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› page 30

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G700 to top the Gulfstream line

by Chad Trautvetter

Gulfstream Aerospace at NBAA-BACE last month launched the G700 as its newest flagship. The new design combines the best features of the G650ER and recently certified G500/600, resulting in a $75 million twinjet with an NBAA IFR range of at least 7,500 nm. The G700 has a five-living-area cabin with 20 large, G650-size windows, providing a strong competitive response that industry-watchers were widely expecting. First flight is planned in the first half of next year, with service entry to follow in 2022.

Though touted as an all-new airplane, the fly-by-wire G700 is actually a 10-foot stretched derivative of the G650, with which it also shares the same nose and wing. The jet also borrows the G500/600's Symmetry flight deck, including the active-control sidesticks, while adding a redesigned tail with lower height for easier hangar access, swoopy winglets, and new Rolls-Royce Pearl 700 engines. Because of the similar flight deck, the G700 will share a common pilot type rating with the G500/600, according to Gulfstream.

"This will be the largest airplane we've ever built," Gulfstream president Mark Burns told **AIN**. "It will have the widest, tallest, and longest cabin in the industry. The G650 set the bar...[and] the G700 is another game-changer."

To show off what is arguably one of the G700's best assets at NBAA-BACE, Gulfstream displayed a cabin mockup outfitted with four living areas and an optional crew rest area across from the forward galley. (The five-living-area configuration swaps the crew rest area for a divan.)

Plenty of light permeates the mockup, thanks to the score of large oval windows in the daytime and high-definition lighting system at night. The G700's standard lighting system has six LEDs per inch, while an optional ultra-HD system boasts 12 LEDs per inch. Both can emulate sunrise through sunset.

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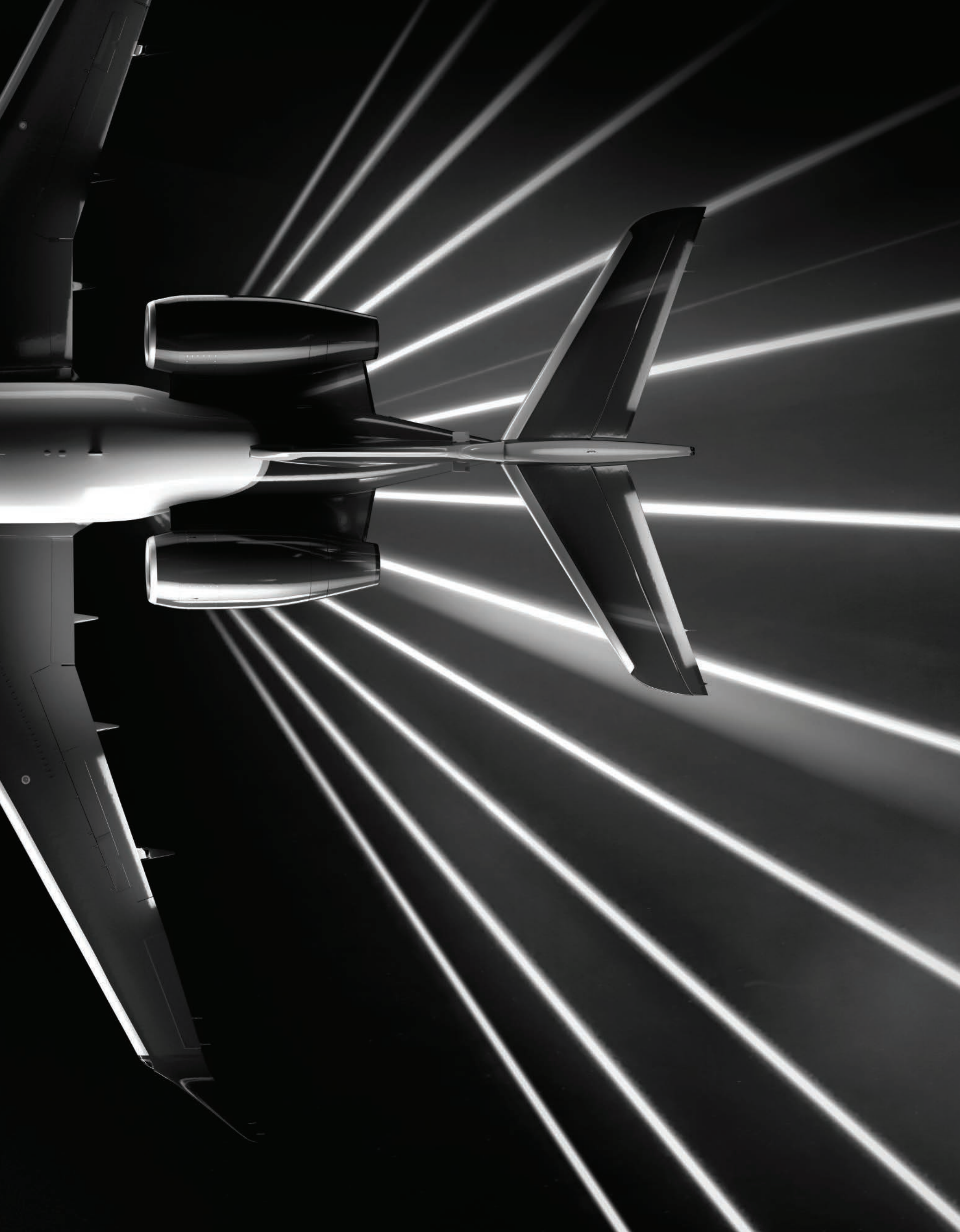
Read Our **SPECIAL REPORT**

New Turboprops

The market for new business turboprops has suffered this year, a historical anomaly. Manufacturers remain steadfast in their faith and look to bring new models to market.

› page 20



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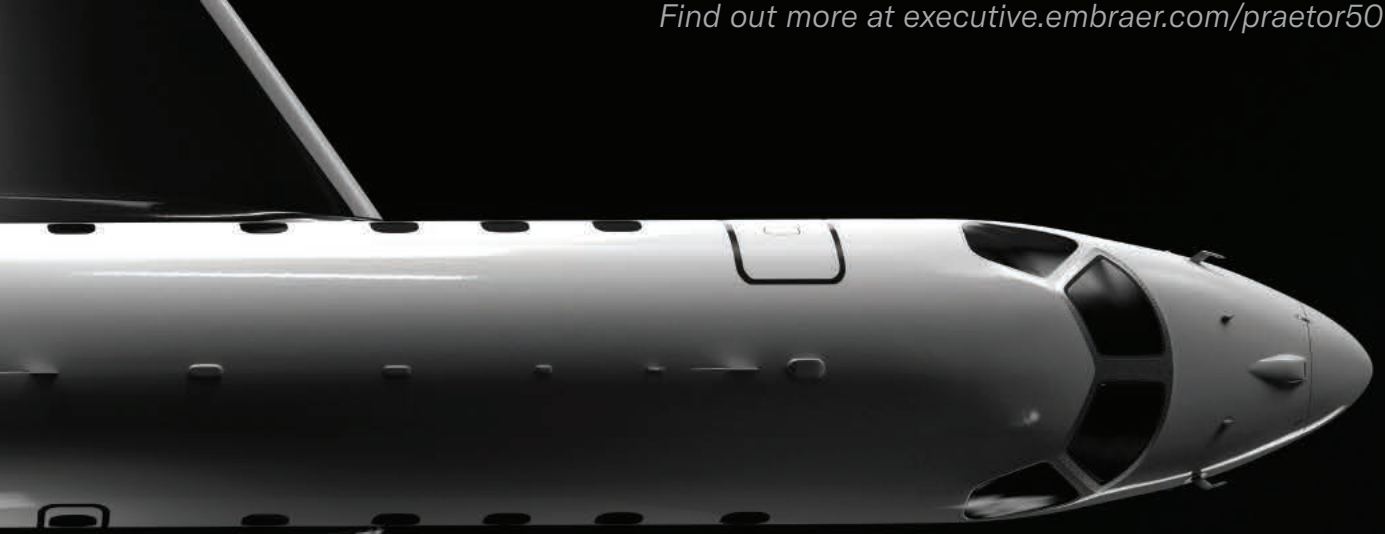

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SAFETY

The March 2018 crash of an AS350B2 into the East River prompted some immediate changes, and the NTSB public hearing set to address more concerns.

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As We Go To Press

FLEXJET PLACES $1.4B ORDER FOR EMBRAER BIZJETS

Fractional provider Flexjet placed a $1.4 billion firm order late last month at NBAA-BACE for Embraer Phenom 300Es, Legacy 450s, and Praetor 500/600s. This deal makes Flexjet the fleet launch customer for the Praetor, according to Embraer Executive Jets president and CEO Michael Amalfitano. Flexjet already has Phenom 300s and Legacy 450s on property, and also operates Legacy 500s and 600s.

HONEYWELL 10-YR FORECAST: 7,600 BIZJET DELIVERIES

Honeywell Aerospace's annual business aviation forecast released last month at NBAA-BACE calls for deliveries of 7,600 business jets (excluding bizliners and personal jets) worth approximately $248 billion over the next decade. This is down slightly in value and total units from last year's forecast. According to Honeywell, North America will account for 60 percent of the demand, followed by Europe (19 percent), Asia-Pacific (10 percent), Latin America (7 percent), and the Middle East/Africa (4 percent). Of those intended purchases, 42 percent mention large-cabin jets, with midsize and light jets each taking 29 percent of the market by volume. Large-cabin jets, including bizliners, are expected to make up 73 percent of the total valuation over the forecast period.

TEXTRON AVIATION SEES MIXED AIRCRAFT DELIVERIES IN Q3

Textron Aviation delivered 45 jets, up from 41 in third-quarter 2018, while turboprop deliveries edged lower to 39, versus 43 in the same period last year. The Wichita airframer's profit rose $5 million, to $104 million, in the quarter on revenue of $1.2 billion—$68 million higher than the third quarter last year. Meanwhile, modifications to the recently certified Cessna Citation Longitude will push some deliveries out to early next year, while deliveries of legacy Citations are expected to be flat year-over-year as customer demand takes a pause because of economic and political uncertainty, said Scott Donnelly, CEO of Textron Aviation parent company Textron.

PILATUS MARKS 50TH PC-24 DELIVERY

Pilatus Aircraft announced on October 16 that it handed over the 50th PC-24, about a year and a half since the first delivery of its twinjet. The milestone aircraft went to an unidentified U.S. customer. To date, the global PC-24 fleet has exceeded the 14,000-flight-hour mark. At NBAA-BACE last month, the Swiss aircraft manufacturer also unveiled a PC-24 with a forward galley designed for additional storage of coffee, ice, beverages, and catering. The modular gallery will be interchangeable with the currently available coat closet, Pilatus said.

PREOWNED DEMAND UP, SOFTER PRICES, SAYS REPORT

Demand for preowned business aircraft was up 24 percent as the fourth quarter began, driven in part by softening prices, according to aircraft market and evaluation specialist Asset Insight's third-quarter AI2 Market Report. Under its metrics, demand increased across all categories quarter-over-quarter—turboprops jumped 42 percent, followed by small jets at 33 percent, midsize jets at 29 percent, and large-cabin jets at 12 percent. Meanwhile, prices have been falling—by an average of 3.9 percent year-to-date. Asset Insight reported that indicators are pointing to continued erosion in prices in the fourth quarter.

BOMBARDIER ADDS EASA TO GLOBAL 5500/6500 APPROVALS

EASA has granted approval for Bombardier's Global 5500 and 6500, clearing the way for the ultra-long-range models to be registered in EU countries. European validation follows Transport Canada certification two months ago and entry-into-service of the first Global 6500 on September 30.

SENATOR SEEKS TO PROHIBIT LOW-ALTITUDE DRONE FLIGHTS

Drone operations over private property at altitudes below 200 feet agl could be banned under the Drone Integration and Zoning Act of 2019 introduced October 16 by U.S. Sen. Mike Lee (R-Utah), a member of the Senate Committee on Commerce, Science, and Transportation's aviation and space subcommittee. Key provisions of the bill include elimination of federal preemption regarding the regulation of commercial drones with regard to rate, route, or service; provisions for states to be more involved in unmanned traffic management testing; protection of state and local rights regarding drone takeoff and landing zones; and prohibitions on states from applying uneven or preferential drone regulations on commercial operators.

CHALLENGER 350 SETS NEW RECORDS, ALL IN A DAY'S WORK

Bombardier continues to rack up speed records, the latest involving 10 record flights a Challenger 350 accomplished in a period of just 20.5 hours. The tour of speed records began at 7:56 a.m. local time on September 27 in Las Vegas and involved stops in Denver, Chicago, Teterboro, Washington, White Plains (New York), West Palm Beach, Houston, Dallas, and Los Angeles, before returning to Las Vegas. Reaching Mach 0.82 during most of the journey, the Challenger 350 arrived back in Las Vegas at 4:20 a.m. local time the following day after flying more than 5,600 nm and setting a city-pair record on each leg.

Bolen ahead of NBAA: Bizav continues to evolve

by Kerry Lynch

As last month's NBAA-BACE event approached, NBAA president and CEO Ed Bolen expected it to reflect the energy and enthusiasm of an industry that is stabilized and looking to the future evolution of aviation with a breadth of far-reaching product innovation and a diversity of businesses.

"The aviation industry is changing; it's evolving, it's adapting, and it's in some ways transforming. I think you'll see all of that on display at NBAA-BACE," Bolen said.

New products have long been a highlight of NBAA and have fueled the industry during its struggles over the past decade.

MARIANO ROSALES

NBAA president and CEO Ed Bolen

New aircraft models stimulate new sales, he said, and "we've seen a lot of that. We've seen companies make themselves very lean and competitive. We've seen the preowned market firm up. So, I think as a general rule, the overall market environment is pretty positive." He added that reports are showing general strength across all of the segments.

In recognition of the important role NBAA-BACE has played in the introduction of new products, the convention hosted a first-ever session to enable companies to highlight their wares on the opening day of the convention at the Innovation Zone.

While aircraft unveilings tend to capture the most attention, this session was designed to highlight other products, those that help with productivity, human resources, and a host of other innovations, said Chris Strong, NBAA senior v-p for conventions and membership.

Beyond the conventional, Strong and Bolen also see the possibilities and interest in the evolving technologies, and they, too, were on display.

"We will have a range of eVTOL products that we will be showcasing at the show," Strong said, estimating maybe a half-dozen or so—including those that haven't gotten much exposure yet—will be on site. "It's going to be awesome."

"Whether the same capabilities, new aircraft, or new propulsion systems, all of that keeps getting brighter and brighter," Bolen added. "We see the industry evolve... Where we are is a great thing. We are fostering this change and, in some cases, we are even demanding it."

Beyond technologies, another area where convention organizers—working in concert with a cross-section of industry—are hoping to compel change is in sustainability. Momentum has been growing on the use of sustainable aviation fuel (SAF), beginning with collaborative agreements at the 2018 EBACE, which grew into aircraft flying in on SAF to this year's EBACE in Geneva. "Now we're going to have it actually at the event itself....not just [for] flying in, but flying out," he said, noting plans are to have enough fuel on-site at the static display at Henderson Executive Airport for aircraft to fly home with SAF.

These efforts have gone from a demonstration that SAF is possible and is something organizations industry-wide support to "it is happening and...we want it to happen even faster." Not only is this something that is theoretically possible, but also it is available and in use today, he added. "We think that there is a big demand. The more people become aware of this as an option, they're not going to just be open to it. They're going to demand it," he said.

Talent Pipeline

Both Bolen and Strong also indicated that they were pleased with the early registration numbers and a sold-out static display. But despite the enthusiasm, Bolen said the industry continues to face its challenges. Chief among them is workforce.

"Attracting and retaining the best and brightest is important," he said. To that end, industry leaders are planning substantial focus and outreach throughout NBAA-BACE to encourage the next generation of workers.

"We'll talk a lot about making sure our industry is something that is attractive to young people. We will be talking about the fact that our industry does indeed place an emphasis on sustainability, that we do embrace technology, and that we do create a community," he said. "There's amazing experiences and ample opportunity to grow as a person in their profession. All of those things are going to be on display.

"You'll see it from the topics that are being discussed. You'll see it from some of the social events that are being arranged for young professionals. You'll see it from the kind of people who are being recognized."

The message, Bolen added, is critical. "Over and over again, you will hear a message to young professionals that this is a great industry. It's not only worthy of your professional time, it's worthy of your personal time. And it's a great place, not just to spend your career, but to spend your life. ■


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Bombardier delivers first Global 6500

by Kerry Lynch

Bombardier's Global 6500 entered service a week after receiving Transport Canada certification. At press time FAA and EASA approvals were imminent.

Bombardier's first Global 6500 has entered service, a milestone reached just a week after the ultra-long-range model and its sibling, the Global 5500, received Transport Canada approval on September 24, the Montreal-headquartered aircraft manufacturer announced.

Bombardier unveiled the 5500 and 6500 during the 2018 EBACE, building on its successful Global 5000 and 6000 jets with redefined wings, new flight deck features, a redesigned interior, and new 15,125-pound-thrust Pearl 15 turbofans, the first of a new family from engine-maker Rolls-Royce.

The first Global 6500, one of about a handful expected to be delivered this year, is leased back to Bombardier for use as a demonstrator. Bombardier showcased the aircraft during the NBAA convention on the static display at Henderson Executive Airport.

EASA approval was anticipated any day as NBAA approached, while the FAA has been expected to follow soon after that. EASA flight-testing was completed as of last month, and the FAA effort was nearly complete, said Julien Boudreault, v-p of program management for Bombardier. Bombardier had further been working through approvals for the pilot-training process.

Flight-test Fleet

Bombardier has seen an extra level of examination during the certification process as regulatory agencies have come under increased scrutiny in the aftermath of the Boeing Max accidents, Boudreault conceded, but said the process was not "overly burdensome...It was a bit more communication." That extra layer has varied by agency, he added.

Certification followed a flight-testing program at Bombardier's test center in Wichita, Kansas, that involved three aircraft representing both models. The first flight test vehicle (FTV 1) had completed its flight test work by last month, save any last-minute residual FAA flight-test requests. FTV 3, used for engine testing and maturity, had been on lease from a customer. Bombardier last month was in the process of returning that aircraft to the customer. FTV 2, meanwhile, also had completed flight profile testing, and was turning toward continued avionics testing.

Flight Deck and Engines

Still to be completed are plans for adding true combined vision to the flight deck—in which enhanced vision is overlaid with synthetic vision in a single view on the head-up display. Currently, both enhanced and synthetic vision are on the models but not yet available as a combined feature. Noting the true overlay would be a first, Boudreault was not ready to outline a timeline, but said, "It's coming very soon... We're extremely active on it."

Other avionics features still in test are airport moving maps and certain other updates that are already on the Global 7500, he said.

Transport Canada nod for the newest Globals was announced the day after Rolls-Royce announced Canadian approval for the Pearl 15 engines. Rolls-Royce also has obtained EASA approval for the Pearl 15. The engines were designed to fit within the same nacelle as found on the predecessor Global 5000 and 6000 models, but provide 7 percent better specific fuel consumption, 9 percent more thrust, 30 percent lower NOx, and 48 percent lower smoke emissions.

Combined with the reprofiled wing, the new Globals offer 13 percent better fuel efficiency and a top speed of Mach 0.90. With the enhancements, the Global 6500 flies 6,600 nautical miles, with the ability to connect New York to Dubai and Hong Kong to London. The 5500 reaches 5,700 nautical miles. Meanwhile, the changes also dramatically improve hot-and-high performance, boosting range from Toluca, Mexico by 1,300 nautical miles. The redesigned interiors offer new high-end elements, including features borrowed from the flagship 7500 such as the Nuage seats

Bombardier has folded the Global 5500 and 6500 into the production line of the Global 5000 and 6000. Plans call to build all four variants as long as orders support them, and Bombardier executives say the company still has orders for the predecessor 5000 and 6000 for the foreseeable future. Deliveries of the 5500 are expected to begin next year.

David Coleal, president, Bombardier Aviation, called the first delivery a "significant milestone," adding. "We're proud of the work our team and our suppliers have done to deliver a technologically advanced aircraft that exceeds our customers' expectations in terms of unparalleled comfort, superior performance, and an incomparable smooth ride." ■

NBAA sees benefits of airspace redesign

The FAA's airspace optimization initiative on the U.S. East Coast is expected to bring incremental relief to constraints in business aviation travel beginning with changes that took place last month, according to NBAA. Under the FAA's Northeast Corridor Atlantic Coast Routes (NEC ACR) initiative, "operators will see significant changes ahead of the project's targeted November 2020 completion date," the association said.

According to NBAA, the first event takes place this week as some high altitude "J-routes" are replaced with "Y-routes" optimized for performance-based navigation. Plans call for similarly replacing low-altitude routes next month and for all J-routes to be replaced by Jan. 30, 2020.

The NEC ACR is targeting increased use of offshore routes, particularly as an effort to avoid severe weather. Other goals include better segregation of overflight traffic from the arrival and departure corridors in the New York and Washington areas, and reducing offshore vectoring and holds.

NBAA pointed to plans for a new "super ultra-high" ATC sector over Washington, D.C., that will reduce airspace restrictions and closures for traffic flying above FL400. Future plans are to replace the commonly used AZEZU offshore routing with more accessible options, NBAA added.

These efforts build on lessons from the South-Central Florida metroplex project, the association noted. "The FAA hopes to improve routing and decrease operational complexity through the nation's busiest airspace," said Ernie Stellings, senior manager at NBAA Air Traffic Services. **K.L.**

NBAA News

World Fuel Powers NBAA-BACE Traffic

World Fuel Services supplied Las Vegas-area Henderson Executive Airport, host of the NBAA-BACE 2019 static display, with a shipment of sustainable aviation fuel (SAF). The Miami-based company, earlier this year, participated in two major demonstrations of the use of SAF—at Los Angeles-area Van Nuys Airport in January and the UK's Farnborough Airport in May ahead of EBACE in Geneva.

The company expected approximately 150,000 gallons of the fuel would be consumed in relation to the NBAA show. Since 2015, World has delivered more than 13.6 million gallons of SAF to commercial and business aviation customers.

"We've been at the forefront of sustainability and alternative fuels for the aviation industry," said Mike Szczechowski, World's senior v-p of business and general aviation. "It all started with the supply of SAF."

Learjet Liberty Makes Its Show Debut

Some three months after taking the wraps off the Learjet 75 Liberty, Bombardier debuted a full-size mockup of the interior of the now lower-cost light jet during NBAA's annual convention last month. Bombardier unveiled the Liberty in early July, a revamp of the 75 with fewer seats to provide a more spacious cabin, newly designated standard and optional features, and extended engine maintenance intervals.

According to Bombardier Business Aircraft manager of product planning and strategy Mischa Loeffler, the Liberty is a lighter-weight aircraft that burns less fuel, has lower operating costs, and decreased acquisition costs. Regarding the latter, the list price has dropped from $13.8 million for the current Model 75 to $9.9 million for the Liberty, an acquisition price that Bombardier executives emphasize is now in the ballpark of other light jets.

First -time Exhibitors Featured

From start-ups to long-established aero firms, and from manufacturers and service providers to government agencies and non-profits, more than 75 exhibitors made their NBAA-BACE debuts at the Las Vegas Convention Center this year. They included **ECHA Microbiology**, an authority on microbiological and corrosion problems; **Bird Control Group**, showcasing its intelligent, laser-based Avix bird repellent system; the **Costa Rica Aerospace Cluster**; **CAV Systems**, with cutting edge fluid-based anti-ice systems that can prevent the formation of ice on wings, tails, propellers, windshields and struts; **Women in Corporate Aviation International**, which has been leading the effort to counter the dearth of women in the business aviation industry; and **Aero Crew Solutions** of Atlanta, touting the benefits of its cockpit and cabin crew recruiting and career advancement services.

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With PC-12 NGX model, Pilatus improves workhorse

by Jerry Siebenmark

For the third iteration to its venerable PC-12 single-engine turboprop (SETP), Swiss airframer Pilatus Aircraft unveiled a new variant that includes a complete redesign of the cabin, new avionics, and a new variant of the Pratt & Whitney Canada (P&WC) PT6A powerplant found on the first two generations of the airplane, in addition to a single power lever. Pilatus introduced the PC-12-NGX in a ceremony during the NBAA-BACE show last month in Las Vegas.

Under development for more than three years, the NGX began flight testing in December 2017 and is expected to receive FAA and European Union Aviation Safety Agency certification in December. Deliveries of the $4.39 million airplane ($5.37 million for the executive configuration) are expected to begin in the second quarter of next year.

Pilatus's new PC-12 NGX has a new cabin, avionics, and upgraded Pratt & Whitney Canada engine.

Pilatus officials hope the upgraded PC-12 NGX will continue the delivery trend of the first two generations of the SETP—the PC-12 and PC-12 NG, which combined account for 1,730 deliveries to date.

"To maintain the PC-12's leadership in the general aviation marketplace, we continuously seek innovative solutions that benefit the safety, comfort, and productivity of our customers," said Pilatus Aircraft CEO Markus Bucher. "The PC-12-NGX is a showcase for the advanced technology collaboration between Pilatus, Pratt & Whitney Canada, and Honeywell. Together, we took the best, and made it even better."

'A Leap Forward'

Powering the NGX is the new PWC PT6E-67XP, which features a dual-channel integrated electronic propeller and engine control system that provides full digital envelope protection, precise and intuitive engine control, reduced pilot workload, and optimized power.

Controlled by a single power lever, the PT6E-67XP produces 1,825-shp and is flat rated to 1,100 shp in cruise flight, a 10 percent increase from the PC-12's PT6A-67P. It allows the NGX to reach a maximum cruise speed of 290 knots. The NGX will be certified to fly without fuel anti-ice additive.

In what Pilatus is calling a first for turboprops, the new engine will be able to operate in a low-prop-speed mode, reducing the prop speed from 1,700 rpm to 1,550 rpm and lowering passenger cabin noise. According to Pilatus, even with the low prop speed, the electronic propeller and engine control system will maintain engine power at "virtually negligible performance degradations."

Additionally, the new engine will have a 5,000 hour time-between-overhaul period with hot section inspections only required on-condition and be able to transmit data from more than 100 engine parameters that are continuously monitored, adjusted, and recorded. "Building on the legacy of the PT6 family, the new engine is a leap forward in engine control and data management systems," said P&WC president Maria Della Posta.

On the flight deck, PC-12 NGX pilots will find what Pilatus is calling an Advanced Cockpit Environment (ACE) with Honeywell Epic 2.0 and a new touchscreen avionics controller with integrated bezel contour grips intended to stabilize the pilot's hand in turbulence. ACE's standard safety features are a new emergency descent mode and tactile feedback aimed at helping pilots avoid unintentional excessive bank angles.

An option in the NGX cockpit is a fully integrated digital autothrottle. Other NGX flight deck features include brighter, more vivid color flight displays; night-mode charts; pilot-defined visual approaches; high resolution 2D airport moving maps; Honeywell's SmartLanding and SmartRunway awareness systems; 3D intelligent audio with ATC playback and Bluetooth interface; electronic checklists linked to crew alerting system (CAS) messages; worldwide graphical weather; support for European protected mode-controller pilot data link communications (PM-CPDLC) mandates; and faster database loading.

PC-24 Influences

Among NGX's cabin refinements are windows that have been reshaped and enlarged 10 percent, offering passengers an improved outside view while providing additional natural light inside the cabin. The airplane's rectangular-shaped windows and dark windshield surround trim were influenced by the PC-24 twinjet, according to Pilatus.

Pilatus also redesigned the executive seats for the NGX to offer more headroom, as well as fully recline and improve lumbar support. New quick-release attachments on the seats enable the pilots to quickly reconfigure seating on the NGX without the help of maintenance crews.

Also modified for the NGX cabin was the headliner, which provides indirect lighting, more uniform and quiet air distribution, and increased headroom. Rounding out new passenger amenities on the NGX are dual cupholders and integrated sidewall USB ports.

Six different interiors—designed by BMW Group's Designworks—are offered with the executive NGX, as are bespoke interiors and paint schemes.

Other attributes of the NGX are its scheduled maintenance intervals, which have been extended to 600 flight hours. Hourly direct operating costs for the engine and aircraft have also been reduced by at least 9 percent, Pilatus added. A new nose-to-tail maintenance program modeled after the PC-24's CrystalCare program will provide all scheduled and unscheduled maintenance of the airframe, engine, avionics, systems, and propeller, including all mandatory and recommended Service Bulletins, freight, consumables, normal wear items, and AOG recovery service. ■

NBAA News

Bombardier Shows Global 7500's Sound System

Bombardier's latest Global 7500 cabin feature, showcased last month at its static display during NBAA-BACE, is dubbed l'Opera, an immersive high-fidelity audio system. L'Opera has full-range speakers, the latest in digital signal processing, and "seat-centric" sound technology that is able to follow the passenger in the cabin.

Developed in concert with Lufthansa Technik, l'Opera was inspired by advances both in home theater technologies and in automotive sound systems, said Tim Fagan, manager of industrial design for Bombardier.

L'Opera incorporates a series of mid-range and high-range speakers, including a rotational center speaker in the entertainment desk suite. Each living space has its own combination of speakers strategically directed to provide a sound mixture maximized at the passenger's listening level. These are accompanied by subwoofers integrated into bulkhead walls and divans to provide a balanced surround-sound experience. The system can produce 1,275 watts of power.

Daher's Latest TBM Makes NBAA-BACE Debut

Daher's new $4.13 million TBM 940 made its NBAA-BACE debut last month. The aircraft is the first turboprop weighing less than 12,500 pounds to be equipped with a standard, factory-installed integrated autothrottle and automatic deicing.

According to Daher airplane business unit senior v-p Nicolas Chabbert, "The aircraft's new features represent a further evolution of our TBM e-copilot concept, providing assistance in single-pilot operations." The e-copilot system, available on the earlier TBM 930 and the current-production 910, uses guardrails built into the Garmin autopilot to maintain flight within the design envelope, automatically using pitch and bank-angle inputs to protect against excessive bank angles, speed departures, and hypoxia incapacitation; when cabin altitude exceeds 11,500 feet the emergency descent mode automatically activates.

Global Aerospace Updates Safety Program

Industry insurance provider Global Aerospace previewed the latest improvements to its SM4 Aviation Safety Program at NBAA's convention. The 2020 edition's focus will be on business aviation's talent shortage and the challenges in attracting, mentoring, and retaining professionals who can safely manage, maintain, service, and fly business aircraft.

To be launched in January, the program will include an online safety learning management system, which will be provided free to the company's U.S.-based general aviation policyholders. It will include customized training courses to help support future talent by improving their understanding of safety management and professional performance, and by promoting their continuous improvement.

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U.S. bizav fatal accidents leveled off in Q3

by Gordon Gilbert

There were no U.S.-registered fatal turbine business airplane accidents in the third quarter of this year. However, the exceptionally high number of fatal accidents and fatalities in the first half of this year have already exceeded annual totals for many past years. According to preliminary statistics gathered by **AIN**, 21 people died in five business jet crashes and 36 lost their lives in eight turboprop crashes in the first six months alone of this year.

In the first nine months last year, three died in two business jet accidents and eight perished in four turboprop mishaps. There were no reported accidents this year involving Part 91K operations, but their was one incident on August 8 in which three people were injured when their NetJets Bombardier Challenger 600 was hit by wake turbulenc. Ther was just one incident in the corresponding time frame a year ago.

Ten passengers and three crew were reported killed in the May 5 crash in Mexico of a charted Bombardier Challenger 601. Two died in the May 22 crash of a Cessna Citation SII. On May 24, the sole-occupant pilot was killed when a Citation 560 overshot its planned destination and crashed into the sea. On April 13, three were killed in the crash of a Rockwell Sabreliner following a reported electrical malfunction.

The first fatal jet accident this year occurred on March 18 to an IAI Westwind 1124. As the airplane approached for landing, it rolled left and became inverted before crashing. Both pilots were killed. Investigators found the gear and flaps extended, the left thrust reverser open and the right thrust reverser closed.

Remarkably, in the third quarter there where four crash and burn accidents in which there were no fatalities among the 27 occupants. On August 26, all 11 passengers and crew evacuated safely from a crash of Citation Excel before fire consumed their aircraft.

On August 21, a Citation Excel suffered a runway excursion after an aborted takeoff. All 10 occupants evacuated the aircraft before fire engulfed the airplane. On August 15, a Citation Latitude overran the runway and caught fire after landing. Five persons on board escaped without serious injuries.

Also escaping without serious injury after crash landing his Citation II on July 17, the sole-occupant pilot was subsequently arrested for allegedly operating an aircraft under the influence of alcohol. The aircraft was totaled from the post-crash fire.

Turboprop Fatal Count Worse

Two Beech King Air takeoff accidents resulted in 21 of the 36 fatalities involving turboprops in this year's first half: 11 on June 21 and 10 on June 30. Two more fatal accidents in the same month included a Cessna Conquest that crashed on June 10 killing the pilot and sole occupant, and the in-flight breakup on June 7 of a turboprop converted Piper Malibu resulting in four fatalities. Another turboprop converted Malibu was involved in a fatal crash on February 28 killing the two people on board.

