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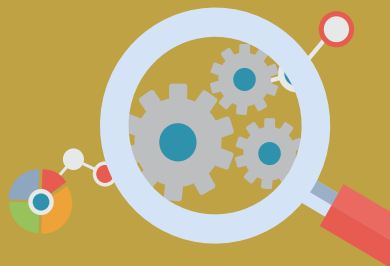
Rescue helicopter photo courtesy of Zurich, Switzerland-based Rega (shorthand for Rettungsfugwacht)



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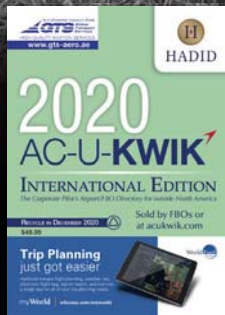
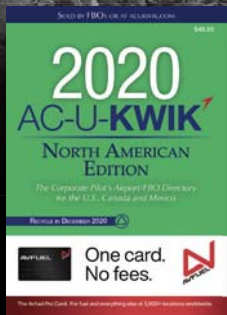
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Yesterday's News

New fuel, old friends

“AVIATION IS UNDER SCRUTINY.” SO STATED DASSAULT CHAIRMAN Eric Trappier during last fall's NBAA convention. During the gathering it was echoed again and again among other exhibitors, speech makers, panelists and in demonstrations at the Las Vegas Convention Center and convention airport. That close monitoring by the masses is focused almost entirely upon aviation's impact on the environment.

While some people assert that human activity — be it growing alfalfa, operating powerplants, grilling steaks or flying off on a honeymoon — has no impact on the Earth's climate, their position has been largely eclipsed by events. Moreover, some related facts, such as propulsion engines burning fossil fuels produce carbon dioxide (CO₂), are indisputable.

Another fact is the mounting international opposition to certain such activities, with aviation very much in the fore. That working to increase efficiency is part of aviation's DNA, or that the U.S. Department of Energy calculates air travel accounting for less than 3% of domestic greenhouse gas emissions — with business aviation a mere sliver of that — seems of little consequence to those groups bent on “plane shaming.” And while there's a movement among several governments to impose new passenger taxes to slow airline travel, any emissions-per-passenger levy could be devastating to business aviation.

Quite sensibly, our community has pledged to protect the environment by achieving carbon-neutral growth this year, and by halving its 2005 emissions by 2050.

Aviation is investing in all manner of technology — ranging from new coatings to ever more efficient engines — to help realize that goal. But as Avfuel CEO Craig Sincock notes in this month's *Fast Five*, there are three principal paths: Electrification; carbon offsets; and sustainable alternate jet fuel, or simply, sustainable aviation fuel (SAF).

While electric propulsion shows promise — a Beaver flew briefly on battery power in December — it will likely be a long while before av-volts can vault oceans. And critics hold that carbon offsets simply permit continued pollution. However, SAF is seen by many as a critical green technology. Essentially, it refines non-fossil source material — think, used McDonald's frying oil — into fuel that can be blended as a drop-in with today's Jet-A yet, by comparison, reduces CO₂ by as much as 85% over its life cycle.

At the moment, only a handful of outfits — just one in the U.S. — are producing SAF, and it's costly. But more plants are coming on line and airlines, including Delta, KLM, Lufthansa, Swiss and United, are moving to embrace the new fuel. That should help up production, lower costs and spur distribution. Meanwhile, almost all business aircraft manufacturers and trade groups are championing it as well.

Business aviation plays an important role in world

commerce, government, and medical and crisis relief. It has good stories to tell and should focus on those, while making plane shaming yesterday's news. Think, drink SAF.



Murray Smith, Professional Pilot magazine

I can see that impish, mischievous smile as he approaches, places a hand on my arm and begins to tell me, again, about the wise man on the mountain top intoning, “Songbirds don't fly at night . . .,” or the overlong tale with the oft repeated punchline “. . . it's only a hobby,” or delivering the latest status report on Mildred, the office plant survivor of past assaults, or so on and so forth. And so it goes. Or went, for decades.

Sadly, Murray Smith, the effervescent founder, publisher, dogged salesman, chief promoter and internal (at times infernal) engine of *Professional Pilot* magazine passed away in his sleep Christmas morning, midway through Hanukkah. I'd known he'd been sidelined for a while with medical issues but had no idea of their severity. The news hit hard; Murray was a dear friend who, on a leap of faith, changed the course of my career.

He was a fixture at business aviation gatherings, but much more than that, Murray was a force within the community. He was passionate about business aviation, its tools, record and people. It was he who devised the cover formula for his magazine: President, Pilot, Plane and Product, which pretty much implies Purpose as well.

He took special pride in the fact that he, not some faceless corporation or large institution, was responsible for *Pro Pilot's* staff and future — and didn't shy away from securing them, as anyone on the receiving end of his sales pitch can attest.

The number 7777 was Murray's great gift to me. On that date, July 7, 1977, he turned over command of *Pro Pilot's* editorial to a young editor whose managerial skills were unproven and untested and then let him fly. I've not touched down since.

A sheynem dank, Murray, and God bless. **BCA**

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NEWS / ANALYSIS / TRENDS / ISSUES

► **SAFRAN HAS JOINED SUPERSONIC JET DEVELOPER AERION** as a “major partner” for its 12-seater AS2 Mach 1.4 corporate transport currently in development with Boeing and engine supplier GE Aviation. Safran will support the preliminary design of the “first-ever modern supersonic business jet,” said Aerion, adding that two Safran companies specializing in landing gear and nacelles have already joined the program. The teaming with Safran comes after a recent flurry of supplier announcements, including the selection of GE Aviation for the electrical power system and GKN Aerospace to provide the empennage and part of the electrical system. Safran Landing Systems is designing the braking and landing gear system at its engineering



centers in Canada and France. Safran’s nacelles company, based in France, will design the AS2 nacelles, including the inlets, fan cowl doors and thrust reverser. The design and initial integration planning work for the electrical system will meanwhile be conducted at GE’s Electrical Power Integration Centre in Cheltenham, UK. The final integration of the system will take place at GE’s Electric Power Integrated Systems Center in Dayton, Ohio. GKN is designing the aircraft’s empennage at its engineering centers in the Netherlands and Romania. The addition of Safran to the development team is another significant boost for Aerion, which in February 2019 announced it was partnering with Boeing on the AS2. Later the same month it unveiled an agreement with Spirit AeroSystems for the preliminary design of the composite pressurized section of the forward fuselage. Both agreements followed the 2018 deal with GE Aviation covering the proposed development of the purpose-designed Affinity engine for the AS2. Aerion, which has selected an advanced version of Honeywell’s Primus Epic avionics system, also picked GKN to provide the electrical wiring and interconnection systems for the AS2.

► **LEONARDO HELICOPTERS HAS COMPLETED THE FIRST FLIGHT** of the fourth prototype AW609 commercial tiltrotor. The aircraft is fully representative of the final configuration and includes the Collins Pro Line Fusion avionics suite. It took to the air from



Leonardo’s facility in Philadelphia on Dec. 23, although the company announced the flight on Dec. 27. For the first time, Leonardo has three AW609s flying. The AC1 is based in Italy and the AC3 and AC4 are based in Philadelphia supporting certification activities. The second prototype was lost in a fatal crash in 2015. The company

says the milestone means the program is now entering the final program development and ground- and flight-testing stages. Leonardo hopes to get the long-awaited certification signed off this year and the first customer delivery by the end of the year. Test pilot Dan Wells said the aircraft performed “beautifully” thanks to rig and groundwork carried out by engineering and production teams. “The new touchscreen cockpit layout really proved its value and the aircraft exceeded all of our expectations,” Wells said. Leonardo is now building the first two production-standard AW609s in Philadelphia and confirms that Era Group will be the first customer for the aircraft. Among the changes on production models are a wider, clamshell entry door and strengthened landing gear. Current plans see the aircraft being certified with a maximum-gross weight of 17,500 lb. There will then be an effort to reach the planned 18,000 lb. Initial configuration for certification will be for passenger carriage, with kits for missions such as search and rescue likely to follow later.

Clay Lacy Performs 10-Year Inspections for Phenoms



Clay Lacy Aviation is performing 10-year inspections for Embraer Phenoms at Embraer service centers at Van Nuys Airport and McClellan-Palomar Airport near San Diego. Phenom 100 aircraft built in 2010 must be inspected in 2020. Clay Lacy completed the first Phenom 100 inspection in October.

ExecuJet Malaysia Receives FAA Certification for Falcons



ExecuJet MRO Services Malaysia, a subsidiary of Dassault Aviation Co., has earned FAA certification to perform line and heavy maintenance on Dassault business jets. The certification includes the Falcon 2000 LX, LXS and EX-series, 7X and 8X. ExecuJet’s facility at Subang Airport in Kuala Lumpur is now certified as an approved foreign repair station to carry out the maintenance work on these aircraft that are on the U.S. registry.



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Bombardier Global 5500, Global 6500 Get FAA Approvals



Bombardier has received FAA type certification of its Global 5500 and Global 6500 business jets. The milestone follows Transport Canada and European Aviation Safety Agency (EASA) certification and entry-into-service in September. The two aircraft build on the Global 5000 and Global 6000 and offer 700 and 600 nm of additional range, respectively, a 13% fuel burn advantage, revamped wing and updated Rolls-Royce BR10 Pearl engines with 9% more thrust.

Duncan Uses Hydrographic Printing for Interiors



Duncan Aviation has delivered two aircraft, a Gulfstream 150 and Bombardier Challenger 300, with interior elements made with hydrographic printing. The aircraft are the first to receive countertops created by hydrographic technology, a new finish option from Duncan. In the future, Duncan will use hydrographics on other applications, including dividers, monuments and card table inserts. The 3-D printing technique opens up a variety of aesthetic options for interior finishes without changing cabinet veneer.

▶ **ITALIAN MANUFACTURER PIAGGIO AEROSPACE HAS SIGNED** a \$221 million contract with the Italian Ministry of Defense for nine P.180 Avanti EVO turboprop aircraft. Under the same contract, Piaggio will execute a \$144 million retrofit of a P.180 operated by the Italian armed forces. The order came five days after Piaggio signed a \$55 million agreement involving the Chinook helicopter's engines. "This represents for Piaggio Aero-



space a turning point. With the restart of aircraft production, we will also be able to gradually reintegrate workers currently into temporary layoffs," said Vincenzo Nicastro, Piaggio Aerospace extraordinary commissioner. **"Nevertheless, we are not going to stop here. We will continue to work on the private market,** with the aim of finalizing new, significant orders." In October,

Nicastro announced that Piaggio would launch a public tender for the sale of the company. Piaggio is nearly ready to launch the tender, he said. The most recent agreement was formalized by the Directorate of Aeronautical Armaments and Airworthiness and Nicastro. Deliveries will take place over four years. Five aircraft will be configured for passenger transport and ambulance services and four others for radio measures, the company said.

