

DRAB POL[®] A V I O N I C S NEWS

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Quarterly Newsletter no 2(83) April - May - June 2019

New services of Part 145 organization:

- 3D SCANNING
- REVERSE ENGINEERING
- 3D PRINT OUTS

„The fundamental principle of transportation is its safety”

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FROM THE EDITOR

Ladies and Gentlemen! Dear Readers !

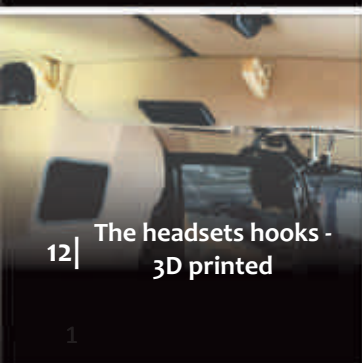
This summer, we could not complain about boredom in „Drabpol Avionics” Department. At the time, there was a large number of foreign trade fairs that we could not miss. At the beginning - German Friedrichshafen, then the exhibition in Geneva and at the end - the Air Fair in Paris. The trade fair was an opportunity to meet with our partners and get familiar with the latest news in the aviation industry. And there were a lot of them.

It is worth to mention about intuitive avionics sets with head-up display, combined with enhanced vision system (EVS). These solutions offer to airline operators a wide range of possibilities, providing dispatch and landing approach priority as well as low visibility landing (regardless of the infrastructure at the destination airport). Most importantly, they can significantly reduce the number of night aviation accidents.

More on this subject on pages 15-17 and 19-22.

We wish you pleasant reading !

Alicja Drabczyńska



DRABPOL
AVIONICS NEWS

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Novelties at the AIR FAIR



After two years, the AIR FAIR Exhibition in Bydgoszcz (now taking place every two years) has returned to the trade fair calendar. We could not miss this event. At our stand, we were promoting the latest avionics solutions for civil and military aviation.

For the first time, we had the occasion to present the new BendixKing solution – the xVue Touch Smart Display with AeroFlight Digital Attitude Indicator that is a touch screen MFD for displaying map and engine data with a digital back-up Artificial Horizon. This solution was also promoted at AERO trade fair in Friedrichshafen and a report from that event can be found on the following pages.

The display, as an element of the entire Aero Vue Touch system, can be installed as a Primary Flight Display (PFD) in a new aircraft or as a replacement for older systems in already flying aircraft. It is used both as a full-screen primary flight display or as a split screen with a primary and multifunction display.

Additionally, we presented our guests with indicator / monitoring of engine parameters from the Aeropoint series and the FMS / NAV / COM / GPS system from the AeroNAV series.



We promoted the BendixKing solutions at our stand together with representatives of the BendixKing company - the Vice-President, Mr. Freddie Zonoozi (in the center) and Mr. Jiri Vitek who is responsible for Central and Eastern Europe.



From the products dedicated to the military market, we have presented models of WESCAM MX-10 and MX-15 cameras, as well as Enersys nickel-cadmium batteries.

The Bendix King offer was supplemented by Mode S transponder with ADS-B, dedicated to GA. At our stand, we promoted BK avionics together with representatives of the manufacturer.

For GA airplanes we presented also Trig's transponders, McMurdo's emergency locator transmitters and Appareo's Vision 1000 flight data recorder.

This flight data recording solution has an in-built GPS WAAS receiver providing registration of following parameters: latitude, longitude, ground speed, vertical speed, GPS altitude.



A constant element of our trade fair exhibition is also Garmin, Aspen Avionics, Avidyne and Collins Aerospace avionics.

Among products dedicated to military market, we presented models of WESCAM MX-10 and MX-15 turrets and Enersys nickel-cadmium batteries

We would like to thank all our guests for visiting our stand.



What's new at European air trade fair?



The second quarter abounded with numerous trade events connected with both civil, business and military aviation. The range of our interest includes AERO Friedrichshafen, EBACE in Geneva and Air Fair in Paris, La Bourget. We participated in all of these events.

27th AERO FRIEDRICHSHAFEN

10-13 April

AERO

Every year, at the beginning of summer, we take part in the biggest and the most important air trade fair for General Aviation, called AERO.



This year's event attracted over 700 exhibitors from all over the world, including our business partners whose stands we had the pleasure to visit.

BendixKing

We were particularly pleased to visit BendixKing's stand. Account Team

Leader of BendixKing, Mr Jiri Vitek handed us a certificate confirming both our membership in the BK dealers elite and our status of „King Elite Channel partner for 2019“. We are very pleased that we have found ourselves in this prestigious group that includes only few Bendix King dealers from around the world.

It is worth pointing out that last year our company was in a group of five best Bendix King dealers and at the same time it received a title of the best regional dealer in Central and Eastern Europe, Russia, the countries of the former USSR and Turkey.

BK novelties

Meeting with our partner was also an opportunity to get acquainted with the latest offer for GA presented at its stand.

Avionics producers presented a complete AeroVue Touch system intended for GA aircraft as a retrofit. This fast, simple and powerful flight display has a 10,1 inch display that provides near 4k resolution, the highest in the industry, displaying detailed information about the terrain, airspace boundaries and weather data.

The display can be used as full screen primary flight display (PFD) or a split screen with a moving map or other critical pilot information. The touch screen technology allows operation in



Jiri Vitek, a representative of BendixKing on Central and Eastern Europe handed us a certificate confirming the membership in BK elite dealers as well as a status of „King Elite Channel Partners in 2019“.



New AeroVue Touch system for the pilot's cabin.

gloves. The additional remote control panel has four knobs for faster access to changes in the course or altitude settings.

It is worth stressing that last year AeroVue Touch was awarded one of the oldest and most prestigious Global Awards for Design Excellence and Innovation – the Good Design Award in the Transportation category

The AeroVue Touch's unique design offers many benefits to pilots in terms of visual and touch interaction. AeroVue Touch has also been recognized as unique due to the pilot's ability to customize the screen to show a full-screen primary flight display with synthetic vision, or a split-screen mode that shows the primary flight display, multi-function display and vertical situation display simultaneously to the pilot. This enables all flight-critical information to be displayed to the pilot on one compact screen.

In terms of touch interaction, it has been recognized for being the first touch flight display to include intuitive user interface designs. The touch display also requires only a maximum of four touches to access any function within the software.

Because of its functions AeroVue Touch works both in conventional general aviation cockpits and tandem-seat cockpits, such as in aerobatic and military training aircraft that have limited space on the instrument panel.

The built-in system (in the AeroVue version) could be seen at the outdoor exhibition stand of the manufacturer - in the Honeywell / Bendix King's company aircraft, at the controls of which we had the pleasure to sit.



Honeywell/BendixKing aircraft already equipped with AeroVue.



Our another partner presented at its stand a few latest solutions in the field of avionics – series of TXi flight displays, G3X Touch, GFC 500 and 600 autopilots.

Especially for the AERO show, Garmin presented the transmission of weather information via the Universal Access Transceiver (UAT) data link.



At the airport in Friedrichshafen (EDNY), where the AERO trade fair was held, Garmin demonstrated the ability of UAT data link to broadcast weather information.

Using a ground-based Universal Access Transceiver (UAT) in Airplus Maintenance GmbH, weather information was broadcast and received by aircraft equipped with Garmin ADS-B systems and displayed on Garmin avionics and portables.

For appropriately equipped aircraft, the reception of weather information during these presentations did not entail any additional costs.

Pilots flying near Friedrichshafen airport with aircraft equipped with ADS-B



The latest solutions in terms of avionics – a new series of TXi displays, G3X Touch and GFC 500/600 Autopilots.

In were able to receive weather information including radar imaging, METARs, TAFs, lightning, icing and winds aloft. Pilots can expect to receive weather up to 50 nautical miles away from the ground station located at EDNY and weather products will display within a 250 nautical mile coverage area.



Currently, the system architecture is based on the US-defined FIS-B datalink using UAT technology. Garmin has tested the reception of these weather products in a Cessna 182 equipped with a GTX™ 345 ADS-B transponder, GTN™ 650/750 navigators, G500 TXi flight display, Aera 660/795/796 GPS portables, the GDL 50 portable ADS-B receiver and the Garmin Pilot™ app on Apple mobile devices.

Especially for the AERO trades, Garmin demonstrated a transmission of weather information via UAT data link.

European Business Aviation Convention & Exhibition- 20-23 May 2019 in Geneva



Genovese EBACE (European Business Aviation Convention & Exhibition) trade fair has been attracting the international business aviation community for many years. We are also present every year on this most important event for the whole Business Aviation market.

