

Briefing Bulletin 03-D

FAA's Commissioning of the Wide Area Augmentation System (WAAS)

Introduction

On 10 July 2003, the FAA commissioned the Wide Area Augmentation System (WAAS) in the U.S. National Airspace System (NAS). WAAS may be used for aviation navigation in both instrument flight rules (IFR) and visual flight rules (VFR) operations. WAAS improves the availability, accuracy, and integrity of the Global Positioning System (GPS) standard positioning service, enabling WAAS avionics to be used for all phases of flight, including approaches with vertical guidance (APVs, which are performance-based rather than system-based approaches).

Appropriately certified and installed WAAS avionics may be used for all phases of flight – departure, including Standard Instrument Departures (SIDs); enroute, including area navigation (RNAV) and airways navigation; arrival and in the terminal area, including Standard Terminal Arrival Routes (STARs); and for instrument approaches. Authorized instrument approaches include the LNAV and LNAV/VNAV minimums on RNAV (GPS) and stand-alone GPS approach charts, as well as the minimums on conventional approach charts with “or GPS” in the procedure title. Additionally, a new type of APV minimums titled “LPV” will be published on select RNAV (GPS) approach charts beginning in the near future.

Detailed information on the various approaches that can be flown using WAAS is provided in the Aeronautical Information Manual (AIM), paragraphs 1-1-22 and 5-4-5. Aircraft with IFR approved WAAS avionics can file /G. Unlike TSO C-129 avionics, which were certified as a supplement to other means of navigation, WAAS avionics are evaluated without reliance on other navigation systems. As such, installation of WAAS avionics does not require the aircraft to have other equipment appropriate to the route to be flown.

NOTE: WAAS avionics must be certified in accordance with Technical Standard Order (TSO) C-145A, *Airborne Navigation Sensors Using the (GPS) Augmented by the Wide Area Augmentation System (WAAS)*; or TSO C-146A, *Stand-Alone Airborne Navigation Equipment Using the Global Positioning System (GPS) Augmented by the Wide Area Augmentation System (WAAS)*, and installed in accordance with Advisory Circular (AC) 20-130A, *Airworthiness Approval of Navigation or Flight Management Systems Integrating Multiple Navigation Sensors*, or AC 20-138A, *Airworthiness Approval of Global Positioning System (GPS) Navigation Equipment for Use as a VFR and IFR Navigation System*.

Restrictions on WAAS Operations: Due to initial system limitations, there are certain restrictions on WAAS operations:

WAAS Outages

At locations where outages of WAAS vertical guidance may occur daily due to initial system limitations, the following note will be included on some Jeppesen RNAV (GPS) approach charts:

“WAAS VNAV outages may occur daily. WAAS VNAV NOTAM service is not provided.”

Many of these outages will be very short in duration but may result in the disruption of the vertical portion of the approach. This note indicates that NOTAMs or Air Traffic advisories are not provided for outages that occur in the WAAS LNAV/VNAV or LPV vertical service. LNAV minimums should be used for flight planning at these locations, whether as a destination or alternate. For flight operations at these locations, when the WAAS avionics indicate that LNAV/VNAV or LPV service is available, then vertical guidance may be used to

complete the approach using the displayed level of service. Should an outage occur during the approach, reversion to Baro-VNAV or LNAV minimums may be required. As the WAAS coverage is expanded, the note will be removed.

Alternates

Pilots may plan to use any instrument approach authorized for use with WAAS avionics at a required alternate airport. However, when using WAAS at an alternate airport, flight planning must be based on flying the RNAV (GPS) LNAV minimums, or minimums on a stand-alone GPS approach procedure, or conventional approach procedure with “or GPS” in the procedure title. Code of Federal Regulation (CFR) Part 91 non-precision weather requirements must be used for planning. Upon arrival at an alternate, when the WAAS navigation system indicates that LNAV/VNAV or LPV service is available, vertical guidance may then be used to complete the approach using the displayed level of service.

Coincident with WAAS commissioning, the FAA will add alternate minimums to select RNAV (GPS) and stand-alone GPS approach procedures so they may be used by approach-approved WAAS receivers at alternate airports. Some RNAV (GPS) approach procedures will still depict alternate minimums as “**NA**” for other reasons, such as a lack of weather reporting capability.

NOTE: This does not change the existing alternate airport requirements for users of GPS TSO C-129/129A, Airborne Supplemental Navigation Equipment Using the Global Positioning System (GPS), receivers. For TSO C-129/129A users, any required alternate airport must still have an approved instrument approach procedure which the aircraft is equipped to fly, other than GPS, that is anticipated to be operational and available at the estimated time of arrival.

FAA NOTAMs

The FAA maintains a Notices to Airmen (NOTAM) service for WAAS and GPS. The term *UNRELIABLE* is used in conjunction with GPS and WAAS NOTAMs and is an advisory to pilots indicating that the expected level of WAAS service (LNAV/VNAV or LPV) may not be available. The FAA’s *WAAS UNRELIABLE* NOTAMs are predictive in nature and are published for flight planning purposes. Upon commencing an approach at a location NOTAMed *WAAS UNRELIABLE*, if the WAAS avionics indicate LNAV/VNAV or LPV service *is* available, then vertical guidance *may* be used to complete the approach using the displayed level of service. Should an outage occur during the approach, reversion to Baro-VNAV or LNAV minimums *may* be required.

