



FAA Navigation Programs AJM-32
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SatNav News

First Boeing 737NG/700 LPV Success

On October 21, 2019, the first B737NG/700 passenger aircraft equipped with Localizer Performance with Vertical Guidance (LPV) flew an LPV approach into Kenai Municipal Airport (PAEN) Kenai, AK. The enroute, approach and landing procedures went perfectly. The aircraft was equipped with CMA-5024 GLSSUs produced by CMC Electronics.

The CMA-5024 GLSSU is one of the first solutions approved to introduce LPV approach capability on B737NG 600/700/800 aircraft. An LPV approach, is a “precision-like” approach available to operators that does not require specialized crew training. It provides airlines with a safe approach into airports when an ILS is unavailable. Additionally, the CMA-5024 is an approved ADS-B positioning source—a required equipage beginning on January 1st, 2020 for all operators accessing controlled airspace or flying on IFR Flight Plans.

The major achievement was led by the FAA’s Navigation Programs Engineering Team with support from Navigation Technical Assistance Contract personnel. The effort has taken years of time and work by a group of superior specialists across two countries. It was indeed a historic moment for the FAA and the US



aviation industry given that it is the first approval for WAAS/LPV installation in the B737NG/700 airframe used in mainline air carrier operations.

An operator’s B737 fleet consisting of three aircraft will be used on the North Slope, which includes Kuparuk and Prudhoe Bay, and will also support operations in Alpine Field on the Northwestern Slope. The addition to the aircraft’s avionics will ensure reliable transportation for employees to the job site.

- Staff, FAA AJM-32/NAVAC

When Minutes Count

Modern Helicopters Speed Up the “Golden Hour”

Time is of the essence — especially when it involves getting a critically ill patient to the proper hospital, particularly in dense urban areas.

“Minutes count and that’s where helicopters come into play,” says Dr. Christopher Wuerker, executive director for Medical Shock-Trauma Acute Resuscitation (MedSTAR) Transport at MedStar Washington Hospital Center.

Wuerker oversees a helicopter transport program that hospital operator, MedStar Health, primarily uses to transfer patients between Maryland, Virginia, and Washington D.C. hospitals.

As in other major metropolitan areas, gridlock is a common feature of surface transport in D.C. Helicopters can beat the traffic, but when weather is an issue, Performance Based Navigation becomes a key part of the helicopter success equation.

MedSTAR supplies flight paramedics and flight nurses but contracts the flight operations to Shreveport, Louisiana-based Metro Aviation. MedSTAR has four Eurocopter EC135s based in three locations for the 24/7/365 operations. Three helicopters, each with a crew of three — pilot, medic and nurse — are on call every day; one helicopter is a hot backup. The crews and the helicopters are equipped for instrument flight rules missions as well as night vision goggle operations.

On a recent demonstration flight, pilot Jeremy Fryer showed how the operation benefits from the Wide Area Augmentation



System (WAAS) approach capability in two of its four helicopters. Fryer is an ex-Army AH-64 Apache pilot who flies from MedSTAR’s base at the St. Mary’s County Regional Airport in southern Maryland.

A MedSTAR mission typically begins with a hospital physician’s “flight request” call to MedStar’s communications center in Lanham, Maryland. The call center links the requesting doctor with an “accepting physician” at one of MedStar Health’s nine acute care hospitals. If the doctors agree that the patient should be flown, a request is sent to the iPad of a Metro Aviation pilot.

The pilot completes a risk assessment using the iPad, which also serves as the

“To have ILS-like capability is really a game changer...”

electronic flight bag. The risk assessment includes questions on weather, route, pilot's readiness, and the crew's fitness for the mission. The completed assessment goes to Metro's operational control center in Shreveport, Louisiana where communications specialists review and evaluate the score. Once they approve the flight, Shreveport sends a dispatch number to the pilot, and the mission launches. It's typically less than ten minutes from first notification to skids-up.

Fryer explained that by having WAAS and helicopter approaches with localizer performance with vertical guidance (LPV) minimums, crews have more assurance that they can safely reach the hospital in lower visibility conditions. "With WAAS giving us an extra 200 feet compared to a GPS approach, there's a significant increase in the flights where we can get into the hospital," says Fryer.