The fair was an opportunity for us both to establish new business contacts and to strengthen cooperation with our partners, present on the EBACE as exhibitors.



Honeywell

Our partner presented, among others the Aspire 200 satellite communication system and the GoDirect router.

The Aspire 200 system enables internet connection for passengers and crew, decrease of workload and fast real time data up and downloading.

Honeywell, through Altenrhein Aviation, received the Supplemental Type Certificate of European Aviation Safety Agency (EASA) for the installation of these solutions on Embraer Phenom 300 aircraft.



At the Honeywell stand, we were pleased to meet the representatives of BendixKing/Honeywell and VSE Aviation.

The introduction of the Aspire 200 satellite communication system and GoDirect solutions for the Phenom 300 platform will ensure reliable communication with both the cabin and the cockpit.

At the Honeywell stand, we were pleased to meet the new management of Honeywell, and thus to discuss the implementation of joint projects in the field of aircraft modification, including the AeroVue system.



UNIVERSAL AVIONICS an Elbit Systems Company

The American manufacturer Universal Avionics showed the demo version of the ClearVision EFVS flight vision system with the new SkyLens HWD and InSight display system.

The ClearVision EFVS solution with SkyLens HWD is a cost-effective and more modern alternative to the traditional, permanent Head-Up Display (HUD). Now, HUD under the Skylens designa-tion consists not only of goggles, but also integrates Synthetic Vision and EVS, or "seeing" through fog or in poor weather conditions.

SkyLens presents high-definition symbology/imagery, including an improved vision system (EVS), synthetic vision system (SVS) and video system (CVS) for excellent transmission in all weather conditions, both day and night.



It also works with InSight glasscockpit, which has been designed as an integrated on-board solution, with built-in SVS with advanced mapping function, electronic maps and radio control system. As an integrated system, InSight retains the ability to connect with a large number of components, such as attitude / heading sensors, air data computers, radars, COMM radios and autopilots.

EFVS ClearVision demo version with SkyLens HWD and InSight are the newest Universal Avionics proposals presented in EBACE.





Collins Aerospace

For the BA market, our next partner presented the Venue cabin management system, covering both the electronics devices management and the entertainment for passengers on board.

The Stage entertainment wireless platform was also presented. It allows free and preferred content transfer throughout the cabin during the flight.

The Stage system provides passengers with access to thousands of wireless entertainment options available during the flight, such as films and TV programs in HD quality on transparent touch screens with intuitive controls, as well as smartphones and ta-



Collins Aerospace presented a wide range of cabin management systems at its stand.

blets. The new wired option provides additional features, including easy integration with the Venue cabin management system to play content on monitors and passenger seat displays.



GARMIN

Garmin showed a wide range of its products, e.g. a series of equipment for aircraft with EASA Supplemental Type Certificates.

These include G500 / 600TXi „glass cockpit” system with touchscreen, G5 backup flight parameter indicator, well known and proven series of GTN 650/750 navigators, dedicated engine parameters display with engine accessories and digital GFC 500/600 autopilot.

The systems for business aircraft, such as the G2000 / 3000 glasscockpit, could not be missing.



At Garmin's stand, it was possible to see the latest solutions of glasscockpits.

The fair in Geneva was an opportunity for us not only to visit our business partners, but also stands of other exhibitors. Our attention was drawn to the AW 169 helicopter, manufactured by Finmeccanica-AgustaWestland. Polish PZL-Świdnik factory manufactures flight control system of this helicopter.

The exhibited helicopter was equipped with the integrated Collins Aerospace avionics system, which consists of digital displays, communication, navigation and situational awareness systems.



AW 169 helicopter, manufactured by Finmeccanica-AgustaWestland with participation of PZL-Świdnik, equipped with Collins Aerospace avionics system.

We would like to thank our partners for welcoming us at the stand and constructive discussion about our collaboration.



53rd International Paris Air Show at the Le Bourget

17-23 June 2019



PARIS AIR SHOW

The last international trade event that we participated in was „International Paris Air Show” - one of the world's oldest and biggest air shows.

Newest technological innovations from the aviation industry and connected hardware, such as engines, satellite navigation, cockpits and weapon systems, have been presented at the trades.

Our first attention was drawn to the stand of L3 Wescam company – one of our business partners, a manufacturer of surveillance systems for aircraft, helicopters, airships, unmanned aircraft and armoured vehicles.

We had a chance to meet a day before the trades, on the conference organized for WESCAM's dealers from all over the world.



At the WESCAM's stand.

„WESCAM's Internal CDR Meeting” 16 June

The conference discussed the new possibilities of surveillance systems dedicated to new companies from all over the world.

These projects are undoubtedly out of the ordinary. The event was accompanied by a presentation of the novelties. New surveillance solutions, such as CMX-15D and CMX-22D, have met with great interest of all participants. In the near future a new CMX-100 system is expected to join this prominent group.

What is important – all new systems are not subject to ITAR. Within the next few days, participants had a chance to exchange their experience and information at the WESCAM's stand.



New surveillance solutions, such as CMX-15D and CMX-22D, have met with great interest of all participants.

We are expanding our product portfolio by renewing our cooperation with L3 Commercial Aviation Solutions

New cooperation



Due to reorganization of L-3 Avionics Systems, Inc. in May we renewed cooperation agreement, so the portfolio of the products we offer, have significantly increased.

Since 2009, we have been cooperating with L-3 Avionics Systems. In recent years, this manufacturer of avionics has undergone significant changes. As a result, the L3 Commercial Aviation Solutions company was formed, which is part of the L3 Technologies group.

Our company has signed a cooperation agreement with two subsidiaries of L3 Commercial Aviation Solutions:

1. Aviation Communication & Surveillance Systems, LLC



As part of cooperation with this company, we offer products related to aviation communication and identification (aircraft Part 25/27/29 class), such as:

- ▶ TCAS 3000SP – TCAS II anti-collision system,
- ▶ NXT-600 – Mode S Transponder with ADS-B (Exclude Q400 a/c and MST67B Replacements),
- ▶ NGX 900 GPS Mode S Transponder with ADS-B and GPS,
- ▶ LYNX – a series of transponders,
- ▶ TCAS Antennas,
- ▶ Standalone TAWS Products,
- ▶ ADS-B Software Products.

2. L3 Aviation Products, Inc.



L3 Aviation Products solutions:

- ▶ **Equipment for aircraft Part 25/27/29 class, such as:**
 - Stormscope Lightning Detection System (all models),
 - Lynx MultiLink Surveillance System (all models) – Mode S Transponders with ADS-B and GPS,
 - GH – Electronic Standby Instrument System,
 - ESI – Electronic Standby Instrument System,
 - JET – Emergency Power Supplies and Electromechanical Gyros,
 - CVR/FDR (all models),
 - MADRAS – flight parameters recorders and data acquisition systems,
 - LDR flight parameters recorders for light aircraft,
 - Accelerometers,
 - QAR – Quick Access Recorder,
 - Microphones with preamplifiers,
 - Recorder Control Units,
 - PI/PII hand held Ground Support Equipment.
- ▶ **Products for Part 23 aircraft, such as:**
 - WX-500 – Stormscope system,
 - ESI-500 – Electronic Standby Instrument System.

We hope that such a large spectrum of products will meet the expectations of aircraft users.

We make 3D prints tailored to the specific Customer requests

IMPROVED SOLUTION – the headsets hooks for Robinson R44 users

We are pleased to inform all readers that our company has patented the headset hooks for Robinson R44 helicopter which was subsequently 3D printed by our PART 145. Our designers developed and printed out this solution by the specific request of Customer – the user of Robinson R44 helicopter.

We can provide such services thanks to a Stratasys 3D printer – Fortus 450MC purchased a few months ago. We can make very accurate prototypes printed in FDM technology.

In addition to standard materials such as ABS-M30, ABS-ESD7, ASA and materials for industrial printing - PC, PC-ABS, PC-ISO, or Nylon12, we are also able to print from high quality and high strength materials such as ULTEM 9085, ULTEM 1010 and ST130. The latter meets the most strict material criteria required by the aerospace industry and regulatory agencies.