Navigation Database (NavData)

WAAS-enabled RNAV (GPS) and WAAS LPV approach procedures will be included in the navigation database as they are developed by the FAA. The first procedures to be issued will be effective 4 September 2003. Questions related to the functional aspects of WAAS-specific navigation equipment should be directed to the avionics manufacturers.

Jeppesen Airway Manual Charts

Explanation of WAAS Features

(Refer to the sample chart on page 4)

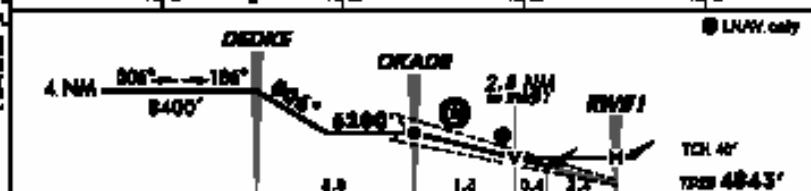
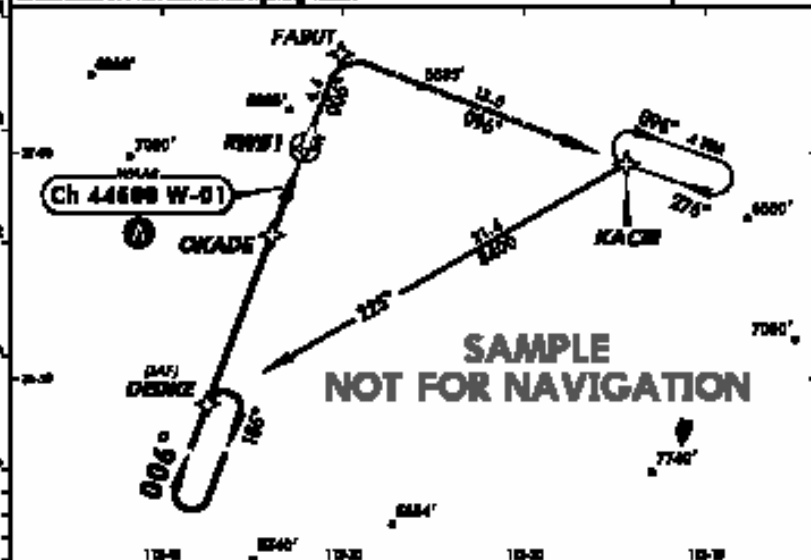
- A** WAAS Channel Number, unique to each airport, and Reference Path Indicator (RPI), which is made up of the letter "W" plus two or three characters representing the runway number. These are shown in both the Briefing Strip (chart heading) and plan view.
- B** Indicates LPV minimums are the lowest available in the minimums box below. The parenthetical term "CONDITIONAL" refers to the fact that other straight-in landing minimums are also available.
- C** The dashed symbol in the profile view indicates vertical guidance is provided by WAAS.
- D** WAAS Glide Path Angle information.
- E** LPV minimums defining near-Category 1 "precision" approach capability with a decision height as low as 250 feet and visibility, with approach lights, as low as ½ statute mile. These are minimums for approaches with vertical guidance (APVs) that take advantage of WAAS to provide an electronic vertical guidance capability.

KKNB/KNB
KANAB MAIN

10 AUG 95 (12-1)

KANAB, UTAH
RNAV (GPS) Rwy 1

① 124.2			⑤ CTAF 123.8		
WAAZ Ch 44800 W-01	Final Appch Crs 096°	Minimum A/I 6200' (1237')	EPV (CONDITIONAL) 5340' (107')	App Elev 4867'	⑥ 10,700' MSA (MUF)
<p>STANDARD AREA CIRCUIT to 8400' outbound via 096° course to FABUT, then outbound via 096° to KACIR and hold.</p> <p>All sets: MICHIE Trans: 124.2 PL 100 Trans: 123.8</p> <p>1. Obtain local altimeter setting on 123.8; when not received use Colorado City altimeter setting. 2. When CTAF not received, Rwy-VNAV NA. 3. Rwy-VNAV not authorized below -5°C (-13°F). 4. EPV or RNP-D.R. required. 5. DME/DME RNP-6.3 not authorized. 6. Pilot controlled lighting 123.8.</p>					



Wind speed-kts	PS	SP	100	200	300	400	500	600	700	800	900	1000
Other Tech. Const. 3.00'	372	473	551	607	643	669	688	701	710	717	723	728

③ UPV			STRAIGHT-IN LANDING Rwy 1			CIRCLE-TO-LAND		
④ 5340' (107')			5640' (77')			5740' (77')		
A	B	C	D	E	F	G	H	I
	3	3	1 1/2	3	3	3	3	3
	NA	NA	NA	NA	NA	NA	NA	NA

④ 5340' (107') with Colorado City altimeter setting. ⑤ 5640' (77') with Colorado City altimeter setting. ⑥ 5740' (77') with Colorado City altimeter setting.

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