Minimums are a key consideration for MedSTAR dispatchers and pilots deciding whether to move a patient by helicopter or ground transport. "To have ILS-like capability is really a game changer," says Fryer. "It removes a significant portion of the workload and allows me to better monitor what's going on, and to think further ahead."

Wuerker says modern helicopters with advanced avionics and the medical technology and human expertise they carry on board have created a paradigm shift on the traditional concept of "the Golden Hour," a reference to the benefits of getting a trauma victim to the hospital in

the first hour after an accident or medical crisis.

"With advanced technologies, we can intervene more quickly on acute strokes and heart attacks in the pre-hospital environment," says Wuerker. "We now deal in Golden Minutes."

- John Croft, FAA Office of Communications



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

ARAIM Developments

Progress continues on development of Advanced Receiver Autonomous Integrity Monitoring (ARAIM) under the agreement on EU-US Cooperation on Satellite Navigation, Working Group C (WG-C) Service Evolution Sub Group (SESG). ARAIM has the potential to improve the accuracy and availability of Global Navigation Satellite System (GNSS) landing capability worldwide, including remote areas such as Arctic regions and outside the coverage of geostationary satellites. In the next few years, non-precision approach operations will become available. As the system continues to mature, LPV-200 approaches will also become available.



Using ARAIM, aircraft will have an independent means to guarantee the integrity of their GNSS-derived position for safety-of-flight, without an external augmentation system. Similar to the currently used Receiver Autonomous Integrity Monitoring (RAIM), ARAIM uses internal consistency checks on the satellite signals to determine the integrity of its position-time solution, without the requirement of a separate downlink or corrections information. Instead, ARAIM takes advantage of dual-frequency signals from GPS and Galileo constellations, while also relying on the stability of the current satellites to ensure the validity of the solution.

WG-C continues the development of defining the requirements for ARAIM technical standards and operational

use. After the 2019 meetings in Germany and Los Angeles, WG-C listed some significant accomplishments, including delivery of the User Algorithm and draft Standards and Recommended Practices (SARPs) and Concept of Operations (CONOPS).

Based on those documents, the next phase of standards development is now poised to begin in earnest. RTCA and EUROCAE have the joint role of defining the avionics requirements, which will form the basis of equipment certification for aircraft use. As both these groups continue their work, expect WG-C to contribute mature baseline draft SARPs in the Spring of 2020, and to continue work on the Safety case, which is essential to the certification effort.

Beyond the standards work, prototyping and monitoring/reporting activities are also underway. At the William J Hughes Technical Center (WJHTC), work is focused on developing an Integrity Status Message (ISM) offline parameter monitoring tool and a performance reporting process. The first report is on track for publication in July 2020. By the time ARAIM becomes operational, this report and archive will contain several years of historical data and analysis, specifically addressing ARAIM and constellation performance. It will also provide the content of the ISM message, once the downlink capability is established.

- Frank Lorge, FAA ANG-E66/WJHTC/SST



WAAS/LPV

Critical Tool for EMS Pilots

On November 6th the Georgia World Congress played host for the 2019 edition of the Air Medical Transport Conference (AMTC) in Atlanta, Georgia. This annual event brings together aerial first responders working in the Emergency Medical System (EMS) with the aircraft and equipment manufacturers that help make their medical miracles happen.

One of the keys in providing this critical public service is to facilitate flight crews to be able to work in all weather conditions 24 hours a day, every day of the year. They rely on the ability to access Performance-Based operations for terminal, approach, and surface navigation with Wide Area Augmentation System/Localizer Performance with Vertical Guidance (WAAS/LPV) as the crown jewel. This gives the EMS aircraft (substantially

helicopters) the ability to navigate to distant locations such as remote accident scenes and rural hospitals with pinpoint accuracy.