A May 13 midair between two Part 135 tour aircraft took the life of one person in a de Havilland Turbine Otter and all five people in a piston-powered de Havilland Beaver. On January 21, the four occupants on a turbine DC-3 died when it crashed, and three died in the January 29 accident of an air ambulance King Air 200.

One Non-U.S. registered business jet accident in the first nine months of this year was fatal to the pilot On August 6 a privately operated Citation Mustang on approach to Chile's Los Ángeles-María Dolores Airport crashed some 1,000 feet short of the runway. The sole-occupant pilot was killed. In the same period last year, 12 people died in two jet crashes.

Until the third quarter of this year there had been no fatal accidents involving non-U.S.-registered turboprops. But 17 people lost their lives in four charter propjet crashes between July and September. In the first nine months of last year, 19 people were killed in five non-N numbered turboprop mishaps. ■

AIN tables show "incidents" as well as "accidents" to distinguish mishaps based on their degree of severity. Investigators often draw fine distinctions between the two events, but, typically, incidents result in minor or no damage and their investigations are sometimes delegated to local officials.

Accidents are events that range from minor damage to destruction and/or injuries. Also, some incidents ultimately get upgraded to accident status during the investigative process.

Accidents/Incidents Worldwide

(First Nine Months 2019 vs. First Nine Months 2018)

U.S.-registered Business Jets and Turboprops

Business jets	Total		Part 91		Part 91K		Part 135		Public/Gov't		Mfr.	
	2019	2018	2019	2018	2019	2018	2019	2018	2019	2018	2019	2018
Total accidents	**12**	**10**	**11**	**7**	**0**	**0**	**1**	**2**	**0**	**1**	**0**	**0**
Nonfatal accidents	7	8	7	5	0	0	0	2	0	1	0	0
Fatal accidents	5	2	4	2	0	0	1	0	0	0	0	0
Fatalities	21	3	8	3	0	0	13	0	0	0	0	0
Incidents	50	53	39	40	1	1	10	11	0	0	0	1

Business turboprops	Total		Part 91		Part 91K		Part 135		Public/Gov't		Mfr.	
	2019	2018	2019	2018	2019	2018	2019	2018	2019	2018	2019	2018
Total accidents	**17**	**11**	**16**	**8**	**0**	**0**	**1**	**2**	**0**	**1**	**0**	**0**
Nonfatal accidents	9	7	9	4	0	0	0	2	0	1	0	0
Fatal accidents	8	4	7	4	0	0	1	0	0	0	0	0
Fatalities	36	8	35	8	0	0	1	0	0	0	0	0
Incidents	37	29	33	23	0	0	3	6	0	0	1	0

All data preliminary. Sources: FAA, NTSB, Aviation Safety Network, AIN research

Non-U.S.-registered Business Jets and Turboprops

Business jets	Total		Private		Charter		Other*		Unknown	
	2019	2018	2019	2018	2019	2018	2019	2018	2019	2018
Total accidents	**11**	**1**	**5**	**5**	**3**	**1**	**2**	**1**	**1**	**1**
Nonfatal accidents	10	6	4	3	3	1	2	1	1	1
Fatal accidents	1	2	1	2	0	0	0	0	0	0
Fatalities	1	12	1	12	0	0	0	0	0	0
Incidents	13	4	6	3	4	1	0	0	3	0

Business turboprops	Total		Private		Charter		Other*		Unknown	
	2019	2018	2019	2018	2019	2018	2019	2018	2019	2018
Total accidents	**18**	**22**	**3**	**6**	**6**	**9**	**6**	**5**	**3**	**2**
Nonfatal accidents	14	17	3	4	3	8	5	3	3	2
Fatal accidents	4	5	0	2	3	1	1	2	0	0
Fatalities	17	19	0	2	8	5	9	12	0	0
Incidents	9	8	5	2	1	3	2	3	1	0

**For example: ambulance, survey, ferry, training, testing, manufacturer, government (non-military), and head of state.*

News Briefs

Gulfstream Nabs EASA Nod for G500

Gulfstream Aerospace's ultra-long-range G500 received European Union Aviation Safety Agency (EASA) validation, the Savannah, Georgia-based aircraft manufacturer announced last month. Coming a little more than a year after U.S. FAA type certification, the EASA nod paves the way for registration of the aircraft in European Union countries. With a top speed of Mach 0.925, the G500 has a 5,200-nm range at Mach 0.85 and 4,400-nm range at Mach 0.90. Entering service in September 2018, the aircraft already has accumulated 35 city-pairs records around the world.

Colibri: Bizav Pilot Shortage Will Affect Bizjet Sales

Some 98,000 new business aviation pilots will be needed globally over the next 19 years to meet the growing demand to fly privately, said London-based business aircraft broker Colibri Aircraft. A shortage of pilots is creating operational challenges for current owners and risking the sale of some business jet types, it added. Thus, Colibri is advising against clients hiring only one full-time pilot and then relying on contract crew to fill the right seat. The broker is also warning that business aviation pilots are increasingly leaving the sector to fly for airlines, which offer more predictable schedules.

CAN Honors NetJets with Corporate Angel Award

The Corporate Angel Network (CAN) has selected fractional provider NetJets as a recipient of the 2019 Corporate Angel Award. "Organizations receiving this award go above and beyond to fulfill our mission of helping cancer patients access the best treatment centers in the country by arranging free travel on corporate aircraft," CAN said. NetJets expanded this partnership earlier this year, giving CAN access to ferry flights and matching NetJets shareowner flight-hour donations up to 50 hours annually.

Duncan: Operators Now Booking into Q1 '20 for ADS-B

With two months remaining before the FAA's deadline for ADS-B Out equipage, business aircraft operators are now finding they will likely have to schedule into 2020 for installations, MRO provider Duncan Aviation reported. Duncan Aviation's satellite avionics shop in Sacramento, California, has bookings for ADS-B upgrades through March 2020, according to Bob Hazy, manager of that facility. In June, the Sacramento shop moved into a new, more spacious hangar at Mather Airport and since filled all the remaining slots upgrade installations this year. The first quarter of 2020 is continuing to fill at the location, the company added, noting Hazy has quoted several additional aircraft for ADS-B upgrades, including a Learjet 45.

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NetJets key for ensuring Longitude's success

by Jerry Siebenmark

Textron Aviation has begun delivering its recently certified Cessna Citation Longitude.

With type certification of the Cessna Citation Longitude in hand and first delivery complete, Textron Aviation officials are hoping the super-midsize twin is on a similar path as the mid-size Latitude—with a little help from NetJets, which has options for up to 175 Longitudes. "We will be delivering to NetJets later this year and that'll be exciting again to have [the Longitude] in their fleet, because we've seen what their participation can do with the program," Textron Aviation senior v-p of sales and marketing Rob Scholl told **AIN**. "With the Latitude, it obviously got the airplane out there, people seeing it, people experiencing it. And I know having [NetJets] continue to fly that product is going to help us make that program another home run for the business."

More than four years after its unveiling at the 2015 NBAA Convention in Las Vegas, Textron Aviation's Cessna Citation Longitude received its long-awaited type certification on September 21 followed by entry into service on October 2. Scholl described the first recipient of the Longitude as a "retail customer." With the NetJets order option, the first tranche of which includes 15, he hopes that stimulates additional orders as it did for the Latitude; 200 of which have been delivered in the first five years—100 of them to NetJets.

In what Textron Aviation called "the most robust flight, structural, and component qualification testing completed on a Citation to date," the Longitude experimental and demo fleet, comprising five flight-test vehicles, completed nearly 6,000 hours of flight time, as well as 11,000 test points. During the certification process, the 3,500-nm-range Longitude also flew a 31,000-nm world tour.

Certification of the $26.9 million airplane was originally expected about two years ago.

Fuel Tank Issues

But at least one issue, fuel tank flammability, hampered Textron Aviation's certification timeline for more than a year and a half while the manufacturer sought an exemption.

Textron Aviation's initial appeal for exemption in February 2018 centered around a difference in interpretation between the FAA and the company on what constitutes a center fuel tank. The Longitude is designed with the fuel tank in a conventional unheated aluminum wing, but includes a portion covered by aerodynamic fairings. The company considers the entire fuel tank to be in a conventional unheated aluminum wing (CUAW) that meets flammability requirements.

But the FAA disagreed, determining that the portion covered by the aerodynamic fairings is not a conventional unheated aluminum wing tank, which means the aircraft doesn't meet the requirements of FAR 25.981(b), amendment 25-125.

In its earlier exemption request, Textron pointed to the safety records of other jets in its fleet with similar fuel systems such as the Citation Sovereign and M2, as well as the Hawker 4000. A temporary exemption issued in August 2018 accepted an interim modification and called for a long-term solution.

A second appeal made by Textron Aviation in December 2018 was more narrowly focused on the more extensive requirements that apply to the use of the flammability reduction means (FRM) in fuel tanks. The FAA has determined that the aircraft's dedicated electric recirculation pump is an FRM and therefore the aircraft must meet those requirements.

In its June 26 decision granting the exemption, the FAA said: "the design modification that Textron has incorporated in the Model 700, to cool the fuel tanks and reduce fuel heating, improves the overall tank flammability to a level equivalent to a CUAW tank."

The Longitude was Cessna's first clean-sheet design since the midsize Citation Sovereign was certified in 2004. ■

MARK WAGNER

Embraer's Praetor 500 wins U.S.,Euro nod

A little more than a month after receiving Brazilian ANAC type certification, Embraer's Praetor 500 earned EASA and FAA approval, Embraer announced on September 30. The certifications follow the trio of approvals granted last spring to the aircraft's longer-range, stretched sibling the Praetor 600.

Announced during the 2018 NBAA-BACE annual convention, the Praetor 500 and 600 marked the next generation of the original Legacy 450 and 500 with new winglets, increased fuel capacity, and other enhancements that boost overall performance.

As certified, the Praetor 500 is capable of flying 3,340 nm with NBAA IFR reserves and four passengers, reaching a speed of 466 ktas, taking off in 4,222 feet, and having an unfactored landing distance of 2,086 feet. This beats the original design targets of 3,250-nm range, 462 ktas high-speed cruise, 4,263 takeoff distance, and 2,091-foot unfactored landing distance. The aircraft is capable of connecting Miami to Seattle, New York to London, and Jakarta to Tokyo, nonstop.

As with its Legacy 450 predecessor, the midsize Praetor 500 is fully fly-by-wire and incorporates the latest edition of the Collins Pro Line Fusion flight deck with capabilities that include ADS-B In, Embraer enhanced vision system with a head-up display, and a synthetic vision guidance system. It also is the first in its class to be offered with Ka-band satcom connectivity. **K.L.**

News Briefs

Farnborough Airport Wins Environmental Award

Farnborough Airport won the inaugural Energy and Carbon Transition Award, part of the Sustainability Impact Awards granted by the Institute of Environmental Management and Assessment. Last year, Farnborough Airport became the first business aviation airport in the world to achieve carbon-neutral status after an assessment by Airports Council International—Europe. Since then, according to the airport, it "has continued to make further substantial reductions in [our] carbon footprint, with a confirmed offset totaling 1,605 [metric tons] of carbon emissions for the last year."

Voom To Offer Per-seat Helo Service in San Francisco

Airbus unit Voom will expand its per-seat, on-demand helicopter service to the U.S. beginning at the San Francisco Bay Area airports—Napa, Oakland, Palo Alto, Hayward, San Francisco, and San Jose. Voom said it will also offer full-helicopter charters to additional area airports, including Half Moon Bay, Monterey, Livermore, and Sacramento. Customers can book flights via the Voom app or online up to one hour before departure and check-in at the departure helipad 15 minutes before boarding time.

JAL's Business Jet Joint Venture Begins Ops

The business aviation joint venture between Japan Airlines (JAL) and Marubeni—JAL Business Aviation (JALBA)—commenced operations in late September. JALBA is partnering with Jet Aviation, which is managing the flight charter, crew, and aircraft maintenance. Meanwhile, JALBA is arranging ground handling services, operational support, and other related flight services. JALBA is offering three types of charter flights: domestic, connecting charter flights, and international charter flights. Connecting charters will be a mix of commercial flights by JAL and business charters at the destination. The flag carrier announced the new start-up in January.

ACI Urges ICAO To Develop Supersonic Standards

Concerned that supersonic aircraft might reach the market before key noise and emissions issues are addressed, the Airports Council International (ACI) World appealed to the ICAO assembly to develop appropriate standards and practices that ensure operations of such aircraft do not harm the environment, airport operations, and the public in general. ACI World worries that reintroduction may occur as early as 2023, but manufacturers have yet to furnish evidence that the new supersonic aircraft will meet ICAO standards in place for subsonic aircraft. Standards and recommended practices for supersonic aircraft should foster sustainable development of international aviation, said ACI World.

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Survey: Illegal charter bad for operators and customers

by Kerry Lynch

A recent National Air Transportation Association (NATA) survey provides a glimpse into the depth of the concerns surrounding illegal charter, with more than 90 percent of respondents saying they have been negatively affected by such unlawful activity.

NATA, which has engaged in a multifaceted fight against illegal charter, launched the survey in August to gather data and feedback on the scope of the problem. The data, the association said, can help define the issue and be used in its advocacy.

"The challenge that we're facing is, how really big is this issue? We know it is a global issue," said Ryan Waguespack, NATA's v-p for aircraft management, air charter services, and MROs. The survey results "did not shock me," Waguespack added.

The survey drew 189 respondents, including 131 Part 135 certificate holders who represent 13.5 percent of the on-demand fleet. These operators average 14 aircraft in their fleet, 1,122 annual operations, and 100 employees.

While 91.4 percent responded in the affirmative when asked about negative effects, only 50 percent of the respondents said they report their encounters with illegal activities. Participants cited a number of reasons, such as fears of repercussions given the small size of the industry. They also are concerned about the potential of losing their own consumers, don't want to be viewed as an instigator, and question how the authorities would respond—or if they are responding.

NATA has been working on the feedback loop with the FAA because a lack of feedback is discouraging reports, Waguespack said. The FAA legally cannot disclose details of an investigation, he acknowledged, but added, "When you're taking a year or two years before the public receives any feedback [after a report of an illegal operation], that's a real challenge." In subsequent cases that operators may uncover, Waguespack said, "Are they going to report it? They're not, because in their mind nothing is being done."

He added operators are concerned about how inspectors may view increased workload that may be associated with complaints or about the "small nature of our industry" where people will be associated with each other for a long time.

The goal for the fight against illegal operations is to empower operators who "are doing it right," he added.

Scope of Illegal Activity

Illegal activity that survey respondents have come across includes disguised leasing structures or leases executed without meeting the proper requirements or sign-off from the FAA, flights claiming to operate under "cost-sharing" exceptions without an owner present, and flights sold under the guise of "sales demos" or "flight training."

A key tip-off is advertised rates far below those of legitimate operations, the survey revealed. This activity has further been discovered because clients have discussed it, an incorrect N number was filed on flight plans, flight crews have made a notification, or multiple leases are taken on a single aircraft.

The survey also reinforced what NATA has concluded separately through its town halls with operators around the country: that the illegal activity tends to be found more in specific regions, including certain southern states (Florida in particular), as well as California. It is not as prevalent, or noticeable, in the Northeast.

But Waguespack said these concerns are reverberating globally. European charter executives also have been spearheading initiatives and have met recently with NATA. Further, Mexican aviation authorities have reached out to NATA and a meeting was scheduled for late October. Waguespack is scheduled to speak on the topic in the Philippines this month and authorities from South America and Australia have reached out to the association.

NATA's Illegal Charter Task Force is looking at several initiatives, such as partnering with the FAA to provide guidance on identifying and steps to avoiding illegal operations. It has also launched a website (www.avoidillegalcharter.com) to provide resources and tools for the industry and traveling public. Beyond educational efforts, the association is working on the enforcement side in the identification of illegal activity.

"It is all about safety, safety, safety," he said. "We're held to a higher standard. We need that process for 135 standards. We do not want just anybody willy nilly flying 135 trips. A loss affects everyone." ■

TARSUS F&E LLC MIDDLE EAST

PREVIEW Dubai Airshow

Industry prepares for event covering Middle East region

by Peter Shaw-Smith

The Dubai Airshow remains the world's number-three aviation event, after Paris and Farnborough and ahead of Singapore, organizers claimed as the Middle East's premier air extravaganza prepares to get underway on November 17. "We're playing host to 1,300 exhibitors at the Dubai Airshow, and of course welcoming something like 87,000 visitors," said Paul Griffiths, CEO of Dubai Airports.

Orders are the hard currency by which the world's four main airshows are judged, and Dubai has seen a total of just under $640 billion in cumulative aircraft deals since 1999, according to show organizers. Banner Dubai Airshow years included 2017, when total orders were just shy of $114 billion, 2013, when the figure reached $206 billion, and 2007, when more than $155 billion of deals took place.

In 2017, Emirates ordered 40 Boeing 787s worth $15.1 billion and Flydubai signed for 225 Boeing 737 Maxes valued at $27 billion, while in 2013, Emirates made its largest aircraft order ever, for 150 Boeing 777X and 50 Airbus A380 aircraft, together worth $99 billion. Flydubai committed that year to 111 Boeing 737s—including 100 Boeing 737 Max-8s—worth $11.4 billion at list prices.

Sheikh Mohammed bin Rashid Al Maktoum, driving force behind the UAE's aviation development, will lead a Royal Tour of show sights on Day One. "We work with His Highness's protocol team and they usually request where they want to stop, and then we add in where we know there's something new that hasn't been there before: new exhibitors, new products, new aircraft," Michele van Akelijen, managing director of show organizers Tarsus F&E Middle East, told **AIN**.

In 2017, the Dubai Airshow hosted 279 delegations from 76 countries. "We know that a lot more than that have been invited for this year, but confirmations won't come until much closer to the show," she said. "[The total figure] is going to go up [10 percent or 15 percent]." This year, emphasizing the importance of military aircraft, Sheikh Mohammed himself is understood to have issued personal invitations to 84 ministers of defense from around the world.

Four conferences are planned during the event, Cargo Connect, Global Air Traffic Management, as well as two at the show's Space Pavilion: Tech Talks and Women in Aviation. The Air Chiefs' conference, for defense top brass, will take place offsite on the eve of the show on November 16. "We split [the conferences] out over two days, but only half days, morning sessions, so that everybody can still enjoy the flying display and have the meetings and networking that they need to do," Akelijen said.

Apollo 15 astronaut Col. Al Worden will be giving a presentation at Space Tech Talks.

The five-day spectacle will also see "up to 165" aircraft on static display, afternoon displays from the UAE's aerial acrobatics team, Fursan Al Emarat (Knights of the Emirates), and several other civilian and military aircraft. "The flying display is the perfect opportunity for civil and military aircraft manufacturers to demonstrate their skills and capabilities to industry leaders and potential customers," she said.

The Dubai Airshow takes place at the Aviation Exhibition Center, Al Maktoum International Airport, on November 17-21. ■

Count on AIN for full coverage of the Dubai Airshow

As ever, you can count on **AIN** for full coverage of the 2019 Dubai Airshow. Our team will publish three of our award-winning daily *Dubai Airshow News* editions at the show on November 17, 18, and 19. We will also have comprehensive reporting of all the top news at AINonline.com, including video, and in daily e-newsletters. ■

Full-throttle opinion from former NTSB member John Goglia

SMS age warrants look at union, management roles

Labor-management disputes at the airlines always raise the concern that safety may be affected. Usually, the concerns focus on the workplace tensions that arise when management and labor are involved in protracted disputes. Those workplace tensions can destroy the collaborative atmosphere important to aviation safety. They can also add stress to workers that can affect their ability to do their jobs properly.

Of course, protracted disputes can lead to even worse outcomes. One of the worst-case scenarios of such disputes recently played out in the news of an American Airlines mechanic who was arrested for allegedly sabotaging a Boeing 737-800 at Miami International Airport. According to an FBI affidavit, the mechanic tampered with the air data module system, a critical component of the aircraft's navigation system, responsible for providing information—such as airspeed and altitude—for display in the cockpit. As the aircraft was taxiing for departure on July 17, the crew powered up the engines and noticed an error message for the system. An inspection of the aircraft found that a pitot line had been blocked with foam.

In the FBI affidavit, the mechanic is quoted as saying that the contract dispute with American Airlines was hurting him financially and that he tampered with the aircraft "to cause a delay or have the flight canceled in anticipation of obtaining overtime work," and "not to cause harm to the aircraft or its passengers." Regardless of what the mechanic's intent was or the reasons for his actions, tampering with an aircraft is the most outrageous thing any mechanic can do. As a mechanic for more than 50 years, I am sickened to think that anyone whose job it is to fix airplanes would intentionally use his knowledge and access to an airplane to do something that puts the airplane, and all those on board, at risk.

I have been thinking about the labor disputes at American Airlines, and Southwest Airlines, for some time, especially in relation to the safety management systems both airlines are now required to have. This act of sabotage and its connection to one of the labor disputes prompted me to finally write this article. As many of you are probably aware, both American Airlines and Southwest Airlines are involved in protracted disputes with their mechanics' unions. Without speculating about the merits of the disputes themselves, it's fair to say that situations at both carriers have become acrimonious enough that both airlines have sued their mechanics' union, alleging—among other things—illegal work slowdowns that grounded flights and disrupted schedules. The unions at both airlines have countersued.

Airlines' Responsibility

The FAA, in reaction to the rising tensions, sent a letter to the heads of each airline and its respective union (unions in the case of American). The letters are essentially identical and state that the FAA is aware of pending litigation between the airlines and their unions but is not a party to those lawsuits and remains neutral on the labor negotiations. The letters state: "The FAA cautions that a breakdown in the relationship between [American/Southwest] and the Union raises concerns about the ongoing effectiveness of the airline's safety management system. Safety is a shared responsibility that demands a collaborative culture irrespective of any ongoing controversy between the organizations."

The letter goes on to state: "In the midst of litigation, I write to emphasize the importance of ensuring cooperatively, in accordance with FAA standards, the highest level of safety in the airline's operations." The letter is signed by the FAA's Associate Administrator for Aviation Safety, Ali Bahrami.

Here is the rub for me. Airlines and unions do not have the same obligation for ensuring safety, especially under a safety management system. In fact, the FAA's regulations codified in 14 CFR Part 5, don't mention unions at all. And that's not because unions don't play a critical role in the safety equation. I was an IAM union member for many years and active in the union's safety work. I participated in many accident investigations as a union member and sat on many FAA/industry regulatory committees. I know first hand the important safety work that unions do.

But doing important safety work and having "shared responsibility" for safety at an airline are two very different things. In my opinion, addressing airline and union management as though they were equals—FAA did by addressing its letters jointly to the airline presidents and union officials—undercuts the airline's ultimate responsibility and accountability for its operation of the airline. After all, it is the airline that holds the FAA's operating certificate and it is the airline alone that is responsible for the functioning of its safety management system.

If there's one thing that SMS has made clear, it's that responsibility and accountability have to be clearly defined and reside at the highest levels of the airline. The airline has to identify an "accountable executive" with the authority over operations, financial resources, human resources, and for ultimate safety performance. The regulations further specifically provide that the airline "must define accountability for safety" and "must identify the levels of management with the authority to make decisions regarding safety risk acceptance."

While one letter from the FAA may not seem that significant, in my opinion it indicates the FAA's historic hands-off approach to what it considers labor problems even when allegations of safety issues are made. My concern with how the FAA handles union worker safety complaints in the midst of labor-management disputes goes back to the days of Eastern Airlines. FAA inspectors investigating airline mechanic complaints grew so frustrated with FAA management's unwillingness to act that they took their complaints to the United States Attorney in Brooklyn, who ultimately filed a criminal case against Eastern Airlines for, among other things, falsification of maintenance records.

So while I have no idea whether the allegations made by mechanics in these recent cases are valid or not, the FAA should not hesitate to place responsibility for safety in the hands of the airlines—where it properly belongs.

The opinions expressed in this column are those of the author and not necessarily endorsed by **AIN.**

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Porsche and Boeing signed a memorandum of understanding to jointly explore the premium UAM market including "the extension of urban traffic into airspace."

Porsche/Boeing team on urban air mobility

Sports car maker Porsche and aerospace giant Boeing are teaming on urban air mobility (UAM). The companies signed a memorandum of understanding to jointly explore the premium UAM market including "the extension of urban traffic into airspace," they announced on October 10. The companies also said they are already developing a fully electric eVTOL concept vehicle and will create a joint team "to address various aspects of urban air mobility, including analysis of the market potential for premium vehicles and possible use cases." A 2018 Porsche Consulting study predicts that the UAM market will gain momentum after 2025.

"This collaboration builds on our efforts to develop a safe and efficient new mobility ecosystem and provides an opportunity to investigate the development of a premium urban air mobility vehicle with a leading automotive brand," said Steve Nordlund, vice president and general manager of Boeing Next, the company's organization that is currently dedicated to the UAM market. "Porsche and Boeing together bring precision engineering, style, and innovation to accelerate urban air mobility worldwide."

"Porsche is looking to enhance its scope as a sports car manufacturer by becoming a leading brand for premium mobility. In the longer term, this could mean moving into the third dimension of travel," said Detlev von Platen, member of the executive board for sales and marketing at Porsche. **M.H.**

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New Business Turboprops 2019

by Mark Huber

Wither the new turboprop market, or the pause that refreshes? Historically, new business turboprop sales remain relatively steady while jet sales gyrate up or down. So far, this year is a little different. While new business jet deliveries have climbed more than 12 percent for the first six months of 2019, turboprop deliveries dropped 11.2 percent for 1H 2019 compared to the year-ago period, according to data from the General Aviation Manufacturers Association (GAMA). It is notable that a big chunk of jet sale gains were models that challenge traditional turboprop territory, such as the Cirrus SF50 single-engine jet or the revised HondaJet Elite light twin.

Amid the decline in turboprop deliveries, certain turboprop models are faring even worse. Piper delivered just 14 turboprop singles in this year's first half compared with 23 in the year-ago period, while Textron Aviation pushed almost 50 percent fewer King Air 350s—its top turboprop model—out the door compared to the same period last year. Meanwhile, the used turboprop market is essentially flat from the year-ago period, with just a three-aircraft gain to available inventory and days on market inching up by two, to a little more than 10 months. Residual values for popular models, such as the Pilatus PC-12, remain strong.

Long-term, the market's confidence in turboprops appears unshaken. Textron Aviation is proceeding apace with development of two new models, the Denali single and the SkyCourier twin. Epic Aircraft plans to bring its long-awaited E1000 certified single to market by year-end. Daher, maker of the TBM series of turboprop singles, purchased fellow turboprop airframer Quest Aircraft over the summer. And one of the largest twin-turboprop fleet operators, membership service provider Wheels Up, attracted $128 million in new investor financing in August, pushing that company's valuation to more than $1.1 billion.

There also is no shortage of takers for turboprop modification and upgrade programs—from engines and propellers to avionics. Blackhawk Modifications, a provider of turboprop engine upgrades, announced a major facilities expansion earlier this year as well as FAA STC approval for its $1.8 million King Air 300 re-engine program. And there are plenty of avionics upgrade programs for legacy turboprops. Earlier this year, Stevens Aviation completed the first installation of a BendixKing AeroVue integrated flight deck on one of the most ubiquitous King Air models—the B200. Numerous other avionics upgrades from manufacturers including Garmin, Collins, and Honeywell are available for a wide variety of turboprop models.

Development of new engine and flight-control technology for turboprops also appears unfazed. GE Aviation continues development of its new high-efficiency Catalyst turboprop engine, while single-lever power control, first offered as an aftermarket option, is slowly moving to become the new cockpit standard in the category, now offered in the Nextant G90XT King Air remanufacture, on new Daher TBM940 singles, and in development for several other new-production models.

These new technologies will add efficiencies, ease of operation, and increased safety margins in aircraft and undoubtedly increase their market appeal.

TWINS

TEXTRON AVIATION CESSNA 408 SKYCOURIER

Price: $5.5 million
Range: 900 nm

Textron Aviation's new unpressurized Cessna turboprop twin can be configured for up to 19 passengers or all-cargo operations. The aircraft was unveiled in late 2017, and Textron has visions of the high wing, all-aluminum aircraft becoming its highest volume twin turboprop. FedEx has already inked a 100-aircraft commitment (orders and options).

The SkyCourier features a pair of 1,100-shp Pratt & Whitney Canada PT6A-65SC engines, Garmin G1000 avionics, fixed landing gear, and an 87-inch cargo door that can swallow LD3 shipping containers. Textron unveiled a full-size passenger cabin mockup of the aircraft last year. The no-frills cabin is almost a perfect 70-inch square with a rubberized floor, small overhead bins, and a netted rear cabin area for passenger luggage. The aircraft can climb to 25,000 feet with supplemental pilot/passenger oxygen and has a relatively slow top speed of 200 knots.

A prototype aircraft could fly later this year and Textron expects FAA certification in 2020.

NAL SARAS

Price: $10 million (estimated)
Range: 1,200 nm (8 passengers)

The seemingly unending saga of this Indian aircraft's tortured development continues. The latest iteration of the NAL Saras twin-engine turboprop pusher took to the skies for the first time on Jan. 24, 2018. In the ensuing year it flew 10 hours, including at this year's Aero India show.

PT1N aka "Saras Mk 2" features a larger rudder, redesigned engine nacelle, new flight controls and brakes, composite components to cut weight, uprated engines, and more modern avionics. Given the upgraded systems and assumed improved performance, NAL now projects a demand for the aircraft, now nearing its fourth decade of development, for between 120 and 160 over the next 10 years and anticipates having the aircraft ready to enter serial production by 2022. However, so far, the only customer to materialize is the Indian air force which has committed to taking 15.

The program has been refinanced with another $60 million but has been subject to fits and starts since the second prototype had a fatal crash in 2009.

PT DIRGANTARA INDONESIA (PTDI) N219

Price: $6 million
Range: 480 nm (19 passengers)

A 19-seat twin-engine STOL turboprop developed from the CASA 212, the aircraft first flew in 2017. Two prototypes are currently in flight test. The N219 has a cruise speed of 190 knots, a stall speed of 59 knots, and features a large rear cargo door for multi-mission operations. It uses the Garmin G1000 glass panel avionics system and is powered by two 850-shp Pratt & Whitney PT6A-42 engines driving Hartzell four-blade propellers.

Through August, PTDI claimed 257 orders for the aircraft—more than 150 from export customers—and said that assembly of the first four production aircraft was underway. The company hopes for Indonesian certification in 2020 and for customer deliveries to begin in 2021. PTDI said it intends to ramp production up to 36 aircraft per year and is exploring an amphibious variant. It is in the process of raising more than $100 million to fund a full-production facility.

DORNIER SEAWINGS SEASTAR CD2

Price: $7.21 million
Range: 900 nm

The German-Chinese joint venture developing the aircraft announced last year that it had raised an additional $166 million to finance the rebirth of this all-composite, push-pull, twin-engine amphibian. The funds will be used to complete the revised Seastar's certification and build a second production line in China. Seawings also unveiled a parapublic variant of the aircraft called the "Orca" designed for maritime patrol, search and rescue, and medevac missions. Seawings said the first Orca will be ready for customers in 2022.

The first new-generation civil variant of the Seastar was rolled out in August 2017. It features an all-digital cockpit with Honeywell Primus Epic 2.0 avionics and four 10-inch LCD displays with advanced vision,

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communication, navigation, surveillance, and air traffic management systems. The aircraft is certified for single-pilot IFR. Other new items include a stern hydro thruster for improved water maneuvering, new corrosion-resistant landing gear with nosewheel steering, a revised 12-passenger cabin layout with air conditioning, and new propellers. First flight is scheduled for this year.

The Seastar made its first flight in 1984 and was initially certified in 1991; however, the effort to put the aircraft into serial production subsequently failed due to chronic undercapitalization. In 2014, Dornier partnered with two state-owned Chinese companies (Wuxi Industrial Development Group and the Wuxi Communications Industry Group) to bring the aircraft to market, announcing plans to assemble the amphibian in Germany and China. Last year Dornier Seawings China began construction of a purpose-built aircraft assembly plant in Yixing. In 2017, Dornier Seawings announced an agreement with Canada's Diamond Aircraft Industries to have that company build Seastar airframes under contract.

The Seastar is powered by two in-line Pratt & Whitney Canada PT6A-135 engines, has a maximum cruise speed of 180 knots, a 900-nm range, a service ceiling of 15,000 feet, and a maximum demonstrated sea state of two feet. The Seastar was designed in the 1980s and was FAA certified under Part 23 in the early 1990s at a cost of almost $150 million. A decade ago, the company said it held letters of intent (LOI) for more than 25 Seastars.

