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A Communication from the  
Vice President, System Operations Services

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## ***Wide Area Augmentation System (WAAS) NOTAMs***

\*F/ET July 10, 2006, marked the third anniversary of commissioning WAAS. The following information is an overview of what is currently going on with WAAS and WAAS Notices to Airmen (NOTAM).

### **WAAS History**

The Satellite Operations Implementation Team (SOIT) determined that there can be many short duration WAAS outages on the order of a few minutes. It would be cumbersome and confusing to issue a NOTAM for each and every short duration outage. Since these outages can be predicted, we did not want to ignore them and decrease any pilot confidence in the system. The SOIT decided that 15 minutes was a level that is operationally significant; therefore, all WAAS outages shorter than 15 minutes were mapped to a minimum duration of 15 minutes. This is why we issue WAAS NOTAMs differently than other radar and navigational aid (NAVAID) outages. It is predictable, used for preflight briefings on a short-term basis, and can be issued as a NOTAM in advance.

### **Service Volume Model/Issuance of NOTAMs**

Satellite navigation and associated avionics systems present a challenge when it comes to predicting availability of service. For WAAS, a predictive modeling tool is required to determine availability. The Service Volume Model (SVM) tool predicts WAAS service availability and NOTAMs associated with WAAS unavailability for a 48-hour period every 24 hours based on Global Positioning System (GPS) satellite geometry.

### **Types of WAAS NOTAMs**

There are two types of WAAS NOTAMs: 1) wide area NOTAMs issued through the U.S. NOTAM Office (USNOF) and distributed either as a Flight Data Center (FDC) NOTAM or under a center's identification, and 2) site-specific NOTAMs, issued through the applicable automated flight service station/flight service station (AFSS/FSS) and are airport specific.

### **FDC/Center WAAS NOTAM (Generated by USNOF)**

A WAAS UNAVAILABLE NOTAM will be issued for an area-wide WAAS outage and indicates a critical WAAS system component failure. These NOTAMs will have no end time and will be issued by the USNOF. Controllers are required to include this information when they clear an aircraft for an area navigation (RNAV) approach if this information is not contained on the Automatic Terminal Information

Service (ATIS) broadcast. Flight service specialists must pass this information to pilots if WAAS status is requested. Examples are found in the Notices to Airmen, Order 7930.2, under Chapter 5, Section 3, NAVAID NOTAMs, paragraph 5-3-7p.

### **Site-Specific WAAS NOTAM (Generated by SVM)**

Site-specific NOTAMs are generated for airports with Localizer Performance with Vertical Guidance (LPV), Lateral Navigation/Vertical Navigation (LNAV/VNAV), and LNAV minima. Site-specific NOTAMs will be issued by flight service stations as sent to them by the SVM unless there is a garbled service B transmission or the format looks incorrect. These WAAS UNRELIABLE NOTAMs, that indicate predicted outages, are published for pilot pre-flight planning and only require the AFSS/FSS specialist to advise pilots of these if they request WAAS NOTAMs during their preflight briefings.

### **Example: LBB LBB WAAS LNAV/VNAV and LPV MNM UNREL WEF 0603281613-0603281628**

This example shows a proposed WAAS NOTAM automatically sent to Fort Worth AFSS (FTW) from the SVM. Its duration is 15 minutes, and the required action to be taken by FTW is to check the format and content and follow its normal procedures to issue a NOTAM through the NOTAM System. This NOTAM indicates when the vertical accuracy of WAAS for LPV and LNAV/VNAV approaches is predicted to be unreliable. The WAAS-equipped aircraft could still fly the LNAV minimums, provided the GPS signal is not affected. The aircraft could also fly the LPV or LNAV/VNAV minimums if the WAAS receiver indicates a good signal is being received upon arrival in the airport area.

Flight service specialists are reminded that WAAS NOTAM information can be predictive, or may indicate a real-time service outage, issued basically as it is sent to them by the SVM and is given upon request to the pilot.

