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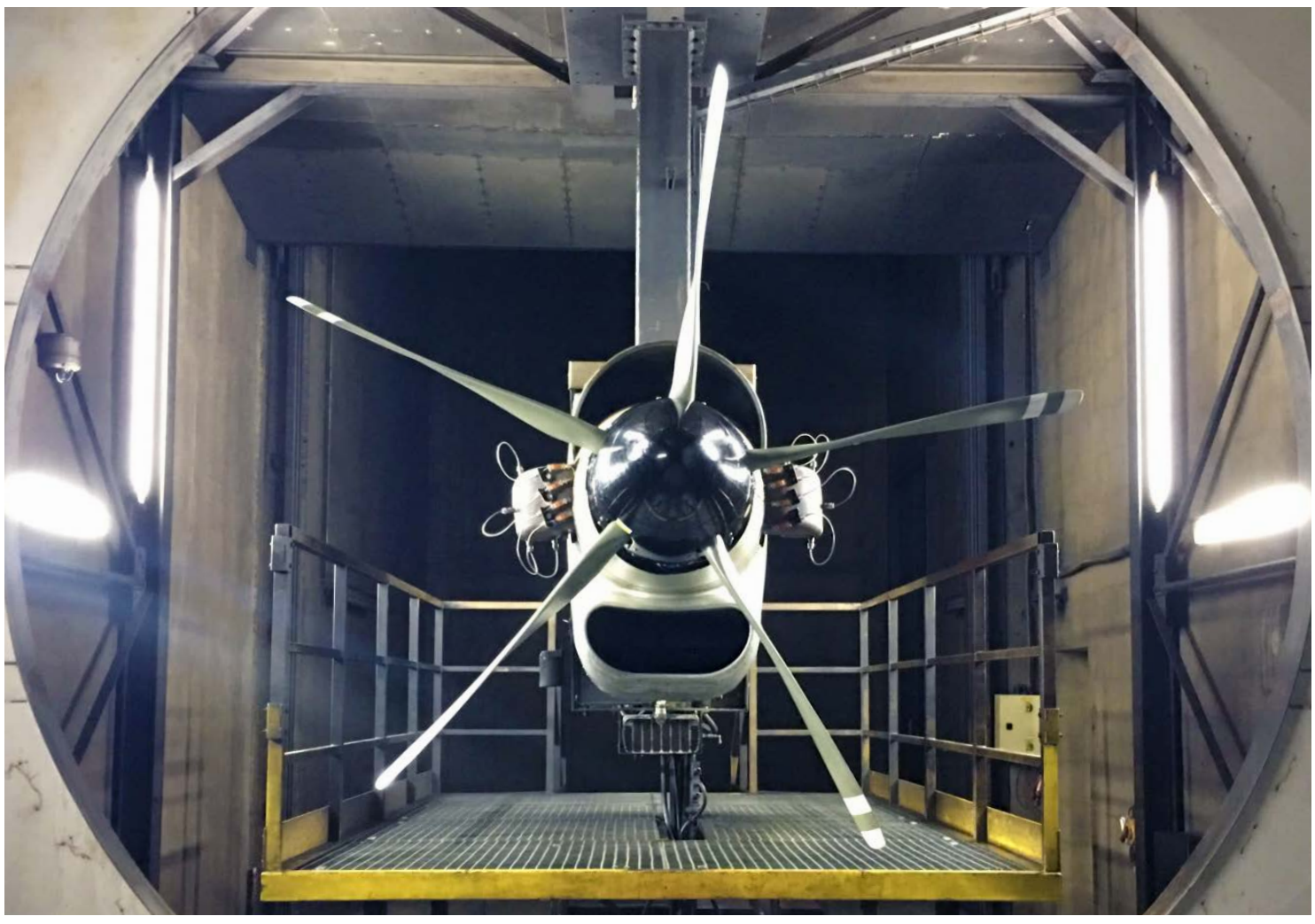

GE spools up on bizav engines

by Kerry Lynch

With the unveiling of the official name of the Advanced Turboprop engine as the Catalyst, GE Aviation celebrated 10 years in the business and general aviation (B&GA) turboprop sector and its subtantial progress toward becoming a provider of a suite of engines reaching up to 1,700 shp.

GE jumped into the B&GA turboprop market sector through its 2008 acquisition of the former Walter Engines line of turboprops, providing the foundation for the light turboprop market with engines ranging from 750 shp to 850 shp. That acquisition gave GE Aviation a foothold in the already developed Czech Republic manufacturing sector, a built-in customer base, and knowledge of the types of services necessary for such engines, said Brad Mottier, v-p and general manager of GE Aviation's Business and General Aviation and Integrated Systems division.

But as important to GE, the former Walter family, now known as the H-Series, has provided "domain expertise" that has helped pave the way for a clean-sheet design turboprop family to pit against the venerable Pratt & Whitney Canada PT6 series.

GE announced that 900- to 1,700-shp turboprop family in 2015 originally as the Advanced Turboprop (ATP) line. And with that announcement, GE had its first major win: a contract to power Cessna's new single-turboprop Denali.

Mottier revealed the change in the name from the ATP to the Catalyst last month to reporters in Prague, saying it signifies GE's newest turboprop engine family is "a catalyst for change, it's a catalyst for the competition to be working on something else...it's a catalyst for new airframe designs..for new maintenance...for new operations...for better pilot experience...[and] for better service."

Emphasizing that the engine is not intended only to provide a means to go faster or be more fuel efficient, Mottier said it is designed to change the pilot experience to more of a "jet like" environment.

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Read Our **SPECIAL REPORT**

FBO survey results

After a decade in the doldrums, FBO operators are seeing some positive signs. Consolidation has been the watchword for the last few years, and that will continue, at a more measured pace. As always, service is key.

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Meet the Mod Masters

Hampton Aviation gives a King Air B200 a new lease on life, with modifications that include anti-skid brakes and electric air conditioning.

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As We Go To Press

FAA BANS CERTAIN RESTRAINTS IN DOORS-OFF FLIGHTS

The FAA formally issued an emergency order March 22 prohibiting use of supplemental passenger restraint systems that cannot be released quickly in commercial doors-off flight operations. The order further prohibits doors-off operations unless passengers are secured with FAA-approved restraints. The order came after the March 11 crash of a 2013 Airbus Helicopters AS350B2 in the East River in New York City that resulted in the drowning of five passengers who were wearing supplemental harnesses. The FAA defined supplemental passenger restraints as "any passenger restraint that is not installed on the aircraft pursuant to an FAA approval, including (but not limited to) restraints approved through a type certificate, supplemental type certificate, or as an approved major alteration using FAA Form 337."

ELBIT SYSTEMS BUYING UNIVERSAL AVIONICS

In a further sign of consolidation in the aerospace marketplace, Elbit Systems announced on March 22 that it is acquiring Universal Avionics through an asset acquisition agreement. The deal is expected to close "in the coming weeks." The joining of the two companies will create a new avionics integrator with the ability to serve a variety of OEM and aftermarket avionics needs. Universal's new InSight Display System integrated avionics suite provides a platform to offer systems for new aircraft, as well as retrofit opportunities. Elbit's avionics capabilities serve a variety of aerospace markets, with its products covering communications, military and helicopter flight decks, electro-optics, and UAS avionics.

VICE CHOSEN TO GUIDE AERION SSBJ TO FINISH LINE

Aerion has named Tom Vice, the former president of Northrop Grumman's Aerospace Systems division, president and COO. In his new role, Vice will be responsible for all aspects of Aerion's AS2 supersonic business jet (SSBJ), including design, development, certification, and customer delivery. The Reno, Nevada-based company announced in December that it was partnering with GE Aviation and Lockheed Martin to develop the Mach 1.4 AS2. First flight is scheduled in 2023, with certification to follow in 2025.

FAA MULLS OPTIONS TO BOOST A/C REGISTRY TRANSPARENCY

The FAA "wants to provide as much transparency as possible" in the U.S. aircraft registry, while also taking into consideration aircraft owners' privacy concerns, FAA Aeronautical Center counsel A.L. Haizlip said last month at the NBAA Business Aircraft Finance, Registration, and Legal Conference in Fort Myers, Florida. Recent *Boston Globe* articles have criticized the registry for obscuring the true owners of aircraft and subsequently prompted simultaneous—and currently ongoing—reviews of the FAA's aircraft registry by the DOT Inspector General and Government Accountability Office. Haizlip said the FAA is internally debating options to increase owner transparency. Some options would barely upset the status quo, while others would make sweeping changes to the amount of owner information the FAA collects.

PREOWNED BIZJET MARKET FINDS BALANCE

The decline in preowned business jet inventory, which is now 9.4 percent of the in-service fleet, has brought an end to the buyer's market, "but it's not quite a seller's market, yet—it's more of a balanced market," Mesinger Jet Sales president and CEO Jay Mesinger told attendees at the NBAA Business Aircraft Finance, Registration, and Legal Conference. Now that buyers and sellers are on even ground, prices of used jets have stabilized. The market has become so tight, he said, that even business jets previously considered "untouchable"—those based in second- or third-world countries—are now selling.

FAA FORECAST: TURBINE FLEET TO KEEP GA MARKET STABLE

The U.S. active general aviation fleet is anticipated to remain stable over the next 20 years, growing less than 0.5 percent in total through 2038, according to the latest FAA forecast. This stability is anticipated to come on the strength of the turbine aircraft and helicopter markets, which are expected to offset declines in the piston aircraft fleet, the agency added. According to its 2018 to 2038 forecast, the general aviation fleet will inch up from 213,050 in 2017 to 214,090 by 2038. Looking at the turbine fleet alone, the FAA is projecting an average growth rate of 2 percent a year, for a total of 15,255 additional aircraft over the forecast period.

BIZAV HAS AN IMAGE PROBLEM, INDUSTRY SURVEY SAYS

Just one in three business aviation professionals believes the sector has a positive image, while 64 percent describe it as either "negative" or "neutral," according to a new study released by communications agency Citigate Dewe Rogerson. The study also revealed that just 9 percent think the industry is "very effective" at communicating its benefits, including economic growth contributions and job creation. Two thirds believe the sector gets mainstream media coverage only when there has been a crash or scandal.

Bizav ops decline at SMO

by Kerry Lynch

In the three months since the city of Santa Monica shortened the runway at Santa Monica Airport (SMO) in California to 3,500 feet, jet traffic has plummeted by more than 80 percent, the city reported last month. Jet operations at SMO last month numbered just 139, down from the average of 687 jet operations in February 2016 and 2017. Similarly, in January, jet operations had declined to 111, down 84 percent from the prior average of 696 in January 2016 and 2017.

At the same time though, helicopter operations increased 41 percent in February and 33 percent in January from the prior-two-year average, while turboprop operations were up 40 percent in February and 9 percent in January.

Traffic Transitioning

Overall operations were down by a little more than 400 in both January and February from their respective prior-two-year averages. February operations numbered 2,219, compared with 2,661 previously, and January operations totaled 2,116, compared with the 2,551 prior-two-year average. The increased turboprop activity may be an indication of jet traffic beginning to transition to turboprop, said senior advisor to the city manager Suja Lowenthal.

MATT THURBER

Since Santa Monica Airport (SMO) shortened its runway by 1,500 feet, to 3,500 feet, in December, business jet traffic there has plummeted by more than 80 percent, while turboprop operations are up 40 percent. This statistic is reflected by the traffic on the ramp at Atlantic Aviation SMO.

The city in December completed its runway-shortening project as part of a larger plan to set the stage for closing the airport altogether by the end of 2028. NBAA had urged the city to delay the shortening in light of a pending lawsuit before the U.S. Court of Appeals that seeks to overturn an agreement between the city and the FAA that enables not only the runway shortening but also the ultimate airport closure. Oral arguments in that case have been scheduled for May 14, keeping the lawsuit on pace for a decision by year-end. ■

FAA authorization extended again

Congress late last month approved a government-wide spending bill that included an $18 billion budget for the FAA in Fiscal Year 2018 and a six-month extension of the agency's authorization. Congress unveiled the massive spending bill just two days before it faced another government shutdown at the end of March 23.

The FAA authorization extension, which runs through September 30, was included shortly before the agency's authorization was set to expire at the end of March. Congress opted to provide additional time to hash out differences on multi-year House and Senate FAA reauthorization bills. But the key sticking point, the future of the air traffic control system, has been settled, at least for now, with House Transportation and Infrastructure Committee chairman Bill Shuster (R-Pennsylvania) dropping his push for an independent user-funded ATC organization.

The government-wide omnibus bill funds the FAA through the remainder of FY2018. The FAA, like most of the federal government, had been operating under a series of stop-gap budget extensions that kept funding flat. But with the full appropriations bill, the FAA is to receive nearly a $1.5 billion boost in this year's budget. That omnibus measure also included provisions of interest to the business and general aviation community, such as funding to expand use of organizational designation authorization, a directive for the FAA to create standards on additive manufacturing, the continuation of privacy protections from real-time flight tracking data, a directive for a Part 135 Aviation Rulemaking Committee on Part 135 rest and duty time rules, a directive for a study on Part 135 trends, and increased NextGen funding. The ban on large aircraft at Teterboro Airport in New Jersey is continued.

Similarly, the long-term FAA reauthorization bill is anticipated to include a number of measures closely watched by the industry that touch upon certification reforms, the future of supersonic travel, the incorporation of unmanned aircraft into the National Airspace System, and protection of the U.S. aircraft registry from future potential government shutdowns.

Other measures discussed have included an initiative—one the National Air Transportation Association opposes—to eliminate the barriers between private and commercial flights. Also, the association is monitoring a provision regarding a report on rest and duty time rules and another measure that could alter aircraft registration privacy protections. **K.L.**

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Cessna SkyCourier concludes early tests in wind tunnel

by Chad Trautvetter

Textron Aviation has completed initial wind tunnel testing of its new Cessna SkyCourier turboprop twin, the company reported last month. Notably, the wind-tunnel model was fitted with electric motors and scaled propellers calibrated to represent the thrust produced by the real aircraft, said Textron Aviation senior vice president of engineering Brad Thress.

"We're making progress in the development of this clean-sheet aircraft and are eager to continue defining the details that will allow us to start creating tools and parts," he said. First flight of the SkyCourier is slated for next year, with service entry planned in 2020.

The wind-tunnel model of the Cessna SkyCourier was fitted with electric motors and scaled propellers calibrated to represent the thrust produced by the real aircraft.

Since the Wichita-based aircraft manufacturer announced the large utility twin in November, it has seen interest from operators beyond launch customer FedEx Express. The company is also gaining feedback from its customer advisory board (CAB) to affirm what customers need in this segment.

"The flexibility and mission potential for the SkyCourier is attractive to a wide variety of operators," said Thress. "The feedback we're gathering from the CAB is extremely important as we develop an aircraft that is reliable, efficient, and meets the diverse requirements of an array of mission profiles." ■

ACSF safety symposium emphasizes compliance

by Kerry Lynch

Pressure on pilots to complete missions, poor training, complacency, fatigue, and apathy are among myriad factors that play into procedural noncompliance, and in turn can have devastating consequences, attendees of the 2018 Air Charter Safety Foundation's (ACSF) 2018 Safety Symposium were told today. However, these factors, said Bob Baron, president of The Aviation Consulting Group, can be mitigated by a proactive and predictive approach that balances safety with operations.

Baron was part of a slate of eight safety experts scheduled to guide attendees on topics ranging from decision-making to implementing an Aviation Safety Action Program to runway excursions to managing communications after an aircraft accident. More than 120 senior industry, association, and government representatives registered for this year's two-day ACSF symposium, which also featured a half-dozen exhibits.

Kicking off the symposium, Baron relayed personal pressures he faced while a contract pilot, including operators chastising him for executing a go-around or deicing the aircraft, and being told to continue operating with a worn tire. Along with pressure from a company, he noted pressure pilots face from interaction with passengers could further lead to procedural noncompliance. Other pitfalls can come from a lack of training, high risk-takers, and even use of contract pilots that can make crew resource management more difficult, he said.

But Baron stressed that balancing "production" with "protection," where a strong safety culture is incorporated while still fostering strong operations, could help offset issues that might lead to noncompliance. He advised thoroughly vetting pilots, "looking for red flags," and cautioned against "pencil whipping" or pressuring pilots to such an approach where boxes are checked without full knowledge of what was just approved. He also advised implementing a strong cockpit resource management program.

A proactive approach—through safety management systems, safety reporting, and/or efforts such as FOQA—further will ward off noncompliance, he added. These efforts won't prevent all accidents, he acknowledged, saying, "There is no silver bullet." However, he added the efforts would provide the necessary ammunition to help provide appropriate safeguards. ■

U.S. tax reform narrows definition of business use

The new U.S. tax law introduced 100 percent bonus depreciation for purchases of aircraft used for business and extended this kind of benefit to both new and, for the first time, preowned models. But it also significantly narrowed or eliminated activities that previously qualified as business use, GKG Law president Keith Swirsky said last month at the NBAA Business Aircraft Finance, Registration, and Legal Conference.

According to Swirsky, aircraft expenses associated with entertainment, recreation, or amusement were previously deductible if they were "directly related [to] or associated with the active conduct of business." But as of January 1 under the new law, all such entertainment expenses are disallowed, "regardless of whether they were related to a business goal," he said.

Likewise, the tax law also largely disallows commuting expenses, such as when a CEO uses a company aircraft to fly between his residence and place of employment. "There is an exemption for when this transport is necessary for ensuring the safety of the employee, but this has not really yet been defined." **C.T.**

News Briefs

Luxury Yacht Seized in Zetta Jet Bankruptcy Case

Global law firm DLA Piper said Australian authorities have seized the luxury yacht Dragon Pearl, which the firm claims was purchased with "misappropriated" Zetta Jet funds, an allegation former company managing director Geoffery Cassidy disputes. DLA Piper is advising now-defunct air charter company Zetta Jet in its ongoing bankruptcy proceedings in the U.S., Singapore, and Australia. Zetta Jet filed for bankruptcy protection in September and ceased operations in late November. The firm's Singapore team has been responding to an injunction brought by two Zetta Jet shareholders—one of them Cassidy—seeking to prevent the U.S. bankruptcy proceedings from taking effect. The Singapore court has so far granted limited recognition to allow the trustee to seek dissolution of the injunction.

Bizav Flying in U.S., Canada Continues Climb

Business aircraft flying in the U.S. and Canada during February ticked up 3.5 percent year-over-year, according to TraqPak data from Argus International. By operator category, Part 135 flying rose 8.8 percent year-over-year, while Part 91 reported a 0.7 percent gain. Fractional activity dipped into the red, falling 0.6 percent. All aircraft categories saw increases, with large-cabin jets climbing 7.1-percent, followed by midsize jets, up 3.6 percent; turboprops, 2.5 percent; and light jets, 2.3 percent. Activity has steadily increased over the past three Februarys from approximately 212,000 flights in 2015 to 237,000 in 2018. Weekday flying was up 3.2 percent from a year ago, while weekend activity rose 2.6 percent.

CL350 Narrows In on Steep-approach Approval

Bombardier Business Aircraft recently completed its steep-approach certification flight-test campaign for the Challenger 350, with final approval expected later this year. This certification will allow operators to perform landings under strict conditions, including the steep 5.5-degree approach angle and short runway at London City Airport (LCY). As part of the campaign, the test Challenger 350 performed several takeoffs and landings at LCY to demonstrate this operational capability.

Saudo To Succeed Even as Safran Helo Engines CEO

Safran Helicopter Engines has announced that CEO Bruno Even will leave the company on April 2 and will be succeeded by Franck Saudo, who joined Safran in 2011 and served most recently as CEO of Safran Transmission Systems. He will be replaced in that role by Eric Valentin, who was promoted from vice president for production in the French manufacturer's landing gear and integration division.

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After strong global performance in 2017, Gama Aviation looks to boost biz in Europe

by Ian Sheppard

Gama Aviation experienced a strong year of growth in 2017, as the business aviation specialist's operations in the U.S., Asia, and the Middle East all ticked up. The U.S. performed the strongest, partly on the strength of its contract with Wheels Up (which now has 12 bases) and the Gama Aviation Signature joint venture, which was created on January 1, 2017. While profit in Europe proved elusive in the year, the group is looking to bolster that side of its business and become less UK-centric, co-founder and CEO Marwan Khalek told **AIN**.

Of the £48 million (around $67 million) raised in an equity placing earlier this year, $10 million has been earmarked for investment in two maintenance facilities in the U.S. (one on the East coast and one on the West); $10 million for developing its Sharjah, UAE business aviation center; and the rest for "acquisitions in the Europe air and ground divisions and the Middle East air division." Khalek said the European division "needs scale and needs to be more European."

The company, which is listed on the UK's Alternative Investment Market, recorded 2017 revenues of $207.4 million, up 5.8 percent, with underlying profit of $18.7 million. In the U.S. the new division created through the merger of its U.S. operations with the BBA aircraft management business (Landmark), rebranded as Gama Aviation Signature, in which Gama Aviation has a 24.5 percent stake, and saw "significant growth."

As a result, revenues for the the company's U.S. air-related activities increased by 35 percent, to $518 million. This was also fueled by the "continued growth of our Wheels Up contract," said the company. It added, "The integration of the BBA business is delivering the envisaged benefits: adding complementary West Coast coverage to the existing East Coast business, diversifying the client base, providing the ability to cross-sell maintenance services into Gama Aviation's wholly owned U.S. ground business, and delivering cost synergies."

In the Middle East, revenue grew by 20.5 percent, to $23.5 million, and the division was "profitable for the first time," returning $0.5 million. In October, Gama Aviation bought out Jet Set's 51 percent stake in its Middle East ground division, seeking "a strong foundation for our planned development in the region."

In Asia Gama Aviation acquired Hutchison Whampoa's 50 percent stake of its Hong Kong-based joint venture, with Hutchison, instead, becoming a strategic investor in the Gama Aviation group by taking a 20 percent stake. The group itself now also holds a 20 percent stake in Hong Kong Chek Lap Kok International Airport-based MRO provider CASL. "We're very well placed in the Asia market...we've decided to use Hong Kong as our main base, while in a holding pattern waiting to see what happens in Mainland China." ■

Boeing 737 Max 7 completes first flight

Boeing's 737 Max 7 flew for the first time last month, departing Renton Municipal Airport in Washington state for a three-hour and five-minute mission that saw the smallest of the new family of narrowbodies reach an altitude of 25,000 feet and a speed of 250 knots.

CFM International Leap-1B engines power the family and help reduce fuel use and CO_2 emissions by at least 14 percent when compared to 737NGs. The 737 Max will also use quiet engine technology to reduce the aircraft's operational noise footprint by up to 40 percent. According to Boeing, the Max 7 has 12 more seats and a 7 percent lower operating cost per seat than the A319neo.

"We got the benefit of flying a really beautiful airplane today," said Boeing test pilot Jim Webb. "This is the perfect start to the test program for this aircraft. We did a low approach at Moses Lake, tested some of the safety systems and verifications, and we really completed the profile exactly as it was written."

Asked to gauge the prospects for the airplane, Webb expressed high expectations. "I think it's going to be a great addition to the Max family," he said. "It is small but mighty, and the performance will make a lot of customers really happy."

Southwest Airlines, WestJet, China's Ruili Airlines, Jet Lines of Canada, and Air Lease Corporation account for the Max 7's identified customers. It has also drawn orders from two business jet customers and one undisclosed operator. Boeing would not reveal order totals, however. "We do not discuss order numbers because we want to leave it up to our customers to pick the right model mix," said Boeing Commercial Airplanes regional director of product marketing Jeff Haber. "We do not make that information public."

The 737 Max series boasts improved and efficient structural design, reduced engine thrust, and less required maintenance. When compared to the A320neo, the Max 8 will feature the lowest operating cost in the single-aisle market with an 8 percent per seat advantage, Boeing claims. It expects Max 10 to offer the lowest seat costs ever established for a single-aisle aircraft.

Boeing delivered 74 Max airplanes in 2018 and a high-capacity Max 8 along with the first revenue Max 7 are to be delivered in 2019. The Max 10 is on track for introduction into service around 2020.

Boeing plans further testing of the aircraft in the coming weeks. Keith Otsuka, Boeing test and evaluation captain, also noted that the aircraft would begin testing for high and hot conditions in China. **A.R.**

News Briefs

Global Jet Capital Lands More Financing

Business aircraft financial solutions firm Global Jet Capital has completed an inaugural securitization for $608 million, marking the first asset-backed security (ABS) capital markets financing backed solely by business jet operating leases and loans. According to Global Jet Capital, the transaction was almost three times oversubscribed, generating more than $1.7 billion in orders from more than 30 investors. Global Jet Capital said it will continue to service the assets. The company plans to continue to use the ABS market as an "integral part" of its funding strategy in the future. It currently has more than $2 billion in business aircraft assets under management.

Gogo Sees Rising Demand for In-flight Connectivity

The number of business aircraft outfitted with Gogo air-to-ground connectivity systems stood at 4,678 at the end of last year, up 12 percent from late 2016, the company said in a recent fourth-quarter filing. Demand for in-flight connectivity was up across all business aircraft segments, Gogo said, but was especially robust for light jets and turboprops, which surged 19 percent year-over-year. For the full year, Gogo recorded $240.6 million in business aviation revenues, up from $199.6 million in 2016, thanks in part to growing demand of its new Avance systems. This year, the company said it expects revenues for this segment to be $285 million to $295 million, an increase of between 18.5 percent and 22.6 percent.

European Bizav Flying Grows

February business aircraft usage in Europe climbed 4.5 percent year-over-year, to 57,037 flights, according to WingX Advance. Business jet departures rose 3 percent, with a decline in private flights offset by a 5 percent gain in charter activity in this segment. While Western and Central Europe experienced "robust growth" in flight activity, the UK was flat and Italy recorded only modest gains. Spain reported the largest gains in business jet activity, with a 12-month-trend increase of 9 percent in this segment.

Astronics Rolls Out Electronic CBs for Aircraft

Kirkland, Washington-based Astronics Advanced Electronic Systems, a subsidiary of Astronics Corp., has rolled out a new 28-volt DC electronic circuit breaker unit. The compact CorePower 1448 functions as both a breaker and a switch for controlling loads and replaces conventional thermal mechanical circuit breakers. It contains 24 unidirectional 28-volt DC electronic circuit breakers. Key benefits are reduced weight and costs; elimination of electromechanical devices, relays, contactors and switches; and reduction in wiring. The system can be controlled via existing avionics displays.

HondaJet is thankful to be the most delivered jet in its category in 2017.

No.1 DELIVERIES 2017

With the accolades and accomplishments collected over the years, we are proud to announce yet another milestone: the HondaJet is the most-delivered jet in its category in 2017. This deserves extending our thanks to all who had the vision to make this possible, including our customers who we are proud to have welcomed into the HondaJet family over the past year. And now we look forward to 2018.

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NBAA leadership event is management standdown

by Sean Broderick

Cyrus Sigari, co-founder and president of jet sales brokerage JetAviva, knew about NBAA's annual leadership conference; he'd approved numerous requests for subordinates to attend. But until this year's gathering in San Diego, he'd never experienced the event himself. Now?

"I plan to be here every year, moving forward," he told **AIN**.

This year's event drew a record number of attendees—approximately 450, according to event organizers. The secret to its success? Taking a concept similar to the safety standdown that is so well-received in the operations world and applying it to the administrative side.

"It's a 'pause moment' to reflect on personal development," Sigari said. "It's an opportunity to reflect and to plan, to come away with a redefined mindset." Julie Goodridge, sales director at Jet Professionals, has attended more than half a dozen of the events. This year, NBAA's Business Aviation Management Committee (BAMC), which puts on the event, tapped her to serve as the conference's co-chair. Relying on her experiences from past events and taking input from industry peers, Goodridge and Dustin Cordier, JetAviva managing partner and the other co-chair, built an event designed to give attendees tools for their mental toolbox.

Adjusting to the New Normal

"Attendees really want a message that they can take back to their flight departments," Goodridge said. "They might take some of the themes and host their own mini seminars. In some cases, it provides people with the tools they need to communicate more effectively with senior leadership."

Goodridge and Cordier, both BAMC members, sought a theme that resonated both with personal development and their industry. They settled on the idea of resiliency.

"It's no secret that we have been going through wild swings over the past decade, both in business aviation and the world in general," Cordier said. "Limping along and waiting for normal to return is not an option. We're not going back to normal. This is the new normal."

The event's lineup featured six main speakers—each of whom came from outside of aviation. Two speakers also led interactive workshops, one on emotional mastery and the other on the concept of "living big." The presenters' task wasn't just to connect with attendees, but also to give them tangible takeaways that could be integrated into their day-to-day operations. The program's sessions covered thriving through change; using visualization to achieve success; bouncing back from tough times; and nurturing a resilient spirit.

"It's one thing to sit in a room for two days and feel good," Cordier said. "It's another to be better, afterwards. The workshops give people an action plan that they can take back."

The BAMC has taken steps to ensure the momentum continues between events. In 2015, it launched a LinkedIn group that conference attendees are encouraged to use to stay connected and discuss leadership-centric themes. The group is going strong, with more than 1,200 members.

"Everybody needs a leadership coach," said Goodridge. The BAMC, through initiatives like its events and the LinkedIn group, "wants to be your leadership coach." ■

Centreline adds a second Legacy 500

Bristol, UK-based charter company Centreline has taken delivery of a second Embraer Legacy 500, which it is managing for the aircraft's owner while offering it for charter.

The company said that the nine-seat Legacy 500's range, at 3,100 nm, will allow it "to add capacity to destinations such as the former CIS, Greece, and the Canary Islands, even from relatively short runways such as Dundee and Oxford." Embraer quotes a takeoff distance (balanced field length) of 4,084 feet (at standard sea level conditions and at its max takeoff weight of 37,919 pounds).

The aircraft is Centreline's third super-midsize jet, after a Falcon 2000LXS and its first Legacy 500, which entered service in May 2016 as the first of the type in Europe. It also operates four Cessna Citaton CJ2s and a CJ1 from its main base at Bristol Airport.

Centreline CEO Tanya Raynes said, "Winning the contract for a second aircraft of this type is a clear sign that Centreline is firmly establishing itself as a management organization." Company owner Pula Aviation intends to develop Centreline into a private jet management company. **I.S.**

DOT IG: FAA NextGen effort lacks oversight

by Chad Trautvetter

A recently released report from the U.S. DOT Inspector General found that the FAA "has lacked effective management controls" in its project level agreement (PLA) process for NextGen developmental projects. For example, it found that 12 of the 22 PLAs the DOT watchdog sampled did not align with the FAA's high-priority NextGen investment decisions, primarily because they were for support or implementation work.

Further, the DOT IG said the lengthy PLA approval process led to the FAA often funding projects without approved PLAs and contributed to difficulty obligating funds to developmental projects. Also, the FAA had not defined which types of projects are eligible for developmental work and lacked standard operating procedures for PLAs. In addtion, the FAA's Office of NextGen did not effectively execute and measure the outcomes of NextGen developmental projects, it said.

"[The] FAA has lacked a clearly established framework for managing the overall oversight of developmental projects and addressing persistent problems," the report concludes. The watchdog agency issued six recommendations to improve the FAA's management and oversight of NextGen developmental funding. The FAA concurred with two, partially concurred with one, and did not agree with three. Since Fiscal Year 2008, Congress has appropriated more than $1.7 billion for NextGen developmental projects. ■

As part of the FAA's NextGen program, air traffic control towers and Tracon facilities are transitioning from the old ARTS IIE analog flight-tracking systems (left) to fully digital STARS Elite systems (right).

News Briefs

New Requirements for NAT

Operators flying the North Atlantic Track (NAT) system between FL350 and FL390 must now comply with ICAO's new performance-based communication and surveillance (PBCS) requirements. Since March 29, PBCS compliance is required to fly on three NAT tracks; more tracks requiring PBCS will be added after March 29, 2019, or when the filing of PBCS designators reaches the 90 percent mark. However, the FAA has extended its deadline for Part 91 operators to September 30 to provide additional time for the agency to process LOA applications, which are required to be filed to indicate PBCS compliance. To operate on the PBCS tracks, aircraft must have controller-pilot datalink communications (CPDLC) capable of RCP240 and automatic dependent surveillance-contract (ADS-C) capable of RSP180. Aircraft without these capabilities can still fly on non-PBCS NAT tracks but will have larger separation minima applied.

IBAC Hails Change in Cockpit Door Rules for Bizjets

The International Business Aviation Council (IBAC) hailed an ICAO council decision last month to raise the weight threshold requirement for hardened cockpit doors for aircraft with 19 or fewer seats from 100,310 pounds (45.5 metric tons) maximum certified takeoff weight to 120,152 pounds (54.5 metric tons). This means that current and future ultra-long-range business jets, including the 103,600-pound-mtow Gulfstream G650ER and in-development Bombardier Global 7000, will no longer need to meet this requirement. According to IBAC director general Kurt Edwards, the adoption will become effective July 16 and applicable to member states in November. It amended a key standard in Annex 6 Part 1—International Commercial Air Transport. For example, a Gulfstream spokesperson told **AIN** that this move will permit the G650ER to obtain approval for air charter operations in Europe.

Willis Launches Cyber Insurance for GA Firms

Willis Towers Watson has launched Aerospace Cyber Guard to help protect general aviation companies—including charter firms, FBOs, and MROs, among others—from cyber risks. According to Willis, its new product would provide cyber liability coverage for losses stemming from data breach response and forensic costs; business interruption losses following a data-security event; damage to a company's brand or reputation resulting from a cyber breach; "reasonable dollar amounts" to prevent ransomware extortion; and losses stemming from "social engineering schemes," including fraudulent money transfers. The cyber-insurance solution will be provided by one or more insurance company subsidiaries of W. R. Berkley Corp.

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A chapter closes: no privatization of ATC

by Kerry Lynch

In a move that took many in Washington by surprise, House Transportation and Infrastructure Committee chairman Bill Shuster (R-Pennsylvania) dropped his push to create an independent, user-funded organization to run the U.S. air traffic control (ATC) system.

The move, announced in a brief statement on February 27, closes the most recent chapter of the decades-long debate surrounding the fate of the ATC organization, marking a reversal for the chairman, who had been the architect and staunch proponent of the most recent proposal.

"Many, including myself, continue to believe that the air traffic control provisions of the 21st Century AIRR Act are good government reforms, and necessary for the future efficiency, effectiveness, and safety of our entire nation's aviation system and its users," Shuster said in the February 27 statement. "Despite an unprecedented level of support for this legislation—from bipartisan lawmakers, industry, and conservative groups and labor groups alike—some of my own colleagues refused to support shrinking the federal government by 35,000 employees, cutting taxes, and stopping wasteful spending."

Shuster had unveiled his most recent ATC proposal last June, including a number of compromises that he hoped would capture wider support than previous provisions. These included language designed to help ensure continued access for rural communities and general aviation operations, as well as a blanket exemption from user fees for all of general aviation.

Those measures chipped away at some of the opposition to the provision, gaining a highly valued endorsement from the co-chair of the House General Aviation Caucus, Rep. Sam Graves (R-Missouri). In fact, a key White House official in September expressed optimism that the measure would pass. "The vote count in the House is looking very, very good," D.J. Gribbin, special assistant to the President for infrastructure policy at the White House, had told an Airlines for America (A4A) Commercial Aviation Summit, saying at "no other time in history have so many things lined up in favor of this proposal," with the backing of the administration, the Department of Defense, the chairman of the T&I committee, the airlines and the controllers' union.

But the compromise failed to sway general aviation groups, rural leaders, House Democrats, and members on both side of the aisle in the Senate, among many others. Opponents feared that the provision amounted to an airline power grab, and in the future, guarantees of access could erode.

Shuster made several attempts to bring the bill to the floor, but behind-the-scenes tallies of potential votes fell far short of what was necessary to get the ATC measure passed.

Shuster's decision to shelve the ATC measure further was believed to have followed a high-level meeting with the White House, which—despite restating its support for ATC privatization—instead wanted to expend political capital on a massive infrastructure package.

Industry Celebrates Victory

The decision to focus on pushing through FAA reauthorization without the ATC measure brought a mixture of relief and celebration from general aviation and other ATC privatization opponents.

"The general aviation community came together like never before, and clearly told Congress that handing over our nation's ATC system to an airline-dominated board is a risk we simply cannot take; everyone should be proud of this significant effort," said NBAA president and CEO Ed Bolen. "We are profoundly grateful that Chairman Shuster has responded to the concerns that have been raised over his proposal, by a large and diverse group of organizations and individuals."

"The voice of the entire general aviation community was heard today," agreed Helicopter Association International president and CEO Matt Zuccaro. "I want to thank our members for their commitment and passion to engage their elected officials."

National Air Transportation Association president Martin Hiller added, "This win for the general aviation community shows what can be achieved when we all pull together toward a common goal."

It's important to the groups that the move clears a path for passage of long-term FAA reauthorization. "In dropping the controversial air traffic control proposal," said Aircraft Owners and Pilots Association president and CEO Mark Baker, "there's now a chance to do something that all segments of aviation have been asking for: a long-term [FAA] reauthorization bill."

"Thanks to the unified fight by the GA community, this bill was not going to pass with ATC privatization as part of it," said Experimental Aircraft Association CEO and chairman Jack Pelton. "We can now move ahead with what we have maintained all along—modernization, not privatization."

While finding reason to celebrate, privatization opponents also remain on guard, noting the issue has resurfaced every few years.

Bolen has repeatedly called the proposal "a bad idea" and asserts that in Washington, such ideas never go away. ■

Gulfstream opens AOG support center

Gulfstream Aerospace has established a center dedicated to the resolution of aircraft-on-ground (AOG) issues to further increase the level of integrated support and ensure faster return to service of customers' grounded aircraft. The technical operations contact center is located within the Gulfstream Savannah Service Center.

Incoming calls or messages designated as AOG are routed to the center, where experienced team members can tap into Gulfstream's worldwide resources, including Field and Airborne Support Teams (FAST) aircraft that can quickly deliver parts, tools and/or technicians; more than 150 field service representatives and FAST-dedicated technicians, including 12 mobile repair teams; more than $1.6 billion in spares inventory at some 20 locations; and a network of more than 30 company-owned and authorized service centers and warranty facilities.

The center is also equipped with large monitors that provide an up-to-date visual dashboard of Gulfstreams worldwide and the company's maintenance facilities and personnel, along with health updates from aircraft during flight. **C.T.**

News Briefs

FAA Blames Airlines for Lack of Wider ADS-B Use

Ali Bahrami, FAA associate administrator for aviation safety, told Congress the ADS-B ground system is fully operational and the main reason for its limited use is the airlines' failure to install onboard equipment, adding that their readiness for the Jan. 1, 2020 mandate is "not where we would like it to be." This testimony came in response to questioning by Rep. Peter DeFazio (D-Oregon) during a hearing on aviation safety before the U.S. House of Representatives Transportation and Infrastructure's subcommittee on aviation. Representatives from the NTSB, NASA, ALPA, and the DOT's Office of Inspector General also testified on issues such as regulating drones and shortages of pilots at regional carriers.

Stelia Intros 3D Printed Fuselage Panel Demo

Stelia Aerospace of Toulouse, France, has unveiled a demonstrator prototype part for metallic self-reinforced fuselage panels, fabricated with stiffeners made by additive manufacturing (aka 3D printing). The one-meter-square panel was produced by a robotic tool through the deposit of aluminum wire merged by electric arc. Stiffeners are currently attached to fuselage panels with screws or by welding. The new additive manufacturing process could simplify production of such parts to a one-step process, cutting required time, materials, weight, and costs.

Executive AirShare Ups Ante for New-hire Pilots

Kansas-based fractional provider Executive AirShare wants to hire 25 pilots by August, and it is sweetening its offer with higher salaries. Pilot-in-command and second-in-command candidates can expect salaries 18 to 30 percent higher than it currently offers, according to the company. They can also expect a more favorable eight-on/six-off schedule cycle. As of April 2, pilots joining the company at the second-in-command level will start at $56,000. Beginning July 2, PIC salaries will shift to the new payscale, meaning that captains on Phenom 300s, for example, will start at $100,000, an increase of 25 percent compared with the previous salary.

Mitchener Departs EBAA

Brandon Mitchener, the CEO at the European Business Aviation Association (EBAA) since last April, left the association early last month. Mitchener had a 25-year career as a journalist and public affairs professional in Europe before succeeding Fabio Gamba at EBAA. The association said it is searching for a new leader, adding that it will continue moving forward with its key events, such as its annual general meeting and EBACE preparations. For the time being, board chairman Juergen Wiese will lead the association until a new CEO is named.

Mariners and aviators discuss ditching survival

by Matt Thurber

On March 6, a group of highly experienced ocean-going mariners and corporate pilots met for a unique event, the "Joint Oceanic Search and Rescue Conference." The goal was to stimulate discussion about how flight crews that experience an over-ocean emergency could work together with nearby ships to maximize the chances of survival.

The conference was hosted by FlightSafety International's Teterboro, New Jersey learning center, and put on by Aeronautical Data Systems (ADS), which has developed new tools to help pilots locate ships that might be in a position to help during an emergency; and how to manage fuel and oxygen supplies during extended-range inflight emergencies.

The conference included a panel of Master Mariners, professors from the U.S. Merchant Marine Academy, and leaders from the City of New York Fire Department's Marine Operations. Corporate flight department directors and safety and operations managers as well as a vice chairman from an airline's ALPA Master Executive Council filled the aviation seats at the event.

"We've been working on this a long time," said James Stabile Sr., an airline pilot and founder of ADS. The company's first products were developed to help dispatchers and pilots calculate emergency options based on fuel and oxygen supplies and depletion rates, and incorporate that into safety management systems. But about nine months ago, Stabile, whose airline flying includes over-ocean routes, realized that there is an additional untapped resource: all the ships that ply the world's oceans. The ADS team added a new feature to its Ergo 360 iPad app, graphical information about ships, depicted on a map of the flight-planned route.

Ergo 360 users can now download ship information before takeoff and, if equipped with airborne connectivity, update the information during the flight. Knowing the ships' position, velocity, and name can help pilots during an emergency requiring an immediate landing or ditching. Pilots can even communicate with ships using a low-cost marine handheld radio, something that ADS recommends that over-ocean pilots carry in their kitbags. The ship information is derived from the Automatic Identification System that tracks about 230,000 vessels worldwide. A lower-cost version of the software—Ergo 180—is also available, and includes the vessel information.

