

SAFETY: CJP LAUNCHES SAFE TO LAND INITIATIVE

OPERATIONS: EUROPE TACKLES ILLEGAL CHARTER

TECHNOLOGY: EXPERTS ASSESS ELECTRIC AIRCRAFT

Special Report: Aviation vs. 5G providers

ACJ TwoTwenty alights in Indy

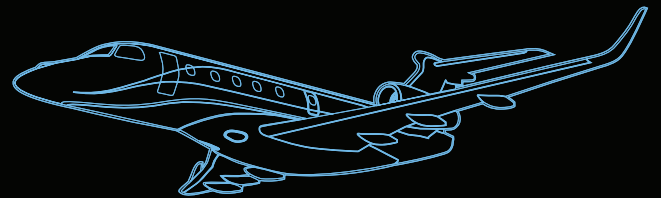
Airbus delivered the first A220-based bizliner to Comlux Completion for outfitting



PRAETOR 500

BY EMBRAER

STRESS RELIEF.

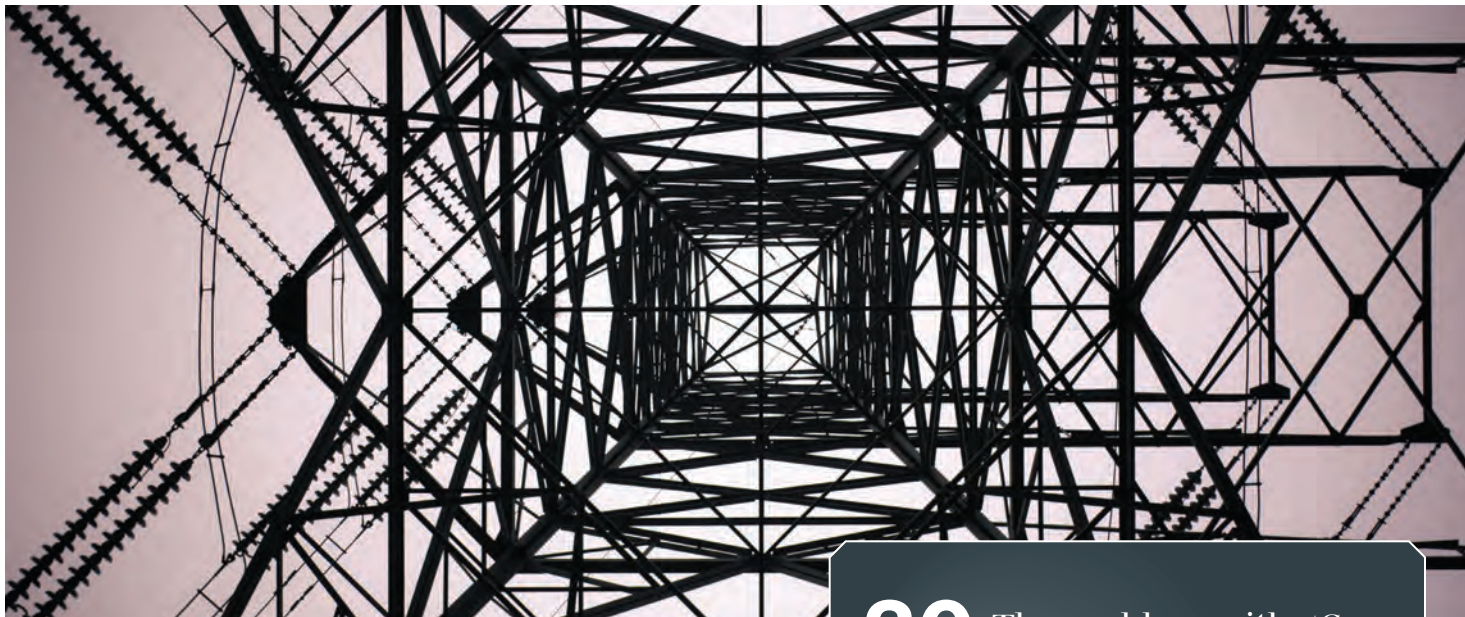


prae·tor five hun·dred : *the only midsize with turbulence reduction capability via full fly-by-wire*

+1 321 751 5050 | embraer.com/human



In **this** Issue:



20 The problem with 5G

29

Genesys avionics breathe new life into Black Hawk



34

Illegal charter a growing issue in Europe




- 4** Dassault beats Falcon delivery forecast, backlog rises
- 4** Elevate Holdings acquires Keystone Aviation
- 6** FlightSafety International purchases Frasca
- 8** WingX: bizjet flights reached new records in 2021
- 10** U.S. fatal bizav accidents double in 2021
- 14** Comlux inducts first ACJ TwoTwenty
- 16** AIN's 50th Anniversary
- 17** JumpSeat app seeks to supplement notams
- 24** CJP initiative aims to break the runway excursion accident chain

DEPARTMENTS

- 38** Expert Opinion | **40** Rotorcraft
- 44** FutureFlight | **50** Maintenance
- 52** On the Ground | **54** Accidents
- 56** Compliance | **58** People in aviation

READY FOR ANYTHING



We train you to stay sharp, fine tune, and always be prepared. This empowers you with unwavering calmness and composure needed for all situations, from the everyday to the unusual. For this reason, FSI training is reserved for the sky's most elite.

FSI. Nothing short of excellence.

Call **+1.201.584.8262** today or visit **FlightSafety.com**

FlightSafety
INTERNATIONAL

News Briefs

PANDEMIC LEADS TO THIRD CANCELLATION OF ABACE

NBAA, in concert with the Shanghai Airport Authority (SAA), has canceled the 2022 Asian Business Aviation Conference & Exhibition (ABACE), citing the ongoing challenges associated with the Covid-19 pandemic. ABACE, which launched in 2012 and attracts more than 9,000 attendees from 50 countries annually, was scheduled to have taken place this year from April 12 to 14 in Shanghai. This marks the third consecutive year that NBAA and its ABACE partner SAA have opted not to hold the event due to the pandemic.

BIZAV PRODUCTION POISED TO RECOVER BY YEAR-END

Market indicators provide hope of “great things” for a business aircraft market that industry analyst Richard Aboulafia of AeroDynamic Advisory said “is seeing its best times in years.” But with Covid-19 and other factors generating uncertainty, he provided a more conservative forecast of output returning to 2019 levels in late 2022 or early 2023 with modest growth afterward. But he said most indicators are positive—including record-low used jet availability, pricing strengthening, and upswing in fractional and charter utilization—and support a “glass half full” thesis.

BIZAV FLYING REMAINS STRONG DESPITE OMICRON

Global business aviation flight activity in December surged 43.7 percent year-over-year, with the North American market posting the strongest December on record and European activity up 63.7 percent, according to TraqPak data from Argus International. “December flight activity was pretty much right on forecast, as the Omicron Covid-19 variant did not cause any noticeable disruptions to business aircraft operations,” noted Argus v-p of market intelligence Travis Kuhn. Bizav flying in North America climbed 36.7 percent and Asia-Pacific 70.3 percent.



Dassault beats Falcon delivery forecast, backlog rises

BY CHAD TRAUTVETTER

Dassault Aviation delivered five more Falcons than it forecast last year while backlog grew for the French-made business jets, the latter helped by the introduction of the ultra-long-range Falcon 10X in May. In total, the company handed over 30 Falcons last year—four fewer than it shipped in 2020 and 10 fewer than it did in 2019.

The Paris-headquartered aircraft manufacturer took in 51 net orders for Falcons in 2021, with the backlog now at a four-year high of 55 units. That compares to 15

net orders a year earlier and backlog of 34 Falcons as of Dec. 31, 2020. Falcon backlog was in the low-50s between late 2017 and 2020; it stood at 63 units at year-end 2016.

Meanwhile, deliveries and sales of its Rafale fighter were equally buoyant, with shipments of 25 aircraft, up from 13 a year earlier. Net orders for 49 drove Rafale backlog to 86 units versus 62 at the end of 2020.

Dassault will report its full-year financial results, to include aircraft delivery guidance for 2022, on March 4. ■

ELEVATE HOLDINGS ACQUIRES KEYSTONE AVIATION

Elevate Holdings, parent company of Private Jet Services and Elevate Jet, has acquired Salt Lake City-based Keystone Aviation from TAC Air. With the purchase, Elevate’s managed fleet will become the 15th largest in the U.S., and the deal includes Keystone’s long-established Part 145 repair station, which will allow New Hampshire-based Elevate to expand its service offerings.

Current Keystone COO Aaron Fish will lead the new company as president and

Keystone employees will work with the Elevate team as the two companies integrate. TAC Air will remain as a strategic partner, with preferred access for Elevate Holdings-managed aircraft at TAC Air’s 16 FBOs.

Additionally, Keystone Aviation’s Salt Lake City division will operate from a new, dedicated client access terminal at the Salt Lake City International Airport and from satellite facilities in Scottsdale, Arizona, and Provo, Utah. C.E.



**Enhanced pilot performance.
Greater SOP adherence.
Customized AI insights.**

**How much more might CAE Rise™
data-driven AI add to your training?**

CAE Rise™ Training System double-teams your training session, supporting instructors with metrics-based intelligence and insight on pilot performance, delivered in real-time to elevate safety and more effectively mitigate deficiencies.

Visit us at www.cae.com/cae-rise

Your worldwide
training partner
of choice



FlightSafety International acquires Frasca

BY KERRY LYNCH



FlightSafety International's acquisition of Frasca International will give it a foothold in the light aircraft training sector in addition to bringing into the fold a company with which it is already partnered in a U.S. Navy training program.

Frasca International, the Urbana, Illinois flight-simulation and training business that Rudy Frasca founded in 1958, has been acquired by flight-training giant FlightSafety International (FSI). The sale—completed on December 31—expands FSI's reach into the lighter end of the general aviation market with Frasca's trainer lines for single-piston Cessna, Diamond, and Piper aircraft to its full-flight level-B, C, and D simulators for models such as the Cessna Citation CJ1+, Beechcraft King Air, Cessna Caravan, and Bell helicopters.

The acquisition brings Frasca into the fold after it was named a subcontractor last year on the FlightSafety Defense U.S. Navy TH-73A Aircrew Training Services (ATS) program. Announced in April, the subcontract award called for 18 level-6 and 7 flight-training devices to be designed and built by Frasca.

A Frasca spokeswoman said the acquisition will enable each company to increase its training capabilities through “scalable and integrated product lines, increased innovation, and expanded expertise in the training and simulation market.”

She further stated that FlightSafety and Frasca “share a long history of collaboration dating back decades to the friendship of the founders of both companies, Al Ueltschi and Rudy Frasca. Both companies were started by passionate aviators and each has a 60-plus-year history of advancing aviation safety.”

Frasca president John Frasca and the rest of the management team will remain in place and the company will continue to operate as Frasca International with all employees remaining in Urbana. In addition, according to the News-Gazette in Urbana, the Frasca family will retain ownership of Frasca Field. ■

News Briefs

DASSAULT COMPLETES FIRST ROUND OF 6X COLD SOAK TRIALS

Dassault Aviation recently completed the first of two Falcon 6X cold soak trials as the widebody, long-range twinjet progresses toward certification later this year. Taking place in Iqaluit in Northern Canada, the cold soak tests were conducted on Dassault's third test aircraft. The test sequences included a specific aircraft warm-up procedure, aircraft initialization, APU and engine starting sequences, air system performance evaluation, and fluid systems checks. The aircraft also completed local flights to simulate full operations in cold temperature conditions. Meanwhile, the three 6X test aircraft have accumulated more than 500 flight test hours and 150 flights. An initial production aircraft with a fully outfitted cabin is anticipated to join the program shortly.

TAMARACK ASKS NTSB TO RECONSIDER PROBABLE CAUSE

Tamarack Aerospace has submitted a petition for reconsideration to the NTSB, asking it to reconsider the probable cause conclusion in the crash of a Cessna Citation-Jet on Nov. 30, 2018. The jet was equipped with Tamarack winglets and the Active Technology Load Alleviation System, which uses Tamarack Active Camber Surfaces to alleviate structural loads. The NTSB's probable cause was “the asymmetric deployment of the left wing load alleviation system for undetermined reasons, which resulted in an in-flight upset from which the pilot was not able to recover.” Tamarack's petition asked the NTSB “to reconsider and modify its findings and determination of probable cause... The basis of this petition is that the NTSB has made erroneous findings that are unsupported by the factual record, inconsistent with engineering principles, or proven to be physically impossible.” Parties to the investigation have 90 days to respond to the petition, after which the NTSB makes a decision.

GEN2
CITATION
M2



Cessna

BY TEXTRON AVIATION

The new CITATION M2 Gen2 jet lives at the confluence of technical precision and thoughtful design. New features abound, including enhanced cabin lighting that sets the mood for productivity, entertainment and relaxation. With upgrades everywhere you look, you'll see why it's called the next generation.

Go there. And beyond. At Cessna.com/m2-gen2

YOU DREAMED IT.
WE DESIGNED IT.



News Briefs

VOLATO PLACES ORDER FOR 15 HONDAJETS

Atlanta-based fractional aircraft provider Volato has placed an order for 15 more HondaJets. The company launched last year with just one specially modified four-passenger HondaJet Elite S—Volato’s aircraft offer galleys and lavatories—and now operates five of the light jets. It will have a fleet of 22 once this latest order is completed. Its program offers five-year terms with fractional shares ranging from one-sixteenth shares to full ownership. According to Volato, it has sold most of its current inventory of HondaJets.

FAA INVESTIGATING AVGAS BAN, FBO LEASE LAPSES

The FAA has notified California’s Santa Clara County that it is informally investigating their decision to ban 100LL aviation gasoline at Reid-Hillview Airport and San Martin Airport. Complaints from airport tenants, operations, and industry representatives alleging the bans violate airport grant assurances prompted the FAA to investigate. “Further, the County is apparently refusing to offer long-term leases for all tenants at Reid-Hillview airport...including the FBOs who provide aviation fuel,” the agency said.

GE AVIATION LOOKS TO TEST CATALYST USING 100% SAF

In a partnership with the Czech Technical University in Prague, GE Aviation Czech will begin testing sustainable aviation fuel (SAF) in its new Catalyst turboprop engine. The goal is to power the Catalyst with 100 percent SAF within 18 months. Testing will take place in new advanced test cells located outside Prague; the two partners and Avio Aero have already begun preparations for the operations. Initially, the testing will begin with a mixture of 40 percent SAF, as well as comparisons running the engine on traditional jet fuel and a SAF blend to compare the carbon and nitrogen oxide emissions.



Light jets helped lead the bounce in business jet flights in the U.S., which was a driver of global gains, according to WingX.

WingX: bizjet flights reached new records in 2021

BY KERRY LYNCH

Business jets flew 3.3 million flights worldwide in 2021, the most on record for a single year and 7 percent more than the previous high point in 2019, according to WingX’s Global Market Tracker. The year finished strong, with the number of flights worldwide in December jumping 23 percent over that month’s 2019 total.

In North America, business jet flights were up by 6 percent over 2019’s total. The U.S. drove this increase with activity that was 10 percent higher. Flights in Canada, by contrast, were down 24 percent from 2019 levels.

Fractional and branded charter saw a surge in activity, up 20 and 18 percent, respectively, from 2019.

In the U.S., flight activity in the light jet segment increased by 15 percent compared with 2019. The super-midsize segment was up 18 percent, but ultra-long-range aircraft—which remained behind pre-pandemic levels through the first half of 2021—had inched ahead in number of flights by the end of the year. Flight hours were down, though.

Business jet activity in Europe also surpassed 2019 levels, with sectors up 5 percent

by year-end. The holiday period saw a 30 percent increase from pre-pandemic levels. However, demand remained down from 2019 in Europe’s three largest markets—France, Germany, and the UK. Italy and Spain, however, saw rebounds, as did Russia and Turkey. Very light jet flights helped spur overall growth throughout Europe, up 22 percent from 2019.

The rest of the world, while a minority of the global total, saw 28 percent more business jet flights last year than in 2019. The UAE climbed 73 percent over 2019.

“Business aviation flourished in 2021, with a very strong rebound in demand from Q2 onwards, characterized by leisure demand, unleashed as travel restrictions loosened,” said WingX managing director Richard Koe. “The prolonged slump in scheduled airline capacity, and the persistent hygiene concerns around new virus variants, appear to have migrated business aviation services to many new customers,” he noted. “The resilience of the rebound in 2021 will be tested in early 2022 by the travel behavior of business executives.” ■



Central Coast Jet Center

Santa Maria, CA (KSMX) | A Premier Avfuel Network FBO

Central Coast Jet Center delivers on every need. All operations enjoy short taxi times, expedient ATC directives, and friendly customer care. As the closest mainland FBO to the Hawaiian Islands, it's the ideal tech stop for those en route to Pacific Rim destinations. Cargo and military operations also benefit from a large ramp space, as well as specialized equipment and service. Make your reservation at CentralCoastJetCenter.com.

- At-Sea-Level 8,004-Foot Runway
- GPU & Air Start
- Rental Cars on Site
- Hangar Space Up to G650
- Airstairs
- Catering & Concierge
- After-Hours Service Available
- Cargo Handling
- Hotel on Field

Avfuel Contract Fuel and AVTRIP Available | Avfuel Training System (ATS) Certified

Powering your flight with more than just fuel. Learn more at avfuel.com.



U.S. fatal bizav accidents double in 2021

BY GORDON GILBERT

U.S.-registered business jets and turboprops, which flew significantly more in 2021 than in 2020, also experienced more fatal accidents last year. According to preliminary figures compiled by AIN, business turbine airplanes suffered 16 fatal crashes in 2021, double the number in 2020. What's more, fatalities

more than doubled: from 21 passengers and crew killed in 2020 to 46 in 2021.

Twenty-three people were fatally injured in six crashes of N-numbered business jets last year compared with four in a single accident in 2020. All six of the fatal

continues on page 60

News Briefs

JOHNSON MATTHEY LAUNCHES NEW SAF PROCESS

Sustainable technology group Johnson Matthey has launched a new method for producing more cost-effective sustainable aviation fuel (SAF). Its Hycogen process, which is intended to be used in combination with FT CANS Fischer Tropsch technology, was developed jointly with BP to convert captured carbon dioxide and green hydrogen into aircraft fuel. A spokesperson told AIN that the cost of the new SAF will be dependent on the cost of the green hydrogen used and the scale of output, with Johnson Matthey planning to license production to fuel manufacturers.

IDAHO SERVICE PROVIDER ACQUIRES PHOENIX FBO

Jackson Jet, one of three service providers at Idaho's Boise Air Terminal/Gowen Field, has added a second FBO facility with the acquisition of Swift Aviation Services at Phoenix Sky Harbor International Airport. The deal does not include Swift's air charter certificate. Swift's facility consists of an 18,000-sq-ft terminal, more than 100,000 sq ft of hangar space, and a 31,500-sq-ft arrivals canopy. Jackson Jet has offered its own aircraft charter in the Phoenix area, but this latest move gives it a solid base there.

GOGO COMPLETES 5G TESTBED TOWER NETWORK

Gogo Business Aviation has completed its seven-tower, air-to-ground 5G testbed ahead of the company's launch of a 150-tower nationwide network in the second half of the year. Sites in the testbed network include remote and populated areas to ensure the network can operate in a variety of environments. Expected to deliver about 25 Mbps on average with peak speeds in the range of 75 to 80 Mbps, Gogo 5G has been designed to deliver high throughput with very low latency.

ACCIDENTS/INCIDENTS WORLDWIDE (2021 vs. 2020)

U.S.-registered Business Jets and Turboprops

Business jets	Total		Part 91		Part 91K		Part 135		Public/Gov't		Mfr.	
	2021	2020	2021	2020	2021	2020	2021	2020	2021	2020	2021	2020
Total accidents	25	14	20	10	0	0	5	4	0	0	0	0
Nonfatal accidents	19	13	14	9	0	0	5	4	0	0	0	0
Fatal accidents	6	1	6	1	0	0	0	0	0	0	0	0
Fatalities	23	4	23	4	0	0	0	0	0	0	0	0
Incidents	69	65	33	44	0	0	34	21	0	0	2	0

Business turboprops	Total		Part 91		Part 91K		Part 135		Public/Gov't		Mfr.	
	2021	2020	2021	2020	2021	2020	2021	2020	2021	2020	2021	2020
Total accidents	28	25	22	17	0	0	6	7	0	1	0	0
Nonfatal accidents	18	18	12	11	0	0	6	6	0	1	0	0
Fatal accidents	10	7	10	6	0	0	0	1	0	0	0	0
Fatalities	23	17	23	16	0	0	0	1	0	0	0	0
Incidents	64	46	40	34	0	0	23	10	1	2	0	0

ACCIDENTS/INCIDENTS WORLDWIDE (2021 vs. 2020)

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

Business jets	Total		Private		Charter		Other*		Unknown	
	2021	2020	2021	2020	2021	2020	2021	2020	2021	2020
Total accidents	12	9	5	3	4	3	2	3	1	1
Nonfatal accidents	10	5	5	2	3	1	1	2	1	1
Fatal accidents	2	4	0	1	1	2	1	1	0	0
Fatalities	10	14	0	2	9	9	1	3	0	0
Incidents	36	10	6	5	10	2	10	1	10	2

Business turboprops	Total		Private		Charter		Other*		Unknown	
	2021	2020	2021	2020	2021	2020	2021	2020	2021	2020
Total accidents	29	10	7	3	7	3	13	4	2	0
Nonfatal accidents	21	8	5	3	5	3	9	2	2	0
Fatal accidents	8	2	2	0	2	0	4	2	0	0
Fatalities	40	9	8	0	15	0	17	9	0	0
Incidents	26	8	2	2	18	4	6	1	0	1

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

AIN tables show "incidents" as well as "accidents" to distinguish mishaps based on their degree of severity. Investigators often draw fine distinctions between the two events, but, typically, incidents result in minor or no damage and their investigations are sometimes delegated to local officials. Accidents are events that range from minor damage to destruction and/or injuries. Also, some incidents ultimately get upgraded to accident status during the investigative process.