The WAAS Outreach Group was also represented at the event with materials and subject matter experts to provide information and to discuss the tremendous success stories that the Program has experienced in the last few years. The FAA has certified over 4,000 LPV procedures across the US providing instrument approach capability to over 125,000 WAAS aviation users. Many others are using WAAS for non-aviation applications. A sampling of the pilots attending the conference validated the WAAS Program and extolled the advantages of LPV equipage and certification.

- Staff, FAA AJM-32/NAVTAC

Miles Dunagan, President of the National EMS Pilot's Association (NEMSPA) offers his observations on the utility of WAAS/LPV in Emergency Aviation:

WAAS Outreach: *Miles, can you tell me about the usefulness of the WAAS LPV Program in your work?*

Mr. Dunagan: Absolutely. As an EMS helicopter pilot, the capabilities that the WAAS (LPV) system gives us is basically the same kind of capabilities that allow us to land at rural hospitals without worrying about the ground set-up (Instrument Landing Systems). We can go out to a rural airport that has an LPV Approach (published) that gives us the capability to fly down to the same minimums that a ground-based system would give us. In the event that we have to go into IMC, or (encounter) unintentional IMC, we're able to recapture and shoot that LPV Approach and come on back down to where the weather is good enough for us to land. It gives us a whole lot more (of a) safety factor and that's what the National EMS Pilots Association stands for. We want everyone to come home safe and sound.

WAAS Outreach: *So you would definitely encourage other EMS operators to equip their (helicopters) with WAAS/LPV?*

Mr. Dunagan: Absolutely, it's a phenomenal tool you're giving your crews, plus an added factor of safety and that's what we're all about.

This sentiment was echoed repeatedly by other EMS Flight Crews when talking with our WAAS Outreach Specialists at the AMTC Conference. This valuable tool is immediately available to all users with the proper equipage. The FAA continues to move forward with additional LPV procedures providing greater coverage in the National Airspace System (NAS).



GPS III production update: On the road to a refreshed constellation

First published in *GPS World* on October 1, 2019
by Tracy Cozzens

With GPS III SV01 and SV02 now on orbit, GPS III satellites continue to roll off the production line at Lockheed Martin's GPS III Processing Facility near Denver.

Johnathon Caldwell, Lockheed Martin Space's vice president for navigation systems, provided *GPS World* with an update to the entire GPS III family.

SV01. The first GPS III satellite is in a holding state pending readiness by 2SOPS [the Second Space Operations Squadron] to take the vehicle onto the system for operational checkout, a transfer expected to take place later this year, Caldwell explained. The satellite completed on-orbit testing in July.

"We're in the process of getting the 2SOPS crews trained up to operate a GPS III vehicle," Caldwell said. "By the end of this year, they will be able to take [SV01] into the constellation and start flying it as a live, set-healthy vehicle."

SV02. Launched Aug. 22, SV02 is following in the footsteps of its older sibling, with a quiet checkout and no major findings. Like SV01, once it completes testing, it will stay in temporary holding until 2SOPS is ready to bring it into the constellation.

SV03. On May 27, the Air Force declared SV03 available for launch. It is now in final preparations for shipment, with an expected launch date in January 2020 aboard a Falcon 9 rocket.



Thermal Vacuum testing verifies that a satellite can operate in space's extreme environment. (Photo: Lockheed Martin)

SV04. The Air force declared SV04 available for launch; it is now in storage awaiting a launch date.

SV05. The fifth satellite is wrapping up environmental tests. Lockheed Martin anticipates that it will be available for launch early next year.

SV06. The satellite has been moved into the thermal vacuum testing chamber and begun a rigorous testing campaign before it meets the harsh environment of space.

SV07, SV08 and SV09 are on the assembly line.