DRA 328NEU

Price: Unknown
Range: 1,100 nm (estimated)

In 2015 Sierra Nevada Corporation acquired 328 Support Services Group (SSG) and the type certificates to the Dornier 328. Since then, the company has been exploring ways to put the 30-seat commuter and executive twin turboprop back into production. A plan to do so in partnership with the Turkish government collapsed in 2017.

In August 2019, 328 Support Services announced the formation of Germany-based DRA to manufacture an updated variant of the aircraft dubbed "328NEU" at Leipzig with $89 million in funding from Sierra Nevada and $7.2 million from the German state of Saxony.

"Germany's return to the design and building of a Part 25-category commercial aircraft is long overdue, and this new operation intends to create an aviation legacy founded on the heritage of an aircraft pioneer," said Dave Jackson, managing director of 328 SSG and DRA. The company said additional program announcements would be forthcoming next year, and that it plans to start customer deliveries in 2023.

The Dornier 328 was produced between 1991 and 2000 and sold 217 copies. It was powered by a pair of Pratt & Whitney Canada PW119B turboprop engines (2,180-hp each) and had a fully loaded range of 1,000 nm, a top cruise speed of 335 knots, and a service ceiling of 31,000 feet. It found favor with commuter airlines before being converted to charter and freight operations.

DESEAR ATL-100

Price: Unknown
Range: 864 nm

Brazil's Desaer (Desenvolvimento Aeronáutica) is working on developing a 19-seat (utility configuration) twin turboprop suitable for operations from unimproved runways. The ATL-100 will feature two 1,000-shp-class engines and a reconfigurable cabin suitable for military, commuter, cargo, or executive layouts. Specifications released to date include an mtow of 19,000 pounds, a maximum cruising speed of 232 knots, and a range of 864 nm.

EVEKTOR EV-55 OUTBACK

SHELVED
Price: $4 million
Range: 800 nm

The program was shelved in 2017 due to lack of funding and, for now, remains there. The first conforming prototype flew in April 2016. At one point, Evektor said it had orders for two dozen of the military/utility/cargo/combi/passenger aircraft, which seats between nine and 14 people.

The Outback features a quick-change cabin that can be reconfigured in 20 minutes. Power comes from a pair of P&WC PT6A-21s rated at 536 shp each. Maximum speed at 10,000 feet is 220 knots and maximum payload is 4,021 pounds. Service ceiling is 29,000 feet. The volume of the combined cargo/passenger area is 447 cu ft and the maximum cargo payload is 3,021 pounds. Evektor claims the Outback can take off from, and land on, runways of less than 1,700 feet at 6,500 feet msl.

Evektor had selected Esterline's CMC SmartDeck integrated digital avionics system as standard equipment.

TURBINE MALLARD G-73T

Price: $4 million
Passengers: 8-9 (executive)

Type certificate holder Frakes Aviation has formed Mallard Aircraft in Cleburne, Texas, with the goal of building new-production aircraft with new Pratt & Whitney Canada PT6 engines and Collins avionics. Fred Frakes converted eight piston-powered Grumman Mallards to PT6 power between 1970 and 1984 and later purchased the Mallard's TC. Mallard plans to offer several interior configurations, among them an executive floorplan with six single seats and a three-place divan, eight single seats in a utility configuration, and a 17-seat high-density layout.

Predicted numbers for the new Mallard: maximum takeoff weight (land or water) 14,000 pounds, up to 4,462 pounds of fuel, a useful load of 5,470 pounds, maximum payload of 2,350 pounds, typical cruise speed of 190 knots and a service ceiling of 24,500 feet.

MAHINDRA AIRVAN 18

SHELVED
Price: Unknown
Passengers: 12

Mahindra Aerospace has delayed plans to begin working on an updated version of the Government Aircraft Factories N24 Nomad twin, rebadged the Airvan 18. Mahindra is presently focused on bringing its recently certified Airvan 10 turboprop single to market. Plans for the Airvan 18 had included a modern glass cockpit and an 18-passenger layout with quick-change options for passenger, cargo, and combi ops.

The Airvan 18 was slated to be powered by a pair of upgraded 450-shp Rolls-Royce 250-series engines and new propellers that would allow it to retain its STOL capabilities, easily using runways shorter than 2,000 feet. Performance estimates include a maximum cruise speed of 173 knots and a range of 1,080 nm with 2,190 pounds of payload. Maximum useful load was projected at 4,405 pounds with an mtow of 9,400 pounds.

SINGLES

EPIC E1000

Price: $3.25 million
Range: 1,650 nm (full fuel with 1,100 pounds payload)

Epic Aircraft expects to begin customer deliveries of its $3.25 million E1000 turboprop single by year-end. The first of 87 customer aircraft on order is already on the assembly line at the company's 300,000-sq-ft factory in Bend, Oregon. Initial production will be one aircraft per month, with the goal to eventually accelerate to one aircraft per week.

The all-composite, six-seat aircraft has a top speed of 333 knots and a maximum range of 1,650 nm. Power comes from a Pratt & Whitney Canada PT6-67A engine (derated to 1,200 shp) and production aircraft will feature the three-screen Garmin G1000 NXi glass-panel avionics.

The sculpted cockpit and the cabin both take the latest automotive styling cues and offer all the modern conveniences, including USB ports for carry-on electronics. Entry is via a rear airstair door, up a center aisle through the facing club-four passenger seat array. The 15-foot-long cabin offers more space than a twin-engine King Air C90. The E1000 is expected to deliver fuel burns of 60 gallons per hour at cruise speeds of 300 knots down low, and 40 gallons per hour at 300 knots at 34,000 feet. Time to climb to maximum altitude is just 15 minutes. The E1000 is projected to need just 1,600 feet of runway for takeoff.

TEXTRON AVIATION CESSNA DENALI

Price: $4.8 million
Range: 1,600 nm (4 passengers)

Textron Aviation's Cessna Denali is a new-design, pressurized, single-engine turboprop that is single-pilot capable and can seat six to 10 passengers. The Denali's flat-floor cabin is 16 feet, 9 inches long—the same as the cabin in Cessna's durably selling but unpressurized and slower Grand Caravan EX turboprop utility single; the other cabin dimensions are nearly identical, too: 58 inches high and 63 inches wide for the Denali and 54 inches high and 64 inches wide for the Grand Caravan. Textron expects the Denali to have a range of 1,600 nm with four passengers, a maximum cruise speed of 285 knots, and a full-fuel payload of 1,100 pounds.

The aircraft features a 53-by-59-inch rear cargo door (slightly larger than the one on the Pilatus PC-12) and a digital pressurization system that maintains a 6,130-foot cabin to 31,000 feet. Options include an externally serviceable belted lavatory with pocket door enclosure in the aft of the cabin. The aircraft is powered by the new GE Catalyst engine with full authority digital engine control (Fadec) and features Garmin G3000 avionics. GE estimates that the engine could be 15 to 20 percent more efficient than comparable models. And its manufacture employs 3D printing, which cuts its weight, improves reliability, and reduces production costs. The initial engine time-between-overhaul interval will be 4,000 hours. The aircraft likely will be ready for deliveries in 2021.

PRIVATEER INDUSTRIES PRIVATEER

Price: $1.5 million
Range, 1,000 nm

The aircraft made its first flight on Aug. 6, 2018. In the first two months of test flying it accumulated more than 40 hours in the air. The test program suffered a setback in March 2019 during a crosswind hard landing that collapsed the starboard main landing gear.

The prototype for this futuristic-looking, single-engine, carbon-fiber seven-seat amphibian has a 714-shp Walter 601 spinning a ducted, pusher MT propeller.

Predicted performance numbers: 215-knot cruise speed, service ceiling of 25,000 feet, range of 1,000 nm fully loaded, water takeoff run of 1,300 feet over a 50-foot obstacle, and useful load of 2,000 pounds. Plans call for the airplane to be marketed as a kit first and then as a certified aircraft.

Starting price is estimated in the $1.5 million range. Privateer claims to have received order interest from prospective customers in Canada, Brazil, Great Britain, France, Indonesia, China, Chile, and the Dominican Republic. Privateer is looking for a joint-venture manufacturing partner capable of producing 2,000 aircraft.

DAHER TBM 940

Price: $4.13 million
Range: 1,730 nm

Earlier this year, Daher unveiled the TBM 940, an upgraded version of its Model 930 single-engine turboprop. New features include integrated Garmin autothrottle with single-lever power control, automatic deicing, and cabin improvements including redesigned passenger seats, more cabin insulation, a new storage shelf, and one additional 115-volt electric cabin and USB port. The 940 also features a temperature controller in the cabin and heated passenger seats.

ONE AVIATION KESTREL K-350

Price: $3 million
Range: 1,300 nm

This year's bankruptcy proceedings at One Aviation have cast significant and perhaps fatal shade on its Kestrel K-350 turboprop single project. One Aviation did go so far as to announce major suppliers for the Kestrel in 2016 including Garmin for its G3000 touchscreen avionics system and Honeywell for the TPE331-14GR engine, flat-rated to 1,000 shp and providing a 5,000-hour TBO.

The aircraft has a four- to five-seat executive interior on par with those of modern corporate jets, including high-gloss wood veneers, fine leathers, a wide aisle, and oversize oval cabin windows. It is just one of nine interiors Kestrel is developing, with passenger seating from five to nine people. The others will accommodate missions as diverse as medevac, cargo, and a high-density configuration for eight passengers.

The flight deck features sidestick controls, a low, contoured instrument panel with large flat-panel displays, and a wrap-around windshield.

Preliminary specifications: maximum cruise speed of at least 320 ktas; 1,300-nm range (pilot, five passengers, maximum cruise speed at 31,000 feet and NBAA IFR reserves with 100-nm alternate); 1,200 pounds of payload with full fuel (319 U.S. gallons usable); and 8,500 pounds mtow.

Kestrel has not released a price for the aircraft, but it is expected to be in the neighborhood of $3 million. ■

Airborne Electrics

The rush to aircraft electrification is on, with turboprops providing ideal initial platforms for several hybrid initiatives that use single turboprops or augmented ones to provide electric propulsion, cut fuel burns, and lower emissions. Various plans, including the 2015 Paris climate accord and the United Nations' Corsia, require airlines to keep emissions at current levels or purchase carbon offsets. These schemes will ultimately mandate cleaner aircraft with significantly reduced emissions. In addition, individual countries are adopting even stronger requirements than proposed multilateral standards.

A plethora of companies have initiatives aimed at converting both commercial and business turboprops to at least partial electric power. Engine-makers Rolls-Royce, GE, Honeywell, and United Technologies unit Pratt & Whitney are all testing hybrid-electric concepts. Earlier this year UTC unveiled a $50 million electrification lab called "The Grid" that is focusing on development of new electric power technologies for future electric and hybrid aircraft.

At this year's Paris Air Show, TBM turboprop maker Daher, Airbus, and French engine builder Safran announced a collaboration to build an electric demonstration aircraft called EcoPulse, which fashions a wing-mounted hybrid propulsion system onto a Daher TBM single-engine turboprop. Safran is developing the distributed propulsion, Airbus is charged with related battery technology and aerodynamic optimization, while Daher will handle systems integration, flight test, and regulatory compliance. As currently envisioned, the system will consist of a turbogenerator, small electric wing-mounted thrusters on the wing leading edge, and a power management system. The electric thrusters could be used for aircraft power on takeoff and landing to cut noise and emissions near the ground, while the fossil fuel turbine would produce cruise power. First flight is slated for 2022.

Also this summer, Ampaire announced plans to bring hybrid-electric power to models of existing turboprop aircraft, including the Cessna 208B Grand Caravan and Viking Twin Otter. Company CEO Kevin Noertker said his company's engine conversions could cut fuel consumption by between 70 and 90 percent, reduce maintenance expense by 20 to 50 percent, and produce significantly quieter aircraft. According to Noertker, the market for bringing hybrid electric power to commuter aircraft could be worth more than $4 billion.

And there are plans to scale hybrid-electric propulsion to larger turboprops as well. This year the newly formed United Technologies Advanced Projects (UTAP) division unveiled its initial hybrid-electric demonstration aircraft, which it said will yield 30 percent fuel savings on a typical one-hour mission. Dubbed "Project 804" (P804), the aircraft is expected to fly within three years. It is a reworked Bombardier Dash 8-100 twin turboprop, re-engined with a two megawatt-class propulsion system and an engine optimized for cruise efficiency augmented by a battery-powered electric motor that assists during the 20-minute takeoff and climb sequence. According to UTAP, the engine and electric motor will each generate one megawatt of power in parallel hybrid configuration.

The system uses off-the-shelf battery cells with a custom-designed packaging and battery management system. The battery, its power management system, and the power electronics will be installed in the aircraft cabin, while the hybrid-electric propulsion system will be mounted on a modified nacelle. UTAP attributes the fuel savings to new engine efficiencies and those derived from electric power and that the system is suitable both for retrofit on existing aircraft and clean-sheet designs. **M.H.**

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Farnborough Airport gets new owner in Macquarie

by Curt Epstein

Operated by TAG since 1997, Farnborough Airport has been sold to Macquarie Infrastructure and Real Assets, which is invested in 12 commercial airports across Europe and Australia, as well as owning U.S.-based FBO chain Atlantic Aviation.

Macquarie Infrastructure and Real Assets (MIRA), which also owns U.S.-based FBO group Atlantic Aviation, has purchased privately owned and operated dedicated business aviation hub TAG Farnborough Airport in the UK.

It's hard to overstate the importance of Farnborough. The London-area airport, which saw a record 30,729 aircraft movements last year, is home to 260,000 sq ft of climate-controlled hangar space, more than one million sq ft of ramp, a three-story 52,000-sq-ft terminal which has held the top score for non-North American FBOs on **AIN**'s annual FBO survey for more than a decade, and a hotel. Movements are expected to surpass 32,000 in 2019, which could push the annual passenger figures past 100,000 for the first time. With a maximum of 50,000 movements a year negotiated with the local governments, the airport's traffic still has considerable room to grown.

TAG won the right to operate the former military airfield, the birthplace of flight in the UK and site of the biennial Farnborough International Airshow, in 1997 and was granted a 99-year lease. In 2007, the company bought the leasehold entirely and has invested more than $150 million in the property.

"The significant investment that has occurred at Farnborough Airport over the past two decades under the previous shareholders has been transformative," said Brandon O'Reilly, who has served as CEO of TAG Farnborough Airport since 2006. "With a number of development projects already underway, we are excited to partner with Macquarie to further develop our offering to the business aviation market."

Last year Farnborough Airport became the first business aviation airport in the world to achieve carbon-neutral status after an assessment by Airports Council International—Europe. Since then, according to the airport, it "has continued to make further substantial reductions in carbon footprint, with a confirmed offset totaling 1,605 tonnes of carbon emissions for the last year."

Over the past five years, TAG Farnborough Airport said it has invested more than $1.25 million into energy-efficiency projects, such as an upgrade to LED lighting, and in 2018 it committed to 100 percent renewable energy supply through the UK energy regulator's Renewable Energy Guarantees of Origin scheme.

In May, on the eve of EBACE, the airport hosted "Fueling the Future" which marked the first time sustainable aviation fuel (SAF) was made available to business aviation in Europe. That same month, Gulfstream Aerospace kicked off construction on its new 225,000-sq-ft MRO facility at the airport. When completed in 2020, it will be the airframer's largest maintenance facility outside of its Savannah, Ga. headquarters.

"We are delighted to announce our investment in Farnborough Airport," added Leigh Harrison, head of MIRA for Europe, the Middle East, and Africa. "In addition to holding an important place in UK aviation history, the airport is known for its high-quality offering to customers." Terms of the transaction were not disclosed.

Earlier this year, TAG sold off its European MRO organization, including its facility at Farnborough, to Dassault Aviation. ■

IBAC urges ICAO, states to foster SAF use

by Kerry Lynch

The international business aviation community is calling on the International Civil Aviation Organization (ICAO) to support incentives for use of non-fossil fuel-based products and for states to increase use of sustainable aviation fuel (SAF). "This approach will be key to lowering our industry's dependency on fossil fuels, and reducing the CO_2 output from the industry, and its effect on climate change," the International Business Aviation Council (IBAC) said in a report submitted to ICAO on behalf of the Business Aviation SAF Coalition. The report was accepted by ICAO and included in the organization's 2019 Environmental Report.

The ICAO report takes a high-level look at where the aviation industry broadly is on sustainability efforts, forecasts for the future, and initiatives underway to improve the environmental footprint.

Business aviation operations represent 0.04 percent of global anthropogenic CO_2 emissions, IBAC said, but "nevertheless, our industry has demonstrated a serious commitment to the ongoing exploration of new methods and technologies to significantly reduce this figure." Business aviation leaders have pledged to work toward the goal of 2 percent improvement in fuel efficiency each year through 2020, carbon-neutral growth from 2020 onwards, and a 50 percent reduction in carbon emissions by 2050, compared with 2005 levels.

To achieve those goals business aviation needs to take a multi-faceted approach, including new technologies, operation efficiencies, improved infrastructure, market-based measures, and SAF.

SAF Potential and Challenges

IBAC called SAF "one of the most promising avenues" for achieving the goals, and that approach was codified by an agreement between business aviation leaders in 2018 to foster its use. The industry since has been conducting demonstrations to raise awareness of and is now pushing to encourage an increase in supply and demand.

Multiple paths exist toward the creation of SAF, which when blended with jet-A in a 50-50 mix, meets the same ASTM standard for current aviation fuel. "It is a simple 'drop-in' for aircraft, indistinguishable from the completely petroleum-based product," IBAC said, adding the mix results in a cleaner burn and reduction of overall CO_2 emissions.

IBAC stressed this is critical for the business aviation industry. "Our industry's commitment to SAF is not just about fuels, but also about... the business aviation license to operate."

On ICAO's part, the organization agrees that SAF can play a major role in reducing emissions and is encouraging states to take part in feasibility studies. Key to its success is availability, the organization said. Available data indicates that commercial production of SAF increased from an average of 0.29 million liters per year between 2013 and 2015 to 6.45 million liters per year between 2016 and 2018.

Research shows that up to 8 billion liters per year of production capacity that could be used toward SAF may be available by 2032. "However, there is significant uncertainty on the share of this capacity that will be directed to SAF compared to other fuels." ■

Changes to Russian regs threaten charter

by Vladimir Karnozov and Charles Alcock

Recent Russian government changes to rules governing the use of business aircraft are seriously disrupting charter flight availability and the ability of foreign operators to fly into and within the country. An amendment to the existing NR 527 regulations introduced in May appears to be intended to induce operators to register their aircraft in Russia. The regulatory changes and more aggressive enforcement of customs rules appear to be a concerted effort to force owners and operators to register their aircraft in Russia.

Today, the majority of business aircraft regularly operating within Russia are registered in other countries, due to high rates on customs duties on imported aircraft and the complexity of adding them to the national registry. Since there are very few Russian-made aircraft suitable for executive charter services, most aircraft are supplied by foreign manufacturers. Accordingly, the new restrictions have significantly limited the available supply of aircraft for charter.

A Western executive charter broker active in the Russian market, speaking with **AIN** on condition of anonymity, reported that customers now have a very limited choice of aircraft, with many of those legally available being unsuitable for trip requirements. "There is almost no choice at the moment and some operators have had to stop making charter flights in Russia," he commented.

When NR 527 was introduced on April 28, 2018, it did not have much impact on the private charter sector. However, amendment 652 appears to have shut down any latitude that operators previously had to provide charter services. The amendment was introduced on May 24, took effect on June 21, and is backed by supplement 14/19 of Russia's Aeronautical Information Publications (AIP).

The Russian United Business Aviation Association (RUBAA) immediately protested the new amendment to the Kremlin's deputy transportation minister Alexander Yurchik. The industry group proposed changes, but the minister appears not to have responded since, as of mid-October, the amendment was still in place, according to the Russian government's legislative website.

Relatively few bizjets are registered in Russia, among them older models like this Hawker 700.

VLADIMIR KARNOZOV

This Dassault Falcon 2000, managed by Estonia-based company Fort Aero, is a frequent visitor to Moscow's Vnukovo Airport.

'Non-objection' Approval Required

RUBAA, under the leadership of executive director Anna Serezhkina, is pushing authorities to abandon the amendment's controversial requirement for foreign aircraft operators to seek written "non-objection" approval from Russian competitors for any proposed one-off charter booking into, from, or within Russia. According to NR 527, all international charter flights in Russian airspace may only be conducted with approval from the Rosaviatsiya federal air transport agency. All foreign operators must fill in an application form (available via the Russian AIPs) and attach full details of aircraft registration, airworthiness certificates, insurance, crew members, and availability of slots confirmed by airport administrations.

At face value, NR 527 does not appear to impact private flights being made by aircraft owners in their own aircraft, although these flights do require an approval process that can take two or three hours. However, according to the aforementioned charter broker, the definition of a private flight in Russia can be obscured by complex aircraft ownership structures.

For would-be charter operations with aircraft having fewer than 20 passenger seats, foreign companies are now required to file their "non-objection" applications five days prior to the planned flight and send these to a defined list of the following eight Russian operators: Aviaservis, AviaTis, GazProm Avia, Jet Air Group, Meridian, RusJet, Sirius Aero, and Tulpar Air. The application must include full information covering the date of the flight, departure and destination airports (with any en-route stops), the aircraft type and registration, a full description of passengers and cargo to be carried, and all associated contact information (including the customers' nationalities and place of residence).

If none of the eight operators object within five days, Rosaviatsiya may accept the application. However, the agency reserves the right to subsequently block the flight with just three hours' notice ahead of the planned departure time.

According to Russian operators approached by **AIN**, there is now high demand for charter flights in the relatively small number of Russia-registered aircraft, since these are now the only types available on short notice and without significant paperwork having to be completed. About half of the 50 or so business aircraft carrying Russia's RA tail registrations are available for charter today.

Rosaviatsia officials have insisted that the non-objection notification process is currently used in many countries of the world, including such mature markets as France and Germany. However, they have acknowledged that the deadline for approval should be significantly shorter than five business days, as in the majority of the European Union states it usually takes only several hours.

New Customs Enforcement

Making the situation worse is what appears to be a new government initiative to enforce customs regulations covering aircraft imported into Russia. In March and September 2019, respectively, local operators Sphere Jet and Sirius Aero were charged with non-payment of import taxes. In the case of Sphere Jet, it did not pay just over $10 million in taxes due on a Bombardier Challenger 300, an Embraer Legacy 650, and a Gulfstream G150 and a G450. The company has ceased charter flights for now, but it is still running its FBO at Moscow's Domodedovo Airport.

Sirius is facing charges for non-payment of import taxes on four Embraer EMB 135s and 145s, four Hawker 750s, as well as two 850XPs and a 1000. For now, it is only able to operate its Bombardier Challenger 850 and a Russian-made Yakovlev Yak-42D jet.

Although the recent customs enforcement activities are not directly linked to the NR 527 issue, they have had the effect of further diminishing the fleet of business jets in Russia that are available for charter. This increases dependence on a limited stock of converted Soviet-era airliners. Russian manufacturer Superjet is offering its SJ-100 twinjet for VIP conversion but has yet to make available the additional fuel tanks needed to provide satisfactory range for this market.

"All this is causing a big turmoil in our sector, and this has been the case for several months now," the head of a Russian air taxi company told **AIN** on condition of anonymity.

The European Business Aviation Association (EBAA) has supported demands by RUBAA for Russian authorities to moderate or reverse the regulatory changes. It has warned of possible reciprocal action that would require Russian operators to seek non-objection approvals from hundreds of European operators.

However, the path to reform is far from straightforward, since Amendment 652 was personally signed by Russian Prime Minister Dmitry Medvedev and would require his personal intervention to reverse it. Rosaviatsiya has no authority to even simplify the process for the new requirements.

Russian business aviation executives have been reluctant to speak on the record about their objections to the new rules and enforcement activity for fear of attracting unwelcome attention from officials. But some have indicated to **AIN** that Amendment 652 may be a temporary, tactical measure on the part of the Kremlin to drive a wider campaign to force business jet owners to register their equipment in Russia.

Putin Pushes For Russian Registration

In an apparent carrot-and-stick move on September 30, Russian President Vladimir Putin signed a decree lifting a requirement for Russian individuals and companies to pay VAT tax on newly acquired aircraft and engines, as long as these go straight onto the Russian registry. Aircraft registered in Russia also benefit from lower airport and air navigation charges.

Russia has a number of FAR Part 145-certified centers qualified to do maintenance on foreign-made aircraft and to issue all necessary documents in both Russian and English. This, in theory, makes it easier for local operators to buy and sell Western-made business jets.

However, according to reports from within Russia, it is becoming hard to source spares and support services from Western suppliers who are nervous about the possible legal ramifications of sanctions legislation.

On some levels, Russian laws covering the placement of imported aircraft on the national register are straightforward and

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Leonardo TH-119 targets Navy training role

by Richard Ward

Thirty-two years ago I started my helicopter training at Redhill Aerodrome, Surrey, England, sponsored by the global oil industry giant Bristow Helicopters. I completed my commercial pilot's license course on the even-then venerable 1960s-vintage Westland-Bell 47 G4A. The "avionics suite" included an RMI with an ADF, a VOR OBS indicator, and a VHF radio. After 120 hours on the -47, the next step to IFR pilot came on the 9.6-tonne, 19-passenger AS332L Super Puma, a transition I remember well.

Unsurprisingly, in the past 30 years, things in the rotary training world have moved on considerably, and in front of me now, standing in the late summer sunshine on the north ramp outside Leonardo's Northeast Philadelphia Airport facility, is the Leonardo TH-119, a 21st century solution to training helicopter pilots from ab-initio to instrument pilot and beyond. Leonardo hopes to be successful in pitching this helicopter in the U.S. Navy's TH-73 competition (previously known as TH-XX) to replace the Bell 206-derived TH-57B/C Sea Rangers based at NAS Whiting Field in Florida. If so, the TH-119 will be training future USN helicopter pilots for perhaps the next 30 years.

Andrew Gappy is Leonardo's director of Navy, U.S. Marine Corps, and federal programs as well as Team TH-119 campaign manager. He's also a graduate of the USN facility at Whiting Field. In a thorough preflight and program briefing, he described how, since the cancellation of the proposed EFIS upgrade to the TH-57D Sea Ranger in 2012, Leonardo had been developing the TH-119 concept to meet the future USN requirement with a single aircraft offering. As Gappy and many of his team had cut their teeth on the TH-57, the enthusiasm and excitement to be a part of the program that could replace this aircraft was plain to see. Enzo Galli, director of engineering, was on hand to answer any technical queries during the brief and add further detail about the program. Peter Wagner, a Leonardo ground training instructor, led me through a systems brief and a comprehensive overview of the Genesys EFIS installed on the TH-119.

The Walkaround

The TH-119's dimensions from rotor tip to tail rotor, height of the vertical tail, and fuselage length are almost exactly the same as those of the Bell Long Ranger. The helicopter looks familiar as, apart from the smart orange and white USN training color scheme, there is little externally to differentiate it from the utility AW119Ke and Kx Koala from which it is derived.

Internally, however, is where the difference lies. With the Genesys AeroSystems IDU-680 EFIS displays and helicopter systems architecture inherited from the twin-engine AW109, Leonardo has been able to certify the single-engine machine for IFR, the first single to be so certified by the FAA in around 30 years. Dual air-data systems, including two ADAHRS and two pitot-static systems, ensure that in the event of a PFD failure, replacement attitude data will be automatically displayed without any crew action required. The dual hydraulic systems are almost identical, except that the number-two system does not boost the tail rotor servo. The redundancy ensures that any single failure does not require immediate action or disconnecting the stability augmentation systems, which would cause a dangerous distraction during IFR flight.

The one system on the TH-119 that required further modifications to meet IFR criteria was the electrical system. With the Pratt & Whitney Canada PT6B-37A turboshaft, electrical power came from a single starter-generator. But a previous customer for the AW119 Koala, who was carrying out geological survey work, requested a second generator. So an STC was already available to provide the needed electrical redundancy.

Patrick McKernan, an experienced AW119 instructor and chief of flight operations at Leonardo, demonstrated the TH-119 to me and delivered a military-standard "out brief," discussing the profile and route to be flown, the weather to be expected, each of our roles and responsibilities both in normal and emergency scenarios (if we lose the engine, whoever gets the collective down first, wins), and threats and errors to be encountered and mitigated.

McKernan took me through the preflight, which is relatively conventional with ready access available to all areas of the helicopter. Handholds and a step big enough for both feet make for a steady platform to inspect the main rotor hub, gearbox, and elastomeric bearings of the four main blades. They are of conventional, non-composite construction as is the majority of the airframe. That could be important in reducing airframe downtime as a training machine is going to suffer more than its fair share of tail stinger strikes during ab-initio maneuvers. The hydraulic system levels can be checked through two sight gauges beneath a panel on the starboard side of the aircraft easily visible from the ground. So is the auxiliary generator, which is belt driven and has a dedicated gauze-covered air intake and exhaust for cooling. As the auxiliary generator is permanently driven, one future modification that is in the pipeline is to upgrade this to a brushless generator to reduce wear during the long periods the aux generator is not required. The external power receptacle is on the right side of the forward fuselage, easily visible to the pilot-in-command, a fact that has positive safety implications for both the helicopter and the ground crew.

Walking around to the port side of the machine, I notice the tail rotor gearbox has a sight gauge easily visible at head height. The prominent tailboom stinger, beneath the lower vertical tail, can also

be readily inspected for signs of previous contact. To make this easier to note, tape has been applied to the bottom of the stinger. As this is an ab-initio trainer, a major part of the syllabus will involve engine-off landings to sliding touchdowns, often on hard runways. To cope with this, the skids are fitted with two-piece removable and replaceable skid shoes, the attachments of which can be inspected on the sides of the skids.

This side of the helicopter has a baggage bay door that provides enough space for any ground-handling equipment. Both main doors slide along external rails and lock and unlock easily. These are an improvement over the plug-door design found on other helicopters, as I find they tend to become difficult to open and close over time.

The Flight Deck

Before we climbed onto the flight deck, we took a quick look into the spacious cabin to see the observer's or third pilot's seat situated behind and between the two pilots' seats. This seat has its own intercom controls and can be moved forward to provide a good view of the controls and displays. There is considerable value for a student to sit behind the pilots and observe a lesson before swapping seats and handling the exercise for themselves, enhancing training value and perhaps even reducing required training times. There is currently a three-place bench seat behind the observer's seat situated against the rear bulkhead, but McKernan suggests this will be replaced by a slightly different configuration of two seats outboard on each cabin side on production variants of the TH-119.

With the sliding doors closed, we climbed onto the forward step fixed to the skids and entered the flight deck. The cockpit doors are of conventional "car style" with a sliding DV section. Unlike production aircraft, this machine, N824BM, has no air-conditioning. Air-con on a military training machine might seem like a luxury, but a student and instructor would learn and teach much more effectively and efficiently in a comfortable environment. The cockpit seats do enhance that environment with their high backs and headrests. The harness is a simple inertia-reel four-point arrangement, and while I took a few minutes setting up my GoPro and voice recorders, McKernan joined me in the right "command" seat.

I flew left-seat for the evaluation, as it had been several years since my last single-engine turbine flight. Also, my previous helicopter type, an AS355, had traditional "steam" gauges. The four-screen configuration and the USN specification that the visual references from the aircraft be the same from the left or right seat mean that there is little disadvantage to flying from either seat. The intended USN students who may fly the TH-119 will have already completed the all-digital, glass-cockpit equipped Beechcraft T-6 Texan II fixed-wing phase of their training before starting their rotary-wing course. So my own experience in glass cockpits from my fixed-wing time flying the Boeing 787 and my lack of recent experience in helicopters will in some way mirror this and provide a good baseline to assess the TH-119's future role.

McKernan had me read the checklist, an excellent way of allowing me to keep up with an unfamiliar type and at the same time take on board all the relevant checks and procedures. The PT6 can be controlled either electronically via the electronic engine control (EEC), mechanically via an Nr droop compensator (MEC), or manually using the twist grip throttle. The PFDs and MFDs begin their initialization processes once the battery switch is turned on, and any button press continues this process.

The rest of the checks are standard test items familiar to any digital cockpit turbine helicopter, addressing aural warnings; FCU and fire systems; fuel-valve and fuel-transfer pumps; and cycling the EEC/MEC engine control on the right side collective to test the EEC and the mechanical control systems.

The fuel system consists of two main tanks under the cabin floor and an upper tank behind the rear bench seats in the cabin. The upper tank gravity feeds into the right lower tank and the transfer pump moves fuel from the right to the left engine feed tank.

Getting in the Air

The engine start procedure is standard for a PT6. Having checked that the external power was providing the required 28 volts, McKernan pressed and released the start button, then checked the MFD to see the ENG START and IGNITER messages are displayed. Once the N1 reached 12 percent and the ITT was checked at below 100 degrees on the MFD strip gauge, he moved the throttle to idle. The start took 20 seconds to reach an N1 of 43 percent and the starter automatically dropped out. If the ITT approached the start limit of 1,090 degrees, you are allowed 10 seconds above 870 and two seconds above 980 before the throttle would close and the start is aborted. However, in this case, the ITT did not trouble any of the limits, peaking at around 650 degrees.