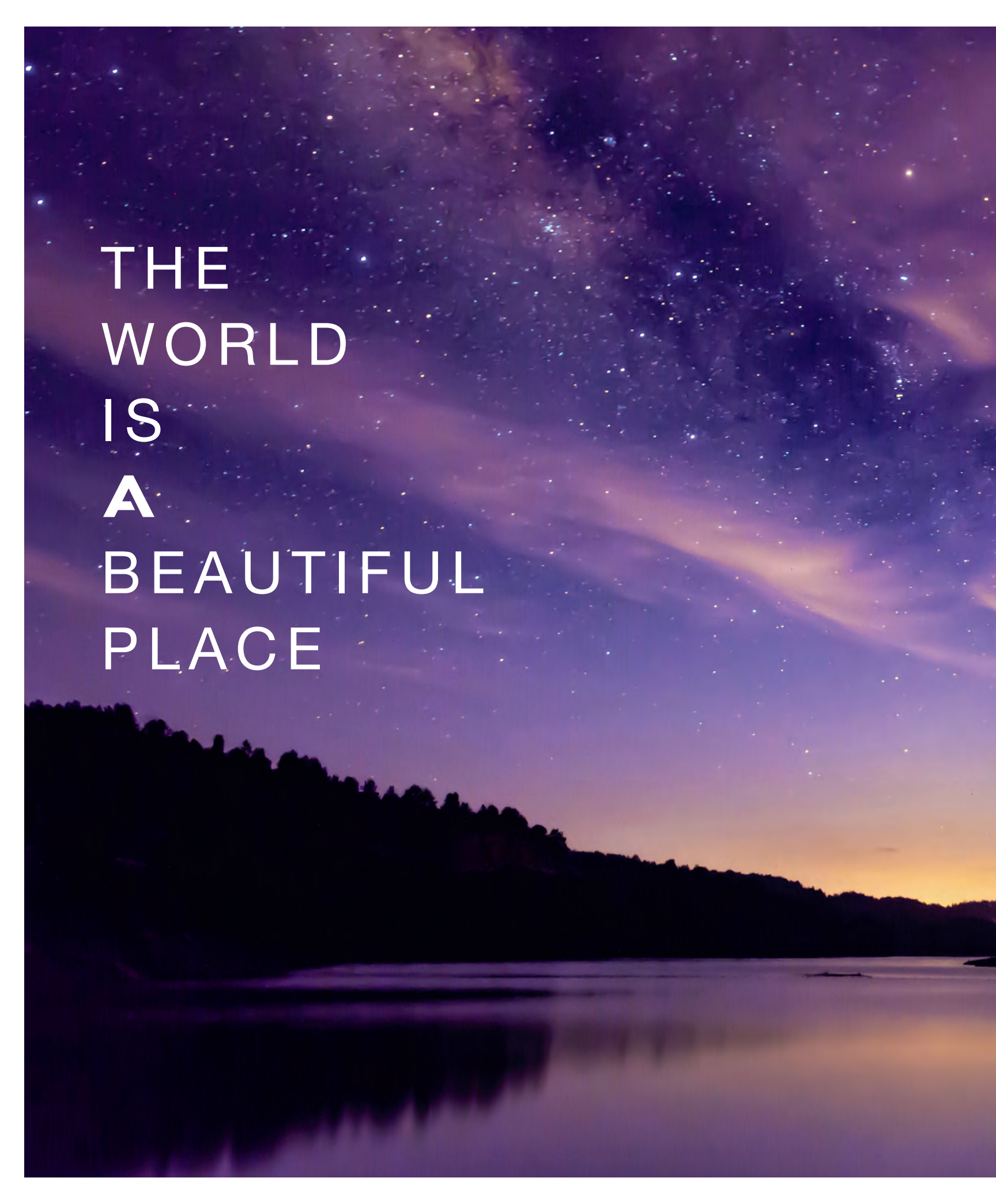


UPDATED AVIONICS. UPDATED CAPABILITIES.

G5000® UPGRADE FOR CITATION EXCEL/XLS

Breathe new life into your aircraft by adding available capabilities, such as georeferenced charts, datalink weather, TCAS II, ADS-B traffic, TOLD, CPDLC, SafeTaxi®, SurfaceWatch™ and more.

For more information, visit Garmin.com/XLS or contact Dave Brown at 913.440.1714 or dave.brown@garmin.com

A night sky with the Milky Way galaxy visible, reflected in a calm lake. The foreground shows a dark silhouette of a forested hillside. The text is overlaid on the left side of the image.

THE
WORLD
IS
A
BEAUTIFUL
PLACE

airbus.com   

Keeping it that way is at the centre of all we do. That's why, with our unwavering commitment to decarbonisation, Airbus is paving the way for sustainable aerospace. Today, our technological developments are already helping to safeguard our precious planet. Discover more about how we're leading the journey, shaping a brighter future for generations to come.

AIRBUS



The first ACJ TwoTwenty will undergo completion at Comlux in Indianapolis, where team members have been preparing for the program during the past two years.

Comlux inducts first ACJ TwoTwenty

BY JAMES WYNBRANDT

The first ACJ TwoTwenty, the executive variant of the Airbus A220 single-aisle airliner, was delivered in early January from the Airbus A220 final assembly line in Mirabel, Canada, to Comlux Completion in Indianapolis. There, the green corporate airliner will undergo a VIP completion.

“Delivering the first-ever ACJ TwoTwenty to Comlux marks a major milestone in the business aviation industry,” said Airbus Corporate Jets (ACJ) president Benoit Deforge. He called the jet a “game changer” set to “pioneer new flying experiences and an unbeatable value proposition to the large business jet market.”

The TwoTwenty combines intercontinental range and expansive personal space in a relatively low-cost VIP package, and ACJ has partnered with Comlux Group, the Swiss VIP aircraft specialist and operator, and its U.S. completion facility to produce and install configurable interiors for the first 15 jets. The preconfigured interiors will speed completion time and reduce expense, bringing the cost below the top price of a new long-range business jet (about \$72 million), according to Comlux.

That buys a cabin 50 percent longer with twice the floor space of an ultra-long-range business jet, and six living areas, each about twice as large as the two or three individual living zones on most large-cabin jets,

Comlux said. Even without the custom-designed cabins found on most corporate airliners, the range of interior configuration and outfitting options will allow buyers to have an interior of their choosing.

Comlux engineers, designers, and technicians have been working with the ACJ team for two years in preparation for the installations. Every interior configuration available to customers has been designed, engineered, and built, as have full-scale interior sections of the cabin with attach points, so every manufactured item can be tested for fit.

Shortly before arrival of the delivery flight, which was commanded by Airbus captains Patrick Spiteri and Thomas Oberreiter, Comlux Completion CEO Daron Dryer told *AIN*, “We’ve never had the opportunity to spend this much advance time preparing for a project. We are ready to get straight to work and deliver a quality, luxurious product to our client base.”

Comlux is bringing several innovations to the project, including SPD-SmartGlass windows that allow passengers to adjust the level of ambient light entering the cabin and a double pocket door separating living areas that, when open, enhances the interior’s feeling of spaciousness.

Preconfigured cabins come in three motifs: Timeless (traditional), Quintessence (classic), and Avant-Garde (modern).

Options include a cinema room with a 55-inch OLED, a double bed, a full shower, and dual galleys, one for meal prep/cleanup, another for presentation and serving.

ACJ and Comlux anticipate that the new jet will be the first corporate airliner for a relatively high percentage of buyers. As such, they have established an interiors selection process to keep it simple and efficient, Adam White, the completion center’s v-p, engineering and design, said in the center’s sleek interior design showroom. Here, customers can select their preferred design motif, configurations of the individual rooms, and the color palette, and can see the colors and feel the fabrics and other materials for seating, flooring, countertops, and veneers. Each customer receives a valise-like box containing samples of all the chosen materials.

Comlux, already the world’s largest buyer of ACJs with more than 20 purchased, bought the first three TwoTwentys and has resold the first to Dubai-based luxury hospitality and investment company Five, with delivery of the completed TwoTwenty expected in December 2022. The company is in discussion with several potential customers for the next TwoTwentys, Dryer said, with redelivery of the second slated for the fourth quarter of 2023 and the third for the first quarter of 2024. ■

HAWTHORNE

GLOBAL AVIATION SERVICES

HAWTHORNE
GLOBAL AVIATION SERVICES

Over 35 Years of MRO Excellence

Now with **EXPANDED CAPABILITIES**



Embraer Authorized Service Center

Offering complete product line service for your Phenom, Legacy 450/500 and Praetor 500/600 aircraft!

Major Inspection and Overhaul Capabilities

24/7 AOG Team Base and Offsite Service

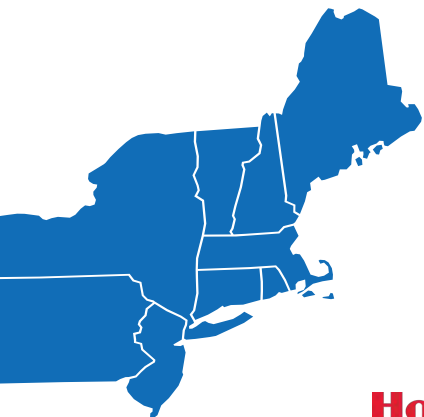
Servicing New York Metro and Long Island Airports

- Pre-purchase Inspections
- Avionics Repairs & Modifications
- Factory Upgrades
- Interior Refurbishment, Modifications & Upgrades
- Wi-Fi and Cabin Management System Upgrades

Contact Us Today!

Office: 631-737-5801 | AOG: 866-272-2995 | FBO: 631-913-7102

Email: ispaog@hawthorne.aero



Servicing
Northeast
AOG

Long Island (KISP)
Chicago (KPWK)
Atlanta (KRYY)
Eau Claire (KEAU)
Tuscaloosa (KTCL)
Sioux City (KSUX)



*"Building Customer Loyalty
One Experience At A Time"*

Honeywell
AUTHORIZED DEALER AVIONICS

gogo BUSINESS AVIATION
AUTHORIZED INSTALLER

EMBRAER
Executive Jets
AUTHORIZED SERVICE CENTER

TITAN
AVIATION FUELS

AIN's 50th anniversary look back: February

BY CURT EPSTEIN

AIN is celebrating its 50th anniversary by highlighting select news from the archives over the past half-century.

Beech-Raytheon merger is consummated



(Aviation Convention News 3/1/80 p.1)

Then: Following ratification by the stockholders of both companies, Raytheon Co. acquired Beech Aircraft Corp. on February 8, 1980. Beech became a subsidiary of the diversified electronics firm, headquartered in Lexington, Massachusetts. As part of the merger, Beech chairperson Olive Beech and Beech president Frank Hedrick joined Raytheon's board of directors while reciprocal privileges were granted to Raytheon's chairman and president by Beech's board.

Now: The 1980 sale of Beech marked the end of the airframer's nearly half-century run as an independent company. By that time, the King Air family was already firmly installed as the premier turboprop twin line. In 1994, Raytheon merged Beechcraft with its newly acquired Hawker product line as the Raytheon Aircraft Company. Following the sale of the aircraft division to Goldman Sachs and Onex Partners in 2006, it became known as Hawker Beechcraft, which declared bankruptcy in 2012. It reemerged as Beechcraft Corporation in 2013 while shutting down the Hawker side, and later that year Cessna owner

Textron announced that it would acquire Beech Holdings, the parent of Beechcraft Corp., for approximately \$1.4 billion, thus bringing two of the "big three" golden-age GA manufacturers under the same parent umbrella for the first time.

How Paulson's Pursuit nosed out Lacy's SP



(Aviation International News 5/1/88 p.10)

Then: There's nothing quite so fragile as an "unbreakable" record. That's what round-the-world record-setting pilot Clay Lacy discovered on February 27, 1988 when Gulfstream Aerospace president Allen Paulson flew one of his company's GIVs to shatter by 45 minutes and 41 seconds the world-girdling mark Lacy set January 30 when he piloted a borrowed United Airlines Boeing 747SP "once around the planet." In all, Paulson set 11 round-the-world marks in the flight, including records in both the National Aeronautic Association's (NAA) Unlimited category and the C-1.k class 55,000-to-77,000-pound category.

Now: The GIV Paulson used, dubbed "The Pursuit of Perfection," was a stripped-down bare-metal aircraft with just 10 hours on the airframe. It was fitted with an extra internal 1,200-gallon fuel tank

and accomplished the record-setting eastbound flight in 36 hours, 8 minutes, and 34 seconds, setting NAA-certified speed records on every leg (which included fueling stops in Shannon, Ireland; Dubai, UAE; Taipei, Taiwan; and Maui, Hawaii) before returning to Houston. Three Gulfstream test pilots and an official NAA observer accompanied Paulson on the flight. After Lacy's earlier record, Boeing stated that no current aircraft could best the 747SP's record, to which Paulson later replied: "I guess they forgot what David did to Goliath." The record stands to this day.

Challenger pilot said yoke was jammed in TEB crash



(Aviation International News March 2005 p.8)

Then: The NTSB preliminary report released on the February 2, 2005 crash of a Bombardier Challenger 600 at New Jersey's Teterboro Airport was all too brief, considering the stir the spectacular, though nonfatal accident caused in the national media. On takeoff, Challenger N370V not only slid off the end of Runway 6 but went through the airport fence and hurtled across busy six-lane U.S. Route 46 at 7:17 a.m., striking cars and finally slamming into a warehouse across the highway, where it burst into flames.

continues on page 18 >

JumpSeat app seeks to supplement notams

BY MATT THURBER

JumpSeat, a new iOS app, has launched to help crowdsource important information that isn't always included in a Notice to Air Missions (notam). The app has been in beta testing since June and is now available to any user, currently for free.

JumpSeat was launched by company co-founders Ben Zavadil and Brad Doebelin to provide an easily accessible repository of information that either isn't covered by notams or that pilots have to search for in siloed locations such as online forums and social media or that might be local knowledge from ground handlers.

"We've seen complaints resounding across the industry," Zavadil said. "Notams don't solve this. This isn't necessarily the fix, but we have the technology to get away from

[forums], scouring Facebook, or hoping that siloed information gets out."

The app offers a simple presentation of a world map populated with airports. Click on any airport to see reports about that airport or the local terminal area forecast. To add a report, users can click on the plus button and then select the type of event, such as runways/taxiways, ATC, scams, fuel, violence, strikes, weather, etc.

Although many airports lack reports, users can view a feed of all reports, beginning with the latest.

Both Zavadil and Doebelin are well aware of the problems affecting the notam system, which includes scores of useless warnings. And they believe that JumpSeat can help mitigate some of the problems

with notams. "If it's fully crowdsourced, it's not going to eliminate all the riff-raff," Zavadil said, "but we want to make sure people are aware of what's going on."

Users can upvote posts in JumpSeat, and the founders plan to add a function to flag an item so its information can be reviewed. "It's really about the community," said Doebelin. "That's why we have the upvoting."

JumpSeat's revenue model will likely involve a subscription at some point, but the founders are still working on developing the content and functionality. The core features will remain free, similar to how the sports-tracking app Strava works. "We want to make sure people get the information they need," he said, "and that they're not locked out until they pay." ■

SMARTSKY NETWORKS®
DATA MOVES US

IN STOCK. READY TO INSTALL.

SmartSky shipsets are available for installation with STCs for numerous airframes and more in progress. Order now for your upcoming installations.
The SmartSky Account Team will be visiting locations across the country.
Contact us to see how you can experience True Connection for yourself.

THE WAIT IS OVER
SmartSkyNetworks.com/Connectivity

©2022 SmartSky Networks. All rights reserved.

The corporate jet, en route to Chicago Midway Airport, was owned by 448 Alliance of Dallas; leased to DDH Aircraft, also of Dallas; and operated by Platinum Jet Management of Fort Lauderdale, Florida. The crash temporarily closed the airport and stopped traffic on the highway.

Now: The three crew and eight passengers escaped the burning aircraft with only minor injuries, while two people in a passing car were seriously injured. This crash, which was eventually attributed to improper weight and balance calculations on the part of the crew (part of a dangerous and fraudulent tankering scheme by the now-defunct operator to cut costs and take advantage of less-expensive fuel contracts) became one of the seminal events in modern private aviation history. It launched years of investigations and resulted in heavy fines and criminal convictions for the executives of Platinum Jet for conducting illegal Part 135 flights. The incident also spurred the FAA to shine a spotlight on the issue of operational control.

User fees included in proposed FAA budget



(Aviation International News March 2007 p.1)

Then: General aviation's concerns found a firm basis in February, 2007 when the FAA presented a reauthorization proposal that included a more than 300 percent hike in the fuel tax and myriad fees for obtaining a pilot's license, registering an aircraft, or receiving a medical.

It would also institute new user fees for GA flights that pass through airspace within several miles of large airports. All domestic commercial and GA users would pay a fuel tax of 13.6 cents

per gallon (included in the 70-cent increase) to fund the Airport Improvement Program, the Essential Air Service Program, and the FAA's R&D.

Now: The threat of the institution of user fees has come and gone several times over the past few decades, and in 2007, the topic became industry front-page fodder for months, with all the major alphabet general aviation groups coalescing in opposition to it. The proposal, which would have shifted much of the air traffic control funding burden from airline passengers to GA operators, spurred a bitter political lobbying debate between the GA and commercial sectors, complete with an airline association-funded media campaign, which stereotyped business aircraft users as globetrotting fat-cat corporate executives.

The Senate struck user fees from its initial FAA reauthorization legislation in May of that year, and the House similarly rejected them in September. A series of continuing resolutions were passed throughout the following year that left the matter unresolved; then both the House and Senate stepped forward with their FAA reauthorization plans (user fees omitted) in 2009. In 2010, the House and Senate each passed—and later reconciled—their versions of FAA reauthorization without user fees, and preserving fuel taxes. A single bill went to the White House for signing. The specter of user fees would rise again over the next several years and again fade away.

Pilot reaction eyed in Q400 crash



(Aviation International News March 2009 p.12)

Then: NTSB investigators turned their attention to “human action” and pilot training in the crash of a Colgan Air Q400 outside Buffalo on February

12, 2009 according to a safety board spokesman. At issue was the reaction of the captain to a stick-stick pusher activation, which, if improperly executed, could explain the sudden pitch up that began the upset. An NTSB spokesman told AIN that investigators hadn't determined whether pilot action resulted in the 31-degree upward pitch, however. Earlier during the flight, the crew had observed “significant” ice accretion on the windows and wings before the eventual upset that killed all 49 on board, and one on the ground.