A TYPICAL FACTORY MADE HOOK

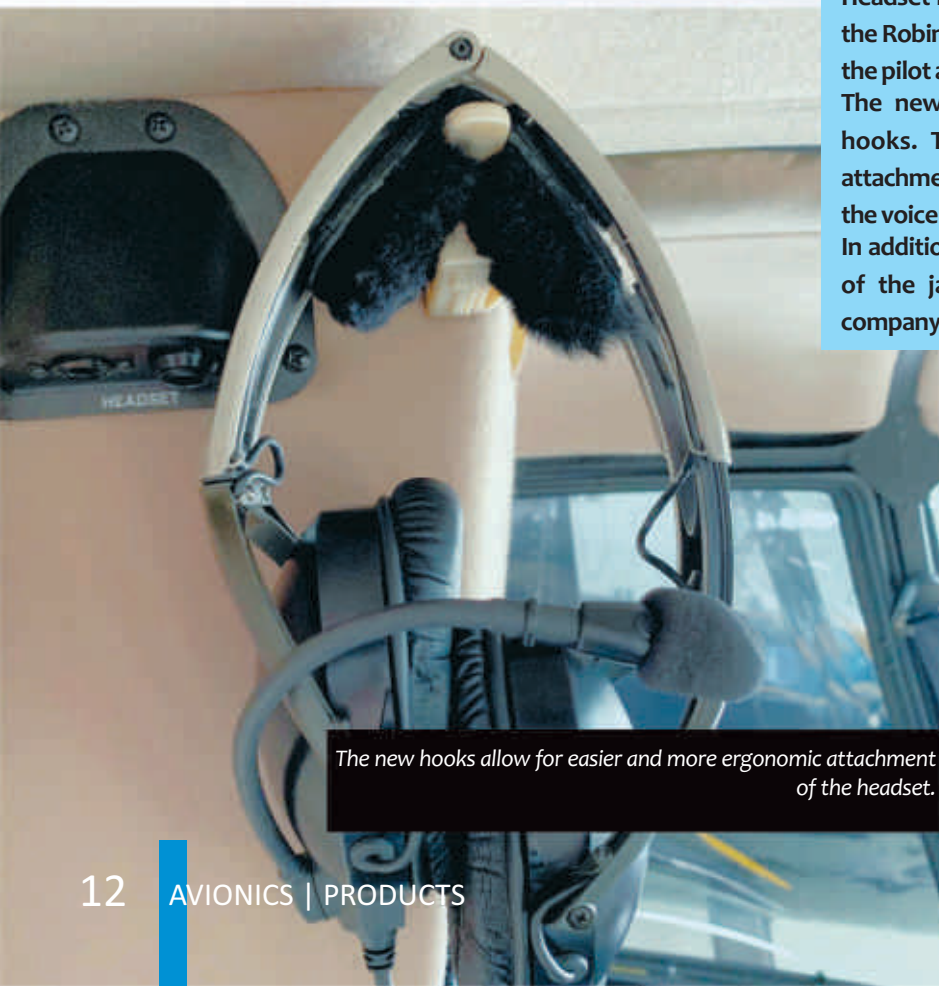


THE NEW SOLUTION OF HOOK

Headset hooks are made of certified material ULTEM 9085. For the Robinson helicopter family we made two types of hooks: for the pilot and front passenger and two for the rear passengers. The new hooks are more functional than factory-mounted hooks. They allow not only easier and more ergonomic attachment of the headset, but also convenient suspension of the voice control unit, which is now close to the ear. In addition, the design of the hook allows comfortable hanging of the jacket. Hooks can also be personalized - including company logo, etc.

The modern CAD software, 3D scanner and 3D printer owned by our company allow to design and manufacture any additional equipment in a quick and effective way.

With the help of our designers and engineers from the Part 145 and Part 21 Organizations, we can make every individual solution requested by the Customer, and we are also able to obtain civil aviation approval for the components made.



The new hooks allow for easier and more ergonomic attachment of the headset.

Garmin GFC™ 500 Autopilot Receives EASA AML STC

Garmin is excited to announce the GFC 500, solid state, attitude-based autopilot for fixed-wing general aviation aircraft has now received a validation from EASA. This installation approval is accomplished via supplemental type certificate (STC) with a comprehensive approved model list (AML) containing all the aircraft models within the FAA STC.



Breaking new ground to validate a non-TSO's product is an ongoing project and the availability of this updated STC further represents EASA's initiative to encourage and permit specific enhancements to aircraft, in an effort to improve pilot situational awareness and safety enhancements among the general aviation fleet.

GFC 500 Autopilot

for Certified Single-engine Piston Aircraft

Intended for qualifying piston single-engine aircraft less than 6,000 lbs, GFC 500 delivers superior in-flight characteristics, self-monitoring capabilities and minimal maintenance needs when compared to older generation autopilot systems.

Built upon the popular G5 electronic flight instrument, the GFC 500 autopilot integrates specifically with G5 to provide pilots with an economical autopilot and modern flight instrument (G5 is sold separately). The GMC 507 mode

controller contains large, dedicated keys and knobs, a control wheel that allows for easy adjustments to aircraft pitch, airspeed and vertical speed and a level button that returns the aircraft to straight-and-level flight. Similar to GFC 600, the GSA 28 servos utilized on GFC 500 also contain brushless DC motors and gear trains that eliminate the need for a mechanical slip clutch. G5 provides input and display of altitude preselect, heading, vertical speed target, airspeed target and Flight Director command bars for the GFC 500.



The optional GAD™ 29 adapter allows GFC 500 and G5 to interface with select Garmin GPS or VHF navigators.

Garmin will continue to work on additional aircraft certifications for the GFC 500 and GFC 600 retrofit autopilots. The GFC 500 and GFC 600 product pages on the Garmin website feature a „Supported Aircraft” tab where information on the latest aircraft support and certification can be found.



Something new in the market!

GSU 25C and GSU 25D systems

Garmin is pleased to introduce the new GSU 25C and GSU 25D Air Data Attitude Heading Reference Systems (ADAHRS).

Accurately and reliably

GSU 25C and GSU 25D provide highly accurate and reliable referencing of the aircraft position, rate, vector and acceleration data while providing the flexibility to be mounted in 16 different vertical or horizontal positions.

Since the magnetometer is mounted external to GSU 25C and GSU 25D, either unit may be mounted without worrying about the special installation needs of magnetometers.

G3X Touch for Certificated Aircraft uses the new GSU 25D, which is included in the LRU kit. G3X Touch for Experimental Aircraft can use either the GSU 25C or GSU 25D depending on aircraft performance. GSU 25D is built for high-performance aircraft flying up to 465 knots indicated air speed (IAS), while GSU 25C is limited to 300 knots IAS.

For enhanced system redundancy, experimental G3X customers have the option to install multiple ADAHRS units or add one to their existing G3X installation. When GSU 25C is installed as a second ADAHRS, it may share the data from the magnetometer and outside air temperature probe already connected to the first GSU ADAHRS (via data on the CAN bus), or, if



preferred, support is provided for optional installation of a redundant magnetometer and OAT probe. The GSU 25 and GSU 25B systems will be phased out and replaced with GSU 25C and GSU 25D, respectively.

EASA Approved ADS-B Solution for Citation Excel and XLS

Garmin is excited to announce the Elliott Aviation STC for the Citation Excel and XLS is now validated and approved by EASA. This STC approves the installation of a compliant ADS-B „Out” system into Cessna 560XL aircraft equipped with the Honeywell Primus 1000 avionics suite.

For business and commercial operators looking to satisfy the ADS-B „Out” equi- page rules as quickly and cost-effectively as possible, Garmin has tailored a compre- hensive suite of approved ADS-B solu- tions that leverage existing cockpit avio- nics to provide an easy, efficient path to compliance and we are excited to add the Excel and XLS to this growing portfolio.

As the industry leader in fielded ADS-B solutions, Garmin is helping operators meet the complex demands of NextGen air traffic modernization initiatives around the world.

Through select members of the Garmin authorized installation center network, we’re able to offer all-inclusive packages such as our GTX 3000 Mode S Extended Squitter (ES) transponder paired with our GDL 88 ADS-B datalink.

These packages provide seamless integration between existing equipment such as TCAS systems, transponder control heads or radio management units to



minimize incockpit modifications, all while maintaining familiar interfaces and functions.

Leveraging the GDL 88 datalink’s internal WAAS/SBAS receiver, the GTX 3000 broadcasts DO-260B compliant aircraft identity, state and intent information to the ADS-B ground station network for relay to ATC and other ADS-B „In” equipped aircraft in the airspace.

The GDL 88/GTX 3000 upgrade package is approved and compa- tible with a va-

riety of TCAS II interfaces and cockpit controller/display combinations.

