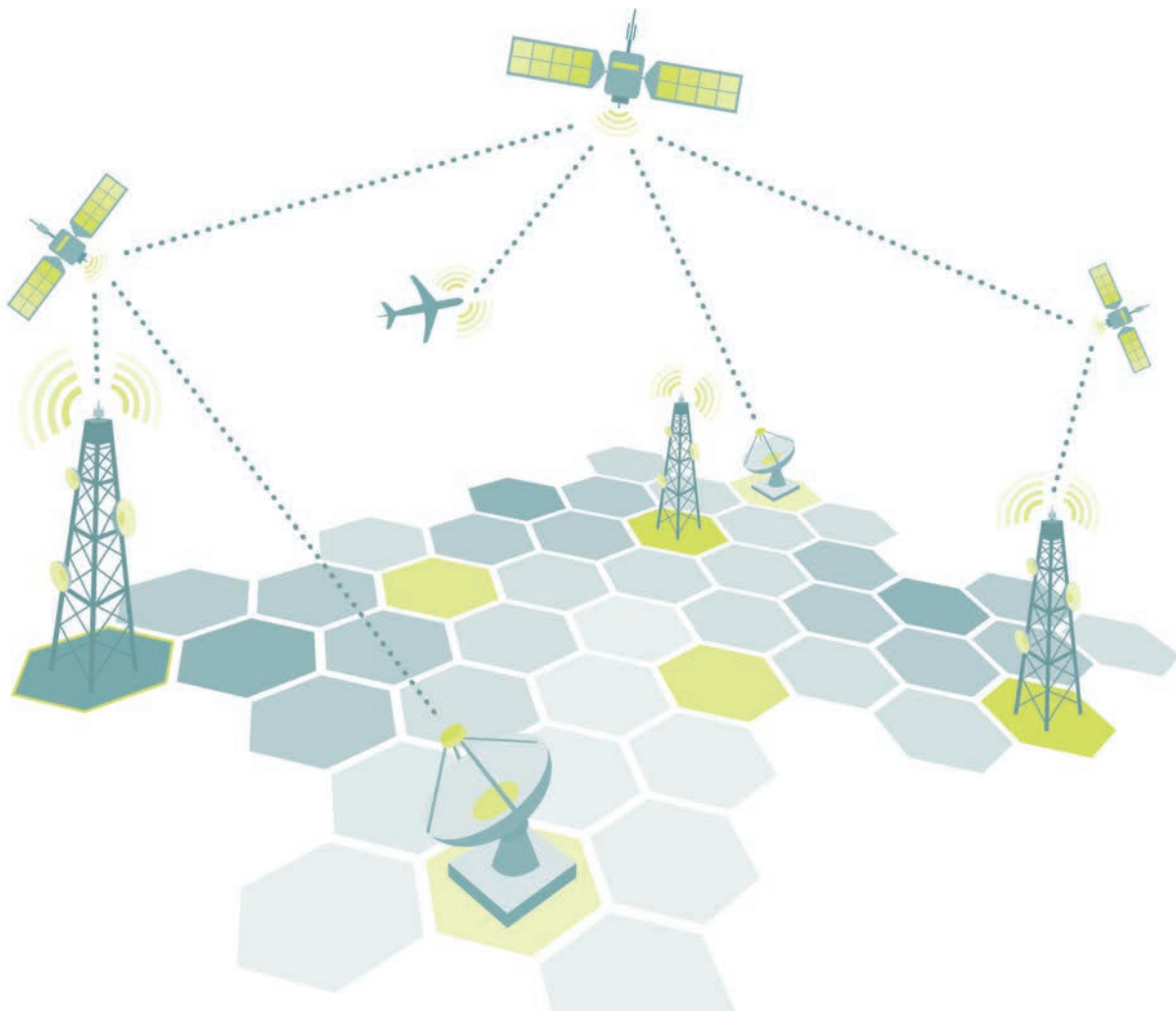


UPGRADING TO WAAS:

ANSWERS FROM INDUSTRY EXPERTS

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Is now the time to upgrade to WAAS? What is the difference between a STC and field approval process? Industry experts answer some of the common questions and confusion surrounding these upgrades as operators consider the future of aviation navigation.



Now is the time to begin researching to determine if an aircraft qualifies for a WAAS upgrade.