Now: The Colgan Q400 crash, the last in a series of fatal airliner crashes in a six-year span, served as a springboard for the introduction of more stringent pilot-training requirements, qualifications, and experience for Part 121 airline operations under the Airline Safety Act of 2010. The regulations, which took effect in 2013, require airline pilots, including first officers, to hold an Airline Transport Pilot certificate with at least 1,500 hours total time as a pilot (a standard that both of the cabin crew of Colgan/Continental Express Flight 3407 exceeded at the time of the crash). The FAA also mandated that airlines provide additional training on upset prevention and recovery. As well, the media focus on the generally inadequate wages traditionally paid to regional airline first officers, along with the then pilot shortage, led carriers to begin offering their newest cockpit crewmembers more livable salaries. ■

▶ Watch AIN@50 videos on [youtube.com/AINtvonline](https://www.youtube.com/AINtvonline)

Trivia Question:



The Dassault Falcon 10 made its NBAA Convention debut in which year?

a) 1973, b) 1975, c) 1977, d) 1979

ANSWER: 1973

First flights in the past 50 years

These aircraft took to the skies for the first time during January and February, from 1972 through 2021

1972

January 18 – Beechcraft King Air E90

1975

January 24 – Eurocopter AS265 Dauphin
February 26 – Cessna 404 Titan

1977

January 10 – Cessna 441 Conquest II
January 31 – Cessna Citation II

1978

January 11 – American Jet Industries Hustler 400 •
February 14 – Cessna T303 Crusader •

1981

January 1 – LearAvia Lear Fan

1983

January 14 – Gulfstream Peregrine •
January 25 – Saab 340

1986

February 15 – Beechcraft Starship

1989

January 11 – AASI Jetcruzer 450

1991

February – Cessna Citation VII
February 13 – Swearingen SJ30

1994

February 15 – Eurocopter EC135 •

1996

February 29 – Cessna Citation 560XL

2002

February – Socata TMB 700C2
February 27 – Cessna Citation 680 Sovereign

2006

January 7 – Spectrum S-33 Independence

2014

February 18 – Cessna Citation Latitude

2015

February 6 – Dassault Falcon 8X •

2020

February 14 – Gulfstream G700



The problem with 5G

BY MARK HUBER



THIMO PEDERSEN / UNSPLASH

The protracted row between the Federal Communications Commission (FCC) and the FAA over the rollout of AT&T and Verizon 5G C-band service hit the pause button last month, with the wireless carriers offering accommodations that at this writing appear to mollify the concerns of commercial air carriers at the U.S.'s largest airports. At issue, the impact of wireless signals in the 3.7 to 3.98 GHz range bumping up against radar/radio altimeters that live in the 4.2 to 4.4 GHz environment, causing those altimeters to give potentially false readings to pilots and the various aircraft systems they support, endangering aviation safety, particularly

during takeoff and landing in low visibility conditions. The apparent solution on the horizon is to adopt a version of accommodations already in place at France's largest airports and in Canada—powering down C-band base stations near runways and aiming wireless tower antennas downward at steeper angles.

Some variant of this solution was suggested by the wireless carriers, the airlines' trade association, Airlines For America (A4A), and the Airline Pilots Association International (ALPA). But while this détente addresses the concerns of the major airlines, it does little to assuage the concerns of regional carriers, business and

general aviation, and particularly the rotorcraft community. There are also national security implications as a good chunk of the U.S. military's aircraft rely on older technology unmodulated pulse-style radar altimeters more susceptible to C-band interference, as opposed to more modern frequency-modulated continuous-wave (FMCW) technology in newer models. But even those have some susceptibility. Existing radar altimeters cannot be economically modified to defeat this interference and new models that do are just now coming to market. If the recent ADS-B mandate is any indication, it could be a decade or more before a meaningful fleet retrofit is

achieved and then, of course, there is the thorny issue of who should pay for it.

For all impacted aircraft, the inability to use radar altimeters makes them more reliant on less secure technology, such as GPS and ADS-B, points out Josh Lospinoso, CEO of transportation cybersecurity firm Shift5 and a founding member of U.S. Cyber Command. “The danger is the reliance it could create on other systems to provide altitude data. The problem is that those systems are vulnerable to a wide variety of cyber and spoofing attacks. It is really a bad idea to rely on other systems besides the radar altimeter for making sure you can land an aircraft safely.” In the event 5G C-band base stations were hacked, they could theoretically be manipulated to transmit at higher power “invalidating any mitigation,” Lospinoso, said. “No question about it, it would be a huge problem.

“Among the classes of aircraft to be concerned with non-compliant radar altimeters,” he added, “the military aircraft are certainly the ones that I would be most concerned about as an asset class.”

The aviation community voiced concerns about 5G C-band as early as 2018 and formally requested that the FCC delay the scheduled December 2020 spectrum auction to evaluate the impact on radar altimeters. In 2019, the Aerospace Vehicle Systems Institute (AVSI) published initial findings of C-band interference with radar altimeters. In October 2020, the Radio Technical Commission for Aeronautics (RTCA) published a comprehensive study that enumerated the dangers to radio altimeters from 5G C-band. The RTCA concluded, “This [interference] risk is widespread and has the potential for broad impacts to aviation operations in the United States, including the possibility of catastrophic failures leading to multiple fatalities.”

While elements of that study with regard to commercial aviation came under fire, the RTCA’s findings about business

“Aviation is an industry that needs that safety assurance and if you don’t have that assurance you aren’t going to want to fly...”

aviation and rotorcraft operations were on solid footing. Namely, that these categories of aircraft were far more likely to experience radar altimeter interference from 5G C-band.

Subsequent AVSI research of nine leading radar altimeters also found evidence of C-band interference, according to Clay Barber, Garmin’s principal engineer and a panelist at an NBAA webinar on the topic in early December. When standards for these altimeters were developed, largely in the 1970s, manufacturers and regulators “didn’t anticipate that the FCC would bring a lawnmower into the library in the spectrum neighborhood.”

Interference responses observed included the “no computing state,” meaning the radio altimeter does not have enough signal information to give an output. This would also disable linked avionics such as for Terrain Awareness and Warning Systems (TAWS). “In other cases, the rad alt simply gave misleading information and relayed that to the downstream systems. Then you can have very bad things happen” triggering erroneous TAWS warnings or actions from the automatic flight controls such as initiating a landing flair too high or too low. “That is what the FAA has the most concern with. It’s got a lot of variation,” Barber said.

continues on next page >

PENTASTAR
Aviation.

CONGRATULATIONS
CRAIG SINCOCK —
TRULY A LIVING LEGEND
OF AVIATION.

AVFUEL

*Thank you for being a trusted partner and friend,
and congratulations on your
well-deserved induction into this distinguished group.*

©2022 Pentastar Aviation

› continued from preceding page

Another NBAA panelist, Andrew Roy, director of engineering for Aviation Spectrum Resources, said not all aspects of the French and Canadian interference mitigation models are applicable in the U.S. as carriers here use much higher power levels on their transmitters. “No two 5G rollouts are the same,” he said. He also expressed concern that mitigation strategies were being rolled out without proper testing. “One of the arguments they [the wireless carriers] make is that they [other countries] have deployed [C-band] and we are not seeing any issues. What’s the problem? And that misses the part about aviation safety. You don’t say, ‘Well I’ve been flying for six months and everything’s fine.’ You need to do that analysis and assessment beforehand to make sure you are meeting the certification.

“Aviation is an industry that needs that safety assurance and if you don’t have that assurance you aren’t going to want to fly,” he said. “It’s really key that we have the data from the 5G [wireless providers] so that we know what is going on and we know what is happening as opposed to saying, ‘Well it hasn’t happened on a few flights so everything should be okay.’ Aviation doesn’t plan its flights that way.”

Various aviation industry sources interviewed by *AIN* repeatedly and bitterly complained about the short shrift their concerns received from the FCC, especially in the months leading to the spectrum auction, and the subsequent lack of technical cooperation received from the wireless carriers. For example, through early December, the wireless carriers had yet to present a list of C-band tower locations to aviation interests. What little cooperation the carriers offered was couched on condition of a virtual gag order, a strategy made public by their CEOs in a letter to the DOT and FAA in early January, offering cooperation “on the condition that the FAA and the aviation industry are committed to doing the



“ Anomalous (missing or erroneous) radio altimeter inputs could cause these other systems to operate in an unexpected way during any phase of flight—most critically during takeoff, approach, and landing phases. ”

same without escalating their grievances, unfounded as they are, in other venues.”

For the two domestic wireless carriers, which spent \$67 billion acquiring the C-band rights last year and are poised to spend billions more rolling it out, the stakes couldn’t be higher: 5G is the wireless holy grail and C-band is the frequency “sweet spot” of range and coverage that is most efficient. Both carriers trail their partly German-owned competitor T-Mobile—which does not use the C-band—when it comes to 5G subscribers in the U.S., as the latter’s public relations minions pointed out in a snarky e-mail sent to journalists in January, that noted “Verizon and AT&T are TWO YEARS Behind. And the gap keeps getting wider.” It would not be an exaggeration to say that the futures of Verizon and AT&T are riding on C-band.

Going into the December holidays, the two wireless carriers already had agreed to a one-month delay to their planned C-band

rollout—to Jan. 5, 2022. Before that date was reached and after much back-and-forth with the FAA and aviation industry, they agreed to an extra two-week delay to January 19, in addition to limiting C-band power output around 50 airports for six months to give the FAA time to evaluate the impact on safety and operations at those locations. But for the FAA, that was not enough. It issued a series of airworthiness directives and advisories warning of safety issues and potential air traffic delays due to potential radar altimeter interference related to the 5G C-band roll-out. The cost of those delays to the airlines alone was estimated annually at \$4 billion. The FAA documents, issued from December 7 through 23, set in motion a series of holiday week letters and filings between the opposing sides.

Following a pair of airworthiness directives issued December 7 that warned of forthcoming notams where 5G C-band interference could be potentially an issue, the FAA doubled down, issuing a safety

alert for operators (SAFO) warning of all the attendant avionics that could be compromised by erroneous radio altimeter data.

“Anomalous (missing or erroneous) radio altimeter inputs could cause these other systems to operate in an unexpected way during any phase of flight—most critically during takeoff, approach, and landing phases. These anomalous inputs may not be detected by the pilot in time to maintain continued safe flight and landing. Operators and pilots should be aware of aircraft systems that integrate the radio altimeter, and should follow all Standard Operating Procedures related to aircraft safety system aural warnings/alerts.

“These systems include, but are not limited to: Class A Terrain Awareness Warning Systems (TAWS-A), Enhanced Ground Proximity Warning Systems (EGPWS), Traffic Alert and Collision Avoidance Systems (TCAS II), takeoff guidance systems, flight control (control surface), tail strike prevention systems, wind shear detection systems, envelope protection systems, altitude safety callouts/alerts, autothrottle, thrust reversers, flight director, primary flight display of height above ground, alert/warning or alert/warning inhibit, stick pusher/stick shaker, engine and wing anti-ice systems, and automatic flight guidance and control systems (AFGCS).”

On December 31, the FAA pleaded with the wireless carriers for more delay and study. Transportation Secretary Pete Buttigieg and FAA Administrator Steve Dickson wrote, “Our goal would then be to identify mitigations for all priority airports that will enable the majority of our large commercial aircraft to operate safely in all conditions. This will allow for 5G C-band to deploy around these airports on a rolling basis, such that C-band planned locations will be activated by the end of March 2022, barring unforeseen technical challenges or new safety concerns.”

Initially, the wireless companies would have none of it. Two days later, on January 2, the CEOs of AT&T and Verizon—John Stankey and Hans Vestberg—wrote to Buttigieg and Dickson: “AT&T and Verizon agreed

to wait until January 5 to begin using the C-band and to implement additional restrictions on our use of the spectrum through July 5 over and above the operational restrictions the FCC already had found sufficient to protect radio altimeters. Although there was no requirement for us to adopt these measures, we did so voluntarily in the spirit of cooperation and good faith.

“Now, on the evening of New Year’s Eve, just five days before the C-band spectrum will be deployed, we received your letter asking us to take still more voluntary steps—to the detriment of our millions of consumer, business, and government customers—to once again assist the aviation industry and the FAA after failing to resolve issues in that costly 30-day delay period, which we never considered to be an initial one.”

The FCC ignored emergency petitions—filed over the holidays—from both A4A and ALPA, requested further delay. Less than 48 hours before C-band was scheduled to be switched on, airline interests prepared an emergency filing to stay C-band deployment with the U.S. Court of Appeals. Mere minutes before the suit was going to be filed, both sides agreed to the two-week delay requested by Buttigieg and Dickson.

While all sides initially reacted positively to the development, behind-the-scenes business and general aviation, in particular the rotorcraft industry, harbored serious misgivings, believing the airlines had cut a side deal and left them in the breeze. NBAA president and CEO Ed Bolen publicly spun diplomacy, stating, “The NBAA welcomes this short-term reprieve from the Verizon and AT&T 5G rollout so that we can better understand and communicate its potential impact on aircraft, airports, and airspace across the system. We need answers to key questions in order to ensure we remain the world’s largest, safest, and most efficient aviation system, and we will utilize this time to gather and share much-needed information about this development for all aviation segments, including business aviation.”

continues on page 33 >

PENTASTAR
Aviation[®]



**THE MOST
AWARDED FBO
IN THE COUNTRY**

Please Vote for
Pentastar Aviation
for Best FBO
in the Americas
in the
2022 AIN
FBO Survey.



248-666-8388

www.pentastaraviation.com

©2022 Pentastar Aviation



The view from the right seat in FlightSafety's CitationJet M2 full-flight simulator at its Wichita learning center, where a group of Citation Jet Pilots Owners Association members flew more than 200 approaches in a study designed to reduce runway excursions.

CJP initiative aims to break the runway excursion accident chain

BY MATT THURBER

The vexing problem of runway excursions after landing isn't going away—these aircraft accidents continue to happen. To help its members, the Citation Jet Pilots Owners Association (CJP), in partnership with the industry, commissioned a study and simulator testing not only to assess pilots' existing performance but also to develop a more logical and realistic method of evaluating the stability of approaches.

Results of the study exceeded CJP's and study partner research group Presage's expectations. Research results were released in October at CJP's annual convention in Palm Springs, California, as the Safe to Land initiative. The study was funded by the CJP Safety and Education Foundation, FlightSafety International, Textron Aviation, Garmin, NBAA, and the Air Charter Safety Foundation.

"It's a very simple, repeatable technique," explained Richard Meikle, FlightSafety

International's executive v-p of safety and regulatory compliance. Simulator testing, which FlightSafety donated as its contribution to the program, showed that pilots understood and picked up on the technique quickly, appreciating how it applies to their typical single-pilot jet operations, as opposed to adherence to multi-pilot, big-airplane stabilized approach procedures that don't always translate to smaller airplanes. In fact, the new CJP-derived approach procedure could be used with almost any type of airplane.

To conduct the study, Presage created a survey asking CJP members about their decision-making process during stable and unstable approaches. The responses from more than 200 CJP members informed the next step, where a 10-member working group evaluated the study's results and developed new instrument and visual approach procedures and callouts.

Using FlightSafety's Citation simulators at its Wichita learning center, 22 CJP members flew more than 200 approaches to evaluate the new procedures and fine-tune the Safe to Land initiative.

In January, CJP began releasing the Safe to Land programming, which includes video training, a bimonthly newsletter, a new cockpit briefing card, and a dedicated page on the CJP website. "We anticipate full integration of these new standard operating practices (SOPs), including training to them with a new [FlightSafety-developed] curriculum for our simulator sessions, to take the next 12 to 18 months," said Charlie Precourt, chair of the CJP Safety and Education Foundation's Safety Committee. "We believe the Safe to Land initiative could be a real game-changer for the light jet community."

Precourt and the safety committee originated the discussion about stabilized approaches and the CJP SOPs, which

ultimately led to the Safe to Land initiative.

“One of the things in [the SOPs] that’s always bothered us has been the criteria for a stabilized approach,” he said, “upon which is the premise that if you aren’t [stable], you go around. And most pilots will tell you the criteria are not anything they’ll buy into.”

In practical terms, while stabilized approach criteria seem like a good idea, what this becomes in reality is something like this going through a pilot’s mind on approach: “At 500 feet, if I’m five knots fast, I ain’t going around. I’ll fix it.”

Precourt said, “I was always bothered by that.” And when he was exposed to the Flight Safety Foundation’s landmark study on Approach-and-landing Accident Reduction (ALAR) through his work on the NBAA board, Precourt met some like-minded safety experts, including Presage president and co-founder Martin Smith. The ALAR study “really resonated with me,” Precourt said. “There’s stuff that happens at 400 to 500 feet, and how do we deal with it? So that’s why I jumped on it and went back to the safety committee. That’s how we got started.”

ANATOMY OF AN APPROACH

Put simply, the results of the CJP/Presage study showed that the current criteria for a stable approach contain an inherent problem.

Typical stable approach criteria call for achieving a stable approach at 1,000 feet above field elevation (AFL) during an approach in instrument meteorological conditions (IMC) or 500 feet AFL in visual conditions (VMC). At those “approach gates,” a Citation CJ3, according to the CJP SOPs, should be: landing gear down, speed brakes retracted, flaps set; airspeed at $V_{ref} - 5/+20$ knots; descent rate maximum of 1,000 fpm; power stabilized at an appropriate setting for the descent rate; and no more than a half-scale deflection on horizontal and vertical guidance indicators.

The CJP SOP guidance, like most stable approach recommendations, calls for



MARTIN SMITH
PRESIDENT AND CO-FOUNDER, PRESAGE

“This whole program is about building discipline and confidence.”

the pilot to evaluate whether the airplane is stable—meaning it meets the above parameters—at 1,000 or 500 AFL and, if so, to continue the approach and land or, if not, to go around.

But runway excursions still happen. According to CJP, “Many runway excursions result from approaches that are either unstable or become unstable after the approach gate at 500 feet.” In other words, pilots might meet the stable approach criteria at the 1,000- or 500-foot gate, but then become unstable after that, and that increases the chance that an excursion might occur.

What the research found was that it doesn’t make sense to have the goals and limit points be the same. The goal is to be stable at 1,000 or 500 feet but what if that is the case and then the airplane becomes unstable after that. How unstable is too unstable? Can the approach be salvaged? If so, what are the criteria and where would they apply to decide if completing the landing safely is even possible?

Let’s say you’re flying a perfectly stable approach in IMC and break out at 700 feet with all the criteria perfectly met at 1,000 feet and still in alignment, so you continue. As you cross the runway threshold, a gust pushes the airplane sideways. You already

met the stable criteria at the 1,000-foot approach gate and decided to continue. Does that mean that no matter what, you are going to be able to land safely?

Not necessarily. What if the sideways gust blows you so far off the runway centerline that you would need a fairly steep bank to get close to the center? What if the airplane balloons a little because of an updraft and now you’re running out of runway?

What CJP and Presage found is that it makes sense to set limit boundaries beyond the approach gates; these limits serve as the final decision point where a go-around must happen. The area between the gate and these limit points or boundaries can be considered as a “yellow caution zone,” according to CJP, “where we can continue and attempt to correct an instability that doesn’t quite meet the goal while committing to discontinuing attempts to ‘fix it’ upon reaching a new ‘limit point.’”

So instead of trying to salvage an approach that becomes unstable after the approach gate without any clear decision point, the CJP Safe to Land initiative applies strict limit points that help pilots determine if the approach is salvageable and when to go around.

Having participated in some of the simulator flying—not as an official part of the study but for observational purposes—I can see how the new process makes deciding whether to continue and when to go around much easier, eliminating much of the ambiguity that can be present during approach and landing.

PREPPING FOR SIMULATOR TRIALS

“We’re looking at decision-making below 1,000 feet,” explained Presage’s Smith. “This whole program is about building discipline and confidence.”

In the Flight Safety Foundation’s groundbreaking ALAR study, which was also conducted by Presage, 83 percent “would be mitigated by a go-around,” he said. At first glance, he explained, it might

continues on next page >

► continued from preceding page

seem that encouraging pilots to go around more would be the obvious solution.

On average, only 3 percent of unstable approaches result in a go-around. “The consequences are, year-over-year, approach and landing accidents [are] making up about 65 percent of all industry accidents, with a large percentage of those preventable with a decision to go around,” according to CJP. But go-arounds are inherently risky, and thus, “In fact, the go-around phase of flight is more fatal than all other phases, when comparing an equal number of flights occupying each phase.”

Of interest, Presage found that in an unstable approach, Smith said, “The closer you get to the ground, the higher the risk, it’s basic logic. [For] the go-around itself, though, the risk stays fairly constant. Because it’s not a function of elevation or height above ground.” Pilots who have tried going around from a higher altitude often find that it’s a messy outcome, perhaps because pilots mostly train to do go-arounds from lower altitudes, over the runway after not being able to complete an instrument approach.

Given the higher risk of any kind of go-around, Smith explained, “we want to be able to say we don’t want unnecessary go-arounds to happen. That there is a sweet spot where [we’re] managing the instability to a lower level while mitigating the risk of the unnecessary go-around. That’s the sweet spot; for this organization, they picked 200 feet.”

This was a result of the CJP member survey, which included 210 respondents who answered 64 questions. Ultimately, the majority say that they are comfortable correcting instabilities by 200 feet.

Based on those results, Presage designed the simulator portion of the study to figure out the most important factors that CJP members should consider at 500 feet, keeping it to two or three. There were 22 pilots in the study, eight in a control group flying current procedures and 14 in the test group flying the new Safe to Land procedures. They flew more than 200 approaches in FlightSafety’s simulators using New York’s East Hampton Airport (KHTO) and its



FlightSafety International donated simulator time for the CJP study.

