FAA Navigation Programs AJM-32
http://gps.faa.gov

SatNav News

# Successful Verification of Low Level Helicopter Demonstration Routes in Maryland

On a crisp December day in Maryland, Hughes Aerospace Corporation successfully completed the flight validation of the low-level route structure designed for the Maryland State Police Aviation Command demonstration. It was the 4th day of flying for Chris Baur of Hughes Aerospace Corporation in their Robinson R66 flight inspection helicopter. It is equipped with a glass cockpit, digital autopilot with Stability Augmentation, ADS-B IN/OUT and a Garmin GTN650H Flight Management Computer with a Test Navigation Database. Hughes also has several independent sensors for independent data collection. This was a collaborative effort among the FAA, Hughes, and AeroNavData/GARMIN.

The route verification was a week-long process that consisted of flying the COPTER Instrument Flight Procedures that utilize the latest FAA criteria featuring COPTER Required Navigation Performance (RNP) 0.3 and Radius-to-Fix (RF) Segment coding. These modern features improve safety and accessibility, requiring less airspace while reducing time, fuel consumption and environmental impact. Eight hospitals and locations are connected to the route that extends across three states, from Morgantown, West Virginia, to Baltimore, Maryland creating an integrated network purposefully designed for helicopter IFR. One of the most exciting features of this program was making history when the first COPTER RF approaches were ever flown. During these approaches, even with strong cross and tail wind components ranging from 20-30 knots, the helicopter's navigation performance was perfect, with cross track (XTK) error essentially 60.7612 feet!

The next steps for the project will be the development of three additional helicopter prototype procedures at Frederick, MD, Fairfax, VA, and Grant County, WV. While the procedures themselves are fully certifiable for IFR production today, a series of demonstration flights in Visual Meteorological Conditions (VMC) under Visual Flight Rules (VFR) will be conducted to collect flight track data. Data analysis will then be performed to identify the benefits for WAAS–enabled helicopter PBN operations. The data collected and lessons learned from this demonstration will provide operators and the FAA the criteria to support future development of such applications in the NAS.

*- Amy Trevisan, FAA AJM-32/NAVTAC*


Garmin GTN650H Flight Management Computer

# GPS Update

# FAA contracts NovAtel for WAAS Modernization

*Reprint from Avionics International*
*by Nick Zazulia, January 4, 2019*

The FAA has granted NovAtel a contract for 40 ground uplink station signal generators to help modernize its wide-area augmentation system (WAAS) navigation service network.

Under the contract, NovAtel will design and produce the next-generation units as well as provide engineering support for its satellite-based augmentation system (SBAS) products which the FAA uses, such as the WAAS G-III reference receiver platform.

> “NovAtel remains committed to supporting the FAA and their safety of life WAAS service.”

The ground uplink station signal generators will include independent L1 and L5 signal paths to control frequency and phase of code and carrier for dual-frequency SBAS. A receiver system based on the WAAS G-III receiver platform will also be released along with the signal generator to aid in upgrading and extending the WAAS network’s infrastructure and the control loop of the ground uplink station, according to NovAtel.

“We have a long history with the FAA and have worked very closely with the WAAS program team to develop multiple-generations of SBAS infrastructure,” said Jonathan Auld, NovAtel vice president of engineering and safety-critical systems. “NovAtel remains committed to supporting the FAA and their safety of life WAAS service, and we are excited to deliver this critical next-generation technology for SBAS modernization.”

The WAAS is a safety-critical navigation aid first implemented in 2003 that corrects and enhances information provided by GPS satellites to give commercial and civilian pilots more precise approach and departure guidance. During 2018, the FAA tasked Leidos and Intelsat with developing the latest geostationary Earth orbit satellites and payloads that will be used in the WAAS network.

NovAtel is not yet sharing a timeline for the signal generator installations, according to a company representative.


*The back of a NovAtel GUS signal Generator. Credits: NovAtel*

# Satellite Based Augmentation System Updates: 5th ICAO Navigation System Panel (NSP)

The future of the Satellite Based Augmentation Systems (SBAS) continues to expand based off the work completed at the 5th ICAO Navigation System Panel (NSP) meeting held in Montreal from November 5 – 15. The meeting received updates on several SBAS programs, discussed mitigation of jamming and spoofing threats, approved a Standards and Recommended Practices (SARPs) amendment assigning new SBAS Service provider identifiers, and approved a technical baseline for future dual frequency SBAS service.

At this meeting, NSP adopted Service Provider Identifiers and updated guidance material related to setting Vertical Alert Limits above 10-m for SBAS approaches. Based on reports of new SBAS acquisition efforts by several countries and organizations, NSP assigned the following Service Provider Identifiers; BeiDou SBAS (BDSBAS) (China) - 5, Korea Augmentation Satellite System (KASS) (Republic of Korea) - 6, SBAS for Africa and Indian Ocean (A-SBAS) (ASECNA) – 7, and Australian SBAS (AUSBAS) (Australia) – 8. NSP also completed the final editorials of guidance material changes related to the approval of operations with Vertical Alert Limits between 10 m and 35 m.