▶ **THE AIRCRAFT OWNERS AND PILOTS ASSOCIATION** has announced its three 2020 Fly-in Locations. The first of the two-day events will be on May 29-30 in San Marcos, Texas (KHYI). The second will take place June 19-20 in Casper, Wyoming (KCPR). The season will conclude Sept. 11-12 in Rochester, New York (KROC). Fly-in festivities will include car shows, rodeos, music, concerts, airshows, and other activities. The Fly-in in San Marcos is co-locating the event as the featured sponsor with Go Wheels Up! Registration for all 2020 Fly-ins will begin this month.

▶ **ITS DEADLINE FIXED A DECADE EARLIER, THE YEAR 2020** dawned on the "Age of ADS-B." As of Jan. 1, aircraft not equipped with Automatic Dependent Surveillance – Broadcast Out will have a difficult time operating in most U.S. airspace. The technology forms the foundation for the FAA's NextGen by moving from ground radar and navigational aids to precise tracking using satellite signals. "We will now be operating in an ADS-B world, and I think that this is something that should improve our environmental footprint," said Ed Bolen, president and CEO of the NBAA. "We are transitioning into the ADS-B era in relatively good shape." Meanwhile, the agency has made it clear it will not issue inflight authorizations to noncompliant aircraft, according to Mike Mertens, Duncan Aviation's manager of regulation compliance. Permission must be requested before takeoff. "At least 60 min. before a flight, preferably considerably earlier, pilots flying aircraft that are not equipped with ADS-B Out must file their flight plan with the FAA and wait for permission from the ATC in the airspace through which they intend to fly," Mertens said. "If ATC is busy, airspace is congested or there's inclement weather, permission to fly may be denied." Furthermore, he cautioned, the FAA will not grant exceptions more than once or twice. At this point, non-equipped aircraft will likely face severe restrictions and downtime. Duncan has also received questions from owners about how soon it can upgrade the aircraft it has intended to sell without the upgrades. Non-compliant aircraft are slow to move in the used market. In the meantime, the NBAA and some in the business aviation community have been concerned whether their privacy could be protected with the new mandate, Bolen said. As technology evolved to allow real-time tracking and sharing of flight data, the NBAA worked with the FAA to develop opt-out options to limit the distribution of aircraft and flight information over the internet.

► **THE DEC. 27 EXPLOSION THAT ROCKED TEXTRON** Aviation's Plant 3 in Wichita appears not to have harmed the company's Cessna 408 SkyCourier turboprop program located inside the building. The blast occurred when a nitrogen line burst near its autoclave, injuring at least 15 people and collapsing the north end of the facility, which



was part of the former Beechcraft factory. No one was killed. Currently the facility houses the company's Composite Center of Excellence and is used for the construction of experimental aircraft. In December, the company completed the SkyCourier's mating of the wings to the fuselage of the prototype aircraft inside the plant. There, Textron also has been progressing with the

assembly of the prototype and an additional five flight and ground test articles. The company said the explosion did not impact the SkyCourier program; the cargo twin's first flight is expected this year. Textron Aviation acquired the Beechcraft site, including Plant 3, in 2014 when it purchased financially troubled Beechcraft for \$1.4 billion. Plant 3 contains autoclaves large enough to hold the full wingspan of a midsize business jet. Following the acquisition, Textron repainted the plant's grimy ceiling a glossy white, replaced the lighting and flooring, and otherwise transformed the facility. Early development work on the Citation Longitude was performed there. Longitude assembly takes place at Plant 4 on the site. Beechcraft incorporated composite material in the construction of the former Starship and in its Premier I and Hawker 4000 fuselages. Textron Aviation, however, has continued to use aluminum, although the company incorporates composites in its aircraft.

► **PIPER AIRCRAFT HAS BEGUN THE APPLICATION PROCESS FOR** its 2020 Apprenticeship Program. This is the second apprenticeship class initiated at the company's headquarters in Vero Beach, Florida. The two-year program, designed to qualify participants as a journeyman in aircraft assembly, includes on-the-job training and classroom instruction. The accredited program was created in response to the company's growing demand for high-quality manufacturing candidates. Each apprentice is a paid employee of Piper Aircraft with full benefits. The program is in partnership with Indian River State College.

► **ACCORDING TO REPORTS, WIJET, AN OPERATOR OF HONDAJET** very light jets, has shuttered its French subsidiary and is conducting flights through subsidiaries in Luxembourg and Belgium where operations have grown. It previously shut its UK operations as well. The French subsidiary had been operating under the French equivalent of bankruptcy protection. In 2018, WiJet signed a memo of understanding with Honda Aircraft for 16 HondaJets valued at \$78 million to replace its fleet of Citation Mustangs. It took delivery of the first aircraft last March. A company



spokeswoman told Private Jet Card Comparisons, which first reported that WiJet was no longer accepting bookings, that WiJet plans to continue flying aircraft that are based in Luxembourg. The HondaJets are flown by Flying Group Lux under its aircraft operator certificate and available for charter throughout Europe. They have also been available through Air France-KLM in a service called La Premiere.

Battle Creek, Michigan's Airport Receives New Name



W.K. Kellogg Airport in Battle Creek, Michigan, has changed its name to Battle Creek Executive Airport at Kellogg Field. The new name reflects the airport's main function, airport officials say. "The city's airport plays an important role in the national general aviation sector, and the new name will provide greater exposure, not only to the airport, but to the city of Battle Creek," said Larry Bowron, airport director.

Gulfstream Opens MRO Facility at Van Nuys Airport



Gulfstream Aerospace has opened its second maintenance, repair and overhaul facility in Southern California with a new service center at Van Nuys Airport. The new center's services include sustainable aviation fuel. It also serves as a local operating base for Gulfstream's Field and Airborne Support Teams (FAST), a rapid response unit specializing in troubleshooting grounded aircraft. The facility complements Gulfstream's operations in Long Beach, California, 45 mi. away.

Bombardier Delivers First Global 6500 to HK Bellawings



Bombardier celebrated delivery of the first Global 6500 to HK Bella-wings Jet Ltd. of Hong Kong, a business jet management company. The news follows the Global 6500's entry-into-service in September. The aircraft made its public debut at the NBAA Convention in October. "We are thrilled to induct the Global 6500 aircraft into our fleet and to commence our operations with one of the world's leading business jets," said YJ Zhang, president, HK Bellawings.

Embraer Delivers First Praetor 500 to Flexjet



Embraer delivered the first Praetor 500 midsize business jet to its launch customer, one year after the aircraft was announced in October 2018. The aircraft was delivered to fractional travel provider Flexjet. "We know what our owners look for in an aircraft and the Praetor 500 hits so many of those features — from performance to fuel efficiency to ample baggage space," said Flexjet CEO Michael Silvestro. "And in keeping our commitment to have the youngest and most modern fleet on the market, soon we will begin upgrading all our Legacy 450s to Praetor 500s."

▶ **FRACTIONAL OWNERSHIP COMPANY NETJETS HAS LAUNCHED** a subsidiary called QS Security Services, offering an international network of safety experts to provide travel security and personal protection to high-profile travelers. The subsidiary will provide clients with a variety of around-the-clock services such as secure ground




transportation, close-protection agents and medically trained personnel, it said. "It all will be done while preserving our owners' productivity and ability to enjoy an exceptional travel experience," NetJets says. The subsidiary is led by Jack VanderStoep, NetJets vice president of global security. VanderStoep has more than 20 years of experience with the FBI and counterterrorism and undercover operations. Security

professionals have backgrounds in federal, state and local law enforcement and the U.S. military. Initially, the services will be offered as a premium service on select routes with a recommended minimum security package that corresponds to the current threat level of the client's destination, according to the U.S. Department of State.

▶ **THE FAA HAS SENT A LETTER TO BLACKBIRD AIR**, a company that created a web-based application to connect passengers with pilots, emphasizing the agency's regulations regarding pilots who transport paying passengers. The FAA's priority is to ensure the safety of the traveling public, it said. "It's critical that both pilots and passengers confirm that the charter flights they're providing and receiving comply with all applicable Federal Aviation Regulations," the FAA said in its charter guidance issued Dec. 19. Passengers paying for a charter flight are entitled to a higher level of safety than is required when taking a free flight with a friend, it said. Pilots transporting paying passengers must have the required qualifications and training and the aircraft must be maintained to high standards that the FAA charter regulations require. Pilots who are paid to fly passengers in general cannot just hold commercial or airline transport pilot licenses. They also must be employed by the company operating the flight, which must hold a certificate under FAR Part 119, or the pilots must hold a Part 119 certificate themselves, the FAA said. The BlackBird platform, as is the FlyteNow website, is available to everyone, the FAA said, and anyone can search the platform and book a flight. "Commercial pilots utilizing the BlackBird application express their willingness to transport people by posting their availability to conduct flights on the BlackBird platform," the FAA said. "Although some exceptions from the Part 119 certification requirement exist for certain, discrete types of operations, no exception applies in this case." The National Air Transportation Association praised the FAA's warnings. "This is a great example of a government organization listening to the industry and following through to address misinformation and noncompliance," NATA COO and general counsel Timothy Obitts said.


▶ **THE NATIONAL AIR TRANSPORTATION ASSOCIATION HAS** announced that over 1,000 pilots have enrolled in its Loss of License Insurance Program. The LoL program, which is administered by Harvey Watt & Co. and underwritten by Symetra, is intended for FAR Part 135, Part 125, Part 91K and Part 91 operators. Its key component offers income replacement for pilots who lose their FAA medicals. NATA COO Timothy Obitts said the program was launched as a way "to help our members and the general aviation industry to combat the pilot shortage that we face today. By expanding the benefits offered to pilots, companies can better recruit, protect, and retain pilots — making this one of our most sought after membership benefits." The Watt company began the first LoL in 1951 to protect professional pilots and their families from financial loss due to disability.

A woman with blonde hair and glasses is looking at a tablet. The background is blurred, suggesting an airport or travel setting.

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C A P I T A L

Gulfstream Delivers 600th G550



Gulfstream Aerospace has delivered its 600th Gulfstream G550 to an undisclosed customer. More than 20% of Gulfstream aircraft in service are G550s, the company says. The aircraft entered service in 2003. Equipped with two Rolls-Royce BR710 engines, the G550 can fly 6,750 nm at Mach 0.80, connecting Tokyo with Palm Beach or Shanghai with London. The cabin can seat up to 19 passengers and sleeps up to eight.

Cirrus Unveils Upgraded 2020 G6 SR Series



Cirrus Aircraft has unveiled improvements to its new 2020 G6 SR Series piston aircraft, including a new mobile app, upgraded interior and exterior and optional four-blade Hartzell propeller. Cirrus began delivering 2020 G6 Series aircraft in January. The highlight of its 2020 Cirrus SR20, SR22 and SR22T aircraft is the new Cirrus Aircraft App for the iPhone powered by Cirrus IQ, the company says. Cirrus IQ allows for remote communication between the aircraft and the pilot through the app.