RNAV Y approach to 4,255-foot Runway 28. FlightSafety programmed the simulator to allow the instructor to insert instabilities ranging from minor, correctable deviations to some that required a go-around, based on the stable approach goals and limits derived from the study. The deviations were randomized so even the instructor and Smith didn’t know what was coming until opening the package for each subject’s flight.

Smith also introduced the concept of warnings to the pilots, which is highlighting

an instability out loud and saying a word that acknowledges it and indicates that some kind of correction is underway. For example, at 700 feet and if speed is more than 20 knots, he explained, “some say ‘speed, correcting’ or just ‘speed.’ We encourage people to sign it. What is non-negotiable is to say it, every time. If you don’t condition yourself to discipline an action, it’ll drift on you. It’s the priming of the psychological pump, that’s the warnings.”

The goal for Safe to Land is to consistently use three new stable approach gates, at 1,000, 500, and 200 feet. The pilot needs to check for stable approach criteria at each gate and verbalize the status. For example, say “configured” at 1,000 feet, “stable” when properly aligned at 500 feet, and then “continue” or “limit, go-around” at 200 feet. If there is an instability at one of the gates, the pilot should keep repeating it until it is corrected. For example: “airspeed, airspeed.”

At the 200-foot limit, Smith advises saying “continue” instead of “landing” because “there is a difference between ‘continue’ and ‘landing,’ he said. “[Some] 52 percent of excursions follow a stable approach. It’s not a good idea to say ‘landing’ because that puts the pilot into a mental state of

expecting the approach to end in a landing, and as we learned during the simulator demonstration, a lot can happen after the 200-foot mark.”

At 200 feet, the airplane is stabilized if airspeed is $V_{ref} - 5/+10$ knots, bank is a maximum of 15 degrees, alignment is within the runway edge lines, and it’s on glide path. “Anytime the flight becomes unstable below 200 feet, the opportunity to re-stabilize the flight has passed, and a go-around must be executed,” according to CJP.

CENTERLINE AND TOUCHDOWN POINT LIMITS

Misalignment with the runway centerline can easily happen at the last minute, and the Safe To Land initiative will help pilots learn to determine “how far it is safe to drift away from the runway centerline” so they know that they have exceeded the drift limit and must go around. Basically, this involves defining a drift limit for the airplane where the runway centerline intersects the corner of the glareshield.

The longitudinal limit requires a little more consideration and results in a touchdown point limit (TPL) “after which a go-around must be initiated.”

There are two elements to think about for longitudinal considerations.

First is the green touchdown zone (GTZ), which is the touchdown target. Pilots are taught to touch down on the aiming point at the 1,000-foot distance

markers, but the GTZ acknowledges reality and gives pilots a larger 1,000-foot “bullseye” from the 500-foot distance markers to the 1,500-foot distance markers.

Next is the TPL, which must be calculated for each runway. Once the airplane reaches the end of the GTZ bullseye, the pilot needs to clearly verbalize that fact, by saying the word “floating” every one to two seconds until either touching down or if still in the air when the airplane reaches the TPL, then going around.

To calculate the TPL, start by subtracting factored landing distance (FLD) from landing distance available (LDA). The result is called the “extra distance,” and this is added to the air distance from the runway threshold to where the wheels touch down. The result gives the pilot a solid limit beyond which a go-around is mandatory, otherwise, the airplane will not be able to stop by the end of the runway.

Here is an example for Montgomery-Gibbs Executive Airport (KMYF) in San Diego. Landing on Runway 28R initially looks promising because of the runway’s 4,598-foot length. But it has a displaced threshold of 1,199 feet, essentially making it a 3,399-foot runway, which may be marginal for a CitationJet.

FLD for a typical CitationJet is 2,465 feet under certain conditions. Subtracting that from the 3,399-foot LDA gives 934 feet, the extra distance. Add 934 to the air distance, say 1,300 feet, gives a result of 2,234 feet, which is the TPL.

Looking at the airport chart for KMYF shows that the TPL is 1,165 feet from the 10L end of the runway, which means that if you’re landing on 28R, you must touch down before hitting the 10L aiming point markers, which are 150 feet long.

Thinking about this and making the

continues on next page >



PREMIER 

Visit Us For The Premier Experience

Our world-class, full-service FBO at PTK near Detroit is open for business!

Exceptional FBO, Part 145 Maintenance with avionics and interior on-site. Our renovated terminal houses fully equipped offices and 55,000 square feet of hangar space. With offerings including 6,500 foot runway space, GPU/power cart, 24/7 Jet A and 100LL fueling, SAF fuel, and lavatory and oxygen service, we're ready to meet your needs. Visit premierjetservices.aero for more information.

Our brand new state-of-the-art culinary aviation catering service takes center stage with superb in-flight dining and terminal café offerings. Call **(248) 666-2343** or email catering@premierjetservice.aero to order.

Waterford, MI. (KPTK)

► continued from preceding page

TPL calculation ahead of time provides a clear limit for determining whether to go around from a floater landing. But it's also helpful, CJP pointed out, to look at the airport chart after calculating the TPL to find a geographic reference, such as the aiming point markers mentioned above.

For the simulator trials using KHTO, it turned out that a crossing runway matched the TPL, giving a clear geographic reference.

FLYING THE PROFILES

FlightSafety and CJP welcomed a group of journalists to try out the simulator profiles. I joined Flying columnist Dick Karl and AOPA Pilot editor-in-chief Tom Haines in the M2 simulator in Wichita. Our instructor was FlightSafety's Dax Beal, and Martin Smith was there to observe and hand over the top-secret codes for inputting our deviations into the simulator.

We started each profile on final to KHTO's Runway 28, with the GPS Y RNAV approach programmed in the M2's Garmin G3000 avionics. Vapp was 101 knots and Vref 94 knots. We were briefed to hand fly when Beal unfroze the simulator then it was up to us whether or not to engage the autopilot for the approach.

Before starting to fly the profiles, each of us got to fly one normal landing, then flew an approach and paused at 200 feet so we could see what one dot of lateral deviation on the localizer looked like close to the ground. After landing from this approach, we taxied on either side of the runway centerline to assess the sight picture for the lateral limits.

Both Karl and Haines handled the injected perturbations well, using the CJP-derived callouts and making decisions at the limit points that either led to a correction and a safe landing or a safe go-around. Some approaches were purely visual, while others were in IMC but breaking out with plenty of ceiling and visibility.



The M2 simulator proved to be an ideal flying laboratory for the CJP Safe to Land initiative.

One example was an approach where everything was fine almost to 200 feet, but then the speed ballooned by about 30 knots, and Haines wisely chose to go around instead of trying to salvage the landing. From the back of the simulator, Smith commented, "That was well-managed. It was not recoverable." He praised Haines for "priming his psychological pump" by making the calls. Karl likewise made the right decisions after Beal input some instabilities, going around after a one-dot deviation on the glidepath and again after sliding sideways (and making the "drifting, drifting..." callout) at 200 feet.

“Anytime the flight becomes unstable below 200 feet, the opportunity to re-stabilize the flight has passed, and a go-around must be executed.”

During my time in the left seat, I got a combination of issues and tried to focus on the callouts and the limits. Having watched Haines and Karl first, I had a good idea of what to look for, but it was still surprising to be all lined up and ready to ease down the last 200 feet and suddenly see the runway sliding away to the side. In this case, I started to bank back to the runway but quickly saw that I'd have to steepen the bank past 15 degrees so leveled the wings and did a go-around.

The TPL demo was most instructive. On Runway 28 at KHTO, the second (closed) crossing runway marks the limit so it was easy to see as the M2 floated and floated, refusing to touch down. Without having a clear TPL for my decision to go around, I'm not sure I wouldn't have tried to force the airplane onto the runway, hoping it would stop in time. But knowing that this was a limit made the decision to go around super easy; it was a brain-reliever, simplifying my decision-making and making the whole operation that much safer.

The stable approach gates and limits developed for the Safe to Land initiative are logical, simple, and consistent. More importantly, they are rooted in reality and don't try to force pilots into doing a go-around when it isn't truly necessary. ■

Genesys avionics breathe new life into Black Hawk

BY STUART "KIPP" LAU



PHOTOS: GENESYS AEROSYSTEMS

Genesys Aerosystems is upgrading Sikorsky UH-60 Black Hawk's with modern avionics and its HeliSAS autopilot.

Avionics modernization programs target older systems that are nearing obsolescence, too costly to maintain, and lacking the functionality required to fit into an ever-evolving airspace structure or mission requirements. The most successful and viable avionics upgrade programs focus on solid aircraft with many cycles remaining on the airframe and engines and performance that are in line with newer aircraft. For the operator, these upgrades can extend the life of an aircraft for decades at a fraction of the cost of buying new, more costly aircraft.

Genesys Aerosystems—a wholly owned subsidiary of flight control manufacturer

Moog—identified a perfect opportunity to extend the life of the versatile and dependable utility Sikorsky UH-60 Black Hawk helicopter. The Genesys cockpit upgrade replaces legacy UH-60A/L Black Hawk avionics with an FAA-certified, fully integrated IFR glass cockpit that includes dual all-digital air data/attitude heading reference system (ADAHRS), HeliSAS stability augmentation system (SAS) and three-axis autopilot, and other modern components that not only enhance aircraft safety and mission performance but provide a strong alternative to buying a new aircraft.

The UH-60 Black Hawk first flew more than 40 years ago and to date over 4,000 examples have been produced, with over 2,300 delivered to the U.S. Army. In addition to the U.S. military, Black Hawks are in service with 28 countries through foreign military sales programs. The bulk of these helicopters—531—are earlier UH-60A/L models, which are still highly capable aircraft but share a largely analog avionics package that is nearing obsolescence. UH-60L Black Hawks share most systems with the original “A” models except for a more powerful engine and an improved

continues on next page >

► continued from preceding page

gearbox to improve lifting capabilities. Many UH-60As have been converted to the L standard. In addition to military use, many early Black Hawks are beginning a second life as civil firefighting or utility aircraft.

The core issue with the legacy Black Hawks is mechanical gyros; each aircraft is equipped with either a set of electro-mechanical or fiber-optic gyros. These gyros are one of the primary components of the avionics system and are prone to failure and are expensive to maintain. The U.S. Army has declared these gyros as obsolete and in August 2020 issued a notice that called for the mandatory replacement of these older systems. In addition to these gyros, early Black Hawks are equipped with a myriad of analog flight instruments, radios, annunciator displays, and other components that date back to the early 1980s.

In addition to a complete avionics modernization program, Genesys offers a modular building block solution for older Black Hawks. For the budget minded, the mechanical gyros can be replaced with dual digital ADAHRS that can “drive” older flight instruments.

FULL PANEL

The most comprehensive option is the complete Black Hawk solution that essentially guts the avionics bay and transforms the instrument panel into a highly functional workspace for the flight crew. The complete system consists of four large (8- x 6-inch) IDU-680 displays, dual GPS/SBAS,

dual ADAHRS, dual digital radios (navcom), a dual-channel data acquisition unit, an integrated engine and crew alerting system (EICAS) with system synoptic pages, a digital standby instrument, and an optional IFR-certified three-axis autopilot/enhanced stability augmentation system (HeliSAS).

Each IDU-680 is interchangeable and includes an integral FMS, TAWS, and TCAS with synthetic vision system (SVS). The IDU-680 displays are tested to the most stringent conditions and certified as

“HeliSAS is designed to be on all the time and helps return the helicopter back to straight and level flight...”



“field-loadable software devices” capable of receiving software updates through a standard USB drive. In addition to improved reliability, improved capabilities, and reduced total system lifecycle costs, the system reduces the operating weight of the aircraft by more than 80 pounds.

The IDU-680 display is a flight and navigation instrumentation system that provides intuitive information to the pilot. Each screen is presented in a portrait orientation and bisected horizontally into two

functional areas, each of which is fully configurable. The functional areas of the primary and multifunction displays (PFD and MFD) can show flight instruments, moving maps, an HSI, flight planner, radio management, terrain, traffic, weather (datalink or weather radar), video feed, or engine displays. IDU-680s are controlled through bezel-mounted controls and knobs to provide tactile feedback to the pilot, important because helicopter pilots often fly with gloves. In general, for ease of use during

mission-oriented operations, most menus are only one level deep.

SVS is displayed on the PFD and includes worldwide terrain (with TAWS alerts), obstacles (towers, antennas, etc.), navaids, runways, and traffic. The flight path is shown through “highway in the sky” symbology or using a flight path vector.

The Genesys avionics upgrade is night vision goggle (NVG) compatible and includes several safety features such as an integrated TAWS to prevent CFIT accidents and other tools to help a pilot combat loss of control in a degraded visual environment (DVE)

or inadvertent IMC encounter, both leading causes of helicopter fatalities.

Each IDU-680 provides TAWS functionality. Terrain and obstacles are displayed on the PFD (SVS) and moving map. TAWS uses “forward looking terrain awareness” algorithms to alert the pilot of hazards. The system also provides alerts for each of the typical ground proximity warning system modes.

To aid in pilot situational awareness during periods of a DVE—such as a white-out or brownout condition—the IDU-680



The Genesys HeliSAS autopilot automatically returns the helicopter to a neutral attitude in case of an IMC encounter, when the pilot releases the cyclic control.

can display a geo-referenced hover vector on either the PFD, moving map, or on an expanded hover vector page. This feature is useful during all operations near the ground. The dynamic hover vector places a “bug” or point over the ground, based on the forward velocity of the aircraft. If the aircraft slows down, the point moves towards the aircraft; if the aircraft accelerates, the point moves away. With limited forward visibility, the pilot can position that point beneath the aircraft and land.

HELISAS FEATURES

Genesys Aerosystems’ HeliSAS weighs only 15 pounds and brings a powerful full-authority digital autopilot and stability augmentation system to light single- and medium twin-engine helicopters. Beyond its size, the greatest value of HeliSAS is that it dramatically enhances safety by reducing pilot workload and has the life-saving potential to recover the aircraft to a safe and stable attitude if the pilot becomes spatially disoriented.

According to Genesys, “HeliSAS is designed to be on all the time and helps return the helicopter back to straight-and-level flight in the event it is inadvertently flown into an unusual attitude or if the pilot becomes disoriented due to a loss of visual references.” As an example, if the pilot becomes disoriented during an inadvertent flight into instrument meteorological conditions (IMC), releasing the cyclic control

will automatically return the aircraft to a neutral attitude (zero degrees roll and two degrees nose-up); the pilot can then manipulate autopilot controls to return the aircraft to visual conditions. In these scenarios, HeliSAS acts as a digital safety pilot.

HeliSAS is both a stability augmentation system (SAS) and a two- or three-axis autopilot; there are two independent systems, a primary SAS/autopilot and a backup SAS/autopilot. The HeliSAS system is certified for either IFR or VFR use. The SAS provides basic pitch and roll stability for the helicopter to ease workload, and stability augmentation is available in all phases of flight. The autopilot provides a variety of pitch and roll modes to optimize flight path control for the pilot. Autopilot functions are

available at airspeeds greater than 44 knots.

Components of HeliSAS include a primary and secondary flight control computer, HeliSAS control panel, and primary and backup electromechanical servos. In addition, there are several assorted buttons and switches installed on the cyclic and collective controls.

To learn more, **AIN** recently was invited to fly Genesys Aerosystems’ UH-60 Black Hawk technology demonstrator. The aircraft was outfitted with the latest Black Hawk avionics upgrade from Genesys, which transformed it into a completely integrated digital flight deck that included HeliSAS with an IFR-certified 3-axis autopilot. Genesys and its project partner XP

continues on next page >



A preflight briefing is enhanced by a demo unit of the Genesys IDU-680 displays.

› continued from preceding page

Services—a flight test and certification specialist—created a beautiful, uncluttered, fully functional cockpit that is intuitive for the pilot. While the demo flight included a profile that rang all the bells and whistles, one of the most interesting aspects of the flight was the HeliSAS demonstration.

The pilots for this demonstration were XP Services flight test pilots Thad King and Frank Lombardi, each with significant rotorcraft experience and both graduates of a test pilot school. King would act as pilot-in-command in the left seat, while Lombardi would help navigate the flight profile from the observer seat. The *AIN* writer/pilot (me)—an airline pilot with no helicopter flight time—would fly from the right seat.

Prior to the flight, Genesys Aerosystems technical representatives briefed all things related to the Black Hawk avionics upgrade, while King and Lombardi provided a safety briefing and answered questions related to the flight profile. Lombardi gave a great summary of the benefits of HeliSAS and described SAS as “augmenting the Black Hawk’s automatic flight control system” and “giving the aircraft a bigger keel,” (something that I could relate to as a sailor).

FLYING HELISAS

During the flight, HeliSAS provided a significant stability improvement. King was able to demonstrate the Black Hawk’s flight characteristics with and without HeliSAS engaged and the automatic recovery feature. Of interest, King also allowed me to successfully take off, hover, and land the helicopter with the aid of HeliSAS, again, with my having no past helicopter flight time. Subsequent attempts to hover without HeliSAS would yield different results.

King demonstrated the automatic recovery feature by rolling the aircraft into a 35-degree bank and pitch to 7 to 8 degrees nose down. The recovery was initiated by releasing the cyclic control; within seconds



XP Services flight test pilots Frank Lombardi (left) and Thad King (right) with writer Michael Maya Charles.

the aircraft returned to a near level, stabilized flight attitude.

When the SAS mode is engaged in-flight, it is designed to maintain the pitch and roll attitude at the time of engagement within limits (10 degrees bank and nose down and 11 degrees nose up). If SAS is engaged above these limits, the system will trim the aircraft to the limiting values.

HeliSAS has a low- and high-air-speed protection feature when an autopilot pitch mode is engaged. If the airspeed decreases below the low-speed threshold, HeliSAS will pitch the aircraft down to obtain a set recovery speed. If the airspeed increases above the high-speed threshold, HeliSAS will pitch the aircraft up to obtain the set recovery speed. An aural warning tone will sound when these airspeed protection features are active.

Other demonstrations included manipulating the autopilot through the centrally mounted HeliSAS control panel. Roll modes include heading select and navigation mode (VOR, LOC, GPS, ILS, or a

separate BC), while pitch modes include airspeed, altitude hold, or vertical navigation mode. On aircraft equipped with the Genesys IDU-680 displays (such as the Black Hawk), the autopilot can track search-and-rescue patterns as programmed in the integral FMS.

Genesys Aerosystems has delivered more than 1,000 HeliSAS systems to over 100 operators, including many aeromedical operators. HeliSAS is currently certified on the Airbus Helicopters H120, H125, and H130; Bell 206B/L, 407, and 505; Robinson R44 and R66; and Sikorsky UH-60 Black Hawk, and these are all aircraft that are often flown single pilot.

Big things do come in small packages. Genesys’s HeliSAS provides a lot of value at a relatively low cost and minimal weight penalty. As a digital safety pilot, the autopilot reduces workload, and its functionality rivals many high-cost systems, while the stability augmentation system features unique flight envelope protection and automatic recovery modes that are lifesavers. ■

► continued from page 23

Many NBAA members have equipped their aircraft with expensive and sophisticated landing and vision systems that would be worthless should 5G C-band deploy without mitigation near thousands of U.S. airports, not just the few dozen large commercial ones currently under discussion.

However, the helicopter industry clearly has the most to lose, and rotorcraft interests pulled no punches following the announcement of the two-week armistice. Writing for the Helicopter Association International (HAI), John Shea, its government affairs director, blasted the wireless carriers' plan to reduce power at only a handful of public heliports.

"The effects of 5G deployment are not limited to the nation's busiest airports, and mitigations by wireless carriers should not be limited to those locations either." HAI pointed out that "the voluntary measures proposed by the wireless carriers would provide modest 5G limitations at the surface of public-use heliports, of which there are only 55 in the country. That number is dwarfed by the estimated 6,533 to 8,533 HAA landing sites in the United States, with more than 4,000 being private-use heliports co-located at hospitals." HAI emphasized, "All over the country, from densely populated cities to oil rigs 200 miles offshore, helicopters are used to save lives, serve and protect American citizens, and support critical industries in demanding environments—and many of those missions are conducted from start to finish without the use of airports." The rotorcraft lobby noted that the impact of 5G C-band radio altimeter interference could be particularly harmful to helicopter air ambulance (HAA) operations and bring with it loss of life. Helicopter air ambulances are required to be equipped with radio altimeters by law. HAI has petitioned

“The effects of 5G deployment are not limited to the nation’s busiest airports, and mitigations by wireless carriers should not be limited to those locations either...”

the FAA for an exemption to this requirement due to the ongoing 5G controversy.

"The loss of a single life because of misguided 5G-related policies would be reprehensible," HAI said, noting that HAA operators transport roughly 1,000 injured or critically ill patients every day. "Up to 50,000 of the more than 300,000 people transported by HAA operators during 2021 were transported from off-airport/unimproved areas at night—meaning the mitigations

proposed to maintain an equivalent level of safety at airports will have no effect on those operations."