"Our focus is oxygen safety in aviation," said James Stabile Jr., ADS v-p of strategic initiatives. "The reason we got to water landings is we've been for many years building a comprehensive globally standardizable oxygen safety management system. One of the aspects of that is fires, and a particularly nasty subset of that is uncontrolled fires over an ocean. In a situation of that nature there are instances on record where an aircraft is vaporized in under 20 minutes. So on a bad day this would mean that a flight crew is going to have to choose between burning to death and crashing into the ocean. And that's a pretty stark decision to have to make, so we set out to figure out how we can mitigate that risk."

The prospect of a water landing raises many questions, few of which have been satisfactorily answered in the training materials provided to pilots. "What we're actually doing," he explained, "is giving flight crews the ability to dynamically find a ship at sea and then crash their very heavy, fast, expensive aircraft in the middle of a billion-square-mile ocean using an iPad."

MATT THURBER

The Joint Oceanic Search and Rescue Conference brought together corporate pilots and ocean-going mariners to develop solutions for safer rescues in the event of ocean ditchings.

The risk of a water landing doesn't just happen to those on the aircraft, and even after a successful ditching, the rescuers face enormous risks of their own trying to save people on the aircraft. "In the interest of both good business ethics as well as creating the most effective solution," he said, "we realized we needed to bring in folks from the maritime industry."

Sharing Information

Putting pilots and ship captains in the same room was designed to stimulate a discussion of over-ocean emergencies and help the two groups communicate about their different needs during an emergency situation, and come up with ways to work together. Stabile Jr. welcomed the group of mariners, including Captain George Sandberg, president of the New York Metro Chapter of the Council of American Master Mariners and professor emeritus at the U.S. Merchant Marine Academy.

"The reality is that the maritime folks lived in this environment long before the aviation industry was born," he said. "Technology is allowing us to bring these ships to light, to identify where they're at in a manner that we can take this information now and assimilate it so we can use it in the event of an emergency."

The Ergo 360 and 180 iPad apps show ship position in two ways. If the aircraft is not equipped for airborne connectivity, specifically Internet access, then the pilot can download the latest ship position information just before takeoff. Once in the air, the virtual ships in the app will move in the same direction and speed as the last-updated information. If Internet updates are available in the air, then the app shows the actual ship position and direction, helping pilots see where the ship is headed for optimum positioning for a water landing. The app doesn't just download every one of the more than 200,000 ships in AIS, but just those bounded by the flight-planned route, thus saving memory space on the iPad.

Pilots have another onboard tool they can use to pinpoint ships shown on the Ergo iPad app—their weather radars—Stabile Sr. pointed out, and he has tested this during his flying. By tilting the radar antenna down toward the ocean, the pilot can see ships painted on the radar screen. This works only with radars that don't automatically remove ground clutter or bodies of water, as some modern digital radars do.

Communication Challenges

Once a suitable ship is located, the biggest problem remains communication between the airplane and ship personnel. Stabile Sr. carries an inexpensive handheld marine radio with sufficient transmitting power (six watts) to reach about 40 miles. He has tested the radio by contacting ships on the universal maritime distress frequency channel 16, then once he has made contact, switching to another frequency to continue the conversation. ADS is also working on another method to facilitate airplane-to-ship communication, but hasn't yet revealed details about this product.

For their part, the ship captains outlined information about maritime emergency operations, for example, the difficulty in maneuvering and stopping a large ship, but also how a ship could help provide a calm ditching area in the lee of heavy winds. Other issues revolve around how little time people can survive in cold water, the challenge of launching rescue boats in heavy seas, and communications difficulties not just because of technology but because there are so many ships carrying crewmembers that don't speak English. Most ships also carry satellite telephones, and attendees agreed that there ought to be a way for ships and aircraft to share telephone number information.

Pilots need to make sure not only that they carry emergency equipment, but that it is properly equipped with survival gear. A raft should be equipped with a modern 406-MHz emergency locator transmitter (ELT), which sends position and identification information to rescue agencies via satellite. But carrying a marine emergency position indicating radio beacon (EPIRB) would also be a good idea.

A key point came up during the conference: it was suggested that a simple step that pilots could take during an over-ocean emergency would be to activate the ELT immediately to ensure a quicker emergency response. The pilots at the event noted that this step is not on their emergency checklists and they agreed that it should be.

An Actual Ditching

The conference ended with a fascinating recounting of a ditching survival by Dr. Phillip Zeeck, who was flying across the Atlantic in a converted World War II-vintage B-26, hauling oil field equipment to France many years ago, before the development of loran or GPS. The aircraft didn't even have a VOR receiver, and on the leg from Greenland to Iceland, the two pilots were unable to receive the NDB station in Iceland on their ADF receiver. Running out of fuel and options, they were finally able to contact an overflying aircraft, which helped them radio a station-keeping ship, Ocean Station Alpha. The ship was able to provide a direction-finding steer to the B-26 pilots, and they were able to find their way to the ship, where they successfully ditched at night, in 25-knot winds and 3.5-meter waves. The rescue boat from the ship picked up the two pilots within minutes.

Zeeck concluded by listing the equipment he now carries for flights he now makes to the Caribbean with his wife in their Twin Commander: this includes three GPSs, an InReach emergency satellite communications transceiver, a handheld marine radio, strobelights and personal emergency locator transmitter for each occupant, and a four-person self-righting raft.

At the end of the conference, ADS promised to form an oceanic rescue and survival board to continue the discussions and push for global standards for response methods for aviation over-ocean emergencies. "Our common objective here is to save human lives," concluded Stabile Jr. "The primary focus of this board will be to close the gap in understanding that exists between aviation and maritime actors, as well as all the actors that would be required in supporting and maintaining a comprehensive solution." ■

Risk-based trends led to LASP cancellation

by Kerry Lynch

The withdrawal of the proposed large aircraft security program (LASP) follows a review of the nearly 7,000 public comments on the controversial program, as well as a re-evaluation in light of the trend toward risk-based principles, the Transportation Security Administration wrote last month in a formal notification in the *Federal Register*.

In January, the TSA officially shelved the program a decade after proposing the LASP rulemaking in October 2008. The LASP proposal would have established security standards for private larger aircraft operations similar to those of commercial operations, including requirements for crew vetting, passenger watchlists, and security programs.

While believing the proposal would increase security and accountability, the agency estimated the proposal would result in costs of $1.4 billion over a 10-year period to operators, passengers, and the agency itself.

While some aspects of the proposal drew support, "The overwhelming majority of commenters objected to it, based on their views that it increased costs unnecessarily, created burdensome new processes, and would lead small airport and aircraft operators to go out of business, causing widespread loss of employment," the agency conceded.

The TSA subsequently considered a supplemental proposal, as well as the possibility of carving out some of the requirements into stand-alone rules. But given the adoption of risk-based principles, the comments, and the relative costs, the agency said it decided to just shelve the rulemaking. ■

'Reckoning' likely in used market

With the U.S. ADS-B Out compliance deadline looming, "we're about 18 months from a significant reckoning in the pre-owned business jet market due to obsolescence," Mesinger Jet Sales president and CEO Jay Mesinger said last month at the NBAA Business Aircraft Finance, Registration, and Legal Conference. According to co-presenter JetNet iQ managing director Rolland Vincent, U.S. operators of 13,425 business jets—one-third of the in-service fleet—have no ADS-B upgrade plan in place.

Vincent estimates that 25 to 30 percent of these jets are in line for retirement when the Jan. 1, 2020 ADS-B compliance date rolls around. Of those operators who have no plans yet in place, 36.5 percent intend to visit a shop to upgrade; 7.7 percent expect to replace their aircraft with one that is already upgraded; 6.3 percent said they will sell their non-upgraded aircraft; 13.3 percent have not yet decided; and 2.6 percent believe the FAA will delay the compliance deadline, despite the agency's repeated statements otherwise, according to the latest JetNet iQ data. **C.T.**

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BBGA ups ante as Brexit looms

The British Business and General Aviation Association (BBGA) is "striving to build an international voice, and that should be communicated to government and agencies at every opportunity." That was the message on March 8 from association patron Prince Michael of Kent at the association's annual conference.

Brexit was top of mind, and the subject of the only panel that included industry, CAA, and UK Department for Transport (DfT) representatives. The proposed two-year "transition period" after the March 2019 Brexit date could mean things don't change too quickly, and the consensus seemed to be that things might change very little in practice. There will need to be a new UK-EU bilateral agreement, and "the government's preferred position is to remain part of the EASA system," reported Mike Alcock, assistant director for aviation at DfT. Alcock added that the UK might well follow the "Swiss model," following the EASA system but not having as much influence in the lawmaking process as it would have as an EU member state.

However, David Oastler, the CAA's head of Brexit, said, "There is still a huge amount of uncertainty, so businesses should be thinking what they have to do in a variety of scenarios."

Marc Bailey, BBGA CEO, updated members on the association's "Vision & Values" initiative. In response to member feedback, it is is making efforts to get "out to the regions" of the UK. Meanwhile, it has reviewed its structure, constitution, and governance, and is also planning a "national association forum." BBGA now has an FBO Group that, among other things, is "lobbying for better access to slots and parking," according to chair Jason Hayward of Universal Aviation at Stansted Airport..

He also reflected on successes at the political level, as the number of Members of the UK Parliament (MPs) joining the influential All-Party Parliamentary Aviation Group (APPG) at Westminster surpassed the 100 mark, thanks to the efforts of former minister Grant Shapps MP. "The APPG has suddenly blossomed...and the Department for Transport is now looking at the 'network of airfields' we need up until 2050," with a report expected form consultancy York Aviation this year. **I.S.**

Cessna Citation Longitude flies around the world

by Ian Sheppard

The soon-to-be-certified Cessna Citation Longitude completed a round-the world trip that took it to the Singapore Airshow and on a tour of Asia-Pacific countries—and back via Europe. The aircraft left Wichita heading westbound on January 27 and traveled more than 31,000 miles in 31 days, according to Textron Aviation.

"After successfully circling the globe and showcasing its outstanding performance and reliability throughout diverse regions and a wide array of environmental conditions, the Longitude reinforced its ability to suit the needs of operators worldwide," said senior v-p sales and marketing Rob Scholl.

The Longitude is powered by Honeywell HTF7700L engines, with fully integrated autothrottles and flight-envelope protection, and has a Garmin G5000 flight deck with new GHD 2100 head-up display offering enhanced vision capability. It also offers an 18-month/800-hour maintenance interval.

After the Singapore airshow in early February, the aircraft undertook a nonstop trip from Singapore to Sydney, Australia. This flight took the aircraft, carrying a crew of two pilots plus five passengers, 3,504 nm from Seletar, Singapore, to Sydney, Australia, in 7 hours, 39 minutes at Mach 0.80, having made a direct climb to 41,000 feet.

Textron Aviation president and CEO Scott Ernest said the flight was "a compelling demonstration of the aircraft's outstanding long-range performance capability for common mission profiles throughout the Asia-Pacific region [and] signals Textron Aviation's commitment to investment in the region—in both products and support."

Following the Asia tour, the Longitude made sales stops in Sweden, France, Italy, and Switzerland before routing through Farnborough, UK, where **AIN** had a chance to experience a flight out over Wales.

One of the reasons for the flight from TAG Farnborough Airport was to demonstrate what Textron Aviation calls "the quietest cabin in the industry," thanks to features such as damped flooring, isolated

interior panels, and acoustic windows Also on display were the twinjet's performance credentials.

The flight stepped up gradually to 43,000 feet over Wales, but cabin altitude was just 5,500 feet, thanks to the 9.6-psi pressure differential. An uninterrupted time to climb would have been 16 minutes to FL430 (rather than the 23 minutes taken). Takeoff weight was 33,000 pounds, 8,000 of which was fuel.

During the demo flight, the cabin was quiet enough to allow normal conversation.

Tom Perry, v-p sales Europe for Textron Aviation, told journalists, "Textron has painstakingly addressed each individual noise source around the airframe and taken soundproofing measures to counter the exact frequency of them all. This is in addition to overall soundproofing for the entire fuselage and noise-reducing doors at the front and rear of the cabin interior. The noise you do hear is literally the slight aerodynamic sound from antennas along the fuselage."

Fuel burn for the first hour of flight (takeoff and climb to cruise) was approximately 2,400 pph (pounds per hour); for the first couple of cruise hours it was 1,800 pph; and later (at a lower weight), 1,600 to 1,700 pph. With four passengers, the maximum range for the aircraft would be 3,500 nm, according to Textron Aviation.

The flight departed Farnborough and received radar vectors to Portland Bill, Dorset and then toward Dawlish, Devon. There followed a turn to the north toward the "EXMOR" waypoint (Exmoor) via Brecon, and farther toward Liverpool before a right turn passing by Birmingham and Oxford and back to an ILS approach to Runway 06 at Farnborough. Landing weight was 30,300 pounds, showing a fuel burn of 2,700 pounds for the 1-hour, 10-min flight.

Inside the cabin, there is a remote control phone or tablet app for operating IFE and controlling the window shades on the large cabin windows. And there is even a window in the lavatory. The baggage hold is accessible during flight. An optional galley feature is a high-power electrical outlet allowing an ordinary espresso coffee machine or microwave oven to be added.

After the Farnborough visit, the Longitude flew back to the U.S., heading to White Plains, New York, before returning to its home base in Wichita on February 26.

The type is now awaiting certification from the FAA, which Textron Aviation said is expected in "early in 2018." EASA approval is expected some six months later, according to Perry. Certification of the "up to 12"-passenger plus two-crew Longitude, with a list price of $27 million, was originally slated for the end of 2017.

The first European order, announced in May 2017, came from Travel Service of the Czech Republic. ■

MARK WAGNER

At the end of February, a Citation Longitude completed some 31,000 miles on a tour around the world. Its UK stop included a demo tour for journalists highlighting the airplane's quiet cabin. FAA and EASA certification are expected this year.

Full-throttle opinion from former NTSB member John Goglia

Recent incidents raise concerns about industry's approach to safety

Today I'm writing to you about some news reports from the world of aviation that have left me shaking my head. I've seen a lot over my decades in aviation—starting as a teenager pulling bodies out of Boston Harbor after the crash of Eastern Airlines Flight 375, a Lockheed Electra that hit a flock of starlings, and through my years with the airlines as a union member and later as an NTSB member on scene for far too many fatal crashes—but I still manage to be dismayed at times by what I read and see that goes on. Some of the things I see are as a safety consultant, but what I will focus on here is what I see in media or other public reports.

The first comes from news reports involving a Spirit Airlines Airbus A320 that flew from Akron, Ohio to Fort Lauderdale, Florida, on January 28. According to an FAA statement to the news media, the crew made an emergency landing after reporting fumes in the cockpit. The Aviation Herald reported additional detail from its sources:

"[The flight] was en route at FL380 about one hour before estimated landing, when a passenger began to complain about an abnormal smell on board. Cabin crew attending to the passenger confirmed the unusual smell, which became stronger and stronger until the cabin air became nearly 'not breathable.' The flight crew was informed, informed ATC about the fumes on board, and began to descend the aircraft early. About 20 minutes before landing the captain confirmed the odor in the cockpit, too, [and] the flight crew donned their oxygen masks. Flight attendants felt increasingly nauseated, a number indicated they nearly passed out over the odor. Below 10,000 feet the captain depressurized the aircraft, [and] the cabin air improved. The aircraft landed on Fort Lauderdale's Runway 10L about one hour after the first passenger complaint. Emergency services needed to treat flight and cabin crew still on board of the aircraft, all cabin crew and flight crew were taken to hospitals."

Whatever the cause of the fume event, what caught my eye in the article was a statement that after the aircraft landed, maintenance personnel boarded the aircraft, did not detect any odor and were about to return the aircraft to service when the captain interceded. The aircraft was then kept out of passenger service for approximately 28 hours. The FAA investigation is continuing and now includes an emergency landing by the same aircraft a week later involving an engine shutdown in flight for excessive vibration.

While the incidents themselves may not be related, I hope the FAA looks closely at whether the reported exchange between maintenance and the captain is accurate. If it is, it raises questions about the maintenance safety culture at the airline. Unfortunately, my experience with FAA investigations is that inspectors all too often rely on paper records and do not probe an airline's safety culture. Maybe this time will be different.

> **"I've seen a lot over my decades in aviation…but I still manage to be dismayed at times by what I read and see that goes on."**

Another report in the news that caught my attention was the NTSB's accident report on the Oct. 28, 2016 uncontained engine failure and subsequent fire on an American Airlines Boeing 767. The cause of the uncontained engine failure, according to the report, was "a high-pressure turbine (HPT) stage 2 disk rupture. The HPT stage 2 disk initially separated into two fragments. One fragment penetrated the inboard section of the right wing, severed the main engine fuel feed line, breached the fuel tank, traveled up and over the fuselage, and landed about 2,935 ft away. The other fragment exited outboard of the right engine, impacting the runway and fracturing into three pieces."

My concern is the emergency evacuation that followed the uncontained engine failure. The NTSB has called out several concerns about American's procedures and crew actions during the evacuation, but my specific concern here is with the continuing problem of passengers stopping to take their carry-on bags with them during an emergency. Passenger cellphone and other on-scene photos for innumerable survivable accidents over the last few years have recorded this phenomenon. In this accident, media pictures clearly showed passengers with all manner of carry-ons, including a number of what appeared to be roll aboards. The problem of passengers retrieving their bags during an emergency evacuation continues, and I have not seen much action by the FAA or the airlines to deal with it.

So, I was heartened to see the Board's report specifically call out the problem of passengers taking their carry-on bags during an emergency evacuation. In its enumerated Findings, the Board stated: "Evidence of passengers retrieving carry-on baggage during this and other recent emergency evacuations demonstrates that previous FAA actions to mitigate this potential safety hazard have not been effective."

Among the Board's new safety recommendations to the FAA: conduct research to (1) measure and evaluate the effects of carry-on baggage on passenger deplaning times and safety during an emergency evacuation and (2) identify effective countermeasures to reduce any determined risks, and implement the countermeasures.

On this particular flight, the flight attendants decided trying to stop passengers from retrieving their bags would further impede the evacuation. It's clear from this and other accidents that control of carry-on bags cannot be left to shouted crewmember instructions, arguing with passengers at the emergency slides, and certainly not getting into a tug-of-war with them while a fire spreads and other passengers are prevented from exiting the plane.

It is patently clear now that something more needs to be done. Passengers—at least some passengers—will hinder the evacuation process by retrieving bags from under the seat in front of them or even the overhead bins. Hopefully, the FAA and the airlines will address this problem before lives are lost because someone needed to grab their laptop or other carry-on item before getting out.

The last troubling report comes from the world of drones and the recent video that purports to be a drone flying close to an airliner landing at McCarran Airport in Las Vegas. As I write, it has not been definitively established whether the video is real or a computer simulation, but either way it's a really dumb stunt. It's these kinds of reckless videos that can lead others to try similar stunts, and one day the results could be much more significant. If the drone video is a simulation, it should clearly state that. If the drone operator had specific permission to fly the stunt, it should clearly state that. And if the video is real and the drone operator was flying as close as it appears to a landing passenger flight, the FAA should prosecute to the fullest extent of the law. ■

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

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FSF approach looks beyond pilot experience

The Flight Safety Foundation (FSF) is calling for a "pragmatic, data-driven approach" to pilot training to continue driving improvements in aviation safety. The foundation wants national civil aviation authorities to have the flexibility "to adopt competency- or evidence-based training methods that target real-world risk and ensure a progressive and satisfactory performance standard."

According to FSF, "It cannot be assumed that critical skills and knowledge will be obtained only through hours in the air. Although…the number of accumulated flight hours has been the baseline for determining experience, what is often overlooked in the pilot experience equation is the quality of flight time." This includes such things as operational experiences, multi-crew operations, and weather-related flight experience, it said.

Thus, the foundation is recommending an improved pilot screening process; a renewed focus on the competency and quality of pilot training providers; pilot training programs that are competency- or evidence-based and not solely hours-based; pilot training programs that maximize the use of simulation; data-driven training programs that are continually updated, based on pilot task-level performance; development of a worldwide quality/performance criteria that is universally recognized; and pilot proficiency/qualification standards that cannot be compromised. It also called for ab initio programs with operator sponsorship/support; a partnership with the International Civil Aviation Organization and industry to define rules, recommendations, guidelines and the expected quality and performance required of flight academies; and programs that place a high value on the knowledge and experience of flight instructors.

Though 2017 was the safest year in the history of commercial aviation, recent crashes in Russia and Iran have prompted FSF to warn against the dangers of complacency.

It attributed the record to "the diligent efforts of thousands of aviation professionals around the world who design increasingly reliable aircraft, engines, and parts; maintain, repair and overhaul aircraft; regulate and enforce performance-based safety rules; investigate accidents and incidents; manage air traffic; develop sophisticated avionics and navigational aids; operate airports; and fly sophisticated aircraft in increasingly complex environments." **C.T.**

ABACE ’18 to boost interest in bizav in Asia

by Ian Sheppard

The 2017 edition of Asia’s flagship business aviation show was markedly subdued following an emphasis on “austerity” in China, but this year promises increased optimism. ABACE 2018, which will be held from April 17 to 19 at Shanghai’s Hongqiao International Airport, had as of last month notched more than 160 exhibitors with 30 or more aircraft expected to make up the static display. The show is “presented in partnership with Shanghai Airport Authority, and co-hosted by the National Business Aviation Association [NBAA] and the Asian Business Aviation Association [AsBAA],” according to the website.

With host facility Shanghai Hawker Pacific Business Aviation Service Centre just completing its second large hangar, ABACE will have significantly expanded floor space, although the show still requires an outdoor temporary building as well. The number of chalets outside increases to 10 this year.

The static display will include a mix of business aircraft, with the Quest Kodiak making its ABACE debut along with the Bell 505 and Mahindra Aerospace Airvan 8. Aircraft will range in size up to a Boeing Business Jet (BBJ).

One of the key presentations will be a business aviation development forum, hosted by the Chinese CAAC, that will highlight the latest efforts in the government’s policy for business aviation. An Asia airport access panel will discuss trip planning for the region, changes at Hong Kong, and new general aviation airports in Asia. Also, a Future of Lift session will explore the potential for a helicopter renaissance in Asia due to capacity issues at Tier 1 airports for business aviation.

Also covered in sessions will be a market outlook, cybersecurity and connected aircraft, insurance and finance of aircraft and hangars, and MRO availability and costs in Asia versus taking the aircraft to the U.S. or Europe. There will be a foreign aircraft registries session, too, while on the final day the ABACE Careers in Business Aviation Program will be in full swing, incorporating AsBAA’s Student Chapter Day. ■

DAVID McINTOSH

ABACE 2017 featured 33 aircraft on static display and 178 exhibitors.

AIN FBO Survey 2018: Worldwide Results

Report by Curt Epstein, charts and data by David Leach

As business aviation continues its rebound from the depths of the global economic downturn a decade ago, optimism continues to grow among U.S. FBO operators, as flight activity and fleet utilization increases. According to industry data provider Aviation Research Group/U.S. (Argus), flight activity in 2017 eclipsed the three-million-hour mark for the first time since 2008, and year-over-year rose 5.5 percent over 2016.

That activity has translated to gains at the fuel pump in many places. In the annual FBO Fuel Sales Survey conducted by industry consultancy Aviation Business Strategies Group (ABSG), 53 percent of the service providers who responded said fuel sales increased in 2017 while another nearly 20 percent indicated that their sales were the same as in 2016. The survey also asked about their confidence in the economy. "We were encouraged to see that 73 percent gave the economy a strong thumbs-up," noted ABSG co-principal John Enticknap. "By comparison, in last year's survey, 53 percent approved the direction of the economy, and the year before, only 27 percent gave approval." Based on that endorsement, 93 percent of those FBOs surveyed said they expected either the same or increased fuel sales in 2018.

"The consensus opinion from our clients is that business is relatively good, with growth in the 2 to 3 percent range, and stable margins," Stephen Dennis, chairman of Aviation Resource Group International (ARGI), told **AIN**. "The outlook for the balance of the year is growth in the 3 percent range." He added that the hiring of trained FBO personnel, especially at the general manager level, is becoming more difficult as a result of lower turnover in many senior and mid-level positions.

As a result of this stability, the needle is moving to a seller's market, when it comes to the buying of FBOs. "The market for selling is good; however, the number of transactions remains low by historical metrics," explained Dennis. "The transactions that are closing are skewed toward higher valuations." While the FBO chains continue look for opportunities among the top-tier airports, the most recent round of major consolidation, which was capped off by Signature Flight Support's acquisition of Landmark Aviation, has made that more difficult. "As we look back over the time since the turn of the century, we have seen a progressive reduction in the number of FBO consolidation opportunities," said Dennis, adding that since 1980, the 10,000 FBOs in the U.S. have decreased by two-thirds. "This is not to say that we won't see continued consolidation. It just means that transaction values will increase, and there will be fewer of them."

Douglas Wilson, president of FBO industry advisor FBO Partners, noted that most of the top 200 airports in the U.S. have only one or two service providers, and those locations are now mainly owned by the chains. As an example, four of the FBOs that made up the top 5 percent in this year's **AIN** FBO Survey were acquired by chains over the past few years. "You've got a significant number of players now out there in the field trying to acquire FBOs, all hunting for the same thing," Wilson told **AIN**. In addition to the long-established chains such as Signature, Atlantic, Jet Aviation, and Million Air, there are also new names, such as Ross Aviation, Hawthorne Global, Lynx, and the latest, Modern Aviation—launched just this February—backed by private equity money, and looking to grow networks of their own.

Among European airports, Paris's Le Bourget remains the busiest business aviation airport, recording nearly 26,000 departures in 2017, while London Biggin Hill saw the largest growth last year at more than 16 percent, according to statistics provided by industry data provider WingX Advance.

"On the international scene, growth is accelerating and advancing beyond the U.S. in several key markets in Eastern and Western Europe," Dennis told **AIN**. "Very few operations are being sold internationally, as the most successful operators are increasing their investments in their operations, preparing for increased growth."

Against this backdrop, we present the top locations in our annual FBO survey, as selected by **AIN**'s readers. ■

NextGen Readiness for 2020 and Beyond

Industry experts say half of the bizav fleet could be grounded on Jan. 1, 2020

Many industry experts predict that a significant percentage of the U.S. general aviation fleet will not meet the FAA's Jan. 1, 2020 deadline for Automatic Dependent Surveillance-Broadcast (ADS-B) compliance. According to equipment installers, bizav operators waiting until 2019 to upgrade their aircraft may encounter equipment shortages and scheduling unavailability. Other surprises may include early versions of ADS-B equipment proving non-compliant with the 2020 standards; controller-pilot datalink communications (CDPLC) mandates for flights to Europe; and additional NextGen performance-based navigation (PBN) requirements likely emerging in the next 10 years.

The Road to NextGen

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The Requirements

The ADS-B requirement serves as NextGen's "surveillance" piece of ICAO's global Communication Navigation Surveillance/Air Traffic Management (CNS/ATM) plan. As such, ADS-B is just one segment in FAA's NextGen suite of programs, but it depends critically on the compliance of every aircraft owner to make the entire system work.

With the goal of eventually replacing traditional radar and ground-based navigational aids, ADS-B technology periodically broadcasts GPS-derived location information and other data from an aircraft's flight management system (FMS) to anyone with an ADS-B receiver. This enhances situational awareness for controllers and pilots, and will allow more direct routing and reductions in separation minimums once all aircraft are ADS-B compliant. While industry experts have identified privacy and security concerns with ADS-B technology, all signs point to the FAA enforcing the 2020 deadline that was published in May 2010.

The compliance standards outlined in 14 CFR Sec. 91.225 and 91.227 essentially state that all aircraft operating in airspace that requires a mode-S transponder today will need functioning Version 2 ADS-B Out by 2020. Aircraft operating above FL180 in U.S. airspace (and in certain other airspaces around the world) must also contain a functioning mode-S transponder-based ADS-B transmitter; aircraft operating below FL180 in U.S. airspace may alternatively use a universal-access transceiver (UAT).

Nearly coinciding with the FAA's ADS-B deadline is the EASA's deadline for CPDLC compliance. According to EC regulation 310/2015, civil aircraft operating within EU airspace above FL285 must have CPDLC capability by Feb. 5, 2020.

The "communications" portion of CNS, CPDLC allows pilots and air traffic controllers to communicate via text messaging. CPDLC can be implemented as part of a Future Air Navigation System (FANS) 1/A+ avionics suite that includes ADS-C (contract), VHF datalink radio or appropriate satcom, and datalink control and display unit (DCDU). FANS 1/A+ capability is required for crossing certain North Atlantic airspaces, but CPDLC capability through the Aeronautical Telecommunications Network (ATN) B1 requirement is preferred in EU airspace.

The EU delayed its ADS-B Out mandate for retrofit aircraft to June 7, 2020; this mandate applies only to aircraft with a maximum certified takeoff mass exceeding 5,700 kg (12,566 lbs) or a maximum cruising true airspeed greater than 250 knots. However, EC Airspace Regulation No 551/2004 provides for local mandates to extend ADS-B requirements to a "wider population of aircraft" in areas where ADS-B is used.

Where the Fleet Is Now

As of March 1 this year, 51,882 U.S.-registered aircraft have been equipped with ADS-B, according to the FAA's website. FAA Office of Communications statistics indicate that as of Feb. 1, 2018, approximately 5,970 aircraft, or 34.6 percent of the IFR GA turbine fleet (which includes business jets and turboprops) have been equipped with rule-compliant ADS-B Out. The FAA has reiterated that "all aircraft that plan to enter 'rule' airspace beginning Jan. 1, 2020 must be equipped with ADS-B."

While some small general aviation aircraft can install standalone ADS-B solutions for as little as $5,000, the cost for a bizjet can be as high as $120,000 if there is no existing Wide Area Augmentation System (WAAS) GPS or FMS in the aircraft. One problem with the ADS-B installation is that it's usually not a simple bolt-on solution and may require new and upgraded equipment.

The FAA website's ADS-B Equipage page tracks the number of equipped but non-compliant aircraft flying. For example, it indicates that 37,941 general aviation fixed-wing aircraft are ADS-B equipped as of March 1. However, only 34,246 of those are ADS-B rule compliant. The difference between the numbers indicates non-performing emitter (NPE) aircraft, essentially those aircraft containing an ADS-B Out system that does not transmit in accordance with FAR 91.227.

"The FAA is monitoring ADS-B transmissions and calls each operator that fails an ADS-B test," said Mark Francetic, regional avionics sales manager for Duncan Aviation, a chain of FBOs and MRO centers that includes 27 U.S. facilities performing ADS-B installations. "As soon as you get an ADS-B system installed, the FAA is tracking you. If they see an anomaly, they're calling you to get your equipment fixed."

Insider Insight

Question—In your opinion, what percentage of the business aviation fleet will be ADS-B compliant on Jan. 1, 2020?

Mark Francetic, regional avionics sales manager, Duncan Aviation, Lincoln, Nebraska: We estimate that 4,000 Part 25 jets will not have ADS-B by 2020 under the current workload. Our numbers [of ADS-B installations] have doubled compared with where they were last year, but we're still behind. If nothing changes, we'll probably see a fleet that's only 60 percent equipped.

Greg Vail, avionics manager, FlightStar Corporation, Savoy, Illinois: About 20 to 25 percent of Learjet 40/45s are currently ADS-B compliant, so there are going to be aircraft sitting on Jan. 1, 2020. We have capacity and have offered incentives to take advantage of scheduling gaps, and customers are still not coming in.

Robert Clare, director of sales, Universal Avionics, Tucson, Arizona: Only 35 to 40 percent of business aircraft are going to be compliant. People are focused on when they can get their aircraft into the installation facility, but they forget that parts may not be available. Lead time for our products now is six weeks, which is shorter than the industry standard of 90 days, but we're at the point where we cannot expedite on certain products.

Mike Mitera, president, Chicago Jet Group, and CEO, Kobev International, Sugar Grove, Illinois: People are still counting on the FAA to push that mandate back, and [the FAA is] not going to. People who are risking that the FAA will push back the mandate are going to get a rude awakening next year. Because at the end of 2019, you're grounded.

Various sources report that up to 30 percent of ADS-B systems fail due to installation or configuration error. While installation errors usually require a return to the avionics shop, some configuration errors are as simple as incorrectly transmitting aircraft size or identification code and may be rectified by the pilot. Call sign mismatches are also easily fixed by the pilot. However, since ADS-B data is normally not directly displayed on the FMS and because some avionics shops cannot fully test or determine ADS-B data transmitted, most operators are not aware of faulty data being transmitted by the ADS-B system until the FAA or ATC apprise them of the situation. Operators are encouraged to request a free public ADS-B performance report (PAPR) from the FAA website to ensure that their aircraft is transmitting correct data.

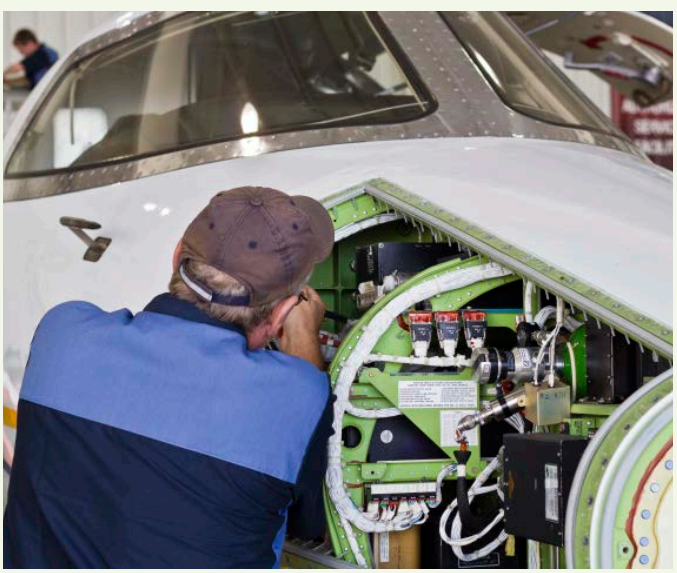
Some NPE aircraft may be victims of upgrading too early. For example, some owners installed ADS-B equipment to comply with Australia's Dec. 12, 2013 ADS-B mandate for all IFR aircraft flying at or above 29,000 feet in Australia's airspace.

"The Australians had a mandate for ADS-B, and they didn't extend [the deadline]," said Francetic. "On that day in December [2013], a lot of those operators flying large business jets like Gulfstreams and Globals flew them to the United States, parked them, threw us the keys, and told us to fix them for ADS-B… The problem that we have now is that [owners of] many of those airplanes that installed ADS-B to the European standard in Australia, which was an earlier version, think they are compliant with ADS-B and they are not. ATC will know it's an earlier version because the data won't display correctly, and will force those operators to land or will refuse entry into U.S. airspace."

Owners of some of these jets may be able to use FAA Exemption 12555, which allows the extended use of an older GPS navigation receiver meeting TSO-C196 or TSO-C129 specifications rather than the Satellite Based Augmentation Systems (SBAS) or WAAS requirements through Dec. 31, 2024. All other ADS-B Out equipment requirements must still be met and operational by Jan. 1, 2020. According to the FAA website, the agency granted the exemption "because the type of GPS navigation receivers suitable for transport-category aircraft that meet the ADS-B Out rule requirements will not be available in sufficient numbers until closer to 2020."

NextGen 2020 and Beyond

The FAA, avionics manufacturers, installation shops, and training facilities have all been gearing up to meet the 2020 mandate for several years. However, the demand for ADS-B installations has not risen as dramatically as forecasted. Even with the deadline less than 20 months away, operators continue to delay installations (*see sidebar on previous page*). The penalties for waiting include higher costs, longer downtime waiting for parts, and the possibility of being grounded on Jan. 1, 2020.



Bizav operators waiting until 2019 to upgrade their aircraft may encounter equipment shortages.

"Right now, if an airplane just needs ADS-B and they already have WAAS GPS, we can turn that airplane in two weeks for approximately $80,000," said Greg Vail, avionics manager at Savoy, Illinois–based FBO and MRO company FlightStar. "But the cost will go up to [about] $90,000 on June 1. Honeywell notified the world that there would be 15 percent price increases on June 1 of 2018 and 2019, and that's still not getting people motivated to come in."

A Bombardier-authorized service facility, FlightStar has been granted STCs for ADS-B Out and single WAAS FMS with localizer performance–vertical (LPV) monitor installations for the Learjet 40/45. The FlightStar ADS-B STC either installs a standalone WAAS GPS system with ADS-B equipment or ties an existing Universal Avionics UNS-1Ew satellite-based augmentation system (SBAS) FMS to the ADS-B equipment for GPS position information. The single WAAS FMS solution replaces an existing FMS with the UNS-1Ew and adds a Universal Avionics LPV monitor with a second WAAS GPS antenna and LPV annunciators.

"From Universal's perspective, the core [of NextGen capability] is the SBAS FMS, which offers LPV, P-RNAV (precision-area navigation), and ADS-B with an accompanying transponder," said Robert Clare, director of sales at Universal Avionics. "There are so many areas in the U.S. where the only option to get into an airport is to fly an LPV approach. That's going to continue as some of these other ground-based solutions that are more expensive to maintain will be decommissioned."

Another key area of NextGen technology that is already in use around the world, LPV approaches take advantage of WAAS or equivalent augmentation systems' accuracy to provide lateral and vertical guidance, similar to a Category I ILS. As of March 1, 2018, more than 3,800 LPV approach procedures are serving nearly 2,000 U.S. airports, including 1,132 non-ILS airports. Approximately 136 European airports offer LPV-equivalent European Geostationary Navigation Overlay Service (EGNOS) approaches.

"WAAS LPV provides a lot of benefits to corporate operators, including fuel, time, and engine-wear savings," said Clare. According to an LPV savings calculator on Universal's website, a Challenger CL604 flying 300 hours per year with WAAS at home base—estimating 50

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ATC will force non-compliant operators to land or will refuse entry into U.S. airspace.

percent of destination airports will also have WAAS, and average fuel cost of $5 per gallon—predicts fuel savings of $44,750 per year. When time savings of 25 hours per year are factored in along with reduced engine cycles and reserve cost, the estimated total savings increases to $50,563.

Because ADS-B is not the only piece of the NextGen puzzle, Universal launched its NextGen Roadmap in 2015 to help customers equip their aircraft for best airspace access through all phases of the NextGen program. It advocates not installing standalone GPS sensors and ADS-B Out components, but rather an SBAS-FMS with ADS-B transponder for ADS-B compliance, and a FANS/CPDLC-capable communications management unit (CMU) with CPDLC-compatible cockpit voice recorder.

"Beyond 2020, the next big thing is performance-based navigation [PBN]," said Clare, referring to ICAO's program to standardize RNAV required navigation performance (RNP) and other navigation system approaches and routes around the world based on the CNS operational requirements. "PBN is going to become more prevalent, depending on where you're operating," Clare added. "There are some areas where you can already use PBN if you have the right FMS. That should get you well into 2024–25."

According to the FAA website's Performance Based Navigation page, one of NextGen's primary goals is to create a PBN-centric National Airspace System. The FAA has already published more than 9,000 PBN procedures, including approaches, arrival and departure procedures, and RNAV-based routes, focusing on metroplex areas including Atlanta; Charlotte, North Carolina; Denver; Washington, D.C.; Dallas-Fort Worth; Houston; Los Angeles; Phoenix; San Diego; San Francisco; Seattle; and south Florida.

"Operators who are focused on ADS-B now may not be able to fly into certain airspaces later because their FMS doesn't have PBN capability," said Clare.

FANS-1/A and CPDLC

As of Dec. 7, 2017, all aircraft flying within the North Atlantic Tracks (NAT) between FL350 and FL390 must be equipped with FANS-1/A CPDLC, ADS-C, and VHF datalink (VDL) or satcom systems. On Jan. 30, 2020, the flight level for this requirement drops to FL290.

Focusing on CPDLC installations since 2012, Sugar Grove, Illinois–based Chicago Jet Group holds 10 FANS-1/A+/CPDLC STCs for 16 business and commercial aircraft types.

"Chicago Jet has earned its own place in this business with CPDLC for aircraft," said Chicago Jet Group president Mike Mitera. "The FANS, ATN, and CPDLC technology—we pretty much own that. While everyone else was working on ADS-B, we were focused on the datalink stuff. We're the experts on it."

Mitera formed a separate company called Kobev International to conduct FANS/CPDLC/ATN training worldwide. Using a Wi-Fi hotspot on the ramp, Mitera connects the aircraft avionics and laptop running a terminal with custom training software to Kobev servers to simulate an air traffic control ground station.

"We do hands-on training in the client aircraft," said Mitera. "I work with the crew like a simulator instructor. I can send and receive messages, set up ADS-C, and show the pilots the ADS information coming from their aircraft live."

Mitera says that one benefit of going to the customer's aircraft is that every avionics suite is different, and each has its own characteristics and challenges.

"When they're hands-on with their own equipment, they can see any shortcomings in the system," said Mitera.

Even aircraft flying U.S. domestic routes can benefit from CPDLC installation as the FAA increases data comm capability at airports and en route centers across the U.S. Currently 57 airports have data comm (CPDLC) capability, and initial en route services are scheduled to begin in 2019. The FAA reports that more than 1,100 domestic air carrier aircraft have been equipped with CPDLC capability and more than 45 operators are using data comm in the national airspace system.

"The advantage of CPDLC for the Learjet operator in the U.S. is the digital communications with ATC," said Vail, who indicated that Flightstar should receive a CPDLC STC for the Learjet 40 series by midsummer. "If a corporate operator sitting at Newark has CPDLC, he basically turns on his equipment and his clearance pops up into the flight management system. He accepts it and they give him a taxi clearance and away he goes, saving an average of 22 minutes."

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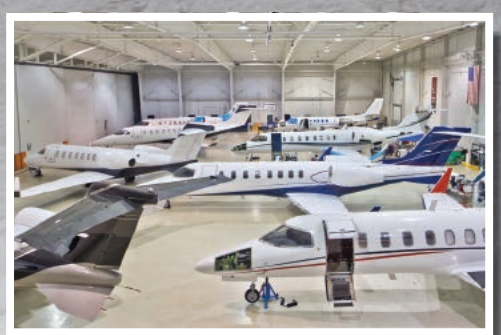

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FBO SURVEY RULES AND METHODOLOGY

This report of AIN's FBO survey covers fixed-base operations worldwide.