The four screens and identical visual cues mean there is little disadvantage to either seat.

Preflight inspection is simple thanks to handholds and steps big enough for both feet.

As the blades started rotating, counterclockwise from above, we checked the hydraulic pressure to ensure it was rising. Five seconds after N1 passed 51 percent, the ITT gauge on the MFD reconfigured automatically to display cruise limits. The N1 stabilized around the recommended 61 percent and we checked the gearbox oil pressure before disconnecting the external power, which illuminates a momentary BATTERY caption that disappeared as soon as the generator was selected "on." Subsequent check items include: inverters on, amps within limits, and the avionics master switch "on." The engine can now be brought up to flight idle using the twist-grip throttle. While there is no limitation, McKernan keeps the torque below 30 percent as the Nr accelerates to 102 percent. All items with redundancy are now checked such as hydraulic servos, fuel pumps, SAS, ADAHRS, and engine control. Then we can turn our attention to the Genesys EFIS.

My first impression of the six- by eight-inch screens was that they are adequately bright enough even on this clear sky, sunny day and the resolution is high enough that the displays are sharp and thus easy to read. The screens are divided into top and bottom, and for the start sequence, McKernan has the PFD show the primary flight instruments (PFI) on the top half and the map beneath. Meanwhile, his MFD showed the full ENGINE page, which displays Caution/Advisory/Status (CAS) messages in a block on the lower left. Time-critical warnings and cautions also appear on the PFD, while on the lower page, ITT/TRQ, and N2/NR are constantly displayed.

McKernan had already stored a simple route from KPNE and return routing via the Coyle VOR, to Ocean County, the nearest airport with an ILS, and then back to KPNE where the intention was to shoot an RNAV approach. This can be activated and viewed waypoint by waypoint via the FPL menu on the PFD, but routes can only be entered and modified via the MFD.

Before we contacted ground at Northeast Philadelphia, McKernan gave me my first introduction to inputting information on the Genesys. Using the radio page of the EFIS, I tuned the ATIS. The inputs and selections are controlled by eight hard keys down either side of the IDU bezels that coincide with soft selection options on the screen depending on the modes selected and four rotary "encoder" selectors along the bottom of the IDUs. The soft selection options are either ghosted triangles if no further

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menu levels are available or solid grey if selecting this option will produce further menu options. R1 key, in the top right of the bezel, will either display MENU or EXIT. If this button displays EXIT, it will always return the screen menu options to the top level. I quickly discovered that if an expected option could not be found, it was because I had not selected EXIT to return the menu to the top level after looking at a different screen. On the top-level menu, the L7 key will select RADIO. This opens an audio/radio menu box on the lower section of the PFD.

The standby VHF frequencies on COM1/2 are boxed, white for MHz and magenta for kHz. These correspond with the same color-coding under two encoder rotary switches on the bottom of the IDU, and the frequency can be altered. The R7 bezel key is labeled SWAP and changes the standby to the active. The EXIT button R1, should then be pressed to go back to the top-level PFD menu. I have to admit, I found this process very fiddly, especially for a helicopter, but like any new system, it would soon become second nature.

The weather showed a 10-knot breeze from the west, clear skies, and a temperature of 70 deg F. With McKernan and me onboard and 400 kg (882 pounds) of fuel, N824BM weighed in at 2,422 kg, 428 kg below the maximum takeoff weight. McKernan had done performance figures before walking out, and the HOGE (hover out of ground effect) at max-continuous power was 4,000 feet; 7,500 feet at take-off power.

With a VFR clearance to the southeast, McKernan lifted us into the hover using 60 percent torque, and we transitioned along Taxiway Juliet with a right turn. The takeoff profile of the TH-119 requires a five-foot transition to 30 knots, a 15 percent torque increase, and an accelerating climb to 60 knots to remain clear of the "avoid" curve on the height-velocity diagram. At 60 knots, McKernan handed me the controls, and we followed the Roncocas Creek out to the west. Immediately, the collective felt rather heavy and I was conscious of avoiding too-large power changes. The cyclic was slightly lighter, but with the force trim cancel button pushed on the left side of the handgrip, roll and pitch control were pleasant. With the SAS engaged and attitude-hold selected, the relatively heavy control forces prevented any tendency to over-control. Yaw control is light and will feel similar to any pilot familiar with the Jet Ranger or Sea Ranger.

I leveled off at 1,500 feet, setting the flight path marker on the PFD onto the horizon, and we accelerated to 120 knots. To sample high-speed cruise, I slowly added power toward maximum continuous torque of 100 percent, but we reached the ITT limit of 750 degrees at 93 percent torque, giving us an IAS of 150 knots, just below the Vne of 152. Although McKernan said he would sit at this speed all day on a long flight, as the ride was quite turbulent, I eased off on the torque to 65 percent and 120 knots where we were burning around 180 kg/hr of fuel. I tried some turns up to 60 degrees of bank and with FTR pressed and the helicopter handled well, but I needed to keep reminding myself to use my feet, needing more right yaw pedal than left.

Missed Approach

We selected VOR mode on the HSI on my lower map and I tracked towards the Coyle VOR while talking to McGuire AFB for traffic service. McKernan modified the route by selecting an ILS approach to Runway 6 at Ocean County, and we remained south of Lakehurst Airport on a left base for the localizer, allowing a good view of the Zeppelin hangars designed and built for the ill-fated Hindenburg, which crashed here in 1937. The northwesterly wind, now up to 26 knots as depicted on the PFD, initially blew me through the inbound course, so I made a left turn into the wind and corrected.

AIN's test flight of the TH-119 began at Leonardo's Northeast Philadelphia Airport facility. The U.S. Navy expects to make its trainer selection by year-end.

The flight path marker on the PFD is a useful tool, but with no heading markers on the horizon line of the PFD, it is not as surgical as it could be. The heading scale is located at the top of the PFD, which means that the scan from that, down to the localizer on the bottom, is a large one. However, a green track marker both on this scale and the HSI coupled with a green dashed line for track is very useful and once on course, it's easy to maintain the localizer. The glideslope display is on the right-hand side of the PFD, and I reduced power to follow it and maintained 90 knots.

The missed approach for the procedure is a climbing left turn back to the Coyle VOR, so we agreed we would arm the go-around mode (GA) and engage it at a minimum of 500 feet. On reaching this altitude, I pushed the GA button on the right of the cyclic and the mode display, situated on the top of the PFD, changed from armed (white) to engaged (green); we then coupled the autopilot. The helicopter pitched up and maintained the current selected heading, and I added power to climb away. On the control panel of the Sperry/Honeywell/Galileo SHZ-109A analog autopilot ahead of the right-side collective, there is no option to select a NAV mode that will track a GPS course. So the IDU menu has to be accessed to engage NHDG, which then captured the track back to the VOR. The displayed course turned from cyan to magenta, indicating this had occurred; as well as the green NHDG mode on the top of the PFD. The next active waypoint information is displayed on the bottom right of the PFD in magenta. I had been warned that the analog autopilot could be imprecise while maneuvering, and the heading oscillated slightly, needing a little manual input in yaw before it settled down on the course.

Things had all happened pretty quickly for me, so we left the autopilot coupled and set course, using the direct function on the PFD to fly to KABKE which is the IAF for the RNAV to KPNE. I took a few deep breaths. McKernan had selected the RNAV (GPS) approach for Northeast Philly and we leveled at 2,000 feet, the platform altitude. The PFD annunciated an LPV approach in green and the inbound course and deviation scale was displayed at the bottom. With the autopilot coupled, we flew the approach in IAS and NHDG modes, which enabled me to control the rate of descent by lowering and raising the collective and allowing the speed and track to be maintained by the autopilot.

As the active flight plan had altitudes pre-programmed, a green top-of-descent marker was shown on the MAP display. At this point, I lowered the collective to set up a 400-fpm descent rate and followed the glideslope indications on the right with Highway in the sky (HITS) boxes showing on the PFD to fly through. As before with three axes coupled, a little pedal assistance was required at these slower speeds to keep the slip/skid indicator centered, but overall, the workload was relatively low and I could monitor the approach well.

The automated minimums call came at 380 feet, and I disconnected the higher modes of the helipilot system. At 75 knots and around 75 feet, I flared, aiming for the touchdown zone markings, which appeared in the synthetic vision on the PFD as we crossed them. During the landing, the aft section of the skids contacted first and then we settled onto the ground. The TH-119 was doing a good job of getting me back into being a helo pilot. Visual circuits were next, onto Runway 33 at KPNE, and I was getting into the swing of things. On base, while turning and lowering the collective, I had to concentrate on the strange sensation of adding a significant amount of right pedal while turning left as I reduced torque, which is perhaps an indication that this is a powerful single-engine machine with up to 1,000 shp at my control.

After two patterns, McKernan offered to demonstrate an engine-off landing onto the hard runway, something I'd never seen before. After a couple of practice engine-offs in the hover and a gentle run-on landing to get his eye in, we climbed to 1,000 feet for the demo. Crossing the threshold of the runway, McKernan closed the throttle and dumped the collective. The NR dropped to 97 percent with a brief "rotor low" aural warning and then recovered. The minimum rate of descent speed was nailed on 1,800 fpm. As we passed 150 feet, McKernan pitched up to reduce the descent rate and leveled the skids, paused, and cushioned with the collective. We ran on at 15 knots, producing a ground slide of approximately 80 feet and a minimum NR of 67 percent.

I took control again to return to the ramp. On the way back, we tried some spot turns, sideways and backward, and the helicopter was nicely controllable with good visibility downwards through the chin windows. Even with the SAS disengaged, I was able to hover over a spot and set down. One nice EFIS feature to look at was the hover vector, which replaces the flight path marker on the PFD below a ground speed of 30 knots. It showed two concentric circles of 10- and 20-knot radius. To prove this, I lifted to a 50-foot hover and started moving backward. A vector extended from the center of the PFD downward, its length proportional to ground speed. As it touched the first circle, our groundspeed, read off the PFD, was 10 knots. This function would be especially useful during a very high hover where visual references are reduced, especially at night, say, during winch operations.

We had been airborne for 1.5 hours, so it was time to head back to the ramp. Indicative of the qualities of this machine and McKernan's stewardship was that I was able and confident to position between the main Leonardo hangar and a pre-production MH-139 on a convenient spot. If the U.S. Navy decides to go with the TH-119, the contract decision is expected towards the end of this year, I have no doubt this machine and its Genesys EFIS system is going to provide a great teaching platform for instructors currently flying the 50-year-old TH-57. And the pilots it produces will be ready for the transition to the most advanced combat aircraft the 21st century has to offer. ■

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UPS wins full Part 135 ticket for drone delivery | by Mark Huber

In late September, UPS Flight Forward received the first full FAA Standard Part 135 air carrier and operator certificate for commercial unmanned drone deliveries by a dedicated drone delivery company. The announcement was made October 1 in Washington by Transportation Secretary Elaine Chao. "This is a big step forward in safely integrating unmanned aircraft systems into our airspace, expanding access to healthcare in North Carolina, and building on the success of the national UAS Integration Pilot Program to maintain American leadership in unmanned aviation," said Chao.

With Part 135 approval in hand, UPS can fly an unlimited number of drones and can fly them at night.

Certificate in hand, UPS made the first revenue flight with it using a Matternet M2 quadcopter in September. UPS's certificate permits the company to fly an unlimited number of drones with an unlimited number of remote operators in command, enabling the company to scale demand, operate aircraft weighing more than 55 pounds, and fly at night.

UPS received the certificate via the FAA's Unmanned Aircraft Systems (UAS) Integration Pilot Program (IPP) and this allows UPS to operate multiple drones under a single certificate and conduct beyond visual line of sight (BVLOS) flights. UPS initially plans to use drones to deliver high-priority medical supplies on the WakeMed healthcare campus in Raleigh, North Carolina. UPS is partnering with the North Carolina Department of Transportation in the IPP.

UPS said the company will "initially expand its drone delivery service further to support hospital campuses around the country and to provide solutions for customers beyond those in the healthcare industry" and will "regularly fly drones beyond the operators' visual line of sight." "This is history in the making, and we aren't done yet," said David Abney, UPS chief executive officer.

"Our technology is opening doors for UPS and solving problems in unique ways for our customers. We will soon announce other steps to build out our infrastructure, expand services for healthcare customers, and put drones to new uses in the future." ■

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Distractions on deck: PEDs a double-edge sword

by Kerry Lynch

As portable electronic devices (PEDs) have become ubiquitous and a generation of new pilots is growing up on them, the aviation community faces a series of challenges in incorporating their use on the flight deck as a tool while preventing the possibility of distraction.

"There are numerous benefits for this technology," said Doug Carr, v-p of regulatory and international affairs for NBAA. "I think the real challenge is how to use it effectively in support of the operation in ways that don't distract from the priority at the moment; which is to fly."

AIN conducted an informal poll to gauge the use of PEDs on the flight deck and the policies of different operations. Of the respondents, 51 percent had firm written policies on their use, 30 percent said their organization had no policy, while the remaining 19 percent had only a verbal policy. The poll drew 147 responses from a cross-section of aviation. It covered the gamut of operations from small operations and Part 91 flight departments, to fractional, management, charter, and U.S. and European scheduled airlines. And the jobs ranged from Part 135 CEO and director of aviation to line and contract pilots.

While providing just a snapshot of the industry's approach to PEDs in the cockpit, the survey revealed a lack of standardization not only across aviation but even within different niches of the industry. A number of respondents from Part 91 operations said they had formal written policies regarding PED use, while a charter pilot in Los Angeles and a Boeing 777 pilot for a "major European airline" both claimed their operations had no written or verbal policy.

Equally varied is the view of how and when devices may (under company policy) and should be used. Numerous policies restrict use to just company furnished PEDs: phones and tablets. In fact, 86 percent of those responding said company policies permit use of company-provided tablets, while just 34 percent said personal tablets were permitted. A little more than half specified permission to use personal phones. And in 10 percent of the responses, companies permitted personal laptops.

The majority—82 percent—said they could use the PEDs while the aircraft was on the ground and 52 percent said they could use them at 10,000 feet and level at initial cruise altitude. However, 8.6 percent said company policy would permit use of devices while moving on the ground, 6.4 percent while on takeoff/climb-out, 9.7 percent on descent, 8.6 on approach, and 5.4 percent on landing.

As for how these devices are being used, not surprisingly the majority are for functions surrounding the flight: More than 92 percent said flight-data gathering activities (such as routing, weather, and traffic) were permitted; 97 percent said they could use devices for accessing charts and maps; 75 percent agreed aviation apps were permitted; and 39 percent approved of texting with flight support or maintenance personnel. Photo and video are other common areas where PED use is permitted with 18 percent of respondents specifying this option.

However, a small number of respondents noted personal uses were permitted as well, such as texting (29 percent), social media (8.6 percent), and gaming (5.4 percent).

Of the activities expressly prohibited, gaming was the top-cited at 76.2 percent, followed by social media at 75 percent and non-flight-related apps at 69 percent.

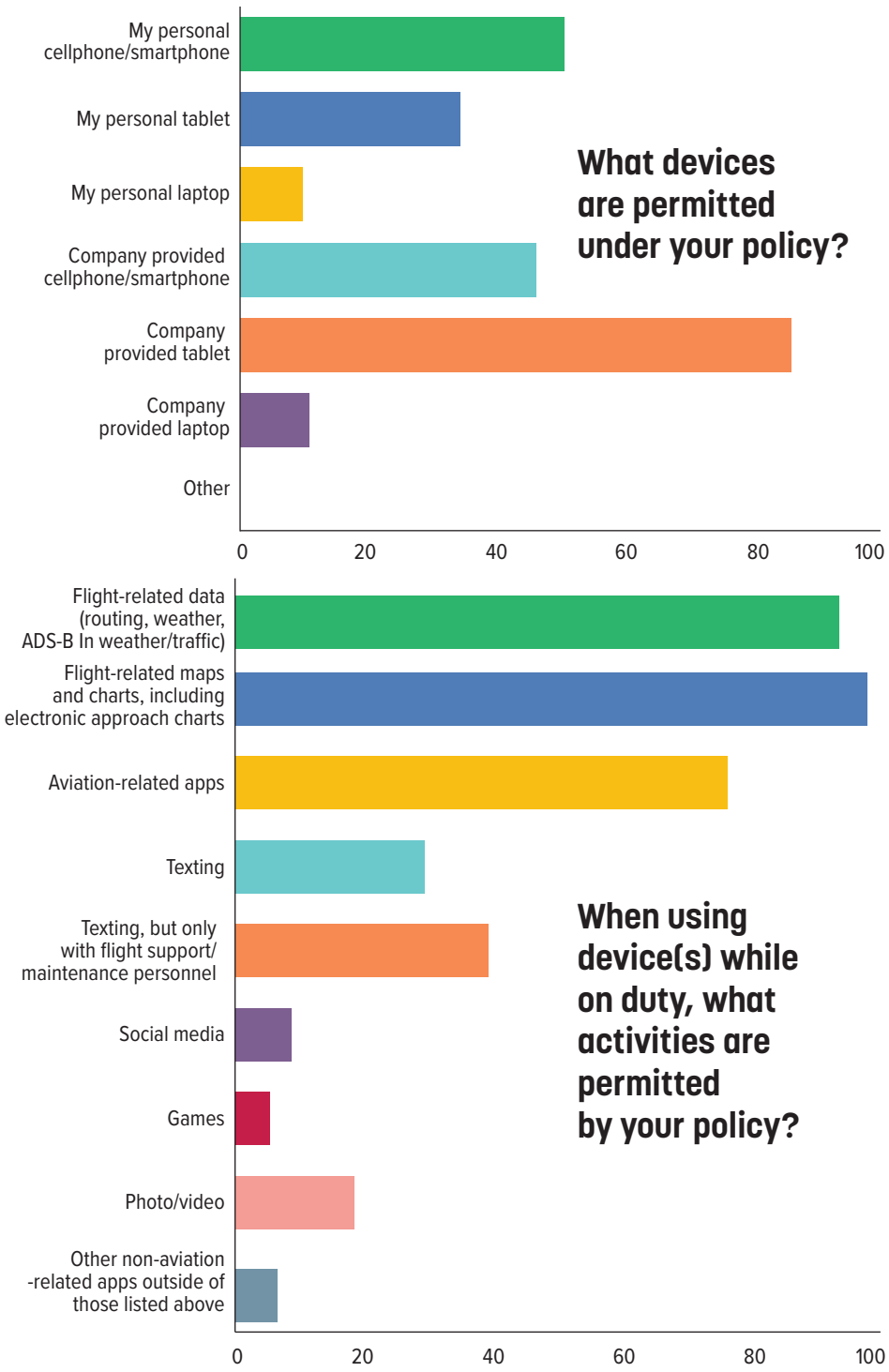
Attitudes toward Appropriate Use

Putting aside company policies, the respondents had varied opinions about what should actually be permitted. Ninety percent of respondents agreed that devices should be permitted to use on the ground while another 75 percent believe above 10,000 feet and level at initial cruise altitude is okay. Far fewer believe the same in other phases of flight: 23 percent on descent; 17 percent on approach; 14 percent while the aircraft is in motion on the ground; 13 percent during takeoff; and 11 percent while landing.

Almost all agreed that devices should be permitted for flight-data gathering (97 percent) and charts and maps (99 percent). However, 5.4 percent said devices should be permitted for social media, and 7.2 percent for gaming. As for texting, slightly less than half believe it should be permitted, even in cases involving maintenance personnel. On the use of the devices for video, 30 percent said this should be permitted in the flight deck.

As for regulations, the FAA does not recommend flight crews use PEDs for personal use at all on the flight deck, an agency spokeswoman said. "The exception is if the PED or laptop computer is directly related to the operation of the aircraft, or for emergency, safety-related, or employment-related communications," she said. The FAA does require authorization for using a PED as an electronic flight bag in Parts 91 Subpart K, 121, 125, or 135.

Part 135.100(b) prohibits "any activity during a critical phase of flight which could distract any flight crewmember from the performance of his or her duties..." In Part 135, said Air Charter Safety Foundation president Bryan Burns, most standard operating procedures require a sterile cockpit on all flight activity below 10,000 feet, and some adopt such policies on the ground. Once at cruise altitude, most SOPs allow access to certain electronic devices but limit such access to only company emails and texts.



Distraction or Tool?

Even with policies and regulations in place, the question remains; are PEDs a distraction? It's a difficult issue, Carr said, because so many of the devices are finding their way onto the flight deck for a number of reasons, chief among them the transition to paperless charts. At some airports, cellular communications are the only way to get a clearance, he further noted.

Also, aviation apps, charts, and maps provide critical and helpful information to the pilot, and there is an abundance from which to choose. Pilots responding to the **AIN** survey listed myriad apps and programs such as AeroWeather, Windy, Flightradar24, JeppView, Jeppesen Mobile FliteDeck, ForeFlight, APG iPreFlight, FltPlan Go, Air Navigation Pro, FlightBag, LogTen Pro, CAMP Flight Scheduling, ArincDirect FOS, and MyRadar, among many others.

Many of those responding to **AIN**'s survey reported distractions as a result of PED use in the flight deck. These reports came from those with written policies, verbal policies, and no policies. The majority of distractions involved missed radio calls and a few missed items on the checklist. One respondent reported that he or she "used [a PED] once during descent and missed a call on checklist. Never did it again."

The National Transportation Safety Board (NTSB) has listed "Eliminate Distractions" on its Most Wanted List of Transportation Safety Improvement for 2019-2020. "When pilots or other aviation safety-critical personnel introduce nonessential distractions, such as PEDs or personal conversations not related to work, into the cockpit or onto the tarmac, the risk to public safety increases exponentially," the agency said.

NBAA has held discussions with NTSB on the issue, Carr said, and looked at it within the association's safety committee. He's encouraged that many are aware of it and that awareness is "one of the reasons that the U.S. has such a great safety record." ■

North Carolina set to test UAS food delivery | by Charles Alcock

Flytrex, which has been conducting trial drone food deliveries in Iceland, is launching service in the North Carolina city of Holly Springs.

Drone technology company Flytrex is preparing to begin trial food deliveries in the town of Holly Springs, North Carolina, under the FAA's UAS Integration Pilot Program (IPP). The flights, using drones manufactured by China's DJI and adapted with software developed by Israel-based Flytrex, will operate on a single designated delivery route between the Holly Springs Towne Center shopping mall and the Ting Park sports and recreation area.

The aircraft will carry loads of up to just over six pounds on a flightpath that crosses over route 55 and largely over unpopulated areas. Under the IPP, it will operate under Part 107 rules and within line of sight of the remote pilot in command.

Flytrex is partnering with local commercial drone operator Causey Aviation Unmanned, having received FAA approval in mid-August. Kite Realty Trust, which owns the mall, is also a partner in the trial program, along with the North Carolina Department of Transportation.

In addition to software that allows operations to be integrated with retail apps used by participating restaurants, Flytrex also has developed a self-triggered parachute recovery system that was recently validated by Northeast UAS Airspace Integration Research under standards set by the FAA and the American Society for Testing and Materials.

Flytrex is already conducting drone delivery trials in Iceland. Operations with the drones it is currently using are limited to round trips of up to seven miles in dry weather and with wind speeds less than 18 mph.

According to Flytrex CEO and co-founder Yariv Bash, the company is hopeful that by the end of 2020 new FAA regulations will be in place to support an expansion of drone delivery services to any location in the U.S. He also indicated that by around the same time, suitable drones should be available that can carry a higher payload on 10-mile roundtrips and operate in wet conditions with higher winds.

Flytrex is now expanding its operation around the Icelandic capital Reykjavik from the six locations it has been serving. The company said that it needed only two days to train local delivery operators, since its system requires no joystick or virtual cockpit. According to Bash, each delivery operator can make up to 15 deliveries per hour. ■

Participants at Reno races show their need for speed

by Chris Pocock

ALL PHOTOS BY CHRIS POCOCK EXCEPT WHERE INDICATED

This Aero Vodochody L-39 Albatros is named "Drop Bear," a mammal unique to Australia. Pilot Lachie Onslow poses with suitably-disguised companion.

Billed as the fastest motorsport in the world, the Reno Air Races always attract a large crowd of spectators over five days. But entrants in the Unlimited class that prompts that description are dwindling. As a counterbalance, the jet class is growing, and racers exceed 400 mph, as they do in the sports class. The other four classes also boast good participation.

Private pilot Bill Smith Jr. has been attending Reno as a spectator for 50 years. He has seen the Unlimited Class grow and decline, as the cost of maintaining and insuring those sensual warbirds has soared. Over recent time, prize money has dwindled from more than $700,000 to less than $100,000, as large sponsors have pulled out, he said. Still, Smith also enjoys the Sports and Jet classes, and each year brings a reunion of old friends.

Another informed observer told **AIN** that it costs a yearly $250,000 to keep a warbird in top shape for Reno. "In the case of a P-51 Mustang, why spend that money when you could convert it to a two-seater, and sell it for $2 million?"

Robin Crandall owns a Hawker Sea Fury named "Sawbones," which is raced by Curt Brown. Crandall has been coming to Reno for 10 years, supported by various sponsors (12 this year) and an all-volunteer crew. During that time, the Wright R3350 engine that replaced the original Bristol Centaurus has been removed three times. Custom stainless steel exhaust stacks have been installed. A new propeller was installed this year. Crandall told **AIN** that the Sea Fury must be officially inspected each year, and insurance costs $17,000. Still, he owns a warbird that can reach 420 mph and is worth $1 million.

"Sawbones" would have been contending for top place in the gold final this year if the canopy had not blown off during practice. Brown was uninjured, and Crandall has a replacement back at his Minnesota base. The top dog for 2019 was Dennis Sanders in another Sea Fury, who clocked 403 mph round the eight-lap, near-63-mile circuit. There were 13 starters but only four finishers in this year's series of Unlimited races.

The Jet class was won by Pete Zaccagnino flying an Aero Vodochody L-29 Delphin that reached 495 mph. L-39 Albatroses from the Czech airframer dominate this class. One is flown by Lachie Onslow, an Australian who flies to Reno each year to compete in a borrowed jet. He first came here 11 years ago to fly in the Formula 1 class. In Australia, he is a helicopter pilot providing support to mining companies and even to fishermen who want to be airlifted into remote gorges to pursue their hobby. "Reno gets into your blood, and it's one big family here," he told **AIN**.

The Sport class attracts the largest number of entries—34 this year. One of them is veteran British pilot James Stringer. He is another Reno enthusiast who takes a long-haul flight to come each year. Stringer has a half-share in a U.S.-based RV Rocket 6 that he races here. At home in the UK, he owns a standard RV-6 that he built himself. The Sport class was won this year by Andrew Findlay flying a Lancair Super Legacy at 390.7 mph.

The next most numerous entry was for the Formula 1 class, won this year by Lowell Slatter flying "Fraed Naught" at an average 243 mph to beat 25 other contenders. There were 15 entrants for the T-6 class, won by Chris Rushing in an AT-6B at 235 mph. The final-day gold race for the Biplane class was canceled due to high winds. The silver race the day before was won by Alan Hoover in a Pitts S-1.

A new racing class next year will be the STOL Drag aircraft. They made a preliminary appearance this year, showing off their bizarre oversized wheels and shock-absorbing struts. They can land in just a few feet. Toby Roberts built his own Carbon Cub with the help of three friends in only 81 days. He told **AIN** that most owners are self-funded. He flies into fields with four-foot-high grass in the Alaskan outback, to shoot moose.

Unfortunately, the Polish-built PZL Wilga belonging to current STOL Drag world champion Mike Patey was destroyed on takeoff after the races. Patey, his wife, and another passenger were unhurt.

If spectators get tired of the racers, there is plenty more to interest them at this show. The U.S. armed forces bring combat aircraft, helicopters, and airlifters for static display. This year, the U.S. Air Force flew the Thunderbirds F-16 demo team. There was also a static display of immaculately restored vintage aircraft, competing for the National Aviation Heritage Invitational Award. This year's honors went to Chris Galloway and his 1931 Waco QCF.

Also on view were two Phenom business jets belonging to Embraer: a 100EV and a 300. Taylor Richards, a business development executive with Embraer, told **AIN** that the company sold a 300E at Reno last year. "We always get serious inquiries here and convert some of them into sales later," he said. ■

Chris Pocock would like to thank Nicole Latva and her media support staff for their outstanding assistance.

P-51 Mustangs have been the mainstay of the Unlimited class, but their number is dwindling.

FRANK MORMILLO

The Sea Fury "Dreadnought," flown by Dennis Sanders, rounds a pylon on its way to becoming this year's Unlimited class winner.

This Cessna 195 was one of 20 entrants for the National Aviation Heritage Invitational Award.

Robin Crandall poses with his Sea Fury "Sawbones," one of only 10 flying in the U.S. and 17 worldwide.

The Rocket 6 flown by UK-based pilot James Stringer taxis for takeoff and the Sport class race.

An L-29 Delphin jet trainer. L-29s and L-39s from Czech manufacturer Aero Vodochody dominate the Jet class.

This A-10 Thunderbolt (also known as the "Warthog") was one of many U.S. military aircraft that were available for inspection in the static park.

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China shows supersonic UAV, bombers, and SAMs

by Chen Chuanren

The People's Liberation Army (PLA) unveiled a host of new air, land, and sea weaponry at the military parade on October 1, which celebrated the 70th anniversary of the founding of the People's Republic of China. As the nation showed off its jet-powered unmanned systems, of particular interest was the WZ-8 supersonic unmanned aerial vehicle.

Revealed publicly for the first time, the delta-winged craft measures approximately 20 feet in span, and its most distinctive features are two bell-shaped exhausts of the kind related to a rocket propulsion system. The sleek design is absent of air intakes, but two pylon hooks suggest the possibility of an air-launched vehicle, likely carried by a Xian H-6K/N bomber. The UAV is intended for high-speed reconnaissance in high-threat and contested environments, before returning to base and landing on a retractable undercarriage.

Other systems on show included the Sharp Sword jet-powered unmanned combat aerial vehicle (UCAV), now designated as the GJ-11, as well as an unidentified jet UAV and a tactical UAV designed for electronic warfare and countermeasure purposes.

CHEN CHUANREN

Two examples of the WZ-8 supersonic UAV were shown at a military parade on October 1. Note the pylon hooks and rocket motor exhausts.

Another first at the parade was the Xian H-6N, an improved version of the H-6K that reportedly flew in December 2016. The bomb bay doors have been removed and replaced with a concave belly recess, which analysts believe could be used for the carriage of DF-21D ballistic missiles. The H-6N has also gained an inflight refueling probe, a first in the H-6 series. This is especially useful since the bomber would most likely be taking off with a lower fuel load when the heavy DF-21 is loaded up. The refueling capability, paired with cruise and ballistic missile armament, gives the H-6N the endurance to strike virtually anywhere in areas of interest in the Pacific region. The Harbin Z-20 utility helicopter, similar in appearance to the UH-60 Black Hawk, was also shown publicly for the first time at the parade, although examples were first noted with People's Liberation Army Air Force serials in November 2017.

On the ground, the PLA showcased its improved and networked air defense systems. The Chinese have modified and improved the HQ (Hongqi, Red Flag)-17, a local copy of the Russian 9M330 Tor. Redesignated as the HQ-17A, the new missile launch system is now equipped with solid-state track and fire control radars.

Also part of the "outfield air defense system" is the HQ-16B missile. First developed in 1999 and initially designed as a ship-launched system, the HQ-16B is now vertically launched from six tubes mounted on a 6x6 truck. It can achieve a range of 40 km at Mach 4. ■

Bell 360 Invictus pitched for Future Attack Recon competition

Bell took the wraps off its long-anticipated entry into the U.S. Army's Future Attack Reconnaissance Aircraft (FARA) Competitive Prototype program on October 2. The two-seat aircraft is called the model 360 Invictus and it relies on what Bell calls "proven technologies," including a main rotor system design based on the Bell 525 Relentless super-medium civil twin currently in advanced flight test.

The Bell 360 Invictus will deliver advanced battlefield situational awareness, as well as lethal options, in support of the maneuver force at an affordable cost, said Vince Tobin, executive vice president of Military Business at Bell. **M.H.**

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Russia advances UAV forces, sheds light on Syrian experiences

The Russian defense ministry is going to spend a billion roubles ($15.5 million) on procuring the Eleron-3 lightweight unmanned aerial vehicle (UAV) in 2019-2021, according to an announcement on the ministry's website early last month. The announcement follows a number of news and video releases in August-September that depicted experimental examples of the Altius-U and Forpost-R long-endurance reconnaissance UAVs undergoing flight trials. Also, the MoD released a video of the S-70 Okhotnik unmanned combat air vehicle (UCAV) in formation flight with a Sukhoi Su-57 fifth-generation fighter.

These releases reveal the considerable progress that Moscow has achieved in unmanned aerial technologies. Today, the Russian army possesses around 4,000 units, placing it among the world's three largest UAV operators; together with the U.S. armed forces and China's People's Liberation Army.