Andrew Roy, echoed Shea's concerns. "Smaller operators, particularly helicopters, generally have lower-performing avionics and operate considerably closer to [cell] towers. Take an emergency medevac helicopter.

If that is going in [on scene] to extract from a road accident or something else they are not going to have time to go into a proper approach angle. They are going to get in or get out. If they are hovering within 150 feet of a cell tower pointed right at them with—and these 5G main beams can have a signal amplification of 10,000 times—then you will start to see some issues with that going forward." And those "issues" could very well end in an NTSB accident report. ■

MAKE TAKEOFFS AND TOUCHDOWNS A BREEZE
Raisbeck Enhanced Leading Edges for Improved Performance

Raisbeck's Enhanced Performance Leading Edges increase cruise speeds by 4+ knots at equal power settings, extend range, reduce stall speeds for gentler handling, and extend outboard wing life.

Isn't it time to invest in a Raisbeck Performance System for your King Air 200 for optimized performance?

(800) 537-7277 | sales@raisbeck.com | raisbeck.com

RAISBECK
ENGINEERING
AN ADCORN GROWTH COMPANY

Illegal charter a growing issue in Europe

BY KATE SANSFIELD



An illegal charter flight in this Piper Malibu Mirage resulted in the death of the pilot and passenger.

Three years have passed since the high-profile crash of a Piper Malibu Mirage off the coast of Guernsey in the Channel Islands ended the life of Argentinian football player Emiliano Sala and his pilot David Ibbotson. The English Premier League star, who was traveling from Nantes in France to Wales, where he had just been signed by Cardiff City, was the sole passenger on N264DB, a U.S.-registered 1984 PA-46-310P piston-powered pressurized single-engine airplane.

The tragic incident on Jan. 21, 2019 resulted in an international media scrum and a search for answers over the nature and circumstances of the flight, as well as the suitability of the aircraft and its crew.

It didn't take long for UK investigators to uncover a catalog of failings.

In its final report into the crash—published in March 2020—the Air Accidents Investigation Branch (AAIB) concluded that Sala, whose remains were retrieved

from the aircraft wreckage on the seabed on Feb. 6, 2019, had been exposed to potentially lethal levels of carbon monoxide, which may have incapacitated Ibbotson. His body has never been found.

Crucially, the report concluded that Ibbotson received a fee to transport Sala despite only holding a private pilot license. “This was a blatant breach of the regulations,” said Glenn Hogben, chief executive of charter industry body the Air Charter Association (ACA).

He explained that under EASA rules, if a flight is operated for hire and reward, it is classified as an air-taxi service and must be approved by the relevant aviation authority to carry paying passengers. The aircraft must also be approved for this role and piloted by a professionally trained crew under an air operator certificate (AOC). “This flight was illegal on every count,” said Hogben, “and thanks to evidence compiled by the [UK] Civil Aviation Authority (CAA),

the man who arranged it has been successfully prosecuted.”

David Henderson, who set up the flight, was found guilty in a UK court in October 2021 of endangering the safety of an aircraft and was sentenced to 18 months in prison. Following sentencing, Rob Bishton, the CAA's group director for safety and airspace regulation, declared the punishment was an acknowledgment by the court of the “significant safety risk” posed by illegal charter. “The aviation system relies on the integrity of all those involved,” he added. “Anyone operating a commercial flight should always have the necessary license and approvals in place.”

INQUEST INITIATED

Henderson's trial told only part of the story, however, and the search for answers continues. An inquest was scheduled to begin in February 2022 to determine how Sala died. According to the coroner, the

probe will consider the flight arrangements, the operation, condition, and maintenance of the aircraft, the pilot's qualifications, the flight itself, and the ensuing search and recovery of Sala's body.

It will also consider the design of the aircraft's exhaust system and carbon monoxide detectors. The origins of the carbon monoxide leak are believed to be a faulty exhaust, through which the Malibu's heating system receives warm airflow.

The AAIB report found Ibbotson was conscious and flying the aircraft as it broke up mid-air and crashed into the ocean.

While Henderson's conviction has been welcomed by the business aviation community, successful prosecutions of grey or illegal charter operations are still rare. Hogben points to only one other prosecution in the UK "in recent history" that has resulted in a prison sentence.

The guilty party in that case was Robert Murgatroyd, pilot of a Piper PA-28 Cherokee who was detained in March 2019 for three years and six months for carrying out an illegal charter flight in September 2017. Despite only holding a private pilot license, Murgatroyd charged his three passengers £500 (\$660) each for a birdwatching trip from Manchester to the Isle of Barra in Scotland. The piston-single was 193 kg (426 pounds) over the aircraft's maximum takeoff weight and crashed into a field soon after takeoff. Nobody was seriously injured. Murgatroyd was convicted on seven charges,

including recklessly endangering the safety of an aircraft or persons in an aircraft, conducting a public transport flight without an AOC, and acting as a pilot without holding an appropriate license.

This case didn't garner as much publicity as the Sala accident, conceded Julie Black, manager of the executive aviation division of Hunt and Palmer, one of Europe's largest air charter brokers.

"Sadly, it took the tragic death of a well-known sports star to truly highlight dangers of grey charter," she said. "Stamping out this illicit practice is, however, a major challenge, and this is largely down to ignorance on the part of passengers and pilots, and proving the flight is illegal."

Black's view is supported by Alex Durand, chief executive of UK charter and management company SaxonAir, which has a fleet of 12 business jets and helicopters. "The CAA had a long trail of conclusive evidence [in both the Sala and Murgatroyd crashes]," he said.

HARD TO PROVE

Durand describes these accidents as "ideal case studies" in grey charter operations, and the blatant infringement of the regulations made a successful prosecution possible. "However, all too often it is really hard to prove there has been a commercial exchange in an illegal flight between the pilot and the passengers," he said. Furthermore, he added, passengers have little

knowledge of the dangers of booking an illegal charter "or even what it is."

The problem has been exacerbated over the past decade with the arrival of the digital charter marketplace, which has opened up the sector to a wave of new business models. Of particular concern to many in the industry is the ride-sharing market.

The system of cost- or ride-sharing allows passengers to contribute towards a private pilot's direct costs—such as aircraft hire, fuel, and landing fees—on a pre-determined trip. The flight cannot be made for commercial gain.

However, for the ACA's Glenn Hogben, the regulation in its current form is "woolly and open to open to abuse."



GLENN HOGBEN
CEO, AIR CHARTER ASSOCIATION

The ride-sharing concept is "well-intentioned and sound in principle," he conceded. The practice was established to allow private pilots to build their hours and reduce their expenses by splitting the costs of the flight down the middle with their passengers. "However, there are loopholes in the regulation for unscrupulous people to exploit and conduct flights for financial gain under the guise of ride-sharing," Hogben said.

WINGLY RIDE-SHARING

His view garners sympathy from Emeric de Waziers, founder and chief executive of Europe's oldest and largest ride-sharing program Wingly. He described grey charter as "a real threat which harms the image of both commercial and private aviation."



Sharing expenses with ride-sharing via companies such as Wingly is legal in Europe.

continues on next page >

► continued from preceding page

While frequently drawing the ire of Europe's AOC community, de Waziers insisted that Wingly's ride-sharing platform does not compete with public transport operators. "It has been built expressly for flight-sharing, and pilots cannot make a cent in profit," he said.



EMERIC DE WAZIERS
CHIEF EXECUTIVE, WINGLY

De Waziers created the Paris-based venture in 2015 after identifying a need within Europe's "huge, passionate private pilot community [of which he is a member] to fly as much as possible and share their direct costs with fellow travelers."

He noted that all Wingly ride-sharing flights are leisure-based, and up to 40 percent of the bookings are canceled due to bad weather. "We signed the European Union Aviation Safety Agency [EASA] charter on cost-shared flights and we are required [under the charter] to make sure passengers understand the difference between a Wingly flight and a commercial flight with a public transport operator."

Responding to the accusation by charter industry representatives that ride-sharing platforms provide a back door to grey charter, de Waziers commented: "As an industry, we have to make sure that people don't flout the system, by making our platforms as transparent as possible."

The Wingly site incorporates an algorithm designed, de Waziers said, "to dictate the average cost of a ride-sharing flight based on the location of the pilot and

the hourly rental of each aircraft type at that destination."

A typical aircraft on the Wingly platform is a four-seat piston-single such as a Cessna 172, Diamond DA40, Robin DR400, or Piper PA-28, although the site does accommodate at the top of its range non-complex six-seaters.

De Waziers described Wingly's oversight of its ride-sharing platform as thorough. "Unless the pilot can justify the rental prices, we won't allow the booking. If pilots don't stick to the rules, they are struck off. Since we began, only two pilots have been banned from the site for attempting to profit commercially from a flight."

On the whole, de Waziers said, Europe's private piloting community has embraced Wingly's "sharing principles," and their approval of the platform is borne out by the numbers. Today, Wingly boasts around 400,000 registered users, including 20,000 pilots, and has facilitated more than 30,000 flights, "carrying an average of two passengers," he noted.

While the charter industry welcomes the principle of cost-sharing, it argues that the EASA regulations governing this niche are too basic and therefore open to exploitation.

"While the passenger is able to dictate the nature and destination of the flight, this model is open to abuse," said Hogben. He argues that the rules must be strengthened to avoid any potential for misunderstanding.

"Now that the UK [CAA] is not part of EASA, we are hoping to see a positive change in this area," said Hogben.

CAA STUDY

The CAA is collating responses to a six-week online consultation—launched on Dec. 1, 2021—on its proposed changes to the cost-sharing regulations for private pilots.

The document concentrates on the recommendations of an internal working group, established by the regulator, and designed, the CAA said, "to improve safety and consumer protection outcomes."

Proposed changes include:

- » Ensuring that the flight is being conducted for "common purpose." Notably, if a flight does not start and end at the same site (A to A), the pilot and passengers must have a common purpose for travel to the destination (A to B), "other than the payment and receipt of remuneration or other valuable consideration."
 - » Clearly defining "direct costs." Demonstrating that the total direct costs of the flight are shared equally between all occupants (including the pilot).
 - » Limiting the cost-sharing flight to six occupants, including the pilot.
- "These new proposals will send a message to perpetrators of illegal charter and would-be rule flouters that the industry and the CAA are coming down hard on them," said SaxonAir's Durand.



AOC holder SaxonAir operates a fleet of 12 business jets and helicopters.

It is important to remember, he noted, unlike these private entities, public transport providers must adhere to a set of extensive and costly regulations. "These are designed to ensure the safety of the paying/traveling public, the crew, and those on the ground," he said.

The ACA's Hogben agreed. The price paid for a charter flight is usually a "direct profit to the illegal provider." But for regulated operators, the fee pays for safety, security, training, and compliance specialists who are looking after passenger safety.

"Sala's sad and avoidable death must always be a reminder of why those rules are there in the first place," said Hogben. ■



Rethink How You Refuel

SAVE 37% ON AVERAGE. TRY IT FOR 3 MONTHS FREE.

For 10,000+ Part 91 aircraft, CAA membership means more savings, more freedom, and more control. We negotiate the best jet fuel prices from more than 270 preferred FBOs throughout the US and beyond. You even get to vote on which FBOs we include — and recommend your favorites.

Interested FBO?

- ★ Apply for free
- ★ No fees to belong
- ★ Keep 100% of fuel sales

Sign up online.



JOIN FOR FREE TODAY!

www.corpaa.us

Leadership skills for the modern world

Autocratic leadership is outdated. With the 1970s rise of freelance and contract workforce concurrent with the demise of employee pensions, individuals had fewer compelling reasons to spend 40 years at one company. What emerged from the shifting workforce landscape was the necessity to lead by example, motivate, and create compelling reasons (beyond pay and benefits) to retain talented team members. This illuminated the need for organizational psychology, which resulted in the 1990s zeitgeist of leading by example. The societal and cultural shift of the past two decades demands continued adaptation of what good leadership looks like.

Organizational psychology and cognitive science have taught us that the modern-day right stuff of leadership is a stronger appreciation of what is outdatedly referred to as “soft skills” but ought to be known as “essential skills.” Empathy, emotional intelligence, and inclusive language are frequently spotlighted, but here are three other fundamental leadership essential skills worth understanding.

PSYCHOLOGICAL SAFETY

Psychological safety is a team culture where individuals feel comfortable asking questions, learning from failure, admitting mistakes, and sharing ideas. It is trust on a large scale, and its defining feature is that it is a team dynamic in which individuals feel valued and respected even when vocalizing dissenting opinions.

Culture is a shared system of beliefs, values, and norms that are so integral to the group that they’re often taken for granted beyond the day-to-day awareness of the group. Therefore, psychological safety cannot be a singular task to accomplish occasionally. It must be operationalized



BY KIMBERLY PERKINS

CORPORATE PILOT AND SAFETY RESEARCHER

and woven into day-to-day practice until it becomes inseparable from the organizational culture.

When we do not feel psychologically safe, our brain shifts from critical and logical processing mode to self-defense, protection mode. When an individual senses danger (real or perceived—physical or emotional), part of the brain triggers a fight, flight, or freeze response as a mechanism for self-survival. When this occurs, our cognitive functioning is impaired and our attention shifts from pro-safety team behavior to one of defensive self-protection. Over time, low psychological safety also affects us physiologically through stress and fatigue.

The incidents that go unreported, the disgruntled employee that overlooks protocols, the subtle noncompliance, and the costly employee burnout all lead to a reduction in safety through a deterioration of safety culture and a loss of productivity that negatively impacts the mission.

OVERCOMING COMMON BIASES

Because of confirmation bias, our brain is constantly scanning for evidence to support our current belief paradigm. Our brain wants to find pieces of evidence that support our pre-existing model and reject information that doesn’t fit the prototype. Essentially, confirmation bias creates our

own personalized virtual reality allowing us to see events, people, and interactions through our individualized filters. Normally, this system works great and allows us to make many millions of simple, small decisions each day. However, these filters can sometimes deceive us from the reality of the situation, creating a trap of interpreting benign behaviors of others as a threat, or in other words, a cognitive disconnect. Our brains are lazy, so it’s easier to say that the other person is wrong or bad than to challenge our confirmation bias, but we must recognize our limitations. We must approach conflict with empathy and curiosity. This cannot be done without psychological safety; it is key to creating a learning environment and challenging our assumptions.

Neuroscience research tells us that we use distinct parts of our brain when we think about people we perceive as “in-group” versus “out-group.” This out-group bias prompts us to unconsciously favor those we perceive as in-group members. When a leader exhibits this in-group favoritism or out-group bias, other team members may feel threatened by the preferential treatment. This leadership behavior may be viewed as a threat by an individual who feels they are being treated as an out-group member. This threat starts the cycle of deteriorating psychological safety, which will negatively impact the whole team. One solution to navigating in-group favoritism or out-group bias is to expose individuals to members of the relative out-group. Exposure can be as elaborate as collaborative outings or as simple as causal coffee chats; the key is to ensure that it’s inclusive. Exposure decreases the negative impact of the bias and circumvents triggering a threat response.

Groupthink bias encourages individuals to “go with the flow” to promote harmony or to “keep the peace.” This requires that individuals put aside their individuality or individual ideas for team cohesion. While this may seem pleasant from an outside perspective, it leads to irrational and poor decision-making. Team cohesion can be an indicator for a team with low psychological safety.

Psychological safety is necessary to ensure team members feel comfortable sharing ideas without fear of negative consequences, such as embarrassment or

retaliation. It means that team members feel comfortable speaking up with their original thoughts even when they fall outside of the groupthink model. To navigate an individual’s groupthink bias, be sure to foster an environment that not only accepts but encourages dissenting views.

COMMUNICATION AGILITY

Communication is a two-way interaction. From its Latin derivation, it means to make something common through sharing. If the audience to whom you are speaking does

not understand what you are saying, by definition, you are not communicating as there is no shared common understanding.

Most communication is conveyed in a non-verbal manner. When the recipient of the communication feels conflicted between a mismatched verbal and non-verbal message by the conveyer, most individuals tend to believe the non-verbal communication. We have all heard the popular adage words matter; so does how you say them.

Communication agility is a leadership trait that requires one to first understand their own style of communication and to reckon with the reality that all communication is received and transmitted through individual filters: experiences, beliefs, and biases. Communication agility requires one to adapt their style to meet the recipient’s communication style. For it to be communication, one must ensure the act of communicating resulted in a shared understanding; that the idea became common between the communicators.

LEADERS VERSUS MANAGERS

The title “manager” is not synonymous with “leader.” Many managers are all too fond of the outdated autocratic style of leadership. Watch out for organizations with low safety reporting and high levels of team cohesiveness as those tend to indicate organizational cultures with poor psychological safety. When employees feel silenced by managers, they will turn towards hushed conversations and selective co-worker messaging as an outlet to find community and psychological safety within their mismanaged organization. As the popular expression goes, “people don’t leave bad jobs, they leave bad bosses.”

Leadership in the modern era requires increased self-awareness, an appreciation for cognitive science, and a how-to for essential skills. While there are many resources for leadership transformation, the method for operationalizing psychological safety is unique within each team. Here’s a checklist to get you started teaming in a psychologically safe organization. ■

PREPARE, ACCOMPLISH, MEASURE: A CHECKLIST FOR BUILDING PSYCHOLOGICAL SAFETY

PREPARE

- » Invite team members to participate. If you have a large team, consider creating sub-groups where people feel comfortable speaking up and assign an individual to represent the sub-group at a larger team meeting.
- » Foster open communication—welcome dissenting opinions.
- » Create motivation—articulate why the work matters.
- » Create a learning mindset by reframing failure. Destigmatize failure by framing it as an important and necessary process of learning. Leaders must demonstrate the willingness to learn by failure.
- » Demonstrate a genuine eagerness to help.

ACCOMPLISH

- » Demonstrate situational humility—make it safe to say “I don’t know.”
- » Ask questions—don’t just express your opinion.
- » Actively listen, acknowledge, and show appreciation.
- » Approach conflict with empathy and curiosity.
- » Seek dissenting views, challenge the status quo by overcoming confirmation bias and in-group bias.
- » Transparency: collectively brainstorm next steps.
- » Encourage and reinforce employees’ commitment to safety by encouraging the filling out of safety reports.

MEASURE

- » Consider conducting anonymous safety culture surveys annually.
- » Make psychological safety part of your safety management system.
- » Create safety performance indicators to measure and enhance a positive safety culture.
- » Most importantly, seek feedback—often.

Hill details progress on turbine single

BY MARK HUBER



Hill Helicopters has reported that it has accumulated more than 340 orders for its turbine single-engine kit HX50 and to-be-certified HC50 helicopters.

The sales pace surprised CEO Jason Hill, who said that sales came from 38 countries and significantly bested orders from competitors, although Hill's helicopters have not yet entered service. "We have a 51 percent market share. We're outselling the [Robinson] R44 by 2.3 to one, the R66 by four to one, and the Bell 505 by 4.6 to one," he told a recent virtual global meetup audience.

UK-based Hill unveiled the HX50 in August 2020. The five-seat, light turbine single helicopter is powered by a 500-shp powerplant. Design features include an all-composite, three-blade main rotor, choice of retractable or skid landing gear, and a ducted tail rotor. Performance targets for the HX50 include a 140-knot cruise speed, a maximum payload of 1,760 pounds, and a range of 700 nm.

"The helicopter industry has long awaited an Elon Musk-style disruption that redefines the modern helicopter," said CEO Hill, the founder of Dynamiq Engineering who previously worked at GKN Westland (now Leonardo). "The wait is over. The only way to create something that is truly groundbreaking is to design from the ground up, giving equal focus to aerospace design, performance, and safety as well as to the artistic and experiential aspects, including comfort, ergonomics, intuitive technology, and luxury. The HX50 brings all of this together to deliver a truly unique aircraft and experience."

While Hill did not discount the myriad difficulties in developing a clean-sheet-of-paper general aviation helicopter, he said the HX50 is "right on schedule and has met all major milestones. We're delivering on all fronts across the program." He predicted the helicopter will achieve first flight next year and customer deliveries will start in 2023 "as originally planned." Deliveries of

the to-be-certified HC50 are slated to begin in 2026. Hill received additional orders for the \$960,000 HC50 in December as part of a promotion to offer the helicopter at a substantial discount through Jan. 31, 2022, to customers who have already placed orders. Those customers will be able to purchase an HC50 for \$696,000.