Kit pricing for the approved configuration can be found below and can be ordered directly from Garmin. The STC and PMA kits are sourced directly from Elliott Aviation.

EASA Approves G500H TXi Flight Displays

Garmin is pleased to announce that the G500H TXi, a new generation of touchscreen flight displays for helicopters, is now approved via an EASA issued STC. The availability of this STC further represents Garmin's commitment to reduce the certification fees and paperwork to our Customer and Dealers.

Optimized for Helicopter Operations

Built on the proven capabilities of the original G500H series, G500H TXi offers a vastly expanded array of features, options and panel possibilities that bring a new level of reliability, adaptability and affordability to helicopter operations. Designed specifically for FAR Part 27 VFR helicopters, G500H TXi boasts a bright LCD design—including a large 10.6-inch display and two versions of 7-inch displays, available in portrait or landscape orientation – and features traditional concentric knobs for added versatility and convenience.

The G500H TXi flight display system is now both FAA & EASA approved on select models of Bell 206/407/427, Airbus AS350/EC130, Robinson R44 and MD Helicopters MD500/530.

For helicopter-specific mission readiness, G500H TXi can be equipped with

a five-color Helicopter Terrain Awareness and Warning System (HTAWS), WireAware wire-strike avoidance technology and Garmin HSVT 3-D synthetic vision. G500H TXi also supports multiple video input options, night vision goggle (NVG) compatibility and a graphical map over-layer within the horizontal situation indicator (HSI) for most display formats. For helicopters already equipped with the original G500H series flight displays, full G500H TXi compatibility with existing system sensors makes for an easy, cost-effective upgrade path.



News for BA - AWIONICS

UNIVERSAL AVIONICS

an Elbit Systems Company

The offer of American manufacturer has been broadened by two new solutions, intended for new helicopters and modernizations in older ones intuitive sets of avionics with a head-up display.

The first is **ClearVision** – a complete HUD and EFVS solution, the second one is **Heli-ClearVision** – a complete HWD / HMD and EFVS solution.





Both are Enhanced Flight Vision Systems (EFVS) providing on a ClearVision Head-Up Display presenting aircraft data over a transparent glass (combiner) combined with enhanced vision (EVS) and synthetic 3D terrain display (SVS).

The systems feature a large field-of-view with the brightest and the highest resolution of HUD among the systems for civil aircraft available on the market. Its unique, pilot-friendly split screen display allows the user to change between the two background imagery areas for optimal control. It allows overcome extreme weather conditions and low visibility situations - both during the day and at night, as well as during the flight with vision goggle (in Heli-Clear Vision system).

The ClearVision system offers to airline operators unmatched capabilities, providing dispatch and landing approach priority as well as low visibility landing regardless of the destination airport's infrastructure.

SYSTEM ClearVision

Clear Vision components:

- | |
|--|
| ▶ Enhanced Vision System (EVS) |
| ▶ Synthetic Vision System (SVS) |
| ▶ Combined Vision System (CVS) |
| ▶ Overhead-Mounted Head-Up Display (HUD) |
| ▶ SkyLens™ Wearable HUD |
| ▶ Software for ADS-B systems (Cts). |

Enhanced Vision System Superb Technology Certified to Deliver Top Safety

The ClearVision Enhanced Vision System (EVS) product family provides a superior visual solution augmented with real-time synthetic information, designed to expand the safety and operational capabilities of your HUD system. With its advanced real-time visual processing, EVS merges the input of high-definition visual cameras, Near IR sensor, and Long-Wave IR sensor into one perfectly fused picture, expanding your situational awareness like never before. This 4th generation high-resolution, uncooled multispectral EVS detects incandescent and LED runway lights with provisions to support color display. With its brighter and clearer image, ClearVision EVS will make any taxi, takeoff, cruise, or landing easier, clearer, and safer.

The top-of-the-line EVS-5000 multispectral camera provides a complete gate-to-gate experience, covering the full flight envelope. The complement of six sensors - from visible light to longwave infrared (IR) - allows the pilot to overcome extreme weather conditions and low visibility situations, day and night. The compact EVS-4000 multispectral EVS camera features two sensors, visible-Near IR and Long-wave IR, that provides an excellent EVS solution for smaller fixed wing aircraft and rotorcraft.

ClearVision EVS is designed to increase platform efficiency and safety, with the latest visual processing technology, meeting all FAA/EASA/ICAO/CAAC EVS or EFVS civil certification requirements.

For utmost flexibility, the EVS interfaces with a variety of display options: traditional fixed HUD system, head-down flight display systems; or a wearable device like the 'near-to-eye' (NTE) SkyLens wearable display.

Synthetic Vision System Terrain and Obstacle Images

The ClearVision Synthetic Vision System (SVS) provides synthetic 3D images generated from a database of runways, obstacles, terrain, and flight plan information. Ready to be displayed on time and on-need, the SVS offers enhanced terrain awareness throughout the flight operation.

Combined Vision System EVS + SVS

ClearVision's Combined Vision System is a unique and optimized solution for commercial aviation. Setting a new standard, the CVS combines both EVS and SVS, providing a high-fidelity view of the outside world even when actual visibility is close to zero. It enables the operator to see the runway lights better in conditions impairing the visibility of unaided approach. This improves the pilots' ability to execute precision and non-precision approaches and safely land, reducing the risks of Controlled Flight Into Terrain (CFIT) accidents.

Clearly divided into upper and lower windows, pilots can adjust the split between SVS on the top and EVS on the bottom to obtain the most useful imagery as weather and visibility conditions change. SVS and EVS image brightness are individually adjustable as well as EVS contrast and overall HUD brightness. A CVD on/off button quickly clears the HUD of anything that might distract from the view out the windshield.

Head-Up Display – Overhead-Mounted Digital HUD

The ClearVision Head-Up Display (HUD) is an electro-optic device presenting aircraft data over a transparent glass (combiner), located in front of the operator.

The presented data collimates to infinity, enabling the pilot to operate the aircraft using out-of-the-window views during critical phases of flight. With eyes focused in front of the aircraft and viewing the aircraft flight path vector, attitude, visual glideslope, and runway aim point on the HUD, operators can achieve greater precision and situational awareness, increasing safety. In addition, the HUD can present external video such as EVS video and support the benefit of lower landing minima.



SkyVis / SkyVis NVG display

The SkyVis Helmet-Mounted Display (HMD) offers the latest in commercially certifiable Line-Of-Sight (LOS) technology. It includes day and night head-up display capabilities with enhanced safety for ‘round-the-clock’ mission support for SAR, EMS, parapublic, offshore, and day-to-day utility operators. The system enables “eyes out” operation during all phases of flight and an unparalleled view of the outside world with aircraft, mission, terrain, flight, obstacle, and navigation data.

SkyVis uses a helmet-mounted, monochrome, monocular display, which augments the operator’s vision with HUD symbology, as



well as optional SVS, EVS-4000, or CVS imagery.

The display module does not require helmet modification and mounts directly to existing NVG mounting hardware. The SkyVis binocular NVG option also mounts to the helmet’s existing mounting hardware and provides NVG compatible display symbology.

SkyVis and SkyVis NVG displays are adjustable to accommodate multiple Inter Pupil Distances (IPD) and are compatible with prescription eyeglasses.

The other systems and their functions are identical to those of the Clear Vision solution.

SkyLens Wearable HUD Retrofit „Near-to-Eye” Display

SkyLens is a revolutionary Head-Wearable Display (HWD), ideal for smaller cockpits or anyone seeking an easy-to-install, retrofittable, and flexible HUD solution. High-resolution symbology, SVS, and EVS are presented on a high-transparency visor, as intuitive as wearing a pair of sunglasses. The easy-to-wear device provides superior see-through transmission in all weather conditions, day and night, and unlimited field of view.

The wide-viewing angle allows the pilot to look 180 degrees to the left or right to view SVS imagery for unprecedented visibility. In addition, the pilot is not constrained to sitting in a specific position as is necessary with a traditional HUD.

Heli-ClearVision



Heli-ClearVision is a complete Enhanced Flight Vision System (EFVS) solution providing head-up symbology combined with enhanced vision (EVS) and synthetic 3D terrain display (SVS). It features a large field-of-view, with the brightest and highest resolution Helmet-Mounted Display (HMD) and Head-Wearable Display (HWD) solutions for rotorcraft in the market. Its unique pilot-friendly split screen display allows the user to change between the two background imagery areas for optimal control. With the Heli-ClearVision system, overcome extreme weather conditions and low visibility situations – day, night and Night Vision Goggle (NVG). Intuitive head-up, eyes-out flying is now possible.