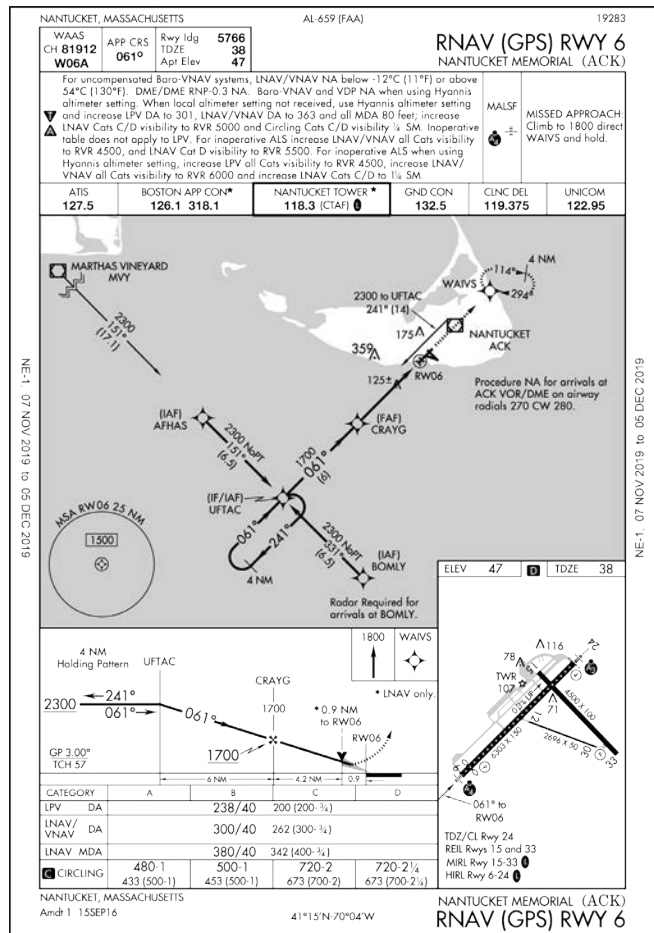
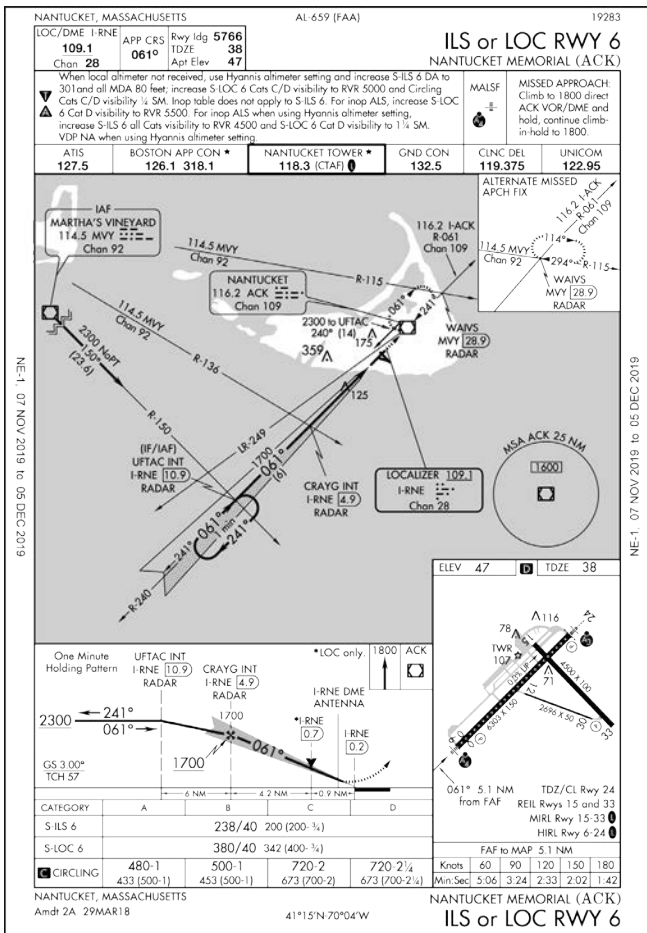
GPS IIIF Satellites. In 2018, the Air Force selected Lockheed Martin to build up to 22 GPS IIIFs, adding new features and resiliency to the original GPS III satellite design. The company has been on the path to meet the critical design review for the GPS IIIF spacecraft, which is due to take place next spring.

Did You Know . . .