Hill said the HX50 program has already made substantial and speedy progress, thanks to being completely vertically integrated and the use of manufacturing techniques new to the helicopter industry, such as making the composite fuselage as a single piece. Hill is also manufacturing its own engine, the GT50. "We make stuff in-house," CEO Hill said. "We have absolute, total control over our cost base. What that means for [customers] is not only that we deliver you an aircraft at the right price point; it also means that we can control the cost of spares and that the through-life costs of support are properly controlled."

continues on page 42

To Serve and Protect

AW169

Leonardo Helicopters' product range enables you to meet the stringent requirements of 21st century security and resilience missions.

Powerful, high-performance, all-weather rotorcraft fitted with modern, leading-edge equipment and flexible interiors facilitate rapid and responsive role changes to meet your needs.

Inspired by the vision, curiosity and creativity of the great master inventor - Leonardo is designing the technology of tomorrow.

Visit us at Singapore Airshow, Stand B-H39

leonardocompany.com

Helicopters | Aeronautics | Electronics, Defence & Security Systems | Space

 **LEONARDO**
HELICOPTERS

› continued from page 40

Hill touted the benefits of vertical integration for rapid prototyping. “If you’ve got a lot of development work to do, it’s also important that you can control the costs of developing prototype parts, of iterating things when stuff goes wrong because it will. This isn’t going to be a smooth ride the whole time. There’s no being beholden to other suppliers and outside firms. We can do it all here. It gives us complete control and that is really what underpins our ability to deliver an aircraft at the right price, on a very sporty timescale, and to give you the confidence that we’re going to be able to support and keep the running costs of these aircraft really low.” Hill elaborated at some length about program progress during the company-sponsored video meetup.

It begins with composites. The one-piece, all-composite fuselage is made via a dry-fiber process where the resin is infused as opposed to using the pre-preg, layup method, which has been the more common process in the aviation industry but is more labor-intensive and more costly. Hill said the dry-fiber process is considerably more economical and has been proven in the manufacture of wind turbine blades and pleasure boat hulls (and the Airbus A220). In late December, Hill successfully completed a 30 percent scale model of the HX50 fuselage using the dry-fiber process.

“There’s no reason why those processes can’t be applied to aerospace, and indeed many of the big manufacturers are looking at them,” Hill said. “We’ve taken that process and demonstrated that we can produce a single-piece fuselage using [it]. That makes a huge difference, not only to the piece price

of the composite parts that we make but also the capital that we need to be able to set up for composites manufacturing at scale. So this is absolutely critical to everything that we do within the company. The blades are composite. The crash cell is composite, the fuselage is composite. The booms are composite and all the fairings are composite. This is a core technology for the business.”

The all-digital glass flight deck is another area where the company has made significant progress, Hill said. The company intends to use three 4K-resolution touchscreens with oversized instrument depic-



The Hill Helicopters interior embodies a car-like experience.

tions to display critical aircraft performance data and information. The cockpit is designed so that it is “possible for people who don’t fly that often to get back into their helicopter and be completely current” and find the experience “as car-like as possible.”

The screens combine to give the appearance of a “monolithic piece of touchscreen glass across the front of the aircraft” that delivers “big, bold, clear flight instruments and context-sensitive information so you only get what you need.” Hill said popular navigation apps could be loaded directly onto the aircraft and displayed on the center screen. “It gives you great visibility, much clearer maps, a much easier user interface than you’ve ever had before,” he said, adding that the layout was ideal for depicting

synthetic vision and terrain awareness straight across the three screens.”

Hill also gained attention, and skepticism, when it announced it would develop its own turbine engine, the GT50, for the helicopter. But the company said that the development of that aircraft component also has made substantial progress as a significant amount of high-tech machining capability has been acquired. “The beauty of doing an engine and an aircraft at the same time is we can essentially design the aircraft that we want. So you start with how much payload, speed, and performance you want and that defines

what the engine needs to be—not the closest thing that you can buy off the shelf from existing manufacturers,” Hill said.

“We have to be able to control the cost of the engine and central to that is making our own compressor wheels, turbine blades, castings, and casings, even making our own gears and bearings. That really is

what this first wave of equipment that we’ve invested in is all about,” Hill said. “You don’t have to be great to start but you have to start to be great.”

HILL DISCOUNTS EVTOL MARKET

The CEO of Hill Helicopters expressed skepticism about the future of eVTOLs during the virtual “Global Meetup” late last year. He said alternative energy sources for these aircraft—battery power and hydrogen—remain impractical as are the total costs likely associated with these aircraft.

“It’s going to be decades before we have batteries or a means of storing enough electrical energy for a genuinely battery electric aircraft to be practical,” Hill said, adding that eVTOL operators are “going to find it

very hard to make a living” and that these new aircraft are not “an immediate threat for us.”

“The only way to get off the ground vertically more efficiently than a helicopter is in a balloon. So I think a lot of these fancy configurations that [eVTOL] people are trying are all well and good, but I don’t believe they offer any material advantages over a well-designed, modern helicopter,” Hill said. “Those [eVTOL] companies will struggle when they try and hit commercial viability. Trying to make money from an existing general aviation aircraft is very difficult. You have to fly enough hours to offset your enormous fixed costs. If you try and do that with a machine that can only fly for five minutes, you have precious little chance.”

Hill said battery-powered aircraft, in all likelihood, “are going to end up being every bit as or more expensive than a conventional turbine aircraft, but far less mission flexible, far less capable.” Hill also threw shade on hydrogen power, noting, “I don’t think that will work either. The problem with hydrogen is it has a really low density. Jet fuel is about 800 kilos per meter cubed. Hydrogen is 72 kilos as a liquid per meter cubed. The amount of energy in a fuel is defined per unit mass. If it’s got a low density you need a huge volume of it to have the kind of range that we’re offering [400-700 nm] with the HX50.”

Hill said any practical alternative to pure internal combustion power likely will involve some degree of hybridization. “I think that’s something that could offer a great suite of benefits to private owners and commercial operators,” he said. However, Hill said the massive amount of money and attention being devoted to eVTOLs has one immediate benefit for commercial aviation “in terms of the opportunity that it provides for us. It’s clearly showing how many people want to do point-to-point travel, and that is an opportunity for [the commercially certified] HC50. That’s an opportunity for a good commercial helicopter.” ■

R44® CADET

Optimize Your Flight Training

- › 10 Instrument Panel Configurations from Basic Mechanical to Integrated Glass
- › Air Conditioning*
- › New Cockpit 4K Video Camera* Enables Training Flight Reviews
- › Derated Power Provides Increased Performance Margins at Higher Altitudes
- › 2400-Hour Time Between Overhaul



*Indicates optional equipment © 2021 Robinson Helicopter Company. Robinson and R44 are registered trademarks of Robinson Helicopter Company. UND is a trademark of the University of North Dakota.

Experts call for sharper focus and more delivery from big-talking electric aviation pioneers

BY CHARLES ALCOCK

At face value, 2021 was a hugely impactful year for the nascent advanced air mobility (AAM) sector, which once again seemed impervious to the monumental challenges posed by Covid to the mainstream air transportation industry. The pandemic has now cast its long shadow over our lives for some 23 months since March 2020, and yet in roughly the same timeframe from now, the first eVTOL air taxi services could begin operations in 2024.

The past year yielded yet more hype, garnished by loudly heralded “orders” for

eVTOL and eSTOL aircraft in a flurry of announcements that did little to conceal the reality that the vast majority were provisional, with no money changing hands. Nonetheless, the 4,000-plus reported sales apparently passed the smell test of some deep-pocketed investors as evidence of prospective rewards for their risk; and the presence of major blue-chip airlines, such as United and American, among the customer base, bolstered credibility.

The past year was also a time of “haves” and “have nots,” as a handful of eVTOL

front runners achieved Wall Street listing after hitching their wagons to special purpose acquisition companies (SPACs), while many more start-ups sniffed out fresh capital like dogs looking for truffles. According to consultants Roland Berger, the SPAC-backed share flotations accounted for more than half of the roughly \$6 billion in fresh investment raised by the AAM sector.

To get a fresh perspective on the industry at the turn of the year, Future-Flight picked the brains of several expert

continues on page 46 >



In December 2021, Embraer’s Eve Urban Air Mobility announced plans for a Wall Street share flotation in the second quarter of 2022, in what some suggest could mark the tail end of the SPAC-backed investment boom in eVTOL aircraft developers.



2022
HAI HELI-EXPO
BY HELICOPTER ASSOCIATION INTERNATIONAL

FIND THE
FUTURE

EXHIBITORS

SPACE IS RUNNING OUT! APPLY NOW!

60+ HELICOPTERS | 100+ COURSES/SESSIONS
14,000 ATTENDEES | 600+ EXHIBITORS | & MORE!

ATTENDEES

REGISTER NOW!

MARCH 7-10 | DALLAS

KAY BAILEY HUTCHISON
CONVENTION CENTER DALLAS

EXHIBITS OPEN MARCH 8-10

HELIEXPO.COM



› continued from page 44

observers. These included Sergio Cecutta, founder of SMG Consulting, which produces the AAM Reality Index; Manfred Hader, senior partner with Roland Berger; Mike Hirschberg, executive director of the Vertical Flight Society; Clem Newton-Brown, CEO of AAM infrastructure group Skyportz; and Darrell Swanson, founder of Swanson Aviation Consulting.

We asked our experts what they feel must happen in 2022 to keep the AAM sector on track to fulfill its potential to transform transportation over the next few years.

Sergio Cecutta called for more tangible progress on the engineering side of new aircraft programs:

“The first thing we would like to see in 2022 is progress towards certification with more OEMs completing their preliminary and critical design reviews, rolling out their conformal-certification aircraft, and starting to fly for certification credit with the regulatory agencies.

“On the investment side, I think most of the large players have been very well funded in 2021, so we see fewer deals happening in 2022, with one or two large ones and smaller players receiving additional financial support. On the public-acceptance side, we would like to see more interactions with the public, showing them the aircraft, not a model but the real deal, flying at large public airshows and introducing them to the entire experience (including the vertiport and what it means to go through it) and how it will fit into their transportation choices, life, and cities.

“Finally, I would like to see a more uniform communication across OEMs, similar to what happens in the rest of aerospace, agreeing to specific milestones to take the ‘it depends’ out of the industry.”

Manfred Hader emphasized the need for more diversified investments, the development of an interconnected ecosystem, and more realism and focus on specific use cases:



Shares in eVTOL aircraft developer Vertical Aerospace began trading on the New York Stock Exchange on Dec. 16, 2021.

“Much has been invested into companies that develop the actual aircraft. However, there is still a lot of work to be done in other areas of the ecosystem (e.g., ground infrastructure, like vertiports, charging pads, etc.). We need to encourage investors to place their bets on these building blocks as well, as the industry won’t take off if the

surrounding infrastructure does not exist.

“We need to further expand the AAM ecosystem and include companies that are currently focused on ground- and air-based mobility. For example, public transportation, ride-hailers, etc., to develop an intermodal and connected transportation system, which provides a real benefit for



SERGIO CECUTTA
FOUNDER, SMG CONSULTING



MANFRED HADER
SENIOR PARTNER, ROLAND BERGER

“The first thing we would like to see in 2022 is progress towards certification with more OEMs completing their preliminary and critical design reviews, rolling out their conformal-certification aircraft, and starting to fly for certification credit with the regulatory agencies.”

the customer. Realistic adjustment of the overall timeline to give the market more credibility. More focus on specific use cases (like the Paris Olympic Games in 2024) to gain learnings. Lastly, get ‘the internal house’ in order and focus on things that require the acquisition or development of new capabilities, such as rapid manufacturing or supply chain, and operations capabilities.”

Mike Hirshberg hailed 2021 as a pivotal year for the AAM sector, bolstered by high levels of new investments, impressive new conditional orders for aircraft, and breakthroughs in flight testing for several new models. In his view, there are plenty more positive steps to come over the next 12 months, notwithstanding the significant challenges that still need to be overcome:

“[The year ahead] will continue this trend, with the best companies attracting the necessary capital to develop, certify, and commercialize their aircraft. Several companies have already gained the initial approvals from the FAA, EASA, and the CAAC [in China] toward certification of their aircraft. There are a lot of other approvals and standards that are necessary before commercial operations can begin, but these are generally on track. According to statements by the companies, these will likely be EHang (2022 by CAAC), Volocopter (2023 by EASA), and Joby (2024 by FAA).

“VFS has nearly 600 eVTOL designs—everything from the silly to the serious—cataloged on our World eVTOL Aircraft Directory, but many of these are either no longer being pursued or never had the financial backing to begin with. A good rule of thumb is the need for \$1 billion, 1,000 engineers, and 10 years for an aircraft to reach certification. Many companies are on track for these kinds of numbers, but a vast majority will never be built.

“It is fantastic to see so much excitement and innovation in aircraft design, but enthusiasm is no substitute for hardcore engineering and methodical aircraft development.

continues on next page >



CLEM NEWTON-BROWN
CEO, SKYPORTZ



MIKE HIRSHBERG
EXECUTIVE DIRECTOR,
VERTICAL FLIGHT SOCIETY

“It is fantastic to see so much excitement and innovation in aircraft design, but enthusiasm is no substitute for hardcore engineering and methodical aircraft development. Anyone who is thinking of an eVTOL aircraft as a scaled-up drone is unlikely to be successful.”

AMSTAT
A CAMP Systems Company
For Salesforce®

- View AMSTAT Contacts & Fleet data from within Salesforce®
- Link your Accounts, Contacts, Leads & Aircraft to live AMSTAT Data
- Map AMSTAT aircraft data to your custom Aircraft Object or ours
- Add AMSTAT data directly into your Salesforce® solution
- Receive alerts of changes to linked data

www.amstatcorp.com
Information That Moves You Forward

For additional information, please contact
Dan Rawson at 732-530-6400 ext. 1450 or drawing@amstatcorp.com

› continued from previous page

Anyone who is thinking of an eVTOL aircraft as a scaled-up drone is unlikely to be successful. A more appropriate approach is to consider the requirements for airliners and scale down for size. There are a thousand reasons why eVTOL won't be successful but the eVTOL industry is working to overcome every single one of them. VFS has been bringing the community together for the past 18 months to discuss the potential for hydrogen-electric vertical takeoff and landing (H2eVTOL) propulsion. [The year ahead] will see more activity in this area and could be a turning point in solving some of the key technical challenges."

Clem Newton-Brown reflected on what he sees as a blind spot in the industry's planning around ground infrastructure:

"In 2022, the industry players need to do more work with regulators and governments in every jurisdiction to push them to move more quickly on rules, regulations, standards, and guidelines on new landing infrastructure. There is so much investment and focus on the aircraft yet they will never fulfill their potential if they are simply flying from and to existing airports and helipads. It will take years before the industry can move forward with confidence in building a new network of landing sites.

"I think most people in the aviation industry underestimate the time required to get to the point of being able to build new skyports [or vertiports]. Even with strong political support, it will be a long process to get regulatory changes approved, and there are construction lead times on top of that. It will be way too late to get to the point of type certification of aircraft and then start pursuing skyport infrastructure. It must happen in parallel."

Darrell Swanson shared the concern over infrastructure needs, while also questioning whether the industry has done enough to engage with key stakeholders:

"Public acceptance is the one area that

“The question is, will they be able to raise enough capital to fund the investment and what will the spend profile look like? We still need to get certified vehicles with certified production processes, so even an optimistic person would see a slow rollout of vehicles.”

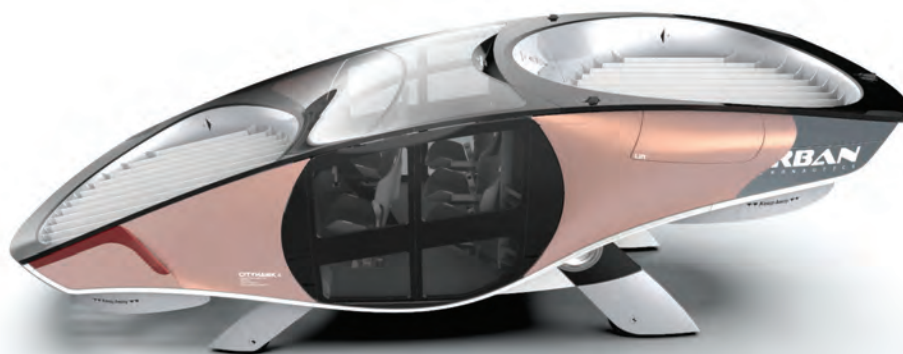
the industry really needs to focus on, as without it we may as well go home. When Ferrovial announced plans to develop 30 vertiports across the UK, Gary Cutts [from UK Research and Innovation's Future Flight Challenge initiative] suggested that we need to instill social desirability of AAM as opposed to acceptance. Acceptance is likened to 'well, here it is, you need to

accept it.' This is what the aviation industry has traditionally done, and I agree with Gary that we need to promote the desirable traits of AAM while we look to mitigate the undesirable ones.

"If we are able to demonstrate significant time savings, the potential for lower costs through commoditization, and the social and regional connectivity [benefits], we will go a long way toward securing social acceptance.

"On regulation, I think there is a reasonable pathway forward for aircraft but we need better legislation that will allow local authorities to assess future vertiport planning applications. When it comes to investment in OEMs, the industry is cracking on with this with Archer, Joby, Vertical, and soon Eve, so well done. The question is, will SPACs be the way forward for other OEMs that are reasonably mature? We have seen the likes of Ferrovial, ADP, and Urban Blue make announcements on the development of infrastructure, and I know of a few others out there, so I am encouraged by this.

"The question is, will they be able to raise enough capital to fund the investment and what will the spend profile look like? We still need to get certified vehicles with certified production processes, so even an optimistic person would see a slow rollout



Urban Aeronautics raised the first \$10 million of a \$100 million Series A funding round to support its plans to develop the hydrogen-powered CityHawk eVTOL aircraft in September 2021.



DARRELL SWANSON
FOUNDER, SWANSON AVIATION CONSULTING

of vehicles. Couple this with a global market where cities/countries are competing to get the first vehicles and it may take a while before we see significant volumes of vehicles unless the automotive industry is able to wade in and produce aircraft at aerospace levels of safety. I would also call on OEMs to release information about the noise footprint of their vehicles to enable us to help identify suitable sites for vertiport facilities. Noise is one of the most emotive aspects of aviation and the one that is likely to slow the development of infrastructure.”

Looking ahead, Hader, Swanson, and Newton-Brown all shared the view that fixed-wing hybrid-electric and electric eSTOL aircraft are set to fulfill as much of their potential as the seemingly dominant vertical lift-and-cruise eVTOL designs, with the prospect of connecting mainland and island communities. Cecutta predicted that cargo and military applications could prove to be among the first deployments of the new aircraft.

While the experts largely took a glass-half-full perspective in seeing 2022 as another year of opportunity for the AAM new wave, there also seemed to be a sense that some bubbles could burst. For instance, Hader pointed to Volocopter’s rumored decision in late 2021 not to proceed with a planned public listing as a precursor to a cooling of the SPAC investment furnace. Both he and Cecutta appear to believe that the next 12 months could see a significant thinning out of this crowded new aviation sector with multiple start-ups withering on the vine for a lack of investment. ■

DEDICATED TO HELPING BUSINESS ACHIEVE ITS HIGHEST GOALS.



Wednesday, June 22

2022

WHITE PLAINS, NY

ATTEND THE WHITE PLAINS REGIONAL FORUM

The regional forum will bring current and prospective business aircraft owners, operators, manufacturers, customers and other industry personnel together for a one-day event at the Westchester County Airport. This event will feature exhibits, an aircraft display and education sessions to help introduce business aviation to local officials and prospective owners and operators, and to address any current issues in the regions.

LEARN MORE

nbaa.org/2022hpn

BY JERRY SIEBENMARK



Elliott Wraps Up The Maintenance Group Acquisition

Nearly a year after acquiring The Maintenance Group, Elliott Aviation has completed its integration and rebranding of the Atlanta-based MRO provider, adding a fourth MRO facility for the Moline, Illinois-based aviation services company. Located at DeKalb-Peachtree Airport (KPDK), the 40,000-sq-ft facility offers maintenance and avionics services for Gulfstream, Bombardier Challenger, Learjet, Dassault Falcon Jet, Cessna Citation, Beechcraft, and Hawker airframes.

JSSI Acquires Aircraft Mx Tracker Traxxall

A little more than six months after acquiring maintenance tracking provider SierraTrax, Jet Support Services Inc. (JSSI) has taken on an even bigger purchase: Montreal-based Traxxall, a provider of aircraft maintenance tracking, parts inventory management, and cloud-based MRO workflow software services. Established in 2013, Traxxall operates five offices in the U.S., England, France, and the Philippines. Traxxall staff will join JSSI's software-as-a-service (SaaS) division, which includes SierraTrax and reports to JSSI COO Ash Reddy. The SaaS division builds upon JSSI's other businesses, including JSSI Parts & Leasing, which provides aircraft parts, engines, and APUs to hundreds of business jet operators, and Conklin & de Decker, a provider of performance and comparison data for benchmarking and comparing aircraft ownership options.