FDS Avionics

introduces new interactive moving maps

Get up close and personal with the world

STORY BY DALE SMITH

Source: Avionics News, February 2018.



Moving maps have become a mainstay aboard every business and personal aircraft with a bulkhead monitor, and they keep passengers from asking, "Are we there yet?" Most of them aren't interactive and couldn't do much more than show passengers how far behind schedule they truly are, but that's about to change.

At the 2017 National Business Aviation Association Convention in Las Vegas, FDS Avionics Corp. introduced the newest members of its popular do family of products: the do 2D and do 3D interactive moving maps.

„The two moving-map products are great additions to our popular do Experience product line,” stated Matt Gele, product manager for FDS. “Each fits a particular customer's needs. The do 3D is a fully-featured moving map targeted to corporate and charter operators flying mid- to large-cabin jets, while the do 2D has been created for smaller jets and turboprops.”

Chelsea Adams, sales coordinator for FDS, added that while both the do 2D and do 3D offer the same high-resolution, 15 square-meters-per-pixel resolution, the difference in the two systems is the level of user interaction. „The do 2D is a wonderful moving-map system,” she said. “But with its high level of interactivity, the do 3D creates a more fun and dynamic user experience. It's similar to what you have with Google Earth. It's much more of an entertainment element in the cabin. You can not only explore points of interest along your route, you can look up details and images of other areas, as well. The system not only has the standard points of interest, we can also customize a do 3D package to meet any owner/operator's particular needs.” While both systems can operate via an aircraft's bulkhead-mounted monitor, Gele stressed that they serve best when viewed on an iPad or other personal device.

“When the aircraft has Wi-Fi, you can use an iPad or other personal device and have the ability to look at whatever you want, not just where you are going,” he said “The platform is not just a moving map, it becomes part of the aircraft's IFE (in-flight entertainment) system. Passengers really like it”

When it comes to IFE, the do Experience does it all

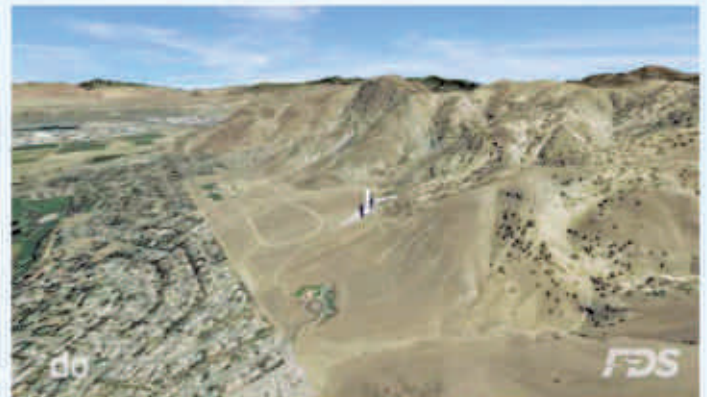
Gele explained that while both the do 2D and do 3D interactive moving maps can be used as stand-alone inputs or integrated with popular cabin management system installations, the units were designed to be part of FDS's growing do Experience family. With the do Capsule on board, any passenger can use their personal device to do work, or enjoy movies, music and the worldwide moving map. It works with iOS, Android or Windows operating systems. Simply join the onboard Wi-Fi

networks and start enjoying the content. According to the company, the current do Experience is actually made up of the do Capsule wireless platform and do 360 content service.

FDS Avionics' do Capsule is the core of the do Experience. When connected to the aircraft's Wi-Fi router, the do Capsule streams all loaded content for up to 22 passenger devices. Because all the available content is already stored on one of the system's two 1TB removable, solid-state drives and streamed via the Wi-Fi router, an internet connection is not required.

Gele also stressed that all the content provided on the do 360 is digital-rights-managed compliant and provided in cooperation with all the major Hollywood studios and content publishers.

“Like content, operators want options when it comes to the cost,” he said. “We also have two scaled-down content



options: do 180, which delivers a balance of movies and TV shows, and the base do 90 that provides some movies and a heavy offering of TV shows. It's all the same programming, but the selection varies by package.”

No matter which content package the customer selects, the next update arrives every three months on a solid-state drive that easily inserts into the do Capsule with no onboard syncing necessary.

Seeing through the DARKNESS

Enhanced vision systems offer utility for even unapproved use

STORY BY DAVE HIGDON

Source: Avionics News, October 2018.

Instrument pilots and their visual-only counterparts continue to adopt and embrace enhanced vision systems and enhanced flight vision systems regardless of their systems' lack of approval for using lower descent minima flying some instrument flight rules approaches.

Safety experts see EVS as holding the potential to bring down the fatality rate of nighttime accidents and to help in other challenging conditions. Pilots covet these systems for a couple of sound reasons.

First, pilots embrace the utility of seeing in the dark, notwithstanding a lack of approval to fly to lower minima; second, the Federal Aviation Administration published a rule change broadening the parameters for legal use during instrument approaches for approved EFVS packages.

The increasingly sensitive, progressively smaller, lighter and less-expensive infrared sensors that provide the image deliver utility even without approach approval – something users see when they first fly behind the monochromatic image visible on the display.

Unlike its cousin, synthetic vision systems, EVS and EFVS deliver a “what you see is what you get” view of the world as seen, live, by the infrared sensor.

In contrast, SVS “sees” only what the latest satellite scan saw when scanning an update to the software driving SVS.

Initially, the FAA approved EVS installations as advisory devices, designed to improve the flight crew’s situational awareness but with no impact on lowering approach minima for aircraft so equipped.



Imaging of mountainous terrain by Garmin's Synthetic Vision Technology (SVT).

Progressively, the FAA has allowed certain operators with certain EFVS packages to gain an extra 100 feet below the 200-foot minimum applied to most instrument landing system approaches. Applicants faced special equipment and training requirements and the utility was limited.

Then came Jan. 1, 2017, and the release of Federal Aviation Regulation 91.176: „Straight-in Landing Operations Below DA/DH or MDA Using Enhanced Flight Vision System Under IFR.”

As explained by Rockwell Collins’ blogs of Jan. 17, 2017, this performance-based revision expands applicability of EFVS for business aircraft owners and operators while also introducing, for the first time, similar benefits to the commercial air-transport industry.

Previously, the commercial air transport sector was unable to participate in the operational benefits EFVS affords except through exemptions. The revised rule changed that.

Along the way, the FAA’s outlook on the installation of non-TSO’d EVS moved more toward understanding the benefits and appeals of these systems for other operators unable to employ an approved system. (See sidebar on regulatory impact.)

Definitions

First, a bit of clarification. The FAA precisely defines an enhanced flight vision system, or EFVS, as a system that uses an infrared sensor to produce the images a pilot sees projected in the out-the-window field-of-view of a head’s-up display or head’s-up guidance system.

EVS packages may employ similar or identical sensors, but the images produced display on a panel-mounted screen placed within the pilot’s field of view in the instrument panel – often as an inset to the cockpit primary flight display. The rule changes incorporated into FAR 91.176 apply to EFVS.



3D imaging of mast-obstacles by the SVT system on the Garmin G1000 PFD screen.

How they work: EFVS, EVS, SVS

Much as modern cameras’ digital sensors detect and record the position, intensity and depth of visible-light images, sensors for EFVS and EVS also detect light – but light in the infrared spectrum, invisible to the human eye. In reality, the infrared signature of an object is heat emanated in the IR spectrum.

The sensors record the heat signatures of everything in the sensor’s field of view; contrasts in the image stems from the different IR heat signatures of people and things.

That signature may reflect a taxiway, runway or highway –with painted markings registering different degrees of infrared heat, as do buildings, other aircraft, the exhaust signature of engines, plus trees, animals, people, other vehicles, the ground and clouds in the sky.

Some sensors’ sensitivity allows them to display a latent image of an object since moved out of the sensor’s field of view, but it’s typically obvious that the image is a ghost of what was once there.

The main departure point between the FAA-defined EFVS and EVS comes down to the display device. For a system to qualify



as EFVS, the display must be ahead of the pilot using it, directly in the field-of-view when looking straight ahead through the windshield.

Displays for EVS vary, from a separate display screen mounted in the panel to insets in either PFD, multifunction display or a dedicated screen. Otherwise, they function similarly.