Since the Russian expeditionary force landed in Syria, its drones have performed over 23,000 flights lasting 140,000 hours. The largest drone that Russia flies in numbers over Syria has been the Forpost, a licensed copy of the IAI Searcher II, of which about 100 have been built since 2012. It provided a platform for development of the Forpost-R, which is set to enter service next year. The "R" version is completely "Russianized," with imported engines having been replaced by the indigenous 83-hp APD-85. This allows for an increase in gross weight from 436 kg (962 lb) to 500 kg, and endurance rises to 18 hours. According to an MoD statement, "The system has acquired new capabilities thanks to state-of-the-art technologies of local origin."

In the meantime, the Russian expeditionary force faces an ever-growing threat from Syrian rebel drones. According to the MoD, during the last 24 months, the air defense systems of the Khmeimeem and Tartus military bases have shot down 118 hostile UAVs, including 58 since Jan. 1, 2019. Additionally, the Pantsyr S1 and Tor-M2 short-range SAMs have fired 31 missiles to intercept 27 rockets launched at the bases from the Idlib de-escalation zone since January 1.

According to MoD spokesman General Igor Kanashenkov, "The drones assembled by the terrorists can cover up to 150 km [81 nm] and attain a maximum altitude of 4,000 meters [13,000 feet]. There is little doubt that the terrorists receive outside help to produce them. While these drones may look amateurish, they make use of very advanced technical solutions developed by skilled professionals. Their technical level has been growing." The Russian forces recently downed a rebel-operated UCAV equipped with a navigation system with three receiving antennas, he added.

VLADIMIR KARNOZOV

This display at the Army 2019 exhibition showcases the primary UAV types used by Russia in Syria, comprising the Eleron-3 (foreground), Orlan-10, and Forpost.

Earlier, another Russian official, deputy defense minister for military technical cooperation with foreign countries General Aleksandr Fomin, accused U.S. forces of assisting the Syrian rebels in carrying out drone attacks on the Khmeimeem airbase. Speaking at the Xiangshan security forum in Beijing last fall, he said that, "a group of 13 drones moved according to a common plan of combat deployment, under control of a single crew team. That time, a U.S. Navy P-8 Poseidon ASW aircraft was on an eight-hour patrol mission over the Mediterranean Sea. Upon reaching our electronic warfare shield, the drones retreated somewhat to receive correcting instructions and began using satellite communications channels to receive outside assistance to find and explore gaps in that shield." **V.K.**

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ROLLS ROYCE

SyberJet SJ30i takes flight with a new avionics suite

by Kerry Lynch and Mark Huber

SyberJet Aircraft's SJ30i light jet, which is fitted with the new SyberVision flight deck, recently completed its first flight, launching a certification test program that is expected to span 18 months, the company announced. The flight test campaign toward an amended type certificate (TC) kicked off at SyberJet's Engineering and Product Development Center at the San Antonio International Airport in Texas.

SyberJet anticipates delivery of the SJ30i to begin shortly after receipt of the amended TC.

Powered by Honeywell's Epic 2.0 avionics suite, the flight deck incorporates four 12-inch liquid crystal displays, SmartView synthetic vision system, INAV moving map display system, electronic charts/maps, TCAS II, TAWS Level A, synoptic displays, dual flight management systems (FMS) with WAAS GPS/LPV, single inertial navigation system, onboard weather radar, full EICAS, electronic checklists, DME, ADS-B Out, and 0.3 nm RNP, as well as support for FANS-1A, SmartLanding, SmartRunway, TOLD, ADS-B In, emergency descent mode, and RVSM operations.

Offered as options are CPDLC, SirusXM weather, flight data recorder, cockpit voice recorder, dual charts/maps, HF radio, satcom, enhanced vision system, and a second MFD.

"We completed all of the test points planned for the first flight and got a look at how much easier the cockpit and systems are to manage with the new Honeywell Epic 2.0 cockpit," said Mark Elwess, chief engineering test pilot. "The SJ30i, known as the fastest and longest ranged light jet on the market, now has a cockpit to lead us into the next generation." Joining Elwess in the test program is senior flight test engineer Robert Moehle

The SJ30i also incorporates a new interior. Both the interior and avionics are lighter, taking an estimated 200 pounds out of the airplane.

"First flight of the SJ30i is a significant milestone for the program," said SyberJet president Chuck Taylor. "Our research and development team and supplier partners have done a fantastic job of integrating the SyberVision cockpit into the proven SJ30 platform. SyberVision makes the fastest and longest-range light business jet in the world, the SJ30, even better."

A follow-on aircraft, the SJ30x, will feature uprated Williams International FJ44-3AP-25 engines with dual Fadec controls and is expected to provide a variety of performance benefits including higher cruise speed at altitude, faster climb, more payload, and better high and hot performance. It will also feature single-point refueling.

The SJ30 program began in the late 1980s and the SJ30-2 finally received FAA certification in 2005. Since then, the company has had several different corporate owners and only eight examples of the Mach 0.83, 2,500-nm, seven-seat jet have been produced. SyberJet's current owner, Metalcraft Technologies, bought the company out of bankruptcy in 2011. SyberJet plans to transfer manufacturing to its new facility at Cedar City (Utah) Regional Airport, with the first production aircraft planned to come off that line in 2020.

The aircraft holds three world records for speed and distance. It is designed with a 30-degree swept wing for high speed and efficient cruising and with leading-edge slats and flaps that are optimized for low-speed approaches. The SJ30 has a maximum altitude of 49,000 feet, maintains a sea-level cabin to 41,000 feet, and is approved for single-pilot operations.

At press time, SyberJet was planning to show the SJ30i flight-test aircraft at its static display during last month's NBAA-BACE. ■

SYBERJET

SyberJet flew the SJ30i with its new Honeywell Epic 2.0-based SyberVision flight deck on October 9. The airplane was scheduled to appear at last month's NBAA-BACE.

› continued from page 26

Russian charter

can be arranged through lease or management arrangements with a local operator, even for aircraft owned by foreigners. But one local operator explained to **AIN** that the full array of aviation and customs restrictions can still prove daunting overall, such as the headaches associated with adding a new pilot to an air operator certificate or removing former personnel from the records—processes that he said can take many months. "These small things spoil the whole picture. Should these [issues] be removed, many more owners would place their aircraft into Russian register," he claimed.

Is a Downturn Coming?

Some in the Russian business aviation community take the view that government officials may have initiated regulatory changes in a bid to protect the domestic industry from an anticipated downturn. The business climate in Russia is generally worsening and some local experts are predicting a decline in business aircraft activity in Russian airspace of as much as 30 to 40 percent over the next few years.

However, statistics provided to **AIN** by specialist data group WingX Advance show that during the first eight months of 2019, traffic levels in Russian airspace generally remained relatively stable. The overall year-to-date trend for Russia through the end of August 2019 was a decline in flights of 4.9 percent. However, August itself showed growth of around 4 percent and the figures for June and July may have been skewed by unfavorable comparison with the same months in 2018 when traffic was significantly boosted by the FIFA World Cup soccer tournament that Russia hosted.

One-third of the just-over 15,000 flights in Russian airspace in the first eight months of 2019 were entirely domestic, and this number increased by 173 to 5,286. Perhaps indicative of declining business fortunes and political tensions, flights to western Europe appeared to have declined across the board, with a 25 percent drop to the UK, 17 percent to France and between 9 and 11 percent to Germany, Switzerland, and Austria. Once popular destinations such as Nice on France's Côte d'Azur have seen 135 fewer flights so far this year, but so too has the Russian Black Sea resort of Sochi.

According to various market assessments, the overall Russian business jet fleet is estimated at 800 aircraft with a value of $3 billion. Of these, about 600 have Russian ownership but are registered in foreign jurisdictions. The remaining 200 jets are owned by foreign citizens and are registered in foreign jurisdictions. ■

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VLADIMIR KARNOZOV

Kosmos-Air recently took delivery of a refurbished Tupolev Tu-204 for corporate service.

Tu-204VIP operator Cosmos identifying unusual niches

by Vladimir Karnozov

Russia's "Cosmos Industrial Amalgamation" (also known as "Kosmos-Air") has taken delivery of its first Tupolev Tu-204-100 narrowbody (registration RA-64017) following the airplane's conversion into a customized corporate jet.

Today, Cosmos runs a fleet of a single Antonov An-12 freighter and three Tu-134s configured as corporate jets, as well as its facility with a passenger terminal and an MRO station located inside a common fence with the VIPPORT-run Vnukovo-3 business aviation center. Right now, Airport Consulting Vienna is performing a technical audit in preparation for major reconstruction of the existing airport infrastructure.

Red Wings, then an all-Tupolev airline, previously operated RA-64017 with the factory's 210-seat standard cabin. Red Wings recently replaced its Tupolevs with Airbus A321ceos. Speaking to journalists at the RUBAE 2019 show at Moscow-Vnukovo airport, Cosmos general director Vladimir Komynin said this acquisition is a first step in the implementation of a long-term development strategy that took a year to prepare, ultimately gaining approval from the company's owner, the Russian Space Agency ("Roscosmos").

An important part of the strategy is that Cosmos, along with its primary function of transporting cosmonauts and Roscosmos officials as well as technical and engineering staff from the industrial companies reporting to the agency, will also develop as a general aviation and charter provider to offer on-demand services. RA-64017 has been placed on Cosmos's air operator certificate with provision for these extended functions, Komynin said.

The new strategy calls for renewing the Cosmos fleet, adding more Tu-204- and Tu-214-series jets and developing a maintenance program, a task to be accomplished in the 2021-2023 time frame. The operator and Tu-204 manufacturer Aviastar-SP in Ulianovsk are in agreement on plans to renovate and convert additional aircraft that may soon go to Cosmos.

The next airplanes to join in are RA-64044 and RA-64045, which were delivered to the sister organization, the flight detachment of the "Yuri Gagarin Cosmonaut Training Center" based at Chkalovsky airport, east of Moscow, which is shared with the defense ministry.

Both are Tu-204-300s, a smaller 138-seat version in factory layout, previously operated by Vladivostok Avia. Following conversion into VIP jets at Aviastar-SP, these were delivered to the new operator earlier this year under agreement with lessor IFC, which owns the airplanes. Intended primarily to transport cosmonauts between training and medical centers in the European part of Russia to the Vostochny spaceports in Blagoveshensk and Baikonur in Kazakhstan, the Tu-204-300s can also fly nonstop with a Roscosmos team to the Kourou Space Centre in French Guiana, South America, from where Russian-made Soyuz launch vehicles have flown since 2011.

While continuing to operate out of Chkalovsky, the two jets will formally be wet-leased to Cosmos. Komynin further said that other Tu-204/214 owners are being approached with a proposal to place their aircraft in management with Cosmos. ■

Pulkovo-3 FBO suffers setbacks

The Pulkovo-3 Center for Business Aviation experienced a significant increase in traffic last year thanks to the FIFA 2018 World Cup, according to statistics released in September at the RUBAE 2019 business aviation show. Located inside the fence of the Pulkovo International, the only airport serving St. Petersburg, the center last year served 4,292 business aviation flights carrying 26,746 passengers. Of those, 6,558 were registered between June 14 and July 15, when the football matches took place.

Sergei Pugin, general director at JetPort SPb, the company that runs Pulkovo-3, told **AIN** the FBO still has enough room for further development and improvement without additional investments into the existing infrastructure. That includes a climate-controlled hangar complex with three sections, each measuring 26,910 sq ft (2,500 sq m), enough to house a single ACJ321 or five Challenger 605s. The ramp has capacity for approximately 30 business jets at a time. With the hangars taken into account, Pulkovo-3 can park up to 46 aircraft.

JetPort SPb does not provide exact figures for the earlier period, but some statistics are available from the Russian United Business Aviation Association (RUBAA). It said that in 2014 the traffic via Pulkovo-3 was 7,888 business jet movements (arrivals and departures); 7,191 in 2015; 7,598 in 2016; and "almost 8,000" in 2017. RUBAA did not yet have a figure for 2018. **V.K.**

Bizjet operators benefit as Kremlin re-ups on Tu-134

by Vladimir Karnozov

A handful of charter and corporate operators still fly Tupolev Tu-134 regional jets outfitted with VIP interiors. They will benefit from the Russian Air and Space Force's recent decision to keep the type's special-mission derivatives in service through to 2023. To be able to keep its aging jets intact, the military has talked the Kremlin into instructing local industry to provide repair and overhaul services on the type's vital systems until the model's retirement.

The last of 854 airframes in the production run came out in 1989. Of those, more than 30 remain in service worldwide, including about a dozen with civilian organizations. This year on May 21, Russia's Alrosa performed final scheduled service on the type in the country, leaving Air Koryo and Syrian Air as the only airlines in the world that still operate the Tu-134 on regular passenger routes. Meantime, Moscow-based air-taxi company Meridian—which operates an ACJ320, Gulfstream G450s, and Challenger 605s—continues to run a single Tu-134VIP (RA-65737). In addition, corporate airline Kosmos-Air (see above story) keeps three such jets, one of which was seen taking off from the Vnukovo airport as the RUBAE 2019 business aviation trade show was closing on September 13. A pair of Tu-134VIPs remain in service with the Kremlin's carrier Rossiya.

Explaining the reason behind keeping their Tu-134VIPs intact, Meridian general director Vladimir Lapinksy and Cosmos head Vladimir Kamynin said that these prove irreplaceable for charter services to remote destinations inside Russia and into neighboring countries in Asia. With their rough landing strips, Western jets cannot safely operate or are not allowed to by the local administration. At the same time, the old jet cannot compete with dedicated business jets on most of the frequently flown routes due to high fuel burn and noise levels. This prompted Moscow-based Sirius Aero, an air-taxi charter company and longstanding Tu-134VIP operator, to replace three such aircraft in 2018-2019 with the Challenger 601/850 series.

VLADIMIR KARNOZOV

Kosmos-Air's Tu-134UBL takes off at the close of RUBAE 2019.

In his turn, Sergei Popov, general director at Perm Motors, told **AIN** that although the manufacturer discontinued making the Soloviev D30 series III in 1992, this engine's gas-generator is in production for industrial applications, such as electric power generation and natural gas pumping. So, new parts are available for the powerplants on in-service Tu-134s. Besides, Perm Motors keeps a few used engines as replacements or as a source of discontinued parts. ■

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StandardAero, Thales partner to develop STCs for the TopMax wearable HUD

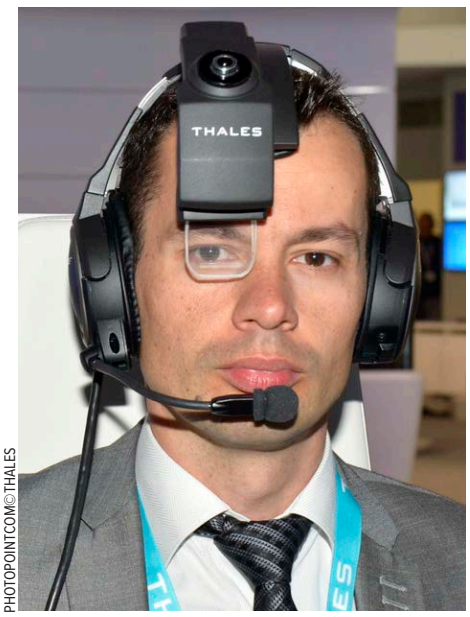
by Matt Thurber

Under a long-term partnership agreement, StandardAero will work with Thales to certify installations of the French avionics manufacturer's TopMax wearable head-up display (HUD) in business aircraft.

The agreement calls for StandardAero to use its organization designation authorization (ODA) capabilities to obtain supplemental type certificates (STCs) to install TopMax in business aircraft. Several STCs are underway, according to StandardAero, and installation downtime is minimal because the hardware is primarily worn by the pilot.

The TopMax HUD determines its location and where the pilot is looking by sensing the location of small reflective stickers mounted above the pilot. TopMax is equipped with an infrared sensor that can spot the location of the stickers and hence the precise orientation of the HUD.

The benefits of wearable HUDs are lower cost, shorter installation time, reduced weight, and nearly unlimited field-of-view because the pilot isn't forced to look straight ahead through a fixed combiner glass. The TopMax's combiner is worn by the pilot, who can look in any direction and virtually "see" symbology wherever he or she is looking. Wearable HUDs can be installed in many more aircraft types, including those that are too small for a traditional HUD.



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The Thales TopMax wearable head-up display will soon be available in a variety of business aircraft.

TopMax also offers full-color symbology and can display off-axis symbology such as crosswind, synthetic runway, extended navigational centerline, 3D traffic, 3D waypoints and trajectory, flight path director, and combined vision system, where enhanced and synthetic vision imagery is overlaid.

For aircraft operators, TopMax will enable manual eyes-out CAT II landing, ILS special authorization CAT I, low visibility for takeoff, and enhanced flight vision system capabilities, according to Thales. "The system will offer identical operational benefits for both takeoff and landing as current head-up displays, along with numerous other operational capabilities," said Michel Grenier, Thales head of avionics in North America.

Once the STCs are approved, StandardAero will offer TopMax installations at its facilities. ■

Avidyne enters FMS market with Atlas

Avidyne (Booth C6911) is moving further into the avionics market for larger aircraft with the introduction of a new flight management system (FMS) called Atlas. The new Dzus-mounted (console-mounted) multifunction FMS is aimed at turbine aircraft as well as helicopters and promises to add more life to airframes equipped with older avionics.

With a retail price starting at $44,999, the first Atlas STC is due next year. Atlas will interface directly with Collins Pro Line 21 and Honeywell Primus avionics by adding vertical guidance during approach operations. The direct interface is a benefit of Avidyne's GPS Legacy Avionics Support technology, according to Avidyne. "This unique integration capability enables EFISs certified before the availability of LPV approaches to have coupled approach guidance on these and other SBAS approaches."

Atlas comes with satellite-based augmentation system (SBAS) GPS, RNP and RNAV, LPV, LNAV, VNAV, LNAV-only, and approaches with vertical approach modes (APV). The FMS will meet TSO-C146c for full SBAS/LPV approach guidance, according to Avidyne.

A dual Avidyne Atlas FMS installation in a Hawker flight deck.

The Atlas pilot interface includes flight planning with one-touch departure, airway, and arrival navigation, GeoFill waypoint nomination, Qwerty keyboard, and touchscreen. The touchscreen doubles as a "hybrid" user interface, allowing control of the FMS functions as well as display of moving-map, SiriusXM Weather or ADS-B In weather, traffic from TCAS, TAS, or ADS-B In, and georeferenced Jeppesen approach plates and airport diagrams.

For installation approvals, Avidyne designed Atlas to interface with a variety of EFISs, PFDs, CDIs, HSIs, remote sensors, and autopilots as well as transponders, for which Atlas is also an approved ADS-B position source. Even in older aircraft with EFIS that was certified before the advent of LPV instrument approaches, the Atlas FMS can enable "coupled approach guidance on these and other SBAS approaches," according to Avidyne.

Other Atlas features make the FMS even more useful, such as Wi-Fi and Bluetooth, a USB charging port, integration with ForeFlight and other EFB apps, optional 16-Watt VHF Com, VOR, localizer, and glideslope radio, optional BendixKing radar display, and optional TAWS-B. **M.T.**

News Update

FAA Approves Flightstar Datacom STC for Learjet 40, 45

Flightstar has received FAA approval of an STC for data communications in the Bombardier Learjet 40 and 45. It allows the use of both controller-pilot datalink communications clearance delivery (CPDLC DCL) and aeronautical telecommunications network baseline 1 (ATN B1) CPDLC. Also available is an option to integrate FANS 1/A+ in ATN B1 CPDLC or CPDLC DCL configurations. The new STC requires a pre-existing Universal Avionics UNS-1Ew SBAS FMS, as well as integration of a Universal UniLink UL-801 communications management unit and a CVR-120 cockpit voice recorder, with or without a recorder independent power supply.

Flightstar currently is seeking similar STC approval from EASA.

Simple ADS-B Out TailBeacon STC'd

Two months after receiving its TSO approval, the uAvionix tailBeacon received FAA certification for the Cessna 172. The $1,999 tailBeacon replaces a typical tail-mounted white navigation light with a unit that fits in the same mounting holes as the light, making installation simple. Installation in other aircraft types can be accomplished under the FAA's ADS-B policy, which allows subsequent installations to be done using an FAA Form 337, as long as no airframe modifications are needed. The tailBeacon includes a rule-compliant uAvionix TruFyx GPS receiver and works with almost any transponder, including Mode S units, to provide 978UAT ADS-B Out capability. The new LED navlight in the tailBeacon is twice as bright as the light it replaces, according to uAvionix.

Iridium, OneWeb Sign MOU for Satcom Services

Iridium Communications and OneWeb are planning to offer a combined service for the new Iridium Certus L-band and OneWeb's upcoming Ku-band satcom services. According to the companies, the memorandum of understanding will "make it easier for their mutual partners to offer unique bundling and co-marketing opportunities" for the two low-Earth-orbit satcom networks. This includes fielding airborne terminals that have combined equipment or dual-constellation terminals. Both networks can complement each other, with OneWeb delivering high-speed broadband over Ku-band satellites while Iridium's global network offers weather-resilient L-band satcom that is suitable for airborne safety services. OneWeb's network is expected to reach global coverage in 2021 and has so far shown speeds up to 400 Mbps and low latency of 32 milliseconds. Iridium Certus is already running, and partners are starting to manufacture airborne equipment to take advantage of its higher-speed service.

UASC taps employee talent for new FMS pilot-interface

by Matt Thurber

During the development of a new flight management system (FMS) that lives solely as software in a Universal Avionics flight deck avionics system, the company's leaders realized that it also needed an equally innovative way for pilots to interface with the new FMS.

"We didn't want to develop a traditional touch CDU [control-display unit] like our competitors," said Dror Yahav, CEO of Universal Avionics Systems Corporation (UASC). "We wanted something different, innovative, that would significantly change the way pilots use FMS."

There was an obstacle to developing a new interface, however, something that is typical at large companies: important decisions are made by top executives and sometimes these decisions are based on faulty ideas about the best way to solve a problem, with little or no input from employees who have a deep understanding of the product. What if these employees' ideas could drive a new solution? "There are many things you can do if you leverage the know-how in the company," Yahav explained.

The result of this thinking was the Universal Grand Challenge, which was launched with the goal of allowing engineers and other employees to get creative and speed up development of a new interface for the new ClearVision i-FMS.

The challenge was to fill in a missing piece in the i-FMS interface. UASC engineers had built in the ability to control parts of the FMS using the SkyLens head-wearable display, which is like a head-up display, but easier to install and with a nearly unlimited field of view. Pilots can already select waypoints and do other simple FMS-related actions by eyeballing the waypoint in the SkyLens display then clicking on the waypoint; this is an augmented reality-type of approach. But there are other FMS activities, day-to-day functions that need more interaction, such as tuning radios, commanding mode changes, setting up approaches, etc., and this was the interface problem that the Universal Grand Challenge was designed to solve.

The challenge was available at six different company sites, four in the U.S. and two international, and was launched on May 1. There were two phases to the challenge. In the first, employees had to set up development groups and come up with ideas. In the second phase, UASC leaders selected two of the groups' solutions to fund, and they were then given five weeks to do rapid prototyping and then present a working solution to attendees and others at a UASC customer conference held in the first week of July. The best solution would be selected as the winner and would go into production.

Interdisciplinary Effort

The ground rules required that each team contain not only engineers but also business development or sales experts. The groups had to select a leader, who could not be a manager. "We wanted to see who is becoming our next-gen leaders," Yahav explained. "We decided to exclude all levels of management from this process. This worked very well. If we had a manager on the teams, then automatically everybody would have deferred to him."

More than 140 employees registered for the Grand Challenge, forming 14 groups of 10 people each. The initial proposals were all done online—only three weeks were available for this phase—and these were judged by a committee of UASC managers, which included Yahav, but none of whom were involved in any of the groups. The committee selected the top two proposals, and the groups were each given $1,000 to fund their prototypes and five weeks to make them work in time for the user conference. "They worked day and night, they were so excited," he said.

> **"We didn't want to develop a traditional touch CDU [control-display unit] like our competitors... We wanted something different, innovative, that would significantly change the way pilots use FMS."**
>
> – Dror Yahav, CEO of Universal Avionics Systems Corporation (UASC)

At the conference, everyone who tried the prototypes was asked to fill out a form and share their impressions of the interface, and this was a big part of selecting the winner. The winning group was at NBAA-BACE explaining how their solution works.

The solution that won the Grand Challenge uses voice recognition, but it does this in a unique fashion by incorporating artificial intelligence. "The reason is because we find that this device can serve pilots with different accents," said Yahav. "Sometimes typical voice recognition can't recognize [speech], especially foreigners [speaking English]. We enabled a machine-learning capability that every pilot can train in five to ten minutes." He further explained that a "personality module" in the system learns as the pilot flies and uses the system, continuously improving the recognition rate.

There is another aspect to the winning solution that makes it work even better, by eliminating the need for the pilot to look at a CDU to see what they have selected, whether by voice, finger, or other means. So the UASC team adapted short-wave radar technology to map movements, allowing the pilot to use gestures. The gesture-recognition element, built into a flight deck display, can see the pilot with enough fidelity to allow the pilot to tap out a new frequency on an invisible keyboard or tune a frequency by turning an invisible knob or select the next waypoint. To help the system know when the pilot is about to gesture, the pilot will need to warn by voice that "I'm about to tell you something." No matter what or how the pilot chooses some avionics change, he or she will still need to confirm the change.

"We found this group's solution very creative," Yahav said. "This whole interface is intuitive and easy to operate."

Of course, the Grand Challenge proved beneficial for more than the winning team. For those that didn't win, he said, "We provided a detailed explanation of why they were not selected. Maybe the time to market was too much. Or it was too costly and we can't sell it at the right price range. They worked very hard, and we need to respect them. Providing feedback is a show of respect."

While the idea for the Universal Grand Challenge was Yahav's—and derived from the DARPA Grand Challenge for autonomous vehicles—he knew early on that managers needed to step back and turn UASC's smart employees loose to explore new ideas. "We as managers need to be humble and not the smartest people in the room," he said. "We needed to find a way to get their brains and engagement, to be a better company. The Grand Challenge was the implementation of that concept."

For a relatively small investment of money, the company came out way ahead. "We gained a lot from this exercise," Yahav said. "Regardless of who wins, we all won. We came up with ideas that we can incorporate in other product lines. And we learned to know each other better. It was very encouraging for the whole company."

Another positive result was the identification of future leaders, while also helping them meet their customers and new colleagues at the user conference. "Typically, they don't get exposure to such customers," he said. "We threw them into the water and they did very well. I enjoyed a lot to look at those young people start to gain confidence and experience. They are very authentic, young, excited, and engaged."

Yahav is excited about new opportunities for UASC and its parent company Elbit. "This crowdsourcing or way of working together, we can see it in young companies, in the internet. We don't see [that] in aerospace, which is more traditional and sometimes stuck in its ways. Bringing that spirit to aerospace is going to be great. We can be young and fresh and bring ideas."

UASC is on the cusp of interesting new developments. "I think it's underestimating us by saying it's a new company," Yahav said. Universal specializes in manufacturing displays and FMSs, but now it is developing a new software-based FMS, head-mounted displays with new enhanced vision systems and interactive controls, and the Grand Challenge-inspired interface.

"A year and a half ago none of this existed," he said. "There is a lot of excitement about what we're going to do and where we're going. A lot of this takes time, but we have a good feeling, we're going in the right direction, we're more competitive, and we can take more risks." ■

Raul Batista (top left), a senior systems engineer at Universal Avionics, participates in the Grand Challenge competition to design a new pilot-FMS interface technology. At left, Universal's ClearVision EFVS with SkyLens wearable HUD.

Leonardo delivers its 1,000th AW139

by Ian Sheppard

Italy's Guardia di Finanza recently took delivery of the 1,000th copy of the AW139.

Leonardo Helicopters delivered the 1,000th example of its AW139 to Italian law enforcement agency Guardia di Finanza on September 20 at an event at its Vergiate, Italy production plant near Milan. Powered by two Pratt & Whitney Canada PT6 turboshaft engines and co-produced in Vergiate and Philadelphia, the AW139 is now in operation with 280 operators in 70 countries and has attracted a total order book of more than 1,100 units.

"We're celebrating an extraordinary moment for the global helicopter industry," said Leonardo Helicopters managing director Gian Piero Cutillo. The AW139 "has really strengthened our identity in producing helicopters and has set new standards."

Leonardo CEO Alessandro Profumo told those gathered for the celebration, which included a display by an AW139 and an AW609 tiltrotor prototype, that it was "a huge milestone...the company had hoped [at launch] to sell 400 and now it's 1,000... in 15 years...and the order book is packed."

He committed to continue to develop the product to stay ahead of coming competition, looking forward to the 2,000th or even 3,000th AW139 delivery. "We now have 25 percent of the market for twin-engine helicopters," he said. "It is our duty to continue flying the flag for Italy."

Profumo also said military variants are now well under way. "Last year we won a tender for the U.S. Department of Defense for 84 AW139s," which will be designated as the MH139. He added that the first four examples would be delivered by the end of next year's first quarter.

Noting that it is unusual for any peacetime aircraft or helicopter to reach the 1,000 mark, Guardia di Finanza commandant general Giuseppe Zafarana said the Guardia placed its first AW139 order in 2010 and a further order in 2019, making a total of 22.

In a briefing on the program, Leonardo Helicopters senior v-p strategy and innovation Roberto Garavaglia said the first AW139 was unveiled at the 1999 Paris Air Show, initially as the AB139 while Bell was still involved. It made its first flight on February 3, 2001, leading to certification and first delivery in 2004 at a maximum takeoff weight of 6.4 tonnes (14,110 pounds)—increased later to 7 tonnes.

"So here we are after 20 years and three months later and these are just the first 1,000," reflected Garavaglia. In terms of applications, the offshore oil and gas market accounts for 33 percent; EMS/SAR, 17 percent; and government/law enforcement, 14 percent. ■

New Airbus H145D3 sets altitude milestone

Airbus Helicopters recently announced an altitude milestone for its new H145D3 and a prominent superyacht customer for the aircraft.

During high-altitude testing in Argentina, it touched skids on Aconcagua, the highest mountain in the Southern Hemisphere, at 22,840 feet, the first time a twin-engine helicopter landed at this altitude. The aircraft departed Mendoza, Argentina, flew 30 minutes to the foot of the Aconcagua, and climbed for 15 minutes to the summit of the mountain where the temperature was –7.6 deg F. The crew—test pilot Alexander Neuhaus and flight-test engineer Antoine van Gent—encountered gusts to 30 knots in low air density during the ascension.

The Argentine flight joins other Airbus Helicopters altitude records. In 2005, test pilot Didier Delsalle landed a single-engine H125 on Mount Everest.

Launched in 2019, the Airbus ACH145/H145D3 has a new, five-blade, bearingless and hingeless main rotor system and Fadec. To date, two flying H145D3 prototypes have accumulated 400 flight test hours and the aircraft remains on track for 2020 EASA certification. **M.H.**

Unmanned Camcopter completes SAR sea-based trials

Schiebel has concluded the shipboard trials of its unmanned S-100 Camcopter aboard the Norwegian Coast Guard icebreaker KV Svalbard. During the trials, the S-100 teamed with a Sikorsky Sea King helicopter to simulate man-overboard recovery operations.

The S-100 located the man-overboard dummy and transmitted positioning data and live images back to the Svalbard using a suite of equipment including the Overwatch Imaging PT-8 Oceanwatch wide-area maritime surveillance payload, the L3 Harris Wescam MX-10 real-time Electro-Optical/Infra-Red (EO/IR) camera, and Radionor's Maritime Broadband Radio (MBR) link. It was also able to be launched in conditions up to Sea State 5 with the Schiebel-designed harpoon system.


S-100 Camcopter

"The S-100 is the only VTOL UAS outside of the United States that is routinely flying from ships and, in addition, it is capable of carrying a multitude of payloads," said Schiebel Group chairman Hans Georg Schiebel.

According to Schiebel, the S-100 has a beyond visual line of sight (BVLOS) range of 108 nm, a service ceiling of 18,000 feet, and can stay aloft for up to 10 hours with a 75-pound payload. It runs on either avgas or JP-5 fuels and can operate in environments where GPS is not available. **M.H.**

News Update

Mil, Kamov Combine Forces

Russian Helicopters will form the "National Helicopter Center" (NHC) by combining the Mil and Kamov design bureaus while retaining the individual brands. The move is aimed at reducing infrastructure, back office, administrative, labor, certification, and flight test costs while fostering increased technical cooperation between the now two separate design bureaus. Russian Helicopters said the latter should lead to improved managerial and production efficiency, enhanced design quality, and more rapid product development. NHC will be stood up by mid-2020 with continued integration between Mil and Kamov to run into 2022.