Dassault Expands Service Options at Mérignac Center

On the five-year anniversary of the opening of Dassault Falcon Service's (DFS) service center in Mérignac, France, the airframer announced the operation will expand its capabilities there to include the Falcon 900EX EASy, 2000EX EASy, and the wide-cabin Falcon 6X, which is set to enter into service this year. The 7,500-sq-m (80,729-sq-ft), six-bay

Mérignac service center was originally opened to support the large cabin, long-range 7X and 8X trijets. Since its opening, the service center has mostly been operating at maximum capacity and has completed 35 of 53 Falcon 7X C-checks, which take a minimum of six weeks to complete.

West Star Plans 'Significant Expansion' at Three Sites

West Star Aviation is planning expansion projects at three of its four primary MRO facilities that will add more than a quarter-million square feet of space at its sites in East Alton, Illinois; Grand Junction, Colorado; and Chattanooga, Tennessee.

In East Alton, West Star looks to add a 40,000-sq-ft general-use hangar and a 48,000-sq-ft paint shop and hangar, the latter of which is expected to "significantly increase" the company's paint capacity there. The company's Grand Junction operation also will see the addition of a 40,000-sq-ft hangar as well as 35,000 sq ft of shop and office space. An enlarged shop will include more room for interiors, a complete composite shop, and a tool room to accommodate work on larger aircraft. And in Chattanooga, West Star will add a 40,000-sq-ft hangar, 17,000 more square feet of shop and support space, and another 20,000-sq-ft hangar that it will lease from the airport.

Metrojet Engineering Clark Opens New Hangar

Metrojet Engineering Clark in the Philippines has inaugurated its new 7,100-sq-m (76,424-sq-ft) hangar with its first Bombardier Global 7500 for hangar parking service. The hangar at Diosdado Macapagal International Airport can house up to 10 long-range business jets including Boeing Business Jets and Airbus Corporate Jets. Included with the new hangar is a 2,500-sq-m, two-story annex with offices and shops as well as available space for a dedicated FBO. An 11,000-sq-m apron and private taxiway complete the new Metrojet facility.





StandardAero ‘being methodical’ in Signature ERO merger

Even though StandardAero closed on its \$230 million acquisition of Signature Aviation’s engine repair and overhaul (ERO) business in July, integration of the two businesses is expected to continue through 2022, StandardAero Business Aviation president Tony Brancato told **AIN**. Based in Dallas, Signature’s ERO comprises engine overhaul facilities in Dallas (Dallas Airmotive) and Portsmouth, England, 10 regional turbine centers, one component MRO site, and two parts/distribution facilities. Combined, the ERO unit employs 1,100 people and generated \$500 million in revenue in 2020.

So far, the integration has “moved along very well,” Brancato said. “We’re continuing to work and integrate our operations together, the engine models, the customer databases that we have. Our sales teams have come together and are fully integrated. Our field service team is now 75 plus strong in the U.S. and that team has been brought under a single leader so we have a single front to our customers early on when they call for any type of AOG services or anything requiring something away from our facilities.”

This is Brancato’s second time with a major integration at StandardAero. As senior v-p of business integration in 2017, he oversaw StandardAero’s roll-up of Vector Aerospace. With 2,200 workers in 22 global locations and \$700 million in annual revenue, the Vector acquisition was considerably larger. “It was a natural progression to take over business aviation at the same time while we were closing on the Signature ERO business,” Brancato said.

He estimated the integration could take as many as 18 months to complete, based in part on lessons learned from the Vector integration. “We’re being very methodical in



Dallas Airmotive technicians work on a turbofan engine at the company’s facilities. Dallas Airmotive is a major piece of the StandardAero acquisition of Signature Aviation’s engine repair and overhaul (ERO) business.

how we bring our two businesses together,” Brancato explained. “We don’t want to break anything. We don’t want to drop any balls with any of our customers.”

The ERO acquisition adds service capabilities on several different engine models for StandardAero. Two of them are the Rolls-Royce Spey and Tay engines found on the Gulfstream II/III and G450, respectively. “So that really brings in a nice marriage for us when we’re talking to customers about their G450—some of these aircraft that have Tay-powered engines on them where we can talk to them about some airframe work, paint, interior, and that propulsion work where we’ll do removals and replacements and send the engines to Dallas.”

The acquisition also brings StandardAero new engine service opportunities in Dallas

on the Pratt & Whitney Canada PW306 and PW500 variants. The PW306 powers aircraft such as the Bombardier Learjet 60 and Cessna Citation Sovereign and Latitude, while the PWC500-series powers the Embraer Phenom 300 and legacy and current-production Citations such as the Encore+ and Excel/XLS/XLS+.” That really expanded our Pratt portfolio,” Brancato said of the acquisition.

StandardAero will retain the brand and logos of Dallas Airmotive and its more than 200,000 sq ft of property in Texas’s third-largest city. “We’re going to grow that business,” Brancato said of Airmotive. “The Dallas facility bolts right on and it fits nicely into our other sites,” he added. It also serves as the farthest west “really large” brick-and-mortar site for StandardAero. **J.S.**



Aero Center To Open Spokane, Washington FBO

FBO chain Aero Center has received permission to establish what will be the second FBO at Washington's Spokane International Airport (KGEG). The \$6 million facility will be completed by the first half of 2023, it said.

Aero Center has secured a 25-year lease for 1.86 acres on which it will establish a 5,200-sq-ft terminal with an adjoining 15,000-sq-ft hangar capable of sheltering aircraft up to the size of a Bombardier Global 7500. A separate 10,000-sq-ft hangar will be reserved for the company's maintenance activities. As part of the deal, Aero Center will also lease nearly two acres of ramp space.

KGEG will be the third location for the company. Aero Center's Wilmington, North Carolina FBO is slated to occupy its new facility this month, while at Florida's Lakeland Linder International Airport it will open a permanent facility in the first quarter.

Virginia University Takes Over FBO at Danville Airport

Virginia-based Averett University has taken over FBO operations at Danville Regional Airport following the conclusion of a bidding process initiated by the city of Danville. After the lease on the facility expired, the incumbent that operated the FBO since 1948 was not selected for renewal.

The university, which held its grand opening for the location under the AU Aviation Services name, has had a presence on the field for four decades, with its aeronautics degree program and flight school based at the George J. Falk Flight Operations Center adjacent to the private terminal.

According to general manager John Earl, the 2,000-sq-ft terminal received a facelift over the past several months. It includes passenger and pilot lounges, a snooze room, two conference rooms, showers, and a flight-planning area. The location has a 2,700-sq-ft hangar that can accommodate a light jet or turboprop.

Earl told **AIN** that the facility is set for a major renovation. It

will incorporate the former commercial passenger area, which has been unused since airline traffic ceased at the airport in the late 1990s. That project, which will add nearly 1,000 sq ft to the FBO terminal, is slated for completion by mid-2023.

Arizona Airport To Receive New FBO

Phoenix-area Falcon Field Airport will gain a third FBO after the awarding of a new lease to aircraft brokerage Cunningham Aviation. As part of its five-acre leasehold, the company acquired a recently renovated, fully occupied 30,000-sq-ft hangar formerly operated by McDonnell Douglas. Cunningham is installing a fuel farm consisting of a 20,000-gallon jet-A tank and a same-sized avgas tank and, once that is operational by mid-2022, the location will begin providing fuel sales.

The company expects to break ground around that time on a \$15 million FBO complex that will add a pair of 12,000-sq-ft hangars capable of sheltering the latest ultra-long-range business jets, along with a three-story terminal. With approximately 20,000 sq ft of space, it will offer the standard passenger and crew amenities, plus a rooftop bar/terrace and a gourmet restaurant. The Mesa, Arizona facility is expected to open in late 2024.

Sky Harbour Tapped for Dallas-area Hangar Complex

Aviation real estate developer and operator Sky Harbour has been selected by the town of Addison, Texas, to establish a new private hangar complex at its Dallas-area airport (KADS). Sky Harbour builds turnkey, single-tenant luxury hangars, with its own dedicated ground handling staff and equipment at each location.

KADS will be the rapidly-expanding company's sixth project in the U.S. Its campus at Houston-area Sugar Land Regional Airport is now operational, and construction is underway in Nashville and Miami. At KADS, which is home to two FBOs, Sky Harbour is planning to build six hangars on the east side of the runway for an approximate total of 110,000 sq ft of aircraft storage space, as well as another 2.3 acres of ramp.





Five Rivers Aviation, Livermore Municipal Airport

In operation as the lone service provider at San Francisco Bay-area Livermore Municipal Airport (KLVK) since 2016, Five Rivers Aviation might have some customers looking around for the rivers in question. But according to owner Pete Sandhu, the name is a poignant tribute to his family's heritage. He told **AIN** that his family emigrated to the U.S. from Punjab, India, in the early 1960s so his father could join the space race as a rocket fuels scientist. Punjab translates to five rivers. His company was selected through a bidding process to take over the aircraft servicing operations from the city-owned GA airport, which had run it for more than a half-century.

The FBO has an 11-acre footprint on the field and features a two-story terminal. The 6,000-sq-ft ground floor serves the flying public, while the Alameda County Sheriff's aviation department occupies the upper floor. It offers a passenger lounge; concierge; pilot lounge with putting green, showers, and two snooze rooms; A/V-equipped eight-seat conference room and 80-person meeting/training room; onsite car rental; and crew cars. With a golf course next door, the company has loaner clubs and complimentary driving range tokens.

Given KLVK's proximity to the brainpower of Lawrence Livermore National Laboratory and Silicon Valley, Sandhu said the airport is home to one of the highest concentrations of experimental aircraft anywhere, part of its flock of more than 400 aircraft (including more than a dozen vintage warbirds). He added that Livermore pilots and aircraft owners are eager to share their love for aviation with fellow pilots and visitors. As a result, hangar space at the airport is at a premium.

Five Rivers previously had four hangars totaling 25,000 sq ft, capable of sheltering aircraft up to a Bombardier Challenger 600 series. With aircraft shelter at a premium, the



Owner of Five Rivers Aviation, Pete Sandhu describes the airport as “a really neat community of pilots that are welcoming and supportive of new pilots and children interested in aviation.”

FBO recently added a new complex consisting of a 15,635-sq-ft and a pair of 14,000-sq-ft hangars, which can accommodate the latest ultra-long-range business jets. This was part of a \$9 million project that also added 24,000 sq ft of new ramp and the renovation of an additional 2.4 acres of pavement.

The FBO is currently home to 20 turbine-powered aircraft ranging from a Gulfstream G550 to a Cirrus Vision Jet. Sandhu said the new hangars were designed and built with a 30-foot door height, which will be artificially limited to 28 feet with a temporary façade trim. This will be removed when the classification rules designating hangars with more than that height door as Group I hangars (requiring more stringent fire-suppression systems) are relaxed.

Five Rivers is already in negotiations with the city of Livermore on locations for two more corporate hangars, as well as a third location to accommodate the air assets of several public safety agencies looking to base at KLVK because of its favorable weather. “Most people don't understand how different the weather can be even 10 miles here, we have all these crazy microclimates,” explained Sandhu. While other area airports may be socked in with morning fog, Livermore, known as the “sunny airport,” is typically clear, allowing for immediate departures.

The company is also looking to begin construction on a 4,000-sq-ft covered outdoor event center equipped for year-round usage with heaters, misters, fans, lights, and speakers, with a grill and brick oven and large screens for movies and presentations. Sandhu is hoping the center will be operational by this summer and is planning a slate of fly-in movies, pancake breakfasts, and Young Eagles barbecues.

The Avfuel-branded facility, which is open normally every day between 6 a.m and 7 p.m., pumps approximately 1 million gallons of fuel a year from its fuel farm, which has a capacity of 24,000 gallons each of jet-A and avgas. It is served by a trio of jet fuel tankers (6,000, 5,000, and 3,000 gallons) and two 1,000-gallon 100LL avgas trucks, tended by the location's staff, which was trained through the Avfuel-line service program.

In terms of customer service, Sandhu summarized it as doing whatever it takes. “We want to understand everything that the customer needs and figure out how to make it happen,” he said. That includes using one of the company's rental Cessna 172s to deliver fuel cans to a stranded helicopter at a small area airport that was out of jet fuel. After manually transferring enough fuel for the hop to KLVK to fully refill, Five Rivers charged the operator just \$50 for the fuel. **C.E.**

BY DAVID JACK KENNY

The material on this page is based on reports by the official agencies of the countries having the responsibility for aircraft accident and incident investigations. It is not intended to judge or evaluate the ability of any person, living or dead, and is presented here for informational purposes.

Preliminary Reports

Nine Fatalities in Dominican Gulfstream Crash

Gulfstream GIV-SP, Dec. 15, 2021,
Santo Domingo, Las Américas
International Airport, Dominican Republic

All nine on board were killed when the airplane went down during an attempted emergency diversion to the Santo Domingo-Las Américas International Airport shortly after departure from the La Isabela airport in Higuero. Initial accounts indicate that one of the two pilots reported an unspecified problem with the aircraft when requesting the diversion. The other victims were alternately described as either seven passengers or six passengers and a flight attendant. The chartered jet's intended destination was Orlando (Florida) International Airport. As of this writing, details of the nature of the in-flight anomaly have not been disclosed.

Caravan Destroyed in Texas Mid-air

Cessna 208B, Dec. 21, 2021,
near Fulshear, Texas

Both pilots were killed and both aircraft destroyed when a scheduled cargo flight from Houston's Bush Intercontinental Airport to Victoria, Texas, struck a powered paraglider about 50 miles southwest of its point of departure. Witnesses reported seeing the Caravan in a near vertical nose-down descent; the owner of the property where it crashed described it bouncing up 30 feet after impact. Media photographs confirm the near-total destruction of the Caravan, while "deputies later recovered part of the [paraglider's] equipment nearly 10 miles away." As

of this writing, the NTSB has not released its preliminary report.

Four Fatalities in Air Ambulance Approach Accident

Learjet 35A air ambulance,
Dec. 27, 2021, El Cajon, California

A Learjet air ambulance crashed onto a residential street in El Cajon while maneuvering to land on Runway 27R at Gillespie Field, killing both pilots and both flight nurses on board. The aircraft was returning to base at the end of a short positioning flight after delivering a patient to Santa Ana-John Wayne International Airport in Orange County. The accident occurred at 19:14 local time, nearly two and a half hours after sunset and two hours after the end of civil evening twilight. Prevailing weather at the airport included 3 miles visibility in mist and a broken ceiling at 2,000 feet; archived radar imagery shows rain showers in the vicinity. No ground injuries were reported, though power lines were knocked down and the post-crash fire damaged one house and a vehicle.

After executing a GPS approach to the 4,145-foot Runway 17, the pilot requested an overhead visual approach to 5,342-foot Runway 27R. The tower controller instructed him to cross the airport to the south and enter a left downwind, then cleared the Learjet to land. Radar track data archived on FlightAware show that the circling maneuver was flown at altitudes of 725-775 feet msl, less than 400 feet above the airport's elevation of 388 feet. The pilot asked the tower controller to turn up the runway lights and was told they were already at 100 percent. About 75 seconds after receiving the clearance, the pilot was heard "cursing and then screaming." The jet entered a steep descent in the vicinity of the base-to-final turn.

Final Reports

Error Deemed Likely in Norwegian Gear-up

Beechcraft 200 Super King Air,
April 9, 2018, Stavanger-Sola Airport, Norway

A King Air 200 transporting medical isotopes to a hospital landed gear-up, causing damage to the airplane's nosewheel, fuselage skins, both propellers, and the trailing edges of both flaps. No one was injured. The crew reported a slight left bank after touchdown, to which the captain responded by touching the gear handle to make sure it was down. He later acknowledged having "retracted the handle in a reflex action," then quickly placing it down again.

The crew claimed that this resulted in the landing gear retracting after touchdown, but investigators failed to find corroborating evidence. They concluded that the landing gear was either in transit or completely retracted during the landing.

Overlooked Exhaust Damage Leads To Engine Failure

Garlick Helicopters UH-1H, April 17, 2018,
Talbingo, New South Wales, Australia

Multiple fractures of the exhaust diffuser's inner struts due to high-cycle metal fatigue caused a sudden engine failure during an external load flight, requiring the pilot to make a forced landing into trees. No one on the ground was hurt, but the pilot suffered serious injuries that were likely made more severe by his not having used the helicopter's upper-body restraints. A post-accident teardown by Honeywell, the engine's manufacturer, found that "the exhaust diffuser cracking and material loss from the inner core would have been visible during the most recent Phase Inspection performed 20.8 hours before the accident. Visual indications

of cracking were likely present during the preceding phase inspection(s) as well.” After reviewing the helicopter’s maintenance records, the Australian Transport Safety Bureau (ATSB) concluded that the cracking went undetected through at least two scheduled phase inspections performed by licensed aircraft maintenance engineers (LAMEs) and no fewer than 34 daily preflight inspections conducted by four different individuals.

The accident occurred on the twelfth in a series of brief long-line flights (about five minutes round trip) to move components of a disassembled drill rig used in geotechnical survey work in support of a proposed hydroelectric project. Following a brief hold while the ground crew prepared the drill rig motor for lifting, the pilot began “a very slow approach” to the lift site, only to be advised that additional time was needed to check the rigging. To minimize rotor wash on the ground crew, he began to climb. Downloaded GPS data showed that the helicopter had reached an altitude of 200-250 feet agl at an airspeed of 20-25 knots when “the pilot heard a loud mechanical ‘screaming’ noise and started planning for a forced landing.” An audible alarm was followed by the yaw accompanying power loss. Witness reports of smoke emanating from the engine bay were confirmed by ground-based cameras at the site.

To avoid endangering ground personnel near the site’s helipad, the pilot instead made an autorotative approach to the Yarrangobilly riverbed to the southwest, jettisoning the hoist line and then flaring as the helicopter reached the trees. The helicopter came to rest nose-down on the riverbank. Members of the ground crew extinguished a small fire in the engine bay, extricated the pilot, and administered first aid until emergency responders arrived on the scene. The pilot subsequently confirmed he could not maintain the necessary view of the ground while wearing the aircraft’s upper torso restraints—a point confirmed by a survey of other Australian vertical reference pilots—and the ATSB confirmed that the nature of the mission required

operating the helicopter in the “avoid” region of its height-velocity diagram.

The exhaust diffuser’s inner struts are critical engine components supporting the rear of the power turbine assembly via the number 3 and 4 bearings. Failure of the struts allowed the power turbine to move aft far enough for the rear tapered section of the power turbine’s drive shaft to make contact with the rear shaft of the compressor assembly, which rotated in the opposite direction. The resulting friction and deformation of the rear compressor shaft then brought the compressor assembly into contact with the walls of the engine case, causing catastrophic engine failure. Following the accident, the operator’s maintenance contractor was acquired by another company that instituted computer-based trend maintenance and improved vibration testing. A joint hazard assessment by the site and helicopter operators also formalized risk management practices for mountain flying and external lift operations, including assuring access to emergency landing sites.

Engine Fire Traced to Incorrect Lock Washer

Airbus Helicopters AS355F1,
Bourne End, Buckinghamshire,
United Kingdom, March 2, 2021

Failure to replace the serrated lock washer supplied with the clamp with the correct folding-type lock washer called out under a separate part number led to the fracture of the V-band clamp securing the right engine’s inboard exhaust nozzle. The nozzle then separated from the engine’s exhaust collector and became lodged in the fuselage’s exhaust duct, blocking it and diverting exhaust gases back into the engine bay and cowling. Subsequent examination found that several of the teeth on the serrated lock washer had broken, allowing the clamp to loosen; fracture signatures on its bracket were consistent with low-load, high-frequency propagation of a pre-existing fatigue crack.

The helicopter was working on a film set. The day’s shooting began with several takes of a ground shot in which an actor boarded the ship with the engines running. Only the left engine was started for this sequence, and it was then shut down while the pilot and film crew prepared for an aerial filming sequence. After restart, recorded images show some smoke drifting from the exhaust duct with the helicopter on the ground, intensifying as power was increased for take-off. Shortly after it lifted into a 20-foot hover, the film crew’s aerial coordinator radioed the pilot to advise of smoke emanating from behind the cockpit. Though engine indications remained normal, the pilot made an immediate precautionary landing, shutting down both engines as the aerial coordinator reported that the smoke was increasing.