### **WAAS Status**

WAAS was approved to provide vertical guidance down to 350 feet. Localizer performance with vertical guidance procedures down to 250 feet was later developed to take advantage of the increased performance provided by WAAS. The first procedures that allow operations down to 200 feet will be published in 2007. This move will improve capacity and safety and will eventually reduce operations costs for the Federal Aviation Administration by enabling the removal of a portion of existing ground-based navigation infrastructure. Currently, there are approximately 340 published WAAS approaches with a requirement to do another 300 per year.

### *Very Light Jets, the Dawn of a New Era in Aviation*



Shown: Dayjets Eclipse 500, the first VLJ to enter service on a large scale by late 2006.

**/T/R/E** The first of a new wave of small, advanced-technology, twin jet-powered personal and business aircraft entered the National Airspace System (NAS) this summer. The entry of the very light jet (VLJ) comes as general aviation had a record year in aircraft sales, 15.1 billion, up 27.2 percent in 2005 over the previous year, according to the General Aviation Manufacturers Association.

The VLJ is generally considered to be a light weight, twin jet aircraft with a maximum take-off weight below 10,000 pounds that maybe certified for single-pilot operations. However, Part 135 operators may be required to operate their VLJs with two pilots. For air traffic control (ATC) purposes, VLJs fall into the small category when applying wake turbulence separation standards. Most VLJs are equipped with all-glass cockpits that include reduced vertical separation minima (RVSM), automatic

dependent surveillance broadcast (ADS-B), and other advanced flight management systems that will enable the pilot to safely operate in all weather conditions up to flight level (FL) 400, at an average cruise speed between 250-350 knots. They are typically designed to carry four to eight people, including crew, on short-haul flights up to 1,400 nautical miles. However, most VLJ operators plan to operate their VLJs between 15,000 feet and FL 280.

The already-established "light jet" category, by contrast, includes larger jets such as the Cessna Citation CJ1 and Beechcraft Premier 1A, aircraft that typically weigh more than 10,000 pounds fully loaded and cost \$4-5 million or more. In contrast, VLJs are expected to cost anywhere from less than \$1 million to about \$3 million. Though expensive, VLJ prices are not unreasonable by lightweight, piston-powered aircraft standards. For example, new top-of-the-line, four-seat, propeller-driven Cessna 172s or Cirrus SR-22s are priced at \$250,000 and \$450,000 respectively.

The rapid development of VLJs by aircraft manufacturers, such as Cessna, Embraer, Eclipse, Adams, and others, may have impacts on the NAS as VLJs become viable alternatives to commercial airline travel. The performance and relatively low VLJ entry price and operating costs will lure an increasing percentage of piston-powered aircraft owners up into the jet ranks, in addition to drawing air taxi providers such as DayJet and "fractional" operators into the growing VLJ market. This has also given rise to the industry known as "on-demand air taxis," whereas, on a few hours notice, a customer can reserve a small and efficient jet, be picked up at the closest regional departure airport, and flown directly to the regional airport nearest their destination on the schedule that works best for them. For example, DayJet identified smaller regional airports as its "niche" market, and has no plans to operate from the major hub airports due to airport and airspace capacity and complexity. These "for-hire" services will cost little more than a full-fare coach ticket on many routes, and will provide access to thousands of smaller airport locations not served by the commercial airlines today.

The FAA will continue to work with aviation industry leaders to ensure that the air traffic system can handle the expected demand of 5,000 to 10,000 VLJs that aviation forecasters predict will enter service by 2015.

*In this publication, the option(s) for which a briefing is required are indicated by an asterisk (\*) followed by one or more letter designators, i.e., \*T = Tower, combined tower/approach control, \*R = TRACON, \*E = ARTCC (En route), or \*F = AFSS/FSS. (Reference 7210.3, para. 2-2-8.)*

This table lists Bulletins published since 2001. They can also be found on the Internet at [www.faa.gov/atpubs](http://www.faa.gov/atpubs)

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\*\* Special Edition