Safran-AECC WZ16 Helo Engine Certified in China

Safran's WZ16 engine jointly developed with the Aero Engine Corporation of China (AECC) has received Chinese CAAC certification, the engine maker announced on October 10. It is the first jointly developed aero engine to be entirely certified by Chinese authorities. Also known as the Ardiden 3C, the WZ16 has been jointly developed and built by Safran Helicopter Engines, with Harbin Dongan Engine and Hunan Aerospace Propulsion Research Institute, both parts of the AECC consortium. The Ardiden 3C was certified by EASA in April 2018.

Leonardo Pledges New Support Center for Navy Helo Trainer

Leonardo will build a comprehensive customer support center for its TH-119 military turbine single in Northwest Florida if it is selected for the U.S. Navy's TH-73 helicopter training program, the company said. The Navy is expected to make a selection on a new training helicopter next year. Leonardo's proposed 100,000-sq-ft facility would support the estimated 130 helicopters the Navy requires and be built in partnership with the Santa Rosa County Economic Development Office as well as Space Florida in the 269-acre Whiting Aviation Park adjacent to the air station where all helicopter pilots for the Navy, Marine Corps, and Coast Guard are trained.

Safran Arrius Tops 10 Million Flight Hours

Safran's Arrius family of helicopter engines (450-750 shp) has flown 10 million flight hours since its introduction in 1996, with more than 3,800 units delivered to 430 customers, the company announced last month. First installed in the EC135, the latest Arrius 2B2Plus variant entered service on the Airbus H135 in 2014. In 2016, the Arrius 2R became operational on the single-engine Bell 505. That engine features dual-channel Fadec and is assembled at Safran's Grand Prairie Plant in Texas. More than 200 units are now in service. Another variant, the Arrius 2G1, powers the Russian Helicopters Ka-226T.

The Bell 525 is nearing the beginning of FAA flight testing as it moves toward certification.

Bell 525s on production line as flight testing continues

by Mark Huber

Bell's 525 "Relentless" super-medium-twin helicopter continues its march toward FAA certification, now likely sometime next year. Currently, four test ships are flying with a fifth slated to join the program soon. Overall, test aircraft have accumulated 1,300 flight hours through the middle of September. Approximately six production aircraft are already in work at Bell's Amarillo, Texas assembly facility.

Josh O'Neil, 525 program flight test manager, told **AIN** that load level survey testing was completed in the first half of this year. "We've completed nearly all of the development testing needed for certification and are beginning the transition to certification flight testing," he said. "We're looking toward the finish line and getting the FAA in here to fly the data with us and then beginning the report generation required for certification."

He said that there has been some confusion in the industry around the special certification conditions Bell has applied for that have shown up in public documents. He said the majority of those were related to Bell's fly-by-wire (FBW) system for the 525 and are merely a way to find common ground with regulators inherent with a "next-generation vehicle" when "[existing] regulation didn't foresee some of this [FBW] technology. I wouldn't characterize any of those as deviations or exceptions. It is all positive and we've gotten to common ground on a lot of [them]."

According to O'Neil, approximately 700 more flight test hours need to be logged before certification, with most of that flying to be done by the program's two newest aircraft—ships #14 and #15. Ship #15 is the first production-representative aircraft, fitted with an oil-and-gas interior. The helicopter was recently completed in Amarillo and will join the other test ships at Bell's Arlington, Texas flight-test facility in the coming days.

O'Neil said flight testing "has gone very well and yielded very little in the way of surprising results. In any program, you sometimes find things that aren't quite what you expected. In our case, we have been very fortunate that it has come in as predicted." He said the 525 is faster than originally predicted and likely will have a maximum cruise speed of 160 knots. The aircraft's fly-by-wire system is also "set," said O'Neil.

"The little bit of development we have ahead of us is really not related to technical issues. It's a little bit of tuning and that kind of thing," he added. "We are very confident in the product." O'Neil said customers who have flown the aircraft have given "very positive" feedback.

"We have entered a phase [in the program] where customer pilots have flown the aircraft and non-pilots have ridden in the aircraft," he said, adding that Bell recently hosted a customer delegation from the North Sea region. During that visit, customers had the opportunity to review 525 training materials, maintenance processes, and tour the production line in Amarillo.

He said these customers were "extremely delighted" with Bell's digital maintenance materials that use the same 3D engineering models to construct the aircraft. "You can click down in 3D and go from system to component to individual maintenance procedures with simple step-by-step instructions using the engineering data."

O'Neil also said that development of the 525's level-D full-motion simulator is well underway and that the target is to have it ready at aircraft certification. It will be located at the Bell Academy in Fort Worth, Texas. Other simulators will be placed globally as needed.

Digital Definition

O'Neil said Bell's decision to design the clean-sheet 525 in the "digital thread environment"—a process that connects traditionally siloed elements in a company to provide an integrated and real-time view throughout a program product's lifecycle—demonstrated its worth during this year's cold-weather testing in Yellowknife, NWT, Canada, where two test aircraft were routinely cold-soaked to -40 degrees F, but nevertheless performed well over the course of a 2.5-month campaign.

"Digital definition allowed us to take into account the different impacts of thermal stresses at the component level and throughout the aircraft's design in a design model that adds all interfaces and parts. It's not a cheap way to go, but the value proposition is to design all of that in before you make a part, put it together, and try and make it work." O'Neil said this year's cold weather test data will be used to pursue flight-into-known-icing (FIKI) certification for the aircraft, which he estimates will occur within "a few seasons" after primary certification is received.

He said digital definition also will allow Bell to produce mission-kitted aircraft more efficiently. "There is a significant amount of kitting that has been part of the design of the aircraft from the outset. Quite a few offshore and SAR kits are designed into the aircraft now and have been brought along with the aircraft. The wire routing and the provisions for all the relevant kits have already been designed and will be tested as part of certification. The ones that haven't will require pretty minimum changes in configuration and installation."

O'Neil said that fielding a military variant of the 525 "is being discussed" but for now will take a backburner as Bell concentrates on gaining certification for the civil design. (In October, Bell announced its entrant to the Pentagon's future attack reconnaissance aircraft competition—the model 360 "Invictus"—would have a main rotor system and FBW borrowed from the 525.) "We don't have a [military] demonstration aircraft in plan." However, he said discussion of a militarized 525 is "almost inevitable" due to its rugged airframe that meets all the latest amendments to FAA Part 29 certification requirements and its FBW flight controls.

The 525 has a projected mtow of 20,500 pounds, a maximum range of 580 nm (no reserve), and passenger seating for 16 to 19 (commuter/high-density). The aircraft is powered by two 1,800-shp GE CT7-2F1 engines driving an all-composite five-blade main rotor system and a four-blade tail rotor. GE Aviation received FAA type certification for the CT7-2F1 earlier this year.

Bell's 525 will incorporate a triple-redundant fly-by-wire flight control system with a BAE flight computer and the Garmin G5000H touchscreen-controlled glass panel integrated avionics suite with four main displays and Telligence voice-command capabilities. The company has not officially disclosed the number of orders or the price of the aircraft. The program's schedule has slipped in recent years following the fatal crash of its initial flight test aircraft in 2016 and a general deterioration of a major market segment for the aircraft—the offshore energy industry. ■

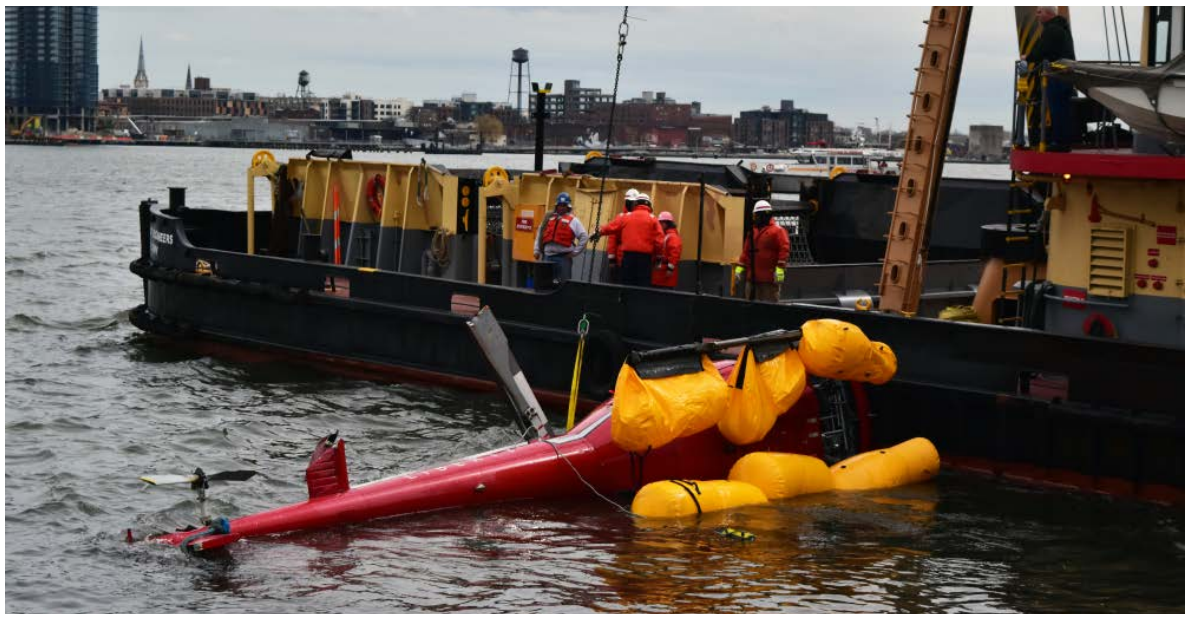
Kopter flight tests new MGB for SH09

The new main gearbox (MGB) Kopter Group has developed for its SH09 turbine-single helicopter is smoother, quieter, and will enable the exploration of a wider performance envelope for the helicopter, the company announced last month. The company said that the new MGB has already been flight tested on Prototype 3 (P3) in conjunction with different combinations of aerodynamic modifications aimed to improve the handling and performance.

Data from those tests will be used to finalize the design configuration of Pre-Series Aircraft 4 and 5 (PS4 & PS5), which will be used to conduct certification flights next year. P3 is currently undergoing a planned inspection and will resume flight tests in a few weeks. Earlier this year, Kopter said it remains on track to obtain EASA certification of the SH09 in 2020.

The SH09 is powered by a single 1,020-shp Honeywell HTS900 engine. Performance goals include maximum cruise speed of 140 knots and a maximum range of 430 nm. The retail price is expected to be close to $3.5 million.

In March, Kopter announced that it had assumed occupancy of the former Bell 505 facility in Lafayette, Louisiana, and that it expects to eventually build half of its total production there, with deliveries from that facility beginning in 2021. In February Kopter said it planned to begin building a new 215,000-sq-ft pre-assembly building at its Mollis, Switzerland headquarters later this year and that the facility there will be fully operational in 2021. **M.H.**



The pilot escaped when this FlyNYon AS350B2 crashed into the East River, but the passengers were unable to free themselves from their harnesses. Those harnesses will be one focus of discussion for the NTSB.

NTSB to hold hearing on doors-off crash

by Mark Huber

The NTSB will hold a public hearing on December 10 regarding the fatal doors-off helitour photo flight that crashed into New York's East River on March 11, 2018.

The NTSB's exhaustive accident document docket related to the crash paints a complex mosaic of an air charter provider under seasonal economic pressure, evidence of an inconsistent safety culture, malfunctioning emergency equipment, thin FAA oversight, flashes of mercurial and sometimes loose management, and an intoxicated front-seat passenger that all combined to create one of the most dramatic and high-profile U.S. helitour accidents in recent years.

The accident helicopter, N350LH, was a 2013 Airbus Helicopters AS350B2 owned by Meridian I Consulting and operated by Liberty Helicopters for FlyNYon. FlyNYon operated its own helicopters, but at the time relied on Liberty to provide supplemental lift under a year-long arrangement that began in September 2017. The accident helicopter was operating under the Part 91 section 119 aerial photography exemption, with five passengers and one pilot aboard when it crashed at approximately 7:08 p.m., 11 minutes after takeoff from the Helo Kearny (65NJ) heliport in Kearny, New Jersey. Moments after being cleared into Class B airspace at 2,000 feet, pilot Richard Vance, 33, radioed a mayday call and indicated an engine failure.

East River Impact

Amateur video showed Vance performing an autorotation into the East River in low light, glassy water conditions and making a slightly nose-high, hard landing. The impact point was just north of Roosevelt Island at 86th Street. The helicopter immediately rolled right with main blades churning into the water, where it rolled inverted. The water temperature at the time was estimated to be below 40 degrees F and the river current was five knots.

Vance emerged from the wreckage within 90 seconds and was taken aboard a passing tug. However, it took rescuers considerably longer to free the passengers—all in their 20s and 30s—described as "tightly harnessed" by New York's Fire Department (FDNY), and all were pronounced dead either at the scene or later at area hospitals. The passengers were identified as Daniel Thompson, 34; Tristan Hill, 29; Carla Vallejos-Blanco, 29; Brian McDaniel, 26; and Trevor Cadigan, 26.

A preliminary FAA report on the accident indicated that the right-side emergency tri-floats appear to have not been fully inflated at the time of impact. The emergency floats had previously failed to inflate during three separate hangar tests at Liberty, as well as during inspections at other operators, according to the NTSB. A post-crash examination of the floats showed damage to three of them and a kink in a pressurization hose. A Liberty mechanic said floats can be damaged as passengers repeatedly mistake them for steps. The cyclic-mounted float activation handle was also notoriously difficult to use, requiring some pilots to use both hands. Vance, in fact, injured his hand while pulling the handle on the accident flight.

Vance said that, after experiencing what he thought was engine failure, during the autorotation sequence he noticed that the emergency fuel shutoff lever was already in the off position and that a portion of the front seat passenger tether was underneath the lever. At that point, the pilot said he had insufficient altitude to effect an engine restart.

An NTSB analysis of GoPro camera footage taken aboard the accident helicopter shows that passenger Cadigan was seated on the front bench passenger seat in the (far-left) number-two passenger position and identified as PS-2 in NTSB documents. The number-one (middle) passenger position, next to the pilot, was unoccupied. Four passengers were seated on the rear bench. Video footage shows pilot Vance repeatedly either trying to block Cadigan, who leaned/reclined back across seat number-one with his head crossing the center pedestal while taking photos, or gesturing to him to refasten his factory-installed lap belt.

Initially, the tether tail from Cadigan's supplemental harness appeared loose but hanging in the area of the floor-mounted controls. Later in the flight, the tether tail appeared taut. According to the NTSB, "Contact with the floor-mounted controls was not visible, but the tautness of the tether tail led directly to that area." Immediately thereafter, video shows that "the pilot's left hand and arm motion were consistent with lowering the collective," a motion consistent with autorotation entry.

The coroner's report showed that Cadigan had a blood alcohol level of 0.18, more than twice the legal limit for operating a motor vehicle. Post-mortem blood drawn from other passengers showed either no alcohol or trace amounts. Preflight banter captured by the GoPro recorded a passenger talking about "liquid courage" and consuming "five bloody marys." Pilot Vance joked about drinking before flying, "They tell us we're not supposed to drink before we fly too, but I mean, come on." (Vance's post-crash toxicology was clean.)

A FlyNYon passenger on another flight who stood next to Cadigan in the terminal during check-in, aviation journalist Eric Adams, told the NTSB that Cadigan had a "very pronounced whiff of alcohol on his breath" that was very noticeable to him. According to Adams's NTSB interview, "everyone in the room knew [about the odor]" including FlyNYon staff. Adams also said Cadigan did not seem drunk, merely having a good time.

Liberty, which flies its own traditional doors-on helitours and is a charter provider for the Blade per-seat, on-demand service, has a formal policy of not boarding impaired passengers. FlyNYon's policy pre-crash was to deny boarding to obviously intoxicated passengers but to leave the assessment of compliant but impaired passengers up to the pilots.

Passenger Harnesses

The passenger harnesses used by FlyNYon on the accident flight had created concern and potential floor-control flight issues before, according to company pilots interviewed by the NTSB. Pilot Vance told investigators there had been previous events with harness tethers "inadvertent or otherwise" as well as with purses and cameras—and the passengers themselves—when they are on the cabin floor and get close to the controls. Liberty's director of training Brent Duca echoed this concern to investigators. He said the safety culture at FlyNYon "sucked."

"If it wasn't cool, if it didn't support the brand, if you weren't a team player, it didn't fly," he told the NTSB. "Guys [Liberty pilots] were chastised. You knew not to challenge NYon."

There were also concerns about passengers unbuckling from the standard factory seatbelts. According to the NTSB, minutes from a November 2017 pilots' meeting noted, "Vigilance about seatbelt: please be continually watchful regarding passengers removing their seatbelt during flights, either on purpose or accidentally. Winter clothing can be cumbersome and it's easy to bump the seatbelt off. Also note if passengers do not speak English and are having a hard time understanding instructions."

The standard FlyNYon harnesses were described as of the yellow off-the-shelf rock climbing/construction variety that attached to interior aircraft cabin hardpoints via a carabiner. In the event of emergency egress, passengers were instructed to cut the harness away via a sheathed knife on the harness. The standard-provided knives on the yellow harnesses cut through the tethers, "but not easily," one pilot reported. Scott Fabia, Liberty pilot and safety officer, told the NTSB that cutting through the yellow harnesses "took some work."

During his preflight passenger briefing on the fatal flight, pilot Vance intimated the difficulty to disengage from the harnesses, telling his passengers, "When we come back, do me a favor-umm ya know-don't worry about takin' any gear off yet ya know or trying to get untethered. Let me shut down. We'll get out and help you guys." In fact, Liberty pilots had taken over the chore of securing passenger harnesses due to lack of faith in FlyNYon's "customer experience representatives" to do the job properly. One of the last words recorded aboard the accident helicopter after it hit the water was from a back seat passenger. Referring to his harness, he asked, "How do I cut this [expletive]?"

Pilots began to voice concerns about the harnesses as early as October 2017, and FlyNYon had in fact ordered what

are now FAA-compliant blue harnesses that offered superior passenger comfort and were viewed as safer. However, the number of blue harnesses delivered was insufficient to support operations and the old-style yellow construction harnesses continued to be widely used on FlyNYon flights, including the accident flight. At the time of the accident, a FlyNYon customer experience representative said the company had 30 to 40 yellow harnesses and 15 blue harnesses but could only use five of them because they did not have cutters for the other ten.

During peak load times, FlyNYon reportedly had shortages of key passenger components. In February 2018, Liberty's training director complained in an email of a shortage of tethers, harnesses, carabiners, and headsets. "We need enough harnesses and equipment so we can have the six aircraft flying and the next six sets of pax ready to fly. We cannot be waiting for aircraft to land so we can scavenge parts off landing passengers so we can get the next group ready."

Doors-off Concerns

Liberty pilots had expressed concerns about operating FlyNYon doors-off flights from their inception. Liberty management opposed the flights and then reversed course in mid-2017. The reversal was said to be fueled by financial considerations: Liberty saw 50 percent of its tour flights from the Wall Street heliport slashed under a 2016 "voluntary" agreement between the New York City Economic Development Corporation and the Helicopter Tourism and Jobs Council. Helitourism had accounted for 75 percent of Liberty's flights over the last 20 years before the agreement. The deal eliminated nearly 30,000 New York City-originated helitour flights annually and all flights on Sundays effective January 2017 for all operators including Liberty. New York City officials had been pushing for a complete ban on helitour flights.

The deal prompted some helitour operators, including Liberty, to establish passenger terminals in New Jersey, but that still did not completely compensate for the loss of business triggered by the deal. The resulting revenue decline forced cost-cutting at Liberty including its withdrawal from the Tour Operators Program of Safety (TOPS), a voluntary helitour industry association that conducts safety audits and promulgates best practices among its members. Liberty executives told the NTSB that FlyNYon flights contributed only 7 to 8 percent of the company's total annual revenues in 2017 and was expected to generate a little over $1 million for the company in 2018; however, during the lean winter helitour months, they comprised a larger share of Liberty's bottom line. FlyNYon paid Liberty a flat rate of $1,200 per flight hour and flew 11,000 to 12,000 passengers in 2017.

John Simone, Liberty's former helicopter safety officer, told the NTSB that he thought doors-off flights "were ridiculous" and that doing them at night "added to the madness." Simone said veteran pilots did not want to do the flights because they understood the risks, and that often left flights to low-time pilots who did not. Pilot Fabia said he was concerned that wind from doors-off flights could blow passenger headsets into a tailrotor, that a cell phone could be inadvertently dropped from a helicopter, that passengers risked direct impact from bird strikes, or that a suicidal passenger could easily jump. Indeed, the NTSB discovered that a fire extinguisher had flown out of a FlyNYon flight in New York and a passenger's shoe fell from a flight in Miami.

When pilots complained about having to fly doors-off in cold weather they were told to "suck it up." Pilots also reported that the minimum allowable temperature for doors-off flights kept falling, beginning at 45 degrees F and ending at the time of the crash at 30 degrees F. Tour helicopter forward speeds varied typically from 60 to 100 knots. Pilot Vance described to investigators his clothing on the day of the crash: boots, Hanes socks, winter socks, boxer shorts, cold-weather compression pants, jeans, a long-sleeve thermal shirt, a hoodie, a nylon jacket with an inner and outer shell, and thin gloves (not ski gloves) that provided him with sufficient dexterity. Vance said the weight of his clothing impacted his decision not to attempt to rescue his trapped passengers by swimming into the submerged helicopter cabin. Other Liberty pilots expressed concerns about how the cold would impact their dexterity and ability to control the helicopter. Liberty did give pilots the option to alternate with other pilots and fly every other doors-off tour flight to rewarm when temperatures were sufficiently cold.

In the wake of the accident, the FAA banned some doors-off helicopter flights.

The CEO of FlyNYon, Patrick Kevin Day, a former line pilot who had once served as Liberty's marketing director, sometimes reacted to critical pilot feedback with profanity-laced email rants, which the NTSB included in the docket, some of which surfaced as early as April 2018 in the New York Times. By then some New York-based FlyNYon pilots had retained the Washington, D.C. law firm of Katz, Marshall, and Banks to represent them and provide whistleblower protection. Firm attorney Joseph Abboud told **AIN** at the time, "We are representing a group of pilots who have strong concerns about a lax safety culture at FlyNYon and who have provided information to the FAA and the New York State Attorney General's (AG) Office relating to their concerns."

In the emails, Day defended the old-style yellow harnesses, those employed on the crash flight, as safe and described Liberty pilots who had safety concerns about the doors-off flights as "dinosaurs," pointing out that FlyNYon's doors-off flights had grown by 400 percent "when operators in Vegas shrunk by 28 percent and operators in NY shrunk below the 50 percent line the government cut them." In his interview with the NTSB, Day persistently maintained that FlyNYon's operations were safe, but admitted that a formal risk assessment of the harnesses used by the company had not been performed. Day denied that the company boarded intoxicated passengers.

But the NTSB uncovered significant safety concerns with regard to implementation of widely accepted industry best practices at both Liberty and FlyNYon. Liberty's director of operations, Patrick Day, Sr., father of the FlyNYon CEO, told investigators that the company did not use a flight-risk assessment tool, calling it "a bureaucratic morass." Scott Fabia, a line pilot and Liberty's safety officer, said his responsibilities for the latter did not include anything "formally" and that he had no knowledge of any safety management system at the company. Meanwhile, Liberty's chief pilot, Paul Tramontana, told the NTSB that FlyNYon's safety culture was not comparable to Liberty's and characterized it as all over the place with nothing really defined.

NTSB interviews of local FAA officials also uncovered safety gaps stemming from the lack of regulation pertaining to the doors-off helitour industry before the crash. Specifically, the NTSB found that, while certain agency inspectors had "concerns" about what was going on at FlyNYon, the FAA did not scrutinize FlyNYon operations, largely because they were conducted under Part 91, as opposed to Part 135. While inspectors did "look at" the yellow, old-style FlyNYon harnesses, they avoided "any specific evaluation because there was no rule, policy, or guidance that would provide any inspector with what the standard should be during surveillance or inspection."

Eight days after the crash, the FAA banned doors-off flights that do not employ quick-release harnesses. The agency now requires operators of all doors-off flights for compensation to obtain an FAA letter of authorization (LOA) for the use of supplemental passenger restraint systems (SPRS). "The LOA will be issued after determining that the restraints to be used can be quickly released by a passenger with minimal difficulty and without impeding egress from the aircraft in an emergency," it noted. The FAA did not specify the type of restraint to be used but rather its characteristics, including that the "SPRS must not require the use of a knife to cut the restraint, the use of any other additional tool, or the assistance of any other person. An SPRS also must not require passenger training beyond what would be provided in a preflight briefing."

In the wake of the crash, Liberty CEO Drew Schaefer resigned. FlyNYon no longer uses Liberty for supplemental lift. Patrick Day, Sr. is no longer director of operations at Liberty. FlyNYon now uses only the newer, more robust blue harnesses on flights that are FAA-compliant.

In August 2019, FlyNYon came under fresh criticism for offering doors-off flights to customers and their pets. In the wake of this criticism, FlyNYon no longer allows pets on flights.

U.S. Senate majority leader Chuck Schumer (D-NY), criticized the pet flights and FlyNYon. "It is outrageous that despite the death of five innocent people in a dangerous doors-off chopper flight and two active federal investigations into lapsed safety that FlyNYon is still operating those same flights at desperate discounts. But now, it is a sheer jaw-drop to know that the same company is strapping in dogs for people to snap pictures of while the animals all but dangle high above New York skies." Schumer called on the FAA to tighten the Part 91 photo flight exemption and make it unavailable for airtourism flights. Leading industry trade groups, including the Helicopter Association International (HAI), have long opposed the practice.

FlyNYon and other operators continue to offer doors-off "tours." FlyNYon is currently offering 30-minute "shoe selfie" flights for $250 in New York using Bell LongRangers. ■

FLICKR CREATIVE COMMONS)

A Lion Air Boeing 737 Max 8 approaches Soekarno-Hatta International Airport in Tangerang, Indonesia.

Review panel faults FAA, Boeing in 737 Max review

by Gregory Polek

The FAA could not have properly assessed Boeing's proposed certification activities associated with the Boeing 737 Max's maneuvering characteristics augmentation system (MCAS) due to the agency's inadequate awareness of the system's function and its "limited involvement" in oversight, according to a panel of global authorities charged with examining the circumstances that might have contributed to the crashes of the model in Indonesia and Ethiopia. In a report issued on October 11, the Joint Authorities Technical Review (JATR) panel also cited "undue pressures" on members of Boeing's organization designation authorization (ODA) apparatus performing certification activities on the Max.

One of the panel's primary recommendations addresses both a lack of sufficient technical expertise and the pressure placed on ODA members. "JATR team members recommend that the FAA conduct a workforce review of the [Boeing Aviation Safety Oversight Office] engineer staffing level to ensure there is a sufficient number of experienced specialists to adequately perform certification and oversight duties, commensurate with the extent of work being performed by Boeing," said the report.

The panel also called for a work environment in which the ODA members could report concerns without fear of reprisal. "The FAA should review the Boeing Organization Designation Authorization (ODA) work environment and ODA manual to ensure the Boeing ODA engineering unit members (E-UMs) are working without any undue pressure when they are making decisions on behalf of the FAA," it said. "This review should include ensuring the E-UMs have open lines of communication to FAA certification engineers without fear of punitive action or process violation."

The JATR team also found that the MCAS hadn't undergone evaluation "as a complete and integrated function" in the certification documents submitted to the FAA. A lack of a "unified, top-down" development and evaluation of the system's function—along with "extensive and fragmented" documentation—made it difficult to assess compliance.

As for the MCAS itself, the panel cited Boeing's insufficient evaluation of the appropriateness of basing the design on data, architecture, and assumptions carried over from the 737NG.

Other recommendations relate to the need for a "harmonized" approach to certification of changed products between the FAA, the European Union Aviation Safety Agency (EASA), and other civil aviation authorities. The panel also called for the FAA to establish "appropriate" pilot recognition times and reaction times to emergency situations, assumptions which date back "decades," it said. "Analysis of aviation accidents demonstrates that pilots may take a significantly longer time to recognize a malfunction and respond to it than the test flight guidance suggests,"said the report.

In a written statement, FAA Administrator Steve Dickson acknowledged and thanked the JATR for its "unvarnished and independent review" of the certification of the 737 Max.

"As FAA Administrator, I will review every recommendation and take appropriate action," said Dickson.

For its part, Boeing offered similar sentiments. "Safety is a core value for everyone at Boeing and the safety of the flying public, our customers, and the crews aboard our airplanes is always our top priority," it said in a statement. "Boeing appreciates the work of the Joint Authorities Technical Review and thanks Chairman Hart and the participating civil aviation authorities for their leadership and dedication to global aviation safety." ■

Muilenburg out as Boeing chairman, remains president and chief executive

Boeing's board of directors has separated the roles of chairman and CEO, electing current independent lead director David Calhoun to replace Dennis Muilenburg as non-executive chairman and leaving Muilenburg in place as president and CEO, the company announced on October 11. The board said splitting the chairman and CEO roles would allow Muilenburg to concentrate all his efforts on running the company as it works to return the 737 Max to service, ensure full support to Boeing's customers, and implement changes to sharpen Boeing's focus on product and services safety. It added that the decision stems from a desire to strengthen the company's governance and safety management processes.

"The board has full confidence in Dennis as CEO and believes this division of labor will enable maximum focus on running the business with the board playing an active oversight role," said Calhoun, a Blackstone executive and former CEO of GE Aircraft Engines. "The board also plans in the near term to name a new director with deep safety experience and expertise to serve on the board and its newly established Aerospace Safety Committee."

The decision to segregate the chairman and CEO roles comes as Boeing faces ever-increasing scrutiny over the design of the 737 Max and its maneuvering characteristics augmentation system (MCAS). A panel of global aviation authorities on October 11—the same day Boeing announced its decision involving Muilenburg—issued a report critical of the FAA for its limited oversight of the MCAS design and Boeing for certain "pressures" exerted on employees involved in certification functions when making decisions on behalf of the FAA.

"I am fully supportive of the board's action," said Muilenburg in a statement. "Our entire team is laser-focused on returning the 737 Max safely to service and delivering on the full breadth of our company's commitments." **G.P.**

News Update

Airbus Starts Automated A320 Line in Hamburg

Airbus has inaugurated an automated fuselage assembly line for the A320 family of aircraft in Hamburg, the company announced on October 1. The new facility features 20 robots, a new logistics concept, automated positioning by laser measurement, and a digital data acquisition system.

For the initial section assembly, Airbus uses an automated system called Flextrack, which employs eight robots drilling and counter-sinking 1,100 to 2,400 holes per longitudinal joint. In the next production step, 12 robots combine the center and aft fuselage sections with the tail to form one major component, drilling, counter-sinking, sealing, and inserting 3,000 rivets per orbital joint.

Besides the use of robots, Airbus plans an initiative that includes separating logistics and production levels, demand-oriented material replenishment, and the use of autonomous guided vehicles.

Boeing Acts on Five-month Safety Review by Board

Boeing CEO Dennis Muilenburg on September 30 said he would immediately act on a series of recommendations that emerged from a five-month review of company policies and processes for airplane design and development by Boeing's board of directors. The review came in response to the pair of accidents involving the 737 Max jets that killed a total of 346 people.

In addition to the previously announced permanent aerospace safety committee within the board of directors, Muilenburg announced that Boeing will establish a new product and services safety organization to unify safety-related responsibilities now managed by teams across several Boeing business and operating units.

Vice president of product and services safety Beth Pasztor will lead the team and report jointly to the Boeing board of directors aerospace safety committee and Greg Hyslop, Boeing chief engineer and senior vice president of engineering, test and technology.

Air New Zealand Appoints Permanent CEO

Air New Zealand has appointed Greg Foran, president and chief executive of Walmart U.S, to serve as CEO on a permanent basis. Foran will begin his appointment in the first quarter of 2020, effectively replacing acting executive Jeff McDowall, who stepped into the role following the departure of longstanding Air New Zealand boss Christopher Luxon in late September. Luxon recently announced intentions to launch a political career with the country's National Party.

EC opens in-depth probe of Boeing-Embraer deal

by Cathy Buyck

Boeing has revised the timeline to close its proposed $4.75 billion acquisition of 80 percent of Embraer's commercial aircraft division after the European Union's anti-trust regulator informed the companies it would open an in-depth investigation into the deal. In a joint statement released on October 3, Boeing and Embraer said they now expect the transaction to close in early 2020 because the European Commission recently indicated it would open a second phase of an assessment in its review of the transaction.

The confirmation of the in-depth probe by the EU followed by one day the decision of the WTO to allow the U.S. to impose tariffs worth $7.5 billion annually on imports of products from the EU as a countermeasure for subsidies to Airbus. U.S. trade representative Robert Lighthizer said the U.S. would act on the authorization and begin applying tariffs on certain EU goods—including 10 percent on large civil aircraft—beginning October 18, in spite of calls by the EU to end the long-running dispute and reach a "fair and balanced solution" for the respective aircraft industries.