History

AIN has been conducting surveys since 1981, asking about the service that FBOs provide their customers and reporting the results from these surveys. Initially, we sent out a paper survey questionnaire by mail to qualified subscribers in the U.S.–pilots, flight attendants and dispatchers–the people who use or make arrangements with FBOs. In later years, qualified subscribers in the remainder of North America and the rest of the world were added.

In 2006 we moved the FBO survey online. We have continued to add FBOs each year and now offer respondents a comprehensive list of 4,500 FBOs worldwide.

The Survey

This year's annual FBO Special Report marks the third in which we have reported overall averages on a cumulative basis and the first in which the FBO survey site was live for the entire year.

The survey site allows subscribers to keep a list of personalized FBOs and from this list they can easily change or affirm a prior rating and leave an updated comment. During this survey period we saw a dramatic increase in ratings compared with last year.

The scores in this report and on our website reflect the cumulative average of scores from 2013 through today. Only the most recent rating of an FBO is counted on a per-user basis and only FBOs that have received 30 or more ratings are eligible for their scores to be published.

From April 1, 2017, until Feb. 9, 2018, we asked subscribers to update and give new ratings for FBOs they had visited in the preceding 12 months. We contacted readers via e-mail, announcements in our e-newsletters, and in the January issue of **Aviation International News**. The bulk of this promotion took place from Dec. 1, 2017, through Feb. 9, 2018.

The site asks readers to evaluate FBOs they visited the previous year in five categories: line service; passenger amenities; pilot amenities; facilities; and customer service representatives (CSRs). For each of these categories, the participant is asked to assign a number from 1 to 5, 1 being the lowest and 5 being the highest.

Observations

Each year we review ratings to ensure their accuracy. On our new site we have a system to flag, review and, if necessary, remove ratings identified as dubious by factors such as e-mail address, IP address, and concentration of scores.

Score Calculations

An FBO's overall average is calculated by adding all the individual category ratings received by that FBO and dividing the resulting sum by the total number of all category ratings received by the FBO. In other words, if a particular FBO was evaluated by 50 people (and assuming that all 50 evaluators gave that FBO a rating in each of the five categories), then the FBO would receive a total of 250 category ratings. These 250 category ratings are added together and then the sum is divided by 250 to arrive at the overall average for this FBO.

Overall averages are calculated using the cumulative average of all ratings given from 2013 through the present. This year's results will show an FBO's increase or decrease versus that FBO's cumulative rating from one year ago.

REMINDER

DON'T WAIT — AIN's FBO survey is now open for year round feedback. It takes only a minute, and you can do it while waiting for passengers, on the shuttle bus to/from the hotel or any other time that is convenient for you. Log on to www.ainonline.com/fbosurvey to rate your experiences at the FBOs you visit.

Top Rated FBOs in the Americas (by overall average)

FBO	AIRPORT CODE	AIRPORT	OVERALL AVERAGE	CHANGE FROM LAST YEAR	
SHELTAIR	KTPA	TAMPA INTERNATIONAL	4.74	-0.01	Top 5%
JET AVIATION	KPBI	PALM BEACH INTERNATIONAL	4.72	-0.02	Top 5%
PENTASTAR AVIATION	KPTK	OAKLAND COUNTY INTERNATIONAL	4.71	0.00	Top 5%
ATLANTIC AVIATION	KMTJ	MONTROSE REGIONAL	4.70	-0.02	Top 5%
LYNX FBO DESTIN (formerly Destin Jet)	KDTS	DESTIN EXECUTIVE	4.70	0.07	Top 5%
XJET	KAPA	CENTENNIAL	4.70	0.02	Top 5%
FARGO JET CENTER	KFAR	HECTOR INTERNATIONAL	4.69	-0.03	Top 5%
HENRIKSEN JET CENTER	KEDC	AUSTIN EXECUTIVE	4.69	0.08	Top 5%
SKYSERVICE	CYYZ	LESTER B. PEARSON INTERNATIONAL	4.69	-0.01	Top 5%
AMERICAN AERO	KFTW	FORT WORTH MEACHAM INTERNATIONAL	4.68	N/A	Top 5%
ATLANTIC AVIATION	KMKC	CHARLES B. WHEELER DOWNTOWN	4.68	0.00	Top 5%
BUSINESS JET CENTER	KDAL	DALLAS LOVE FIELD	4.68	0.02	Top 5%
GLOBAL SELECT	KSGR	SUGAR LAND REGIONAL	4.68	0.03	Top 5%
J. A. AIR CENTER	KARR	AURORA MUNICIPAL	4.68	0.00	Top 5%
MERIDIAN TETERBORO	KTEB	TETERBORO	4.67	0.02	Top 10%
WILSON AIR CENTER	KMEM	MEMPHIS INTERNATIONAL	4.67	0.01	Top 10%
BANYAN AIR SERVICE	KFXE	FORT LAUDERDALE EXECUTIVE	4.66	0.00	Top 10%
BASE OPERATIONS AT PAGE FIELD	KFMY	PAGE FIELD	4.66	0.01	Top 10%
ROSS AVIATION	KLGB	LONG BEACH /DAUGHERTY FIELD	4.66	-0.04	Top 10%
ALLIANCE AVIATION SERVICES	KAFW	FORT WORTH ALLIANCE	4.65	0.09	Top 10%
MILLION AIR	KADS	ADDISON	4.65	0.00	Top 10%
ATLANTIC AVIATION	KPIT	PITTSBURGH INTERNATIONAL	4.64	0.03	Top 10%
RECTRIX	KSRQ	SARASOTA/BRADENTON INTERNATIONAL	4.64	0.05	Top 10%
SIGNATURE FLIGHT SUPPORT	KSDL	SCOTTSDALE	4.64	-0.03	Top 10%
SIGNATURE FLIGHT SUPPORT	KSTP	ST PAUL DOWNTOWN HOLMAN FIELD	4.64	0.00	Top 10%
DEL MONTE AVIATION	KMRY	MONTEREY PENINSULA	4.63	0.08	Top 20%
MILLION AIR	KIND	INDIANAPOLIS INTERNATIONAL	4.63	-0.02	Top 20%
TEXAS JET	KFTW	FORT WORTH MEACHAM INTERNATIONAL	4.63	0.00	Top 20%
MONTEREY JET CENTER	KMRY	MONTEREY PENINSULA	4.62	0.00	Top 20%
SHELTAIR	KISP	LONG ISLAND MAC ARTHUR	4.62	-0.02	Top 20%
WILSON AIR CENTER	KCHA	LOVELL FIELD	4.62	0.03	Top 20%
WILSON AIR CENTER	KCLT	CHARLOTTE/DOUGLAS INTERNATIONAL	4.62	-0.01	Top 20%
WORLD-WAY AVIATION	SDCO	SOROCABA	4.62	0.02	Top 20%
ATLANTIC AVIATION	KCRQ	MC CLELLAN-PALOMAR	4.61	0.04	Top 20%
HERITAGE AVIATION	KBTV	BURLINGTON INTERNATIONAL	4.60	0.04	Top 20%
SIGNATURE FLIGHT SUPPORT	CYUL	PIERRE ELLIOTT TRUDEAU INTERNATIONAL	4.60	0.02	Top 20%
SHELTAIR	KJAX	JACKSONVILLE INTERNATIONAL	4.59	0.00	Top 20%
VAIL VALLEY JET CENTER	KEGE	EAGLE COUNTY REGIONAL	4.59	-0.01	Top 20%
FONTAINEBLEAU AVIATION	KOPF	OPA-LOCKA EXECUTIVE	4.58	0.00	Top 20%
SIGNATURE FLIGHT SUPPORT	KMSP	MINNEAPOLIS-ST PAUL INTERNATIONAL/ WOLD-CHAMBERLAIN	4.58	-0.02	Top 20%
ATLANTIC AVIATON (Formerly Orion Jet Center)	KOPF	OPA-LOCKA EXECUTIVE	4.57	-0.02	Top 20%
MILLION AIR	KSAT	SAN ANTONIO INTERNATIONAL	4.57	0.03	Top 20%
PREMIER JET CENTER	KFCM	FLYING CLOUD	4.57	-0.04	Top 20%

FBOs with same overall average are listed in alphabetical order

Most Improved FBOs over the Past 12 Months

FBO	AIRPORT CODE	AIRPORT	OVERALL AVERAGE	CHANGE FROM LAST YEAR
EMBRAER FBO	SDCO	SOROCABA	4.55	0.15
ALLIANCE AVIATION SERVICES	KAFW	FORT WORTH ALLIANCE	4.65	0.09
ATLANTIC AVIATION	KAUS	AUSTIN-BERGSTROM INTERNATIONAL	4.39	0.08
DEL MONTE AVIATION	KMRY	MONTEREY PENINSULA	4.63	0.08
HENRIKSEN JET CENTER	KEDC	AUSTIN EXECUTIVE	4.69	0.08
CUTTER AVIATION	KABQ	ALBUQUERQUE INTERNATIONAL SUNPORT	4.25	0.07
JET AVIATION	LSZH	ZURICH	3.95	0.07
LIDER AVIAÇÁO	SBSP	SÃO PAULO/CONGONHAS INTERNATIONAL	3.82	0.07
LYNX FBO DESTIN (formerly Destin Jet)	KDTS	DESTIN EXECUTIVE	4.70	0.07
NORTHEAST AIR	KPWM	PORTLAND INTERNATIONAL JETPORT	4.27	0.07
SIGNATURE FLIGHT SUPPORT	KAUS	AUSTIN-BERGSTROM INTERNATIONAL	4.18	0.07

FBOs with same change are listed in alphabetical order

4.74 Sheltair

Tampa International Airport (TPA), Tampa, Florida

For most of its 13 years in operation, the FBO, which began its existence as Tampa International Jet Center, has placed among the top rungs of **AIN**'s annual FBO survey. When Florida-based Sheltair purchased the facility in May 2016, that legacy was solidified with the location taking the overall top rating in the two subsequent years. Like most of the top-ranked FBOs, Sheltair Tampa was a solid all-around performer, earning scores of 4.72 and above in every category; it was the only FBO to exceed 4.7 in each category in this year's survey. "It just makes you know that your formula's working, and all the hard work you put into upkeep [of] the facility, training the staff, and treating the customer the right way; you know you're doing the right thing and should keep doing what you're doing," said general manager Clayton Lackey, who has been with the facility for nearly a decade. "So, in that sense, it's just a validation of all the efforts paying off; and people are noticing."

The facility has always been well maintained and that tradition continues under its new ownership, which invested in an ongoing major refurbishment of the lobby, kitchen, and vending areas. A renovation of the snooze room, private restroom, and shower facility in the pilots' lounge is up next. "That's something that I'm really proud to be a part of and really grateful for," Lackey told **AIN**. "They want to allow us to maintain our tradition here of quality and premium service."

The location is home to 35 turbine-powered aircraft, ranging from Gulfstreams and Globals to a Piper Meridian and a pair of helicopters, which, along with the normal transient traffic, filled the location's existing hangar space. That led to the grand opening in February of a $6.5 million development project that includes a new 32,000-sq-ft hangar, bringing it to 172,000 sq ft of aircraft storage and office space, and an additional, 2.5 acres of ramp.

Sheltair Tampa received its highest score in the line service category, and its technician staff was busy over the past year as the facility saw a more than 40 percent increase in volume over 2016. It increased from two million gallons of fuel pumped to nearly three million, drawn from the FBO's Avfuel-supplied fuel farm which holds 60,000 gallons of jet-A and 10,000 gallons of avgas. Among the location's most popular features is its 11,000-sq-ft airside canopy, which protects arriving and departing aircraft from central Florida's blazing sun and frequent rainstorms.

4.72 Jet Aviation

Palm Beach International Airport (PBI), West Palm Beach, Fla.

With Jet Aviation notching the half-century mark as a company, its facility at Florida's Palm Beach International Airport has, for the second straight year, been the second highest scoring FBO among **AIN**'s readers. It earned the fourth highest score overall in the line service category, and showed its all-around quality by tallying more than 4.7 in four of the five categories. "There really is no hidden secret or special formula," said Nuno Da Silva, the location's general manager. "You have to provide that service, day in and day out. I think that, over the years, we've seen that consistent service, whether it's this facility or other facilities that normally rank pretty high. It's that consistent good service that really puts you above the rest."

Da Silva credits his employees with the bulk of the location's success. "Obviously, the Jet Aviation brand has a lot of weight to it, but at the end of the day, it's our frontline employees that really make us stand out from our competition," he told **AIN**, adding the average staff tenure at the FBO is nearly two decades. "They know the customers, they provide consistent personal service, and by being here for such a long time and knowing the customers, they always anticipate their needs."

During the run-up to Hurricane Irma last fall, Da Silva credited his staff with not only taking care of their own homes and families, but also making sure the facility was buttoned up to minimize storm damage, along with maintaining the expected quality of service in the crush of aircraft customers departing for safer areas. Just weeks later, his staff loaded up a chartered 737 with supplies and volunteers headed to Puerto Rico to assist the Jet Aviation location there in the wake of Hurricane Maria.

The 25-acre facility, one of three chain-owned FBOs at PBI, is a member of the Air Elite Network and was accepted into the TSA's DASSP gateway program for flights into Washington, D.C.'s Reagan National Airport. It is also registered as IS-BAH Stage I compliant. It features an 18,000-sq-ft, two-story terminal, with a massage-chair-equipped pilot lounge, a snooze room with zero-gravity chairs, showers, conference room, business center, U.S. Customs, passenger lounge with a refreshment bar offering slushies, freshly baked cookies and ice cream, crew cars, and vans to take passengers to waiting aircraft. For its upkeep, the facility has a licensed electrician and a licensed HVAC technician on staff.

The Phillips 66-branded facility is home to 57 turbine-powered aircraft ranging from a G650 to a Cessna Conquest II. It offers 160,000 sq ft of hangar space, which can accommodate aircraft up to a Global 7000, to the delight of a customer who is eagerly awaiting delivery of the new large-cabin twinjet and had Da Silva provide hangar measurements.

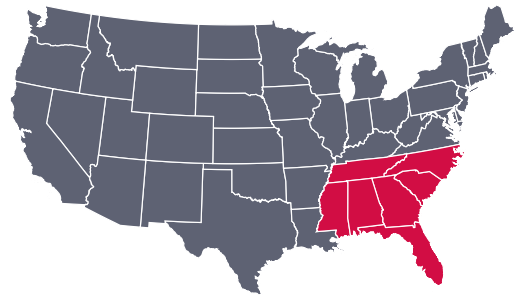
4.71 Pentastar Aviation

Oakland County Airport (PTK), Pontiac, Mich.

While Detroit-area Oakland County Airport is a competitive market for general aviation handling with no fewer than six FBOs, Pentastar Aviation, third highest scoring facility in this year's **AIN** FBO Survey, continues

Top Rated FBOs in the Americas by Region

SOUTHEAST



FBO	AIRPORT CODE	OVERALL AVERAGE	CHANGE FROM LAST YEAR
ATLANTA			
EPPS AVIATION	KPDK	4.38	0.01
HILL AIRCRAFT	KFTY	4.35	0.06
ATLANTIC AVIATION	KPDK	4.31	-0.01
SIGNATURE FLIGHT SUPPORT	KPDK	4.14	0.00
SIGNATURE FLIGHT SUPPORT	KFTY	4.09	0.00
CHARLESTON			
SIGNATURE FLIGHT SUPPORT	KCHS	4.53	-0.03
ATLANTIC AVIATION	KCHS	4.39	-0.01
CHARLOTTE			
WILSON AIR CENTER	KCLT	4.62	-0.01
CHATTANOOGA			
WILSON AIR CENTER	KCHA	4.62	0.03
DAYTONA BEACH			
SHELTAIR	KDAB	4.55	0.05
FORT LAUDERDALE/PALM BEACH			
JET AVIATION	KPBI	4.72	-0.02
BANYAN AIR SERVICE	KFXE	4.66	0.00
SHELTAIR	KFLL	4.56	0.02
STUART JET CENTER	KSUA	4.56	0.01
NATIONAL JETS	KFLL	4.52	0.02
FORT MYERS/NAPLES			
BASE OPERATIONS AT PAGE FIELD	KFMY	4.66	0.01
PRIVATESKY AVIATION SERVICES	KRSW	4.37	0.00
NAPLES AIRPORT AUTHORITY	KAPF	4.32	0.01
JACKSONVILLE			
SHELTAIR	KJAX	4.59	0.00
MEMPHIS			
WILSON AIR CENTER MEM	KMEM	4.67	0.01
SIGNATURE FLIGHT SUPPORT	KMEM	3.94	-0.01
MIAMI			
FONTAINEBLEAU AVIATION	KOPF	4.58	0.00
ATLANTIC AVIATON (Formerly Orion Jet Center)	KOPF	4.57	-0.02
SIGNATURE FLIGHT SUPPORT	KBCT	4.52	-0.05
ATLANTIC AVIATION	KBCT	4.31	-0.02
SIGNATURE FLIGHT SUPPORT	KOPF	4.25	-0.01
NASHVILLE			
ATLANTIC AVIATION	KBNA	4.16	0.02
SIGNATURE FLIGHT SUPPORT	KBNA	4.06	0.01
NORTHWEST FLORIDA			
LYNX FBO DESTIN (formerly Destin Jet)	KDTS	4.70	0.07
SHELTAIR	KECP	4.55	0.02
MILLION AIR	KTLH	4.17	0.02
ORLANDO			
SHELTAIR	KORL	4.50	0.03
ATLANTIC AVIATION	KMCO	4.48	-0.04
ATLANTIC AVIATION	KORL	4.48	-0.01
SIGNATURE FLIGHT SUPPORT	KMCO	4.35	-0.05
RALEIGH/DURHAM			
TAC AIR	KRDU	4.34	0.00
SIGNATURE FLIGHT SUPPORT	KRDU	4.01	0.00
TAMPA			
SHELTAIR	KTPA	4.74	-0.01
SHELTAIR	KPIE	4.56	0.02
SIGNATURE FLIGHT SUPPORT	KTPA	3.97	0.00
SAVANNAH			
SHELTAIR	KSAV	4.51	-0.01
SARASOTA			
RECTRIX	KSRQ	4.64	0.05

to soar. The one-stop facility has come a long way from its roots as the flight department for auto manufacturer Chrysler and offers expanded FBO services, maintenance (Class 4 Part 145 repair station with avionics shop) and detailing, interiors and completions, aircraft charter and management, advisory service and sales from its 22-acre leasehold. The main 5,000-sq-ft terminal offers a passenger lounge with refreshment bar, and a crew lounge with massage chairs, snooze room, and shower facilities.

Pentastar, which is open 24/7 with on-duty maintenance staff and CSRs, is likely the only FBO in the U.S. with its own jetway. Part of the Star Gate terminal, a separate 10,000-sq-ft structure with a baggage carousel, it is used to handle jetliners and aircraft carrying clientele who desire discretion, such as visiting sports teams, entertainers, and dignitaries.

Over the past year, the company spent $350,000 in general upkeep projects, and it recently added full Wi-Fi service encompassing its entire 10-acre ramp.

Its 130,000 sq ft of hangar space, which can accommodate aircraft up to a 737, is home to more than 25 turbine powered aircraft, ranging from a G550 on to a Hawker 900XP.

The FBO also has its in-house catering business, Five-Star Gourmet, which provides a full catering menu. It also functions as a café, serving waiting crews and passengers as well as the FBO's staff of more than 200, and can provide fully catered meals for meetings held in the facility's three A/V-equipped conference rooms, the largest of which seats 25. That business has seen 10 percent growth year-over-year, according to president and CEO Greg Schmidt, while the company's fleet of managed aircraft is at its highest total in the past decade.

The location earned its highest score (4.80) in the CSR category, and some front desk staffers at the FBO have more than 25 years' experience there. That collective knowledge is passed along to new hires. "They're getting trained from some of the people who have great longevity in the industry," noted Schmidt. "We're going to deliver the highest standards in the industry and we're going to do it with professionalism and integrity."

4.70 Atlantic Aviation

Montrose Regional Airport (MTJ), Montrose, Colorado

With more than a dozen years under its belt, the lone FBO at Colorado's Montrose Regional Airport has made a name for itself for its customer service representatives, whether that means helping with a hotel reservation or locating an engagement ring lost in the terminal. That remains true this year, as the facility, which just saw its first full year under Atlantic Aviation ownership, earned its highest score (4.84) in that category, along with garnering the fourth highest total overall score in the category in this year's FBO survey. The facility occupies a 10-acre leasehold featuring a 4,000-sq-ft terminal with passenger and crew lounges, a snooze room with private bathroom and shower, a 12-seat A/V-equipped conference room, concierge and shuttle service, crew cars, and onsite car rental. For crews, there is access to a local gym, as well as free passes to a nearby golf course.

Home to two business jets, the FBO, which is open from 6 a.m. until 9 p.m. every day, recently acquired a 4,000-sq-ft hangar from the county, bringing it to 30,000 sq ft of heated space that can accommodate the latest class of big business jets. "We see it as an opportunity to expand our footprint on the field, and it also helps to position us for any further growth," said general manager Mitchell Martin.

Winter is peak season for Montrose, a gateway to Colorado's ski resorts, with the FBO earning roughly 60 percent of its yearly take during those snowy months, but as Martin explained, the location is rich in outdoor activities, which attract customers year 'round. "You can go an hour in any direction and find world-class skiing, hiking, hunting, fishing, mountain biking, rock climbing, you name it," he told **AIN**. "If it involves the outdoors, it's here." As a result of those active sports, guests sometimes don't return to the FBO in the same condition in which they arrived. "This year has been especially hard on the skiers," said Martin. "We have seen several broken bones and have assisted whenever we could to help those passengers with boarding and keeping them as comfortable as possible."

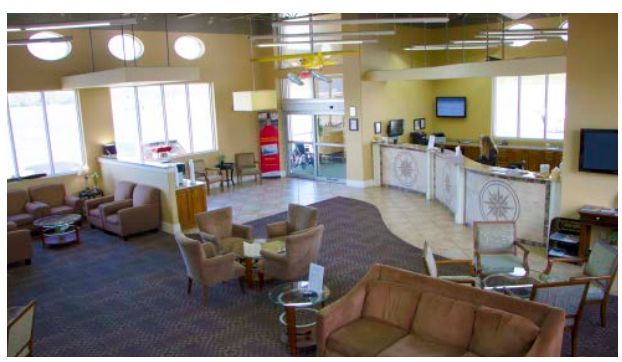
As for the rest of the care the location is known for, Martin said it is a simple formula. "Just making sure that everyone is taken care of from the time the wheels touch down until the time they leave," he explained. "Making sure that people's cars are on the ramp and standing by, making sure that people don't have to wait for their fuel, making sure that if they ask for a quick turn, they get a quick turn, and having the staff and equipment on hand, ready to take care of them."

4.70 Lynx FBO Destin

(Formerly Destin Jet), Destin Executive Airport (DTS), Destin, Florida

Lynx FBO Destin (formerly Destin Jet) in the Florida panhandle rocketed to a top-five U.S. FBO position this year, up more than 20 places from last year's survey. The facility received its highest marks in the facilities category—at 4.78, it tied for the fourth-highest score in this category.

According to Lynx FBO Destin president and partner Chad Farischon, the Destin facility—the sole service provider at Destin Executive Airport—offers a spacious lobby, two large pilots' lounges, two executive conference rooms, showers, six 4,000-sq-ft hangars, and large ramp space. Amenities include a coffee bar, café, popcorn machines, freshly baked cookies, and four crew cars.

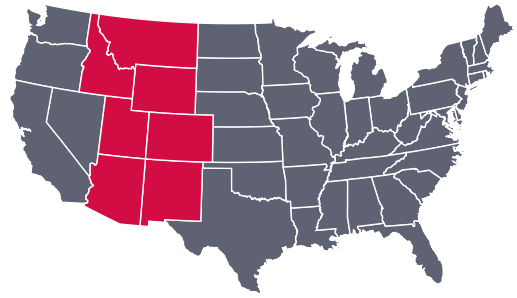


"We are continuing our investment in people, equipment, and facilities and are planning a renovation of the south location," said Farischon. "The newly renovated facility will provide a larger and well-appointed space for customers and better usage of our largest and most convenient ramp." The FBO is also considering plans to develop a larger hangar that can accommodate ultra-long-range business jets, he added.

Lynx FBO Destin, the first location acquired by the fledgling Lynx chain, averages 150 arrivals and departures daily during the peak summer months. Over the past year, it has added resources and event planning to better support high-activity holiday weekends and provide an "improved experience" for customers, Farischon said. "This has also allowed us to further increase the focus on safe operations during peak periods."

Top Rated FBOs in the Americas by Region

ROCKY MOUNTAIN



FBO	AIRPORT CODE	OVERALL AVERAGE	CHANGE FROM LAST YEAR
ALBUQUERQUE			
CUTTER AVIATION	KABQ	4.25	0.07
BOISE			
JACKSON JET CENTER	KBOI	4.42	0.01
DENVER			
XJET	KAPA	4.70	0.02
DENVER JETCENTER	KAPA	4.50	-0.01
SIGNATURE FLIGHT SUPPORT	KDEN	4.42	0.00
TAC AIR	KAPA	4.20	0.01
SIGNATURE FLIGHT SUPPORT	KAPA	4.16	-0.03
GLACIER & YELLOWSTONE			
GLACIER JET CENTER	KGPI	4.56	0.04
YELLOWSTONE JETCENTER BY SIGNATURE	KBZN	4.53	-0.02
GRAND JUNCTION			
WEST STAR AVIATION	KGJT	4.46	0.01
JACKSON HOLE			
JACKSON HOLE AVIATION	KJAC	3.87	-0.04
MOUNTAIN RESORTS			
ATLANTIC AVIATION (Formerly Black Canyon Jet Center)	KMTJ	4.70	-0.02
VAIL VALLEY JET CENTER	KEGE	4.59	-0.01
TELLURIDE REGIONAL AIRPORT	KTEX	4.31	0.01
ATLANTIC AVIATION	KRIL	4.21	0.03
ATLANTIC AVIATION	KASE	4.09	0.00
PHOENIX/SCOTTSDALE			
SIGNATURE FLIGHT SUPPORT	KSDL	4.64	-0.03
CUTTER AVIATION	KPHX	4.56	0.06
SWIFT AVIATION SERVICES	KPHX	4.55	0.01
ROSS AVIATION	KSDL	4.32	-0.01
SALT LAKE CITY			
TAC AIR	KSLC	4.46	-0.03
SUN VALLEY			
ATLANTIC AVIATION	KSUN	4.50	-0.02
TUCSON			
ATLANTIC AVIATION	KTUS	4.37	0.00

The FBO also places a strong emphasis on customer service. "Lynx recognizes that each customer's needs are unique, so we do not take a one-size-fits-all approach to customer service," Farischon explained. "Our team members are trained and empowered to adapt to individual situations and provide service that is tailored to meet the needs of the customer.

"We believe that the key to providing this level of service starts with hiring the right people who embody our customer-centric culture and embrace the Lynx values. These values guide our actions and are woven into not only our customer philosophy, but into our base operations as well. The result is an amazing team of whom we are very proud."

Last year, the FBO team had to navigate operations through several hurricanes and tropical storms. "We successfully avoided any resulting operational issues through diligent preparation and the dedication and hard work of our team," according to Farischon.

Lynx FBO Destin is also active with the local community and nonprofit organizations, sponsoring events such as the Air Commando Association, Collings Foundation, and other veteran flight services in the Destin area. C.T.

4.70 XJet

Centennial Airport (APA) Denver, Colorado

A fixture among the highly rated service providers in **AIN**'s annual FBO survey since it opened more than a decade ago, XJet's first location, at Denver's Centennial Airport, received its highest score this year for its customer service representatives (4.76).

"We believe it's all about services, not commodity and just jet fuel. There's a lot more wrapped into this, and I think FBOs are realizing that," said company founder and CEO Josh Stewart. "There's a level of service that customers still expect and demand, and those are the customers we're tailoring our business model toward." The facility delivers what it describes as "seven-star" service to those customers, which for XJet's club-based business model, is a mix of members and the customary transient aircraft. As a result, the company is constantly adding new amenities, keeping those that prove popular and removing those that aren't well utilized. Among the most appreciated is an on-premises auto spa where customers can drop off their cars for detailing and even scheduled maintenance. An agreement with a local car dealership ensures that there is always a Ferrari or Bentley nearby and ready for a test drive.

Stewart noted that the business at the airport has grown at a nearly 5 percent clip since the economic downturn, while Denver itself is growing at almost twice the national average, as a market. Overall, business improved at the facility over the past year, with fuel sales revenues increasing by nearly 16 percent over 2016. The location recently selected AEG Fuels as its exclusive fuel supplier.

Indoor aircraft storage at Centennial is at a premium, according to Stewart. The XJet facility has 50,000 sq ft of heated hangar space, occupied primarily by the 21 member jets, which range from a G550 down to a Phenom 300.

As a result of rising traffic, the company will embark on a $1.5 million project this spring that will expand its ramp parking by more than 2.5 acres, and it further plans to renovate its passenger lobby and pilots' lounge.

One of the first FBOs in the U.S. to embrace the International Standard for Business Aviation Handling (IS-BAH), the location is currently working towards its Stage II registration.

4.69 Fargo Jet Center

Hector Int'l Airport (FAR), Fargo, North Dakota

Last year was a good one for Fargo Jet Center, the lone FBO at North Dakota's Hector International Airport. GA fuel sales were up by 9 percent, surpassing what Darren Hall, the company's vice president of sales, described as pre-economic-downturn levels. Since the opening of a new customs facility several years ago, international tech stops have become a large area of business for the company, which specializes in quick turns. "Customs was a big win for us, too," noted Hall. "We had 783 airplanes last year, which is about a 19 percent increase. We had 650-something the year before, so we had a big bump in international traffic."

Constantly improving the location's visibility in the international arena certainly plays into that increase, and Fargo Jet exhibits at more than 20 industry trade shows a year. "You get in front of somebody, you're able to shake their hand, earn their trust a little bit, and you've already started building that relationship, before they've even thought about coming to Fargo," Hall told **AIN**.

The location, which is open 24/7, earned the third highest score (4.77) overall in the line service category in this year's survey, despite facing certain inherent geographical drawbacks. "It's tough on the line guys out there; you're trying to do high-end, red carpet service when you've got the 20-knot wind and it's 20 below zero," explained Hall. "When it gets to those extreme conditions, there are some procedures that we implement that really ensure we're going to be able to serve the clients when they come through." Those strategies range from leaving the fuel trucks idling to insure they move instantly when needed, to pre-heating a customer's car ahead of their arrival. Hall said his staff valeted nearly 2,500 customer vehicles last year, and given the short amount of time the average passenger spends at the FBO, he acknowledges that there is a very limited amount of time to impress them. "So we're just very attuned to that, and watching for every little opportunity where we can serve someone," he said. "It might be the smallest little point, but that little point might make their day." Another customer favorite feature are the muffins that are baked every day in the FBO. Since 1990, Hall estimates it has handed out approximately 130,000 of the treats.

Among the facility's amenities are a pilots' lounge with snooze room, shower facilities, a trio of crew cars, and five A/V-equipped conference/training rooms, ranging from eight to 20 seats. It offers 230,000 sq ft of heated hangar space that can accommodate aircraft up to a G650.

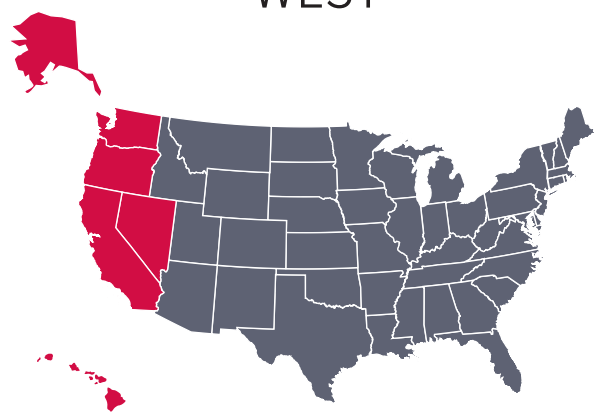
4.69 Henriksen Jet Center

Austin Executive Airport (EDC), Austin, Texas

Making its first appearance among the top finishers in **AIN**'s annual FBO Survey is Henriksen Jet Center, the lone service provider at privately owned Austin Executive Airport. The facility opened in 2011, and features a 22,500-sq-ft terminal. It earned the highest score (4.78) in this year's survey in the passenger amenities category.

Top Rated FBOs in the Americas by Region

WEST



FBO	AIRPORT CODE	OVERALL AVERAGE	CHANGE FROM LAST YEAR
ANCHORAGE			
ROSS AVIATION	PANC	4.34	0.00
HONOLULU			
AIR SERVICE HAWAII	PHNL	4.42	-0.02
SIGNATURE FLIGHT SUPPORT	PHNL	4.21	N/A
LAS VEGAS			
SIGNATURE FLIGHT SUPPORT	KLAS	4.37	0.00
ATLANTIC AVIATION	KLAS	4.29	0.00
HENDERSON EXECUTIVE AIRPORT	KHND	4.06	0.02
LOS ANGELES			
ROSS AVIATION	KLGB	4.66	-0.04
MILLION AIR	KBUR	4.46	-0.02
ATLANTIC AVIATION	KSNA	4.36	0.01
CASTLE & COOKE AVIATION	KVNY	4.35	-0.07
SIGNATURE FLIGHT SUPPORT EAST	KVNY	4.32	-0.02
PALM SPRINGS			
SIGNATURE FLIGHT SUPPORT	KPSP	4.43	-0.04
ATLANTIC AVIATION	KPSP	4.29	0.00
ROSS AVIATION	KTRM	4.26	0.00
PORTLAND			
ATLANTIC AVIATION	KPDX	4.33	0.02
SAN DIEGO			
ATLANTIC AVIATION	KCRQ	4.61	0.04
JET SOURCE	KCRQ	4.36	0.02
SIGNATURE FLIGHT SUPPORT	KSAN	3.68	-0.03
SAN FRANCISCO			
DEL MONTE AVIATION	KMRY	4.63	0.08
MONTEREY JET CENTER	KMRY	4.62	0.00
SIGNATURE FLIGHT SUPPORT	KOAK	4.32	-0.07
ATLANTIC AVIATION	KSJC	4.18	0.01
BUSINESS JET CENTER	KOAK	4.13	0.00
SEATTLE			
CLAY LACY AVIATION	KBFI	4.23	-0.03
SIGNATURE FLIGHT SUPPORT	KBFI	4.18	0.01

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Its passenger lounge, off the main lobby, offers private areas, with computer/telephone rooms and a 10-seat A/V-equipped conference room. Among its focal points are a fully restored 1914 Indian motorcycle, and a stand-mounted Rolls-Royce/Snecma Olympus 593 engine that once powered the Concorde. A refreshment bar offers Starbucks coffee and fresh-baked cookies. Fruit-infused water is available in the summer and hot apple cider in the colder months. A 15,500-sq-ft arrivals/departures canopy shelters aircraft from the Texas heat, and the facility has complimentary portable air conditioner carts to swiftly cool down heat-soaked aircraft as they prepare to load passengers for departure. Covered valet parking is also available.

For crew, the pilots' lounge has an 80-inch television, and massage chair-equipped quiet rooms, as well as shower facilities and a private crew galley. The FBO has an agreement with a local recreation center for visitor gym privileges.

The facility has 111,000 sq ft of hangar space that can accommodate the latest big business jets, and has plans to add another 30,000-sq-ft hangar next year. It has six acres of ramp space, but with 600 acres of property on the airport, there is ample space to expand if demand requires. Added this year to the airport is a new 55-foot control tower. "We constructed it as private, but we met all the FAA contract tower requirement specifications," noted Jodie Kaluza, who serves as the manager for both the FBO and the dedicated GA airport. She added that that the FBO, which is open 24/7/365 exceeded one million gallons of fuel pumped last year for the first time.

Kaluza said she sees many customers who enjoy coming to the FBO due to their staff interactions. "We know this business is about building relationships, so we try to earn business each and every trip," she told **AIN**. "We consistently try to treat every customer like he's our most important. I know that's such a cliché, but it's so important in this industry."

4.69 Skyservice

Lester B. Pearson International Airport (YYZ), Toronto, Canada

The only Canadian service provider to rank in the top 10 percent in this year's survey and rank in the top 5 percent for the past three years is Skyservice's Toronto full-service facility, one of four locations operated by the company.

Skyservice has been operating at Lester B. Pearson International, the country's busiest airport, for a quarter century, and its current 12,000-sq-ft terminal was built in 2001. It features spacious passenger and crew lounges; snooze room; three A/V-equipped conference rooms, the largest of which can accommodate 30 people; 24-hour available onsite Canadian Customs; a gym with shower facilities; onsite car rental; flight planning center; courtesy offices with computers; Starbucks coffee bar with fresh baked goods; and a 24-hour courtesy shuttle to any location in the area. Complimentary valet service and car washing has proved a popular amenity. The location recently doubled its concierge service with the addition of two more full-time employees, now offering two in the morning and two in the afternoon.

With its low staff turnover rate, the facility earned its highest score (4.81) in the CSR category. "I am very fortunate to have veteran staff working the front desk," said Josie Da Costa, the location's customer service manager, adding that they are creative and resourceful when trying to find a solution to every request. "If a customer experiences any issues during their visit, we will do our best to take the weight of the problem off them." According to Michael Denham, the FBO's facility manager, it regularly self-audits its own performance with feedback from customers, as well as its employees.

The FBO is home to 45 tenant and managed aircraft ranging from a King Air 200 to a G650. Its main hangar provides 88,000 sq ft of space, and a 75,000-sq-ft regional jet maintenance facility can shelter aircraft up to a 757, but with the company noting increases in its managed fleet and charter divisions as well as significant passenger growth, more hangar space is needed.

"We are excited and looking forward to breaking ground on our newest facility in Toronto, which will give us an additional 100,000 sq ft of hangar space and 20,000 sq ft of office and meeting space," said CEO and chairman Marshall Myles. Construction on the $60 million project on the south side of the airport is set to begin this spring with an anticipated completion date in February 2019.

4.68 American Aero

Fort Worth Meacham International Airport (FTW), Fort Worth, Texas

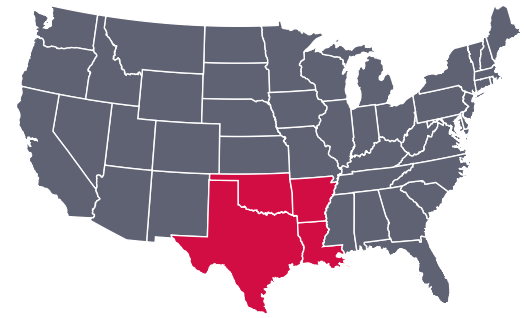
American Aero moved into its new permanent $50 million facility at Fort Worth International/Meacham Field just last year, and the location cracked the top five percent of North American service providers among **AIN** readers in this year's survey. The terminal, which occupies 8,600 sq ft in the city's 75,000-sq-ft aviation department complex, was designed from the ground up by pilots and industry veterans, so it is little surprise that it garnered the second highest score (4.76) in the pilot amenities category this year.

"We got a lot of feedback from our customer base, including both crewmembers and passengers, on what they like to see in an FBO, what they don't like to see in an FBO, and really took that to heart and incorporated that into our design," noted Riggs Brown, the facility's general manager. That input, led to a terminal more reminiscent of a luxury hotel than an airport structure. The pilots' lounge features a galley/dining area with china and glassware service, and a refrigerator stocked with beverages, a sound-proofed snooze room, a rest room with shower, an entertainment room, and a flight planning area. A monitor tied to security cameras allows the pilots to observe their aircraft as well as be alerted when their passengers arrive at the landside porte cochere. In the service galley area, there is a 90-second dishwasher, ideal for quick turns. The facility offers Volvo SUVs as crew cars

The terminal is sheathed in photochromic glass, which shields the interior from the harsh Texas sun, and also keeps the building cooler, reducing utility costs by 20 percent. For aesthetic purposes, the interior was furnished with sound-dampening materials and has white-noise speakers embedded in the walls. It has a refreshment bar, a 25-seat A/V-equipped conference room, and three lounges offering increasing levels of privacy, as well as 80 covered parking spaces. In terms of training the company uses Ritz Carlton, NATA, and Avfuel programs. Several staff members are emergency medical responders in case of any illness or accidents.

Top Rated FBOs in the Americas by Region

SOUTH



FBO	AIRPORT CODE	OVERALL AVERAGE	CHANGE FROM LAST YEAR
AUSTIN/SAN ANTONIO			
HENRIKSEN JET CENTER	KEDC	4.69	0.08
MILLION AIR	KSAT	4.57	0.03
ATLANTIC AVIATION	KAUS	4.39	0.08
SIGNATURE FLIGHT SUPPORT - NORTH TERMINAL	KSAT	4.19	0.00
SIGNATURE FLIGHT SUPPORT	KAUS	4.18	0.07
DALLAS/FORT WORTH			
AMERICAN AERO	KFTW	4.68	N/A
BUSINESS JET CENTER	KDAL	4.68	0.02
ALLIANCE AVIATION SERVICES	KAFW	4.65	0.09
MILLION AIR - DALLAS	KADS	4.65	0.00
TEXAS JET	KFTW	4.63	0.00
HOUSTON			
GLOBAL SELECT	KSGR	4.68	0.03
JET AVIATION	KHOU	4.50	0.02
MILLION AIR	KHOU	4.49	-0.01
GILL AVIATION	KDWH	4.47	0.02
WILSON AIR CENTER	KHOU	4.34	-0.01
LITTLE ROCK			
TAC AIR	KLIT	4.04	0.03
NEW ORLEANS			
SIGNATURE FLIGHT SUPPORT	KNEW	4.32	-0.04
ATLANTIC AVIATION	KMSY	4.28	0.00

FBOs with same overall average are listed in alphabetical order

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The FBO offers 11 acres of ramp and nearly 300,000 sq ft of hangar space that can accommodate aircraft up to a 737-200. A dedicated U.S. Customs facility will be operational in the building by the end of summer.

The company says it is driven by its dedication to safety, as demonstrated by its commitment to IS-BAH. In 2015 it was the first FBO in the Western Hemisphere to achieve Stage I registration in the voluntary set of industry best practices, and last year became one of the first in the world to earn Stage II accreditation. It is now working toward its Stage III audit. "The genesis of the design of our FBO started with safety, and it started with service," said company vice president Robert Agostino. "We didn't view those two points as being mutually exclusive."