► **LATECOERE IS ACQUIRING BOMBARDIER'S ELECTRICAL WIRING** interconnection system assets and assume its related workforce in Queretaro, Mexico, for \$50 million in cash. Under the agreement, Latecoere, which is based in Toulouse, France, will supply Bombardier with electrical wiring interconnection systems for its Global, Challenger and Learjet business jets – a supply business projected to total about \$80 million a year. The transaction is expected to close in the first half of this year. About 700 Bombardier employees currently specialize in the harnessing and electrical subassemblies and manufacture the systems. Bombardier says the sale will not affect the remainder of its operations at the site and it will continue to produce major structures there such as the aft fuselages for the Global line, including the Global 7500 – said to be the most complex aircraft component manufactured in Mexico. Meanwhile, the FAA has granted type certification for the Global 5500 and Global 6500 business jets. The milestone follows Transport Canada and European Aviation Safety Agency certification and entry-into-service last September.

► **EMPLOYEES OF FINANCIALLY TROUBLED MOONEY** International were sent home from work at the Kerrville, Texas facility Jan. 6 – their second furlough in about a month. In early December, employees were recalled from a two-week furlough and at the time, the company said it was finalizing negotiations for its sale to a group of investors who wanted to re-establish the planemaker as a “viable production and



support company for the Mooney brand of aircraft.” But that deal apparently fell through, a Mooney employee, who requested anonymity, reported. “From what I know, the buyer backed out, and they’re looking at other options,” the employee said. “We all hoped for better things.” Employees were first

furloughed in mid-November. They were recalled Dec. 2 and worked through Dec. 20 when the facility was shuttered for a holiday break, said Devan Burns, Mooney human resources specialist. “We were supposed to get paid for that, but we didn’t,” Burns said of the company’s promise of holiday pay. And then the company furloughed 55 employees, she said. Mooney has been owned by Chinese investors since 2013. During the first nine months of 2019 it delivered eight aircraft and posted billings of \$6.5 million, according to the General Aviation Manufacturers Association. In 2018, it delivered 14 aircraft.

► **THE U.S. SENATE RECENTLY CONFIRMED THE NOMINATIONS** of Michael Graham and Thomas Chapman to serve as members of the NTSB. Graham recently served as director of flight operations safety, security and standardization at Textron Aviation, is a past member of the NBAA Safety Committee and led a Single Pilot Safety Working Group. Meanwhile, Chapman most recently was minority counsel to the Senate Commerce Subcommittee Aviation and Space. He also held government affairs positions for USAirways and Southwest Airlines.

► **INNOVATIVE SOLUTIONS & SUPPORT, BASED IN EXTON**, Pennsylvania, has received FAA approval for an autothrottle system that helps protect against one-engine inoperative catastrophic loss-of-control accidents. The system automatically adjusts power in the operating engine to give the maximum safe thrust, which prevents loss of control yaw, the company said.

Questions for Craig Sincock



AVFUEL

Craig Sincock

President & CEO
Avfuel Corporation
Ann Arbor, Michigan

Some college students luck out in the roommate draw, Sincock among them. His Wolverine den at the University of Michigan included several flight instructors. And so, he spent his undergrad years in Ann Arbor studying business and learning to fly. Sincock put that knowledge to use as an investment banker and consultant, flying to meetings with clients—one a small outfit in his old college town that would become his legacy: Avfuel Corporation. Now an ATP, he flies Avfuel's Cessna Corvalis, Citation XLS+ and Dassault Falcon 2000LXS to further business.

1 Avfuel is seemingly everywhere, but that wasn't always the case.

Sincock: No, it wasn't. It all started in 1973 as a four-person company serving Midwest FBOs. I advised Avfuel as an investment banker and, in 1983, bought it outright. We were fortunate to hire really good people who attracted more good people. We substantially grew by acquiring the aviation businesses of Pride Refining, Triton Energy and Texaco. Today, Avfuel's sign stands at more than 650 branded FBOs across North America and Europe. Our development can, in part, be attributed to 31 acquisitions in addition to organic growth — one customer at a time. We now support over 5,500 flight departments, brand nearly a quarter of all U.S. FBOs, and serve airports, airlines, cargo carriers, the military, and rotary wing fleets. I'm proud to say that four-person team is now a family of roughly 1,000 employees globally who help touch one third of all U.S. business flights.

2 And you're more than a fuel supplier.

Sincock: Avfuel supplies aviation fuel in 120 countries, which requires tremendous logistical expertise. We surround the fuel with services to support the underlying infrastructure: Avtank designs, manufactures and maintains refueling equipment; Avlease helps manage and lease equipment; Avsurance provides insurance specifically for aviation customers; Avplan is a full-service flight-planning and trip-support company; Avflight owns 21 FBOs and provides commercial ground handling at 18 U.S. airports. The genesis of these businesses was listening to customer needs and providing solutions to fulfill them.

3 As you're aware, aviation is being targeted as a polluter with fossil fuel as the main culprit.

Sincock: No one can deny there are valid reasons for environmental concerns at all levels of transportation. And while our industry shares those concerns, we often disproportionately take the spotlight. But here's the thing: aviation provides critical services and will always remain a necessary mode of transportation. It connects the economies and governments of the world. It supports relief efforts and saves lives. Beyond that, more and more people want to travel, so there's pressure to expand. To do our part, we'll all need to discover ways to accommodate that demand responsibly and ecologically.

4 What do you suggest?

Sincock: It will take a combination of solutions—the largest being sustainable aviation fuel. Avfuel is a leader in SAF. We provided fuel at demo days in Van Nuys and Jackson Hole; supplied OEMs ahead of EBACE and NBAA-BACE, as well as at bases in Wichita and Montreal; and provide ongoing SAF supply to several commercial customers. Even though it is available, production is limited — there's only one manufacturing and blending facility operating in the U.S. at a commercial scale, and its volumes are spoken for. But that's changing; there are more than a dozen groups working to supply SAF. Furthermore, tax incentives are helping to offset its cost. I foresee that within 10 years, SAF will represent 15% to 25% of the world's Jet A supply. The demand is rising and we have the infrastructure in place to move, store and deliver it.

There's also hybrid technology, including electric power. In fact, Avfuel built one of the first electric refueler trucks in 2003. But for electric aircraft, we'll only see some progress in the short term, and I believe it will be limited to trainers and small-scale operations. It may be 15 to 20 years before its use becomes practical. Furthermore, there are carbon credits to offset aviation's CO₂ footprint. My guess is that within 12 to 36 months, anyone who is interested in these credits will easily be able to purchase them. Avfuel can provide carbon credits to its customers today.

5 While Jet A gets all the attention, what's the status of lead-free avgas?

Sincock: Getting the lead out of 100 octane avgas is a complex challenge. What makes it more complicated is that we need a one-fuel solution rather than multiple recipes. There would be quality control, infrastructure, compatibility and supply issues if more than one product were to hit the market. There are a number of alternatives being developed. Our own Avfuel Technology Initiatives Corporation is working on both SAF and no-lead avgas solutions. I'm confident the industry will get there, but it will take time. **BCA**



TAP HERE in the digital edition of **BCA** to hear more from this interview or go to AviationWeek.com/BCA

False Favorites

Smooth landing, great pilot . . . **NOT**



Deicing an Airbus A320, as seen from the cabin.

BY **JAMES ALBRIGHT** james@code7700.com

The flying public has a lot of misconceptions about aviation in general and how we do our jobs in specific. It is even worse when pilots of any kind have some of these same misconceptions. The fact that you are reading this magazine probably means you are not likely to fall for any of these wrongheaded ideas. So, what follows may just be useful as a gauge of how poorly informed many of your passengers may be, helping to prepare you for the moment these questions come your way.

Salty Spray Protection

A few years ago, I was sitting in an airline cabin on a snowy Massachusetts day awaiting our departure from Boston Logan International Airport (KBOS). I was in an aisle seat, on the left side of the airplane, just aft of the wing. To my left there was a young man and to his left a young lady. She was already seated when I arrived, the young man took his seat last.

After everyone was boarded and seated, the airplane was pushed back and the captain came on the PA system to explain we would need to deice. After a few minutes we could hear the spray of the Type 4 above and forward of us

and then the wings. The woman, nervously pointing out the window, asked to nobody in particular, "What are they spraying on the wings?"

The young man said, "It's heated saltwater."

"Why do they use saltwater?" she asked.

"It has a lower freeze point, there is no cause for concern," he explained. "I am a pilot; these are things we have to know."

"That is so amazing," she said.

I held my tongue as the young man went on to wax eloquently about flying. He explained that he was multiengine rated, which meant he could fly anything with more than one engine. "But

isn't it dangerous?" she asked. "It's safer than driving," he said. I decided to tune them both out.

Road Wary

We often hear that the most dangerous part of any pilot's day is the drive to and from the airport since "Flying is safer than driving." But it really depends on what kind of flying you are talking about.

John and Martha King of King Schools Inc. have made it their business to educate general aviation pilots in everything from their initial private pilot's license to their Airline Transport Pilot (ATP) certificate, and they offer courses in risk management. The Kings argue that even experienced pilots do not have a realistic idea of flight risks and that the idea that the drive to the airport is the most hazardous part of any flight is simply wrong.

According to the Kings' research, the general aviation flight risk on a per-mile basis is on a par with motorcycles, about seven times greater than the risk of a car accident and 49 times greater than the chance of being involved in an airline crash.

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The author and his bride on a PA-23 cross country from Honolulu to Kona, Hawaii, 1983.

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San Francisco, California (KFSO) to London, England (EGLL) as seen on a cabin passenger display

are not in the same high-risk category as general aviation. The general public associates any airplane crash as a blot on our industry. We would do ourselves some good if we rephrased that old fly-vs.-flivver chestnut to “Flying with two professional ATPs up front is safer than driving.”

Flanders Curveball

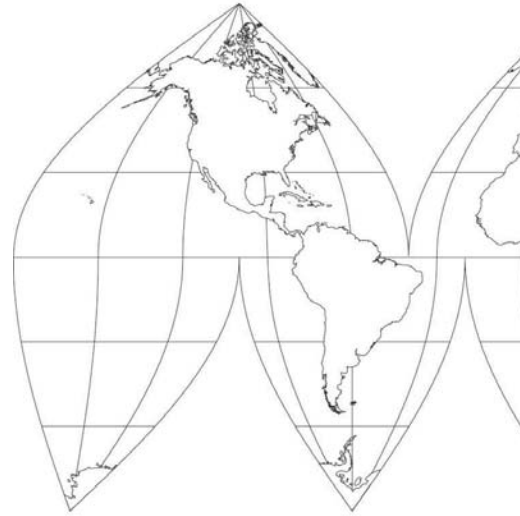
I’ve heard this one from passengers, but even more alarming, I once heard it

from a pilot with whom I was flying. The statement: Our route across the ocean is curved because of the winds.

You will likely hear this more on an oceanic flight since such crossings are less likely to be constrained by sub-optimal airways and the distances are rarely as great when flying domestically. But if your cabin has a video map of your journey, you should be ready with the correct answer.

Let’s say you are flying from San Francisco to London on an optimum route. The cabin map might display a route over Greenland. “Why are we going the long way?” one of your passengers might ask. It’s clearly apparent to him that the shortest distance between the two cities is a straight line over Boston and the line on the map is anything but straight!

The visual confusion traces back to Gerardus Mercator, a 16th Century Flemish cartographer, who solved a problem posed by earlier mariners needing to plot straight courses over relatively short distances. The earth isn’t flat, but for the purposes of navigating several



hundred miles it might as well be. Visualize a globe that you have to unwrap and flatten so it can be scanned into a map. You will end up with not enough map at the poles.