Boeing and Embraer announced the deal in July 2018 and the sides repeatedly said they expected the transaction to close by the end of the year. In September, Embraer Commercial Aircraft CEO John Slattery told **AIN** he recognized the large amount of work still needed to get the go-ahead from the regulatory bodies. "The competition authorities around the world are very diligent at their work," he said. "Each of the jurisdictions we have to go to—it's 10 in total—has a voluminous number of questions. But when you look at the empirical evidence, it's clear to everybody there's no competition between the E-Jet, for example, and the 737."

In their statement, Boeing and Embraer said they obtained "a number of regulatory approvals" including that of the U.S. Federal Trade Commission.

The European Commission's competition directorate-general did not immediately respond to **AIN**'s request for comment. ■

FLICKR: CREATIVE COMMONS (BY-SA) BY TDELCORO

A SkyWest Airlines Embraer E175 and an American Airlines Boeing 787-9 cross paths at Los Angeles International Airport.

ATR board greenlights short-runway ATR 42-600

by Cathy Buyck

ATR will move ahead with the development of a short takeoff and landing version of the ATR 42-600 after its board of directors formally authorized the launch of the program. It expects certification of the ATR 42-600S in the second half of 2022 and first delivery immediately afterward, the Toulouse-based European turboprop manufacturer—a 50-50 joint venture between Airbus and Italy's Leonardo—said last month.

Plans for the ATR 42-600S surfaced at the 2017 Paris Air Show and ATR revealed at the 2019 Paris Air Show in June it had secured commitments for 17 of its STOL variant of the ATR 42-600, hoping to launch the program by year-end. While maintaining the anticipated timeline, it also managed to gain a further three commitments, though it remained quiet about the identity of the customers. Turboprop aircraft leasing specialist Elix Aviation Capital has signed a letter of intent for 10 examples and serves as the launch lessor; it expects deliveries of the aircraft to occur between 2022 and 2024. Air Tahiti has committed to becoming the launch operator. The Polynesian carrier will take two ATR 42-600Ss, leaving commitments for eight units undisclosed. In June, however, ATR said it had signed a memorandum of understanding with the Development Bank of Japan to pursue the project.

"Adding the ATR 42-600S to our family makes total sense and paves the way for the company's future," commented ATR CEO Stefano Bortoli. "There is a huge potential for 50-seater aircraft, and the ATR 42-600S could help airlines widen their horizons," he added, pointing to the variant's proposed takeoff and landing capabilities on runways as short as 800 meters (2,625 feet). Close to 500 airports worldwide have a runway whose length extends between 800 meters and 1,000 meters and could accept the ATR 42-600S. The standard ATR42-600 requires a runway length of 1,050 meters.

ATR plans to offer the STOL variant as a 50-passenger airplane; however, to use the STOL on an 800-meter runway in standard flight conditions—15 deg C airfield temperature, sea level, dry paved runway, and a route of 200 nm—loads might need to drop by as few as 10 passengers. Still, ATR described the ATR 42-600S as "the best-performing aircraft in this segment" and reported "a strong interest from airlines for a new 50-seater product capable of operating in more constrained conditions."

The principal modifications for the 42-600S include the introduction of a larger rudder, which allows increased control of the aircraft at lower speeds, and an autobrake system to ensure full braking power immediately upon landing. The new variant will also be able to symmetrically deploy its spoilers to improve braking efficiency on landing, ATR noted.

As in the standard ATR 42 and ATR 72, Pratt & Whitney Canada PW127M turboprops will power the STOL variant, though pilots can select between the ATR 42 and 72 engine ratings, "meaning the aircraft can use increased power for performing STOL operations or elect to operate more efficiently with less power on longer runways," the OEM said. ■

Thai Airways told to resubmit rehab plan

Thai transport authorities gave national carrier Thai Airways 30 days to revamp its financial recovery plan as part of a major restructuring effort to drive down costs and return the airline to profitability. The order came after deputy transport minister Thaworn Senneam met with the carrier on October 10 as part of a review of the company's flailing financials.

Speaking to Thai media, Senneam disclosed the carrier must submit a new business plan and expedite a fleet adjustment program to sell 19 decommissioned aircraft in a bid to reduce maintenance costs. Thai Airways also received an order to submit a monthly update regarding its ambitious aircraft acquisition scheme to procure a mix of 38 narrowbody and widebody jetliners. Board members in late September rejected the airline's aircraft procurement proposal, valued at $5.1 billion, after they called for a revision of funding sources and an analysis of market conditions. The management team has about five months to revise and resubmit a new fleet acquisition program, which could see the carrier take aircraft on lease. A separate plan to lease three Boeing 777-200ERs remains under evaluation.

The review of Thai Airways's operational and financial restructuring program comes as the airline battles with fierce market conditions and an accumulated debt of more than $3.2 billion. Thai and its subsidiaries reported a net loss of $226 million in the first half of 2019, compared with a loss of about $105 million during the same period a year before.

Thai Airways president Sumet Damrongchaitham has sought to quell mounting concerns over the carrier's financial predicament, stating the company controlled sufficient cash flow and a credit line that accounts for roughly 13 percent of revenue estimates. Nevertheless, the carrier has requested a loan of $1 billion for the 2020 fiscal year to cover investment and working capital needs. According to Damrongchaitham, the airline would not use the loan to help finance its $5.1 billion fleet procurement plan.

Senneam publicly questioned Thai Airways's management team and its ability to return the carrier to profitability. The airline must now submit a plan that explicitly details cost-cutting measures on unprofitable routes and a revised plan to increase internet ticketing sales. A multimillion-dollar maintenance, repair, and overhaul joint venture with Airbus also remains under examination, with plans to break ground in early 2020. **J.M.**

Maintenance news by AIN Staff

PhilJets Aero Services in Manila is one of two service centers Textron Aviation has added. The new PhilJets maintenance facility is housed in a 13,000-sq-ft hangar.

Textron Opens Australia Parts Warehouse; Adds Asia-Pacific Service Options

Textron Aviation has opened a 2,000-sq-ft aircraft parts warehouse in Australia and added to its service options in the Asia-Pacific region, the Wichita-based airframer announced. Co-located with Premiair Aviation Maintenance at Essendon Fields Airport (MEB), the new warehouse will hold up to 10,000 parts across the OEM's Beechcraft, Cessna, and Hawker product lines, a Textron Aviation spokeswoman told **AIN**. Factory-direct parts, shipped locally from Essendon, can be purchased from the company online or through its local sales and support staff. Opening of the Australia warehouse comes after Textron Aviation expanded its parts warehouse in Singapore last year to better support customers in Asia-Pacific.

Premiair Aviation Maintenance is also one of two new authorized service centers in the region. It also announced it added authorized service capabilities in the Philippines with the addition of PhilJets Aero Services in Manila. PhilJets's 13,000-sq-ft hangar facility at Ninoy Aquino International Airport is initially offering maintenance on Philippines-registered Beechcraft King Air 200, 250, 300, and 350 turboprops and is pursuing certification for Cessna Caravans and Beechcraft King Air 90s.

JSSI Acquires MRO Tech Firm Tracware

In a bid to bolster its technology-based services, Jet Support Services (JSSI) has acquired Tracware, a UK-based developer of process control software to manage workflows for third-party MRO providers, OEMs, and aircraft management firms. It is the latest strategic acquisition for JSSI; last year, it acquired Conklin & de Decker and S3 Aero Specialists.

As a provider of maintenance programs to the aviation industry, JSSI is responsible for more than 2,000 business and regional jets and helicopters, managing nearly 10,000 maintenance events annually across a broad section of MRO providers.

Tracware founder and managing director Andrew Maley explained the acquisition will enable the firm to build on its current products and services, "leveraging decades of JSSI maintenance data to better meet the requirements of MROs globally." Under the acquisition, Tracware will be recognized as a JSSI company, and its employees and operations will be integrated with JSSI.

Mx Provider ACTSI Opens at Subic Bay Airport

MRO provider Aviation Concepts Technical Services Inc. (ACTSI) has opened a business jet service center at Subic Bay International Airport (SFS) in the Philippines. The opening of an 18,000-sq-m/193,750-sq-ft hangar is the first phase of the company's facility upgrade project at SFS.

SFS officials hope the ACTSI facility at the former U.S. Navy base serves to become a business aviation hub in the region. The airport features a 9,000-foot runway, no slot restrictions, and is within 90 minutes flying time of Hong Kong, Macau, and Taiwan. Owned by Razon & Co., ACTSI has Cayman and Bermuda repair station approvals and is working toward obtaining FAA Part 145 approval.

Aviation Concepts Technical Services will be supporting business aircraft from a new facility at Subic Bay Airport.

ExecuJet MRO Services Adds Fourth Base in Australia

Dassault's ExecuJet MRO Services is expanding in Australia with the opening of a line maintenance facility in Brisbane. Based at Queensland's Brisbane Airport, the facility is ExecuJet MRO Services' fourth in Australia, also including bases in Sydney, Melbourne, and Perth. "We are opening the new station in Brisbane to increase our reach in the northeast of Australia and broaden our line maintenance capabilities," said Grant Ingall, v-p of MRO services for Australasia.

The new Brisbane location enables ExecuJet MRO Services to meet demands for capabilities that include mobile repair services and aircraft-on-ground support, Ingall said, adding that the station also is helping the MRO provider respond faster. ExecuJet MRO Services Australia recently added Falcon 7X maintenance capability to its Civil Aviation Safety Authority authorization in Australia.

FAA Seeks $515k Penalty from Parts Supplier

The FAA is seeking a $514,558 civil penalty against Aerospace Support International of Doral, Florida, for allegedly selling ball bearings without the proper airworthiness documentation. These bearings are used in a component that ensures that the aircraft generator provides steady electrical power.

According to the allegation contained in a civil penalty letter, between March 2015 and July 2017 the aerospace parts broker "intentionally duplicated the proper airworthiness documentation of bearings it purchased legitimately to fraudulently attest to the airworthiness of dozens of other bearings it sold numerous times to four separate companies."

Companies purchasing the parts were Ametec MRO, Safe Fuel Systems, Silver Wings Aerospace, and Triumph Group. Aerospace Support International is also a supplier of parts to Boeing, Airbus, PWA, Parker, Honeywell, Moog, Liebherr, and Hamilton Sundstrand.

The agency also contends the company duplicated other paperwork that documented the bearings were made to an industry or commercial standard by an FAA-approved parts manufacturer. Aerospace Support International's "deliberate and intentional action resulted in a serious risk to the flying public," the FAA asserts.

Aerospace Support International has asked to meet with the FAA to discuss the case.

MRO Insider Adding AOG Service Functionality to App

Maintenance price quote platform provider MRO Insider is adding new AOG service functionality to its mobile application for smartphones, tablets, or desktop computers. Through the app, users will be able to simplify the AOG process by entering their aircraft's location. Service providers will then quickly respond to them with their hourly rate, ETA to aircraft, and other information.

This will be presented along with any client reviews or ratings and the facility's repair authorization and drug program paperwork. The function is expected to be operational early next year.

Piaggio Taps Traxxall for Maintenance Tracking

Piaggio Aerospace has named Traxxall an approved maintenance tracking provider for the Italian airframer. As part of the approval, all new factory-delivered Piaggio Avanti Evo turboprop twins will include Traxxall's maintenance tracking as an optional service.

"This partnership will permit us to provide enhanced service to our existing Piaggio-Aerospace-operator clients, and the opportunity to support new and existing Avanti operators worldwide," said Traxxall president Mark Steinbeck.

Elliott Forms Team for AOG for Phenom 100s and 300s

Elliott Aviation has formed a mobile response team specifically for Embraer Phenom 100 and 300 AOG events,

the FBO operator, aircraft dealer, and MRO provider announced. The team—based in Minneapolis and available 24 hours a day, seven days a week—is factory trained by Embraer, Garmin, and CAE and has direct access to Embraer's technical help desk.

The team is available for regional and national dispatch as travel time allows, and offers its services for $125 an hour. It also is able to manage warranty considerations internally.

AAR Employing Drones for Aircraft Inspections

AAR's MRO facility in Miami has begun using a French company's drones to conduct aircraft inspections as part of its maintenance processes. Under a 12-month technology agreement with Donecle, which specializes in automated aircraft inspection by drone, Chicago-based AAR expects to expand the inspections to its other MRO facilities following further assessment and results.

A Donecle drone used by AAR conducts an automated aircraft inspection.

AAR will continue to conduct manual inspections, as well as comply with FAA requirements. According to AAR, the drone can safely perform nose-to-tail visual inspections of Boeing 737s and Airbus A320s in less than an hour using laser positioning.

Unity Aviation Joins Ranks of Viking Service Centers

Unity Aviation Canada has been named by Viking Air as a factory-endorsed service center (FESC) for the Series 400 Twin Otter in the Americas, the British Columbia-based airframer announced. Under the endorsement, Unity Aviation will provide authorized maintenance, refurbishment, and warranty-related work on legacy de Havilland and Viking Twin Otters.

In addition to specializing in the maintenance of legacy de Havilland Twin Otters, Unity Aviation's parent company, Unity Group, provides dry-lease contracts of the DHC-6-300 worldwide on a multi-year basis.

IATA's New Parts Portal Meant To Shave Procurement Costs

The International Air Transport Association has launched an online tool designed to reduce over-payments for aircraft parts called MRO SmartHub, the industry group announced. Designed to make the assessment of fair market value (FMV) more accurate, the platform will allow subscribing airlines and maintenance, repair, and overhaul (MRO) providers to transparently list items to buy and sell online.

IATA estimates the value of the global MRO market to total $81.9 billion annually, a significant portion of which it attributes to material costs. The association said it expects MRO SmartHub to shave 10 to 15 percent from material costs through efficiency gains in the supply chain and more accurate assessments of FMV.

New Part 145 Shop Opens at Wiley Post Airport

Oklahoma's Wiley Post Airport has a new FAA Part 145 repair station with the opening of Avion Aero Holdings. Owned by Oklahoma Aviation founder and president Sho Kassam and Justin Colvalt, an aviation mechanic, inspector, and pilot with nearly two decades of experience, the company recently acquired a long-term lease on a 30,000-sq-ft hangar at the airport.

Avion offers full services ranging from oil and filter changes on piston and turbine aircraft, to annual inspections and scheduled and unscheduled maintenance. Its turbine specialties include Cessna Citations (510, 525, 560, 680, and 750 series) and the Beechcraft King Air family from the C90 through the 300. Avion Aero is also the state's only specialized repair facility for Astra, Cirrus, Diamond, and Piper aircraft. It also offers a mobile repair unit.

Lufthansa Technik's Tulsa Facility Expands Capabilities

The Lufthansa Technik Component Services (LTCS) operation in Tulsa, Oklahoma, has received Civil Aviation Administration of China certification. It also has become the 33rd design department of Lufthansa Technik's European Union Aviation Safety Agency (EASA) 21/J Design Organization, and the first for its Americas region.

The designation gives LTCS the ability to develop repair methods to improve the component services of the company in the Americas, as well as improve turnaround times and reliability and overcome material obsolescence.

Honeywell Marks 100,000th APU Milestone

Honeywell has rolled its 100,000th auxiliary power unit (APU) off the production line that also happens to be its 15,000th 131-9 model, its most popular APU flying today, the Phoenix-based provider of aircraft systems and engines announced.

Honeywell recently marked a milestone for its auxiliary power units, rolling out its 100,000th, a Model 131-9. Introduced in 1950, the Honeywell family of APUs now counts 36,000 in service.

In 1950, Honeywell's first APU took to the skies. Currently, more than 36,000 of them are in service on aircraft ranging from business, commercial, regional, and military fixed-wing airplanes and rotorcraft. Of those, more than 13,000 are the model 131-9 and are primarily found on Boeing 737 and Airbus A320 airliners. Honeywell introduced the model 131-9 in 1995.

Additionally, Honeywell said it will soon introduce a new unit to provide on-ground power to turboprops and small to midsize jets.

Western Authorized To Work On FJ44-equipped Citations

FBO and MRO Western Aircraft has been authorized to service Williams International FJ44 engines found on seven Cessna Citation models. Specifically, the authorization allows Western to maintain FJ44s on the CitationJet, CJ1/1+, CJ2/2+/M2, CJ3/3+, and CJ4.

It already has some familiarity with the engine as Western is an authorized service facility for the Pilatus PC-24 twinjet, which is powered by the FJ44-4A. With this new authorization, Western will also be able to help Citation customers with engine rentals and parts.

Metrojet Hong Kong Earns Qatar Mx Approval

Hong Kong-based business aviation services provider Metrojet has received authorization from the Qatar Civil Aviation Authority for its Hong Kong maintenance, repair, and overhaul facility, designating it as an approved maintenance organization for Qatar-registered aircraft. The approval covers the MRO's full capability list for Gulfstream, Bombardier, and Embraer business jets.

This latest nod is added to the company's already established approvals from Hong Kong, U.S. FAA, Bermuda, Canada, Cayman Islands, Isle of Man, San Marino, Thailand, and Aruba.

StandardAero completes Hillsboro Expansion

The September 20 grand opening of a 30,000-sq-ft expansion at StandardAero's Hillsboro, Ohio engine component manufacturing and repair facility completes an 18-month-long, $16 million project that included expansion of its facilities in Cincinnati, Miami, and Kansas City. Additional space and equipment at Hillsboro will support its aerospace engine low-pressure turbine vane manufacturing operation, as well as offer room for further growth.

West Star Co-founder Rasberry Retires

Robert Rasberry, who co-founded West Star Aviation with the acquisition of Premier Air Center in 2002, is retiring from the MRO provider but will remain chairman emeritus and serve as a senior advisor for West Star's parent and investment firm Northwest Equity Partners.

Rasberry joined Sam Haycraft, Jim Swehla, and Mike Durst in the acquisition of East Alton, Illinois-based Premier Air Center 17 years ago. They added a second location in 2005, rebranded the growing operation as West Star Aviation, and steered the company from an entity with 150 employees to one that now has more than 1,400 and spans four major MRO centers along with a half-dozen more satellite facilities.

No immediate plans were announced for a successor in Rasberry's role of chairman. ■

Napa County Airport is looking to add another FBO, which it hopes will help attract more business to the California wine region gateway. Current statistics show it handling approximately 129 GA operations a day.

California Airport Seeks To Add Second FBO

California's Napa County Airport has issued an RFP for a second service provider, as it looks to increase business at the dedicated general aviation gateway. Currently, Lynx, which purchased the Napa Jet Center last year, is the sole FBO there. According to Elizabeth Habkirk, the county's deputy director of public works, the facility pumped 2.25 million gallons of fuel and handled more than 50,000 operations last year. The RFP is for a 10-acre leasehold next to the existing FBO, with an initial 30-year term, plus two five-year options.

Habkirk told **AIN** the proposal comes with a minimum capital investment requirement of $34,000 per acre per year, for an approximate $10 million outlay, and prospective operators should come to the table with ideas on how they expect to attract more customers. "We recognize the airport as an important 'front-door' to the Napa Valley and look forward to the opportunity to grow business at the airport to benefit the entire community," said county board of supervisors chair Ryan Gregory.

The wine-country airport has scheduled a mandatory pre-proposal conference on November 13 for those looking to issue a proposal, which is due by March 27. The airport is currently undergoing an environmental impact review for the new facility, which would be expected to be completed by October 2022.

UK FBO Chains Plan Expansion in Manchester, Bournemouth

UK-based Weston Aviation is adding a fifth airport to its FBO chain, with a new operation at Manchester Airport. The privately owned company already provides passenger and cargo handling, flight supervision, maintenance, and charter brokering at Gloucestershire Airport, Cornwall Airport Newquay, and Humberside International Airport in the UK, as well as at Cork International Airport in Ireland. It also provides fuel service at Doncaster Sheffield Airport in the north of England. Meanwhile, UK-based FBO chain XLR Executive recently opened a new facility at Bournemouth Airport on the south coast of England, reporting 95 movements in the first five weeks of operation. The company also has FBOs at Birmingham, Liverpool, and Exeter.

Lynx FBO Expands To Metro NY

Growing service provider chain Lynx FBO continues its expansion with the purchase of its eighth U.S. facility, FTC FBO, one of two full-service facilities at New Jersey's Morristown Airport (MMU). In operation since the mid-2000s, the CAA-preferred FBO features more than 45,000 sq ft of heated hangar space, nearly five acres of ramp, and a 2,000 sq ft terminal with passenger lobby, pilot lounge, snooze room, eight-seat conference room, and flight-planning area.

For the Sterling Group-backed Lynx, which now has a coast-to-coast FBO network, this location, just 27 miles west of New York City, represents an opportunity to fill a gap in its coverage.

"We are excited to enter the New York metropolitan area and believe this expansion into the largest general aviation market in the United States is a perfect complement to our growing network of FBOs," said company CFO Matt DeLellis. "We look forward to working with DM Airports Ltd., the town of Morristown, and the local team to develop a safe, customer-centric FBO that operators in the region have come to expect." The company expects to begin planning for design and development of a new terminal and hangar complex at MMU as soon as the deal closes.

Florida Keys FBO Breaks Ground on New Facility

Marathon Aviation broke ground on a new Marathon Jet Center at the Florida Keys Marathon International Airport to replace the temporary facility that has operated there since the existing terminal and hangar were destroyed by 2017's Category 4 Hurricane Irma. The 3,000-sq-ft, two-story, Key West-themed FBO will be available 24/7, and will offer a pilot lounge, flight planning area, coffee and snack bar, an exterior access elevator to take guests to the second-floor passenger lounge, outdoor viewing decks, fee-based U.S. Customs, and a 12,000-sq-ft hangar with 28-foot high doors capable of sheltering aircraft up to a G650. The new buildings will be constructed to comply with the latest county hurricane code standards for wind and flooding. The Avfuel-branded facility is expected to be completed in the first quarter of 2020.

"Our investment in this venture reflects our deep, long-term commitment to this local community, its economy, and our customers," said Marathon owner Martin Hiller, adding it's the company's mission to provide a fully immersive, luxury Middle Keys experience. Marathon Aviation also operates a second FBO at the Florida Keys airport that is dedicated to piston aircraft.

Avflight Breaks Ground in Grand Rapids

FBO chain operator Avflight has broken ground on its $6 million-plus FBO complex at Gerald R. Ford International Airport, in Grand Rapids, Michigan. The Avfuel sister company was selected earlier this year as the airport's second service provider. A ceremony last month, attended by company executives, airport authority board members, and local dignitaries, marked the beginning of work on the five-acre leasehold, which is expected to open in spring 2020.

"We are anxious to break ground on this new facility, and we are proud to see growth in general aviation at our airport as the demand for more options increases," said airport president and CEO Tory Richardson, adding it generates more than $3.1 billion in economic output in West Michigan each year. "As our community grows, so does the need for air travel and services associated with air travel." The facility on the east side of the airport will include a 5,000-sq-ft terminal, a 30,000-sq-ft hangar capable of sheltering the latest big business jets, indoor car parking, and 1,650 sq ft of customizable tenant office space.

"Grand Rapids is one of Michigan's flagship communities with so much to offer its businesses and visitors," said Joe Meszaros, the company's vice president of operations. "Our multi-million-dollar investment in this new complex reflects our long-term commitment to the region and confidence in our shared future at the airport."

When completed in spring 2020, the new Avflight FBO at Michigan's Gerald R. Ford Airport will provide a 5,000-sq-ft terminal and 30,000-sq-ft hangar, serving as the Grand Rapids airport's second service provider.

Northern Virginia FBO Unveils Renovation

APP Jet Center, the lone service provider at Washington, D.C.-area Manassas Regional Airport/Harry P. Davis Field, has just completed a million-dollar full renovation of its facility. The project included expansion of the main lobby and crew lounge, new snooze rooms, conference room, shower facilities, and a full galley.

"We are very excited to provide our Manassas clients with a fresh, new upscale experience at APP Jet Center," said Thom Harrow, CEO of parent company APP Properties. "This entire project was designed with our clients' needs top of mind." Earlier this summer, the company—which also operates IS-BAH-registered FBOs in Hayward, California, and Fort Pierce, Florida, and has hangars at Denver's Centennial Airport—won the right to build an 18,000-sq-ft, approximately $2.5 million hangar at Manassas, which will accommodate aircraft up to a Bombardier Global. Along with the finalization of the purchase of an existing 12,000-sq-ft hangar/office structure, it will bring the facility to 250,000 sq ft of hangar space when the new hangar opens next October.

Michigan FBOs Rebrand

Privately owned Executive Air Transport, the lone aviation-services provider at Michigan's Muskegon County Airport is rebranding as it grows into a regional FBO chain. In 2017, owner and president Terry Boer acquired Tulip City Air Service, long a fixture at West Michigan Regional Airport, and kept its name intact. With his latest recent purchase of charter provider Air Service, based at Traverse City's Cherry Capital Airport (TVC), he is establishing

a new FBO there, which will compete with the existing Avflight facility. All three locations will be rebranded as Vision Air Center, while the company's charter operations at all three locations will be incorporated as Vision Air.

While it is already using the former Air Service office at TVC to conduct charter operations and will retain it as its FBO terminal, the company expects to begin handling transient aircraft there in the first quarter of 2020, following the installation of a new Phillips 66-branded fuel farm holding 20,000 gallons of jet A, and 10,000 gallons of 100LL avgas. The facility also includes a 20,000-sq-ft hangar, which can accommodate up to midsize business jets.

Omni Handling Prepares to Expand in Portugal and Spain

Slot restrictions at the main airport serving the Portuguese capital Lisbon have prompted FBO group Omni Handling to expand in other parts of the country. Within the next two or three months, Omni is preparing to open new facilities at Funchal on the island of Madeira and also at Santa Maria in the Azores. Meanwhile, it is seeking to make use of Beja Airport, which is 90 miles from the center of Lisbon and has an 11,319-foot runway. Plans to build a new main airport for Lisbon at Motijo, which is a 15-minute drive to downtown, have been delayed for various reasons and are now expected to take several more years to complete. In addition to Beja, Cascais Airport, with its 4,539-foot runway, is another option for smaller business aircraft. In December 2018, Omni Handling was acquired by undisclosed new owners and since then has been pursuing a new development strategy supported by fresh investment. According to Omni Handling CEO Ricardo Pereira, these may also include establishing new operations in neighboring Spain.

Euro Jet Expands Ground Support Network

Ground support group Euro Jet Intercontinental is set to open new private lounges in the Albanian capital Tirana and the Romanian capital Bucharest. When the new facilities open by early November, the Czech Republic-based company will have 13 bases across Eastern Europe.

Its new facility in Tirana is located immediately adjacent to the general aviation aircraft parking ramp and provides a crew rest space with a kitchen and bathroom. The new lounge in Bucharest is at the city's Baneasa Airport within the general aviation terminal. So far this year, Euro Jet has reported record numbers of flights handled, especially in summer resorts in Croatia and Montenegro. The company also has crew lounges in Prague and Karlovy Vary, Czech Republic; Tivat, Montenegro; Zagreb and Dubrovnik, Croatia; Constanta, Romania; Poprad, Slovakia; Kiev, Ukraine; Belgrade, Serbia; Sofia, Bulgaria; and Warsaw, Poland. Additionally, it has a heated hangar in Prague.

Redbird Skyport Calls It Quits

Redbird Skyport, one of two service providers at San Marcos (Texas) Regional Airport (HYI), located midway between San Antonio and Austin, closed its doors last month after eight years in operation.

The facility was owned by parent company Redbird, which is known in the flight training sector for its affordable motion simulators and other training devices, and a flight school/simulator showroom occupied half of the 17,000-sq ft-terminal. While Redbird's training equipment division has seen "explosive growth," company founder Jerry Gregoire said that since its opening in 2011 the FBO never had even a profitable quarter, let alone earned a profit.

In a blog on his company website announcing the closure, he listed as factors in the FBO's demise: never-realized projections of increases in traffic to the airport, turnover in the city manager's office that failed to live up to promises made by their predecessors, and the opening of privately owned Austin Executive Airport. Those employees who wish to remain with the company will be invited to join its simulator business, said Gregoire. The move leaves Berry Aviation as the lone FBO at HYI. ■

After eight years in operation, Redbird Skyport is closing its hangar doors for the last time.

FBO PROFILE: Astonsky Le Bourget

The passenger lobby features panoramic views of the ramp and the runway.

Paris's FBO constellation adds star

The constellation of FBOs at Paris Le Bourget Airport expanded to seven last month with the official opening of Astonsky, a division of the Clair Group.

The company's Astonjet charter division is based at the Paris-area dedicated business aviation airport, so when BBA Aviation made one of the facilities Signature Flight Support operates there available, Clair Group leaped at the opportunity to establish its own FBO. The company has previous flight support experience, operating a small FBO and its flight school Astonfly at GA-only Toussus le Noble Airport, one of the busiest airports in all of France, but the Le Bourget FBO represented a major advance.

While its name and those of its sister divisions play off the word "astonish," the FBO looks to do just that by disrupting the market at Le Bourget and raising the bar with five-star service. Indeed, noted company president Charles Clair, the staff was recruited from the finest hotels in Paris, as well as from its competing service providers at Le Bourget. "It's not just from your car to the airplane," he said. "We can offer to clients a really new luxury experience." The disruptive part he said, comes from its pricing. "In this case, we are not at a different price than our competitors, we are the same price, but the difference is the services and the spaces that you can find in our FBO."

In January, the company acquired Signature's former Terminal 2 and spent the next 10 months gutting and totally renovating the 1990-vintage facility, at a total cost of more than $11 million, leaving only the elevator unchanged, according to Clair. With construction taking place six days a week and sometimes at night, original hopes of an opening in time for the Paris Air Show this past summer proved overly optimistic, acknowledged Clair.

The grand opening instead took place on October 17 as the company unveiled its new 75,000-sq-ft, six-floor terminal and office complex, which also houses Astonjet, with work continuing right up to the debut.

The showpiece of the facility, located on the north side of the airport near Runway 27, is the more-than-10,000-sq-ft ground-floor passenger lounge/lobby, which features panoramic views of the ramp and the runway, a 1,600-gallon saltwater aquarium, central fireplace, a bar area, and embedded in the floor, a 3,000-bottle wine cellar with a thick glass ceiling that guests can walk over. It is stocked exclusively with the finest French wines. "Passengers can buy some bottles that they can share in the lounge, or they can keep it to drink in the airplane," said Clair.

Upstairs, a 3,200-sq-ft private, secure VIP lounge caters to more discrete clients, either individuals or groups, with its own chef-served dining area, conference table, sofas, and a private bathroom with shower.

Customs and security are handled in the lower level of the terminal in a separate discrete area, equipped with its own x-ray and metal-detection equipment and its own access to the ramp. "We've got dedicated space for customs for departure and arrival in a specific area because we do not want the customs to perform their control directly in the lounge in view of all the passengers," Clair explained.

Flight crews have their own dedicated areas, as well, from a glass-enclosed flight briefing/planning room downstairs to a 2,150-sq-ft pilot lounge upstairs with televisions, espresso machine, snacks, four bed-furnished snooze rooms, shower facilities, and games.

The complex is open 24/7 and has a staff of 35. It also includes 54,000 sq ft of hangar space with 26.25-foot-high doors that can shelter aircraft up to a Dassault 7X.

The three-acre leasehold also includes more than 170,000 sq ft of ramp space, enough to accommodate any size aircraft.

Fueling at Le Bourget is generally handled directly with several fuel providers, but Astonsky has a preferred supplier agreement with Shell and World Fuel, and while more expensive than dealing directly, operators can purchase fuel through the FBO.

For now, Clair has his hands full with the new location, he said, with no current plans for Astonsky's expansion. **C.E.**

by David Jack Kenny

PRELIMINARY REPORTS

Loss of Twin Otter Claims Four

VIKING AIR DHC-6-400, SEPTEMBER 18, 10 KM FROM KAMPUNG MAMONTOGA, MIMIKA REGENCY, INDONESIA

Three crew members and one passenger perished after a DHC-6-400 Twin Otter disappeared from radar on a flight from Timika to the mountainous region of Ilaga in the remote eastern province of Papua. Weather at departure was described as good. Search-and-rescue teams located the wreckage four days later on a mountainside at an elevation of 13,500 feet. In addition to the single passenger, the twin turboprop was reported to be carrying 1.7 tons of rice.

Two Fatalities in Tanzanian Takeoff Accident

CESSNA 208, SEPTEMBER 23, SERENGETI, TANZANIA

The pilot and only passenger were killed when an Auric Air Caravan crashed just after takeoff from the Seronera airstrip in the Serengeti desert. An announcement on the company's website confirmed that no one else was on board. According to the commissioner of Tanzania National Parks, the flight was bound for Arusha to pick up tourists. Investigators were reported to have reached the scene the following day, but at press time no further details had been released.