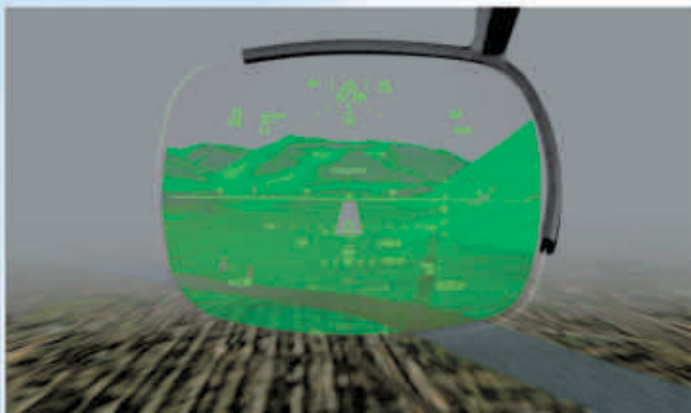
In contrast, an SVS, or synthetic vision system, uses no resident light sensors, visible or otherwise. No cameras, no all-seeing eye.

Instead, a computer built into the SVS hardware uses data from an integral global positioning sensor to identify its precise location, heading, speed and altitude. Then, software in the processing computer regenerates landscape data produced by multiple global scans to project an accurate image of the terrain below and around the aircraft. Further, the image moves proportionally to how the landscape progresses below the plane at a rate and viewing angle that accurately reflect the aircraft’s speed and altitude.

The landscape data consists of the collective data of multiple landscape scans from satellites, each more precise and in finer detail than the prior scan.

SVS imagery has, during the past two decades, progressed from crude but proportionally accurate wire-frame graphics through solid-frame graphics and on to today’s near-photographic, three-dimensional renderings in hundreds of thousands, if not millions, of colors.

But one element of SVS remains unchanged, forever handicapping the technology from achieving the same level of utility as EVS/EFVS.



Translucent (HUD) and terrain view from the Collins Aerospace EVS.

Reality.

EVS/EFVS displays show the world what the sensor sees as it is, real-time – right now. If an object shows up on the EVS/EFVS display, it's a solid bet that the object is where it's imaged. As mentioned earlier, a latent image of something that's moved may display from the latent IR, but that latent image's ghostly nature will be apparent.

But the infrared sensors can't see through everything; dense fog, smoke and particulates in the atmosphere can effectively blind EVS sensors – or at least limit its vision.

SVS imagery, however, is a replay of what the last scan stored in the landscape database. If an object wasn't there for the scan it can't be there for the replay; and a replay can never show the pilot an image of terrain as it exists now – only how it existed then.

And it always shows everything within its programmed range, regardless of how cloudy, smoky or rainy the atmosphere.

Advanced systems available on some aircraft successfully merge the two technologies, fusing them, if you will, into a single image that cancels out the shortcomings of both technologies. But we're here to talk about EFVS and EVS for light aircraft, and in that arena, many avionics packages allow pilots to enjoy both, simultaneously, but on separate displays.

The practical applications of IR sensors

Decades ago, the world's military organizations embraced a couple of new technologies, both of which let their users literally see in the dark.

One of those technologies, predominant in nightvision goggles, uses image-enhancement technology.

Image enhancement amplifies ambient light, visible and outside the visible spectrum (including infrared) and displays the resulting monochromatic image on small screens in front of the user's eyes.

The main benefit beyond the night-vision capability: The technology is small enough to wear like goggles or glasses.

The second technology, thermal imaging, uses passive infrared sensors to collect the infrared signature of people and things. This technology, in its early incarnation, required the sensor to be supercooled and a display screen larger than practical to wear.

The latest sensors work without the super-cooling, can be designed for the range of infrared desired, and they're smaller and use less power.

Best of all, thermal imaging is considered a better option for conditions approaching absolute darkness. This passive technology is also excellent for detecting the heat signatures of the machines we use – be them tanks or helicopters, trucks or combat aircraft. They also work well in many types of atmospheric contamination – whether clouds, fog or rain. Dust and smoke can, however, be problematic.

But overall, this technology produces images pilots can use in instrument conditions or on a cloudless, moonless night. A night approaching total darkness.

No wonder that when the technology became available to civil aviation, proponents embraced the technology.

2001: A new view on situational awareness

As with so many new aviation technologies, EVS came in at the upper end of the business aviation market before growing in acceptance and perceived value until it's a standard item on some of today's top business jets and an available option on high-performance piston aircraft favored by many business owners and pilots.

The first OEM to embrace EVS burst out of the gate with a retrofit system – in 2001.

Gulfstream Aerospace won the first EVS supplemental type certificate for the then leading-edge GV in September of that year. It was only the beginning.



View from Falcon's HUD system, created by Universal Avionics.

Come December 2002, the FAA issued a second STC, allowing retrofit of Gulfstream's EVS to the company's large-cabin, long-range Gulfstream IV.

The system's appeal fed its growing popularity and other planemakers sought to add the capabilities to their business aircraft. The performance drove that appeal.

Gulfstream's first EVS incorporated a specially designed forward-looking infrared camera to project a real-world infrared image on the pilot's-side Honeywell Head-Up Display. Developed in cooperation with sensor maker Kollsman Inc., the Gulfstream EVS set a model for addressing many of the issues highlighted by the FAA's Safer Skies Agenda.

The now-familiar benefits were right there for the crew to see: runway markings; taxiways; adjacent roads; surrounding areas like fences and green spaces – all in reduced-visibility conditions. The Gulfstream system also helps crews avoid many hazards otherwise not easily visible – or completely invisible – without EVS.

As with most advances in aviation technology, it takes little time to spread.



Camera of Astronics Max-Viz Enhanced Vision Systems (EVS).

Today, options from experimental up

Today's pilots enjoy a wide variety of EVS options with a wide spread in price points. For the high-end business-turbine-aircraft oriented are systems like those produced by Universal Avionics/Elbit Systems, Honeywell, Rockwell Collins and others; for aircraft at the piston, turboprop and light-jet end of the scale are systems from Thales and Astronics, with its Max-Viz systems.

Most of these systems are designed for larger aircraft, while Astronics' systems are approved in and popular with Cirrus, Mooney, Cessna, Beech and others – particularly aircraft already sporting an integrated avionics package in the panel.

These can be factory installed in some models or retrofitted under an STC for others.

For aircraft lacking an integrated avionics suite, a multi-function display or other display screen would be needed to view the output of the infrared sensor.

Depending on the model, some are also usable in daylight conditions thanks to dual sensors or a switchable filter to protect the IR sensor from suffering damage due to excessive light.

Cessna gained approval for the use of the Max-Viz 600 as an option in G1000-equipped 172 Skyhawks, 182 Skylanes and 206 Stationairs back in January 2013. Available on factory-new aircraft or as a retrofit, the company's decision to add the option reflected the findings of the 2010 Joseph T. Nall Report on general aviation safety.

That report from the AOPA Air Safety Institute revealed that the fatality rate in night fixed-wing general aviation accidents was double the daytime-accident rate.

Utility beyond instrument-approach minima

Utility beyond instrument-approach minima The growing popularity of EVS fits with the view of safety authorities that sees potential benefits from both technologies: SVS and EVS.

Their ability to improve a pilot's situational awareness is hard to overstate, even absent the rarely needed reduction in instrument-approach minima, be it for recognizing approaching taxiway intersections, runway ends, gate hardware, taxiway and runway edges, wildlife and vehicles – at least for EVS.

It's one more tool in the kit that pilots can use with confidence

– after, of course, studying the system they're flying with and recognizing its limitations.

And there are always limitations, some of them with our natural eyes, others with the artificial eyes we gain with EVS and its cousin, SVS.

But as complementary tools, the old Mark II Eyeball system and the two enhanced technologies hold the potential to be potent tools for improving situational awareness and, in the end, aviation safety.

THE FAA'S MORE LIBERAL VIEW OF EFVS

Last year's regulatory changes to FAR 91.176, „Straight-in Landing Operations Below DA/DH or MDA Using Enhanced Flight Vision System Under IFR,” covered a myriad of regulatory areas, opened up EFVS operations to a broader spectrum of aircraft operators, and expanded the IFR utility of such systems.

We touch on some of the highlights of the revised regulations.

SOME OF THE CHANGES

The revised rule runs to some length, but this highlights some of the impact of the revisions:

- Enhances low-visibility flight and ground operations.
- Increases access, efficiency and throughput at many airports when low visibility is a factor.
- Reduces infrastructure necessary to support low visibility operations.
- Provides a real-time display of the outside world in low visibility conditions using imaging sensors.
- Enables descent below Decision Altitude/Decision Height or Minimum Descent Altitude in low visibilities on a greater number of approach procedure types (precision, approach procedure with vertical guidance and non-precision).
- Cross-referenced materials that make the review and learning of this material much easier than in the past.
- The revised rules also establish new landing minima, allowing operators to use an EFVS to touchdown and rollout 91.176(a).