What Mercator did was stretch everything to make the edges of these “peels” of map meet, distorting everything except the equator. The farther the location from the equator, the greater the distortion. This makes land masses and oceans near the poles



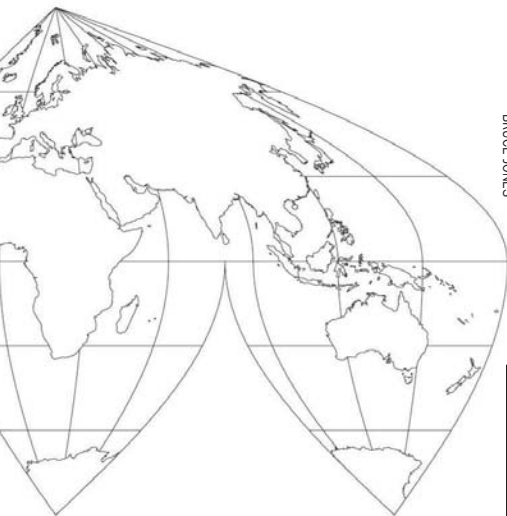
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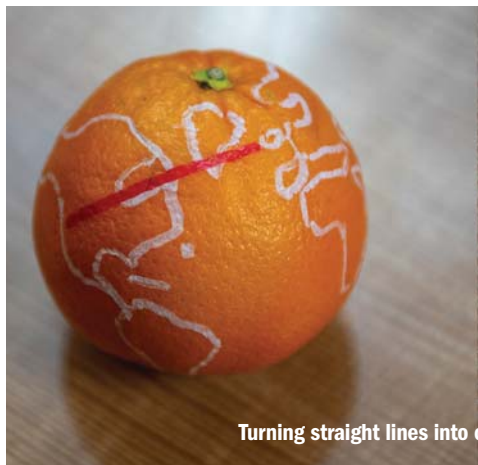
A six-point sinusoidal projection of the Earth

appear larger than they really are, but it also allows a navigator to place a plotter along a line of longitude and derive an

BRUCE JONES

I get that,” the passenger said, “but why aren’t we flying a straight line?” I thought about it and retreated to the galley for an orange.

Upon it, I drew a crude diagram of North America, the Atlantic Ocean, Europe and Africa. I then used the straight edge of a napkin to trace a straight line between our origin and destination. The passenger agreed that my drawing, while crude, did represent what would be an optimal route between those cities on our orange globe. I then sliced the orange in half, being careful to keep both cities on the same side. With a little effort, I managed to hollow the fruit from the rind. With scissors, I made a few radial cuts from each pole to help in the flattening process to come. I then placed the orange rind on a cutting board and pushed downward to flatten it. As the



Turning straight lines into curves using an orange.



JAMES ALBRIGHT

accurate course. It also serves to bend straight lines away from the equator. That’s why the line from San Francisco to London curves to the north.

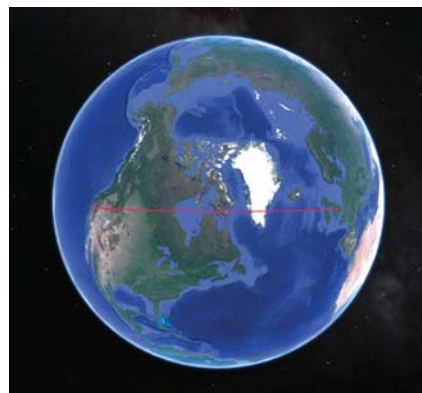
If we were to view the route from directly overhead its midpoint with an altitude high enough to view both cities, it would be straight. Mathematically, this view would be along the flat plane that carved the world into half by its great circle. In other words, it would be as if we placed a new equator along the line between these two cities. Viewing this along what is called “gnomonic projection,” you would see a straight line that does indeed fly over Greenland.

I was once on a charter from San Francisco to London and was asked this question during my mandatory rest time away from the cockpit. I did my best to explain to the passenger the compromises Mercator had to make and that the maps we are accustomed to viewing are actually distorted. “Yeah

orange flattened. the cuts started to expand and the route of flight, as if reacting to a magical force, bent northward. “Wow!”

So, how do you explain this if you don’t have an orange handy? Try this: “Most maps are distorted because it is pretty hard to show a three-dimensional surface on a two-dimensional piece of paper or video monitor. Because the world is a sphere,” (make a sphere with your fist), “flattening a true representation widens everything close to the poles.” (Expand your fist so the fingers spread out.) “Every straight line on the sphere except the equator will curve toward either the North or South Pole.” (Trace a curve with a finger from your other hand. Then contract your hand back into a fist.) “So, the line looks curved because the flat map cannot faithfully represent a straight line on a curved surface.”

This explanation doesn’t always work.



San Francisco to London on a Gnomonic projection map

GOOGLE EARTH

Some people have a better understanding of three dimensions than others. Many passengers — and some pilots — are comfortable assigning things that aren’t intuitively obvious into the magic category. Another act of magic is the air we breathe. If you can’t see it, how do you explain it?

A Cup of Consciousness

I’ve heard this one on airline flights and in the business aviation world, too: Those passenger oxygen masks that look like dangling Dixie cups will keep your passengers from passing out if the cabin depressurizes. That is only true if the pilots up front remain conscious so they can get everyone down to an altitude with breathable air.

Most flight attendants have the spiel memorized; on my last airline flight I realized I had it memorized too. “In the



Passenger oxygen “Dixie Cup” masks

unlikely event of a sudden loss of cabin pressure, oxygen masks will automatically drop down from the panel above your head. To start the flow of oxygen, pull the mask toward you. Place it firmly over your nose and mouth, secure the elastic band behind your head, and breathe normally. The plastic bag below the mask may or may not inflate, but oxygen is flowing regardless.”

The flight attendant had the mask in the general area forward of her face and the straps above her head, making her point without marring her makeup or hair. With that, she went on to explain those very complicated seat belts and I continued to read the novel I brought onboard.

Most passengers assume those plastic cups will be able to keep them conscious for as long as it takes. Then there are the cynics who believe the masks are nothing more than placebos to give us something to do before we pass out. Those of us up front with the real oxygen masks know better; those little cups do work for a limited time and will keep our passengers conscious, provided we do everything just right.

Getting the airplane from cruise altitude to an altitude with breathable air requires pitch attitudes that we normally tend to avoid and immediate action: Push the nose down, accelerate to maximum speed, pull the throttles to idle and extend the speed brakes. We practice this in the simulator regularly to the point we hope it becomes automatic. Some airplanes do this automatically, but most require actions by a

conscious pilot. As long as they remain conscious, I think most professional pilots will do this correctly. But remaining conscious in the cockpit is not assured.

Listening on the radio to my fellow professional aviators I am amazed by how rare it is to hear a pilot talking to air traffic control through an oxygen mask. The least restrictive rule (14 CFR 91.211) requires at least one pilot wears and uses an oxygen mask above 41,000 ft., or above 35,000 ft. if one pilot leaves the flight deck. A good technique in this situation is to hand off ATC duties to the pilot not wearing oxygen, but I am still surprised at how rare it is to hear a Darth Vader-like pilot checking in at high altitudes.

We in business aviation often say that Part 91.211 is the most often violated FAR in the book. Part of the justification is that our Time of Useful Consciousness (TUC) as given in the most popular tables is a generous 15 to 20 sec. at 40,000 ft. Lots of time! Lost on many of these pilots is the fact that those times were based on an old U.S. Air Force study involving extremely fit (and young) test pilots. I very much doubt most pilots these days will last half as long and if the two pilots up front pass out, those cup masks won't do the folks in back much good.

But let's say you are in the depressurized cabin with that cup mask attached to your face while the airplane descends nicely because the pilots up front have their masks on. Will you have enough oxygen for the ride down? That depends. The masks in most airline cabins are the same as what we have on our corporate

jets, but the oxygen source might be a bit different. On our Gulfstreams, for example, passenger oxygen masks are plumbed into bottles that will last for a while, depending on how many passengers are on board, the cabin altitude, and the speed at which the pilots descend to an altitude where the masks are no longer necessary.

The weight and physical size of oxygen bottles and the lines to each mask assembly introduce costs and maintenance issues that make them poor choices for some airline cabins, but not all. Some models of the Boeing 787, for example, do have gaseous passenger oxygen systems that can last 60 min. But most airline aircraft have chemical oxygen generators installed above each seat row with much less capability. These oxygen generators do not require heavy bottles and the connecting hardware, nor do they require refilling. In either case, when the cabin altitude reaches a predetermined level (typically 14,000 ft.) or if the system is activated by the flight crew, overhead panels open and oxygen masks drop out. Pulling the mask down also tugs at a lanyard that releases a firing pin to activate the oxygen generator.

A typical oxygen generator includes an oxidizer of sodium chlorate (NaClO_3) mixed with barium peroxide (BaO_2) and potassium perchlorate (KClO_4) that is heat activated. That heat is generated by chemicals activated by a small explosive charge that is triggered by pulling that lanyard. Once activated, the chemical cocktail produces oxygen



A Virgin Atlantic Boeing 747 touching down at Manchester Airport, United Kingdom, May 2008.

MATT BIRCH/VISUAL APPROACH IMAGES

until the generator has been exhausted, which occurs in the range of 12 to 20 min., depending upon the type and size of generator installed, the starting cabin altitude, the descent rate and the inhalation rate of the user. Your inhalation rate depends on your physical conditioning and how calm you remain.

Calm? What does that have to do with anything? There is only so much oxygen in either system, and once it's gone, it is gone for good. The more rapidly and deeply you breathe, the faster it goes. How easy will it be to remain calm as your aircraft is pitched steeply down, the wind is rushing over the fuselage, and the speed brakes are adding to the perceived turbulence?

And what about the plastic bag? The reason it may or may not inflate is because of the user's respiration rate. If you remain calm and don't use all of the oxygen generator's output, the excess gets put in that bag, ready for you should you need it or once your generator is empty. There is a chance some passengers will run out (and pass out) while others are still being supplied oxygen.

Up front, our oxygen masks are certainly more capable than those little cups in back and are designed to keep us conscious and functioning. Among many pilots it is fashionable to dismiss the need to use oxygen at high altitudes because the chances of a sudden loss of pressure are low. I used to think that; it has only happened to me once in 40 years. But now that I have access to several aviation news websites that give me daily updates, I see that sudden depressurization isn't so rare after all. I've also heard that while the oxygen is pure, it is dry and the masks are not sterilized. We keep alcohol wipes in the cockpit to keep our masks clean. That may not be as good as a freshly sterilized mask, but the wipes do help.

I think the real reason most pilots are reluctant to use their masks is that they are uncomfortable. We replaced our masks with the most comfortable ones we could find and we trade oxygen duties between pilots at 1-hr. intervals. I agree that all of this will be for naught if we never lose pressurization at altitude. But it is a responsibility we have accepted in our duties to get our passengers safely from Point A to Point B, and that duty isn't complete until we have landed, the passengers have disembarked, and our aircraft is put to bed for the day.