Pilot Only Casualty in B.C. Helicopter Crash

SEPTEMBER 24, 2019, BELL 206B-3, CAMPBELL RIVER, BRITISH COLUMBIA, CANADA

No ground injuries were reported after a "locally owned" Bell Jet Ranger hit the roof of a woodcarving shed in the Tyee Spit area of Campbell River and slid off into the parking lot. The pilot—who owned the helicopter company and was a veteran of many years of flying on Victoria Island—did not survive. Renowned local artist Bill Henderson was inside his studio at the time but not close to the portion of the roof penetrated by the main rotor blades and was unhurt.

One witness to the impact said that "the sound was not right. It looked like the motor was not running." A second witness corroborated the impression that the main rotor blades had begun to slow as the helicopter apparently turned toward a nearby helicopter pad and "began to wobble." British Columbia's transportation minister confirmed that the pilot was Ed Wilcock, owner of E&B Helicopters and the veteran of many years of flying on Victoria Island that included transportation and emergency evacuation services for the forestry industry. The initial investigation is being conducted by WorkSafe BC, the BC coroner's office, and the Transportation Safety Board.

Five Killed in TBM 700 in Michigan

SOCATA TBM 700, OCTOBER 3, LANSING, MICHIGAN

The pilot and four passengers were killed when the business flight went down short of the runway during an ILS approach to Runway 10R of Lansing, Michigan's Capital Region International Airport. At press time, the fifth passenger remained hospitalized in critical condition. The accident occurred just under one hour after departure from Indiana's Indy South Greenwood Airport.

ADS-B position data suggest a routine descent from FL190 to 3,000 feet msl. The airplane joined the localizer and crossed the marker at 2,302 feet and 168 knots calculated true airspeed. The pilot's readback of the landing clearance was the last transmission received from the aircraft. Over the next two minutes, as it continued to descend on the glideslope, it decelerated to 72 knots at an altitude of 180 feet above ground level half a mile from the threshold. Its speed dropped to 64 knots as it began a shallow climbing left turn, gaining just 20 feet. The final ADS-B data point came 300 feet north of the localizer centerline 0.36 feet short of the runway; the initial point of impact was 480 feet farther northeast.

Prevailing weather included calm winds with 1.25 miles visibility in light rain under a 400-foot overcast. The 1,404-hour commercial pilot had 86 hours in TBM 700 and 850-series airplanes, all during the preceding 12 months. Fuel was present at the scene, and there was no initial evidence of loss of power before impact.

FINAL REPORTS

Unqualified Pilot Insisted on Flying Solo

CESSNA 500 MARCH 24, 2017, MARIETTA, GEORGIA

The 78-year-old owner of a 1976-model Cessna Citation insisted on flying the airplane solo despite never having completed either the initial or recurrent training required to exercise a single-pilot exemption, claiming instead to be covered by the conformity certificate issued to the previous owner. According to the NTSB's probable cause report, a friend of the pilot told investigators that he was largely unable to fly the airplane without the autopilot and had never learned to program the GPS, leaving him ill-prepared to cope with any in-flight routing changes. The jet crashed into the front yard of a home in a flat spin after completing at least one 360-degree roll. Fire consumed most of the wreckage and left the house uninhabitable. The residents were not home and the pilot was the only casualty.

The friend, a 23,000-hour flight instructor and aircraft mechanic with multiple type ratings, had made several attempts to teach the pilot to program the Garmin GTN 750 he'd had installed three years earlier, but he continued to struggle "pulling up pages" and "correlating the data." Instead, he had preloaded routes between the only four destinations he flew to; if air traffic control amended his routing, he "would get confused and not know how to amend the flight plan." He was also heavily dependent on the autopilot, engaging it just after takeoff and leaving it on until short final, but erroneously believed that the autopilot controlled the trim, which he would therefore not adjust. The chronic out-of-trim condition led him to complain that the airplane was "uncontrollable."

In cruise flight from Cincinnati to Atlanta at FL220, the pilot responded to an amended routing via an arrival procedure by reporting "difficulty with my GPS" and requesting a direct clearance to the airport. During the next 10 minutes, the cockpit voice recorder picked up the pilot's voice saying, "I have no idea what's going on" and the sound of the autopilot disconnecting before the pilot radioed that he was having "a steering problem" and "could not steer the airplane very well." After receiving a descent clearance to the minimum vectoring altitude, he descended 500 feet below, then reported that he had his "autopilot back…so it gives me some stability." He was unable to change frequencies to approach control and asked the Center controller to "take me in." About a minute later he said he was "just barely able" to keep the airplane straight and level. Two minutes after that the CVR recorded the pilot saying, "It's going down, it's going down." The recording ended 19 seconds afterward.

'Intentional Noncompliance' Cited in Freighter Crash

SHORT BROTHERS & HARLAND SD3 30, MAY 5, 2017, CHARLESTON, WEST VIRGINIA

Operating in low instrument conditions, the crew of Air Cargo Carriers (ACC) Flight 1260 declined a straight-in localizer approach in favor of a circling VOR-A approach with higher minimums, prematurely descended below the procedure's first step-down altitude, then initiated a steep turning descent within half a mile of the displaced threshold. A performance study based on returns from Charleston Yeager Airport's ASR-8 surveillance radar showed the airplane's descent rate increasing to 2,500 feet per minute in a 42-degree left bank before moderating to 600 fpm in the last seconds before impact. The pilot and first officer were killed when the cargo plane crashed onto Runway 05, 330 feet beyond the displaced threshold, sliding off the runway and down an 85-foot embankment.

The NTSB's probable cause report called out not only the flight crew's violations of both company procedure and Federal Aviation Regulations, but also the approach controller's failure to advise them of a special weather observation recorded seven minutes before their first radio contact. The Board also noted ACC's lack of any formal safety reporting program or "method to evaluate trends of safety or monitor pilots…with previous performance issues."

The flight departed from Louisville (Kentucky) International Airport at 5:41 a.m, and obtained Charleston's ATIS Information November while in cruise flight at 9,000 feet. Ceilings were reported as broken at 1,300 feet agl. At 6:37 the first officer contacted Charleston Approach; the controller provided the local altimeter setting but did not advise of the 6:30 observation including a 500-foot overcast. Told to expect the localizer approach to Runway 05, which has a minimum descent altitude of 373 feet, the first officer requested and was cleared for the VOR-A approach, which has a 653-foot MDA. After crossing the VOR, the freighter descended to 1,600 feet (120 below the charted step-down altitude), leveling off four miles from the extended threshold. A pilot on the ground saw it "hugging the [cloud] bases" less than a mile west of the airport. Security camera footage captured its steep, descending left turn half a mile out.

Standing FAA orders require issuing a new ATIS message "upon receipt of any new official weather." Regulations for circling approaches by Part 135 operators require initiating a missed approach if the aircraft is not in position to land "on the intended runway…at a normal descent rate using normal maneuvers … within the touchdown zone." Radar tracks and surveillance footage of three previous VOR-A approaches to Charleston showed that the captain, a former Alaska bush pilot, had descended below the MDA while in instrument conditions on all three; the first officer had told friends that he had "difficulty staying on heading, speed, and course while flying in IMC" and once "lost situational awareness during a missed approach and almost flew into a mountain." The Board cited this accident as an example of "procedural intentional noncompliance…a longstanding concern… highlighted on the NTSB's 2015 Most Wanted List." ■

Fund an Angel Cocktail Reception

On October 23, the second night of NBAA-BACE, business aviation leaders gathered at the Fund an Angel Cocktail Reception to support the critical work of Corporate Angel Network (CAN). Proceeds go directly to supporting CAN's mission of transporting cancer patients to treatment centers throughout the country. Thank you to everyone who helped make the event such a great success.

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More than 100 aircraft representing the entire Daher TBM single-engine turboprop lineup were at Rocky Mountain Metropolitan Airport in Denver for the 2019 TBM Owners and Pilots Association's Convention.

TBM owners event thriving

by Jerry Siebenmark

The TBM Owners and Pilots Association's (TBMOPA) 2019 convention in Denver attracted 345 attendees—including 135 owners—and 102 aircraft representing the entire Daher TBM single-engine turboprop lineup: TBM 700, 850, and 900 series, the French airframer announced last month. The five-day convention at Denver Marriott Tech Center—September 25 to 29—focused on providing academic and learning sessions specific to airmanship and safety.

"The 2019 TBMOPA convention marked another step in meeting our association's goal of promoting safety and providing opportunities to maximize both the pleasure and utility of the TBM ownership experience," said TBMOPA chairman David Scobey. "We very much appreciate Daher's efforts in supporting safety-based enhancements to existing TBMs currently in service, as well as for its new-production aircraft. This is a sign of the TBM manufacturer's long-term commitment to its product line."

Daher also used the convention to discuss its acquisition of Quest Aircraft and what it would mean for TBM owners, as well as its development plans. In addition, Daher made presentations at the convention as did its vendors Pratt & Whitney Canada and Hartzell.

Scobey added that TBMOPA members' attendance at the learning sessions qualified TBM owners for savings of as much as 10 percent on insurance premiums after a claim-free year. ■

Safran chooses partner to develop turboprop engine for unmanned market

Engine maker Safran, ZF Luftfahrttechnik (ZFL), and MT-Propeller are jointly developing a new turboprop engine system aimed at Europe's unmanned aircraft market. ZFL will develop the propeller accessory gearbox.

"This partnership lays the foundation of a solid cooperation between renowned actors in the field of aircraft propulsion. It will offer the European aerospace industry a 100 percent European engine solution for new unmanned applications, featuring high levels of design maturity and competitive operating and maintenance costs," said Safran Helicopter Engines executive v-p for programs Bruno Bellanger.

The new engine will be optimized for medium and high altitude, up to 45,000 feet, and feature Fadec and propeller control for both power and propeller pitch. It is a derivative of Safran Helicopter Engines' Ardiden 3-based Tech TP demonstration engine. That engine made its first ground run in June at Safran's Tarnos, France facility. The goal of Tech TP, which is part of the European Union's Clean Sky 2 research and innovation program, is to validate technologies required to develop a new-generation turboprop with lightweight architecture, improved fuel consumption, and lower emissions.

Safran's Ardiden 3 is a new turboshaft that produces power in the 1,700- to 2,000-shp range. Two models, the Ardiden 3C and 3G, already have completed more than 10,000 hours of tests and been certified by EASA. The 3G powers the Russian Kamov Ka-62, while the 3C/WZ16 powers the Chinese Avicopter AC352. More than 250 Ardiden 1 engines are already in service, completing some 200,000 flying hours in Indian airframes, including the HAL Dhruv, Light Combat Helicopter, and Light Utility Helicopter. **M.H.**

by Gordon Gilbert

Within 6 Months

Dec, 2, 2019 **Update**

U.S.: Interior Fire Protection

The FAA has extended the comment period from October 1 to December 2 for its proposal to amend certain airworthiness regulations for fire protection of Part 25 aircraft interior compartments. This proposal would convert those flammability regulations from detailed, prescriptive requirements into simpler, performance-based standards.

Dec. 31, 2019

U.S.:NAT MNPS Compliance

U.S. operators with older minimum navigation performance specifications (MNPS) approvals have until December 31 to get these updated if they want to keep flying in the North Atlantic Tracks under new operations specification management letter of authorization (LOA) B039. These requirements have been in effect for nearly two years.

Jan. 1, 2020 **2 Months to Deadline**

U.S./Taiwan/Mexico: ADS-B Out Mandate

ADS-B Out equipment must be operational starting January 1, 2020, in aircraft that fly in the U.S. under IFR and generally where transponders are currently required, and in Taiwan IFR airspace above FL290. In Mexico, requirements are proposed for a start date of January 1, 2020, in Class A, B, C, E airspace above 10,000 feet, and other specified airspace. The requirement could take effect earlier in some airspace over the Gulf of Mexico.

Jan. 1, 2020

Aircraft CO_2 Emissions

The first international standards for carbon dioxide (CO_2) aircraft emissions have been enacted by ICAO and initially apply to large subsonic jets, including business jets, for which the application for a type certificate was submitted on or after January 1, 2020.

Jan. 30, 2020

Datalink Com in North Atlantic

Aircraft flying within the North Atlantic Tracks between FL290 and FL410 must be equipped with FANS-1/A controller-pilot datalink communications and ADS-C starting on Jan. 30, 2020. Aircraft that are not FANS-equipped will be able to operate at cruise altitudes of FL430 and above.

Feb. 18, 2020

EASA: Halon Banned

Under EASA rules, operators of large airplanes and large helicopters shall ensure that built-in lavatory extinguishers on aircraft newly certified on or after February 18, 2020 do not use Halon as the extinguishing agent. The goal is to gradually mitigate the environmental impact that Halon extinguishing agents in firefighting equipment have on the ozone layer and climate. The requirement applied to portable extinguishers on these classes of aircraft starting from May 2018.

Within 12 Months

June 7, 2020

7 Months to Deadline

Europe: ADS-B Out Mandate

The ADS-B Out retrofit requirement in Europe takes effect June 7, 2020. This mandate applies only to aircraft with a mtow exceeding 5,700 kg (12,566 pounds) or having a maximum cruising speed greater than 250 knots. .

Aug. 14, 2020

EU: Pilot Mental Fitness

The European Union has published revised air operations safety rules to incorporate provisions to better identify, assess, and treat the psychological fitness of air crew. The rules, applicable to commercial air transport operators, go into effect Aug. 14, 2020. The requirements include mandatory alcohol testing of flight crews during ramp checks.

Oct 1, 2020

Australia: Rest and Duty Times

New fatigue rules apply to holders of commercial air operator certificates, including charter, on-demand air taxis, and Part 141 flight schools. Operators who select the prescribed limits must be in compliance by June 30, 2020. Operators who develop their own fatigue risk management system must be in compliance starting Oct. 1, 2020.

Beyond 12 Months

Feb. 25, 2021 and Jan. 27, 2022

15 Months to Deadline

Canada: ADS-B Out Mandate

The implementation date of Feb. 25, 2021 is proposed for ADS-B use in Canadian domestic airspace, initially limited to Class A airspace. The mandate would be expanded to include Class B airspace above 12,500 feet on Jan. 27, 2022. Beyond this date, expansion of ADS-B requirements to other Canadian domestic airspace will be based on an assessment of the safety and efficiency requirements for specific airports. ■

Compiled by Kerry Lynch

RICK MADARASZ

SHANNON CHAMBERS

PJ SHARPE

ANNE DEVILLIERS

MICHAEL PARKER

Robert Rasberry, who co-founded *West Star Aviation* with the acquisition of Premier Air Center in 2002, is retiring from the MRO provider but will remain chairman emeritus and serve as a senior advisor for West Star's parent and investment firm Northwest Equity Partners. Rasberry joined Sam Haycraft, Jim Swehla, and Mike Durst in the acquisition of East Alton, Illinois-based Premier Air Center 17 years ago and steered the company from an entity with 150 employees to one that now has more than 1,400 and spans four major MRO centers along with a half-dozen more satellite facilities.

Gerry Block, founder and CEO of *Sandel Avionics*, stepped down from his post. Block established Sandel in 1998 to bring high-performance color graphics avionics to unserved general aviation customers and is credited as the creative force behind the company's complete product line, including the original SN3308 ColorMap HSI, 4ATI primary instruments, Commuter Airline TAWS, HeliTaws, and Avilon King Air flight deck. No reason was given for the move nor were future plans announced.

Teterboro, New Jersey-based aviation services provider *Meridian* promoted **Emil Iannone** to chief operating officer of the company's air charter division. He had served as its director of operations for the past six years.

Vivek Kaushal was named COO of *Global Jet Capital*. He steps into the role formerly held by Dave Labrozzi, who recently became vice chairman. Kaushal joined Global Jet in 2015 as it acquired the GE Capital business aircraft portfolio.

FlightSafety International promoted **Rick Madarasz** to treasurer and chief financial director. Madarasz joined FlightSafety in 2017 as a financial director after holding senior financial positions in various industries, including as CFO for a firm specializing in building commissioning and v-p of accounting and controller for a medical device manufacturer.

Mike Tamkus joined the executive leadership team of *Solairus Aviation*. Tamkus has more than 20 years of aviation industry experience, most recently as senior v-p of client services and sales for NetJets subsidiary Executive Jet Management.

CHC Group promoted **Miguel Carrasco** to senior v-p of operations and supply chain. Carrasco, who formerly served with Conoco Phillips and American Airlines, joined CHC in 2016 as v-p of maintenance and supply chain.

EPIC Fuels named **Owen Busch** senior v-p of sales for both EPIC Fuels and the Signature Select FBO brand. Busch has nearly 20 years of experience in the business and general aviation fuel sector, holding roles with Avfuel, Signature Flight Support, and Atlas Oil before becoming v-p of global sales excellence for World Fuel Services.

The *National Air Transportation Association* promoted **Shannon Chambers** to v-p of marketing and communications. Chambers has served with NATA for the past 12 years in various marketing, membership, communications, and public relations roles.

Investment firm *EnTrust Global* brought **Matt Meissner** on board as vice president focused on investment research.

Heli-One promoted **Christian Drouin** to v-p, serving as the lead executive for the entire organization. He replaces **Eddie Lane**, who is leaving Heli-One to pursue another opportunity.

Bombardier named **Christophe Degoumois** v-p of international business aircraft sales, responsible for all regions outside of the Americas. Degoumois joined Bombardier in 2004 as a sales director and most recently was v-p of sales for Europe, Russia and the Commonwealth of Independent States.

Global communications provider *OneWeb* appointed **Ben Griffin** v-p for commercial aviation, focusing on in-flight connectivity solutions through a network that uses low-earth-orbit satellites.

Anthony (Tony) Lawson was named v-p and general manager of *Cadence Aerospace—Giddens Industries*, the Everett, Washington complex part manufacturer. Lawson, who has more than three decades of experience, previously was v-p of operations, quality, and environment, health, and safety, as well as operations manager for the Cadence Tell Tool facility in Westfield, Massachusetts.

Aircraft acquisitions and brokerage specialist *Soljets* added **Michael Parker** to its sales team as executive sales director. Parker brings more than two decades of experience to his new role, formerly holding roles with Cessna Aircraft, HondaJet Northwest, and Keystone Aviation, as well as serving as a charter pilot of both turboprop and jet aircraft.

Dassault Aviation named **Anne Devilliers** Falcon sales director for Great Britain, Ireland, the Balkans, and Greece. Most recently Falcon international sales manager, Devilliers joined Dassault in 2003 at the company's Dassault Falcon Jet U.S. subsidiary, holding a number of marketing positions before joining the Falcon sales team in 2016.

Chad Edinger joined *JET Infrastructure*, which owns and manages a portfolio of jet fuel pipelines and terminals across the U.S., as general manager. Edinger previously was v-p of marketing and business development for NuStar Energy (formerly Kaneb Pipeline).

John Benoit joined *Universal Avionics* as director of strategic business development, leading market development activities with airframes and avionics manufacturers, developing product roadmaps, and fostering partnerships. He brings 20 years of aerospace experience to his new role, previously holding posts at Esterline Avionics Systems, Aviage Systems, Performance Software, and Honeywell Aerospace.

Aerovon Risk Advisors, formerly Eastern Aviation Insurance Services, appointed **Miller Stallings** as an account executive, managing new accounts.

West Star Aviation appointed **Rusty Gardner** avionics install manager its East Alton, Illinois location. West Star also appointed **Jeremy Turnbough** paint program manager at East Alton.

Millennium International Avionics hired **Doug Miller** as a senior software engineer, responsible for product innovation with a focus on market growth initiatives.

The Av8 Group added **Jeff Favati** to its sales team as sales manager.

Kadex Aero Supply brought **Colin Mann** on board as regional sales manager (West) in Calgary. Mann most recently was director of maintenance for Avmax Aviation services.

Uniflight Global named **Darryl (DJ) Bates** director of maintenance for its flight operations division. Bates has more than 40 years of helicopter maintenance experience and a background in Part 135.

Millennium International Avionics named **Todd Slater** business development director.

Skyservice Business Aviation appointed **PJ Sharpe** director of business development, USA.

Avant Aerospace promoted **John Hardy** to director, based at the company's East Alton, Illinois facility while overseeing all Avant locations.

Cutter Aviation promoted **Gina Iacolino** to chief inspector for Cutter Aviation's maintenance facility in Denver, Colorado. A former mechanic and crew chief with the U.S. Army, Iacolino has nearly 30 years of experience as an A&P, sheetmetal, field maintenance, and shop floor mechanic, as well as a Part 135 aircraft records manager and chief inspector.

FlightSafety International named **Daniel Greenhill** director of sales for unmanned systems training. Most recently director of sales for Gulfstream training programs, Greenhill has served with FlightSafety since 2004 in a number of roles.

West Star Aviation appointed **Larry Marler** technical sales manager at its facility in Chattanooga, Tennessee. ■

FINAL FLIGHT

FBO industry veteran **Michael Wayne "Mike" Dolphin**, 73, died peacefully at his home last month. He was born and raised in Pittsfield, Massachusetts, and attended Embry-Riddle Aeronautical University in Daytona, Florida.

Dolphin's career began with Yankee Airlines in Pittsfield, then he moved to Richmor Aviation in Hudson, New York, and ultimately served as president of Jet Systems at Westchester County Airport in White Plains, New York, until retirement several years ago. Dolphin was well known in New York-area business aviation circles for his hard work, energy, and sense of humor. He was always active in promoting and supporting business aviation and the FBO industry.

A pilot for more than 50 years, Dolphin logged more than 18,000 hours, much of that as a recreational pilot, including in his personal Cessna 210 single. He was also an avid motorcyclist, in addition to enjoying dogs, boating, and cars. ■

AWARDS and HONORS

John Rosanvallon, who is stepping down as CEO and president of Dassault Falcon Jet after a nearly-45-year career with the French manufacturer, and **Mary Miller**, corporate v-p of industry and government affairs for BBA/Signature Flight Support, are among a slate of six recipients announced for this year's National Aeronautic Association (NAA) 2019 Wesley L. McDonald Distinguished Statesman of Aviation Awards.

They join former NAA president and CEO **Jonathan Gaffney**, U.S. Air Force chief of staff Gen. **David Goldfein**, founding member and former president of the International Aerobatic Club **Michael Heuer**, and long-time Air Line Pilots Association communications executive **Don Skiados** as this year's honorees. ■

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Gulfstream intros flagship G700

The mockup's first section includes a forward lavatory; storage area; a flexible crew rest area; and an "ultra-large" galley complete with a 10-foot countertop, spacious refrigerator, microwave, conventional oven, and plenty of storage space for tableware, food, and drinks. In fact, the galley is so well equipped that Gulfstream said owners could eschew catering and, instead, bring along a chef to cook meals from scratch onboard the G700.

Its second section offers club-four seating with all-new, fully articulating and berthable seats that improve comfort and aesthetics. They are available in a number of fabrics, finishes, and firmness levels. In addition, the mockup has wider ledges with integrated storage, device power outlets, and deep cup holders.

Meanwhile, the third zone features an entertainment area with a three-seat divan, pop-up 40-inch 4K flat-screen TV, and immersive 3D sound system that turns the sidewall panels into speakers. Gulfstream collaborated with Bongiovi Acoustic Labs on the sound system, which uses transducers attached to the back of the cabin wall panel and thus allows the panel itself to become the speaker.

For dining, the fourth section is configured in a club-six layout with a quick-deploy table that spans the entire cross-section. The table also includes a hidden, built-in wireless charger that allows passengers to recharge their smartphones simply by placing their devices on the table.

The aft section of the mockup contains a master bedroom with a full-size bed and dresser, in addition to an en suite lavatory with a toilet and vanity opposite from a floor-to-ceiling storage closet. In a first for a Gulfstream, the aft lav includes windows. Aft lavatory options not shown on the mockup include a larger vanity with opposite toilet, as well as a shower.

A rear door in the aft lavatory allows in-flight entry to the 195-cu-ft baggage compartment, which can hold up to 2,500 pounds.

The $75 million Gulfstream G700 has five living areas: as shown at NBAA, galley/crew rest, club seating, entertainment zone, dining, and master suite.

In Perfect Symmetry

At the front end, the G700 features Gulfstream's touchscreen Symmetry flight deck driven by Honeywell Primus Epic avionics and BAE-developed active-control sidesticks that simulate mechanical linkage to prevent simultaneous pilot input and allowing pilots to clearly see movement of the controls. The full three-axis digital fly-by-wire system offers flight-envelope protection, stability augmentation, increased redundancy, and reduced maintenance.

Many of the visible switches found in earlier designs have been eliminated. Instead, inputs are made through 10 touchscreens like those in the G500/600. In addition, cursor control devices are integrated into the center console, giving each pilot control of three of the four main display screens and allowing data to be shifted between them in the event of a failure.

The system incorporates intelligent input recognition software that filters out erroneous inputs. "Basically, Symmetry won't let the pilots make any system changes that could harm the airplane," said Gulfstream senior v-p of innovation and test flight Colin Miller. "And an intuitive phase-of-flight capability reduces pilot workload. It can automatically turn on things such as the fuel pumps in the engine start sequence. Because of this, you can go from dark screens to engine startup in less than 10 minutes."

Standard avionics include dual head-up displays—another first for a Gulfstream—EVS III enhanced vision and synthetic vision system, giving it full enhanced flight vision system (EFVS) to land capability. Additionally, the G700 comes standard with 3D taxi, Honeywell RDR-4000 3D weather radar that provides predictive hazard warnings for lightning and hail, and a new predictive landing system that aims to prevent runway overruns by showing where the airplane will come to a stop on the ground in its current configuration.

Gulfstream has also redesigned the pilot seats for better comfort—an important feature on an airplane with an endurance exceeding 14 hours.

Other Systems and Specs

Power for the G700 comes from two 18,250-pound-thrust Rolls-Royce Pearl 700 turbofans. Compared with the BR725 on the G650/650ER, the new model provides 8 percent more thrust while burning 3.5 percent less fuel, in addition to weighing less. The new engine will be Stage 5 noise compliant and nitrous oxide emissions will be 35 percent below CAEP/6 standards.

New features inside the engine include a blisk fan, 10-stage high-pressure axial compressor, and improved gearbox breather exhaust. Safran-Aircelle is supplying the new nacelle for the Pearl 700. The engine will require a new certification, Gulfstream said.

Meanwhile, Daher is supplying the new high-speed winglet for the G700. "Its curved shape will give the airplane a distinctive ramp presence compared to other Gulfstreams," Miller said. The G700's nose-to-tail length of 109 feet 10 inches—10 feet greater than the G650ER—will also add to the new airplane's ramp presence, he added.

The G700 will have a maximum takeoff weight of 107,600 pounds and a maximum fuel load of 49,400. Balanced field length at mtow is 6,250 feet, while the landing distance is 2,500 feet at an as-yet-unspecified "typical landing weight."

Maximum range is "conservatively" 7,500 nm at a normal cruise speed of Mach 0.85 or 6,400 nm at Mach 0.90 high-speed cruise, according to Gulfstream's Miller. Like the G650/650ER and G500/600, the G700 has a maximum speed of Mach 0.925.

At Mach 0.85, the G700 could fly nonstop westbound from New York to Beijing, all of South America to the south, and Cape Town and Delhi to the east. At a reduced mtow of 100,000 pounds to meet weight restrictions at New Jersey's Teterboro Airport (TEB), the twinjet can fly nonstop from TEB to Beijing, Tokyo, all of South America, Nairobi, and Delhi at Mach 0.85.

Certification is expected in 2022, with service entry to immediately follow. Like other in-production Gulfstreams, the G700 will be certified for steep approaches. ■

Flexjet opens London office to support European expansion

Flexjet last month opened a new office and customer hospitality space in London as part of the private aviation group's plans to expand its presence in the European market. The U.S.-based group said the new facility, located in the upmarket Mayfair district of the UK capital, will provide fractional owners with benefits similar to those available through the Flexjet Red Label program with the Flexjet-Exclusive Private Terminals at airports.

The London office was opened by Marine Eugène, the former NetJets executive who became Flexjet's European managing director in January. "In the coming year, we expect to make further announcements about our European expansion, including the acquisition of new aircraft and new programs to expand access for Europe-based customers who surely will gravitate to the Flexjet Red Label experience."

Flexjet, which is part of the Directional Aviation group of companies, is not yet offering its Flexjet Red Label fractional ownership or 25-hour charter card program from sister company Sentient Jet to customers in Europe. However, Directional does offer ad hoc charter flights in Europe through its Private Fly subsidiary.

To support expansion plans in Europe, the group has opened a European Tactical Control Center at London Luton Airport. In 2016, Flexjet acquired UK-based operator Flairjet and then in 2018 added Italian operator Sirio. Between them, these companies operate a fleet of 15 jets, including a mix of 12 Nextant 400XTis and three Embraer Legacy 600s. **C.A.**

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THE FLORIDA INTERNATIONAL AIR SHOW...
November 1-3, Punta Gorda Airport, Punta Gorda, Florida. Info: floridaairshow.com

FLIGHT SAFETY FOUNDATION INTERNATIONAL AIR SAFETY SUMMIT... November 4-6, Taipei. Info: flightsafety.org/events.

BOMBARDIER SAFETY STANDDOWN... November 12-14, Omni Fort Worth Hotel, Fort Worth, Texas. Info: safetystanddown.com.

IBERIAN PENINSULA BUSINESS AVIATION CONFERENCE...
November 14, Madrid, Spain. Info: ipbace.com.

DUBAI AIRSHOW... November 17-21, Airport Expo, Dubai, UAE. Info: +97 1 4286 7755; dubaiairshow.aero.

7TH EASA AIRWORTHINESS DIRECTIVES (AD) WORKSHOP...
November 25-26, Cologne, Germany. Info: easa.europa.eu/newsroom-and-events/events/7th-easa-ad-workshop-0.

AFRICAN AIR EXPO... November 27-29, King Shaka International Airport, Durban, South Africa. Info: africanairexpo.com.

DECEMBER

MASSACHUSETTS BUSINESS AVIATION ASSOCIATION SAFETY DAY... December 4, Marriott Burlington. Info: massbizav.org.

JANUARY 2020

THE PRINCIPLES OF AIRCRAFT VALUATIONS AND APPRAISALS... January 10, Fort Lauderdale, Florida. Info: aeropodium.com/valuation.html

HAI HELI-EXPO... January 27-30, Anaheim Convention Center, Anaheim, CA. Info: rotor.org.

NBAA WEST PALM BEACH REGIONAL FORUM... January 29, Palm Beach International Airport, West Palm Beach, FL. Info: nbaa.org.

FEBRUARY 2020

SINGAPORE AIRSHOW... February 11-16, Changi Exhibition Center, Singapore. Info: singaporeairshow.com.

MARCH 2020

AIR CHARTER SAFETY SYMPOSIUM... March 3-4, NTSB Training Center, Ashburn, VA. Info: acsf.aero/symposium/.

NBAA SAN JOSE REGIONAL FORUM... March 5, San Jose International Airport, San Jose, California. Info: nbaa.org.

INTERNATIONAL WOMEN IN AVIATION CONFERENCE... March 5-7, Disney's Coronado Springs Resort, Lake Buena Vista, FL. Info: wai.org/conference.

NBAA INTERNATIONAL OPERATORS CONFERENCE...
March 16-19, Charlotte, North Carolina. Info: nbaa.org/events/2020-international-operators-conference/.

AIRCRAFT ELECTRONICS ASSOCIATION INTERNATIONAL CONVENTION AND TRADE SHOW... March 24-27, Nashville, TN. Info: aea.net.

APRIL 2020

EURASIAN BUSINESS AVIATION SUMMIT AND EXHIBITION...
April 28-30, Gostiny Dvor Exhibition Complex, Moscow, Russia. Info: +7 9372 757 085; email: info@eabaa.show; eabaa.show.

MAY 2020

EUROPEAN BUSINESS AVIATION CONVENTION & EXHIBITION... May 26-28, Palexpo Convention Center, Geneva, Switzerland. Info: info@ebace.aero; ebace.aero/2020/

JUNE 2020

NBAA WHITE PLAINS REGIONAL FORUM... June 10, Westchester County Airport, White Plains, New York. Info: nbaa.org.

JULY 2020

FARNBOROUGH INTERNATIONAL AIRSHOW...
July 20-24, Show Centre, ETPS Rd, Farnborough, England. Info: +44 (0) 1252 532800; enquiries@farnborough.com; farnboroughairshow.com.

DUBAI 2017

PHOTOS: MARK WAGNER

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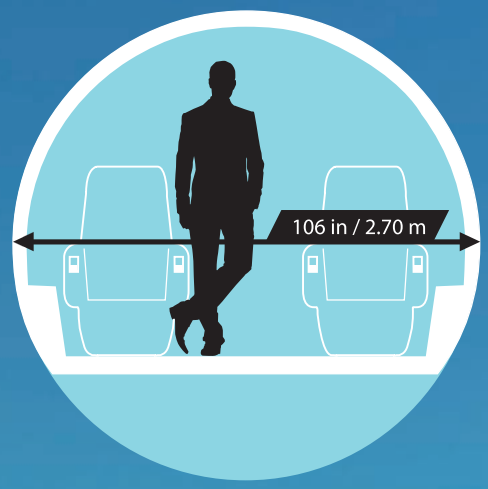

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