OTHER CHANGES

- Relocates EFVS to 100-foot operations to 91.176(b).
- Permits operators who fly EFVS operations under Parts 121, 125 or 135 to use EFVS-equipped aircraft.
- Allows dispatch/release under IFR.
- Allow those operators to initiate and continue an approach when destination weather is at or below authorized visibility minimums on the Instrument Approach Plate.
- Establishes pilot training and recent flight experience requirements for EFVS operators.
- The pilot flight crew member or any other person who manipulates the controls of an aircraft during EFVS operation meets the training, recent flight experience and refresher training requirements in FAR 61.66 is applicable to EFVS operations.
- Provides EFVS training requirements for Part 121 and Part 135 operators.

ADS-B IN

GAINING MAXIMUM BENEFITS FROM NEXTGEN

STORY BY DAVE HIGDON

Source: Avionics News, November 2018.

The carrot and the stick. The phrase evokes the image of a donkey walking toward a carrot dangling from a stick tied to the animal's neck.

When the donkey tires of chasing the just-out-of-reach carrot, the owner falls back on the stick to urge the animal onward – but not until letting the donkey taste that carrot.

Humans share many traits with our wilder brethren, among them the need to alternate between carrot and stick to keep us motivated.

To that end, aviation insiders long ago recognized the Federal Aviation Administration's mandate to equip for Automatic Dependent Surveillance-Broadcast as a stick; no ADS-B Out after Jan. 1, 2020, no access to much of the nation's airspace – including virtually all major airports.

Recognizing that technology offered an opportunity to dangle a carrot in front of aircraft owners and operators, the FAA built its nationwide network of ADS-B ground stations to broadcast to properly equipped aircraft the same air-traffic data seen by controllers – and a little more: Weather products tailored and packaged for display on the then-new multifunction displays adorning a growing list of new aircraft.

The carrot earned its name:

ADS-B In since it's broadcast for in-cockpit use.

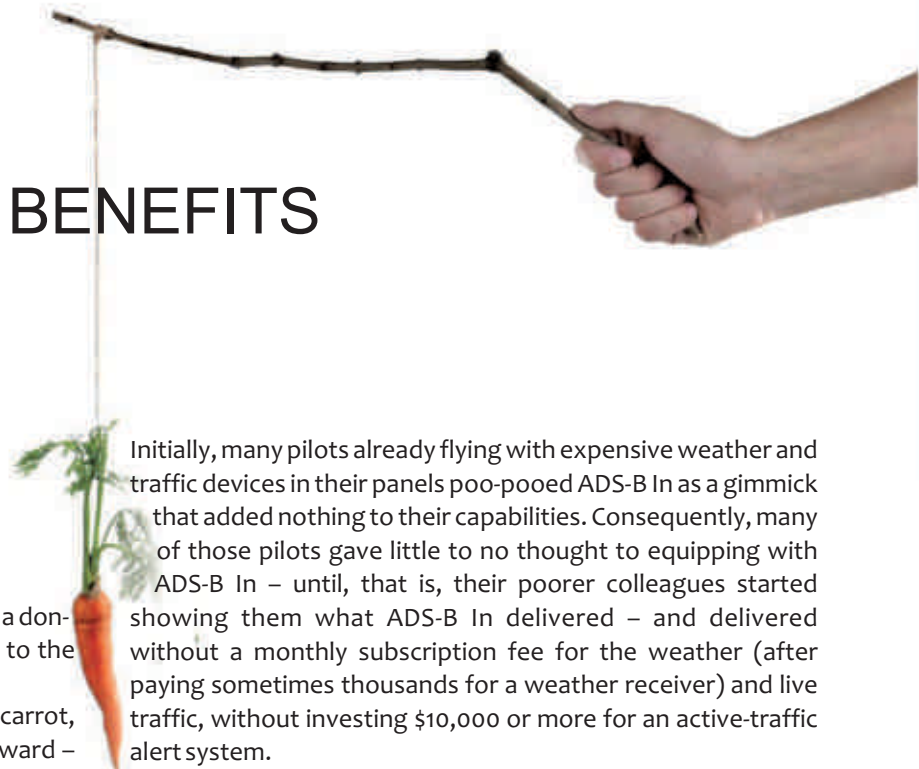
Almost nine years after the final rule mandating ADS-B Out, ADS-B In remains a user's choice, an option not required by regulation.

But walk the exhibit aisles of shows such as the AEA International Convention & Trade Show, Sun'n Fun, EAA AirVenture Oshkosh, and the NBAA Convention, and chances are ADS-B In receivers will be among the most-numerous of the exhibits – and you'll likely see ADS-B In options absent the last time you attended.

Aviators have taken to ADS-B In like they took to iPads eight years ago.

Why? For the products available! ADS-B In delivers Flight Information Services-Broadcast and Traffic Information Services-Broadcast.

Both are free to any user with a receiver and a way to view those products, with options ranging from smartphones to tablet computers to panel-mounted multifunction displays.



Initially, many pilots already flying with expensive weather and traffic devices in their panels poo-pooed ADS-B In as a gimmick that added nothing to their capabilities. Consequently, many of those pilots gave little to no thought to equipping with ADS-B In – until, that is, their poorer colleagues started showing them what ADS-B In delivered – and delivered without a monthly subscription fee for the weather (after paying sometimes thousands for a weather receiver) and live traffic, without investing \$10,000 or more for an active-traffic alert system.

Today, among the biggest selling avionics products are ADS-B In receivers, thanks to prices starting as low as a couple of hundred dollars. There's even a market for tech-savvy pilots to buy the hardware and assemble their own home-rolled ADS-B receiver with a Bluetooth link for displaying the products on compatible devices.

FIS-B: What you get – for the cost of a receiver

FIS-B automatically transmits a wide range of weather products with national and regional focus to all equipped aircraft.

As with all ADS-B In products, FIS-B is a free service. But it has one limitation, however: FIS-B is broadcast only on 978 MHz, which means its products are only available to aircraft that can receive data over 978 MHz UAT frequency.

FIS-B's broadcasts provide a range of aeronautical information sourced from the FAA and weather products from the National Weather Service.

Consider this list:

AIRMET – Airmen's Meteorological Information:

A weather advisory issued by a meteorological watch office for aircraft that is potentially hazardous to low-level aircraft /aircraft with limited capability. AIRMETs cover less severe weather than SIGMETs: moderate turbulence and icing, surface winds of 30 knots, or widespread restricted visibility.

Convective SIGMET – Convective Significant Meteorological Information:

Issued for an area of thunderstorms affecting an area of 3,000 square miles or greater, a line of thunderstorms at least 60 nm long, and/or severe or embedded thunderstorms affecting any area that are expected to last 30 minutes or longer.

SIGMET – Significant Meteorological Information:

A weather advisory that contains meteorological information concerning the safety of all aircraft: severe or greater

turbulence over a 3,000-square-mile area, severe or greater icing over a 3,000-square-mile area, IMC conditions over a 3,000-square-mile area due to dust, sand, or volcanic ash.

METAR – Aviation routine weather report: Contains data for the temperature, dew point, wind speed and direction, precipitation, cloud cover and heights, visibility, and barometric pressure. Reports are typically generated once an hour.

SPECI – A Special METAR generated if conditions change significantly within the hour.

National NEXRAD – Continental United States Next Generation Radar. NEXRAD detects precipitation and atmospheric movement or wind. It returns data which when processed can be displayed in a mosaic map, which shows patterns of precipitation and its movement.

Regional NEXRAD – Regional Next Generation Radar.

D-NOTAM – Distant Notice To Airmen: Information requires wide dissemination: en route navigational aids, civil public use landing areas and aeronautical data.

FDC-NOTAM – Flight Data Center Notice to Airmen- Information that is regulatory: changes to charts, procedures, and airspace usage.

PIREP – Pilot Reports: A report of actual weather conditions encountered by an aircraft in flight.

SUA Status – Special Use Airspace Status.

TAF – Terminal Aeronautical Forecast: Issued four times per day.

AMEND – Amended TAF is issued when the current TAF no longer adequately describes the ongoing weather or the forecaster feels the TAF is not representative of the current or expected weather.