ILS APPROACH CANCELLATIONS

One can almost feel the clock ticking for the 60-year-old Instrument Landing System (ILS) approaches and their expensive annual maintenance costs. The Federal Aviation Administration (FAA) has been cancelling redundant instrument ground-based approaches for several

years, shifting its focus toward developing more satellite-based approaches with ground references.

This effort was reaffirmed by the FAA's cancellation

of more than 130 redundant ILS approaches in mid-December last year, as reported by the Aircraft Owners and Pilots Association (AOPA). However, no hard mandate for satellite-based Wide Area Augmentation System / Localizer Performance with Vertical Guidance (WAAS/LPV) approaches is expected by industry experts... yet.

While the focus may be shifting away from ILS approaches, budgets are tight

and many questions still surround WAAS/LPV upgrades.

MEETING FUTURE NEEDS

Gary Harpster is a long-time member of the Aircraft Electronics Association (AEA) Advisory Board and an Avionics Installation Sales Rep at Duncan Aviation-Lincoln with 40 years of industry experience. He's well-known for his avionics expertise.

When someone asks him if now is the time to upgrade to WAAS, he responds "Does your aircraft meet the needs of the future?" If an aircraft isn't equipped with WAAS/LPV, the answer is probably no.

"Now is the time to begin researching to determine if an aircraft qualifies for a WAAS upgrade," says Gary. "Some aircraft may not qualify because of compatibility with the existing systems."

The chief compatibility issue is the age of an aircraft's Flight Management System (FMS). Many FMSs currently in operation were installed in the 1990s. These 20-something-year-old computers, or more specifically their processors and memory,

The average WAAS upgrade pays for itself in fuel and engine time saving in about two or three years.



simply weren't designed to handle the increasing amounts of data required by today's technology.

"Legacy aircraft have a lot to gain from this upgrade," says Justin Vena, an Avionics Installation Sales Rep at Duncan Aviation-Battle Creek. "The average pay back period is two to three years. LPV

approaches allow aircraft to avoid step-down approaches, which saves time on engines and fuel." To estimate the pay back period for a WAAS installation, please visit

www.DuncanAviation.aero/waas and look for the "WAAS/LPV ROI Calculator."

Steve Elofson is the Avionics Installation Sales Manager at Duncan Aviation-Lincoln. He explains that these old FMSs are due to be updated anyway. "When operators start looking at the additional features, an upgrade really starts to make sense," says Steve.

WHAT IS LPV?

Many operators are struggling to make sense of the distinction between WAAS and LPV. WAAS increases the accuracy of the Global Positioning System (GPS). LPV is the certification that enables an aircraft to fly GPS approaches to a lower minimum.

Chad Ostertag, an Avionics

Sales Rep at Duncan Aviation-Battle Creek, works with operators to determine what level of functionality they're looking for when they ask for WAAS. Often it takes a few questions to determine what they're really interested in is LPV.

"Most customers are looking for a solution that will get them the LPV approaches," Chad explains. "If we install a system that is WAAS capable, it is also LPV capable, but without a proper certification path the LPV portion can't be activated."

A SIGNIFICANT INSTALLATION EVENT

Upgrading to WAAS/LPV sounds deceptively simple: it's just a matter of plugging in a new unit, right? Not for Part 25 aircraft.

"Customers will call and ask for a price quote, expecting this type of an upgrade to cost \$10-20,000," says Justin. "When they hear the quote, it's much more expensive than they expect, but this is the future of aircraft navigation. The upgrade will give them significant value, which offsets the initial cost."

The pricing confusion seems to stem from smaller WAAS-enabled GPS units, Garmin units in particular. They offer similar features as their more expensive counterparts and are installed at a fraction of the cost with minimal downtime. However, "these units

are not certified for Part 25 aircraft,” says Steve. “They are only certified and designed for Part 23 aircraft, which are mostly piston and turboprop aircraft.”

Upgrading to a different system will likely require the replacement of nearly all existing wiring.

The upgrade path for Part 25 aircraft is more complicated. An installation requires units to be integrated with an aircraft’s flight control and autopilot

systems, making an upgrade a very significant installation event.