Cheers for the Gentle "Chirp!"

When I was stationed in Hawaii with the U.S. Air Force, I often found myself airlining to the mainland to pick up an airplane that had been broken or in extended maintenance. Most of our pilots hated these trips because you ended up having to do long preflight inspections to make sure the airplane was OK and, even worse, waiting for what had been repaired to really be repaired. I didn't have much choice in the matter at first because I lacked seniority, but after a while I figured out this was a great way to learn. So, I tended to volunteer for these assignments.

Back then it was next to impossible to get a direct flight from Hawaii to anywhere on the continent other than Los Angeles or San Francisco, so we tended to fly to California and then hop on another airplane to get to where we needed to report. I once had the good fortune to be on an airplane going from Honolulu to

down to the applause of most of the passengers, including the one seated to my right. He concluded his clap with a thumbs up aimed my way, "Nice!"

After a few hours we boarded the same airplane and for those of us continuing on, in our same seats. The winds were howling at Wichita and the pilot did a good job putting us down in the touchdown zone with a firm thud. My seat-mate gave a bit of a chuckle and laughed. "Not as good as the first pilot," he said. "I hope he catches hell for that!"

"Why do you say that?," I asked.

"Didn't you notice?" he asked. "That was a lousy landing!"

"It's hard to judge from the cabin of the airplane," I said. "But it seemed OK to me."

He laughed some more. "Well maybe you weren't paying attention. But he clearly landed on one set of wheels before the other."

"Oh," I said. After a long day of traveling, I didn't feel like going into the de-



The author at 45,000 feet abiding by 14 CFR 91.211.

JAMES ALBRIGHT

KLAX and on to Wichita, my true destination. I was seated in the cattle car class between a window and a talkative fellow who had been on a business trip to Hawaii and was on his way back home to Wichita. I learned his life story before we even leveled off. I told him I was an Air Force pilot but not much else. I opened a book and he took the hint.

The Los Angeles skies were docile for our descent and approach. As we rounded out and flared, I grimaced as I watched the fixed distance markers of the runway slide by. The airplane finally kissed the runway about halfway

tails of the wing-low crosswind landing technique or the importance of landing in the touchdown zone.

Turning a False Favorite Into a Truth

It may not be the end of the world if your passengers don't understand the intricacies of the Mercator projection or the benefits of ethylene glycol. But you should be prepared to answer these questions thoughtfully. Your credibility is at stake when part of the audience knows the answer and you don't. **BCA**

Inside Ops Group

Crowd-sourcing to fill gaps in critical aviation safety information

BY DAVID ESLER david.esler@comcast.net

“A spokesman for Qantas said the Australian flag carrier had not used the route for months. Hong Kong-based Cathay Pacific said it had been taking a detour for ‘quite some time.’”

“A number of other airlines, including Virgin Atlantic, Turkish Airlines, Alitalia, Lufthansa, Air France, Aeroflot and Transaero, have also shifted flight plans.”
— *The Guardian, July 18, 2014*

When Malaysia Airlines Flight 17 en route to Kuala Lumpur from Amsterdam was shot down over the eastern Ukraine on July 17, 2014, with the loss of 283 passengers and 15 crewmembers, Mark Zee took it personally. At the time, the Irishman was flying Fokker 100s for Austrian Airlines over the same route the ill-fated Boeing 777-200 had traversed before being blown out of the sky by pro-Russian rebels 30 sm from the Russian border.

“It could have been us,” he told *BCA*. “Our airline was operating two flights a day on that route.” In fact, it could have been an airliner operated by any one of numerous carriers — as well as business jets — that at the time overflew the beleaguered Ukraine between Western Europe and Asia. “Everybody was using that corridor,” he said.

Malaysia 17, ironically, was the 17th aircraft to be shot down that summer in the disputed airspace, all the previous ones having been military transports. Apparently deciding that it could no longer ignore the hazard presented by Russia-backed anti-aircraft batteries in the area, the Ukrainian government, three days prior to the Malaysia shoot-down, issued a NOTAM establishing a no-fly zone there up to 32,000 ft. “They didn’t say what the hazard was,” Zee noted, “just that the airspace was restricted. The warning was there but with no explanation.” Malaysia 17 was cruising at FL 330 when the Russian missile took it down.

Why Didn’t They Share?

Some airlines had known about the risks of operating over Eastern Ukraine, and it turned out that at least two of them had been avoiding that airspace months before the Malaysian

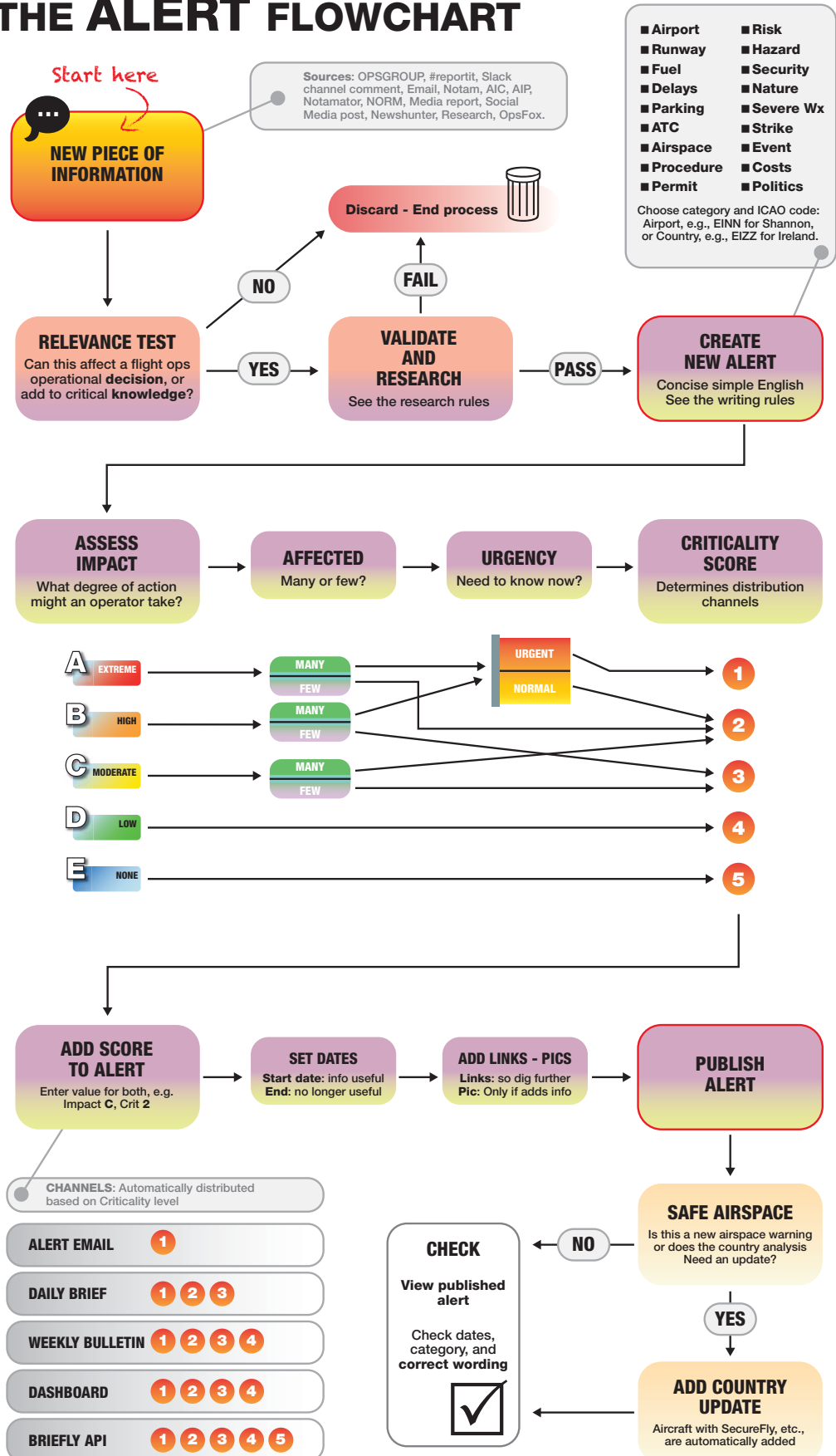
incident. “But why didn’t they tell anybody?” Zee asked. “The tragedy was that the information was out there and known and wasn’t shared. And that’s why I started Ops Group.”

A sort of aviation free spirit, Zee has, in addition to being an airline pilot, served as an air traffic controller at the Shannon, Ireland, and Christchurch, New Zealand, ATC centers and once served as a flight dispatcher. These assignments have accorded him a broad understanding of how professional aviation works and how essential it is to share safety-related information clearly and efficiently among disciplines. He divides his time between residences in New York and New Zealand.

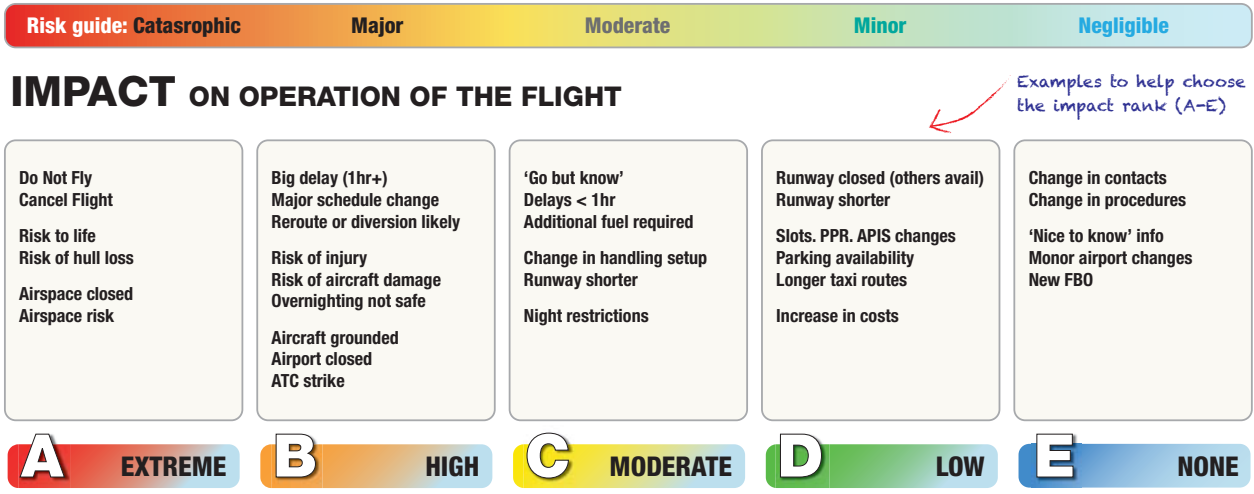
Deeply disturbed by the Malaysia 17 incident and the previous silence about the danger, Zee began to consider “a mechanism to share information.” Resigning from his airline job, he embarked on a self-described “quest” to “think this thing out.” This took him all over the world — including to North Korea and Russia — where he had interchanges with individuals in flight operations and risk management, “forming the idea.” Then, he repaired to his “cabin in the woods of New Zealand” to finalize what would become Ops Group.