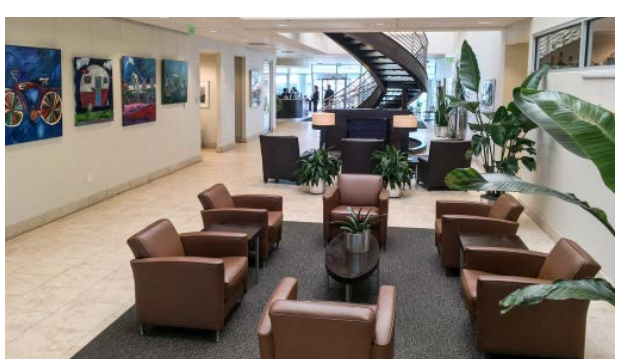
4.68 Atlantic Aviation

Charles B. Wheeler Downtown Airport (MKC), Kansas City, Missouri

When the location now known as Atlantic Aviation Kansas City opened in 2010, as independent Hangar 10, the facility instantly raised the bar for FBO service at Charles B. Wheeler Downtown Airport. Purchased by Atlantic three years later, the facility has continued to rank among the top FBOs in North America, according to **AIN**'s readers. The location's 26,000-sq-ft, two-story terminal earned scores of 4.7 or higher in the categories of facilities and pilot and passenger amenities. The modern building features three conference rooms and a centrally located fitness center, rather than one typically situated in an unused office. Offering showers and locker rooms, it sees regular use by the location's transient and based customers as well as its employees. Through a partnership with the city's art council project, the spacious terminal is continually redecorated with work from local artists.

In the pilots' lounge there are three snooze rooms, each with a bed, television and private bathroom, sponsored by local hotels. Kyle Eiserer, the location's general manager, noted that the ultimate goal of his team is to ensure that every detail is handled with precision, down to the recommendation of dining choices. "Kansas City is known for barbeque and so we frequently send crews to some of our favorite local restaurants," he said. "A few have been known to take BBQ home with them."

Over the past year, the location, which is open 24/7, completed the fourth and final phase of its master plan, adding a fourth hangar and bringing it to more than 60,000 sq ft of aircraft storage space. "As part of this construction project we were able to build a U.S. Customs facility, which greatly expands the capability of the airport," explained Eiserer, adding that before the addition, Customs would clear only U.S. citizens. "With this new facility and equipment, U.S. Customs has the capability of clearing virtually any aircraft. To date we have seen an uptick in international traffic and we expect this to continue." The facility also has a smaller, private terminal attached to one of its hangars for the exclusive use of its based customers.



4.68 Business Jet Center

Dallas Love Field (DAL), Dallas, Texas

The Lone Star state is well represented with top-tier FBOs in this year's **AIN** survey, and among them is the family-owned Business Jet Center at Dallas Love Field, which has experienced three consecutive, record breaking years in terms of fuel sales. Its 33,000-sq-ft, three-story terminal earned the location its highest score (4.72) in the facilities category. "We believe appearance is very important," said Cat Clay, the location's manager of FBO sales and marketing. "From a clean and spacious lobby to a red carpet welcome on the tarmac, we pay much attention to the details."

It has a triangular arrival/departure canopy that can shelter aircraft up to a Global, three crew lounges; a trio of snooze rooms, each with a full-size private restroom and shower; a gameroom equipped with a foosball table, pinball machine, and golf simulators among its other diversions; three Mercedez-Benz crew cars; and a refreshment bar offering a wide variety of snacks, including cookies, granola bars, fruit, beverages, slushies, and ice cream. Pets are catered to as well, with treats and a grass area.

One of four FBOs on the field, the location is home to 60 turbine-powered aircraft and currently has 250,000 sq ft of hangar space that can shelter the latest big bizjets. But that isn't enough, according to co-owner Michael Wright. "Growth in the number of based tenants and transient customers has created the need for more hangar space," he explained. "To accommodate this growth, we plan to break ground this spring on a new 48,000-square-foot hangar." The company also recently added a Mototok Twin 7500 tug to its fleet of ground service equipment to ease aircraft positioning.

The facility is open 24/7 and its staff of 65 employees embraces the slogan "big or small, we love you all" when it comes to its customers' aircraft. "A customer is a valued customer no matter what they fly," said Jason Pons, the company's manager of FBO operations. "Aircraft size counts only when considering what fits where."

When hiring staff, the company makes it clear what qualities it is looking for when it comes to personality. "You can teach just about anyone to perform certain duties that go along with working at an FBO," said Clay, "but you cannot teach someone to care."

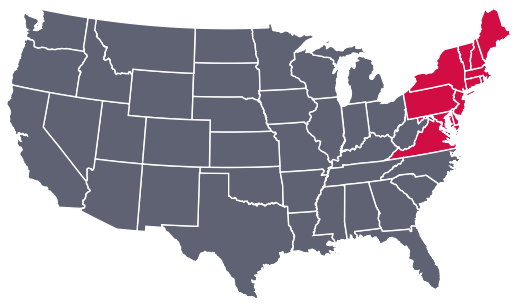
4.68 Global Select

Sugar Land Regional Airport (SGR), Sugar Land, Texas

Offering a strong counterpoint to the notion that a highly rated, well-run FBO has to be privately owned is Global Select, the municipally owned location at Houston-area Sugar Land Regional Airport. The facility earned the top overall scores in two of the five categories in this year's survey. For pilot amenities (4.77) the facility offers a private, code-locked, pilots' lounge with a theater room with stadium seating and a wall-sized television screen, a quiet area for reading or completing paperwork, relaxation rooms with massage chairs, a kitchen, dining area, and fully stocked shower facility. The FBO recently redid each of its three snooze rooms with a television and a large recliner with blankets and pillows.

Top Rated FBOs in the Americas by Region

NORTHEAST



FBO	AIRPORT CODE	OVERALL AVERAGE	CHANGE FROM LAST YEAR
ALBANY			
MILLION AIR	KALB	4.53	0.00
BALTIMORE			
SIGNATURE FLIGHT SUPPORT	KBWI	4.08	-0.01
BOSTON			
JET AVIATION	KBED	4.24	0.02
SIGNATURE FLIGHT SUPPORT	KBED	3.97	0.05
SIGNATURE FLIGHT SUPPORT	KBOS	3.66	-0.03
BURLINGTON			
HERITAGE AVIATION	KBTV	4.60	0.04
LONG ISLAND			
SHELTAIR	KISP	4.62	-0.02
SHELTAIR	KFRG	4.44	0.01
SHELTAIR	KFOK	4.41	0.04
ATLANTIC AVIATION	KFRG	4.31	0.00
MAINE			
NORTHEAST AIR	KPWM	4.27	0.07
BANGOR AVIATION SERVICES	KBGR	3.89	0.00
NEW YORK CITY			
MERIDIAN TETERBORO	KTEB	4.67	0.02
JET AVIATION	KTEB	4.45	-0.01
SIGNATURE FLIGHT SUPPORT SOUTH TERMINAL	KTEB	4.38	0.00
SIGNATURE FLIGHT SUPPORT WEST	KHPN	4.35	-0.04
MILLION AIR	KHPN	4.30	-0.04
PHILADELPHIA			
ATLANTIC AVIATION	KPHL	3.98	-0.03
PITTSBURGH			
ATLANTIC AVIATION	KPIT	4.64	0.03
WASHINGTON, D.C.			
SIGNATURE FLIGHT SUPPORT	KDCA	4.44	N/A
APP JET CENTER	KHEF	4.42	-0.03
SIGNATURE FLIGHT SUPPORT	KIAD	4.31	0.00
JET AVIATION	KIAD	4.29	0.00

Apex Executive Jet Center

Melbourne, Florida | KMLB

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4.68 J.A. Air Center

Aurora Municipal Airport (ARR), Sugar Grove, Illinois

While the Chicagoland area has many options when it comes to airports and FBOs, the one that consistently rises to the top in **AIN**'s annual survey is J.A. Air Center at Aurora Municipal Airport. While the company known initially as Joliet Avionics traces its existence back more than half a century, its move to Aurora corresponded with the debut of its new FBO a decade ago.

"Our commitment to the industry has stayed the same since we've opened," explained general manager Randy Fank. "All aircraft, whether single piston or heavy jet, are equal customers and deserve to be treated the same with a great attitude and a gracious smile."

The location, one of two service providers at the airport, is open from 6 a.m. until 10 p.m. Its facilities once again earned the location's highest rating (4.73), and guests entering the 11,000-sq-ft terminal are immediately drawn to various restored vintage cars on display, furnished through the FBO's partnership with Rich Harvest Farms, an exclusive local golf course with its own car museum. Newly added in the lobby this year is a player piano, to provide soft background music for passengers awaiting their flights.

A 15,000-sq-ft canopy shelters loading and deplaning customers from the sometimes harsh Lake Michigan weather. Valet service whisks customer cars away to indoor parking.

Flight crew are well cared for as well, with a pilots' lounge featuring a newly added pool table, snooze rooms, and a gym with showers. A new Audi A8 has also joined its fleet of crew cars.

With 100,000 sq ft of heated hangar space, the FBO is home to 30 aircraft including a Boeing 737. A one-stop shop for virtually all aviation needs, J.A. offers aircraft charter and management, interiors, maintenance, detailing, sales, and harking back to its founding, one of the largest avionics shops in the U.S. Given the looming ADS-B equipage mandate, the facility is seeing an increase in activity with customers booked months out.

Fank added that his employees never stop looking for ways to keep the customers satisfied. When one frequent customer mentioned that they were planning a trip to Hawaii for a week, the FBO's CSR manager offered to watch their dog for them.

This spring, the CAA-preferred location will join the World Fuel-sponsored Air Elite Network, which has strict standards for its members in the quality of facilities and service. "We look forward to taking our customer service to an even higher level with the Ritz Carlton training that our CSRs will be going through," said Fank. ■

Top Rated FBOs in Americas by Region

CANADA

FBO	AIRPORT	OVERALL AVERAGE	CHANGE FROM LAST YEAR
CALGARY			
SKYSERVICE	CYYC	4.43	-0.02
MONTREAL			
SIGNATURE FLIGHT SUPPORT	CYUL	4.60	0.02
SKYSERVICE	CYUL	4.43	0.00
TORONTO			
SKYSERVICE	CYYZ	4.69	-0.01
SIGNATURE FLIGHT SUPPORT	CYYZ	3.64	0.03

BRAZIL

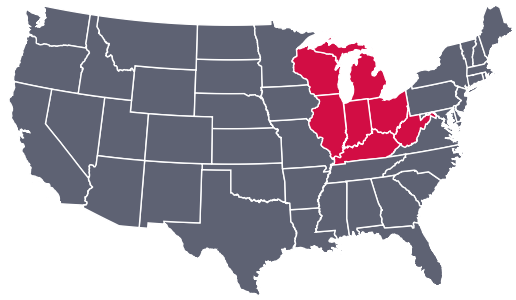
FBO	AIRPORT	OVERALL AVERAGE	CHANGE FROM LAST YEAR
SÃO PAULO			
WORLD-WAY AVIATION	SDCO	4.62	0.02
EMBRAER FBO	SDCO	4.55	0.15
LIDER AVIACÃO	SBSP	3.82	0.07

CARIBBEAN

FBO	AIRPORT	OVERALL AVERAGE	CHANGE FROM LAST YEAR
PROVO AIR CENTER	MBPV	4.49	-0.05
ODYSSEY AVIATION	MYNN	4.44	0.02
JET AVIATION	MYNN	4.15	-0.03
TLC AVIATION	TNCM	3.70	0.00

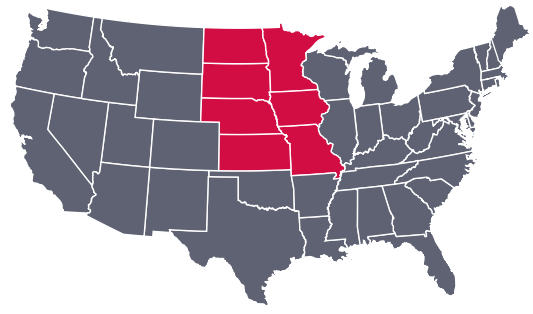
Top Rated FBOs in the Americas by Region

GREAT LAKES



FBO	AIRPORT CODE	OVERALL AVERAGE	CHANGE FROM LAST YEAR
CHICAGO			
J. A. AIR CENTER	KARR	4.68	0.00
ATLANTIC AVIATION	KPWK	4.49	-0.02
SIGNATURE FLIGHT SUPPORT	KPWK	4.40	-0.01
ATLANTIC AVIATION	KMDW	4.36	0.01
DUPAGE FLIGHT CENTER	KDPA	4.33	-0.01
CINCINNATI			
SIGNATURE FLIGHT SUPPORT	KLUK	3.99	0.01
CLEVELAND			
ATLANTIC AVIATION	KCLE	4.05	0.00
COLUMBUS			
LANE AVIATION	KCMH	4.35	-0.08
DETROIT			
PENTASTAR AVIATION	KPTK	4.71	0.00
INDIANAPOLIS			
MILLION AIR	KIND	4.63	-0.02
SIGNATURE FLIGHT SUPPORT	KIND	4.27	N/A
LEXINGTON/LOUISVILLE			
TAC AIR	KLEX	4.40	0.02
ATLANTIC AVIATION	KSDF	4.17	0.00
MILWAUKEE			
SIGNATURE FLIGHT SUPPORT	KMKE	4.21	0.00

MIDWEST



FBO	AIRPORT CODE	OVERALL AVERAGE	CHANGE FROM LAST YEAR
DES MOINES			
ELLIOTT AVIATION	KDSM	4.52	-0.01
FARGO			
FARGO JET CENTER	KFAR	4.69	-0.03
KANSAS CITY			
ATLANTIC AVIATION	KMKC	4.68	0.00
MINNEAPOLIS/ST. PAUL			
SIGNATURE FLIGHT SUPPORT	KSTP	4.64	0.00
SIGNATURE FLIGHT SUPPORT	KMSP	4.58	-0.02
PREMIER JET CENTER	KFCM	4.57	-0.04
ST PAUL FLIGHT CENTER	KSTP	4.36	N/A
SIGNATURE FLIGHT SUPPORT	KRST	4.20	-0.01
OMAHA			
TAC AIR	KOMA	4.40	-0.06
ST LOUIS			
MILLION AIR	KSUS	4.47	0.02
SIGNATURE FLIGHT SUPPORT	KSTL	3.89	0.00

4.67 Meridian

Teterboro Airport (TEB), Teterboro, New Jersey

Meridian Teterboro earned the highest single category score in this year's survey (4.91 for CSRs). The facility has a total hangar space of 102,000 sq ft that can accommodate a Gulfstream G650. The terminal and office space equal 51,500 sq ft and the facility offers amenities such as a private movie theater, pool table, sleep rooms, and a gym with locker rooms and private showers. There are also quiet rest areas, work stations, and flight-planning facilities. The FBO offers rental car and limousine services. Meridian Teterboro currently has 18 turbine aircraft based.

4.67 Wilson Air Center

Memphis International Airport (MEM), Memphis, Tennessee

Wilson Air Center offers 108,060 sq ft of hangar space and can accommodate a Boeing 767 on its ramp. The 21-year-old terminal is 5,700 sq ft and is staffed by 30 employees. Wilson Air Center's amenities include a pilot lounge, snooze room, remote quiet room, lobby, and office space. The FBO offers services such as aircraft fueling with Shell Aviation products, on-site rental cars, military freight, and airline handling. With three turbine aircraft based at the facility, Wilson Air Center is open 24/7.

4.66 Banyan Air Service

Fort Lauderdale Executive Airport (FXE), Fort Lauderdale, Florida

This past August, Banyan Air Service celebrated its 38th anniversary at Fort Lauderdale Executive Airport in South Florida. With more than 1 million sq ft of hangar and office space in the complex, the FBO can accommodate aircraft as large as a Gulfstream G650. Banyan has a 14,525-sq-ft terminal, built in 2007 and has amenities such as a cascading waterfall and 800-gallon saltwater aquarium along with a customer lobby, executive business center, conference rooms, flight-planning center, sleep bunk room, private shower, pilots' lounges, and more. Banyan Air Service Fort Lauderdale currently has 130 turbine aircraft based at the FBO and employs approximately 180.

4.66 Base Operations,

Page Field (FMY), Fort Meyers, Florida

Base Operations Page Field, which operates from 7 a.m. to 11 p.m. every day, has a total of 50,000 sq ft of hangar space across three bulk hangars. The FBO is planning a new 24,000-sq-ft bulk hangar with attached office space,

which is expected to be completed by early 2019. The existing hangar facilities can accommodate a Falcon 2000, and the airport's 6,406-foot runway can handle most long-range business jets. The 23,000-sq-ft terminal, which was completed in 2011, features a crew lounge, meeting rooms, weather/planning room, gift shop, and more. Base Operations Page Field has more than 40 based turbine aircraft and 35 full-time employees, including airfield and facility maintenance.

4.66 Ross Aviation

Long Beach Airport/Daugherty Field (LGB), Long Beach, California

Ross Aviation at Long Beach/Daugherty Field features a passenger lobby, pilots' lounge, showers, gift shop, conference rooms, as well as complimentary shuttle vans and limousine and taxi. The FBO offers a 14,000-sq-ft terminal and 172,000 sq ft of hangar space that can accommodate a Boeing 767. Currently, there are 35 turbine aircraft based at Ross Aviation at Long Beach/Daugherty Field and 25 employees available on site.

4.65 Alliance Aviation

Fort Worth Alliance Airport (AFW), Fort Worth, Texas

Alliance Aviation in Forth Worth offers four community hangars that equal 106,000 sq ft. The FBO can accommodate aircraft as large as the Boeing 777-300 and 747-400. Its 15,000 sq ft terminal features a pilots' lounge, 14 seat A/V-equipped conference room, briefing area, snack room, shower, charging station, fitness center, and weather and flight-planning

facilities, and more. With approximately 74 based aircraft and 28 staff members, the FBO offers services such as onsite customs and aircraft cleaning and lavatory services.

4.65 Million Air

Addison Airport (ADS), Dallas, Texas

Million Air Dallas Addison has 190,000 sq ft of hangar space that can accommodate a G650. The 18,000-sq-ft terminal, which was built in 1984, features a flight-planning center, flight briefing terminals, fitness center, showers, lounges, crew rest area, a snooze room, and new Tesla chargers. In addition to its approval as a Ronald Reagan Washington National Airport Gateway facility, Million Air Dallas Addison

offers services such as U.S. Customs, onsite car rentals, and Avtrip reward card points granted at two points a gallon. The FBO has 50 based turbine aircraft and 50 employees.

4.64 Atlantic Aviation

Pittsburgh International Airport (PIT), Pittsburgh, Pennsylvania

Long a presence at Pittsburgh International, Atlantic Aviation's FBO earned a score of 4.85 for its customer service representatives in this year's survey, putting it in the top five in the category. The location, which is open 24/7, has a 10,000-sq-ft terminal with two conference rooms, pilots' lounge and snooze room, shower

facility, business center, gym, refreshment bar, in-house U.S. Customs, crew cars and onsite car rental. Home to a dozen turbine-powered airplanes, it offers 70,000 sq ft of heated hangar space that can shelter jets up to a Global Express.

4.64 Rectrix

Sarasota-Bradenton International Airport (SRQ), Sarasota/Bradenton, Florida

The facility has 180,000 sq ft of hangar space and passenger facilities. The largest aircraft that can be accommodated are Gulfstream's GIV and GV. The 9,000-sq-ft terminal is nine years old, with amenities including a passenger and crew lounge, conference rooms, flight-planning room, weather briefing area, and snooze room. With 16 employees who oversee 18 based turbine aircraft, the FBO offers services such as aircraft maintenance,

rental cars, a Tesla charging station, domestic and international handling, overnight hangar service, and more.

4.64 Signature Flight Support

St. Paul Downtown Airport/Holman Field (STP), St. Paul, Minnesota

Signature STP is known for its customer service, and the location earned the second highest score in the category this year (4.87), the same score it earned in last year's survey. The 32-acre, decade-old facility is open 24/7 and has a 12,000-sq-ft terminal, with a pair of A/V-equipped conference rooms, business center, kitchen, crew lounge with snooze room, locker room with shower facility, dishwashing service, rampside vehicle access, crew cars and cour-

tesy shuttle. It offers 190,000 sq ft of heated hangar space and half a million sq ft ramp. A Signature TechnicAir service center is part of the complex.

4.64 Signature Flight Support

Scottsdale Airport (SDL), Scottsdale, Arizona

Signature Flight Support Scottsdale offers six hangars that encompass 145,000 sq ft of space. The largest aircraft the FBO can accommodate is a G650. The terminal, which was built in 2003, is 13,000 sq ft.

Amenities include a crew room, conference room, kitchen, passenger lounge, showers, and snooze room. The FBO currently has 20 turbine aircraft based at its facility.

4.69 TAG Farnborough

Farnborough Airport (EGLF), UK

TAG Farnborough extends its decade-plus run as the top-ranked FBO outside of North America as chosen by **AIN**'s readers in this year's survey. The only service provider at the privately operated, business aviation-only London-area airport, the airport-owned facility once again proved it can stand toe-to-toe with even the best North American locations, ranking in the top 5 percent worldwide. It had the second highest score overall in three categories: passenger amenities, pilot amenities, and facilities. "Our key philosophy is to offer a five-star service and sophistication with no compromises, exactly as customers and crew would expect from Europe's leading business aviation airport," said Brandon O'Reilly, TAG Farnborough's CEO.

The airport, 35 miles from the capital and the site of the first powered flight in the UK, ranked 2017 as its busiest year in a decade, with a 7.4 percent increase in movements year-over-year. The location started off 2018 with a surge as well, posting a record 20 percent rise in movements for the first two months, and it expects that momentum to continue.

The facility, which handles approximately 25,000 flights a year, is home to 40 private jets, and offers 260,000 sq ft of heated hangar space, which can accommodate aircraft up to an ACJ320. It is open from 7 a.m. until 10 p.m. on weekdays, and 8 a.m. to 8 p. m. on weekends.

Its 52,000-sq-ft terminal features a new quiet lounge in the crew area, a bed-equipped snooze room, zero-gravity ergonomic chair, and, spurred by customer feedback, an exclusive crew gym and dedicated shower facilities in both the gym and the adjacent main terminal.

To support higher-passenger-volume flights, a stylish new passenger lounge overlooking the runway on the top floor of the three-story terminal was created and can accommodate groups of up to 80 people. A fast-track entrance to the airport for passengers and crew was recently added, and direct car access to the ramp is permitted. Customs and immigration service is located in the terminal, as is a café operated by in-flight caterer Absolute Taste.

4.54 Universal Aviation

London Stansted Airport (EGSS), UK

The UK's capital region is well served with private aviation service providers, and another standout among them is Universal Aviation's facility at London Stansted, which just saw its business grow by 20 percent, year-over-year, following 40 percent growth during the previous year. In operation there for nearly three and a half decades, the facility's two-story, 11,000-sq-ft terminal was modernized in 2012, and the operations room and kitchen were recently refreshed. Among its amenities are VIP arrival and departure lounges; conference rooms; shower facilities; crew lounge with business center; concierge service; full baggage handling and ramp transfers; as well as a dedicated security screening area and UK customs and immigration clearance in-house. But according to Sean Raftery, Universal's managing director for the UK and Ireland, the facility has another unique benefit.

"We're not just a ground-handling office," he told ***AIN***. "Our facility also houses our European Operations Centre, which is our regional flight-planning and trip-support office, supporting Europe-based operators. Being part of a global company means that wide resources are at our disposal and we can proactively monitor new and changing regulations... to better guide and support our customers."

The location, which is open from 7 a.m. until 10 p.m. with after-hours callout available, is also a certified, registered, and approved UK air passenger duties administration center. It achieved Stage I IS-BAH registration last year, and while it has 40,000 sq ft of private ramp and its own equipment to handle any aircraft up to and including widebody jetliners, it does not possess a hangar of its own. Aircraft shelter is available through the facility's partners on the airport.

Its staff of 60 has an average tenure of 10 years at the location. "Every team member here is an important player and they understand their valuable role in supporting the customer mission," said Raftery.

4.49 TAG Aviation

Geneva International Airport (LSGG), Geneva, Switzerland

Last year, the TAG Aviation facility at Geneva's international airport assisted nearly 17,000 movements and 36,000 passengers, which accounts for nearly 49 percent of the business aviation market share at the airport, according to Erturk Yildiz, the FBO's handling manager. He noted that the number of movements increased by 5 percent in 2017 compared with the previous year. The 7,000-sq-ft (650-sq-m) recently renovated facility in the airport's general aviation terminal includes three passenger lounges, a trio of crew rooms (lounge, relaxing room, snooze room), a private shower, kitchen, and conference room, and valet parking as well as onsite Swiss and French immigration and customs service.

"Facilities are very important, but you can't disassociate them from people's attitude and their manners," Yildiz told **AIN**. He noted that going "above and beyond" is just part of the company's service culture, and described a recent situation when a customer departing for a weekend in London was disappointed when her bottle of balsamic vinegar was broken at the security check. As the staff knew the flight was headed to TAG Farnborough, they called their colleagues

Top-rated FBOs in Europe, the Middle East, Africa and Asia Pacific

	FBO	AIRPORT CODE	AIRPORT	OVERALL AVERAGE	CHANGE FROM LAST YEAR
TOP 20%	TAG FARNBOROUGH AIRPORT	EGLF	FARNBOROUGH	4.69	-0.01
	UNIVERSAL AVIATION	EGSS	LONDON STANSTED	4.54	-0.01
	TAG AVIATION	LSGG	GENEVA INTERNATIONAL	4.49	0.03
	XJET	EGSS	LONDON STANSTED	4.49	-0.05
	GRAFAIR JET CENTER	ESSB	STOCKHOLM CITY/BROMMA	4.48	N/A
	MJETS FBO	VTBD	DON MUEANG INTERNATIONAL	4.47	-0.05
	ECCELSA AVIATION	LIEO	OLBIA COSTA SMERALDA	4.42	-0.05
	KLM JET CENTER	EHAM	AMSTERDAM SCHIPHOL	4.40	-0.05
	EXECUJET EUROPE	LSZH	ZURICH	4.37	0.05
	JET AVIATION	LSGG	GENEVA INTERNATIONAL	4.35	-0.01
	HAWKER PACIFIC	YSSY	SYDNEY KINGSFORD SMITH	4.34	0.05
	SIGNATURE FLIGHT SUPPORT	LFMN	NICE COTE D'AZUR INTERNATIONAL	4.32	-0.04
	HARRODS AVIATION	EGGW	LONDON LUTON	4.30	-0.02
	EXECUJET MIDDLE EAST	OMDB	DUBAI INTERNATIONAL	4.27	0.01
	DASSAULT FALCON SERVICE	LFPB	PARIS LE BOURGET	4.19	-0.05
	SIGNATURE FLIGHT SUPPORT - TERMINAL 3	LFPB	PARIS LE BOURGET	4.19	-0.04
	SKY VALET CANNES	LFMD	CANNES-MANDELIEU	4.16	N/A
	EXECUJET BRUSSELS	EBBR	BRUSSELS NATIONAL	4.15	-0.02
	SIGNATURE FLIGHT SUPPORT - TERMINAL 1	LFPB	PARIS LE BOURGET	4.14	0.00
	UNIVERSAL AVIATION	LFPB	PARIS LE BOURGET	4.14	-0.02
	HONG KONG BUSINESS AVIATION CENTER	VHHH	HONG KONG INTERNATIONAL	4.11	0.01
	JET AVIATION	OMDB	DUBAI INTERNATIONAL	4.09	0.02
	SWISSPORT EXECUTIVE	LFMN	NICE COTE D'AZUR INTERNATIONAL	4.05	-0.04
	SIGNATURE FLIGHT SUPPORT - TERMINAL 1	EGGW	LONDON LUTON	4.00	-0.02
	JET AVIATION	LSZH	ZURICH	3.95	0.07
	JETEX	LFPB	PARIS LE BOURGET	3.94	-0.01
	VIENNA AIRCRAFT HANDLING	LOWW	VIENNA INTERNATIONAL	3.92	0.00
	AVIAPARTNER EXECUTIVE	LFMN	NICE COTE D'AZUR INTERNATIONAL	3.85	-0.06
	VIPPORT VNUKOVO-3	UUWW	MOSCOW/VNUKOVO	3.30	-0.01
	MILLION AIR / CJET	ZBAA	BEIJING/CAPITAL	3.26	-0.04

FBOs with same overall average are listed in alphabetical order

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there and when it landed, she was presented with a replacement bottle. "We never forget that our guests deserve the best," explained Yildiz, "and we never forget that the competition is just a meter away from our door, one meter to the right, or one meter to the left."

The facility is open for private aviation operations from 6 a.m. until 10 p.m.

As TAG's main European hub, Geneva also incorporates a major MRO facility, offering full maintenance capabilities. Its 64,600-sq-ft (6,000-sq-m) hangar can accommodate up to 14 aircraft, and services include painting, cabin systems installation, cabin refurbishment, and avionics upgrades.

4.49 XJet

London Stansted Airport (EGSS), UK

Taking cues from its stylish elder sibling in Denver, Colorado, XJet has received a positive reception for its $50 million expansion to the UK, a process that began in 2016. That's when it unveiled the renovation of its Diamond Hangar, one of five FBOs at London Stansted Airport. Geared to handle VIPs and heads of state, the 25,000-sq-ft terminal offers two private lounges, each of which can handle up to 25 people, with en suite showers and bathrooms, an A/V-equipped 18-seat conference room, a prayer room, an aviation-themed pilots' lounge and quiet room with furniture crafted from aircraft parts, a bar and espresso counter in the large lobby area, onsite car rental, and office suites.

The location also has its own private customs and immigration screening area. The FBO's crown jewel is its 90,000-sq-ft climate-controlled hangar, one of the largest in Europe, which allows it to shelter commercial-size aircraft up to a 747. "We're dealing with much larger aircraft," noted company founder and CEO Josh Stewart, adding the facility can handle any size jet used by visiting dignitaries. "We have all our own equipment to move them: tugs, stairs, and baggage loaders. All equipment is provided by XJet. We don't want [to have to rely on] any third party."

Stewart noted that while the UK capital area is a very competitive market, Stansted has tremendous growth potential. "Most other London airports are at capacity or restricted by movements [limits] or night curfews. At Stansted that is not the case," he told **AIN**. "We can operate 24/7, with limited slot restrictions. The airport's [at] only about 65 percent capacity, so there's room for growth."

For training its staff, the location uses a program where new hires must successfully complete a 90-day evaluation period before they are given their "XJet wings." "We use a lot of what we learned in United States to help roll out our London facility," said Stewart, adding that UK staff members are often sent to the flagship Denver location for cross-training.

4.48 Grafair Jet Center

Stockholm Bromma Airport (ESBS), Stockholm, Sweden

Established in 2004 by Swedish businessman Bengt Grafstrom, who has had extensive business aviation interests in Florida, the company operates the only full-service FBO at Stockholm's Bromma Airport, just five miles from the city and the first in Europe to receive a paved runway. It was Grafstrom's desire to establish a U.S-style FBO in Sweden, along with his Florida influence, that led to the incongruous use of palm trees in the company logo, and as decorative elements in the terminal.

The 5,400-sq-ft (500-sq-m) private terminal features a comfortable passenger lounge that overlooks the ramp and offers direct access to the tarmac; a small meeting room; a larger 14-seat, A/V-equipped conference room; a business center; a pilots' lounge with massage chairs; a pair of electric crew cars; and possibly the facility's most popular amenity, a freezer stocked with a wide variety of ice cream treats. Direct plane-to-car transfer is also permitted. "I used to say that this is as close as you can get to an old-fashioned American FBO, but in Sweden," said company CEO and FBO manager Johan Emmoth, who is also a pilot. Also unusual for a Scandinavian FBO is having a parrot for a mascot, but Emmoth's pet has been living in the FBO's lobby since it opened, and enjoys the attention it receives from staff and customers. The company also offers aircraft management for a fleet of seven business jets and turboprops and in-house maintenance service

In 2007, the company doubled its heated hangar space to 15,000 sq ft (1,400 sq m), and Grafair is poised to nearly double its aircraft storage capacity again, when it opens the largest hangar on the airport this summer. The 26,000-sq-ft (2,400-sq-m), $4.6 million (€3.7 million) building will feature heated floors and a basement to store infrequently used equipment, accessible by a large cargo elevator, which frees up valuable floor space above. It will also offer a built-in subterranean wine cellar to house the in-house caterer's collection. The secluded FBO has its own ramp, and is normally open from 6 a.m. until 10:30 p.m. on weekdays, with shorter hours on the weekend corresponding with Bromma's operating hours. Outside those times, traffic can operate into the capital's Stockholm Arlanda Airport, where Grafair has had a handling business since 2014, and just this November opened a smaller, full-service FBO with its own ramp.

Top Rated FBOs in the Rest of the World by Region

EUROPE

FBO	AIRPORT	OVERALL AVERAGE	CHANGE FROM LAST YEAR
GENEVA			
TAG AVIATION	LSGG	4.49	0.03
JET AVIATION	LSGG	4.35	-0.01
LONDON			
TAG FARNBOROUGH AIRPORT	EGLF	4.69	-0.01
UNIVERSAL AVIATION	EGSS	4.54	-0.01
XJET	EGSS	4.49	-0.05
HARRODS AVIATION	EGGW	4.30	-0.02
SIGNATURE FLIGHT SUPPORT - TERMINAL 1	EGGW	4.00	-0.02
PARIS			
DASSAULT FALCON SERVICES	LFPB	4.19	-0.05
SIGNATURE FLIGHT SUPPORT - TERMINAL 1	LFPB	4.14	0.00
UNIVERSAL AVIATION	LFPB	4.14	-0.02
SIGNATURE FLIGHT SUPPORT - TERMINAL 3	LFPB	4.19	-0.04
JETEX	LFPB	3.94	-0.01
SOUTHERN FRANCE			
SIGNATURE FLIGHT SUPPORT	LFMN	4.32	-0.04
SKY VALET CANNES	LFMD	4.16	N/A
SWISSPORT EXECUTIVE	LFMN	4.05	-0.04
AVIAPARTNER EXECUTIVE	LFMN	3.85	-0.06
STOCKHOLM			
GRAFAIR JET CENTER	ESSB	4.48	N/A
ZURICH			
EXECUJET EUROPE	LSZH	4.37	0.05
JET AVIATION	LSZH	3.95	0.07

4.47 MJets FBO

Don Mueang International Airport (VTBD), Bangkok, Thailand

The highest-scoring Asian FBO in this year's survey and the only location in Asia to land in the top 20 percent of locations worldwide is MJets, at Thailand's Don Mueang International Airport, which experienced an 8 percent increase in private jet traffic last year.

MJets opened a new 26,000-sq-ft (2,400-sq-m) two-story terminal in August 2016. It features a 3,400-sq-ft passenger lounge; including private meeting rooms and a separate area for private accommodations; catering; and on-site visa, customs, immigration, and security service. It also has a

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shower-equipped crew lounge and rest area, which nearly tripled the size of the crew area in the previous facility, along with four conference/training rooms, the largest of which can accommodate 60 people.

The $8.6 million project also added 52,000 sq ft of hangar space that can accommodate an ACJ or BBJ, taking total indoor storage at the facility to 86,000 sq ft (8,000 sq m). The full-service location, which also operates an FAA Part 145 and Cessna-authorized repair station, along with an aircraft charter/management division, is the first in Southeast Asia to earn Stage 2 accreditation under IBAC's IS-BAH and IS-BAO programs. In addition to that demonstrated dedication to safety, MJets, which is open 24/7 and has a staff of 170, operates on the simple philosophy of "service beyond expectation."

In addition to its FBO at VTBD, the company has also expanded its ground-handling services into Cambodia, Myanmar, Laos, and India. It has plans to develop an FBO in Vietnam as well. ■

AIN asked survey respondents to identify specific FBO employees or teams who routinely go above and beyond when it comes to customer service. Below we have hightlighted 25 individuals who were repeatedly recognized in this year's responses.

PERSON	FBO	AIRPORT CODE
ANGELA THURMOND	AMERICAN AERO	KFTW
BETSY WINES	MERIDIAN TETERBORO	KTEB
BEVERLY PATTON	SHELTAIR	KFLL
BRIAN BOURBEAU	PREMIER JET CENTER	KFCM
BRIDGETTE NICHOLS	HILL AIRCRAFT	KFTY
CARLA BOUCHER	SIGNATURE FLIGHT SUPPORT	CYUL
CHARLY MCLANE	HENRIKSEN JET CENTER	KTME
CHRIS HOLDEN	GLACIER JET CENTER	KGPI
CINDY HAYDEN	MILLION AIR	KSUS
HOLLY HOPKINS	TEXAS JET	KFTW
HOLLY YORK	ATLANTIC AVIATION - WEST	KBHM
JASON HAYWARD	UNIVERSAL AVIATION	EGSS
JESSICA ROWDAN	CUTTER AVIATION	KABQ
JIMMY THATE	SIGNATURE FLIGHT SUPPORT	KPBI
KAWAI LOPEZ	MONTEREY JET CENTER	KMRY
KITTY LEE	HONG KONG BUSINESS AVIATION CENTER	VHHH
MARK GOODWIN	NORTHEAST AIR	KPWM
MELISSA THOMPSON	MILLION AIR	KADS
PABLO GARCIA	BANYAN AIR SERVICE	KFXE
PATRICIA JUNGE	SHELTAIR	KISP
REBECCA RERES	SHELTAIR	KTPA
SETH MAGER	ATLANTIC AVIATION	KPBI
SHALENE ENGLAND	J. A. AIR CENTER	KARR
SUSAN PANOS	JET AVIATION	KTEB
TARA CREEL-CESENA	CUTTER AVIATION	KDVT

Highest Scores in Each Category Worldwide

FBO	AIRPORT CODE	AIRPORT	LINE SERVICE	PASSENGER AMENITIES	PILOT AMENITIES	FACILITIES	CSRs	OVERALL AVERAGE
APP JET CENTER	KHEF	MANASSAS REGIONAL/HARRY P. DAVIS FIELD	4.85	4.20	4.13	4.25	4.79	4.42
WILSON AIR CENTER	KHOU	WILLIAM P HOBBY	4.82	4.07	4.25	3.98	4.74	4.34
FARGO JET CENTER	KFAR	HECTOR INTERNATIONAL	4.77	4.66	4.65	4.69	4.71	4.69
JET AVIATION	KPBI	PALM BEACH INTERNATIONAL	4.76	4.67	4.70	4.72	4.80	4.72
SHELTAIR	KTPA	TAMPA INTERNATIONAL	4.76	4.73	4.72	4.75	4.73	4.74
HENRIKSEN JET CENTER	KEDC	AUSTIN EXECUTIVE	4.64	4.78	4.67	4.78	4.52	4.69
TAG FARNBOROUGH	EGLF	FARNBOROUGH	4.50	4.74	4.77	4.85	4.56	4.69
GLOBAL SELECT	KSGR	SUGAR LAND REGIONAL	4.50	4.73	4.77	4.86	4.51	4.68
RECTRIX	KSRQ	SARASOTA/BRADENTON INTERNATIONAL	4.43	4.73	4.60	4.74	4.71	4.64
SHELTAIR	KTPA	TAMPA INTERNATIONAL	4.76	4.73	4.72	4.75	4.73	4.74
GLOBAL SELECT	KSGR	SUGAR LAND REGIONAL	4.50	4.73	4.77	4.86	4.51	4.68
TAG FARNBOROUGH	EGLF	FARNBOROUGH	4.50	4.74	4.77	4.85	4.56	4.69
AMERICAN AERO	KFTW	FORT WORTH MEACHAM INTERNATIONAL	4.63	4.65	4.76	4.63	4.75	4.68
SHELTAIR	KTPA	TAMPA INTERNATIONAL	4.76	4.73	4.72	4.75	4.73	4.74
MERIDIAN TETERBORO	KTEB	TETERBORO	4.61	4.54	4.71	4.71	4.81	4.67
GLOBAL SELECT	KSGR	SUGAR LAND REGIONAL	4.50	4.73	4.77	4.86	4.51	4.68
TAG FARNBOROUGH	EGLF	FARNBOROUGH	4.50	4.74	4.77	4.85	4.56	4.69
BASE OPERATIONS AT PAGE FIELD	KFMY	PAGE FIELD	4.57	4.70	4.57	4.83	4.66	4.66
LYNX FBO DESTIN (formerly Destin Jet)	KDTS	DESTIN-FORT WALTON BEACH	4.68	4.64	4.70	4.78	4.68	4.70
HENRIKSEN JET CENTER	KEDC	AUSTIN EXECUTIVE	4.64	4.78	4.67	4.78	4.52	4.69
MERIDIAN TETERBORO	KTEB	TETERBORO	4.61	4.54	4.71	4.71	4.81	4.67
SIGNATURE FLIGHT SUPPORT	KSTP	ST PAUL DOWNTOWN HOLMAN FIELD	4.71	4.55	4.61	4.52	4.87	4.64
ATLANTIC AVIATION	KPIT	PITTSBURGH INTERNATIONAL	4.64	4.61	4.54	4.59	4.85	4.64
ATLANTIC AVIATION	KMTJ	MONTROSE REGIONAL	4.70	4.66	4.63	4.72	4.84	4.70
AIR SERVICE HAWAII	PHNL	HONOLULU INTERNATIONAL	4.70	4.27	4.27	4.16	4.83	4.42

FBOs with same overall average are listed in alphabetical order

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Zurich, Switzerland

Auch, France

Istanbul, Turkey

Bodrum, Turkey

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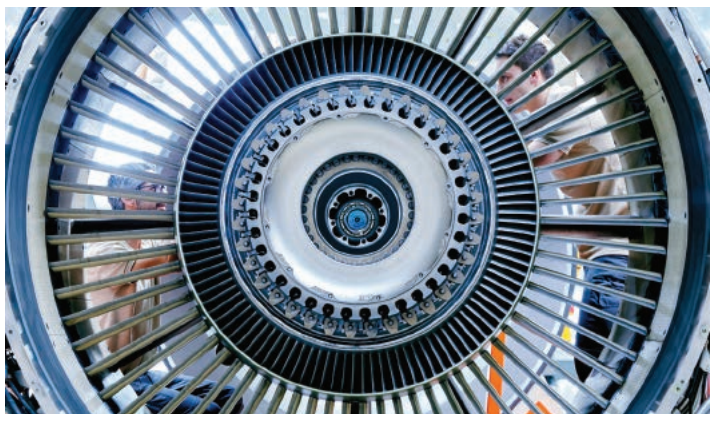