Did you know when looking for WAAS LPV approach plates for runway ends, they won't be listed as WAAS LPV – or at least not in plain sight like you would see on an ILS approach plate. For example, Runway 6 at Nantucket Memorial (ACK) has both an ILS and an LPV. The approach plate below on the left outlines the ILS or Localizer approach with the title above clearly stating it is an approach plate for the ILS or Localizer approach. The approach plate on the right is for the same runway with LPV, LNAV/VNAV, and LNAV lines of minima. It is titled as an RNAV (GPS) approach.

RNAV stands for “Area Navigation”. The older GPS based non-precision approach format is being phased out with a newer format prefaced by the acronym RNAV. An example would be the change from “GPS RWY 18” to “RNAV (GPS) RWY 18”. All GPS based approaches moving forward are RNAV; to include LPV, LNAV/VNAV, LNAV, LP and stand-alone GPS approaches.

Just remember, when looking for an LPV line of minima at your runway end, it will be titled RNAV (GPS) RWY XX.

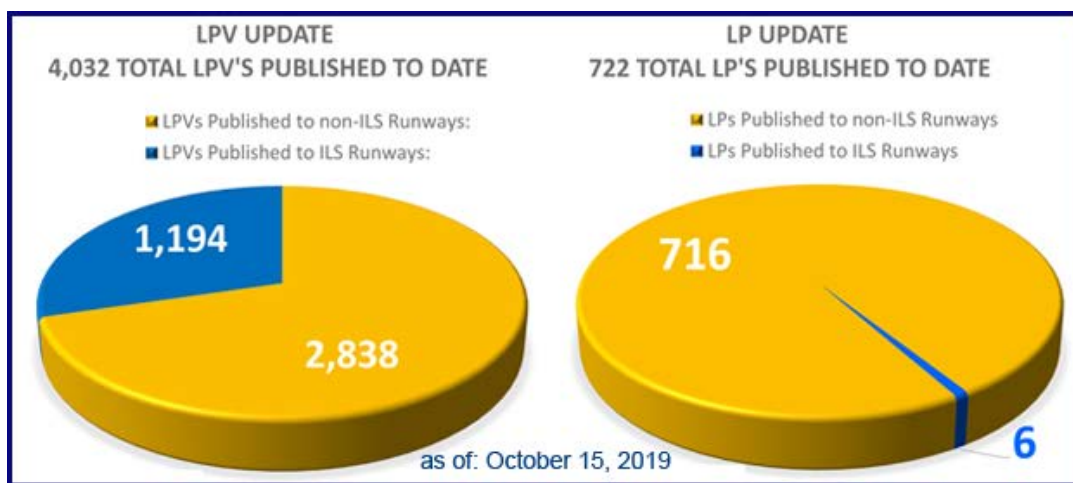


Satellite Navigation Approach Procedures

WAAS

The chart below 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

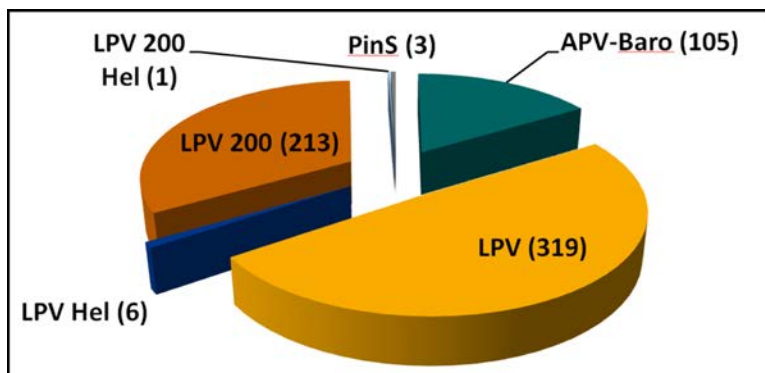


EGNOS

The number of procedures in Europe is also growing. The table reflects growth in Europe as of November 7, 2019, as included in the EGNOS Bulletin, Issue 31, Q3 2019.

Follow this link to the most recent EGNOS Bulletin, Issue 31, Q3 2019:

http://egnos-user-support.essp-sas.eu/new_egnos_ops/content/quarterly-bulletin



Canada



Numbers provided by
NAV CANADA
as of October 10, 2019