The Dual Frequency Multiple Constellation (DFMC) SBAS SARPs (DS2) drafting group presented its finding and recommendations; which the NSP accepted. In particular, NSP agreed to freeze the current proposed baseline DFMC SBAS SARPs standard for the next two years, to support further industry testing. In two years, presuming that DS2 can complete the validation of the standard, DS2 expects that the Air Navigation Commission (ANC) will initiate final adoption of the standard. NSP also proposed sending the DFMC SBAS SARPs technical baseline using an Electronic Bulletin to explain this process and status to States. Work remains to validate several items. NSP plans to revisit the scope of the draft standard at the October 2019 meeting and make a decision whether or not to include additional material. Items for consideration are SBAS authentication and SBAS satellite selection aids.

*- Joseph Dennis, FAA AJM-32/NAVTAC*

*DS2 Working Group completed development of the DFMC SBAS SARPs technical baseline.*

**Your WAAS Story**

. . . We're collecting testimonials about the benefits of Wide Area Augmentation System (WAAS) navigation from users. If you are a pilot, passenger, airport manager, controller, dispatcher, airline employee, or are involved in aviation in any capacity - whether you fly fixed-wing or vertical flight aircraft - we want to hear from you! Please send your stories and contact information to Amy Trevisan at: amy.ctr.trevisan@faa.gov

# WAAS Team supports NBAA and AMTC


The WAAS Operational Implementation Team traveled to National Business Aviation Association Business Aviation Convention and Exhibition and Air Medical Transport Conference (AMTC) this past October to support the FAA's satellite navigation exhibit. Located next to the FAA's "Equip 2020" exhibit, the team had a platform at the convention to educate event attendees about future capabilities to include GPS dual frequency as well as the easiest way to meet the upcoming 2020 Automatic Dependent Surveillance-Broadcast (ADS-B) mandate for all aircraft in the National Airspace System (NAS).

This year, the FAA Satellite Navigation exhibit at NBAA included the FlyThisSim simulator. Many were drawn to experience flying a WAAS-enabled Area Navigation (RNAV) GPS approach flown to LPV line of minima. Attendees were curious about not only WAAS but also the interoperability and expansion of Satellite Based Augmentation Systems (SBAS) like EGNOS, MTSAT, GAGAN and others worldwide.

The following week, the team traveled to Phoenix, Arizona to AMTC, and spoke to many EMS pilots about the benefits of WAAS to their flying community. There was strong interest the in Low Level IFR routes with access to Copter RNAV (GPS) PinS approach concepts on booth display. Many international attendees were also very interested in the concept procedures.

Overall, the AMTC EMS convention showed that the EMS community demands safety and are serious about ways, including WAAS LPV, that will allow them accomplish their mission of saving lives.

*- Amy Trevisan, FAA AJM-32/NAVTAC*


# Did You Know . . .

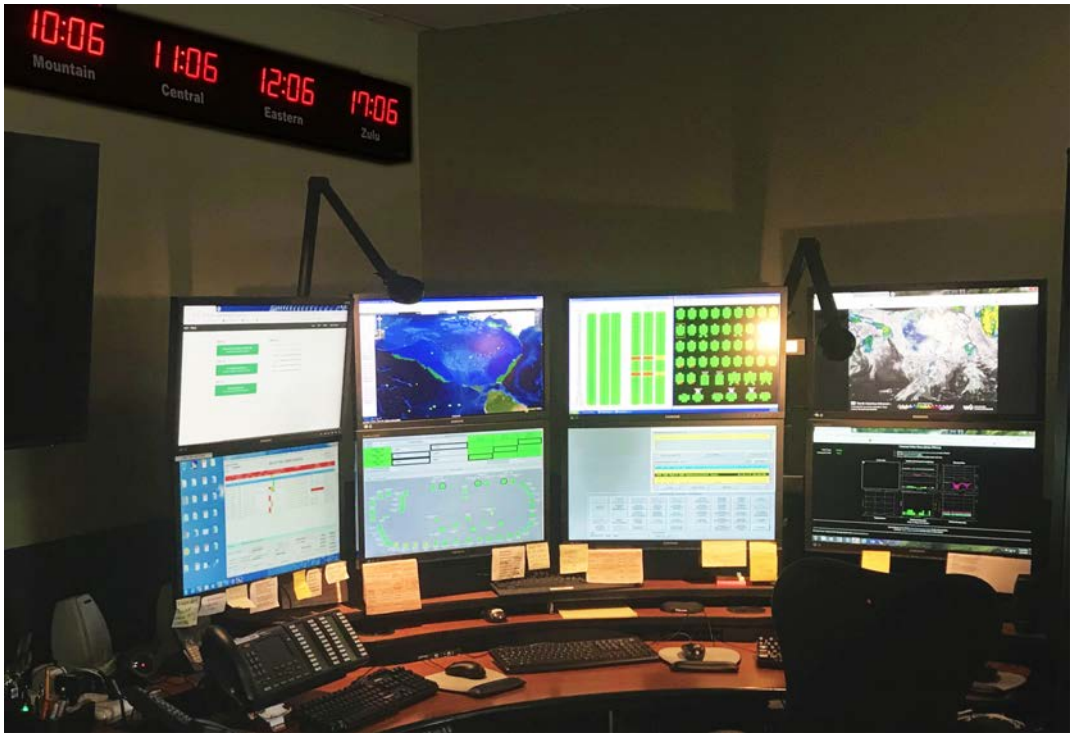
We recently received a question about the Operations and Maintenance (O&M) consoles for the Wide Area Augmentation System – **how many are there, and how do they work?**

Here is a little history and information about WAAS O&M:
When the system was commissioned in July of 2003, the operators at the operations and maintenance consoles began their job keeping an eye on WAAS.