At the time, he was also tied into a group of about 40 aviation professionals engaged in operations who regularly exchanged emails on their work; he suggested they formalize their liaison into the mechanism he envisioned for disseminating operational risk information. “So it started as an email list,” he said, “that eventually became 6,000 participants, and the medium changed from email to bulletins to a dashboard and a daily alert briefing. The original group was composed of airline and business aviation pilots, aviation security specialists, ops people and flight dispatchers. The largest segment, though, was and continues to be pilots.”

THE ALERT FLOWCHART



Source: OpsGroups



Source: OpsGroups

Right from the start, Zee had to establish a clear delineation between proprietary information of a submitter’s employer and that of operational risks to be shared with the larger aviation community. “Airlines tend to be protective of information,” Zee said. “But part of our process was educating them that, if you have risk information, you must share it, since it is not competitive information. We wanted to create a platform so we could do that at scale. We had small informative networks, but Ops Group was putting all of them together to create a larger entity so everyone was talking to everyone else.”

Child of the Internet

Spawned by the internet, Zee’s organization is said to be totally crowd-sourced. “We organized it by word of mouth. I named us ‘Ops Group’ right at the start, beginning in 2016, as we are a group of operational people. If we have a mission statement, it is ‘share radically and speak plainly.’” When it comes to risk, he explained, “that information has to be shared and the concept can be radical.”

Also because Ops Group essentially “lives” on the internet (at <http://www.opsgroup.com>), it has little brick-and-mortar infrastructure. “Officially, the home is New Zealand because that’s where it was born and continues to be administered,” Zee said, but “because we have the communications technology today that we do, we don’t need a headquarters.” A Kiwi native residing in New Zealand, Zee spends a lot of time in New York “because America is where aviation is developed and the capital of business aviation. It is the single greatest home base of people going around the world.”

And who runs Ops Group? The organization employs 10 full-time staffers focused on information flow and formulating the alerts Ops Group publishes on its site. It is mostly a team of flight dispatchers, pilots and membership people who create the tools and apps that support the service. “And they are everywhere,” Zee claimed, “including the Philippines and Serbia — there are great coders in Serbia. From time to time we assemble or meet at a conference.”

Operating funding derives from the paid subscriptions of Ops Group members. “That is back to the ethos of the organization,” Zee said. “We do not advertise and might be the only [web-based information] organization that has that policy. We are not sponsored by companies and so have nobody to answer to but the pilots and passengers on the day of flight. We are

truly independent, and we are the ‘humans of aviation’ trying to make things better. The focus is only on things that make life better for our pilots and their passengers, sharing information in aviation. We are in the unique position to do something about it — for example, our NOTAM initiative.” (See “Ending NOTAM Nonsense,” November 2019, page 18).

Ops Group is used by airlines, business aviation, regulators, “everyone from the single business jet pilot to the airlines,” charter and fractional operators, flight planning and international handling companies, and manufacturers — all are represented in membership. Additionally, according to Zee, membership includes “agencies like Eurocontrol, the Air Force, everyone involved in how aviation operates on a daily basis.”

While the “public page” of the Ops Group website is free to nonmembers for a limited period of time as an inducement to join, a monthly subscription is required to access the site’s full range of services. Most subscriptions are team plans, e.g., for an airline or flight department, covering, on average, 20 people at \$15/month. Individual rates vary. (See <http://ops.group/story/membership/#pick-a-plan>) Anyone involved in aviation operations can submit an information item or alert to Ops Group, but according to Zee, “90% of what we get is from members.”

Significant responsibility comes with publishing critical operational information — especially alerts — on a public website. Accordingly, Zee says, “We vet the hell out of everything,” referring to the rigorous verification process he and his staff developed and is illustrated in the accompanying alert flowchart.

Sharing Radically

The services Ops Group provides include:

► **Daily Briefs.** “We collect a pool of worldwide information of operational risks and changes,” Zee elaborated. “That’s the game and the crowd-sourced part and the ‘solving aviation information part.’” Members receive an immediate alert for high-impact items, plus once a day, Ops Group publishes a summary — the Daily Brief — covering the previous 24 hr. Complementing its web presence is Slack, a message app for teams that has widespread usage across the industry as a replacement for emails. “It’s more immediate than email,” Zee said, “and rides on your smartphone. Of our 6,000 members, 2,800 are in Slack.”

Examples of recent alerts were the responses to the Bahamas’ post-hurricane relief effort in September (see



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-Henry Maier, President and CEO, FedEx Ground

“Coordination Exercises”) and the Iranian shoot-down of a U.S. Global Hawk reconnaissance drone last June and consequent imposition of a no-fly zone over the western border of Iran. Ops Group published detailed analyses of both events and, in the case of the Iranian incident, the movement by Eurocontrol of traffic from a highly traveled route within Iran to a temporary one over Iraq.

Just as a point of interest, two of the most ubiquitous items in the international brief are air traffic controller strikes (especially in Europe) and runway closures for maintenance. One of the latter — Runway 27L at San Francisco International Airport in July 2017 — ultimately led to Ops Group’s launching its crowd-sourced NOTAM revision project after the crew of an Air Canada Airbus A320 jetliner missed the NOTAM announcing the runway closure buried in their briefing package of dozens of notices, became confused on arrival at SFO, and nearly landed on a taxiway adjacent to Runway 28R crowded with four airliners waiting to take off. The five transports collectively were carrying approximately 1,000 passengers.

► **Weekly Bulletins.** These include summaries of the week’s events and blogs and articles written by a team of dispatchers and pilots in plain language, avoiding legalese or regulatory jargon.

► **Coordination Exercises.** In the January issue of *BCA* we described the role Ops Group played in coordinating the massive aviation relief effort in the Bahamas after part of the archipelago was devastated by Hurricane Dorian in September 2019. (See “Bahamas Bound, Post Dorian,” January, page 40.) “The Bahamas exercise was us stepping up to fill a void,” Zee said. “The beauty of how it works is that we can solve problems when necessary. There was mass confusion in the Bahamas and little support offered, so we stepped up to coordinate some of that.

“It was a one-time thing,” he continued. “We learned the value of current, accurate, reliable aviation information. That’s what was missing in the Bahamas: what airports are open, is there fuel, how do I get permissions, what are the restrictions and risks, and so forth. In disaster relief, information is huge and there was a failure to provide anything of value to the relief effort. We want to look at this more closely to see how we can help in future situations.”

► **Crowd-Sourced Projects.** In an article he wrote on the pressing need to revise the whole concept of Notices to Airmen that was appended to a July 2019 Ops Group weekly bulletin, Zee invited members to submit their ideas on how to make NOTAMs more readable, effective and prioritized so that the most critical information is emphasized and the plethora of items not essential to safety of flight downgraded or eliminated — “a powerful instrument,” said Zee.

He describes his far-flung organization as “a group with the ability to solve major problems that we care about, and the major problem right now is aviation information. So, what we’re seeing is the democratization of aviation information where we no longer have to rely on the single source like the state to tell us what’s happening. What we now have is the ability for individual pilots and dispatchers to report what they are seeing and not have to depend on the state.”

While this appraisal is provocative — that the crowd-sourced operational information can supplant that which is approved and disseminated by governments, Zee insists that the Ops Group source provides a more immediate and valid picture “so you know what’s happening on the ground before you go someplace.” An example is Ops Group’s “Airport Spy,” a

Ops Group’s Five Maxims

Ops Group summarizes its mission in five maxims. Here are excerpts from their descriptions on the organization’s website: No. 1: Speak plainly. “[O]nce we start seeing words like ‘promulgate,’ our brain switches off, and we miss the message. . . . It’s not just NOTAMs. It’s a whole slew of AICs, circulars, documents Where we fail is in forgetting that [they] are simply a message from one human to another. We wrap them in language so legalese and unreadable that the message is lost”

► No. 2: Connect — as real people. “When we really want to change how things are, we have to connect as the humans we are. In all our imperfect glory. Then, we can really get things done”

► No. 3: Radical sharing. “The route you’re flying today is the one I will fly tomorrow. So, tell me what you know, and I’ll do the same for you Share radically. Hide nothing, hold nothing back”

► No. 4: Rebels. “It’s not easy, standing up to the system. . . . Sometimes we have to rebel. Courage. Standing up for what is right and what makes things better for all of us”

► No. 5: Adventure. “Aviation is adventure Adventure is creativity. It’s the essence of tapping into something larger than ourselves, and trusting that we’ll be looked after. And, equally importantly, doing all we do with a sense of humor. If it’s not fun sometimes, what’s the point? Solving serious problems doesn’t have to be done seriously all the time. It should be an adventure” **BCA**

trip advisor for airports and airspace. “Members write a quick report,” Zee explained, “and it goes into the system so that when you go someplace, you can read what other members have said about an airport, slots, and so forth. Hong Kong is a good example — if you just read the state information, you would not know what a pain in the ass it is to go there.”

Because It Works . . .

The founding purpose of Ops Group was to share information, and Zee believes the platform he created accomplishes that. “It works. It means that you can put greater emphasis on what the people operating where you’re going know and are saying. Now you have verified human-sourced information from pilots and operators, and that is very different from what we had before Malaysia 17.”

How will Ops Group evolve? Zee pointed out that the manner in which the organization is solving the information problem is laying the groundwork for addressing others. “We are here to solve problems that affect aviation — and to fix NOTAMs,” he says.

It is worth considering that like many innovations, Ops Group was conceived to fill a deficiency — in this case, the absence of thorough, accurate, timely and clearly presented safety-essential information. In this respect, it provided a means for the users of the system to rise up to fix it. **BCA**

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Rega to the Rescue

An innovative Alpine operation **with a global reach**

BY **PARTICK VEILLETTE** jumpraway@aol.com

Helicopter emergency medical service (HEMS) is an especially challenging mission when performed among mountains where high density altitudes, tricky winds and steep, unforgiving terrain are ever-present threats. When the weather deteriorates, which can happen rapidly in the mountains, the lack of an IFR en route network and VFR-only non-icing-capable helicopters has often ended badly.

However, an expectant mother with a premature delivery living in a remote village in the Alps can now be airlifted to a hospital by an IFR-certified helicopter flying along an IFR network even during inclement weather. That critical transportation is provided by Rega, shorthand for Rettungsflugwacht, meaning “air rescue service.”

BCA was given the courtesy of a base visit to the Swiss non-profit’s Zurich headquarters in November 2018 and as part of a college tour led by this author in May 2019. During the latter, our group was treated to an in-depth presentation

and guided tour from Dr. Olivier Seiler, Rega’s former deputy medical director, and Reni Fritschi, the head of its subscription office. Rega’s media service spokesman Adrian Schindler was our host on the initial visit.

In 2018, Rega came to the aid of 11,579 patients and organized more than 17,000 missions. Its helicopters flew a total of 12,573 missions that year, a 6.8% increase over 2017, and its jet fleet flew 980 missions, a 10.8% increase over the previous year. On an average day service personnel will care for approximately 32 patients. On peak days its helicopters have been called upon to perform 90 missions. One of its busiest days was Dec. 31, 2017, when Rega’s helicopter crews performed 110 missions throughout the alpine country.