Older FMSs aren’t coupled to an aircraft’s autopilot as completely as newer, integrated systems, says Steve, and modifying the wiring can be somewhat like brain surgery. Operators considering upgrading to a

system that is different from the OEM configuration should be prepared to replace most, if not all, of the existing wiring.

UNIQUE SYSTEM CONFIGURATIONS

For LPV to be possible, all system components must communicate with each other and function according to manufacturer specifications. “Flight guidance, primary flight displays and the autopilot all have to react correctly,” says Gary.

There are a multitude of different combinations of makes, models, and system configurations among business aircraft operating today. Each unique combination must be thoroughly researched, a new configuration engineered, and the new systems installed.

WAAS FLIGHT MANAGEMENT SYSTEMS FOR PART 25 AIRCRAFT (AS OF APR 3, 2014)

Manufacturer	WAAS Flight Management Systems
Universal Avionics	UNS-1Lw
	UNS-1Fw
	UNS-1Ew
Rockwell Collins	AMS-5000
	FMS-3000
	FMS-4200
	FMS-5000
	FMS-6000
Honeywell	NZ-2000

Gary explains that it is the responsibility of the installing agency to make sure a unit works with an aircraft's onboard systems, making experience and manufacturer relationships crucial in a service provider.

"There is a lot of research that takes place on the front end," says Gary. "We make sure a solution will work with the existing avionics system configuration. We minimize risk."

Duncan Aviation's teams also collaborate with FMS manufacturers to troubleshoot discrepancies with new units and find solutions.



For an installation to be done correctly, customers should expect downtimes of no less than two weeks.

MAXIMIZING AN UPGRADE

No matter how an operator approaches a WAAS/LPV upgrade, the proposition may be expensive in terms of both money and downtime.

An upgrade can be maximized by performing major and minor inspections and maintenance during the installation. Coordinating an upgrade with service events requires some advance planning, but can save valuable downtime.

Shorter downtimes can be achieved by upgrading from an older to a newer generation system. For an installation to

be done correctly, "customers should expect downtimes of no less than two weeks," says Steve. However, upgrade paths aren't available for all systems, particularly older aircraft models.

FIELD APPROVALS VS. STCS

Once a Supplemental Type Certificate (STC) is developed for an installation, the upgrade involves a more straightforward process with more easily anticipated downtimes. However, WAAS/LPV is still relatively new to the industry and not many STCs have been created.

Universal Avionics recognized this problem early on and approached the FAA for help to make the upgrade process easier. The FAA agreed, and the Engineering Assisted Field Approval Process for Universal Avionics WAAS/LPV FMS products was announced on Sept. 21, 2009.

This unique FAA field approval process saves operators time and money by providing an alternative to the intensive STC process. "It requires that the existing Universal FMS be 3D coupled for it to be eligible for the engineering assisted field approval," says Justin. The process requires that the vertical and lateral coupling for Universal's FMS units fully integrate with the aircraft's flight director or autopilot. This allows aircraft to depart with a certified WAAS/LPV system.



No hard mandate is expected in the near future, but WAAS/LPV may soon offer some distinct flying advantages.

Scaling requirements on existing EFIS systems vary and must be evaluated for each installation, says Justin.

STCs are required for Rockwell Collins, Honeywell and non-3D coupled Universal Avionics FMS WAAS/LPV upgrades.

THE FUTURE OF WAAS

Although the AOPA reports that the FAA is collaborating with them to ensure that adequate guidance is available to meet the needs of operators, the clock is ticking for ILS approaches. These antiquated ground-based approaches have large annual maintenance costs. WAAS/LPV approaches, by contrast, are significantly less expensive to implement and maintain while offering much more functionality to operators.

WAAS/LPV upgrade solutions are now available for most aircraft, says Justin. Duncan Aviation recently completed engineering assisted field approvals for Universal Avionics WAAS/LPV upgrades in a Citation 550B and a Hawker 800XP. In addition, the company STCs with Honeywell on a NZ-2000 FMS 6.1 software upgrade in a Challenger 601-3A and Falcon 900B.

Despite the ILS approach cancellations, Steve doesn't expect a hard mandate for WAAS/LPV any time in the near future. However, with aging computer systems, increasing amounts of data to process and steadily increasing air traffic, he speculates that the upgrade may soon offer some distinct flying advantages that will necessitate an upgrade for operation in certain airspaces.

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