COMPLETION	REFURBISHMENT	MAINTENANCE
CAMO	CHARTER / AIRCRAFT BROKERAGE	ENGINEERING

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FBO Chains: Top Rated Facilities by Overall Average

FBO	AIRPORT CODE	AIRPORT	OVERALL AVERAGE	CHANGE FROM LAST YEAR
ATLANTIC				
ATLANTIC AVIATION	KMTJ	MONTROSE REGIONAL	4.70	-0.02
ATLANTIC AVIATION	KMKC	CHARLES B. WHEELER DOWNTOWN	4.68	0.00
ATLANTIC AVIATION	KPIT	PITTSBURGH INTERNATIONAL	4.64	0.03
ATLANTIC AVIATION	KSUN	FRIEDMAN MEMORIAL	4.50	-0.02
ATLANTIC AVIATION	KPWK	CHICAGO EXECUTIVE	4.49	-0.02
CUTTER AVIATION				
CUTTER AVIATION	KPHX	PHOENIX SKY HARBOR INTERNATIONAL	4.56	0.06
CUTTER AVIATION	KABQ	ALBUQUERQUE INTERNATIONAL SUNPORT	4.25	0.07
CUTTER AVIATION	KELP	EL PASO INTERNATIONAL	3.99	0.00
JET AVIATION				
JET AVIATION	KPBI	PALM BEACH INTERNATIONAL	4.72	-0.02
JET AVIATION	KHOU	WILLIAM P HOBBY	4.50	0.02
JET AVIATION	KTEB	TETERBORO	4.45	-0.01
JET AVIATION	LSGG	GENEVA INTERNATIONAL	4.35	-0.01
JET AVIATION	KIAD	WASHINGTON DULLES INTERNATIONAL	4.29	0.00
MILLION AIR				
MILLION AIR	KADS	ADDISON	4.65	0.00
MILLION AIR	KIND	INDIANAPOLIS INTERNATIONAL	4.63	-0.02
MILLION AIR	KSAT	SAN ANTONIO INTERNATIONAL	4.57	0.03
MILLION AIR	KALB	ALBANY INTERNATIONAL	4.53	0.00
MILLION AIR	KHOU	WILLIAM P HOBBY	4.49	-0.01
ROSS AVIATION				
ROSS AVIATION	KLGB	LONG BEACH /DAUGHERTY FIELD	4.66	-0.04
ROSS AVIATION	PANC	TED STEVENS ANCHORAGE INTERNATIONAL	4.34	0.00
ROSS AVIATION	KSDL	SCOTTSDALE	4.32	-0.01
ROSS AVIATION	KTRM	JACQUELINE COCHRAN REGIONAL	4.26	0.00
ROSS AVIATION	KHPN	WESTCHESTER COUNTY	4.27	-0.02
SHELTAIR				
SHELTAIR	KTPA	TAMPA INTERNATIONAL	4.74	-0.01
SHELTAIR	KISP	LONG ISLAND MAC ARTHUR	4.62	-0.02
SHELTAIR	KJAX	JACKSONVILLE INTERNATIONAL	4.59	0.00
SHELTAIR	KFLL	FORT LAUDERDALE/HOLLYWOOD INTERNATIONAL	4.56	0.02
SHELTAIR	KPIE	ST PETERSBURG-CLEARWATER INTERNATIONAL	4.56	0.02
SIGNATURE FLIGHT SUPPORT				
SIGNATURE FLIGHT SUPPORT	KSDL	SCOTTSDALE	4.64	-0.03
SIGNATURE FLIGHT SUPPORT	KSTP	ST PAUL DOWNTOWN HOLMAN FIELD	4.64	0.00
SIGNATURE FLIGHT SUPPORT	CYUL	PIERRE ELLIOTT TRUDEAU INTERNATIONAL	4.60	0.02
SIGNATURE FLIGHT SUPPORT	KMSP	MINNEAPOLIS-ST PAUL INTERNATIONAL/WOLD-CHAMBERLAIN	4.58	-0.02
SIGNATURE FLIGHT SUPPORT	KCHS	CHARLESTON AFB/INTERNATIONAL	4.53	-0.03
SKYSERVICE				
SKYSERVICE	CYYZ	LESTER B. PEARSON INTERNATIONAL	4.69	-0.01
SKYSERVICE	CYUL	PIERRE ELLIOTT TRUDEAU INTERNATIONAL	4.43	0.00
SKYSERVICE	CYYC	CALGARY INTERNATIONAL	4.43	-0.02
TAC AIR				
TAC AIR	KSLC	SALT LAKE CITY INTERNATIONAL	4.46	-0.03
TAC AIR	KLEX	BLUE GRASS	4.40	0.02
TAC AIR	KOMA	EPPLEY AIRFIELD	4.40	-0.06
TAC AIR	KRDU	RALEIGH-DURHAM INTERNATIONAL	4.34	0.00
TAC AIR	KAPA	CENTENNIAL	4.20	0.01
WILSON AIR CENTER				
WILSON AIR CENTER	KMEM	MEMPHIS INTERNATIONAL	4.67	0.01
WILSON AIR CENTER	KCHA	LOVELL FIELD	4.62	0.03
WILSON AIR CENTER	KCLT	CHARLOTTE/DOUGLAS INTERNATIONAL	4.62	-0.01
WILSON AIR CENTER	KHOU	WILLIAM P HOBBY	4.34	-0.01

AIN'S FBO SURVEY BY THE NUMBERS	LAST 12 MONTHS
Number of FBO evaluations provided by all respondents	5,246
Number of respondents who evaluated at least one FBO	1,808
Number of FBOs evaluated by at least one respondent	863
Number of FBOs that received the requisite number of evaluations (30) to be eligible to have an overall average displayed.*	261
Number of countries having FBOs that were evaluated*	98

* Cummulative statistics

Top Rated FBOs in the Rest of the World by Region

MIDDLE EAST

FBO	AIRPORT	OVERALL AVERAGE	CHANGE FROM LAST YEAR
DUBAI			
EXECUJET MIDDLE EAST	OMDB	4.27	0.01
JET AVIATION	OMDB	4.09	0.02

Top Rated FBOs in the Rest of the World by Region

ASIA PACIFIC

FBO	AIRPORT	OVERALL AVERAGE	CHANGE FROM LAST YEAR
BANGKOK			
MJETS FBO	VTBD	4.47	-0.05
SYDNEY			
HAWKER PACIFIC	YSSY	4.34	0.05
BEIJING			
MILLION AIR / CJET	ZBAA	3.26	-0.04
HONG KONG			
HONG KONG BUSINESS AVIATION CENTER	VHHH	4.11	0.01

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The 6X's max range is 5,500nm (at Mach 0.8) and it can fly at up to Mach 0.90. This makes it capable of flying Moscow to New York, Paris to Beijing, Los Angeles to London (or even Geneva), São Paulo to London or Beijing to San Francisco, to name but a few city pairs.

New engines drive change from Falcon 5X to Falcon 6X

by Ian Sheppard

When Dassault decided late last year to drop Safran's Silvercrest engine that had already delayed its Falcon 5X by three years (the actual engine delay was four years), the obvious replacement choice was the PW800. However, the higher thrust range would necessitate a redesign, and for this reason, among others, the company decided to ditch the 5X name and "relaunch" the Falcon 6X. Dassault made the announcement in late February and followed up with a technical briefing on March 8.

During the "unveiling," chairman and CEO Eric Trappier said, "The more powerful engine results in a longer range [up by 300 nautical miles to 5,500 nm]." He added that the 6X "retains the same wing that proved so efficient in our short flight-test [program for the 5X]" and that "we've kept the new flight control system too." Finally, he added, "It will also feature the most spacious cabin and largest cross-section in the large [business jet] segment [at 2.6 meters/8.5 feet]." Dassault plans to "fly [the aircraft] in less than three years and have the aircraft on the market in four," said Trappier, a goal he acknowledged is challenging.

Pratt & Whitney Canada proposed the PW800 that uses the new core developed for its range of geared turbofan engines that now powers airliners such as the Bombardier C Series and Airbus A320neo family. The PW814, certified last year, was developed for the Gulfstream G500/G600 and uses the midsize core from the airliner engine, but without the reduction gearbox. The 6X's PW812D uses a smaller core.

Switching to the Pratt & Whitney Canada engine results in a thrust increase for the 6X from 11,450 pounds per engine with the Silvercrest to 13-to-14,000 pounds with the PW812D, with its 44-inch single-piece fan and 4.5-to-5.0 bypass ratio. Specific fuel consumption of PW800s is some 10 percent less than that of current, in-service engines, according to P&WC.

Olivier Villa, senior executive v-p civil aircraft, who was instrumental in the 5X program, told the audience, "We've kept the basis of the 5X and optimized the new design around the new engine. We've increased the length of the cabin by 20 inches," which he added later was a "stretch" in front of the wing due to the greater weight of the larger engines. "It will also have the brightest environment, with large windows and skylight [a popular feature that has been retained from the 5X design]." The aircraft will be offered with 12-, 13-, or 14-passenger versions of the cabin, he said. Cabin altitude will be "3,900 feet at FL410—and it will be 'whisper-quiet' like the 8X," which measures 49 dB on average, with air quality "up to 10 times better than an office building." Cabin height will be 78 inches from floor to ceiling and the baggage compartment will be 155 cubic feet "with an additional, unpressurized compartment of 76 cu ft."

Villa noted that the new mtow will be 77,460 pounds, "So we keep a very good ratio [85 percent] of maximum landing weight to maximum takeoff weight" which "means it can do a short hop and then, unrefueled, fly 3,600 nm, for example, Washington-to-New York and then [on to] London, Paris, or Geneva. You won't do that with our competitors," said Villa, as he presented a slide showing the Gulfstream G500.

In addition, the aircraft will "still be able to use challenging airports, including, of course London City Airport, with its steep approach and noise controls." And Villa pointed out that the 6X's takeoff speed will be "15 knots slower than [the equivalent] Gulfstream's."

Avionics

He said the cockpit was built around the EASy 3 platform (a development from the in-service 8X), with the Honeywell IntuVue RDR-4000 radar and Falcon-Eye EVS/SVS head-up displays, which are "unique in the market." The 6X will also be improved over the 5X, given the additional development timescale, with "smart systems, but with the pilot still in the loop. This reduces by a factor of three the number of pilot actions needed to power up and start the aircraft—to only five steps." FalconSphere II electronic flight bags (EFBs) will be integrated into the front instrument panel (pilots can use their iPads or other tablets for flight planning away from the aircraft).

Villa claimed that Falcons have "more than 60 percent greater control-surface efficiency, increased maneuverability, and safety [as a result of] the systems DFS introduced with the 7X and improved with the 8X." The 6X carries forward the 5X's flaperons ("from our military heritage" such as the Rafale fighter) and with the control surfaces working in tandem, lift-over-drag augmentation improves "visibility, control, and comfort during a steep approach." It also has a closed-loop autotrim that further reduces pilot workload. "It will set the flight path, and the system does all the necessary adjustments."

Another new 6X feature, even compared to the 5X, will be the introduction of OBIGGS (On-Board Inerting Gas Generation System), using nitrogen to pressurize the fuselage fuel tanks.

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Dassault sees 'timid recovery' in bizjet market

Dassault Aviation plans to deliver 40 Falcon business jets this year, down from 49 Falcon shipments last year, president and CEO Eric Trappier said last month during a press conference outlining the company's 2017 financial results. Its 2018 revenues are anticipated to be on par with last year's total of €4.8 billion ($5.94 billion), which was up from €3.56 billion ($4.4 billion) in 2016.

Dassault logged net orders for 41 Falcons last year, compared to 33 in 2016. "We see some sign of a timid recovery in the business aviation market, as the prices on the second-hand market have stopped [collapsing] and sales of used Falcon are better," said Trappier.

The French aircraft manufactuer has yet to total all of the losses from the cancellation of the Falcon 5X due to problems with the Safran Silvercrest engine, he said. While Dassault has not sued Safran over this issue, Trappier noted, "We are claiming for compensation."

In February, Dassault launched the Falcon 6X to fill the gap in the super-midsize jet category left by the cancellation of the 5X. But that's not the only new Falcon that Dassault is working on. Trappier said the company is entering "an active stage of pre-development" regarding its "New Falcon" program, but declined to elaborate further.

Meanwhile, deliveries of the Rafale were flat year-over year, at nine aircraft last year. This will increase to 12 this year, consisting of three of the fighters for France and nine for Egypt and Qatar. Dassault also benefitted from additional activities in defense last year, such as the delivery of the eighth French navy Rafale retroffited to F3 standard and ongoing upgrade or support programs on the Mirage 2000 fleet in France, the United Arab Emirates, and Qatar.

The company has also continued the development work on the F3-R standard and expects to deliver the first such aircraft this year. Further, its UCAV demonstrator Neuron will continue flight tests this year in France, mainly focused on the stealth capacity. Production rate of the Rafale will reach 2.5 fighters per month—versus one per month in 2017—due to increased export deliveries. **G.L-B.**

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Norm Hill Aviation finds niche in Gulfstream parts

by Mark Ollier

Out of the hustle and bustle of Los Angeles up in the Mojave Desert is California City Airport. As you drive down the road to the airport, Gulfstream tails come into view, and you find Norm Hill Aviation, the "world's largest as-removed Gulfstream parts supplier."

Owner Norm Hill has been in the aviation business since 1971, and focused solely on Gulfstreams since 1981. He worked for The Jet Center at Van Nuys Airport on the Gulfstream service, inspection, and completion lines for 10 years before joining Circus Circus Hotel and Casinos in Las Vegas as director of maintenance, taking care of a fleet of 10 Gulfstreams for five years.

At 55, Hill had been managing the West Coast sales operation for Dallas Airmotive for 10 years. Seeing that replacement part prices were killing the longevity of the older Gulfstream IIs and Gulfstream IIIs, Hill found a niche in the market to specialize in "as-removed" second-hand parts.

Hill started out of his home office, removing parts from one Gulfstream II at the airport and then storing them in two containers in his backyard before going all in and moving to the current location at California City in 2011.

From those humble beginnings of one hangar and parking aircraft on a distant airfield, Hill has expanded with parts storage and a new purpose-built parking ramp for the 46 Gulfstream IIs, IIIs, and IVs he currently stores. A Gulfstream V is in the works. Business is now moving from the G-II and G-III to the GIV. There are currently three GIVs in stock with a projection to procure another seven or eight before year-end.

Hill explained, "There were 458 Gulfstream IIs and Gulfstream IIIs built, [and] only 107 of those airframes are currently serviceable, so the future lies with the Gulfstream IV, with 852 built. This gives us a much greater range when it comes to market sales."

Norm Hill Aviation focuses exclusively on Gulfstreams. All aircraft are inspected and vetted by Hill before the purchase and then they're flown to California City for parting out. With a total of 16 staff and certified A&P mechanics working together, the parts are removed from the aircraft upon arrival, shrink wrapped, and stored in a temperature-controlled building with the full history label, awaiting sale. Every part sold can be traced to birth, so the customer knows the full history before purchase.

Norm Hill Aviation purchases older Gulfstreams and then parts them out to keep operators flying. The company is now turning its attention from earlier models to the more prevelant GIV.

Parts are sold all over the world, with 92 percent sold to customers in the U.S., Canada, and Mexico. Parts can be ordered directly from Norm Hill or purchased online through PartsBase.

Any part on the shelf ordered before 1 p.m. will be shipped same day via FedEx or UPS and will arrive on the next business day. In the case of unusual parts still on the airframes, all efforts are made to remove the part for dispatch the same day.

With the company now advancing into the Gulfstream GIV market, there are plans in the pipeline to move to new premises at the airport. California City Airport has plans for a 15-acre transient space, a new FBO, and two large hangars. Hill hopes to secure a long-term lease for new hangar space. Once that's done, plans are to upgrade and have a separate maintenance and tear-down division. ■

› continued from page 40

New engines drive newest Falcon

This minimizes the risk of ignition of fuel vapor. It is the first nitrogen-based system for a business jet, said Villa, again citing synergy with Dassault's military aircraft designs.

Smarter Maintenance

On the MRO/support side, Villa said the "FalconScan" system would monitor 100,000 parameters, and will be "directly connected to all aircraft systems, so you quickly know where a failure is and can decide quickly what to do." Apart from alerts in the cockpit, in-flight notification to engineers on the ground is via FalconBroadcast, he added.

Likewise with the PW812D engines, Cedric Gauthier, director business aviation sales and marketing with P&WC, said the company and Dassault would "have the ability to anticipate problems before they occur." He added that the new engine was "designed with 10,000 hours on-condition, a 40 percent reduction of on-wing maintenance."

Technical Briefings

In-depth technical briefings, akin to what will ultimately be contained in the type-rating course, followed at Le Bourget. Gilles Constant, system technical manager for the Falcon 6X, and Mark Aubin, director of Falcon technical support, gave a presentation explaining the flight control system. Aubin said the 6X will be the first business aircraft to have a 115-volt generator, so electric power can come from the engines, APU, or RAT (ram air turbine, which deploys for emergency power). He said, to start the aircraft, the pilot simply turns the APU on, starts it, then starts the left and right engines, "and that's it, five steps." The system "auto-configures load-shedding to make the most of what's left," he added. While the process is highly automated, "the pilot can still override the automation," said Aubin. On the support side, he said, "We're working on advanced prognostic algorithm integration and big data."

Another technical presentation was given by Woody Saland, who is based at Teterboro Airport, the headquarters of Dassault Falcon Jet. He stressed that with new Falcons, pilots fly the trajectory. "The sidestick controller is not like on a traditional aircraft; it's just to influence the flight path." Similar to the 7X and 8X, the FCS works out what had to be done to fly the commands, while making the handling as simple, and ride as comfortable, as possible. Dassault illustrated this with a film comparing steep turns being flown in a Falcon 8X and a Boeing 787, both over Le Bourget, with stark differences in the amount of pilot input and constant correction required. Saland said, "You tell the system, 'I want to climb [or turn]. You figure it out.'" And the safety angle is covered by having "three different redundant systems from three different manufacturers. Any one of these can fly the aircraft, and if not, you are back to 'direct law.'" Added to that, there is a priority button on the controller "to kill the other stick," to avoid situations in which one pilot is unintentionally overriding the inputs of the other.

The cabin of the Falcon 6X will be 6.5 feet high and 8.5 feet wide, which Dassault says is "the highest and widest cross section in a purpose-built business jet." At nearly 40.4 feet long, it is more than 20 inches longer than the cabin of the Falcon 5X.

He noted: "Since the Falcon 2000, anyone flying a Falcon is flying the same cockpit," more or less, so training to transfer is minimized. That said, he noted that with the 6X, the cockpit would be "the biggest we've ever had." He noted that the new EFB is removable "but the idea is that you leave it there, the pilot takes his tablet to the hotel, and wirelessly transfers data [to/from] the airplane."

The 6X is priced at $47 million, which Dassault claims is no more than the 5X would have been. It is currently negotiating with 5X customers and others to secure the first sales, while it also negotiates new supplier agreements. It expects to produce two aircraft a month beginning in 2023, according to Trappier, "But that depends on how the market is going to react." ■

Bombardier looking to sell Downsview site | by Kerry Lynch

Bombardier has retained TD Bank as it weighs potential options for the sale of its facility in Downsview, Ontario, just outside of downtown Toronto. Bombardier earlier this year confirmed that it was looking at options for the facility, which is the site for Global business jet and Q400 regional turboprop production, among other activities.

The potential sale is part of Bombardier's five-year turnaround plan that the then-cash-strapped company unveiled in 2015. "As part of this turnaround plan, we have been reviewing our facilities worldwide—including Downsview—to ensure we have the most efficient and cost-effective operations necessary to support our growth objectives," Bombardier said in a statement.

The sale does not mean Bombardier plans to walk away from the Toronto area, saying, "We remain committed to strongly supporting the Ontario aerospace industry and the Downsview Aerospace Innovation and Research Initiative, as we look at options for our Downsview site." Reported new potential sites for manufacturing have included a location by Toronto Pearson International Airport.

But Bombardier maintains it is using only about 10 percent of the 375-acre Downsview site and is supporting the entire cost of the 7,000-foot runway there. "We've been working on this for quite a while. It's an amazing piece of land, right? Downtown Toronto; that's got huge value," Bombardier president and CEO Alain Bellemare told investors in February. "For us, it's an underutilized asset. We can do the same type of work somewhere else."

Bombardier is hoping to close on something fairly quickly this year, Bellemare added. "The process is following its due course and we are seeing a lot of interest for this site due to its strategic location and unique features," a Bombardier spokesman said. "In case of a sale, we would ensure that there is no impact on Q400 and Global production." Bloomberg reported that Bombardier has received several bids valued at least C$500 million (US$382 million). ■

NEWS note

The National Air Transportation Association (NATA) board of directors is renewing its call on general aviation businesses to follow a code of ethics, issuing a statement last month underscoring the belief that following an industry-wide code will benefit aviation businesses on the whole.

The statement highlights the need to uphold a code of ethics that involves four pillars: safety, integrity, accountability, and respect. "It is these attributes that have historically been a key part of the success of the general aviation industry. NATA strongly encourages general aviation businesses to establish and enforce a code of ethics using these four guiding principles," said NATA president Martin Hiller. ■

Two-seater helps boost new pilots' confidence

by Alexa Rexroth

PHOTOS ALEXA REXROTH

Armed with a flight instructor's typical toolbox of an expansive whiteboard, dry-erase markers, and a computer-projected flight manual, Laurent Coulon, a Hélicoptères Guimbal Cabri G2 factory pilot, held court over a captivated audience at Precision Helicopters in Oregon. Precision hosted Coulon along with Cabri instructors and pilots for a multi-day advanced training course designed to provide the first factory-equivalent training session in the United States. Seated among a group of pilots with Coulon at the helm, I listened with an ear typically tuned to a frequency of Robinson-related understanding when discussing piston helicopters. As discussed in depth by Coulon, however, the Cabri G2 differs from the Robinson R22 in multiple capacities. I would come to immediately recognize these differences later in the day when I had the opportunity to fly the Cabri.

With a fully articulated three-blade composite main rotor system, fenestron tail rotor, and composite airframe, the Cabri certainly stands out from other piston training helicopters. A Lycoming O360-J2A serves as the aircraft's powerplant, and pricing for the helicopter sits around $400,000. While that price tag may induce sticker shock for a buyer who could purchase a Robinson R22 for something in the ballpark of $250,000, Coulon explained the value of the aircraft is apparent when it comes to safety and associated maintenance costs.

Avery Kunz, an experienced Cabri instructor at Precision, echoed Coulon's reasoning and explained, "The way that it operates is very much like a turbine in terms of the power management, so we like the idea that it gets students into the mindset of the next aircraft they are going to get into. Students recognize the benefits of flying the aircraft and the quality of training they get with flying the Cabri."

Training costs in the Cabri have been averaging $430 to $450 per flight hour in the U.S., certainly more expensive when compared to most other piston training helicopters, but Kunz said cost has not been an overwhelmingly limiting factor. "We're seeing this shift and change away from the Robinson product and its narrow flight envelope. The Cabri gives the student a lot more freedom to make mistakes while still remaining safe and has a much larger operating envelope," said Kunz.

The French aircraft has been actively establishing itself in the U.S. market. Kunz estimated that in the U.S., there are approximately 20 to 25 Cabri instructors and 24 Cabri helicopters with 28 expected in the country by the end of the year. Coulon said the largest Cabri fleets are operating in England and New Zealand, with the U.S. falling into a third-place operating ranking. "Step by step, people are preferring to fly with the Cabri. It is much safer for training," he said.

I was curious about lead times on receiving a Cabri in the U.S., and Coulon said the process would take three to six months at the maximum end of the scale. I asked if it was difficult to acquire Cabri parts in the U.S., to which Kunz responded, "As a distributor, we do keep parts on the shelf here. The time zones work in our favor here in the U.S., and we can usually have something overnighted by the next day. Turnaround is not a long time and we have not had any aircraft sitting and waiting for parts."

Classroom Instruction

Before setting out on our scheduled flights, Coulon provided a detailed ground course surrounding the advanced training syllabus in an effort to aid instructors in imparting the knowledge in their respective training programs. He outlined the unusual attitudes and emergency maneuvers that could be expected during the flight training portion to provide pilots with a refined understanding of the aircraft's operating envelope. The topic of the relationship between Cabri's fenestron and pilots limited to conventional tail rotor experience occupied the bulk of Coulon's discussion.

"The only difficulty is the fenestron. People who are coming from a Robinson and going into a Cabri will need to get used to putting in some work with the pedals. The controls are heavier and you have to use trim and some effort. In the beginning, control seems harder, but after a little while you will see that in flight, it is very stable," said Coulon.

A service letter was added to the flight manual after two incidents involving pilots without previous fenestron experience who had losses of control in yaw. Coulon walked us through the typical situations and conclusions provided within the service letter. The letter stressed that a pilot should "never hesitate to apply full right pedal" to correct a yawing to the left and arrest the yaw before it can increase in speed. In addition, the letter notes, "A pilot with most experience with counterclockwise-rotating rotors, is a significant aggravating factor, because the pilot is used to applying left pedal rather than right, thus accelerating yaw motion rather than stopping it."

I asked Coulon how long he thought it would take a pilot without fenestron experience to begin to adapt to the Cabri. "When they start to fly in the Cabri, they will need around five to 10 hours to feel comfortable," he said. As a pilot without

The instrument panel is arranged in an intuitive and appealing way, left. The two-seat trainer may seem small, but the pedals are still a stretch for smaller pilots.

any previous non-conventional tail rotor experience at that point, I was eager to find out how the fenestron felt in flight.

In the Right Seat

With two helicopters operating at a time, I was placed with Kunz as my instructor, while another pilot was assigned to fly with Coulon. While the goal of the course at hand was to provide advanced training for Cabri flight instructors over a multi-day period, I told Kunz that I wanted my one hour of flight time in the Cabri to serve as an introduction to its nuances and characteristics. With gusting winds and persistent precipitation providing the setting for the day, we walked out to the Cabri, N370PA, and Avery told me this specific aircraft was the first Cabri to have arrived in the U.S.

Upon sitting in the helicopter, two things became strikingly noticeable to me. The first was of aesthetic concern, as I was faced with an appealing instrument panel and electronic pilot monitor (EPM) screen. A row of simple switches fell below the gauges and I noticed that carburetor heat was applied via a switch that could be left at "auto" or flipped to "hot" or "cold." The second realization involved a very tangible concern that I can never seem to ignore despite some serious wishful thinking. I tried, filled with false hope stunted further still by my limited stature, to gain full extension on the pedals. Even after flipping the pedals to a position closer to the pilot, I still was out of luck. I immediately decided that my permanent sidekick, a cushion that has played a supporting role far beyond lumbar support, was going to be necessary to ensure my ability to apply full pedal input.

Kunz walked me through the start-up checklist and when the EPM came alive, I realized I would need to train my eye to adjust to the multiple limit indicator (MLI) and engine and rotor speed indicator. The uncluttered nature of the EPM helped to make that process non-intimidating and approachable. I was still concerned, however, about my impending pickup into a hover.

With the fenestron discussion on my mind, coupled with the thought of the rotor spinning clockwise, my apprehension was apparently obvious to a very vigilant Kunz. He instructed me to simply look outside and focus only on keeping the nose straight. I still started to input left pedal as I slowly raised the collective and Kunz demonstrated how much right pedal was indeed required for a successful pickup. He reset the Cabri and allowed me to do another pickup and this time I made sure to have my right foot ready. The second pickup felt better, but I could still feel myself fighting motor memory.

As we began to transition to forward flight, I started to recognize that the Cabri's controls definitely felt heavier than the R22's. Once we initiated straight-and-level flight, Kunz reminded me to use the electric trim to my advantage. We proceeded to a confined landing area where I continued to work on my control inputs and got my first glance at the Cabri's impressive capabilities for a relatively small piston helicopter. Advancing again into forward flight, a rainbow in the distance was unfortunately competing in the windscreen view with a trim string that was clearly indicating my continued lack of proficiency. This visual reminder, however, fueled my interest in wanting to keep working to improve my comfort level with my pedal work.

Kunz directed me to another airport where we performed power recovery and full down autorotations and I began to fully appreciate the impressive little aircraft. The full-downs felt controlled and stable while Kunz demonstrated the Cabri's obviously large operating envelope. Upon return to Precision's base at Chehalem Airpark, we practiced hover autorotations that further increased my admiration of the Cabri. I was starting to feel hooked and thought that I would begin to feel more comfortable with the fenestron and controls with continued training. During my short time spent flying the Cabri, I transitioned from feeling doubtful upon pickup to feeling stung again by the addictive flying bug upon set-down.

A few days after my flight, I noticed a particularly interesting service letter in the Cabri's flight manual titled "safety and extreme maneuvers." The letter notes the Cabri's "good ability to demonstrate autorotations and forgiving behavior, a high capability to recover from marginal flight conditions, and the capability to operate in high wind gusts." The list of commendable qualities is immediately followed by Cabri's confirmation that such "characteristics may induce the pilot's excessive confidence" and they "would like to highlight that once the Cabri G2 flight margins have been overtaken, the safety benefits that you can expect are cancelled." Cabri therefore "insists that flight manual procedures should be followed for best flight safety." Even such a seemingly capable helicopter can't ever escape the consistent, and gravely important need for pilots to always remain humble. ■

Pilot Alexa Rexroth put the Cabri through its paces during a one-hour flight in the two-seat trainer.

The Cabri's fenestron is one characteristic that will be an adjustment for pilots used to more typical trainers, such as the Robinson R22, according to AIN's Alexa Rexroth.

Training the instructors

Precision Helicopters of Newberg, Oregon, hosted the first advanced training session for the Cabri in the U.S., led by Laurent Coulon. "I think the pilots are happy to fly with me because they can discover what we can and can't do with the Cabri. I want the instructors to apply the same techniques to their instruction," said Coulon. The course was well received by attendees who were able to receive flight training from both Coulon and Precision's in-house instructors. Orin Acker, an experienced pilot from Chicago and course attendee, concluded, "The Cabri flies better than a small helicopter should. It handles very well and has good authority. It was very impressive." **A.R.**

Price: (typically completed and equipped)	$400,000.00
Engine:	Textron Lycoming 0360-J2A
Power Rating: (Max continuous)	145 hp
Power Rating: (Max takeoff 5-Minutes)	160 hp
Passengers: (typical)	1 crew + 1 pax
Max Range Speed:	80 kias
Range: (85% power, 15-min reserve)	380 NM
Max Endurance Speed:	50 kias
Max Endurance: (50 kias, no reserve)	5 hrs 40 min
Max Fuel capacity:	45 gal
Ceiling: (service)	12,000ft
IGE hovering ceiling: (gross weight, ISA)	5,000 ft
Max hovering ceiling: (two pax, two hrs fuel, ISA)	7,500 ft
Max Gross weight:	1,543 lbs

Bizav is finding new options in Philippines

by Chen Chuanren

The Philippines has significant potential for business and general aviation, but operators are being slowly squeezed out of Manila. As a result, other airports are making plans to fill the gaps in capacity, and the Asian Business Aviation Association (AsBAA) recently set out to study possible options.

At Manila's Ninoy Aquino International Airport (NAIA) slot shortages have reached a critical point, and as a stopgap measure, President Rodrigo Duterte's administration has decided to gradually remove general and business aviation from the airport, much to the dismay of and inconvenience to many operators and business aviation passengers.

Currently, business/general aviation is allotted only two slots per hour between 6 a.m. and noon, after which they are banned until 7 p.m. There are no slot limits between 7 p.m. and 6 a.m. There are no expansion plans in place, creating uncertainty about the future of business aviation at NAIA.

AsBAA recently organized a study trip to the Philippines to present a group of business aviation stakeholders with alternatives to NAIA and various new opportunities to develop business aviation outside of Manila.

Clark's Master Plan

One such alternative is Clark International Airport, located approximately 100 km (62 miles) from Manila. Once the largest U.S. Air Force base outside the U.S., Clark is now a relatively quiet but growing airport, serving both commercial flights and general aviation. Currently, it has a healthy ecosystem, with business aviation companies such as Metrojet and INAEC setting up there to exploit its vast infrastructure and access to international and domestic networks.

Metrojet has seen business quadruple over the last three years. It currently provides Part 145 MRO services across a wide range of aircraft types, as well as tire and battery services and is considering expanding its hangar space from 14 to 18 aircraft. Parking fees, which are significantly less than those in Hong Kong, also account for significant revenue.

The airport now serves 254 domestic and 166 international weekly flights and has seen growth of more than 50 percent year on year. And the number is set to rise, as Terminal 2 is already under construction and is due to open by first quarter 2020. It's designed to handle 8 million passengers annually. Under a master plan drawn up by Aéroports de Paris, Clark aims to construct a second runway and serve 22 million in its second phase of development. Unlike Manila, Clark has plenty of real estate for expansion and envisions eventually operating three terminals handling 80 million passengers and cargo facilities, even adding a third parallel runway.

There is no doubt that Clark will be a promising business hub. However, as New Clark City thrives, so would the airport, a double-edged sword. As the airport grows, business and general aviation might once again receive less priority than commercial traffic.

Subic's Clean Slate

Another option for business and general aviation is Subic Bay International Airport, another 80 km (50 miles) farther from Manila than Clark. Subic Bay Metropolitan Authority (SBMA) chairperson and administrator Wilma T. Eisma aims to transform the airport into a thriving GA/BA complex.

"My vision is to make Subic Bay International Airport a business aviation airport," she said, adding that she also sees it as a home for general aviation, MRO, and charter operators. "We can get spillover from neighboring airports like Clark, but I would rather court GA/BA heavily and have a niche for them to attract tourists with curated experiences," she said.

Subic is set to become a thriving tourism and gaming destination, as Eisma told **AIN** that a Korean conglomerate will be opening an integrated resort, and Royal Caribbean Cruises' Ovation of the Seas will make Subic Bay her port of call starting in June this year.

SBMA has also commenced studies with U.S. Trade Development Agency to privatize the airport within five years, before the end of the Duterte administration's term.

Eisma added that the SBMA now has approximately 900 million pesos (US$17.6 million) reserved for the improvement work of Subic Airport, such as the installation of an ILS and AWOS for day, night, and instrument flying operations.

More than 200 hectares (494 acres) of land are earmarked for development at the airport, including plans to extend the 9,000-foot runway. Currently, there are four to five empty hangars available for operators, and air-taxi Air Juan and U.S.-jet company Aviation Concepts use another two.

However, the dearth of current operators may either attract or deter investors, resulting in a chicken-and-egg dilemma for GA/BA users.

So What's Next?

The casino industry accounts for significant potential in the Philippines, a new playground for high-value gamers. Manila itself now has four major integrated resorts: Pagcor, Resorts World Manila, Solaire Resort and Casino, and City of Dreams.

"It is becoming challenging and costly for us now, due to the restricted timing [at Manila]. We now have to ferry our clients and aircraft to Clark after our meeting in Manila," said Alex Chan, head of aviation services for Melco Resorts and Entertainment, which owns City of Dreams. "If Clark really takes off, Manila could be eventually closed to GA/BA, which we do not want."

The Philippines could be a favorite for aircraft positioning with its extremely affordable parking rates. According to Chan, rates in Hong Kong for ramp parking are around $5,000 daily, while hangars at Clark could average approximately $2,000 a month.

Helicopter air taxis and even floatplanes might thrive, should general aviation be moved outside of Manila. Air-taxi Air Juan also flies Cessna Grand Caravan seaplanes from Manila Bay to Subic in 20 minutes.

"Business travelers are very time sensitive and [helicopters] would be most effective," said Benjamin Lopez, INAEC Aviation president. The company operates a mixed fleet of Bell 429s, AW139s, EC135s and AS350B2s. "We have seen an increase in the use of helicopters with the current lack of intercity infrastructure and runway congestion. The way forward now is to get people familiar with this mode," he concluded. ■

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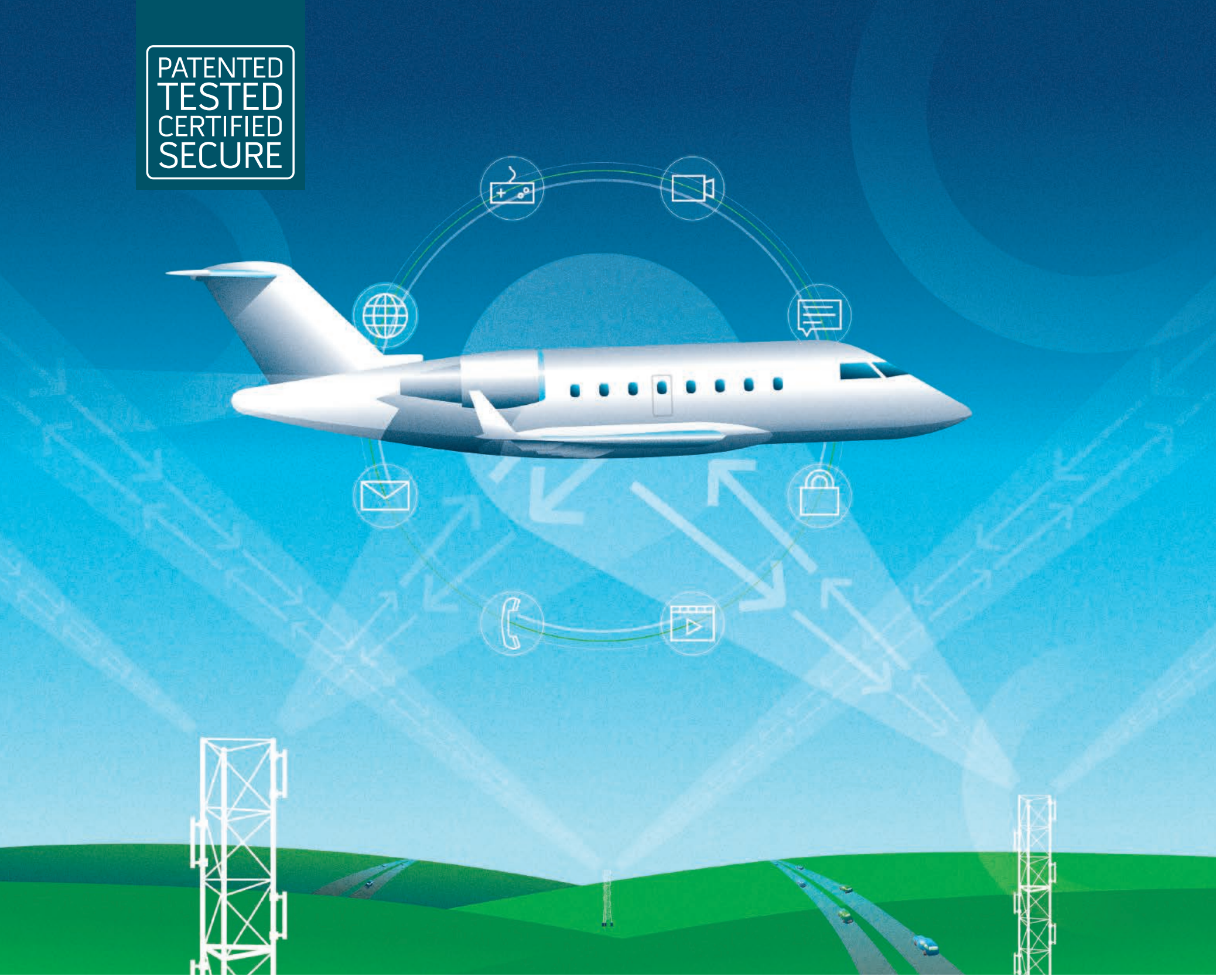

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Meet the Mod Masters: Hampton Aviation

by Matt Thurber

From outward appearance, King Air N713GD looks like a relatively ordinary B200, although a sharp observer can probably tell that it's been modified. In fact, this King Air has a new lease on life, having been rescued by the experts at Hampton Aviation, completely torn down, repaired, then put back together with fresh interior and paint, Raisbeck Epic upgrade, and more recently, two unique modifications—anti-skid brakes and electric air-conditioning.

The two modifications are not easy to spot, so here is a guide.

Looking at the King Air's main landing gear, each wheel sports a special hubcap filled with electronics. The wires from the hubcap are routed through the axle and emerge in a bundle clamped parallel to the brake line, so that's another clue. The final change that's apparent is a special Vivisun switchplate on the instrument panel.

Those are all the physical hints that this King Air carries the Advent Aircraft Systems eABS (electronic anti-skid braking system) supplemental type certificate (STC) upgrade. Of course there is more to it, such as additional wiring, an electronic control box mounted in each wing's forward root, and two brake control modules (BCMs) mounted in the inboard wing leading edges. The result of this installation is the ability to land using less runway without reverse thrust, which is better for the propellers, and most important, no more flat-spotting or rupturing tires from pilots standing on the brakes too hard and causing a wheel to lock up.

The other modification is even more subtle, apparent from the outside by a 220-volt male plug recessed into the aft belly. Inside the cabin, the gasper air outlets mounted in the headliner are supplemented by evenly spaced heat-exchanger vents. This is the Peter Schiff Aero (PSA) air-conditioning STC, and what makes it unusual is that it is electrically driven, replacing the King Air's original engine-driven-compressor air-conditioning with a system that delivers cold air directly from heat exchangers located at the headliner vents.

Hampton Aviation opened seven years ago, after the current owners purchased the former Mac Air, moving into a new 100- by 200-foot hangar, then opening a paint shop. Earlier this year, Hampton added another hangar measuring 110 by 125 feet. The company's specialty is heavy airframe structural repairs, particularly on the King Air 200/300 series, including the military RC-12. For that airplane, Hampton Aviation is the only repair facility to have designed its own tooling to manufacture replacement bonded lower-wing spar caps. Under Hampton's service life extension program, which is done under contract to Northrop Grumman, Hampton doubles the King Air's airframe service life to 15,000 hours. Another Hampton military program is major repair to Air Force T-1As (Beechjet 400s), due to lavatory leaks that caused corrosion.

Hampton Aviation sheet metal technicians can manufacture parts in the company's machine shop, including King Air wing leading edges on a massive bending machine. For finer sheet metal crafting, an English wheel and an electric shrinker and stretcher are available. "When it comes to structures, we're not afraid of anything," said sales and marketing manager Tom Canavera.