Rega currently operates 19 helicopters and three medical jets. The helicopter fleet comprises seven Airbus Helicopters H145 light twins, stationed at the lowland bases in Zurich, Basel, Bern, Lausanne and St. Gallen, and 11 AgustaWestland (now Leonardo) specialized twin-engine

models located at the mountain bases in Untervaz, Locarno, Erstfeld, Samedan, Wilderswil, Mollis and Zweisimmen. These networks connect with major trauma centers in Basel, St. Gallen, Zurich, Bern and Geneva.

Each base has a three-person team, composed of a pilot, paramedic and flight physician, with the goal of reaching the scene of the emergency within 15 min. For many years, Rega has been working with the anesthesiology departments of the central hospitals closest to its helicopter bases and uses their staff doctors as flight physicians.

At any one time, six helicopters are in reserve, either undergoing maintenance or being used for training. All maintenance is done at Rega’s headquarters at Zurich International Airport. Rega also operates an Airbus Helicopters H125 for training.

In May 2019, Rega’s status was renewed by the Commission on Accreditation of Medical Transport Systems (CAMTS) and remains the only European

organization certified both for aeromedical helicopter, ambulance jet operations and for medically escorted repatriations.

One of the many aspects of Rega's flight operations that differentiate it from others is its rescues by winch. Much of Switzerland's terrain is unsuitable for even vertical landings since obstacles can pose a risk of rotor blade contact. Thus the fleet-wide use of cables, which when extended to their full length of 90 meters, the system's electric motor can lift up to two people to the helicopter in approximately 2 min. From his position next to the open cabin door, the paramedic uses a remote control device to lower the flight physician (and sometimes also a rescue specialist from the Swiss Alpine Club) down to the injured person, then raise the patient once the physician signals.

The amount of crew coordination during winch operations is extensive. Rega has posted a video to allow others to view these missions and to understand how important it is that the crewmembers communicate well with each other. The video can be seen at: www.rega.ch

Rega helicopters also utilize a long-line system to rescue injured mountain climbers from vertical or overhanging rock faces. The line, which is up to 200 meters long, is suspended from the bottom hook of the helicopter and carries a rescuer.

Severe injuries in alpine terrain can sometimes involve the spine and these must be treated with extra care since even a slightly wrong motion could result in permanent paralysis. Even stabilizing a broken leg must be done with great care to avoid inflicting the patient with excruciating pain. To mitigate such problems, Rega has created a "vacuum sack" that immobilizes the patient in a secure position for transport. The patient is then laid into a special "air rescue sack" that is attached to the rescue winch and either hoisted into the helicopter or, depending on circumstances, left suspended and flown to the nearest possible landing site, and there transferred into the helicopter for transport to a medical facility.

Alpine IFR

An Achilles' heel to HEMS safety in the U.S. has been encounters with weather that exceeds the capability of the pilot or rotorcraft, or both, and results in accidents. This problem becomes magnified when the weather occurs in mountainous terrain.

It is Rega's position that an IFR-equipped helicopter operated by an IFR-current pilot within an instrument

en route and approach system can avoid such danger. Moreover, today's satellite-based technology affords the rotary-wing community the ability to develop such an IFR infrastructure even in the deepest mountain valleys. The Rega personnel also realized that when the need for an on-scene landing arises, as it often does in HEMS operations, the IFR infrastructure could be followed to a VFR breakout point whereupon the helicopter could then often proceed visually to the rescue scene.

Accordingly, Rega has been working closely with the Swiss Air Force and Skyguide air navigation service to establish a network of instrument flight routes through the Swiss Alps. This Low Flight Network (LFN) is based on satellite navigation and links airfields with permanent IFR infrastructures, as well as hospitals and smaller airfields with specially designed approaches. At the end of 2014, the

European air traffic control authority.

The testing involved a Rega Agusta/Leonardo helicopter flying from Samedan/Engadin Airport, located in a high alpine valley 5 km from St. Moritz. At an elevation of 1,707 meters (5,600 ft.), it is the highest airport in Europe that allows airliner traffic and is considered one of the most challenging airports in the world because of its difficult topography, winds and high density altitude. The route traversed through topographically challenging terrain over the Julier Pass, via Savognin through the Surses valley, on to Thusis, and finally to Graubünden Cantonal Hospital in Chur.

The main LFN routes, north-south and east-west, were certified for rescue missions during day conditions in December 2016. On the 16th of that month, Rega transported its first patient on an instrument flight route of the LFN over the im-



In order to be able to gently load patients lying on a stretcher trolley into and out of their CL-650, Rega has constructed a three-piece ramp which is permanently installed in the jets. The ramp folds into the entrance door of the airplane.

last Agusta/Leonardo machine was fitted with a second navigation computer and a second global positioning system/satellite-based augmentation system (GPS/SBAS) and subsequently IFR-certified by the Federal Office of Civil Aviation (FOCA).

In collaboration with the European project group Precision Based Navigation Rotorcraft Operations under Demonstration (PROuD), the precision of this technology was established during test flights conducted in July 2015. PROuD promotes the introduction of satellite-based helicopter flight procedures and is funded by the EU, the aviation industry and the

posing terrain of the Gotthard Pass. Then on Dec. 23, 2017, FOCA granted Rega special authorization to use key intersections of the network around the clock. These included the military airfields in Emmen and Meiringen, as well as the IFR approaches to the hospital helipad in Bern.

Another key component for an all-weather rescue system is the availability of current weather information around the clock along with the communication capability to transmit it to the cockpit. Without this, IFR operations are not permitted.

"Thor," Rega's major effort to provide this data, included installing

KIMBERLY HENNEMAN



REGA



approximately 60 new weather stations and webcams at key locations throughout the Alps. In addition, Rega modernized the radio network and operating devices in the helicopters to allow a better transfer of that data between its Operations Center and the cockpits of its rotary fleet.

And since Rega's mission success requires the ability to fly in icing conditions, it spent two years evaluating different aircraft before signing a contract for three new all-weather Agusta/Leonardo AW169-FIPS helicopters. Equipped with anti-icing systems, the new models are to begin operation in 2021 and partially replace the current H145 lowland fleet. With the purchase of the -FIPS machines, Rega is a major step closer to its goal of performing rescues regardless of the weather outside.

Total acquisition costs are estimated to be 50 million Swiss francs (\$51 million) for the three machines, including the necessary medical equipment. This sum has already been earmarked in Rega's long-term financial planning, and the company's healthy financial position means that this project can be funded without outside capital.

"With the new rescue helicopter, we will be able to extend our scope of operation and in the future come to the aid of more people in distress than ever before," says Rega CEO Ernst Kohler. In addition to its full ice protection system, the AW169-FIPS will be equipped with state-of-the-art avionics enabling the rotorcraft to perform high-precision instrument flights. Once these components of an IFR system are implemented, injured and sick patients from peripheral regions in Switzerland will have timely access to advanced medical care.

Rega's Operations Center at Zurich Airport lunched in April 2013. At its heart is a state-of-the-art integrated dispatch system. The flight coordinators have four screens that display not only the various maps and satellite images but other important information including weather and avalanche data as well as potential obstacles near the search or incident site.

Giving Pilots Proper Tools

Approximately one-quarter of Rega's helicopter missions occur in darkness. At night, overhead cables and clouds are very difficult to detect and so Rega pilots use night-vision goggles (NVG), which intensify the existing light by a factor of up to 25,000. The result is a green-colored image in which roads, clouds and

the landscape are clearly visible when the ambient light conditions permit. In contrast, in remote valleys with limited light, hardly a moon and heavy overcast, the NVGs bring little improvement. The equipment is not used during landing nor during winch operations because of the pilot's need to estimate distance accurately.

Rega has signed a long-term agreement with Elbit to jointly market and equip its helicopters with Elbit's Clear-Vision HeliEVS. The system merges the input of a high-definition visual camera and a long-wave IR sensor into one high-quality fused picture. It detects helipad, rig and runway lights with provisions to support a color display. The system projects images onto a helmet-mounted display allowing Rega's pilots to "see" risks and obstacles even when visibility is poor.

Its AW169s will also be equipped with the Laser Obstacle Avoidance Monitoring system manufactured by Selex EX in Genoa. The system utilizes an eye-safe laser technology to detect all kinds of obstacles, especially thin ones including power lines and aerial gondola cables (both common in Swiss valleys), along a helicopter's path. The warning allows a pilot to make timely corrections to the flight path.

A Special Simulator

In spring 2013, Rega's new simulator for its Agusta/Leonardo mountain helicopters went into operation. The simulator used for initial and recurrent training in the A109 is located nearby at the Lufthansa training facility close to Zurich Airport. The Level-B certified sim has a 220-deg.-by-60-deg. field of view. Data loaded into the visual software includes hospital helipads frequented by Rega's pilots.

In order to fly IFR, helicopter pilots must complete between 400 and 500 hr. of classroom training, as well as a minimum of 55 hr. of flight training. All Rega helicopter pilots fly around 50 training hours in the flight simulator and an additional 20 training hours in the helicopter. The Level B certification allows the simulator to be used for compulsory check flights. The simulator provides the additional capability of training for hoist procedures. The unique ability of this simulator to replicate external load missions enables both flight crews and paramedics to practice as a crew. (I understand the realism of the visual scene is so good that it can induce vertigo to anyone looking over the "edge" of the open door in the rear cabin while lowering the



Rega's helicopter rescue teams regularly perform winch rescues to protect the rotor disc from unacceptable risk caused by nearby obstacles.

When the cable is extended to its full length of 90 meters, the electric motor will require approximately 2 min. to lift a full load (two persons) to the helicopter.



winch.) All Agusta/Leonardo pilots as well as paramedics complete up to eight training exercises in the simulator every year.

Coordination Center

Each rescue mission starts with an emergency call into Rega's Operation Center. Anyone anywhere in Switzerland can connect with the rescue coordinator by dialing 1414. The ultra-modern center on the second floor of Rega's main building on Zurich Airport is staffed 24/7/365. The unit is divided into two sections, with one dealing with missions within Switzerland and almost always involving its helicopters, while the other focuses on missions outside the country and primarily involve fixed-wing transport.

When the green light at a coordinator's desk illuminates, the operators, all of whom are proficient in all four of Switzerland's official languages, respond, aided by an automated information system designed to expedite the exchange. One of their first tasks is to determine the location of the caller or victim. More than 80% of incoming phone calls are received from cellphones, but that doesn't guarantee the person making the phone call can give an accurate location, especially if a visitor. So, Rega developed a special app that automatically displays the sender's position on the coordinator's screen. (See "Multifunction App" sidebar.) With the push of a button, the digitally transmitted mission coordinates are fed into the mission helicopter's FMS and appear on the map display in the cockpit.

The coordinator can quickly determine the nearest rescue helicopter available for dispatch. If this happens to be in the canton of Valais, the coordinators work immediately with their counterparts at Air Glacier (which operates predominantly in the French-speaking region of the canton) or Air Zermatt (which serves the canton's German-speaking region).

The flight coordinators have four screens that display not only the various maps and satellite images but other important information to include meteorology and avalanche data as well as potential obstacles near the victim's location. Rega partner organizations including Skyguide, the Swiss Air Force, MeteoSchweiz and the Institute for Snow and Avalanche Research quickly compile the information for the coordinators.