Winds and Temperature Aloft – Computer-prepared forecasts of winds and temperatures aloft.

TIS-B Service Status – Provides periodic status of TIS-B service via FIS-B UAT uplink.

The FAA recently added six new weather products to the FIS-B service that most ADS-B In systems can already receive, including lightning, turbulence, icing, cloud tops, graphical AIRMETs and Center Weather Advisories.

Pilots yet without access to the new FIS-B products should gain access by updating their individual avionics, but the capability and availability will vary based on individual ADS-B avionics. Operators with issues getting the new products should check with their avionics' manufacturer for help. A couple of notes. First, FIS-B information, including weather information, NOTAMs, and TFR areas, are intended only for advisory use for the sole purpose of assisting in long- and near-term planning and decision-making. The system lacks sufficient resolution and updating capability necessary for tactical aerial ma-

neuvering around localized weather phenomena. In particular, in extreme scenarios, the oldest weather radar data on the display can be up to 15 to 20 minutes older than the display's age indication for that weather radar data. Also, FIS-B information must not be used in lieu of a standard pre-flight briefing.

Additionally, aircraft owners should make sure safety assessments are conducted on TIS-B and FIS-B avionics. The equipment should meet the performance requirements of FAA TSO-C157b to ensure it is compatible with existing FAA FIS-B services and meets minimum performance and quality control standards.

ADS-B In also faces some altitude limits. ADS-B In products are broadcast from the hundreds of ground stations that make up the ADS-B network, and the FAA cites a ceiling for FIS-B of FL240. Nonetheless, some ADS-B receivers pick up the broadcasts at higher altitude. The FAA supplies winds and temperature aloft data for altitudes up to FL390, but other FIS-B products data stops at FL240. The FAA says that some users will receive the FIS-B service at higher altitudes.

Some FIS-B products will only include data up to or near FL240; however, winds and temps aloft will extend up to FL390.

Proponowane rozwiązania ADS-B In

BendixKing



KGX 150R ADS-B UAT receiver with built-in GPS WAAS and optional Wi-Fi module.

GARMIN

AVIDYNE
eSMP



GDL 39 3D - position sensor and ADS-B, which shows information on a compatible Garmin GPS receiver or on a mobile device.

UNIVERSAL AVIONICS

– ostatnie newsy

SBAS-FMS SCN 1002.1/1102.1 Released



Universal Avionics introduces Software Control Number (SCN) 1002.1/1102.1/ 1102.1M for the Satellite-Based Augmentation System-Flight Management System (SBAS-FMS). The following updates were accomplished in the new software version:

► **Future Air Navigation System (FANS) / Controller-Pilot Data Link Communications (CPDLC) Push-To-Load**

Software now supports route clearance uplinks and downlinks, including automatic flight plan updates from Air Traffic Control (ATC) messages, requests to ATC for flight plan changes, and reports of the flight plan to ATC. This functionality allows flight plan data from the UniLink™ UL-800/801 Communications Management Unit (CMU) to be reviewed and used by the crew to update the active flight plan. In addition, flight plan data and ATC requests can be sent from the FMS to ATC via the UniLink CMU. Note, this change renames any reference from “UniLink RTE” to “Dispatch RTE” to avoid confusion between routes received from ATC and routes received from the airline dispatch.

► **GLS-1250 Sensor Selection**

This minor point change includes a functionality which modifies the logic used in selecting the master GPS sensor for a navigation solution. Previously, the GLS sensor had priority over the SBAS GPS sensor. This change results in the SBAS GPS sensor having higher priority except when conducting a GLS approach within 30NM of the destination.

► **Transition-To-Hover Guidance**

This software displays a new guidance waypoint, “TDN,” on an Electronic Flight Instrument System (EFIS) when Transition-To-Hover is active. It will also display wind angle in magnetic on page NAV 1 when Transition-To-Hover is active and magnetic variation is valid. This software update also adds a new configurable Transition-To-Hover install type CDV155_REV1 to render a more accurate final hover position when the helicopter descends from high altitude with high vertical speed. This change optimizes the Transition-To-Hover pattern size to reduce the time from Mark-On-Target to hover position and also minimizes the track error while capturing Transition-To-Hover RF leg.

New Hover Steering Display Formats Available For EFI-890H

The latest software version for the EFI-890H Advanced Flight Display, Software Control Number (SCN) 1017.1.11, offers new Hover Steering display formats for the Navigation Display (ND) and Composite Primary Flight Display (PFD) to display along- and across-heading velocities, and hover steering source information. This includes the addition of automatic selection of display modes when slowing down below 30 kts, new helicopter auto ranging for low speeds, and a new configuration option for hover steering display units. Normal range configuration options to allow for smaller map ranges were also updated.

In addition, SCN 1017.1.11 for the EFI-890R/H adds Rockwell Collins APN-209 RALT as an option for the +/-10 VDC Input function menu, adding support for Rockwell Collins AP-209 Radio Altimeter.



UA Unveils Next Generation Software – Based FMS

We're excited to introduce our next generation Flight Management System (FMS), the ClearVision Interactive-FMS (i-FMS).

The i-FMS is a software-based FMS designed to be an end-supplier solution for flight management in an Integrated Modular Avionics (IMA) infrastructure. The i-FMS offers the latest in Human-Machine Interface (HMI) by augmenting Head-Up Displays (HUD) and Head-Wearable Displays (HWD) to the flight deck itself, allowing pilots to „fly by sight”.

The i-FMS tackles one of the main challenges pilots face today with FMS operations; the need to propose changes to the FMS during critical phases of flight such as takeoff and landing. Typically, during this time pilots are required to shift their attention from outside the cockpit window to the FMS display unit – to reprogram the FMS and validate changes are correct – requiring last-minute updates and head-down operations.

The i-FMS better supports this, allowing pilots to project waypoints and information from the FMS onto the real-world, superimposed on a HUD or UA's SkyLens™ HWD. Pilots are able to interact with these features by Line-of-Sight (head/eye tracking) and a select/deselect button on the aircraft yoke or throttle.

The i-FMS features a portable FMS with highly modular architecture for ready deployment to any ARINC 653 compliant platform and a separate Human Machine Interface



(HMI). The ARINC 653 compliant system allows customers to run the application in many third-party options to best suit their flight deck, with no need for specific hardware or Line Replaceable Units (LRU).

The HMI, implemented with an ARINC 661 User Application, connects to the core operating system and allows pilots to communicate with the application.

With UA's easy-to-use, customizable HMI, customers can design their own flight deck with the hosted FMS software. Since the system is modular, customers may specify future functionalities, allowing for easy adaptation to address upcoming requirements. Support for a third-party HMI is also offered.

Additionally, customers may integrate their proprietary functions by interfacing to the core operating system or by customizing menus and operational logic.

UA Partners with AerSale on A320 EFVS Solution

Universal Avionics is partnering with AerSale, Inc. to develop an FAA Supplemental Type Certificate (STC) for the ClearVision™ Enhanced Flight Vision System (EFVS) on the Airbus A320 aircraft.

The ClearVision EFVS solution includes the SkyLens™ Head-Wearable Display (HWD), a cost-effective and more modern alternative to a traditional fixed Head-Up Display (HUD).

The SkyLens high-transparency visor presents high-resolution symbology/imagery, including Enhanced Vision System (EVS), Synthetic Vision System (SVS), and Combined Vision System (CVS) for superior see-through transmission in all weather conditions, day and night.

The state-of-the-art HWD requires significantly less installation efforts, and can often be installed in just a few days, compared to a fixed HUD which requires disassembly of the aircraft cockpit and can take weeks – all while the aircraft is grounded.

As part of the NextGen roadmap, ClearVision aligns with Federal Aviation Regulation (FAR) 91.176 released by the FAA, enabling operators to perform a




full landing procedure with no natural vision, where the reported visibility is as low as 1000'. The ClearVision system offers unmatched capabilities for airline operators, providing dispatch and landing approach priority as well as Low Visibility Landing, regardless of the destination airport's infrastructure.

FAA certification for the retrofit upgrade is expected by the end of first quarter of 2020, with CAAC and EASA STC validation to immediately follow.

We would like to invite you to the nearest trade fair:

	MSPO Kielce 3-6 September 2019 27th International Defence Industry Exhibition MSPO	WE INVITE YOU TO OUR STAND no D-68 HALL D
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	ARMS AND SECURITY Kiev 8-11.10.2019 XVI International Specialized Exhibition	WE INVITE YOU TO OUR STAND no 3-G23
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