Because of its military contracts, Hampton Aviation must comply with strict quality standards. All toolboxes are shadowed (tools tracked individually and inventoried at the beginning and end of every shift). Even the smallest debris is inventoried and disposed of inside the secure tool room, including seemingly innocuous items such as acid brushes. No electrical equipment is allowed below 18 inches above the floor, a fire-prevention measure. Before any engine run and test flight, a complete inventory of the facility and tools is done, and personnel conduct a FOD walk on the hangar floors and ramp areas. The facilities and the airport undergo a four- to five-day military aircraft operations inspection every three years.

Every airplane that has left the Hampton facility after major rework, which is now more than 30 King Airs, "left with zero discrepancies," said Canavera. Hampton has the capacity to handle additional work and is expanding into the civil market, offering maintenance and repair services, paint, interior refurbs, and modifications such as Advent's eABS and PSA's air-conditioning and products from Raisbeck, BLR, and StandardAero. Recently, Hampton Aviation became a Garmin authorized dealer and expects to add Rockwell Collins and L-3 Aviation Products dealerships shortly, which will allow the company to offer ADS-B Out upgrades.

The company's quality standards, he said, "have a direct benefit to the [civil] side. When airplanes leave here, they are super clean. We like doing things right." ■

Anti-skid brakes reduce wear on tires and propellers

Earlier this decade, Advent Aircraft president Ron Roberts was working on an electronic anti-skid braking system (eABS), and running some tests in a Cessna Conquest II at West Star Aviation in Colorado. Roberts, who used to work for a light airplane OEM, wondered why there was no reasonably priced ABS for general aviation airplanes without power brakes. "I had a motorcycle with anti-skid brakes," he said. "It worked very well, and if I can put it on a low-priced motorcycle, we ought to be able to put it on a little jet airplane."

Advent Aircraft's eABS anti-skid braking system on the PC-12 adds a new wire harness, connecting the wheel speed sensor to the system's electronics.

Roberts had been discussing eABS with some OEMs, including Eclipse Aerospace, and an Eclipse v-p happened to be visiting West Star at the same time.

Roberts asked the v-p if he would like to try the eABS on the Conquest, which he did. The v-p then asked Advent to devote all of its resources to perfecting the system on the Eclipse 500 very light jet, which had been experiencing some blown-tire incidents. The result was the first eABS supplemental type certificate for Advent.

"It was driven by the technology being available as a result of Ron's design," said Advent managing director Ken Goldsmith. Since that certification, Advent has sold more than 110 eABS kits to Eclipse, and more are on backorder.

On some airplanes, the lightweight Eclipse 500/550 is a good example; with full flaps and a bit too much speed, it's not hard for the wings to still generate lift after touchdown, and thus not bear enough weight onto the wheels to keep them from locking up when the brakes are applied. This is a delicate balance with any high-performance airplane not equipped with anti-skid brakes; there just

isn't any way for a pilot to know that the brakes are locking the wheels, and pilots have to be careful when trying to extract maximum landing performance. Typically, a pilot doesn't have confidence in landing as short as possible because of trying to prevent the wheels from locking and flat-spotting or blowing a tire.

After developing the Eclipse eABS, Advent designed systems for the Pilatus PC-12, King Air 200/300 series, and the Beechcraft T-6B/C military trainer/light attack aircraft.

More than 135 eABS systems are installed, and the system is factory standard on new Eclipse 550s. The STC for the T-6, PC-12, and King Airs was issued about a year ago, and sales for those models are starting to ramp up. Advent is working with aircraft manufacturers on adding eABS as an option on new airplanes at the factory.

According to Goldsmith, Textron Aviation Defense is including eABS as standard equipment on new T-6C orders and as a retrofit for existing fleets. "On the T-6, where there is no reverse available, you see big increases in tire life. Anecdotal [evidence suggests] up to a 300 percent improvement in tire wear. You can make a hard landing and a hard accelerate-stop, and there is no tire wear."

During tests in the King Air 200, Hampton Aviation was able to achieve a landing roll of 1,108 feet, 242 feet less than the 1,350 feet in the AFM, without using reverse thrust.

In general, anti-skid brakes help pilots extract maximum landing performance. Advent sold its first King Air kit to an operation that kept suffering from flat-spotted tires. The risk is that if the tire blows, then the wheel could be damaged and would need a detailed eddy current inspection. And if this happens at an airport without maintenance support, delays and expenses could mount.

Advent develops the STCs for eABS upgrades, and its dozens of dealers worldwide can install the kit supplied by Advent. King Air owners can have eABS installed by Textron Aviation service centers. The eABS system is certified by the FAA, Transport Canada, and EASA, and in Australia via reciprocity with the FAA.

The eABS kit costs $55,890 for a King Air and $50,604 for a PC-12. Installation takes five to 10 days, depending on the airplane, with the dual-wheel King Air more complex than the single-wheel PC-12. A King Air kit adds 29 pounds to the airplane's empty weight.

The kit's main components are the two BCMs installed in series in the brake lines for the left and right main landing gear, plus wheel speed transducers, digital electronic control units, and in the cockpit, a Vivisun on/off switch/annunciator. There is no need to modify the braking system's master cylinders or landing gear.

The eABS work by modulating the hydraulic pressure delivered to each wheel's brakes. The unique feature of the Advent ABS is that it compares the wheel speed, as measured by the transducer in each wheel, to aircraft speed, derived from onboard GPS. If the aircraft is going faster than 10 knots, anti-skid will work. Below 10 knots, braking is normal, with no anti-skid protection.

However, the brakes will not operate if wheel speed is not at least 85 percent of the aircraft's groundspeed. "If wheel speed slows to less than 85 percent of groundspeed," Roberts explained, "the system reduces brake pressure." Because the eABS is electronic, it can rapidly modulate the brake pressure to prevent the wheel from skidding. This helps especially when applying brakes on uneven surfaces or where one wheel is on ice or snow and the other is on a clean surface.

Technically, a pilot could land an eABS-equipped airplane with the brakes fully applied, and because the wheels do not match the groundspeed of the airplane when it touches down, the wheels would simply roll. "The wheel is going way too slow for the brakes to actuate," he said. As the wheel goes over the 85-percent groundspeed threshold, then the eABS would allow the brakes to work to stop the airplane. All this time the pilot could have kept maximum pressure on the brakes. Of course, it is not recommended to land with the brakes on.

Making It Stop

During a visit to Hampton Aviation, I was able to try a high-speed abort in the company's King Air, after witnessing test pilot Earl Covel perform a high-performance landing. I experienced the feel of eABS in the aforementioned operator's PC-12, following pilot Gideon Clement's demonstration of a maximum performance landing after a trip around the traffic pattern at Stewart International Airport in Newburgh, New York.

Clement flies two PC-12s equipped with eABS out of Stewart, and he took me for a short flight to demonstrate eABS in his company's PC-12 NG. The wind was steady, and Clement brought the PC-12 right over the numbers on Runway 34, crossing the fence at 80 kias with flaps set to full and weight at touchdown about 8,000 pounds. He later calculated the flight manual landing ground roll without reverse thrust and with a 5.6-knot headwind factor at 775 feet. As soon as the PC-12 touched the ground, he lowered the nose and stepped hard on the brakes. The PC-12 was stopped in about 600 feet, he estimated.

For my turn on the brakes, Clement added power, then pulled the power lever back at about 80 knots. I pushed as hard as I could on the brakes and at the same time tried to stay on the centerline. I could feel the anti-skid pulsing to keep the wheels from locking up, and I kept the pressure on through the pulsing, and the PC-12 came to a rapid stop. Keeping the airplane straight was no problem, and

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The Peter Schiff Aero electric air-conditioning system installed by Hampton Aviation in the company's King Air 200 delivers chilled air from overhead heat exchanger vents.

Fixing King Air air-conditioning

Inventor and A&P mechanic Peter Schiff's exploration into the world of aircraft air-conditioning (AC) started when he owned a Twin Commander and designed and certified a better environmental-control and pressurization system for that airplane. About six years ago, he thought the AC portion of the system might work well in the King Air, but there was a key difference: the King Air's ducting system is much more extensive than in the Twin Commander, and pushing cold air efficiently through all that ducting just wasn't going to work. According to Schiff, this is still a problem in existing King Air AC systems.

What Schiff wanted was an all-electrical AC system, because running the right engine on a King Air just to try to cool the cabin is inefficient and noisy. He also wanted to design a system that would eliminate all the drawbacks that he found in the King Air's existing AC system. These include using the area under the floorboards as a return duct. "The system has to cool not only the cabin but the space under the floor," he said.

Another problem is having to run huge blowers to pump air through the condenser and high-volume ductwork, he explained. Later model King Airs have two large blowers just for the aft cabin, and the energy needed to run the blowers adds more heat to the system.

Finally, the original forward evaporator is the type that requires a purge valve to prevent the refrigerant (R134a in modern systems, R12 in older systems) from clogging up the system.

Schiff figured there must be a better way to cool the interior of a King Air, and he put his company—PSA—to work to come up with a solution.

The result is a unique electrically powered, patented AC system that eliminates the engine-driven compressor, solves the ducting problem, and can run from a ground power unit or 220-volt extension cord while on the ground.

The main difference between the typical King Air AC and the PSA 830 CCA is that the former requires an engine-driven compressor and the latter's compressor is electric.

In a traditional vapor-cycle aircraft AC system, the engine-driven compressor compresses the R134a refrigerant, which is still a gas at this point, and converts it to a high-pressure gas.

This heated pressurized gas flows through the condenser in the nose of the aircraft, and while a fan blows outside air over the condenser, the gas turns into a high-pressure liquid. A filter/dryer traps moisture to prevent the moisture from freezing and blocking the system.

The high-pressure liquid now flows into an evaporator, with a restrictor expansion valve that causes the liquid to turn back into a gas, a process that removes heat from the refrigerant (heat of vaporization). A fan blowing air across the evaporator captures the cooled air, which is distributed throughout the cabin ducting.

In the King Air, there is one evaporator for the flight deck, and one (or two in later models) for the cabin.

The PSA 830 CCA retains the forward evaporator, ducts, fan, and vents to cool the flight deck. Additional outlet vents are added in some models.

In the cabin, PSA replaces the original evaporator with one that cools a water/glycol mixture instead of air. From that evaporator—and this is a central feature of the PSA patent—a small brushless electric pump moves the cooled water/glycol to heat exchangers installed in the cabin overhead, typically six in a King Air, or seven if one is mounted in the lavatory area. "It's like a radiator core that cools each seat position individually," said Schiff.

There is a huge advantage to using a cooled liquid versus pumping air through large ducts, and that is, he said, "A liquid will transfer 830 times as much cold as an

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Anti-skid brakes reduce wear

I could appreciate the confidence that eABS gives the pilot to use the brakes to maximum effectiveness without worrying about blowing a tire.

The experience in the Hampton King Air 200 was much the same. Test pilot Earl Covel flew around the Mena traffic pattern, then did a maximum performance touchdown and rollout, bringing the King Air to a rapid stop in less than 800 feet. I then did a high-speed abort, where we sped to 85 knots, and after Covel cut the power, I braked hard, bringing the King Air to a smooth, rapid stop. I could feel the brakes pulsing, and I was briefly tempted to let up on the brake pedals, but kept stepping on them firmly. The eABS clearly works well, and looking over the tires on both airplanes afterward, I could see no hint of having put them through any kind of trauma.

"The thing that's most appealing to me," said Covel, "is not ruining the tires if you should have to jump on the brakes. There've been incidents of people landing with their foot kind of resting on the brake and flat-spotting a tire when they land. It can't happen with this airplane."

Clement says that eABS helps him get the full potential from the PC-12, and he likes the confidence that eABS provides. For example, there is no trouble landing in a crosswind on a relatively short runway, because he doesn't have to worry about the upwind wing lightening the load on that side's landing gear and risking a flat-spotted tire. "On those days when you need to carry a few extra knots," he said, "you can still stand on the brakes."

New Programs

Advent is working on improving the anti-skid brakes on the Fabrica Militar de Aviones IA 63 jet trainer, and provided its standard eABS for the Calidus B-250 light attack turboprop.

The next business aviation project on Advent's drawing board is the Beechjet/Hawker 400, including re-engined versions from Nextant and Textron Aviation, which aren't equipped with thrust reversers. "We're serious about improved anti-skid for the Beechjet," Goldsmith said. "It's a substantial improvement to the [existing] system." The Beechjet upgrade would also be available to the U.S. Air Force, which has a fleet of the military version, the T-1A Jayhawk.

Textron Aviation's in-development Denali single-engine turboprop would also be a candidate for eABS. "If the anti-skid on the PC-12 is making that a better airplane and allowing it to realize its full potential, then the Denali should be the same," he said. "I'm not sure if the Denali has anti-skid, but I understand that customers are asking for it. We're going to offer it for the Denali, for the aftermarket if Textron Aviation doesn't offer it."

Textron Aviation helped Advent by providing a new King Air 350i for eABS installation and testing, which included a detailed analysis of improved stopping distances. While the current STC doesn't include an AFM revision to reflect shorter stopping distances, Advent has submitted a separate STC application for those improvements, and this is pending with the FAA. Goldsmith would like to conduct the same testing and seek a similar new STC with reduced stopping distances for the B200 series. "Medevac operations need to get into some tough airports," he said, "and they have to [plan for shorter] runway lengths. If we can get them a couple hundred extra feet, that could make the difference for a King Air mission versus a helicopter." ■

The cockpit switch for the Advent Aircraft Systems electronic anti-skid brakes shows the system is armed and ready for a max-performance stop (top left). During a landing demo, this PC-12 used just 600 feet of runway for the ground roll.

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King Air air-con

equivalent air duct. That's why we call it the model 830." The hoses have less surface area, he explained, so less of the cold is lost compared to large-area ducting.

The resulting system is tremendously efficient and useful. For example, instead of starting an engine to cool the cabin, in a CCA-equipped King Air, all that is needed is to plug a 220-volt extension cord into a male plug that is mounted in the aft belly of the fuselage. There is no need to open the door and turn on any switches; the system runs automatically once power is applied.

After the cabin is cooled and everyone climbs aboard, with the AC still running powered by the extension cord, the pilot can start the engines, switch on the generators to take over the electrical load, then have someone outside

On the ground, Peter Schiff Aero's electric air-conditioning system in the King Air runs off a 220-volt extension cord plugged into a receptacle in the aft lower fuselage.

the airplane unplug the extension cord. An external APU can also be used to run the system.

The CCA system imposes only a nominal load on the electrical system, and there are no limitations for when it can run, so it can be used during all taxi and takeoff operations.

The CCA scroll-type compressor is more efficient because it is powered by a five-hp, variable-speed, brushless, soft-start motor. The motor weighs just 6.3 pounds instead of the heavier typical on-off-switched engine-driven compressor found in most AC systems. "We don't have the old technology of switching the compressor on and off, which would require huge starting currents in the case of an electric motor," said Schiff.

The PSA AC is charged with R422 refrigerant, which has a higher evaporation pressure that helps the refrigerant move more readily through the long refrigeration lines back to the compressor.

Maintenance of the PSA AC system is far simpler, with easy access under the cabin floor walkway. The water/glycol mix needs an occasional top-off using a syringe, about every two months. The variable-speed compressor motor lasts much longer and does not shed aluminum, Schiff said, as do compressors on older King Air systems.

The PSA 830 CCA air-conditioning system is STC'd and PMA'd in the King Air 200 through 350. The kit price is $54,000 for the 200/300 series, and $58,000 for the King Air 350. Installed cost averages about $102,000, depending on the amount of interior work that needs to be done to gain access to the airframe. Government/military airplanes have simpler interiors, according to Hampton Aviation sales and marketing manager Tom Canavera.

Hampton holds an exclusive dealership for government/military/fleet programs and is also a dealer for private King Airs. ■

Other Voices

Female fliers hold the key to solving pilot shortage

by Kimberly Perkins

Aviation is a highly romanticized industry. Culturally, we talk about the best aspects, which include exotic destinations, fancy first-class seating, and courageous pilots. We read fascinating fighter jet stories and watch intriguing documentaries that augment the luster of the industry. Yet, a closer look reveals that nearly half of the

Kimberly Perkins, international jet captain

population is left in the contrails. Women are drastically underrepresented in aviation—a situation that has not improved over time like other STEM (science, technology, engineering, and math) fields. The reason lies in small fragments of a much larger cultural issue.

In the United States, women make up 47 percent of the total workforce. But, professional female pilots constitute 5 percent of the piloting workforce, a statistic that has remained unmoved in four decades. Compared to other STEM fields and "traditionally" male-dominated industries, aviation has one of the lowest percentages of female participants. There are mentors, scholarships, conferences, magazines, and organizations that all have a goal to increase participation, yet the number remains. When experts are questioned on this topic, often the same old explanation is given: "It's a pipeline problem." It is more than that. While there certainly are pipeline issues, women face gender-unique social pressures, double standards, and systemic barriers that deter their entrance into aviation.

Women have been interested in aviation since Wilbur and Orville gave up bicycles for airplanes at the turn of the 20th century. Women participated in air races throughout the 1930s and became test pilots and flight instructors during World War II. They have joined airlines and become an integral (albeit, small) piece of the aviation industry. Therefore, the situation is more complex than labeling it as a "pipeline problem." We must evaluate the issue holistically and discuss the uncomfortable truths that propagate the barriers keeping woman from aviation.

Aviation-specific Gender Inequity

There are many factors that contribute to job satisfaction, such as salary, retirement, location, the duties of the job, and potential for growth. Aside from salary, those slices remain relatively gender-neutral in the job-selection pie. A large piece of this pie, and often overlooked, is the topic of soft issues. Soft issues are human issues. They can include morale at the office, interpersonal relationships, the ability to approach management, a good work/life balance, a sense of worth in the work product, and the nebulous feeling of happiness at work. Soft issues are harder to measure quantitatively because they are subjective; yet they play a significantly important qualitative role in determining where people want to work. The answer to the "why are there so few female pilots" question lives in this piece of the pie. It is time we address the problems here in hopes of sweetening that slice.

Bias can be conscious or subconscious; both forms can be divisive. An explicit gender bias is one made consciously and is a form of micro-aggression. For example, a female pilot keys the mic in response to air traffic control. She is met with another pilot on frequency responding to her voice with the well-worn "another empty kitchen" comment. I have received a handful of these statements, always in the United States, and always from a male pilot.

An implicit bias is formed subconsciously and often carries less intentional malice. When I was pregnant, colleagues and peers often asked me, flabbergasted, how I was going to manage being a parent and a pilot. I have worked with male colleagues with children the same age as mine. They have never been asked this question. There is a presumption that female pilots cannot be parents and have a flying career, yet men are exempt from such categorization. This is an implicit bias that women are meant to give up their career to become the primary caregiver for children. Implicit biases are more harmful to gender equality because they are insidious, more prevalent, and seemingly socially acceptable. They perpetuate age-old stigmas and stereotypes that women have been fighting against for years.

Practical Solutions

Over my past 15 years in aviation, many of the men I have met are inclusive and not-inherently sexist. It is time we build a bridge. Ignorance is no longer tolerable. Rarely does a social injustice radically improve without assistance from the majority. We need men to stop justifying their sexist colleagues and start defending the disenfranchised.

The casual sexism that exists in our society and permeates our workplace creates a divisive double standard. A Wall Street Journal editorial blamed women for fatherless children, using the term "female careerism." When you Google "female careerism" you get more than 60,000 hits. The same is not true when you Google "male careerism." The double standard is perpetuated by some of the kindest people and sometimes in the subtlest of ways. How many working fathers are made to feel bad about their choice of keeping their career rather than becoming a stay-at-home parent? Some women do not want to end their careers, nor should they feel compelled to do so because someone else did. We can end this double standard and subtle sexism by ensuring we avoid language that promulgates societal inequities. Women have every right to the same career and family choices as men.

I have heard the perpetuation of a common stereotype that piloting is not a family-friendly industry with the "you chose to be a pilot, which means you'll miss things" statement in a variety of versions over the past 15 years. In every scenario, it has been a male colleague whose

wife stays at home with the children. Not all families are structured as such. When compared to aviation dads, pilot moms overwhelmingly have working partners, which means no stay-at-home parent. This phenomenon means that mom pilots are overwhelmingly disadvantaged when it comes to flying pop-up trips and adjusting to last-minute schedule changes. Employing empathy is a basic, yet highly underutilized, managerial trait. We must all put our own biases aside and become cognizant that not all family structures support an equal work/life balance for all employees, therefore, negative rhetoric does little for employee encouragement.

Value Diversity

In addition, operators should insist on having a diverse group of candidates. It is not about lowering any standards; it is about removing obstacles that hinder others from joining the process. Ensure your hiring practices do not exclude diversity by insisting the new hire look and think like everyone else. Such biases perpetuate an exclusive good old boys club, which could affect productivity and workplace creativity. Studies from MIT and a variety of think tanks show that diverse groups make better decisions and are more productive. So, evaluate your hiring practices to ensure you are not subconsciously limiting your potential by hiring only those that look and think like you.

Aviation remains very much a good old boys club, which is a homogenized network of people that look and think alike. It can be difficult to break into the cliques and break down the clichés. Women are at a disadvantage from the start because they lack direct access to networking, the passing of information, and access to resources, which could provide immeasurable benefits.

When I was a young female pilot, I looked around my flight school at a classroom filled with young men, where the hallways were lined with posters of male pilots. As I moved through my flying career, I was never lucky enough to encounter a female manager mentor. As I looked up that corporate ladder, it was a sea of men. Such an environment can be lonely, unwelcoming, and intimidating, which is why establishing a mentoring program is critical.

Beyond basic human rights and morality, we have ample justification to end the gender bias in aviation. The pilot shortage can be

rectified by accessing a great populace, and the retention of employees can be resolved when we use a multifaceted lens to evaluate why women are consistently underrepresented in aviation. The reason lies in the soft issues that are hard to quantify but vitally important to evaluate.

For the aviation industry to be resilient, it must grow with modernity. We have parked the old DC-3s and retired the need for flight engineers. Let us also park the sexist rhetoric, Top Gun chauvinism, and subtle biases that keep half of our population from joining our industry. With these changes, we can sweeten the aviation pie. ■

Kimberly Perkins is a mother, daughter, wife, and a career pilot. She is an international jet captain flying for 15 years. She is the Founder of the non-profit Aviation for Humanity and on the board of directors for the Pacific Northwest Business Aviation Association. She has piloted airline and private executive jets on six continents. She resides in Seattle.

› continued from page 1

GE spooling up on engines for bizav

This includes a simplified cockpit, thanks to the single-lever engine and propeller Fadec control. Calling the engine a digital design from birth, he added the Catalyst family also will pull down from GE's commercial family the "digital twin" concept, which moves toward on-condition maintenance capabilities, with the ability to track exact flying conditions, from weather and flying environment to how the engine is flown on every flight and marry that data with built-in knowledge of the "DNA" of each engine.

The engine will initially enter service with a 4,000-hour time-between-overhaul period, up to a 33 percent increase from similar engines in the class. Even so, GE Aviation's long-term goal is to eliminate service bulletins and unnecessary inspections by knowing the specific operating conditions of each Catalyst engine under the digital twin concept.

"We believe it's a new standard," he said. In fact the engine has so much new technology and simplification in operation that it will require new-cockpit redesigns in forward-fit applications.

At the same time though, Mottier believes there is not as much risk with this program since "we are bringing technologies that have millions, hundreds of millions of flight hours in GE commercial [applications] and applying it into the small engine space."

With a 16:1 pressure ratio, the Catalyst will provide up to 20 percent lower fuel burn and 10 percent higher cruise power than its competitors, says GE. The engine is designed with variable stator vanes to optimize performance throughout the envelope and a two-stage cooled high-pressure turbine that enables the engine to run at much higher firing temperatures than other engines in the class. The engine further has a three-stage counter-rotating low-pressure turbine designed to minimize turning losses and improve overall efficiency.

While the three-stage low-pressure turbine design builds in extra weight, GE Aviation believes the additional available energy, power, and efficiency produced through the design more than makes up the difference.

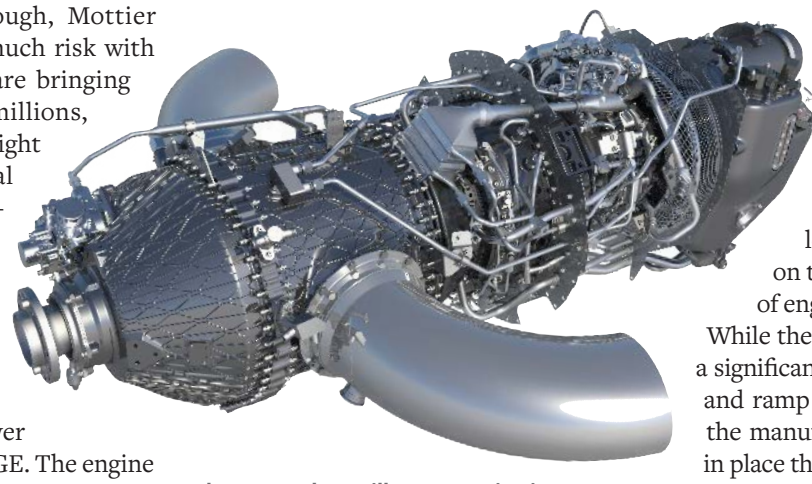
GE is incorporating additive manufacturing (3D printing) with a dozen key parts that will lower the parts count by 855, reduce weight by 10 percent, and help provide a one percent improvement in specific fuel consumption.

The single-lever control is designed to simplify pilot workload, and the Fadec manages the operability throughout the envelope, said Gordie Follin, engineering lead for the Catalyst program, noting, "You don't have to think about it."

"It frees the pilot to fly the airplane… [and] greatly simplifies what's happening. It will be automated as you go through taxi, climb, cruise, the whole cycle," added Paul Corkery, the lead of turboprop programs. Further, the control provides built-in safety, preventing over-speed, over-temperature or over-torque conditions.

The formal naming of the Catalyst comes as GE Aviation has moved into the testing phase of the engine program, completing first run for the first model—a 1,240-shp variant for the Cessna Denali—in December. The engine had accrued close to 40 hours of testing at GE's test cell, before moving to a new test cell as part of a collaboration with a Czech Technical University team (CVUT) in Prague. Tests were expected to restart last month under the partnership with CVUT, which will be testing that engine over the next several years for health-engine monitoring.

The next engine—referred to as number 5—is in assembly, being outfitted with instrumentation, and is anticipated to be ready for testing in a couple of months. That engine, to be used for altitude testing, is slated to head to Canada this summer for trials. Meanwhile, three engines will go to Cessna beginning later this year in preparation for the Denali's planned maiden flight in first-quarter 2019.

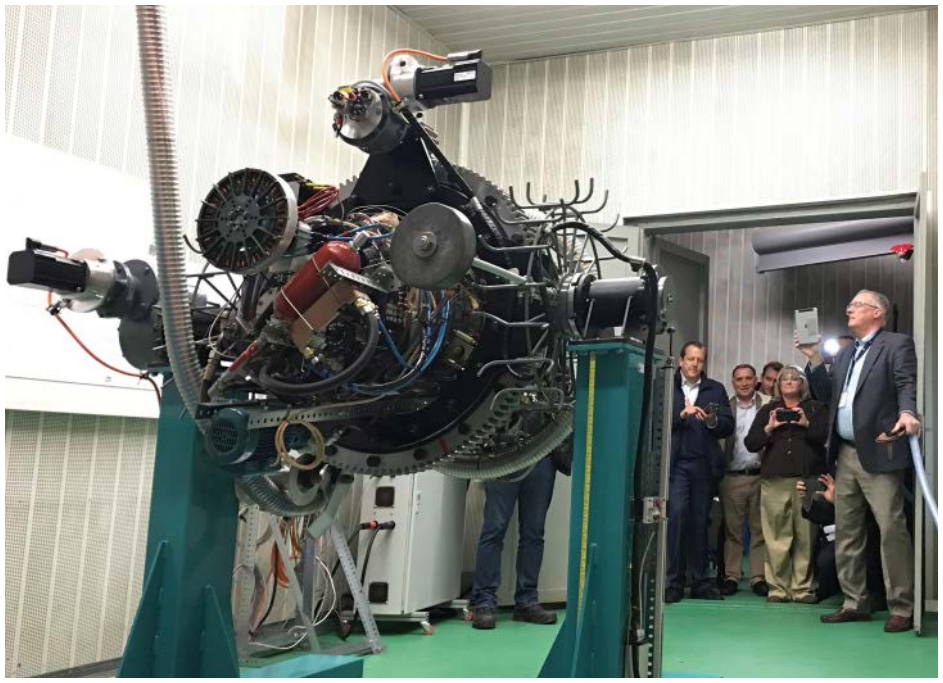


The GE Catalyst will enter service in 2020 on the Cessna Denali.

In all, GE Aviation expects the program to encompass 10 engines, including one that will be flown on a King Air testbed, again through its partnership with CVUT.

The Catalyst will come under new ice crystal test requirements, which Fallin said he believes marks a first for a new engine program. While the regulations were intended for larger commercial engines, the requirements affect all new types. "The consequences for these small engines are much more than for a big engine," he said. "We are pioneering a new validation methodology with the FAA."

In total, the test program is anticipated to span some 2,000 hours by the time the Cessna Denali enters service in 2020. The engine will be built at B&GA's turboprop headquarters in Prague under an EASA production certificate, but certified under the FAA through an agreement involving GE Aviation, the FAA, and EASA.



GE acquired the H80 line a decade ago, giving it experience in the turboprop engine market.

While work continues on the first Catalyst application, Mottier noted, "We're already working on additional applications and additional engines and engine models." Next application announcements will be at the discretion of the customer, but he indicated a belief that announcements may be forthcoming in the next couple of years.

GE Aviation has internally forecast a market for some 300 Catalysts a year over the next 20 years, but Mottier qualified that to point out how long the P&WC PT6 has been on the market and the thousands of engines produced over the years. While the Catalyst program represents a significant investment for GE Aviation and ramp up in Prague, it expands on the manufacturing capabilities already in place through the H-Series.

H Series

In fact, while assembly lines will be separate, component manufacturing between the ATP and H-Series will be co-located. The plant, which includes four test cells in addition to component manufacturing and engine assembly lines, represents a dramatic transformation from its state when GE first moved in a decade ago.

After GE Aviation acquired the Walter lines, it was forced to move production into a different facility in Prague, because the original property had been sold to a separate entity. It found a rundown factory in Prague that was complete with vegetation growing inside.

That factory underwent a renovation. But to keep the Walter production certificate, the company transferred the equipment to the new location in such a way that it was an exact replication of the original facility, "right down to the placement of the workbenches," Mottier said.

Since then, GE Aviation has continually improved those facilities, introducing lean concepts and upgraded facilities and processes. And it built up manufacturing capabilities since that time, expanding the workforce in Prague by 60 percent.

For the H-Series alone, GE Aviation has poured $55 million into upgrades, beginning with the compressor and swapping out less environmentally friendly aspects of the engine before turning to other aspects such as the gearbox. The company added 20 percent more power and improved fuel burn by 10 percent over the original Walter M601.

And although the H-Series provided GE Aviation with an entry into the B&GA turboprop market and provided that much desired domain expertise, the series also has provided a steady flow of business, with the 300th engine delivered last year (an H80-200). The series has had more than a dozen applications and work continues on new ones. Testing is beginning on an aerobatic variant of the H75 for the new Diamond Dart military trainer, while the new Let 410NG is coming to market with the H85. Meanwhile, Thrush is closing in on certification of GE Aviation's electronic engine and propeller control (EEPC) system on the H80 powering the 510G agricultural airplane. The EEPC already had been approved for H75 engines powering the Nextant G90XT King Air upgrade.

In all, GE Aviation has invested $400 million in its turboprop programs and expanded its engineering staff to more than 1,800, a three-fold increase. Its supply chain spend has doubled and is expected to increase six-fold over the next 10 years, Mottier reported.

In reflecting over the B&GA business that GE Aviation has built over the past decade, he traced from the beginnings of a dilapidated factory that has become an expansive operation in the Czech Republic, fed by local university collaboration and talent, and of what once was a faltering engine line that is now a thriving business of engine families spanning from 750 shp to 1,700 shp. "It's been an incredible journey over the past 10 years," he said. ■

FAA aims for consistency in flight standards office

by Mark Huber

The reorganization of the FAA's Flight Standards office, announced last August, was prompted by the 5,000-employee service's well-known reputation for being inconsistent between regions and the need to be considerably more nimble in the face of faster technological change. That was the message from executive director John Duncan at Heli-Expo, where he gave an update on the progress of the sweeping reorganization.

"You'd ask one question on one side of the country and not get the same answer that you got on the other side of the country for the same set of circumstances. We had to do something about that. We could not survive in the long run with that inconsistent kind of delivery. Secondly, we have to be more efficient in the way we do business. There is a lot of work out there. We have to leverage the resources we have. That means the funding resources as well as using the people we have and reaching out to industry and leveraging industry and get the work done that needs to be done. We also need to be agile enough to change as the industry changes and keep up with what is going on. So that is where we are headed," he said.

"The first iteration of that is consistency. We must be interdependent as a team and talking to each other within our organization, not operating independently in a field office somewhere. That means we had to change the mindset of the 5,000 people in the flight standards organization, build a different skill set, and build the tools that are necessary to get this done." Duncan enumerated some of those tools: leadership training, change management, coaching, and "mutual learning" to "move the culture."

The second part of the equation was reorganizing flight standards to support the cultural realignment, replacing the old eight-region system, which had "a history of being relatively independent" and "doing the same thing and all coming up sometimes with different answers to the same question." That involved restructuring along four functional lines: air carrier safety assurance; general aviation safety assurance that now includes all the flight standards district offices (FSDOs) in the country; a single safety standards organization responsible for all of the standards development, policy, rulemaking, and dissemination; and a fourth organization called foundation of business that handles budget, personnel, registry, and training. He said the reorganization did not involve moving any people and approximately half of the leadership is located outside of Washington, with ample field experience and support for their new roles.

Duncan said effecting this type of cultural and structural change "takes a little bit of time" and asked for the audience's "help and feedback about the folks in my organization.

"I expect they [flight standards] will be working in partnership with you to get to the goal you're headed for, as long as you can meet the appropriate standards. I expect them to recognize that there are multiple ways to comply with regulation and I expect them to be in conversation looking for solutions.

"If you find yourself in a situation where that is not happening, or where you have a disagreement, I would ask you to bring someone else into the conversation to help. We have the capability to do that. Working together we can get this done in a much more efficient and practical way. That's our job. To fix the problem, not to punish," he said.

Duncan acknowledged that there is still institutional resistance to change. "We are working with a cultural change. People change at different rates, and we have the challenge of dealing with people who do not change at the same rates as others. Over time that will accelerate, as the new structure will [enable] folks who have been isolated in the past to come along with the change. There are a lot of good people out there who do need to change, and we will work through those issues."

Despite the reorganization, Duncan said local points of contact have not changed and that the FAA has created a rapid response team to answer any questions that cannot be handled via that channel. The team can be reached at (888) 283-8944 or via Email: FlightStandards-RRT@faa.gov. ■

Bell aims for urban air taxi by 2025

Bell showcased its four-passenger, electric VTOL urban air-taxi design earlier this year at the Consumer Electronics Show. The company plans to have the eVTOL to market by 2025.

Bell is pursuing the development of its urban air taxi with the same rigor and discipline that it applies to a mainline helicopter program. That was the message from Bell director of innovation Scott Drennan at Heli-Expo in March. Drennan said Bell hopes to have a vehicle to market around 2025.

"We're in a full-blown development program. We have a dedicated team that we are ramping up over the course of this year to about one hundred [team members]. We're focused right now on system-level tests at full scale. We're going to take an approach like we do on our full-scale vehicles. They have dedicated systems and full-size system level tests and then we integrate those across a demonstration platform," Drennan said.

While Drennan is not prepared to say exactly which technologies Bell will be using on the final vehicle, he believes "all of your best learning occurs as you develop your prototypes and demonstrations" and that "lots of people are proving out their concepts" at this phase of development. He did say that early vehicles likely would rely on some form of hybrid electric propulsion.

"We are not revealing the propulsion system right now, but we're doing lots of tests on it as we speak and moving through our design cycle. If we also think it's the right pathway to all-electric, we will be ready for an all-electric vehicle when the mission makes sense, where we're starting out with that four- to five-place vehicle. So it's going to be larger than the early [two seat] electric vehicles that you've seen come out, and we believe in adding range to the equation by having the hybrid electric units. So our vehicle will start out hybrid electric," he said.

Drennan thinks Uber has set broad vehicle parameters that most market entrants are following, specifically 5- to 10-minute charging turnaround times, the ability to operate at least 2,000 flight hours per year, and direct operating costs that are at least half of those posed by today's light helicopters. Capital costs must also be dramatically lower, and that means adopting lower-cost production techniques such as automotive-style cellular manufacturing, Drennan said.

But keeping costs low will be challenging, Drennan admits, as right now it appears that urban air taxis will need to meet the same safety standards as light helicopters under FAR Part 27. "Those vertical takeoff pieces of the mission, you'd expect it to revolve around Part 27, but we'll see where that goes," he said. He also said that it is unlikely that Bell will be incorporating whole aircraft ballistic recovery parachutes into the design, as some competitors are.

"We just don't believe that's a tenable solution. I can't imagine these vehicles coming down in the middle of an urban environment [uncontrolled and] under chutes. While these vehicles will not get the baked-in energy of autorotation that you do with a large rotor, we look at it as an energy problem, and we will provide the energy to come to ground via redundant motors, propellers, and power systems. We want to make sure the public knows our vehicle will be able to handle situations like that," Drennan said, adding that safety and limited external noise signatures are key to building the required levels of public acceptance and urban airspace access that will make urban air vehicles truly economically viable.

"You've got to make a safe vehicle that flies over all kinds of urban environments. Otherwise you just won't get to the yearly usage rates you want. Realistically, they're going to be much quieter than helicopters. Electric propulsion is going to help with that as will distributed propulsion, because you can bring down your [blade] tip speeds. You can also use techniques like shrouding and phasing of the frequencies that you can't do mechanically. Electric motors can phase at different frequencies and you can change the sounds that are perceived. The tones that we've experienced so far are much different, and they can blend in more easily to the background noise of an urban environment," he said. **M.H.**

Heli taxi operators see market in Asia

by Chen Chuanren

In Manila, Bangkok, and Jakarta, capitals of three of Southeast Asia's thriving economies, hour-long traffic gridlocks hinder productivity. In fact, traffic jams in Jakarta are estimated to cost the economy 65 trillion rupiah (US$4.87 billion) in losses annually. Helicopter taxis, or heli-taxis, are taking off in some parts of Southeast Asia, as business executives and members of the upper middle class seek alternatives to ground traffic.

Airbus Helicopters and Bell are seeing the market come back in various segments after the 2008 economic crisis. Today they capture 40 percent and 27 percent of Asia-Pacific's market, respectively, much of that in the single-engine segment. Most are involved in commercial, air-taxi and helicopter emergency medical services (HEMS), which has seen a boom in recent decades.

"Governments are spending more on public services. Most deals in 2017 are for parapublic usage like HEMS, police, etc." said Sameer Rehman, Bell's managing director, for the Asia-Pacific region.

Airbus has found a market for its Voom heli-taxi service in São Paulo, Brazil, and it believes it will find similar success in congested cities in Asia as well.

The Value of Heli-taxi

"The idea of air mobility will be popular once the concept of value makes its way down to everyone," said Rehman, who believes the time savings heli-taxis provide will justify the cost.

"We are in talks with operators in Manila, Jakarta, Bangkok, and potentially Kuala Lumpur for an Uber-style ride-hailing business model for heli-taxi," Fabrice Rochereau, Airbus Helicopters vice president sales, Asia-Pacific told **AIN**, and both agree that all functions seen on the ground will migrate to helicopter applications.

While helicopter shuttles are currently reserved mostly for high-net-worth clients in most societies, establishing predictable expenses is seen as one way to make helicopter operations affordable to all, by ultimately reducing the price.

"In fact, the more you fly, the more affordable it will get, and you rationalize the [cost of the helicopter]. Everyone should have access to affordable vertical lift," said Rehman.

He said many of their Bell 505 clients have never owned a helicopter before. Seeking value, they have traded their sports cars and yachts for helicopters, and he believes that trend will filter down to heli-taxis.

Indonesian Case Study

Indeed, such a heli-taxi model has gained traction in Indonesia, which tops Southeast Asia in helicopter operations.

Jakarta is probably one of the first cities in the region to possess on-demand urban air transport under Helicity Indonesia, managed by Whitesky Aviation. The company now operates in the Indonesian capital and Bandung, which have 173 and 50 helipads, respectively.

Currently Whitesky Aviation operates an Airbus H130, two Bell 429s and a pair of new Bell 505 Jet Ranger Xs, with two more due for delivery this year. Rehman revealed that the company is looking to "work on a new number" from the 30 Bell 505 orders made in 2016.

A single flight within Jakarta starts at 7 million Rupiah (US$490), not including landing fees, which start at 2 million Rupiah (US$147). Intercity flights to Bandung could be twice as much. Whitesky CEO Denon Prawiraatmadja told Indonesian media that some days are already fully booked after the launch of the service in early December last year.

Ride-hailing company Grab has also begun trials of GrabHeli last June, with a Bell 407. The GrabHeli had similar trials in the Philippines, operating Phijet's H130.

Singapore's Potential

Rehman would like to develop a viable HEMS in Singapore. He notes that four of the major hospitals are capable of handling helicopter medevac from the Republic of Singapore Air Force. Such capabilities are currently reserved for the RSAF's Super Pumas, and helicopters are only allowed to operate along three helicopter routes over the island, all managed by the air force.

"We need to get the government to think about how to have helicopter access to these high-rise buildings in Singapore, for those in need of critical care. Singapore has some of the tallest buildings, and we should take advantage of these landing sites as any advanced country should," said Rehman. So far, there is only one helipad on a commercial building in the Lion City, on Swissotel Stanford. "There should be an effort within the ministry to discuss how to make it work safely, reliably, and benefit all.

"I think it could be one or two hospitals with a couple of helicopters funded through company social initiatives or insurance schemes, and it will charge the country for better helicopter management, headed by the RSAF. I think it is possible for commercially owned HEMS services to operate here," he said.

He thinks that medical tourism from neighboring cities could be the start to such services, as Singapore is one of the preferred destinations for healthcare in Southeast Asia.