Flames became visible 10-15 seconds later and the pilot reacted to the FIRE RH warning light by discharging the right engine’s fire bottle, which extinguished the flames. The right engine and gearbox had been removed, repaired, and reinstalled 2.6 flight hours earlier due to elevated chip detector readings. Follow-up inspection found that the right engine’s vibration level was close to its service limit due to damage to the compressor module bearings, and it was subsequently replaced. Excessive vibration was cited as a likely factor in the clamp’s failure. The manufacturer responded by clarifying the helicopter’s maintenance manual, to explicitly require installation of the correct washer. ■



AINalerts
sent right to your inbox

BY GORDON GILBERT

JUST AROUND THE CORNER

March 21, 2022

NEW

Europe: Electric/Hybrid Engines

EASA has issued a notice of proposed amendment (NPA) that aims to close the certification gaps that pose compliance difficulties for crewed aircraft that do not use conventional piston or turbine engine power. Currently, regulatory exemptions are needed to obtain approval for pending new aircraft designs intended to be powered by electrical batteries and engines. The NPA would also integrate into the regulations hybrid powerplant systems that transform fossil-fuel energy into electrical energy. Comments on the proposal are due by March 21, 2022.

Within 6 Months

NEW

March 22, 2022

U.S.: Nashville Area Airspace

The FAA is proposing to modify the airspace over Nashville International Airport in Tennessee. Under the proposal, existing flight paths would not change but the area where pilots are required to interact with ATC would expand. The agency says the “airspace change is to better manage the complexity and volume of aviation activities in the area.” Input from a virtual public meeting, scheduled for February 22 from 6 to 8 p.m., will assist the FAA in drafting an official notice of proposed rulemaking (NPRM). Although the NPRM won’t be published until early 2022, the FAA has already set March 22, 2022, as the comment deadline on the proposal.

April 30, 2022

Colombia: ADS-B Out Mandate

Starting on April 30, 2022, unless specifically authorized by ATC, no person may operate an aircraft within Colombian territory in any controlled airspace or other airspace in which a transponder is required without ADS-B Out operational capability.

June 10, 2022

U.S.: Pilot Records Database Reporting

By June 10, 2022, begin reporting information to the Pilot Records Database about

individuals employed as pilots in commercial operations (including Part 135 air taxi and Part 91 air tour operators). Required information encompasses drug and alcohol testing results, training, qualification, and proficiency records, final disciplinary action records; records concerning separation of employment; and verification of a motor vehicle driving record search.

Within 12 Months

Sept. 16, 2022 and Sept. 16, 2023

U.S.: UAS Remote ID

New FAR Part 89 requires that after Sept. 16, 2022, no unmanned aircraft system can be produced without FAA-approved remote ID capability. After Sept. 16, 2023, no unmanned aircraft can be operated unless it is equipped with remote ID capability as described in new Part 89 or is transmitting ADS-B Out under Part 91.

Nov. 13, 2022

Australia: Airport Certification

Revised Australian airport certification regulations (CASR Part 139) and an accompanying revised manual of standards (MOS) went into effect on Aug. 13, 2021. Under a transition period, operators of certified airports have until Nov. 13, 2022 to fully comply with the requirements and MOS publications.

Dec. 12, 2022

Canada: Duty/Rest Regulations

Revisions to duty time and rest regulations for Canadian-registered commuter and air taxi operators of turbine and non-turbine aircraft (CAR Parts 704 and 703) go into effect on Dec. 12, 2022. Transport Canada said the changes include: prescribed flight and duty time limits that respect modern scientific research and international standards to limit the amount of time a crew-member can be on the job; and fatigue risk-management systems that will require operators to demonstrate that any variance to the prescribed flight and duty time limits will not adversely affect the level of flight crew fatigue or alertness.

Dec. 31, 2022

New Zealand: ADS-B Out Mandate

Covid-19 pandemic implications prompted New Zealand to extend its ADS-B out compliance date for one year from the previous deadline of Dec. 31, 2021. The ADS-B provisions, already mandatory for aircraft flying above 24,500 feet, will apply in the rest of New Zealand’s controlled airspace by Dec. 31, 2022.

Dec. 31, 2022

Mexico: CVRs and FDRs

Cockpit voice and flight data equipment requirements for turbine aircraft

operations (including air taxis) go into force incrementally from Dec. 31, 2020 through Dec. 31, 2022 based on the number of aircraft that are in an operator's fleet. The rules generally apply to turbine airplanes with 10 or more passenger seats and large turbine helicopters.

Beyond 12 Months

NEW

June 2, 2023

U.S.: Aircraft Fueling

The National Fire Protection Association (NFPA) is granting a 24-month extension to the compliance deadline of its standards that call for airport fueling vehicle loading racks to be equipped with automatic shutoff devices that are compatible with fueling trucks. This extension to June 2, 2023 applies only to airports that adopted the 2022 revision of NFPA 407. The original compliance date of June 2, 2021, still applies for airports operating under the 2017 revision.

June 7, 2023

Europe: ADS-B Out Mandate

The ADS-B Out requirement in Europe is Dec. 7, 2020, for aircraft receiving their certificate of airworthiness (C of A) on or after December 7. Aircraft that obtained their C of A between June 6, 1995, and Dec. 7, 2020, must arrange for retrofits to meet the ADS-B Out mandate by June 7, 2023. Both deadlines apply only to aircraft with an mtow exceeding 5,700 kg (12,566 pounds) or having a maximum cruising true airspeed capability greater than 250 knots. Aircraft with a C of A dated before June 6, 1995 are exempt from European ADS-B requirements.

For the most current compliance status, see:

[www.ainonline.com/aviation-news/
compliance-countdown](http://www.ainonline.com/aviation-news/compliance-countdown)

Looking For An Aircraft?

Acquiring an aircraft that meets your needs and minimizes your risk is time-consuming and complicated. As with any major investment, you should hire a consultant who works in the market full-time. Our comprehensive acquisition service is designed to consult with you and help you identify your true aircraft needs. Our experts then locate, evaluate and negotiate an aircraft purchase on your behalf.

Experience. Unlike any other.
www.DA.aero/aircraftsales



Ann Pollard



Leah Alexander



**DUNCAN
AVIATION**

Duncan Aviation has been assisting companies around the world with the sales and acquisition of aircraft for 65 years.

People in Aviation

BY KERRY LYNCH

The FAA has named **Billy Nolen**, a former airline captain who most recently held a leadership role with WestJet Airlines in Canada, to serve as associate administrator of aviation safety. Previously v-p for safety, security, and quality for WestJet, Nolen brings a long airline background to the agency, including Qantas Airways, American Airlines, and Airlines for America (A4A).



GREG FELL

JetNet named **Greg Fell** to lead the company in a newly created CEO position. Ownership of *JetNet* is remaining with the Esposito family, and Tony Esposito remains president, owner, and majority shareholder. Fell brings a 30-year background of senior management,

including strategic development and IT infrastructure growth, across a number of industries to his new role, including as CEO for the social media company Display Social, COO of Gama Aviation, and positions with Ford Motor Co. and Terex.



NIKOLAY KOLESOV

Nikolay Kolesov was appointed director-general of *Russian Helicopters*. He succeeds **Andrei Boginsky**, who has held this position since 2017 but has transferred to United Aircraft Corporation as the deputy director-general for civil aviation and as the

director-general of Irkut Corporation. Kolesov had been the head of Concern Radio-Electronic Technologies since 2009.

Lilium appointed **Karim Jalbout** chief people officer. Jalbout recently was a lead partner for private equity and technology at Egon Zehnder and also led global customer propositions and sales at Sony Ericsson Mobile.

Stevens Sainte-Rose joined *Wheels Up Experience* as chief people officer. Sainte-Rose has human resources experience across a range of industries, previously as senior v-p of HR at The Coca-Cola Company International, as chief human resources officer at U.S. Walgreens, chief HR and transformation officer at Dawn Foods Global, and most recently chief HR officer at Parallel Inc.

Gulfstream Aerospace promoted **Michael Swift** to regional senior v-p for Europe, the Middle East, Africa, and the Indian subcontinent, succeeding

Roger Sperry. Sperry is retiring at the end of the year after serving with Gulfstream for 20 years and in the business aviation industry for nearly 50, also including with Cessna, Learjet, and Galaxy Aerospace. Swift joined Gulfstream in 2018 as a regional vice president of sales after holding aircraft financing positions with Bank of America Merrill Lynch and Textron Financial. In addition, **Chad Beaulieu** was promoted to regional v-p of sales for the south-central U.S. He succeeds **Sherman Griffith**, who is retiring after 15 years with the company. Beaulieu previously was regional sales manager for the south-central region and has also served with business aviation organizations such as Leviate Air Group, Dallas Jet International, and Starbase Jet. Meanwhile, **Tim Wood** has rejoined Gulfstream as regional sales manager for the Middle East, Africa, and the Indian subcontinent. Previously with the Royal Air Force, Wood served with Gama Aviation before originally joining Gulfstream in 2018.

Mente Group named **Jay Bushouse** managing director for the Midwest region. Bushouse, a flight instructor and airline transport rated pilot with more than 4,500 flight hours, previously served as a sales director for Textron and also has been involved in sales and marketing, revenue management, and planning in the commercial real estate sector.

Jet Linx promoted **Scott Wilbanks** to senior v-p of aircraft management sales. Wilbanks, who has 20 years of sales and business development experience, joined Jet Linx in 2014 in Atlanta as director of private jet card sales and most recently was v-p of regional aircraft management sales.

Linda Peters, who has managed exhibitor activities for NBAA's conventions and other events, retired after spending nearly the past 28 years with the association. Peters had joined the association in 1994 after serving with the Helicopter Association International.

The *Women in Aviation and Aerospace Charter* (WIAAC) appointed **Victoria Foy** as co-chair. She



JAY BUSHOUSE



VICTORIA FOY

succeeds **Jacqueline Sutton**, who had served as co-chair since July 2020. Foy is executive v-p of Safran Seats and has 15 years of senior leadership experience.



DIANA SCHNEIDER

Four Corners Aviation named its initial senior leadership team: **Diana Schneider**, v-p of client services; **Ray Bennett**, v-p of sales; **Mike Jefcoat**, v-p of operations; and **Phil Leone**, v-p of safety and security. Schneider, who joined *Four Corners Aviation's*

predecessor in 2019, began her aviation career as an accountant/controller in 2007 and has a financial, managerial, and organizational background through other industries as well. Bennett has 30 years of aviation sales experience, including management roles in the areas of avionics, fractional aircraft, aircraft manufacturing, parts distribution, and aircraft management. Jefcoat spent 18 years as an airline pilot, including with Delta Connection, and also has served as the chief pilot and director of operations for FlightWorks, a consultant with ATP Flight School, and an FAA-approved check airman on the Hawker 800 and Bombardier Challenger 300. Leone, meanwhile, has 26 years of experience in the New York Air National Guard, where he served as an aircraft commander, instructor, and evaluator in the C-5A Galaxy, aircraft commander in the C-17 Globemaster, and chief of safety for the 105th Air-lift Wing in Newburgh, New York.



DAVID CAPORALI

JSSI named **David Caporali** v-p of business development for Latin America. Caporali, who has 15 years of industry experience, previously was director of aircraft sales for Viking Air Limited and also has served with Lider Aviação, where he specialized in

regional sales and distribution of Hawker Beechcraft products in Brazil and North America.

MyGoFlight added **Mitch Biggs** to its senior management team leading sales and business development. Biggs formerly was v-p of sales and marketing at Avidyne Corporation and has held senior sales positions with several national retailers.

The *General Aviation Manufacturers Association* (GAMA) hired **Alex Burkett** as general counsel and director of safety and regulatory affairs.

Burkett joins GAMA after serving as the staff director and special advisor on aviation for the U.S. House aviation subcommittee and also has served as director of regulatory compliance for United Airlines and as an attorney with the National Transportation Safety Board.

Jet East hired **Patrick Moylan** to serve as v-p of safety. A former air traffic controller with the U.S. Marine Corps, Moylan most recently was a senior associate at FBO Partners and also has served as senior director of health, safety, and environmental for Signature Flight Support and held several safety positions supporting the FAA's Office of System Safety and NextGen.

Air Charter Service appointed **John Castellano** as v-p of commercial sales. Castellano has 18 years of private aviation experience, previously working with companies including Jet Aviation, Private Jet Services, NetJets, and Marquis Jet. ■

FINAL FLIGHT

Charles Schneider, a software engineer who co-founded *MyGoFlight* in 2010, died December 17 after being in an aircraft crash the previous day near McGhee Tyson Airport in Knoxville, Tennessee. Schneider, who served as CEO of *MyGoFlight*, had been traveling on business in a Cirrus SR22 piston single when the aircraft crashed at 9:20 a.m. on December 16, the company said, adding the cause of the accident is unknown. According to the Aircraft Owners and Pilots Association (AOPA), the CAPS ballistic parachute was deployed, but the aircraft crashed and was destroyed in the accident. *MyGoFlight* posted that Schneider had died that next morning at UT Medical Center in Nashville, Tennessee.

Schneider—who had a background that included leadership roles at companies such as Booz Allen & Hamilton, Oracle, MDC Holdings, and Builder Sourcing—founded *MyGoFlight* after obtaining his pilot license and deciding he did not want to use paper charts, the company said. Instead, he decided to use a computer but had a difficult time keeping it on his lap. Shifting to an iPad, he determined a need to secure it and, *MyGoFlight* said, “Our first product, the iPad Kneeboard, received so much attention and demand, a business was born.”

The business has since expanded to numerous mounts, cases, cradles, flight bags, luggage, anti-glare glass, and into the first certified head-up display for general aviation.

› continued from page 10

bizjet accidents in 2021 occurred during Part 91 flights.

The six U.S.-registered business jet accidents (with fatalities shown in parenthesis) last year are: January 9, Citation V (one); May 4, Gulfstream GIV (one); May 29, Citation 501 (seven); July 26, Bombardier Challenger 605 (six); September 2, Citation XLS (four); and the crash on December 27 of a Bombardier Learjet 35A (four). There were no official reports of mishaps involving operations under Part 91K.

Instances of non-fatal accidents involving U.S.-registered turboprops totaled 18 in both 2021 and 2020. However, fatal accidents increased nearly 30 percent year over year: Seven accidents took the lives of 17 people in 2020 versus 10 crashes and 23 fatalities last year (the same number who perished in U.S. jet accidents in 2021). Updated information shows that all fatal N-numbered turboprop accidents occurred under Part 91.

Fatal accidents involving N-numbered turboprops last year are: February 7, Cessna Conquest (two fatalities); April 23, Swearingen SA226 (two); May 5, Mitsubishi MU-2 (three; one on ground); July 10, King Air C90 (two); July 18, C90 in Mexico (three); August 20, TBM 700 (one); September 28, Rockwell 690 (three); October 8, Cessna Turbine P210 (four); November 15, King Air E90 (two); and December 10, Piper Meridian (one).

In 2021, two non-U.S. business jets had fatal accidents that claimed 10 lives compared with four accidents and 14 fatalities in 2020. On April 20, the co-pilot was killed in the crash of a Learjet 35A in Brazil during flight testing/training. On December 15, all nine occupants died in the crash of a chartered GIV in the Dominican Republic. Fatal accidents of non-U.S. registered turboprops grew from two to eight, and fatalities skyrocketed from nine in 2020 to 40 in 2021.

Our data does not include mishaps involving solely cargo or military operations, illegal flights, shootdowns, and intentional crashes. ■



JAMES HOLAHAN (1921-2015), FOUNDING EDITOR, WILSON S. LEACH, FOUNDER & CEO

EDITOR-IN-CHIEF – Matt Thurber

NEWS EDITOR - AIN PUBLICATIONS – Chad Trautvetter

SENIOR EDITORS – Charles Alcock, Curt Epstein, Kerry Lynch, Gregory Polek – Air Transport, Jerry Siebenmark

CONTRIBUTORS

David Donald – Defense, Mark Huber – Rotorcraft, Jennifer Leach English, David Jack Kenny – Safety
Gordon Gilbert, Richard Pedicini, James Wynbrandt

PRODUCTION MANAGER – Martha Jercinovich

GRAPHIC DESIGNERS – John A. Manfredo, Grzegorz Rzekos

DIRECTOR OF VIDEO – Ian Whelan

CHIEF OPERATING OFFICER – Dave Leach

VICE PRESIDENT SALES & MARKETING – Karl H. Elken

ASSOCIATE PUBLISHER – Nancy O'Brien

ADVERTISING SALES

Michelle James – Midwestern U.S., Western U.S./Western Canada/Asia Pacific, +1 (520) 343-0236

Nancy O'Brien – Events, +1 (530) 241-3534

Joe Rosone – Mid-Atlantic U.S./Southeast U.S./Caribbean/Brazil, +1 (301) 693-4687

Diana Scogna – Europe/Middle East, +33 6 62 52 25 47

Victoria Tod – Northeastern U.S./Eastern Canada/Great Lakes U.S./United Kingdom, +1 (203) 733-4184

Yury Laskin – Russia, +7 05 912 1346

AUDIENCE DEVELOPMENT MANAGER – Nicole Bowman

MARKETING AND CLIENT SERVICES MANAGER – Lisa Valladares

SALES AND MARKETING COORDINATOR – Adam Brandwein

SOCIAL MEDIA MARKETING – Zach O'Brien

SALES ADMINISTRATOR – Cindy Nesline

DIRECTOR OF FINANCE & HUMAN RESOURCES – Michele Hubert

ACCOUNTS PAYABLE – Mary Avella

ACCOUNTS RECEIVABLE – Bobbie Bing

U.S. HEADQUARTERS

214 Franklin Ave., Midland Park, NJ 07432, +1 (201) 444-5075

Advertising Inquiries: +1 (201) 345-0085, adsales@ainonline.com

Circulation Inquiries: +1 (201) 345-0085, subscriptions@ainonline.com

WASHINGTON, D.C. EDITORIAL OFFICE:

Kerry Lynch (business aviation): klynch@ainonline.com, Tel: +1 (703) 969-9195

EUROPEAN EDITORIAL OFFICE:

Charles Alcock: calcock@ainonline.com, Tel: +44 7799 907595

AIN MEDIA GROUP EXECUTIVE TEAM

Wilson Leach, Dave Leach, Jennifer Leach English, Karl H. Elken, Matt Thurber, Michele Hubert, Nancy O'Brien

Aviation International News (ISSN 0887-9877) is published thirteen times per year (monthly plus a special NBAA Convention News issue in November).

Periodicals postage paid at Midland Park, N.J., and additional mailing offices. **Postmaster:** Send address changes to Aviation International News, P.O.

Box 8059, Lowell, MA 01853 USA. Allow at least eight weeks for processing. Include old address as well as new, and an address label from a recent issue if possible. Subscription inquiries: +1 (201) 345-0085 or email: subscriptions@ainonline.com.

Aviation International News is a publication of The Convention News Co., Inc., 214 Franklin Ave., Midland Park, NJ 07432; Tel.: +1 (201) 444-5075.

Copyright © 2021 All rights reserved. Reproduction in whole or in part without permission of The Convention News Co., Inc. is strictly prohibited. The Convention News Co., Inc. publishes Aviation International News, AINAlerts, AIN Air Transport Perspective, AINtv, Business Jet Traveler, BJTwaypoints,

ABACE Convention News, Dubai Airshow News, EBACE Convention News, Farnborough Airshow News, FutureFlight.aero, HAI Convention News, LABACE Convention News, MEBA Convention News, NBAA Convention News, Paris Airshow News, Singapore Airshow News, Mobile Apps: Aviation

International News; AINonline. PUBLICATION MAIL AGREEMENT NO. 40649046 RETURN UNDELIVERABLE CANADIAN ADDRESSES TO:

PITNEY BOWES INTERNATIONAL MAIL, STATION A, P.O. BOX 54, WINDSOR, ON, N9A 6J5, returns il@imex.pb.com.



For feedback, letters to the editor, or other editorial needs, please contact AIN's Editors at ainedit@ainonline.com

Aviation's finest meet...

... at Asia's most influential aerospace and defence event



Reconnect with aerospace leaders
Discover cutting edge technology and solutions
Transform the future of aviation

Flying & Static Displays | Trade Programmes | Sustainable Aviation & Aviation CEO Forums

Register your interest at enquiries2022@singaporeairshow.com

Limited passes available due to safe management measures



**SINGAPORE
AIRSHOW
2022** 15-18 Feb
WHERE AVIATION'S FINEST MEET

Organised by:

experia
events that influence

Official Media Partner:

AVIATION WEEK
NETWORK

Supporting Media Partners:

AIN
PUBLICATIONS

FlightGlobal

Made Possible In:

SG Singapore
Passion Made Possible

SIMILARITIES TO A FIGHTER JET ARE PURELY INTENTIONAL.



Digital flight control climbs higher on the Falcon 10X, with more fighter jet technologies for smooth, safe flying. A Smart Throttle. A Recovery Button. And simplified, more intuitive, eyes-up interfaces. All purely superior. **The Falcon 10X. Simply perfect.**

Falcon 10X

WWW.FALCON10X.COM | FRANCE: +33 1 47 11 88 68 | USA: +1 201 541 4600

**DASSAULT
AVIATION**