.

Said Loyola de Palacio, EU's vice president and transport commissioner: "This is an important day in our common effort to put the citizens at the heart of EU policies."

The regulations will apply to travelers departing from an EU airport on an EU carrier or from a third country to an EU destination. Legal provisions will address:

- Denied boarding. Before bumping passengers, airlines and tour operators will be obliged to call for volunteers to

exchange their seats "... for advantages." If this does not resolve the situation (caused by overbooking), affected passengers will be paid 250 euros for flights up to 1,500 km. (930 mi.), 400 euros for 1,500-3,500 km. and 600 euros for long-haul flights of 3,500 km. or more. According to the European policy makers, "this [compensation levels] would create a strong incentive to make volunteering attractive and a powerful deterrent to overbooking practices." They added that a similar volunteer system is proving effective in the U.S.

- Minimizing inconveniences. The right to compensation will not be applied if overbooked travelers are informed two weeks prior to departure date and are offered alternatives. This would include giving passengers a choice between an alternate flight "at the earliest opportunity," or reimbursement.

- Long delays. The policy makers specifically ruled that passengers with special needs who encounter long flight delays must have their basic needs provided for. However, they stressed that it would be unfair to apply this to all inconvenienced passengers because

delays are often not the airline's fault.

Although the initiative indicates that Europe's slack economy is now perking up, (which will, presumably, help all airlines back to profitability), it did not stop some low-cost carriers from voicing vehement opposition. "What the European Parliament has voted is nonsense," EasyJet Chief Executive Ray Webster said. "So, we are left with a possibly illegal compromise which discriminates against those airlines, such as EasyJet, offering the lowest fares in the market."

IN SHARP CONTRAST with EasyJet's intense opposition to the new rules, Ryanair officials actually called for a ban on overbooking, claiming that Ryanair is the only major European airline that does not follow this practice in order to optimize load factors. They added that the new regulations are anticompetitive. "... an unfair penalty on air travel [that] bears no relationship to the fare paid."

According to Jim Murray, head of the Brussels-based European Consumers' Organization, "the [European] Parliament's reputation as a consumer champion has suffered a setback." He was referring to the policy makers' decision to jettison passengers' rights to refund, repatriation or rerouting on delayed flights. The group also questioned the elimination of a rule forcing airlines to disclose flight punctuality records.

Mike Ambrose, director general of the European Regions Airline Assn., was also critical of the new regulations, calling them "an indescribable jumble of ill-considered ideas." ☐