Now Overcoming Hurdles

Heli-taxis and even HEMS have encountered speed bumps in Asia, and regulatory issues usually outweigh the lack of infrastructure.

"In China and India it is almost impossible to operate helicopters outside of airports, and it is senseless for HEMS to operate between airports," said Rochereau. "In China, I think it will really take off as long the government gives the go-ahead. There are many big cities in China, and there is good potential."

He added that in Bangkok and Singapore single-engine helicopters are prohibited over populous cities, and there is work to be done to remove the stigma. A single-engine asset model is more efficient and costs less.

"For a start, we are trying to propose flights over the river in Bangkok, as we did in Paris," he said.

Rochereau is optimistic that regulations will change to allow single-engine helicopter operation. He pointed out that, in Europe, single-engine fixed-wing IFR operation was banned a decade ago, but it was later approved once reliability was proven, and the probability of failure was shown to be low.

"It is the same for helicopters. First you have to demonstrate that it is as safe as a twin-engine, and both the manufacturers and operators have to work together to convince the regulators." ■

News Update

HAI Accredits First China Op

Beijing Capital Helicopters, a subsidiary of HNA General Aviation Group, has become the first helicopter operation in China accredited by the Helicopter Association International's Accreditation Program of Safety (HAI-APS). The voluntary safety program adopts the International Standard for Business Aircraft Operations (IS-BAO) to helicopter mission-specific standards. At Beijing Capital Helicopter that includes standards for 13 different missions including air tour, helicopter air ambulance, and offshore operations. The company operates the largest Airbus AS350 fleet in China and is an authorized Airbus service center for H125 and H135 models.

Bangkok Company Begins Training in Brunei

Thai Aviation Services has begun Sikorsky S-92 simulator training at the CAE Brunei Multi-Purpose Training Center (MPTC) in Darussalam under a multi-year contract. Based in Bangkok, Thai Aviation Services operates a fleet of S-92s used primarily for offshore oil-and-gas operations in the Gulf of Thailand. The CAE 3000 Series S-92 mission simulator features helicopter-specific mission training for offshore oil-and-gas, search-and-rescue, and other operations and procedures including low-level flight, confined-area operations, autorotation and landing on platforms at sea.

More eVTOLs and Related Tech Announced

Aris Aerospace has unveiled its ArisOne five-seat design that features hidden dual coaxial lift fans, eight articulating thrusters, and an autonomous avionics system. The production aircraft is aimed at having a range of 200 miles and a top speed of 175 mph and will feature an emergency ballistic parachute recovery system and will be designed to be fully wheelchair accessible.

Kitty Hawk announced in March that it will pursue certification of its Cora two-seat eVTOL initially in New Zealand with Zephyr Airworks there. Kitty Hawk has been quietly working on the project since 2010 and achieved its first transition flight last November in the U.S. Cora is designed for autonomous flight and features a triple-redundant flight computer, a main aft-mounted propulsor for vertical flight, and a whole aircraft parachute system. The aircraft is designed to have an initial range of 62 miles and a top speed of 110 mph.

Air Traffic Management company **Frequentis** has formed a strategic alliance with unmanned traffic management company **Altitude Angels** to craft solutions that will allow unmanned aerial vehicles to more safely coexist in shared airspace. The companies demonstrated Altitude Angel's Guardian UTM platform with Frequentis's infrastructure components at March's World ATM Congress in Madrid. **M.H.**

NYC helo crash spotlights risks of doors-off flights

by Mark Huber

The NTSB's investigation into the fatal March 11 crash of a "doors off" helicopter photo tour flight into New York's East River will continue for months, but key areas of interest likely will be the supplemental passenger restraint systems, the fuel shutoff control, and the emergency pop-out floats.

N350LH was a 2013 Airbus Helicopters AS350B2 owned by Meridian I Consulting and operated by Liberty Helicopters for FlyNYon. It was operating under the Part 91 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.

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 degees F and the river current at five knots. Vance emerged from the wreckage within 90 seconds and was taken aboard a New York Fire Department (FDNY) tug. However, it took rescuers considerably longer to free the passengers—all in their 20s and 30s—described as "tightly harnessed" by the FDNY, and all were pronounced dead either at the scene or later at area hospitals.

The NTSB said it is investigating the accident on a variety of fronts with the help of wreckage teardowns, personnel and witness interviews, and recovered devices and equipment from the helicopter including a GoPro camera and an Appareo Vision 1000 and memory card. On March 15, the NTSB reported that a teardown of the helicopter's engine and examination of the flight controls revealed no evidence of abnormalities, failures, or malfunctions.

While the exact cause of the accident remains under investigation, Vance reportedly has told investigators that a passenger harness became entangled with the floor-mounted fuel cutoff control next to the collective.

In the accident helicopter, the fuel-cutoff switch is on the floor next to the collective..

Regardless of the cause of the engine shutdown, the pilot apparently had few options and little time at or below 2,000 feet, as cleared by ATC. Autorotations at 65 knots per the Airbus flight manual trigger a descent rate of 1,800 feet per minute, and he was heavy with a full passenger load. The NTSB will be looking at the particulars of the maneuver and the deployment of the tri-bag pop-out float system and its maintenance history. Several post-accident photos appear to show partial inflation of the system on the starboard side, the side of the rollover direction, but they are not conclusive. The typical tri-bag float system requires semi-annual, annual, and three-year inspections, with full inflation during the last. They also typically have a maximum forward deployment speed. However, even if the floats were functioning properly, that was no guarantee that the helicopter was going to stay upright, according to a 1996 FAA study, the last of its kind. The study concluded, "Rotorcraft, in both ditching and water impact scenarios, were found to overturn immediately upon impact. Overturns occurred to rotorcraft both with and without deployed floats."

At the time of the 1996 study, the FAA recommended supplemental floats placed near the top of the aircraft to prevent rollovers.

On doors-off photo flights, passengers wear supplemental harnesses that allow them to hang out the sides of the door sills. Aviation photojournalist Eric Adams, who was on one of the other two photo flights that took off with N350LH on March 11, told **AIN** that the harness is secured by a carabiner, a D-shaped coupling link with a safety closure, used by rock climbers, and that the tether attached to the harness "has a modest amount of slack, but not enough that you can get very far out of the cabin." For rear seat passengers, the D-ring attaches to mounts on the rear cabin wall. There is a harness-cutting knife on the forward strap of the harness in a plastic enclosure, and in an emergency occupants are supposed to use that to extricate themselves, as opposed to reaching behind their backs and unscrewing the D-ring. "The average person on the street wouldn't recognize it as a knife or know how to use it," Adams told **AIN**.

Not being able to find the harness knife may not have been the passengers' biggest problem, according to Adams. None of them were wearing appropriate clothing, he said, not to mention survival suits to help endure a wintertime ditching. According to the U.S. Coast Guard, sudden immersion into water even as warm as 69 degrees F can produce a phenomenon called "cold water shock" that can trigger cardiac arrest, involuntary gasp reflex, and loss of muscle coordination even in young, healthy people.

Since the crash, New York U.S. Sen. Charles. Schumer (D) called on the FAA to revoke Liberty's operating certificate. Liberty is suspending all open-door flights pending conclusion of the NTSB investigation. The family of the front seat passenger, Trevor Cardigan, 26, is suing Liberty, charging negligence.

The Helicopter Association International (HAI) restated its long-standing opposition to doors-off/open helitours and the FAA issued a statement saying it was examining the use of supplemental/substitute harnesses on photo flights.

On March 16 the FAA issued the following statement via Twitter: "Helicopter pilots and consumers should be aware of the hazard from supplemental restraint devices during an emergency evacuation during 'doors off' flights. The FAA will order operators and pilots to take immediate action to control/mitigate this risk. Until then, the FAA will order no more 'doors off' operations that involve restraints that cannot be released quickly in an emergency. (*See update, page 4*) Additionally, the FAA will conduct a top-to-bottom review of its rules governing these flights to examine any potential misapplication that could create safety gaps for passengers." ■

UAS automated flight approval expanding to 500 airports

The march to integrate unmanned aircraft systems (UAS) into the National Airspace System (NAS) continues. In early March, the FAA announced that it was expanding beta testing of its automated Low Altitude Authorization and Notification Capability (LAANC), begun in November, to 300 air traffic facilities covering 500 airports beginning April 30. Final deployment of the system will begin on September 13.

Under FAR Part 107, UAS operators must secure prior approval to operate in any airspace under ATC control. Drone/UAS operators using LAANC can receive near real-time airspace authorizations, thus dramatically decreasing waits compared to manual authorizations, which can take days or even weeks. The automated system also allows air traffic controllers to see where planned drone operations will take place. Beginning April 16, the FAA will also consider agreements with additional entities to provide LAANC services. Currently, there are four providers—AirMap, Project Wing, Rockwell Collins, and Skyward. Applications must be made by May 16.

LAANC uses airspace data provided through UAS facility maps. The maps show the maximum altitude around airports where the FAA can authorize operations under Part 107. It gives drone operators the ability to interact with the maps and provide automatic notification and authorization requests to the FAA. The agency calls LAANC an important step in developing the Unmanned Aircraft Systems Traffic Management System (UTM).

LAANC is part of a triad of registration, identification, and regulation the FAA is developing as part of its UAS integration mandate as handed down by Congress and the President, said Joe Morra, director of the safety operations branch for the FAA's UAS integration office. Morra, speaking at HeliExpo in March, said the challenge posed by integrating UAS into the NAS is particularly daunting when you consider the scope and velocity of the UAS industry. "There are roughly 310,000 manned aircraft registered now. We're over 1 million UAS registrations. As of two weeks ago, more than 140,000 are for non-modeling purposes and the other 900,000 are for modeling purposes," he said, adding that registration was the "fundamental" first building block of a coordinated national UAS system, from which all other tools—including airspace waivers, automation tools, and identification—flowed.

"Identification is important because the demand from the public is for more operations over people and expanded operations beyond the line of sight, to do things like package delivery and human transport, which is mentioned in the presidential memo," he said.

Morra said the automated LAANC system being rolled out not only provides operators with near instant authorization, but also allows ATC to know how high and how many Part 107 UAS vehicles are operating in any given airspace. "LAANC takes [authorizations that] took days or weeks and reduces it to seconds. Towers have pixelated their airspace, and if you are operating below certain altitudes the authorization can almost be automatic. And your device can determine that. That's where we are heading with this type of automation. Once you know where somebody is going to be operating once they are identified and registered, that is the foundation for building how you have people operating around helicopters, manned aircraft, and airports in a way that works for everybody."

Morra said expanding automation will further integrate UAS into the NAS, but for now it is the duty of UAS pilots to deconflict themselves from manned aircraft operations. "If someone is following the rules, they should be deconflicting themselves. The next step is; how [to] automate this more on the technological side....If you could see those aircraft out there in a manner that give you the availability to at least know that they are there, and then link into ADS-B, or whatever." ■

Heli-Expo 2018:

OEMs log deals in Las Vegas

by Mark Huber

KASHEA KLOSS

If nothing else, this year's Heli-Expo showed that the new helicopter deal-making drought is over, with OEMs lining up sales announcements in rapid fire. While nowhere near the values or volumes of the princely pacts of a decade past, they easily tallied into the hundreds of millions of dollars. Attendance and exhibition numbers for this year's show were robust: 17,312 attendees, 705 exhibitors, 51 display aircraft on the floor, 807 professional education course registrants, and 2,368 rotor safety challenge attendees.

Let's Make a Deal

While civil market leader Airbus dominated, there was plenty of pen action to go around. Airbus and Metro Aviation announced an agreement with an estimated value of at least $125 million for a fleet order for 25 EC145e medium twins. Deliveries have already begun and are scheduled to continue over the next four years. The EC145e is a lower-cost variant of the out-of-production EC145C2, a model similar to the U.S. Army's UH-72A Lakota that is still in production. It will be built in the same Columbus, Mississippi plant where the Lakota is manufactured, helping to enable the continued operation of that facility, according to Airbus. It anticipates maintaining a production rate of two UH-72As/EC145es per month in Columbus. Working with Genesys Aerosystems, Metro has developed and received FAA STCs for a VFR electronic flight instrument system (EFIS) and an autopilot and stability augmentation system for the EC145e. IFR certification is expected this year.

Airbus signed deals for at least an additional 24 helicopters; Heliflite China placed an order for seven H125 and three H130 singles, Boston MedFlight ordered three H145 medium twins, Helicopter Travel Munich (HTM) signed an agreement for four H125s, Noevir Aviation booked a single H125, and Japan's Auto Panther and Nakanihon Air Service opted for an H130 and H135, respectively. Babcock announced it would be the global fleet launch customer for an unspecified number of H160s and an unidentified North American corporate operator signed up for four of the new medium twins. The H160 made its Heli-Expo debut this year.

Leonardo Helicopters won an order for 26 helicopters worth more than $147 million from Chinese distributor Sino-US Intercontinental Helicopter Investment. The deal is for seven AW119Kx singles, 15 AW109 Trekker light twins, and four AW139 intermediate twins. The company also announced orders for two new light twins from long-time UK distributor Sloane Helicopters and that Era Group would take delivery of the first two AW609 civil tiltrotors off the assembly line, an event now anticipated for 2020.

Kopter (formerly Marenco Swisshelicopter) announced firm orders for 23 of its all-composite SH09 light singles and options for 11 more with a total list price value of $119 million from customers Paradise Helicopters (Hawaii), Helitrans of Norway, Elling Halvorson, and Safomar Aviation (South Africa). The new orders give Kopter a full production line for its first two to three years after certification, claimed company CEO Andreas Löewenstein.

Bell used Heli-Expo as a backdrop to unveil its updated 407 single, the 407GXi, that features the Garmin G1000H NXi integrated flight deck and a new Rolls-Royce M250-C47E/4 engine with dual channel Fadec, and announced that helicopter EMS provider Air Methods would be the U.S. launch customer with an initial order for six ships. The 407GXi was certified by Transport Canada on January 19 and first deliveries are scheduled for near mid-year.

Sikorsky, which had a slow 2017 sales year, announced the delivery of an S-92, the 300th, to offshore operator Era Group.

Focusing on Adding Value

OEMs also showed a renewed focus on value-add and expanded their portfolio of services and products to their installed customer bases.

Airbus Helicopters-Thales helicopter training joint venture Helisim and its member companies are building a new 23,000-sq-ft, $40 million pilot and maintenance crew training center on the Airbus Helicopters campus at Grand Prairie, Texas, it announced at Heli-Expo 2018. Helisim will develop and operate the center, which will house the first Airbus H145 and H175 level-D simulators in North America. The H145 simulator is scheduled for installation first and construction of the center will begin later this year. Its Reality H simulators will be built by Thales. Plans call for an H160 simulator to be added at a future date, once that model is certified and production is under way. According to Helisim, the center will incorporate Airbus Helicopters' existing training facilities at Grand Prairie, including its H125/AS350 full-flight simulator and H135/H145 flight-training device. The new center is expected to accommodate "several thousand" students annually.

Airbus also is expanding its footprint in the current ride-sharing business. Airbus Helicopters and Fly Blade have formed a strategic partnership to develop new on-demand helicopter services. Launched in 2014, Blade already serves 22 core routes in seven states and claims to facilitate more civilian transport by helicopter than any other company in the U.S. The company's services include a multi-state lounge network and booking and operator technology platforms. This alliance is seen as complementing Airbus's existing Voom service in Brazil and new service just announced for Mexico and is expected to bring more business to participating helicopter operators as their aircraft are flown more frequently.

The drive to accumulate and use data more efficiently and in real-time continues. Sentient Science touted its cloud-based DigitalClone, a system that applies software that evaluates the survivability of drivetrain components. Sikorsky reports that over the past year it has been able to tie all of its digital tools together into an integrated support network that enables health usage and monitoring (HUMS) information to come off the aircraft and go into a maintenance management system and interactive technical manual coupled with the new Sikorsky360 customer portal that provides a faster integrated maintenance and parts solution, the company said. Sikorsky also released its updated iFly Sikorsky 2.0 iPad flight calculator app for the S-92 and S-76D.

Naturally there was no shortage of product improvements, many of them focusing on creature comfort. Robinson Helicopter has added crashworthy heated front and rear seats to the list of available options for its R66 turbine helicopter. The installation represents one of the first of its kind on any civil rotorcraft, Robinson said. It adds 3.3 pounds to the single-engine helicopter's weight and $5,300 to its price. According to company president Kurt Robinson, it was requested by the airframer's Russian customers and represents the culmination of several years of engineering.

Present Industry Challenges

Mounting evidence shows there is a real shortage of pilots and mechanics, and this is especially true for the rotorcraft industry, according to a study conducted by the University of North Dakota (UND) in partnership with Helicopter Foundation International (HFI) and HAI. The cumulative projected shortage of helicopter pilots in the U.S. between 2018 and 2036 is 7,649. The study forecasts an even more profound shortage of 40,613 certified aviation mechanics in the next two decades in the U.S.

Overall industry safety is improving, but reaching set targets remains elusive with regard to cutting the fatal accident rate. John Duncan, executive director of the FAA Flight Standards Service, noted that "this year is not looking great" with regard to the USHST's interim goal of reducing fatal accidents by 20 percent. Duncan noted that most of those accidents are related to loss of control. Historically, the overall accident rate for the U.S. helicopter industry remained stable in 2017 and well below the accident totals it experienced several years ago, according to preliminary data released by the United States Helicopter Safety Team (USHST). Comparing 2017 with 2013, the year the USHST was founded, civil accident rates have declined by 17 percent, while fatal accidents are down 33 percent. In 2013, the fatal helicopter accident rate in the U.S. was approximately one per 100,000 flight hours, and over the past several years has leveled off at approximately 0.55 fatal crashes per 100,000 flight hours. This is still better than the organization's goal of 0.69 for the year.

The Coming eVTOL Future

The electric vertical takeoff and landing (eVTOL) revolution is upon us, and there likely is no turning back. That was the message from a growing number of opinion leaders at this year's Heli-Expo. Bell made its urban air-taxi cockpit mock-up the centerpiece of its booth and engine maker Rolls-Royce devoted an entire seminar to electric-hybrid propulsion.

AHS International executive director Mike Hirschberg pointed out that more than $1 billion has been invested in vehicles and related research before regulations are finalized for the category. And the roster of companies includes major players such as Airbus, Boeing, Bell, Embraer, Intel, Amazon, Honda, Toyota, and Uber. "Electric aviation is really changing in what it will be in the future," he said during a Heli-Expo presentation. "This is technology that's really going to revolutionize flight." ■

Advent's ePBS can bring brake-by-wire to all models

by Matt Thurber

Advent Aircraft Systems is developing an electric power brake system (ePBS) that offers the benefits of brake-by-wire technology to nearly any aircraft, including all-electric designs, new aircraft with traditional hydraulic systems, and older aircraft as a retrofit. The ePBS design incorporates Advent's anti-skid technology, as developed in the eABS retrofit now available for the Eclipse 500/550; Beechcraft King Air series and T-6; and Pilatus PC-12 (*see story on page 48*). The ePBS is optimized for aircraft weighing 3,500 to 30,000 pounds mtow.

For manufacturers of new aircraft or retrofit applications, ePBS would eliminate hydraulic brake lines, master cylinders, and fluid from cockpits, while also adding an independent brake-by-wire emergency braking system. The hydraulic units are entirely self-contained in ePBS.

An ePBS system weighs approximately 30 pounds and, according to Advent, "consists of brake pedal sensors and feel units, a primary brake electronic controller, parking and emergency brake controller, wheel speed transducers and hubcaps, and both primary brake and emergency/parking brake hydraulic units. The electronic controllers would send commands to the brake valves, using state-based logic, based upon the applied brake pedal force. There are no quirky system behaviors for which the pilot must allow." An advantage of ePBS compared to existing power-brake systems is that it doesn't require a hydraulic accumulator or nitrogen bottle to power the emergency brake.

"The emergency brakes would be independent and isolated so that no primary brake system components or sensors would be needed for the emergency brakes to operate," according to the company. "A separate hand control would be used to operate the emergency brakes. The health and readiness of the emergency brake would be verified every time the pilot sets the parking brake. Additionally, the emergency brake could be operated, for practice, on any landing without requiring any maintenance actions at all."

Advent is offering ePBS to aircraft manufacturers to incorporate in existing designs or for new aircraft programs. While ePBS could be certified as a retrofit, that would require more work to remove the existing brake system and all of its components. Its ePBS would also be "ideally suited" for unmanned aircraft systems. "We see this as a product where we would collaborate with an OEM [for a new program] or upgrade ePBS to an existing airplane to incorporate into future production," said Advent managing director Ken Goldsmith.

"The advantages of brake-by-wire have been to get all hydraulics out of the pressure cabin, which has been a regulatory issue from a fire-safety standpoint for a long time," said Advent Aircraft president Ron Roberts. "All-electric airplanes [and others] are getting rid of centralized hydraulic power systems. This is still hydraulic, but it's an isolated and dedicated system. We can give them an elegant system, where the brake control and feel is very refined. The ePBS would provide a natural feel, allowing the pilot to modulate the braking action for smooth directional control."

Advent is discussing ePBS with aircraft manufacturers and is prepared to help an OEM incorporate ePBS in an upcoming program, according to Goldsmith. "We would relish discussions with any OEMs that might have interest," he told **AIN**. "We'll answer any questions and offer a solution that they weren't aware was available." ■

ForeFlight releases flight-planning improvements

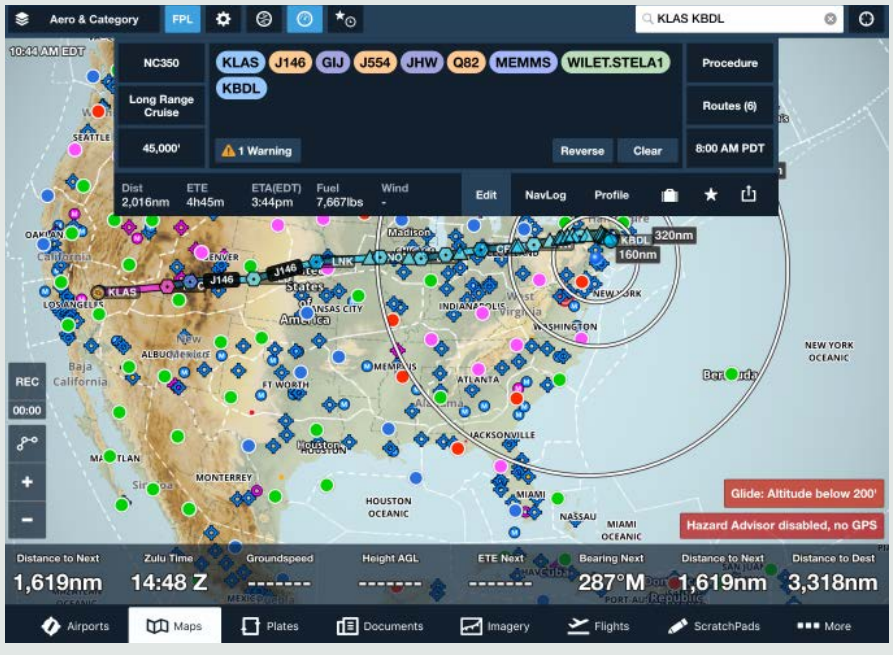
In the new Version 9.6 update of the ForeFlight electronic flight bag app, ForeFlight developers have improved the app's flight-planning features, delivery of important airport Notams, flight log updating, and other capabilities.

The former AviationCloud Autoroute flight routing engine has been redesigned and renamed Recommended Route (this feature is available for ForeFlight Performance subscribers). Based on aircraft performance profiles built into the app for a variety of piston- and turbine-powered types, the Recommended Route optimizes routing and altitude and also analyzes FAA preferred routes and ATC-cleared routes to provide options that the pilot can choose from. For jet airplanes, the routing engine tries to maximize time at efficient high altitudes, but also, according to ForeFlight, "applies, roughly, a one-third rule for climb, cruise, and descent so you're not running a full parabolic flight plan and can level off for a few minutes," which frequently is requested by ATC. If the crew is planning to fly a short leg, the routing engine compensates and doesn't automatically try to suggest climbing to higher altitudes.

To help pilots gain more use from the voluminous Notams published by various authorities, ForeFlight analyzes Notams and looks for specific runway closure information, which is then made available prominently. When connected to a compatible ADS-B In receiver, ForeFlight updates the closure warnings in flight.

When the crew uses the "Flights" tab to plan flights, all the data—charts, weather, Notams, etc.—needed for the flight can be downloaded using the Pack feature. Pro Plus- and Performance-level subscribers also receive icing and turbulence map layers in their Pack download.

Other new V9.6 features include a Flight Log with automatic time calculations, including block, flight, and meter times. Performance users can fine-tune the built-in performance profiles by comparing ETE and fuel burn with actual results using bias sliders in the aircraft view section. ForeFlight model output statistics (MOS) forecasts now include temperature and dewpoint data. **M.T.**



ForeFlight Version 9.6 adds a number of new flight-planning features.

News Update

Lightweight GoDirect Router Saves Weight, Power

Honeywell Aerospace is bringing to market a new lightweight, onboard router estimated to be half the size and weight of traditional products and one-third the price. In addition, it will use about 30 percent of the power of existing systems. The router will be available next month.

The GoDirect router also comes with built-in security software that provides security from laptops and other connected systems brought on board, both on the ground and while the aircraft is in the air. This threat-protection software, also available next month, further will be offered as an upgrade option on legacy Honeywell routers.

The new router is designed for ease of installation. For aircraft with older, legacy systems, the new router will simply plug into the same location, a swap that should take about 30 minutes.

Honeywell first is certifying the system on its Challenger 300, but has a number of installation and certification projects planned for the next few months.

Garmin TXi Touchscreens FAA, EASA Certified

Garmin is now shipping its newly certified G500 and G600 TXi touchscreen displays for Part 23 Class I/II (G500) and Class III airplanes weighing up to 12,500 pounds (G600).

The TXi displays come in three sizes: 10.6 inch for PFD, MFD, and optionally integrated engine-indicating systems (EIS); and two seven-inch versions, available in portrait and landscape layouts. The seven-inch display in portrait configuration can be dedicated as either a PFD, MFD, or EIS, while the landscape-oriented seven-inch display can only be used as a dedicated EIS. When using EIS on the larger 10.6-inch display, the display runs in split-screen mode.

Prices for the G500 TXi range from $11,995 for the seven-inch display to $15,995 for the 10.6-inch display. G600 prices are $18,995 (seven-inch) to $24,995 (10.6-inch). EIS prices are $4,995 (adding it to the G500 TXi) or $17,935 (dedicated EIS for a twin-engine Baron).

Iridium Selects Certus Service Providers

Iridium's new Certus L-band satellite service, which runs on the company's Next satellite network, is nearing the flight-test phase later this year and service entry for aviation users in mid-2019. In preparation for the new high-speed airborne connectivity network's service entry, Iridium has selected Honeywell, Skytrac, Avitek, and Navicom Aviation as service providers. Data speeds depend on antenna size and will range from up to 167 Kbps for a low-gain antenna to 704 Kbps for a high-gain antenna. Eventually, speeds of up to 1.4 Mbps will be possible. **M.T.**

Embraer E190-E2 wins trio of certifications

by Gregory Polek

The Embraer E190-E2 has gained type certification from the Brazilian Civil Aviation Agency (ANAC), the U.S. Federal Aviation Administration (FAA) and the European Aviation Safety Agency (EASA). A ceremony held in São Paulo in late February marked the occasion, which Embraer called the first time an aircraft program as complex as the E2 received approval from the three major worldwide certification authorities simultaneously.

Certification of the E190-E2 clears the way for delivery to launch customer Wideroe of Norway, which plans to start service with the first of its 114-seat jets on April 24. Launched in 2013 along with the larger E195-E2 and smaller E175-E2, the E190-E2 gained certification in 56 months, precisely on schedule. Four flight-test articles clocked more than 2,000 hours in the air since first flight in May 2016. Embraer also conducted some 45,000 hours of tests in laboratories with rigs dedicated to aircraft avionics, flight controls, and electrical, hydraulic, and environmental systems.

"Having had the pleasure of launching the E-Jets E2 family back in 2013, it is very emotional for me to see the E190-E2 reach type certification today, on schedule and on budget," said Embraer president and CEO Paulo Cesar de Souza e Silva. "Our development teams have once again excelled in their creativity, dedication, and competence. Not only were all development targets met, but several important ones like fuel burn, performance, noise, and maintenance costs came in better than originally specified."

In January, Embraer announced a series of positive adjustments to the E190-E2's performance and operating cost profile. Aerodynamic improvements resulted in a decrease in the E190-E2's fuel burn rate by 17.3 percent compared with the E190-E1, as opposed to the original estimate of 16 percent. The company attributes the improvement to better-than-expected performance of the new wing, and aerodynamically "clean" fuselage and the "smart" use of the airplane's fly-by-wire controls. It also cited a weight control program that allowed it to achieve its weight goals precisely on target, flap slap and slat optimization during the flight test campaign and drag reduction on key elements for takeoff performance such as landing gear.

Hot-and-high improvements have resulted in an increase in range out of London City Airport to 2,200 nautical miles, allowing the E190-E2 to reach markets in Russia, Egypt, and Turkey. The company expects to gain certification for London City within two years, explained program director Fernando Antonio Oliveira, who named E1 operators BA Cityflier, KLM Cityhopper, and Austrian Airlines as likely candidates for flying the E2 in and out of LCY. From Mexico City, range increases to 1,600 nautical miles, extending the E190's reach to Canada and South America. Embraer also sees a lot of potential for the E2 in hot-and-high markets in China, where it already claims an 80 percent share of the market for airplanes in the 190's seating category. The company now counts five Chinese operators flying 100 aircraft.

Embraer Commercial Aviation marketing vice president Rodrigo Silva e Souza explained that aerodynamic fine-tuning that resulted in the performance improvements also translates into a reduction in aircraft noise. Specifications show that the E190-E2 generates a 20 EPNdB margin on Stage 4, equating to a 3 EPNdB improvement over original expectations. Of course, the fuel burn reduction resulting from the aerodynamic improvements also reduces emissions, and Embraer estimates that 1.3 percent better fuel consumption translates into about 1,700 tons less CO_2 emissions per aircraft over 10 years.

Finally, Embraer now expects that pilots will need only two and a half days of transition training for the E2, or half a day less than the original plan. ■

Four E190-E2 prototypes clocked more than 2,000 flight test hours over the course of 19 months.

New finance modes won't replace ExIm, says Boeing

While U.S. ExIm Bank financing remains closed to deals valued at more than $10 million, Boeing last year saw foreign export credit agencies from the UK and Italy step in to help guarantee credit lines to support their own suppliers, thereby further strengthening a global aircraft finance market that Boeing Capital president Tim Myers called more robust than any he has seen in his career. Speaking last month with reporters via conference call from an aviation finance conference in San Diego, Myers emphasized the significance of those recent additions, as well as a projected increase in insurance industry participation in financing Boeing aircraft from 2 percent last year to 5 percent this year. Nevertheless, he also stressed the importance of export credit agency financing during inevitable lean periods.

"Innovation abounds in this business," he said. "Boeing worked very closely with the insurance markets last year and launched AFIC, which is the finance and insurance consortium. That company has already done over a billion dollars in financing alone. In the meantime, we're being supported by those countries who supply a lot of product and parts to the Boeing Company, by their export credit agencies."

Still, Myers warned of "exogenous shocks" that threaten to disrupt several straight years of good liquidity. For events such as the financial crisis of 2008-2009, ExIm Bank financing often proves critical in maintaining the flow of aircraft deliveries.

"When you look at the financial crisis in '08-'09, these markets shut down very quickly," he explained. "What happened is that ExIm and the other ECAs stepped in, and ExIm in '09 and '10 took over 30 percent of the Boeing deliveries. So as much as I'd like to say there's tremendous liquidity today... there's always a chance where we hit a liquidity crisis.

"There's also, when you look at a level playing field, having an export credit agency behind us...is a tremendously powerful tool," he added. "You get a lot of transactions that are government to government, and whatever insurance products we can create you can't create that kind of competitive power." **G.P.**

News Update

First A350-900 ULR Rolls Out

The first A350-900ULR rolled out of the Airbus final assembly line in Toulouse to an outdoor station for ground testing before installation of its Rolls-Royce Trent XWB engines, the company announced in late February.

Next, plans call for the aircraft to embark on a "short" flight-test program to certify the modifications to the standard A350-900 that will bring the ULR's additional range capability. Capable of flying to a range of 9,700 nm or more than 20 hours, the latest variant of the A350 XWB will fly farther than any other airliner when it enters service with launch customer Singapore Airlines by the end of the year.

Engineers managed an additional 1,600 nm of range in the A350-900ULR though adaptations to the fuel system computer and to the air venting and inert gas distribution piping in the wing.

SIA plans to use the A350-900ULR for direct services between Singapore and U.S. cities, including New York.

Flyadeal Set To Cut Big Aircraft Deal

Saudi Arabia appears ready to fully commit to the low-fare air transport market as Saudia subsidiary Flyadeal prepares to order 50 narrowbody aircraft to support a major expansion in and around the kingdom.

"We are in the evaluation phase and hope to make a decision by the middle of the year," Flyadeal CEO Con Korfiatis told **AIN** at the recent Aviation Festival in Singapore, referring to proposals from Boeing and Airbus to supply 737 Max jets or A320neos, respectively.

Now flying five Airbus A320s leased from Dubai Aerospace Enterprise (DAE), Flyadeal launched commercial services in September with a route between Riyadh and Jeddah. It expects to receive three more A320s this this year.

Embraer To Drop E-Jet Output

Embraer projects it will deliver between 85 and 95 E-Jets this year, down from the 101 it shipped in 2017, due to what Embraer CFO Jose Filippo characterized as typically slower production resulting from the transition to a new aircraft model. Speaking during the company's fourth quarter 2017 earnings call last month, Filippo reported that Embraer expects to lower delivery totals this year and in 2019, followed by a return to historical trends once it executes gradual acceleration of E2 production.

Embraer registered a book-to-bill ratio of 0.92 last year, a performance company CEO Paulo Cesar de Souza e Silva called "relatively good" compared with Embraer's competition. Following its 1,400th E-Jet delivery in December, its commercial aircraft backlog stood at 435. Embraer expects to deliver the first recently certified E190-E2 to Wideroe of Norway this month.

Performers dressed as ancient Sri Lankan warriors mark SriLankan Airlines' entry into the Oneworld alliance in 2014.

SriLankan Airlines eyes boost from Qatar

by Neelam Mathews

SriLankan Airlines awaits a response from Qatar Airways to partnership overtures during discussions held in Colombo with a Qatari delegation, Sri Lankan minister of public enterprises development Kabir Hashim said at a recent press briefing in Colombo. Qatar had shown interest last October during a visit by Sri Lankan President Maithripala Sirisena to Doha, where he signed several bilateral deals.

Ailing government-owned SriLankan Airlines has unsuccessfully endeavored to attract an airline to partner with it for several years. Emirates, which held a 43.6 percent stake and participated in a 10-year strategic agreement with SriLankan, did not renew its partnership upon its expiration in 2008 and sold all its shares to the Sri Lankan government in 2010.

SriLankan already has started restructuring under a process that will last for the next two years. "A new board is to be appointed shortly," Hashim confirmed to the Daily News local newspaper. "There is no intention to close SriLankan Airlines...We need a good international partner to work with us."

Both members of the Oneworld alliance, Qatar Airways and SriLankan Airlines plan soon to expand their present cooperation on code shares, SriLankan Airlines' country chief for India, Chinthaka Weerasinghe, told **AIN**, adding that London Heathrow remains SriLankan's only direct long-haul European destination. "Doha's Hamad International Airport has become a hub for us," he said. "It is now a transit point for our passengers traveling onwards to over 20 European destinations on Qatar Airways."

Weerasinghe said the carrier's recently added long-haul route to Melbourne has done well, thanks largely to the Australian city's large expatriate population. He added that large numbers of passengers also connect from North India for the Australian route. However, the carrier continues to concentrate on regional routes, in particular India, where it flies nonstop to 14 destinations—the largest by a foreign carrier—with 134 flights per week.

Weerasinghe downplayed the threat posed by budget carrier Indigo's recent aggressive campaign to connect 26 Indian cities to Colombo. "Indigo has a strong presence in India," he said. "However, most of their connections are via transit points. People like nonstop flights on short routes." ■

Suppliers feeling squeeze of vertical integration

by Dan Catchpole

Aerospace suppliers face new challengers as Boeing reverses an outsourcing trend established during development of the 787 and, along with rival Airbus, moves into aftermarket sales. After years of pushing suppliers for price concessions, the OEMs have assumed a new tack, threatening to hollow parts of the supply chain and driving further consolidation in the industry.

After aggressively outsourcing design and production work in the early 2000s, Boeing has now turned its focus toward doing the work itself, giving it what it considers more control over its supply chain and opportunities to make money in aftermarket sales.

Boeing recently announced a joint venture with seat manufacturer Adient. Meanwhile, it now makes 737 Max nacelles in South Carolina; it produces actuators in the United Kingdom and Portland, Oregon; it has established its own avionics unit; and it makes much of the 777X's advanced wings itself.

Boeing sees plenty more opportunities for so-called vertical integration, said aerospace analyst Kevin Michaels of aerospace consultancy AeroDynamic Advisory.

Four key questions should drive the aerospace giant's strategy, he told delegates at the recent Pacific Northwest Aerospace Alliance annual conference in Lynnwood, Washington. Whether or not the work is critical to making future aircraft designs competitive constitutes the first consideration. The others center on ensuring so-called value creation for Boeing's customers, moving Boeing closer to its $50 billion services revenue target, and assuming an acceptable level of risk.

Potential areas for further integration on aerostructures include engine pylons, fan and exhaust cowls, thrust reversers, doors and windows, and forward and nose fuselage sections, Michaels said.

On aircraft systems, possible areas include slides and rafts, fuel management, and the flight control computer, he said.

Airbus has more consistently defined what is core to its aircraft designs, he said, while Boeing still suffers a hangover from its aggressive outsourcing on the 787 program.

While vertical integration can reap big windfalls in good times, it can mean more liability in lean times, warned Michaels.

It also can put Boeing in direct competition with suppliers, many of whom already feel squeezed by cost-cutting campaigns at Boeing and Airbus in recent years. Tier 1 suppliers appear the most vulnerable to Boeing's push for vertical integration, as the strategy results in more consolidation in the industry.

In the last year, Rockwell Collins bought B/E Aerospace. Then United Technologies agreed to pay $23 billion to buy Rockwell Collins in September. In December, the European Commission approved the merger of Safran and Zodiac Aerospace.

"Even though it's creating this tremendous stress and angst and uncertainty in the supply chain, if you're a Tier 2 [supplier] with really good products and components, and haven't been able to sell it to that Tier 1, you might have an opportunity to sell direct on the middle of the market aircraft," Boeing's next new aircraft, Michaels said. ■

Hawaiian To Order Boeing 787-9s

Hawaiian Airlines last month confirmed its intention to buy 10 Boeing 787-9s following a decision to drop an order announced in 2014 for six Airbus A330-800neos. The letter of intent, which also grants Hawaiian an option covering another 10 of the airplanes, calls for the first example to arrive in the first quarter of 2021. Hawaiian has chosen the GE GEnx-1B engine option for its Dreamliner fleet.

The airline calls the 787-9 the ideal option for its long-haul routes to Asia and North America. "The Dreamliner combines excellent comfort for our guests with fantastic operational performance and will allow us to continue modernizing our fleet into the next decade," said Hawaiian Airlines president and CEO Peter Ingram. "It has more seating capacity than Hawaiian's current widebody fleet, which will allow us to further build upon our successful growth in Asia."

Hawaiian now operates a mainline fleet of 24 Airbus A330-200s, eight Boeing 767s, two A321neos, and 20 Boeing 717s. The company noted it chose the 787-9 as part of a competitive bid process that also included the Airbus A330-900neo.

Hawaiian said it expects to finalize binding purchase agreements with Boeing and GE in the second quarter of this year. The company also plans to begin negotiating inclusion of the new aircraft in its contracts with the Air Line Pilots Association and the Association of Flight Attendants, both of which must adopt new contract language before the company's board of directors issues final approval of the purchase. **G.P.**

Gulfstream Aerospace will increase its maintenance and completions capability at its Appleton (Wisconsin) International Airport service center by 50 percent with a 180,000-sq-ft expansion slated to be completed by mid-2019.

Gulfstream Announces Expansion at Appleton MRO

Gulfstream Aerospace is undertaking a $40 million, 180,000-sq-ft expansion of its Appleton (Wisconsin) International Airport (KATW) maintenance and completion center that is expected to add 50 percent more capacity, create 200 new jobs, and push total employment at the location to more than 1,000. Construction is expected to start next month, with operations beginning in the second quarter of 2019.

The new facility will be located northeast of the airport and include a hangar, offices, back shops, and support space. Gulfstream's existing Appleton headcount totals 820 and present space is 315,000 sq ft. Gulfstream has operated at Appleton since 1998 as part of its then $250 million acquisition of K-C Aviation and has expanded its presence at the airport several times, since.

Oriens Opens Biggin Hill PC-12 Service Center

Two months after acquiring the former Avalon Aero business aviation MRO at London Biggin Hill Airport, Oriens Aviation has formally relaunched the facility—Oriens Maintenance Services—as an authorized Pilatus Aircraft service center. The move follows what the UK and Ireland Pilatus sales distributor calls an "excellent" 2017, in which fresh customers took delivery of five new aircraft, the PC-12 company demonstrator was sold, and a first new-build PC-12 delivery position was secured for this year.

There has been such interest in the Swiss turboprop single that the company expects to see PC-12s being flown under recent European regulations permitting commercial single-engine turbine IFR operations, according to Oriens Aviation sales director Craig Lammiman.

Acquisition of the MRO facility from Avalon Aero, which also provides BAe 146 line and base maintenance at its Cranfield base north of London, included transfer of the lease on an 18,000-sq-ft/1,670-sq-m hangar and a seven-strong manintenance team now led by a newly appointed director.

StandardAero To Expand Three Facilities

MRO provider StandardAero will expand its facilities in Cincinnati and Hillsboro, Ohio, and Miami this year, increasing shop capacity by a total of 260,000 sq ft. According to StandardAero, it will invest $16 million in construction and equipment for this expansion.

The expansion at the Cincinnati location will include an additional 200,000 sq ft of work space, which will be used to accommodate component repair growth on new platforms and military and commercial engines.