There are two operations and maintenance consoles that are located one each at the National Operation Control Center, and the Pacific Operation Control Center. Each station has an operator, and the two sites take turns at monitoring and controlling. When one operator is "controlling" they are responsible for controlling and monitoring the status of WAAS. The other operator will be logged on as "monitoring" and has no control capabilities.

The WAAS controlling operator is responsible for the operation of the WAAS system and service. If an equipment fault is detected the operator notifies the appropriate Airway Facilities Control Center for reporting and coordination of restoration activities. The controlling operator is also responsible for determining when the individual subsystems within the WAAS can be released for maintenance activities.

There is a watchful eye at all times, even on the extremely reliable Wide Area Augmentation System.




*Pacific Operation Control Center (POCC)*

The SatNav News is produced by the Navigation Programs AJM-32 branch of the Federal Aviation Administration (FAA). This newsletter provides information on the Global Positioning System (GPS), the Wide Area Augmentation System (WAAS) and the Ground Based Augmentation System (GBAS).

# Satellite Navigation
# Approach Procedures

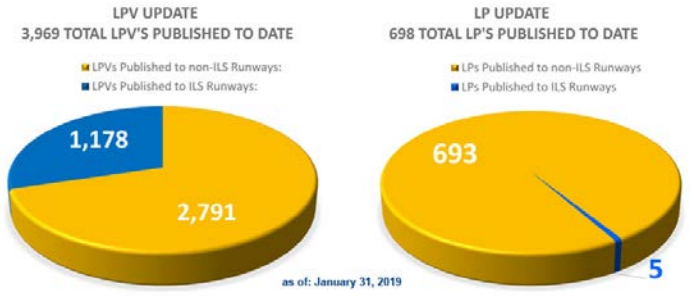
## WAAS LPVs

The table to the right reflects the continuing growth of satellite-based approach procedures. For more detailed information about satellite-based instrument approach procedures, please visit our GPS/WAAS Approach Procedures web page. *http://www.faa.gov/about/office_org/ headquarters_offices/ato/service_units/techops/navservices/gnss/approaches/index.cfm*

**Satellite-based Approach Procedures**

| RNAV (GPS) Approaches | ILS Runways | Non-ILS Runways | Total |
|---|---|---|---|
| **LPV Line of Minima** | 1,178 | 2,791 | **3,969** |
| *<250' Decision Altitude* | | | *1,088* |
| *Exactly 200' Decision Altitude* | | | *1,037* |
| **LP Line of Minima** | 5 | 693 | **698** |
| **LNAV Line of Minima** | 1,222 | 4,848 | **6,070** |
| **LNAV/VNAV Line of Minima** | 1,154 | 2,703 | **3,857** |
| **GPS Stand-Alone Procedures** | 0 | 51 | **51** |
| **GLS Approach** | 11 | | **11** |

*(Data as of January 31, 2019)*




## EGNOS LPVs

The number of LPVs in Europe is also growing. The table to the right shows LPV procedures in Europe as of October 11, 2018, as included in the EGNOS Bulletin Quarter 2 (Source: EGNOS Bulletin, Issue 27 Q3 2018)

Follow this link to the most recent EGNOS Bulletin Issue 27 Q3 2018: *http://egnos-user-support.essp-sas.eu/new_egnos_ops/content/quarterly-bulletin*

| Country | Airports – SBAS APV procedures | # SBAS APV Procedures |
|---|---|---|
| Austria | 0 | 0 |
| Belgium | 5 | 9 |
| Croatia | 5 | 9 |
| Czech Republic | 5 | 9 |
| Denmark | 4 | 8 |
| Estonia | 1 | 2 |
| Finland | 1 | 2 |
| France | 68 | 103 |
| Germany | 23 | 37 |
| Guernsey | 1 | 2 |
| Hungary | 0 | 0 |
| Ireland | 2 | 4 |
| Italy | 11 | 25 |
| Malta | 1 | 2 |
| Netherlands | 3 | 4 |
| Norway | 17 | 26 |
| Poland | 0 | 0 |
| Portugal | 2 | 3 |
| Romania | 1 | 2 |
| Slovak Republic | 2 | 4 |
| Spain | 4 | 9 |
| Sweden | 8 | 14 |
| Switzerland | 7 | 8 |
| United Kingdom | 15 | 32 |
| **Total** | **186** | **314** |

## Canadian WAAS LPVs


Numbers provided by
NAV CANADA
as of November 8, 2018