Meanwhile, the Miami facility will add 30,000 sq ft of working space to install a clean line, additional vacuum furnace, water jet, and cleaning capabilities. With these changes, the facility will be able to repair large engine cases. The Hillsboro facility expansion will include 30,000 sq ft for OEM manufacturing production, bringing the facility's manufacturing footprint to 115,000 sq ft.

At the same time, StandardAero signed an MoU with Papillon Airways for 40 retrofittable crash-resistant fuel tanks (CRFTs) for Papillon Grand Canyon Helicopter's fleet of Airbus AS350B3s and EC130B4. The CRFT installations are expected to begin soon.

Garmin Flies Citation XLS Retrofitted with G5000

The first Cessna Citation XLS retrofitted with the Garmin G5000 integrated flight deck recently made its maiden flight. During the 116-minute flight from Garmin's Olathe, Kansas flight-test facility at the New Century AirCenter Airport, the crew performed an initial checkout of the G5000 system, including engagement and evaluation of the aircraft's all-new flight control system.

In its configuration for the Citation Excel/XLS, the G5000 flight deck features three 14-inch flight displays with multi-pane capability, allowing pilots to simultaneously view maps, charts, checklists, TAWS, TCAS, flight plan information and weather. Since the crew alerting system is integrated into the G5000, Garmin was able to relocate the autopilot control to the glareshield. The setup also includes two pedestal-mounted touchscreen display/controllers and adds ADS-B, PBN/RNP 0.3, LPV/APV approach capability, as well as options for datalink, synthetic vision system, and other features.

STC approval is targeted for early next year, and the retrofit will be available through Textron Aviation service centers and select Garmin dealers.

Garmin has started test flights of a Cessna Citation XLS retrofitted with the company's G5000 integrated avionics system. STC approval is expected in early 2019.

LoPresti Aviation HID Lights Installed in Phenom 300

Duncan Aviation's Battle Creek, Michigan facility completed the first installation of a LoPresti Aviation BoomBeam high intensity discharge (HID) lighting system on an Embraer Phenom 300. The BoomBeam HID upgrade, which is engineered for each model aircraft, can produce up to 15 times more light than traditional incandescent lighting systems, Duncan said.

HID systems also reduce electrical load and heat output and decrease lighting-related AOG time because there are no filaments. LoPresti's system, which comes with a five-year/5,000-hour warranty, is designed with a color to more closely match natural daylight.

The Phenom 300 landing and taxi light upgrade increased the four-light system to a six-light system, providing an extended range of visibility. Luke Krepsky, aircraft manager with the Phenom 300's operator, Exec Aire, said the increased visibility will benefit the Stevens Point, Wisconsin-based company's operations.

Stevens Aviation Completes King Air 350 Blackhawk Upgrade

Stevens Aviation's Nashville facility completed its first Blackhawk XP67A engine upgrade on a Beechcraft King Air 350. The modification, which was completed in two weeks during a phase inspection, features two factory-new Pratt & Whitney Canada PT6A-67A engines and new MT five-blade natural composite propeller assemblies.

The upgrade increases the single-engine service ceiling; lowers operating and maintenance costs; and reduces the overall weight of the aircraft by an average of 18 pounds. The new engines yield a power increase of between 25 and 30 percent, which translates to an increase in true airspeed and rate of climb.

Blackhawk Modifications tested the upgraded King Air 350 against a stock version of the aircraft at FL350 at ISA+20 and found that the upgrade package improved true airspeed by 18 percent. The Blackhawk-upgraded version reached 35,000 feet from sea level in just 18 minutes, while the stock version of the King Air 350 took 45 minutes.

Elliott Aviation Installs, Delivers Gogo Avance L5

Elliott Aviation recently installed and delivered its first Gogo Avance L5 system. The installation was completed on a Cessna Citation Excel, which also had Elliott's recently approved Garmin ADS-B STC for Honeywell-equipped aircraft included in the work scope, along with paint and interior refurbishment. Elliott is currently installing a Gogo Avance L3 in an Astra, which is also receiving full paint and interior.

Jet Aviation Hong Kong Extends FAA Falcon Approvals

The FAA approved Jet Aviation's MRO facility in Hong Kong to support 48- and 36-month inspections for U.S.-registered Dassault Falcon 7X/8X and Falcon 900-series jets. This approval extends an existing FAA approval to support 48-month inspections for the 7X/8X and 36-month inspections for the Falcon 900 series.

Jet Aviation Hong Kong holds Hong Kong CAD maintenance repair station approval, an FAA repair station certificate, and mainland China JMM approval for PRC-registered aircraft.

QTA Gets Nod for Challenger 300/350 Barrel Replacement

Quiet Technology Aerospace (QTA) received STC approval of its carbon-fiber engine inlet replacement barrel for the Bombardier Challenger 300/350. This offers a terminating solution to a corrosion issue involving the super-midsize jet's aluminum inner-barrel engine inlet.

Conair Group's modifications contract with Canada's Flying Colours will allow it to use the Bombardier Q400 twin turboprop for other special missions besides aerial firefighting.

Flying Colours Earns Q400 Conversion Contract

Canada-based Flying Colours signed an agreement with Conair Group to modify six Q400MR turboprops to support the company's multi-purpose missions.

Flying Colours is tasked with engineering, fabricating, installing, and certifying four interchangeable interiors to support passenger, cargo, combi-transport, and medevac missions. In the passenger configuration, the aircraft will accommodate up to 64 people, while the full cargo version will transport up to nine tons of material. The combination cabin will carry 19 passengers and freight, while the medical transport format will support up to six stretchers along with associated medical equipment and clinical staff.

The first aircraft will enter Flying Colours' St. Louis facility next month, with the others to follow over the next several years.

PAG Signs MRO Agreement with Honeywell Aerospace

Precision Aviation Group (PAG) signed a dealership agreement with Honeywell Aerospace. This allows PAG to sell, exchange, and offer maintenance, repair, and overhaul services for Honeywell avionics products, including Aspire satcoms and SkyConnect helicopter tracking systems.

Pentastar Upgrades Global with DU-875

Pentastar Aviation completed its first Honeywell DU-875 flight deck display upgrade on a Bombardier Global Express. The company received an STC for the upgrade on Global Express airframes last year and has since added the Cessna Citation 550, 560, 560XL, and 750, as well as the Dassault Falcon 900/900EX and Bombardier Learjet 45 series to the approved model list.

The Honeywell DU-875 flight deck display upgrade is a form-fit plug-and-play LCD upgrade that improves display reliability and offers a growth plan to Primus Elite with advanced features, including synthetic vision system (SVS), on multiple platforms via additional software and hardware upgrades. Honeywell is currently offering a $40,000 trade-in incentive per-display replacement.

Able Aerospace Signs Bell Mx Agreement with AVESA

Aeroservicios Ave, S.A. (AVESA), Bell's customer service facility in Central America, recently selected Able Aerospace Services as its provider for component inspection, repair, overhaul, and exchange service. This partnership benefits AVESA customers operating light and medium Bell helicopters in Guatemala and Central America, because it improves in-country product availability and cost savings.

Guatemala-based AVESA will have access to Able Aerospace's component inspection, repair, overhaul, and OEM-approved replacement parts. AVESA will also have access to Textron's exchange pool for Bell models.

Elliott ADS-B Solution OK'd for Citation Excel/XLS

Illinois-based Elliott Aviation's ADS-B solution for the Cessna Citation Excel and XLS received FAA STC approval. The STC and equipment installation kit is now available through the Garmin dealer network.

Elliott's solution features integration to cockpit equipment such as TCAS II and ADS-B In via a Garmin Flight Stream wireless gateway. The STC incorporates remote-mount Garmin GTX-3000 transponders and can be installed in any aircraft with the Honeywell Primus II radio package, such as the Hawker 800A/800XP and Hawker 1000.

The solution does not require current Honeywell equipment to be sent out for upgrades, which lowers the chance of additional repair costs. In addition, the ADS-B upgrade costs at least 40 percent less than the current one being offered by Honeywell, according to Elliott Aviation.

Elliott Aviation's new low-cost ADS-B solution for the Citation Excel and XLS, will be applicable to a wide range of aircraft that are equipped with the Honeywell Primus radio package, according to the FAA's follow-on installation policy.

Airwolf Offers Enstrom AD Solution

Airwolf Aerospace is providing a solution to Enstrom Helicopter operators grounded by a recent spindle Airworthiness Directive. The FAA directive grounds all piston-powered Enstroms with more than 1,500 hours on their spindles until they are replaced with new components, and are thereafter subject 500-hour recurring inspections.

Helicopters modified with Airwolf's newly STC'd tension-torsion (TT) straps are no longer affected by the AD, the company said. According to Airwolf, approximately 550 helicopters currently in operation worldwide are covered by the AD.

The company also announced it is in the final stages of FAA approval for its PMA lead lag bearings, shear bearings and dampers for the Bell 407.

Jet MS Completes Global 5000 Maintenance

Jet Maintenance Solutions completed a maintenance service event for a Bombardier Global 5000 at its Lithuania headquarters. The aircraft, which is operated by a European business jet operator, was delivered to the Jet MS hangar for minor repairs. Jet MS received approvals to start maintenance for the Bombardier Global 5000/6000 last year.

Hawke Aerospace Renamed Uniflight Global

Reflecting on its reach across multiple businesses in the rotorcraft sector, Grand Prairie, Texas-based Hawke Aerospace Holdings has rebranded its three segments that it refers to as "finance, fix, and fly," under the Uniflight Global banner.

The move covers Uniflight, its MRO division, which operates two Part 145 locations, a customer service facility for Bell, Airbus Helicopters, and Leonardo at its flagship Grand Prarie Municipal Airport facility, and the other at Pittsburgh-area Rostraver Airport; Infinity Helicopter Leasing, its financing division, a joint venture that currently has 11 rotorcraft in its portfolio; and Aviation Services Unlimited (ASU), the company's Part 135 flight department based in Rome, New York, and operates a fleet of three Bell 206 Jet Rangers and a Cessna 172 on aerial survey missions.

Bombardier Mulls Moving Florida Service Center to OPF

Bombardier Business Aircraft is considering relocating its Florida service center from Fort Lauderdale International Airport (FLL) to a new, larger facility at nearby Miami-Opa Locka Executive Airport (OPF). The company recently sent a letter to Miami-Dade deputy mayor Jack Osterholt comfirming an application for up to $5 million in "Building Better Communities" bonds to partially fund the proposed $75 million service center at OPF. The Miami-Dade County Commission is scheduled to vote today on an official contract for this bond.

If Bombardier relocates its service center to Opa-Locka it could have 200 to 300 full-time employees in place by 2025.

If it gets the green light, the 200,000-sq-ft OPF service center would double the footprint of Bombardier's existing FLL base, which was established in 1995. Florida is a key location for Bombardier, said company v-p and general manager of customer experience Jean-Christophe Gallagher, as it supports Learjet, Challenger, and Global operators not only within the southeast U.S., but also Latin American and even Canadian customers who prefer the warmer weather in the winter.

Bombardier's lease at FLL expires in 2020 and the company "must decide by the end of April whether to renew the agreement with Broward County, or relocate to the city of Opa Locka in Miami-Dade County," Gallagher said in the letter. If the bond is approved, Bombardier has committed to 150 full-time, direct jobs and more than 50 indirect jobs in Miami-Dade by 2020, with the potential for 200 to 300 full-time jobs by 2025. ■

by David Jack Kenny

PRELIMINARY REPORTS

Five Lost in French Helicopter Collision

AEROSPATIALE SA342M (TWO), FEB. 2, 2018, LAC DE CARCÈS, VAR, FRANCE

Five French Army officers were killed in the midair collision of two SA342M Gazelle helicopters conducting training exercises. All five were reportedly experienced pilots. The aircraft were operated by the EALAT light aircraft training school at nearby Cannes des Maures. The five-seat Gazelle is used in France's ongoing security operations in Mali and other counterterrorist roles.

Tour Helo Crashes

EUROCOPTER EC130B4, FEB. 10, 2018, PEACH SPRINGS, ARIZONA

Two of the three passengers who initially survived the crash of a Papillon Airways tour helicopter in Quartermaster Canyon have since succumbed to their injuries. Three others were pronounced dead at the scene. Four weeks afterward the pilot remained in critical condition, while the only surviving passenger's condition had been upgraded to "fair."

The accident occurred on approach to a landing zone on the canyon floor in gusting winds about half an hour before sunset. Witnesses reported seeing the helicopter begin a left turn as it approached the landing area, then drift backwards slightly as the turn accelerated into a left spin. The helicopter made at least two complete revolutions before descending into a gully. Most of its structure was consumed by a post-crash fire.

Rescue efforts continued into the following morning, hindered by darkness and increasing winds. On March 7, Papillon announced plans to retrofit all its EC130B4s and AS350B3s with crash-resistant fuel tanks.

Airspeed Discrepancies Involved in Russian Crash

ANTONOV AN148-100B, FEB. 11, 2018, RAMENSKOYE, MOSCOW DISTRICT, RUSSIA

After preliminary analysis of the airplane's flight data recorder, Russia's Interstate Aviation Commission reported that the crash of Saratov Airlines Flight 703 followed widening discrepancies between the values reported by the pilot's and standby airspeed indicators. (Readings from the copilot's ASI were not recorded.) All 65 passengers and six crewmembers were killed when the twin-engine regional jet went down seven minutes after taking off from Moscow's Domodedovo Airport.

The readings began diverging two and a half minutes after takeoff as the airplane climbed through 4,000 feet, with the pilot's ASI initially reading higher. Altitude indications remained in agreement. The "Match IAS" annunciator illuminated when the difference reached 30 km/h (16 knots), then extinguished after 10 seconds. A second alert followed 50 seconds later at an altitude of 6,500 feet, with the standby indicator now showing higher airspeed. The crew disconnected the autopilot. Indicated airspeed on the pilot's gauge declined to zero over the next 34 seconds and remained there for the rest of the flight. Airspeed measured by the standby indicator decreased to just over 100 knots before the airplane pitched down 30 to 35 degrees, then increased rapidly to 430 knots at impact.

The FDR also showed that despite temperatures of -5 degrees Celsius, pitot heat had not been activated on any of the three airspeed probes. Ice blockage of a pitot tube causes two types of indication errors. If the tube's drain hole is also blocked, trapped ram air pressure will make indicated airspeed increase with altitude as ambient pressure falls. If the drain hole is open, ram pressure bleeds off and indicated airspeed drops to zero.

B.C. Departure Accident Results in Certificate Suspension

BEECHCRAFT KING AIR A100, FEB. 23, 2018, ABBOTSFORD, BRITISH COLUMBIA

Transport Canada suspended the operating certificate of Island Express Air six days after its King Air 100 crashed into a raspberry field while taking off from the Abbotsford airport during a snowstorm. Two of the ten on board were hospitalized with injuries not considered life-threatening, and two others suffered less serious injuries.

The suspension will remain in effect until the operator can prove "it can keep its operations consistently compliant with aviation safety regulations."

Conquest Lands on Great Northern Highway

CESSNA 441 CONQUEST II, MARCH 2, 2018, 25 MILES EAST OF BROOME, WESTERN AUSTRALIA

No injuries or aircraft damage were reported after a Skippers Aviation turboprop made an emergency landing on Australia's Great Northern Highway following the loss of power in both engines. The flight was transporting nine passengers from Fitzroy Crossing in the Northern Territory. As the airplane began its descent for landing at Broome, the right engine began surging, followed by the left engine.The pilot made a mayday call and shut down the right engine only to have the left stop shortly afterward. The quantity of fuel on board has not yet been reported.

FINAL REPORTS

Against Advice, Pilot Flew Without Instructor

AIRBUS HELICOPTERS AS350B3E, NOV. 18, 2015, CARLSBAD, CALIFORNIA

The new owner who destroyed his Airbus AS350B3E trying to land it on a dolly had been warned by at least three flight instructors not to fly it without supervision, according to the NTSB. In its final report, the Board noted those instructors had urged the pilot to get additional training before operating the helicopter on his own, recommendations with which he had "concurred." However, less than three weeks before the accident, he cancelled his reservation for factory transition training.

The 65-year-old owner, president of a Montana bank, and his 60-year-old passenger were killed when the helicopter struck its tail skid, rolled over, and spun on the ramp after his fourth attempt to land on a wheeled dolly came in short. Both men were rated helicopter pilots, but the passenger had no documented AS350 experience. The owner had received less than 11 hours of familiarization training in the three weeks since buying the aircraft.

According to witness accounts and cellphone footage, the pilot's initial approach touched down short, with the rear half of the skids hanging off the back of the platform. After rocking backwards and striking its tailskid, the helicopter began oscillating back and forth hard enough to dislodge one of the dolly's chocks. The pilot lifted off and landed on the line between Taxiway A and the ramp, but had the line crew replace the chocks for another try rather than repositioning the helicopter to the ramp.

The second and third attempts terminated in five-foot hovers. The fourth touched down with the skids again hanging off the dolly's aft edge. After striking its tailskid for a second time the helicopter nosed forward and lifted off, then spun 180 degrees left while pitching up 45 degrees. The tail rotor and vertical stabilizer separated after hitting the pavement. The helicopter bounced and "landed hard on its belly," spinning at about one revolution per second for the next five minutes and sliding 530 feet down the ramp. The tailboom and horizontal stabilizer separated before it "rolled onto its side, shedding the main rotor blades." In-cockpit footage showed that the pilot lost consciousness during the final contact with the ground; the passenger remained aware for two more minutes but was unable to shut down the engine.

The pilot had previously owned a Bell 407, whose rotor turned in the opposite direction (requiring opposite use of the anti-torque pedals) and whose skid toes, unlike those in the AS350, were visible from the cockpit. The extent of his helicopter experience is unknown; investigators did not locate his logbooks, and each of his past five medical applications had claimed "25,000 hours" of total flight experience (including fixed-wing). His toxicology screen was positive for alprazolam (Xanax) and the antihistamine diphenhydramine. The report noted, "The use of two CNS depressants simultaneously typically results in cognitive impairment which is magnified well beyond the simple addition of the effects."

Fatal Gulf of Mexico Accident Unexplained

BELL 407, FEB. 27, 2017, CHAUVIN, LOUISIANA

The NTSB was unable to determine why the pilot of a Westwind Bell 407 descended into the Gulf of Mexico while returning to base from the South Timbalier ST37 oil platform. The accident occurred at 10:33 a.m. in visibility estimated at 15 nautical miles. Data from the helicopter's SkyConnect onboard monitoring system showed it climbing to a maximum altitude of 729 feet before beginning a steady descent on a constant heading of 336 degrees.

In a probable-cause report, the Board noted that the pilot was appropriately qualified. Toxicology tests were negative. Aircraft damage suggested a high-speed, shallow-angle impact with the water's surface with no evidence of any malfunction before impact. The report concluded that the reasons for the pilot's failure to maintain altitude "could not be determined based on the available information."

Collision with King Air Destroys Drone

BEECHCRAFT KING AIR A100, OCT. 12, 2017, QUÉBEC CITY, QUÉBEC

Canadian authorities were unable to identify the operator of the unmanned aircraft that collided with Sky Jet Flight 512 during its final approach to the Québec/Jean-Lesage International Airport. The King Air was descending through 2,500 feet on a seven-mile final to Runway 24 when the pilots spotted "a drone, about the size of a dinner plate, in front of the left wing." Damage to the airplane was limited to a dent in the outboard section of the left wing's de-icing boot and scratches on the wing's upper skin. The drone "disintegrated" and no debris was recovered. ■

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Part 91 and 135 operators drive growth of ACSF's ASAP

by Kerry Lynch

In the five years since the Air Charter Safety Foundation (ACSF) launched an industry-wide Aviation Safety Action Program (ASAP), the number of Part 135 and 91 participants has begun to outpace those from the 121 sector, Randy McDonald, manager of ASAP programs for the FAA, said in March at the ACSF's 2018 Safety Symposium.

According to McDonald, the ACSF program now accounts for 54 percent of the active agreements with the agency. "That's huge," he said. "We really appreciate what you bring to the table, because that's the information we really need." Adding that most of the accidents and incidents involve general aviation, he said, "Our focus should be on general aviation and recruiting them into the program."

Voluntary Participation

The ACSF ASAP program enables Part 135 and 91 operators to participate in a voluntary safety reporting agreement with the FAA without fear of agency action. ACSF aggregates the data to track safety trends. Russ Lawton, director of safety for the ACSF, credited the growth, in part, to the change in compliance philosophy at the FAA to help address unintentional noncompliance issues without enforcement. This makes participation a "no brainer," Lawson said.

He further attributed this growth to opening up the ACSF program to Part 91 operators, which now outnumber the Part 135 participants. Underscoring the importance of the program, Lawson noted that 90 percent of the reports that go into ASAP come from a sole source, "which means no one would ever know about the hazard or safety issue had it not been reported."

Mike Graham, director of flight operations safety, security, and standardization at Textron Aviation, noted his organization is among the most active of participants in the ACSF ASAP program, adding that the number of reports coming through the various flight activities throughout Textron Aviation has grown exponentially. He praised the quality of information the organization has received, citing as an example an instance involving SOP issues in one of the organization's operations. The reports enabled the organization to pinpoint the issues and tailor training as a result.

While McDonald praised the increased participation, he said companies need to do more. The FAA does not take action on reports accepted into the ASAP program, but companies must also refrain from punitive action, he said. This is particularly notable in the maintenance end, with fewer maintenance organizations participating, and a lack of trust is still prevalent.

As the program continues to gain steam, the FAA is revising its guidance material surrounding ASAP. The agency has released for comment the draft update to Advisory Circular (AC) 120-66C, which was released in 2002 to provide guidance for participation. With evolution in safety and reporting, the original AC is outdated, McDonald said. "We've learned so much over time."

The revision, in the works for several years, is designed to make the program more flexible, removing certain time requirements and providing latitude for participants to tailor the program to best suit their operations. In addition, the revision is designed to make the program more inclusive, he said, and noted that the FAA now refers to its agreement with organizations as a partnership agreement. McDonald urged attendees to comment on the draft. Deadline for comments is April 26. ■

JSFirm helo pilot, tech listings top 50K

Aviation job website JSfirm has topped the 50,000 mark of helicopter pilot and maintenance professionals in its database of job seekers. Including both active and passive job searchers specifically in the helicopter niche, the database numbered 51,669 at latest count. Jeff Richards, operations manager said, "This total grows every day and doesn't include the hundreds of thousands of guest visitors each month, or the other 17 categories of job seekers."

The milestone is particularly important given concerns surrounding a looming shortage of helicopter pilots and aviation technicians. JSfirm pointed to the recently released University of North Dakota study that projected a combined potential shortage of 50,000 helicopter pilots and aviation technicians through 2036. That study, conducted in collaboration with the Helicopter Foundation International and Helicopter Association International, predicted that the vast majority of that shortage would be in the maintenance arena.

"This shortage is being felt across the aviation industry," said JSFirm managing partner Sam Scanlon. "But, with the shortage of helicopter pilots and maintenance professionals, coupled with the report from UND, it stands to reason why so many helicopter companies are active on our website: it works for them." **K.L.**

by Gordon Gilbert

Within 6 Months

April 30, 2018 **NEW**

EASA Proposal for PBN Operations

The European Aviation Safety Agency (EASA) issued a notice of proposed amendment (NPA) updating the requirements and introducing new conditions enabling aircraft to obtain approval for performance-based navigation (PBN) operations. The new sections are specifically dedicated to support global PBN operations, as well as provide an acceptable means of compliance and guidance materials. Once adopted, the requirements will apply only to new applications. Comments are due April 30, 2018.

June 16, 2018 and Jan. 1, 2019

Upgraded CVRs and Underwater Locators

The European Aviation Safety Agency (EASA) will require upgraded CVRs and underwater locating devices (ULDs). New ULDs must be capable of transmitting for at least 90 days instead of 30 days. By Jan. 1, 2019, airplanes with an mtow of at least 59,500 pounds, with more than 19 passenger seats, and performing transoceanic flights must be retrofitted with an additional ULD with "very long detection range." Also by Jan. 1, 2019, all CVRs with a 30-minute recording duration must be replaced by units with two-hour recording capability. Additionally, CVRs recording on magnetic tape must be replaced by solid-state units.

Within 12 Months

Nov. 8, 2018

15-minute Position Reporting

The International Civil Aviation Organization Council adopted a tracking standard for certain international flights that requires crews to report their aircraft's position at least every 15 minutes. It will become applicable on November 8. The new requirement will be made formal as Amendment 39 to Annex 6—*Operation of Aircraft*, Part I. The new standard is the outcome of recommendations stemming from the disappearance of Malaysia Airlines Flight MH370 on March 8, 2014.

Jan. 31, 2019

Canada CRM Requirements

Transport Canada has introduced so-called "contemporary" crew resource management (CRM) training standards applicable to commercial aircraft operations, including air taxis. The new requirements go into effect Jan. 31, 2019. This latest iteration of CRM now includes the concept of threat and error management (TEM). TEM "advocates the careful analysis of potential hazards and taking the appropriate steps to avoid, trap, or mitigate threats and manage errors before they lead to an undesired aircraft state."

Beyond 12 Months

Jan. 1, 2020 and June 7, 2020

ADS-B Out Mandates

ADS-B Out equipment must be operational starting Jan. 1, 2020, in aircraft that fly in the U.S. under IFR and where transponders are currently required, and in Taiwan IFR airspace above FL290. The ADS-B Out retrofit requirement in Europe takes effect June 7, 2020.

January 1, 2020 and January 1, 2023

Aircraft Carbon Dioxide Emissions Standards

The first international standards for CO_2 aircraft emissions enacted by ICAO initially apply to large subsonic jets, including business jets, for which a type certificate is submitted on or after Jan. 1, 2020. The standard applies to deliveries of current in-production large aircraft starting Jan 1, 2023. All covered in-production airplanes must meet the standard by Jan. 1, 2028. Jet airplanes with an mtow less than 12,500 pounds, and piston-engine airplanes and turboprops less than 19,000 pounds mtow, are exempt.

Jan. 30, 2020

Expansion of Datalink Com in North Atlantic

Phase 2 of the North Atlantic datalink mandate began with Phase 2a in February 2015, at which time flights within the North Atlantic Tracks (NAT) between FL350 and FL390 were required to be equipped with FANS-1/A controller-pilot datalink communications (CPDLC) and ADS-C. The program expanded to these altitudes in the entire ICAO NAT region on Dec. 7, 2017, and will apply to all flights in this region above FL290 on Jan. 30, 2020.

Jan. 1, 2021

Stage 5 Noise Rules

Effective Jan. 1, 2021, more stringent noise certification rules apply for new type certificates for airplanes less than 121,254 pounds. The new rule, known as Stage 5, is intended only for newly designed airplanes and is not aimed at phasing out the existing noise standards that apply to the production or operation of current models. ■

Compiled by Kerry Lynch

STEPHEN WALLACE

MICHAEL O'DONNELL

BRAD DREW

JAMES DENT

SHANE BURNS

Ken Dufour and **Jason Zilberbrand** have taken over the management and day-to-day operations of appraisal company *Vref Publishing*. Dufour, who has a 50-year career in aviation, spent 20 years as a board member for Embry-Riddle Aeronautical University and has established a strong background in appraisals and as an expert witness. Zilberbrand previously served with JSSI, The Jet Collection, and most recently, as CEO of Aurum Jets.

Windecker Aircraft appointed **Yubi Chen** CEO. Chen brings a background in international business and trade relations with foreign countries to her new role.

Safran Helicopter Engines named **Franck Saudo** CEO. Saudo joined Safran in 2011 and served most recently as CEO of Safran Transmission Systems. He will be replaced in that role by **Eric Valentin**, who was promoted from vice president for production in the French manufacturer's landing gear and integration division.

Stephen "Wally" Wallace joined *Launch Technical Workforce Solutions* as president of Launch Technicians. Wallace previously held leadership positions with MRO Holdings and Flightstar Aircraft Services.

David Adler joined *BrightWater Partners* as president of newly formed BrightWater Aviation Capital. Adler retired as president of Sikorsky Aerospace Services in November 2015 after serving with the company for 17 years.

Aircraft Propeller Service appointed **Andrew Dawson** CFO. Dawson previously served as CFO for Nidec Drive Systems, as well as for Merkle-Korff, and also has served with Ernst and Young.

SterlingRisk Insurance appointed **Michael O'Donnell** president of its Aviation Practice Group. O'Donnell, who joined SterlingRisk in 2011, most recently was executive vice president of the group and has served in the aviation insurance industry since 2002.

The *Malibu/Mirage Owners & Pilots Association* (MMOPA) board of directors appointed **Dianne White** executive director, effective April 1. She succeeds **Brian Cameron**, who is retiring from the position. White will continue to serve as editor of *MMOPA Magazine* and brings 30 years of marketing and business and management experience, including as editor of *Twin & Turbine Magazine*, to her new role.

Jet Linx named **Brad Drew** senior v-p of sales. Drew has more than 25 years of industry experience including as founder of DrewfordL Consulting and as senior v-p of sales for Sentient Jet.

Cirrus Aircraft named **Ken Harness** senior v-p of product development. Harness has more than 28 years of leadership experience in the aviation and aerospace industries, including as v-p of product development and engineering at Highland Group, COO at Sikorsky Global Helicopters, COO at Diamond Aircraft, and v-p of engineering at Eclipse Aviation.

Mott MacDonald named **Graham Bolton** its global aviation practice leader. Bolton has been involved in the strategic planning, design, and delivery of projects at airports including Heathrow, Dubai, Istanbul, Hong Kong, and Seattle.

Executive AirShare named **Dylan Haynie** senior v-p of sales. Haynie most recently was sales director for Embraer.

Michael Donahoe has taken the role of v-p, U.S. and Latin America sales for *Hopkinson Aircraft Sales*. Donahoe previously served as operations coordinator for Southwest Flight Center and then became involved with business aircraft acquisition and/or sales for JetBrokers, Gary Lewin Aviation, Integrated Aviation Group, and Threshold Ventures/Scottsdale West Holdings.

Erickson Incorporated named **Kevin Cochie** vice president and general manager of defense and national security and **Hayden Olson** vice president of safety and human capital. Also **Chris Schuldt** is taking the role of chief of staff and senior director of DNS Special Programs. Cochie has more than two decades holding public and private sector roles in the defense industry, most recently as vice president of Washington operations and special programs for Nammo. Olson, who most recently led his own advisory firm, returns to Erickson, where he previously was director of finance business operations and interim vice president and general manager for government aviation. Schuldt previously served with Evergreen Helicopters in sales, program management, and executive capacities.

The *Aerospace Industries Association* named **Alex Wagner** vice president and senior advisor to AIA president and CEO Eric Fanning. Wagner previously spent seven years with the Department of Defense, most recently as chief of staff to the 22nd Secretary of the Army.

National Jets hired **James Dent** as vice president of flight operations. Dent, who was previously director of training at the company, brings more than 50 years of aviation experience to his new position, holding roles of chief pilot and director of operations for Part 135 operators.

Embraer named **Mark Schramek** vice president, government relations in the U.S. Schramek has more than 20 years of government and government relations experience, previously serving as senior executive account manager supporting the Space and Intelligence Systems Segment of Harris Corporation and before that holding assignments at the Office of the Secretary of Defense, the Secretary of the Air Force, and Air Combat Command.

Brad Kutz joined *Wipaire* as vice president of engineering. Kutz most recently was a senior systems engineer for Rockwell Collins and also has served with Cirrus and AAI Corporation China (Textron Defense Systems).

Tom Captain joined *Spike Aerospace* as an executive advisor. Captain brings a nearly four-decade background in aerospace to his new role, recently retiring as vice chairman from Deloitte, where he led the global aerospace and defense practice.

MROinsider.com added three account managers: **Craig Miracle** in Austin, Texas; **Guy Shaginaw** in Orlando, Florida; and, **Jacob Kingsley** in Tecumseh, Michigan. Miracle, who holds an A&P certificate, previously was a UH-60 mechanic for the U.S. Army. Shaginaw has 20 years of business experience and is a private pilot. Kingsley is stepping into a field he grew up around, MROInsider.com said.

TrueNoord added **Richard Jacobs** as head of sales and marketing and **Carst Lindeboom** as sales director. Jacobs has a 25-year career that began with Fokker Aircraft, VLM Airlines, and Denim Air. Lindeboom formerly served Denim Air as sales director, TUI Airlines, and Amsterdam Airlines.

Duncan Aviation named **Keith Schell** as manager of its components repairs and parts & rotables sales teams. Schell joined Duncan Aviation in 2015 as parts sales team leader and most recently was manager of the parts & rotables. In addition **Dan Moog** joined the turbine engine service sales team, Moog who will focus on sales in the Northeast U.S. and brings 25 years of aviation experience to his new role.

Shane Burns was promoted to general manager of the *Downeast Air* facility located at the Knox County Regional Airport in Owls Head, Maine. Burns has served as assistant general manager for the facility since 1999.

Joshua Gentner joined *Smith Gambrell & Russell's* (SGR) Global Transport and Corporate Practices as a partner based out of the New York office. Gentner joins SGR from Vedder Price, where he counseled on debt, equity, and lease financings, including U.S. and cross-border leveraged leases, among other areas.

Mayo Aviation appointed **Jeffrey Curry** director of technical services. Curry, who spent eight years with the U.S. Marine Corps, has more than 30 years of aviation industry experience with companies including NetJets, Business Jet Access, Pratt & Whitney, Gulfstream Aerospace, Raytheon Aircraft Services, and West Virginia Air Center.

FINAL FLIGHT

Archie Trammell, Jr., a renowned aviation journalist, safety advocate, and weather radar expert, died on February 5. He was 89. Born on Oct. 23, 1928, in Corpus Christi, Texas, Trammell long had a passion for aviation, receiving Army Air Corps training during World War II. He subsequently became a mechanic and joined the U.S. Coast Guard, where he went to loran school and first learned about radar on the job. Following his service, he earned degrees in aircraft maintenance engineering and journalism and became a commercial pilot.

He first returned to mechanic work, performing maintenance on DC-6s and -7s for American Airlines, before stepping into journalism. While working for a newspaper in Stockton, California, he wrote a few articles for *Flying* magazine, eventually joining the publication as senior editor. Trammell later moved over to take the role of editor-in-chief for *Business and Commercial Aviation*. In the late 1970s, he left *BCA* to join Bendix, and, after a short stint, he founded his own radar-training firm, AJT, in 1979, becoming known for his weather radar seminars, lectures, and video programs. He brought that expertise to AOPA as executive director of the Air Safety Foundation from 1981 to 1983.

Returning to his business, Trammell became a leading expert on proper use of weather radar and flying procedures. NBAA in 2006 recognized him for his contribution to safety with its Award for Meritorious Service to Aviation, calling him a "widely sought-after safety consultant whose lectures…have been used to train…the crews of more than 4,000 business flight departments."

Over his career, Trammell wrote numerous safety articles, published a free website, produced training manuals, and authored a book on safe flying. ■

West Star Aviation named **Michael Zeris** Gulfstream technical sales manager at its East Alton, Illinois (ALN) facility. Zeris, who joined West Star in 2015, has 17 years of aviation experience, including service in the U.S Navy as an aircraft technician and with Midcoast/Jet Aviation. ■

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MARK WAGNER

APRIL

GARMIN G500/G600 & GTN PILOT TRAINING... April 2-3, Garmin Headquarters, Olathe, Kansas. Info: aviation.training@garmin.com; http://newsroom.garmin.com/press-release/garmin-announces-new-2018-classroom-pilot-training-classes.

COMMERCIAL UAV EXPO EUROPE... April 10-12, RAI Amsterdam, Amsterdam, The Netherlands. Info: https://www.expouav.com/europe/conference-information/.

SUN 'N' FUN... April 10-15, Lakeland Linder Regional Airport, Lakeland, FL. Info: www.flysnf.org.

ASIAN BUSINESS AVIATION CONFERENCE & EXHIBITION... April 17-19, Shanghai Hawker Pacific Business Aviation Service Centre, Shanghai, China. Info: info@abace.aero; https://abace.aero/2018/.

AIRCRAFT RECORDS & TOTAL ASSET MANAGEMENT SEMINAR... April 18, Gibson Hotel Dublin, Dublin, Ireland. Info: www.everestevents.co.uk/event/aircraft-records-total-asset-management-seminar-2018/.

REGIONAL AIR CARGO CARRIERS ASSOCIATION SPRING CONFERENCE... April 24- 26, Hilton Scottsdale Resort & Villas, Scottsdale, AZ. Info: richardm@raccaonline.org; https://www.raccaonline.org/.

EURASIA AIRSHOW...April 25-29, Antalya International Airport, Antalya, Turkey. Info: http://eurasiaairshow.com.

GARMIN G1000/G1000 NXI PILOT TRAINING... April 26-27, Garmin Headquarters, Olathe, Kansas. Info: aviation.training@garmin.com; http://newsroom.garmin.com/press-release/garmin-announces-new-2018-classroom-pilot-training-classes.

AVUSI XPONENTIAL... April 30-May 3, Colorado Convention Center, Denver, CO. Info: www.xponential.org.

MAY

NBAA MAINTENANCE CONFERENCE... May 1-3, Albuquerque Convention Center, Albuquerque, NM. Info: info@nbaa.org; www.nbaa.org/events/maintenance-conference/2018/.

NATA CERTIFIED FBO SAFETY MANAGER WORKSHOP... May 8-10, Thunderbird Aviation, Minneapolis, MN. Info: events@nata.aero; http://nata.aero/Events/2018-NATA-Certified-FBO-Safety-Manager-Workshop.aspx.

NBAA BUSINESS AVIATION TAXES SEMINAR... May 10-11, Dallas, TX. Info: info@nbaa.org; www.nbaa.org/events/taxes-seminar/2018/.

63RD ANNUAL BUSINESS AVIATION SAFETY SUMMIT... May 10-11, Radisson Blu Aqua Hotel, Chicago, IL. Info: solorzano@flightsafety.org; https://flightsafety.org/event/bass-2018/.

4TH ANNUAL BUSINESS AVIATION GOLF OUTING... May 15, Safari Gold Club, Powell, OH. Info: trentd5@nationwide.com; https://www.golfevent.org/.

EUROPEAN BUSINESS AVIATION CONVENTION & EXHIBITION... May 29-31, Palexpo Convention Center, Geneva, Switzerland. Info: info@ebace.aero; https://ebace.aero/2018/.

JUNE

GARMIN PILOT TRAINING CLASSES... June 4-5, Garmin Facility, Salem, Oregon. Info: aviation.training@garmin.com; http://newsroom.garmin.com/press-release/garmin-announces-new-2018-classroom-pilot-training-classes.

MAINTENANCE RESERVES SEMINAR 2018... June 5-6, Jury's Inn, Prague, Czech Republic. Info: info@everestevents.co.uk; https://everestevents.co.uk/event/maintenance-reserves-seminar-2018/.

PILATUS OWNERS AND PILOTS ASSOCIATION ANNUAL CONVENTION... June 7-9, The Roosevelt Hotel, New Orleans, LA. Info: http://pilatusowners.org/popa-annual-convention-off-season/.

GREATER WASHINGTON AVIATION OPEN... June 11, Washington, D.C. Info: www.gwao.org.

NATA ANNUAL MEETING AND AVIATION BUSINESS CONFERENCE... June 12-14, Grand Hyatt, Washington, DC. Info: events@nata.aero; http://nata.aero/Events/2018-Annual-Meeting-and-Aviation-Business-Conference.aspx.

NBAA REGIONAL FORUM... June 21, Westchester County Airport (HPN), White Plains, NY. Info: info@nbaa.org; www.nbaa.org/events/forums/2018hpn/.

JULY

FARNBOROUGH INTERNATIONAL AIRSHOW... July 16-22, Show Centre, ETPS Rd, Farnborough, England. Info: +44 (0) 1252 532800, enquiries@farnborough.com; www.farnboroughairshow.com/trade/.

EAA AIRVENTURE... July 23-29, Wittman Regional Airport, Oshkosh, WI. Info: www.eaa.org.

AUGUST

LATIN AMERICAN BUSINESS AVIATION CONVENTION & EXHIBITION... August 14- 16, São Paulo, Brazil. Info: www.abag.org.br/labace2017.

SEPTEMBER

NBAA REGIONAL FORUM... September 6, San Jose International Airport (SJC), San Jose, CA. Info: info@nbaa.org; www.nbaa.org/events/forums/2018sjc/.

NATA GROUND HANDLING SAFETY SYMPOSIUM... September 18-19, NTSB Training Center, Asburn, VA. Info: events@nata.aero; http://nata.aero/Events/2018-NATA-Ground-Handling-Safety-Symposium.aspx

REGIONAL AIRLINE ASSOCIATION ANNUAL CONVENTION... September 26-28, Long Beach, CA. Info: www.raa.org.

OCTOBER

COMMERCIAL UAV EXPO AMERICAS... October 1-3, Westgate Resort & Casino, Las Vegas, NV. Info: https://www.expouav.com/.

NBAA BUSINESS AVIATION CONVENTION & EXHIBITION... October 16-18, Orange County Convention Center, Orlando, FL. Info: (202) 783-9000; www.nbaa.org.

IAWA 30TH ANNUAL CONFERENCE... October 24-26, South's Grand Hotel, The Peabody Memphis, Memphis, TN. Info: info@iawa.org; https://iawa.org/30th-annual-conference/.

SAFETY STANDDOWN... October 30-November 1, Info: http://www.safetystanddown.com/

DECEMBER

MIDDLE EAST BUSINESS AVIATION ASSOCIATION SHOW... December 10-12, Dubai World Trade Center, Dubai, United Arab Emirates. Info: http://www.mebaa.aero/

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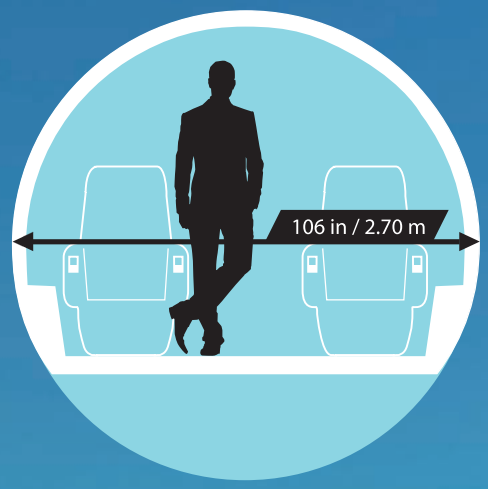

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