The Rega ops center also organizes missions for the mountain rescuers with the Swiss Alpine Club. And notably in a country where alpine cheese production

is a serious business and a definitive part of its culture, Rega also performs animal transports on behalf of Swiss mountain farmers.

Repatriation Service

Rega provides worldwide repatriation for “patrons” — more on that later in the article — who get injured abroad where medical care either is insufficient or, after receiving initial treatment, the person requires ambulatory transport back to Switzerland. The “abroad” section of the ops center coordinates and organizes those missions. The flight coordinator is assisted by a medical coordinator who works with the foreign hospital or medical service. Beyond that, thousands of patients, their friends or family contact Rega from places all over the world for assistance in finding suitable locations for diagnoses and treatment.

Rega’s medical consultants have visited 6,000 hospitals worldwide for inspections to “see behind the doors,” so they know first-hand the quality of medical care at those facilities. This extensive hospital database is an indispensable resource. In some cases, expert advice based upon this information can eliminate the need for a repatriation flight. However, if Rega’s medical coordinators deem that the standard of care is insufficient at the location, the patient will be



The interior and medical equipment of Rega’s ambulance jets are custom-made. A project team comprising Rega pilots, medics and engineers, in collaboration with external specialists, spent four years designing the new cabin layout. The specialized medical equipment turns the Bombardier CL-650 into the equivalent of an airborne intensive care unit.

retrieved and flown back to Switzerland. The medical coordinator will determine when the patient is fit enough to be flown, and whether this should take place in a sitting or lying flat position.

Rega utilizes two forms of fixed-wing aircraft for repatriation flights. It can use scheduled airline service (which the airlines apparently don’t like very much) or one of Rega’s long-range Bombardier CL-650s, which are the equivalent of high-speed, long-range airborne ICUs.

Repatriation from abroad requires intricate flight planning. For example, at the time of our visit, tensions continued to mount in Kashmir, forcing Swiss and other European airlines to delay and reroute flights because of the disputed airspace. Pakistan closed its airspace following military skirmishes, and shortly thereafter Afghanistan had closed access to its skies. Rega’s jets fly under the authority of the International Red Cross and Red Crescent, thus in theory it should have access to more airspace. Despite this, the risk of transiting airspace overlying hostile ground actions must still be weighed. The dispatcher continues planning the optimal route taking the jet stream’s projected position and strength into calculation, determining if the leg has enough fuel required and if not, planning fuel stops.

One of the special planning tasks involves a risk assessment to minimize the crew’s exposure to communicable diseases from the patients, all of whom will be confined in the same, relatively small aircraft and breathing the same air for lengthy periods. So, proper hygiene and health procedures must be employed to protect Rega crews, patients and the Swiss population. Accordingly, Rega works with Swiss Tropical and Public Health Institute in Basel when there are health questions. The Division of Infectious Diseases and Hospital

Multifunction App

Rega’s smartphone app for marking the location of callers has been downloaded more than 1.3 million times since its launch in 2011. With iRega, users with iPhone or Android phones can alert the Rega Operations Center to trouble with a swipe of the finger.

However, the app provides additional functions that could hasten the search for someone who gets into a precarious condition. The “Share Position” function provides your position as you set off hiking or jogging. If you go missing, it can call up your last known position. (In today’s age of concern about personal security, this information is used only in case of emergency.) With the “Monitor Activity” function activated, friends and family can follow a person’s position and progress on an outing. The “Acknowledgement” function transmits a signal to your smartphone at specified intervals or times to ask if you are OK. If you fail to acknowledge, a check call will go to your device. If you don’t answer, a call will go to your three contacts. The latest version of the app provides a detailed topographic map of your location.

The app proves its worth regularly and repeatedly. For example, an injured paraglider was stuck in a tree and needed rescue. He called but gave an inaccurate location. Unable to find him, would-be rescuers suggested he download the Rega app. He did, and the GPS coordinates for his cellphone were instantly available. Rescuers discovered he was far away from his original report. **BCA**



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Avalanche Rescue . . . When Minutes Count

Avalanches are a major threat in mountainous regions, and when an alpine adventurer becomes entrapped in the suffocating white snow and ice debris field, the probability of survival drops to minutes.

Rega responds to 30 avalanche rescues in an average year. An especially challenging rescue occurred on Jan. 31, 2015, near the alpine town of Graubünden when seven ski tourers were buried under an avalanche. The rescue operation involved three Rega helicopters, eight mountain rescuers from the Swiss Alpine Club and an avalanche dog. A pair of additional helicopters responded as well.

In the end, all were located, but three of the skiers were found dead while the other four were suffering from serious injuries and flown to the hospital.

Rega helicopters carry several detection devices specially designed for avalanche search and rescue. If a person buried under the snow is carrying an avalanche beacon — a prudent habit for skiers venturing outside the boundaries of a ski resort — the device’s signals can be localized by the helicopter as it flies 10 to 20 meters above the avalanche debris with its transceiver functioning as a direction finder.

Rega helicopters also use the RECCO system, a Swedish invention, in which a detector device emits a directional radar signal that responds to a reflector worn by skiers or hikers, and points the rescue team in the direction of the victim. The closer the detector gets to the reflector, the stronger the returned signal. This aids the rescuer to pinpoint the victim’s location.

RECCO reflectors are lightweight passive transponders consisting of a diode and an antenna and requiring no power or activation to function. The reflectors are integrated into jackets, pants, helmets, backpacks, watches and harnesses. The RECCO SAR detector can cover large areas fast. Searching from a height of 100 meters, it can search a 1-sq.-km area within 6 min. More than 900 ski resorts and mountain rescue organizations in 28 countries employ RECCO handheld and SAR helicopter detectors for rescue operations. **BCA**



REGA

On 10 October 2018, Rega successfully located a missing person on the Neisen peak (nearby Interlaken) at night with the aid of this multi-sensor search system. A highly sensitive infrared camera, optical sensors, a computer workstation in the cabin and a connected search light make it possible to perform searches from the air efficiently and over large areas – during the day and at night.

Epidemiology at the Zurich University Hospital provides professional support in this area as well.

When major international catastrophes strike and a number of Swiss citizens are grievously injured, the repatriation effort can be formidable. For example, when a tsunami struck Southeast Asia in December 2004, 16 Rega medical teams spent 10 days in the affected regions. Rega’s jets flew to the disaster area four times. A total of 60 patients were transported back to Switzerland in a variety of ways. This disaster put the ultimate stress test on the team members.

It doesn’t take a large natural disaster to demand extensive resources. In July 2011, a seriously ill woman in Canada and a seriously injured woman in Hawaii both needed intensive care transport. HB-JRC took off from Zurich on July 27 directly for Sondrestromfjord (Greenland) then Vancouver for refueling. In order to meet the long mission routing it was necessary to staff the aircraft with two flight crews,

accompanied by a flight physician and intensive care nurse. During the “off” time the reserve flight crew is able to rest in the bunk beds of the cabin. Roughly 16 hr. later, the aircraft landed in Maui where the flight crewmembers promptly went to a hotel to rest. The next day they had the injured woman onboard and departed for Vancouver to pick up the second patient. The return trip overflowed Greenland and landed back in Zurich on July 30 after more than 31 hr. in the air.

Rega recently upgraded its fleet of fixed-wing long-range jets to the capable Bombardier Challenger 650, which has a 6,500-km nonstop range. Last year, the jets flew 4,690 flight hours, or the equivalent of 76 circumnavigations. That also equates to an impressive annual 1,563 flight hours per airframe for the year.

On the day of our visit in May 2019 each of the trio of jets was dispatched to far-flung parts of the globe. One was fetching a patient in the Philippines and another patient in India. The second was headed to Bosnia and Herzegovina. The third jet

was on its way to Corsica then Spain.

During our visit in late 2018, we were invited to tour a Challenger undergoing modifications. In order to gently move stretcher patients in and out of the aircraft, Rega constructed a three-piece ramp of synthetic fibers, which is permanently installed in the jets. The ramp folds into the aircraft’s main door.

Forward in the aircraft are bunks, necessary for the additional crewmembers required for long mission days that can take them to locations halfway around the globe.

Aeromedical transport of patients requiring advanced care sometimes demands specialized equipment to accommodate medical needs related to heart and lung concerns and premature births. Rega’s helicopters and jets regularly carry cardiovascular support equipment and on those missions are accompanied by certified cardiovascular specialists. The premature birth portable kit (termed “Preemie” in the industry) is designed to be capable with all

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Developing a SAR Drone

It should be no surprise that Rega, an EMS organization that prides itself for innovation, would be working on a special drone project that would work in close collaboration with its rescue partners.

“Ever since it was founded, Rega has continually used cutting-edge technology to further improve air rescue and to come to the aid of even more people in distress,” notes Rega CEO Ernst Kohler. “I am confident that the Rega drone will expand our scope of operations even further.”

“We observed the development of drone technology from an early stage and were always convinced that drones could be of help in particular on search missions,” says Sascha Hardegger, Rega’s head of helicopter operations, who is in charge of the drone project. Rega has decades of experience conducting air searches and last year alone conducted 160 such missing person operations.

Rega considered drone systems currently on the market but none met all of its requirements, among them that the drone be relatively small, lightweight, able to fly several kilometers and for several hours without visual contact with the drone pilot. Working with key partners, it has spent nearly two years developing its own drone project with the aim of putting it to work on search missions in the near future.

The evolving Rega drone has three rotor blades and a rotor diameter of just over two meters, and has little in common with commercially available multicopter drones. During a search mission, it will fly at an altitude of 80 to 100 meters above ground level and, using satellite navigation, it will be able to scan large search areas precisely and autonomously — *i.e.*, without a pilot directly controlling the drone — following a predefined route.

Since aerial cables are common throughout the Alps, the drone is being designed to independently detect and avoid such obstacles as well as other aircraft. This is possible thanks to onboard anti-collision systems coupled with countless data stored in the drone’s inflight computer including digital fine-scaled models of the terrain and obstacle databases. Rega does not anticipate deploying the drone over densely populated regions or in the vicinity of airports or airfields. It is equipped with an emergency parachute in case of catastrophic failure in its propulsion or navigation systems.

Sophisticated onboard sensors and software are being developed for the search aircraft in collaboration with ETH Zurich (Swiss Federal Institute of Technology), known for cutting-edge research and innovation. Infrared and daylight cameras convert the images into pixels that are analyzed by special software to recognize a human pattern and immediately be relayed to the search team. The drone also includes a sensor that can detect a cellphone signal in an uninhabited area from

several hundred meters distant.

“Even if the drone is unmanned and can fly autonomously, it still needs a well-trained drone crew, comprising an operator and a pilot, to coordinate the search with the various rescue teams and to deploy the drone effectively,” Hardegger explained. “If the search for an ill or injured person proves successful, a Rega helicopter or other form of rescue will still be needed to recover the person or fly medical assistance to the site of the incident.”

The prototype is currently undergoing test trials by law enforcement agencies. Further testing is planned before the drone can be used in search operations. The anticipated date of transition into operational use is later this year. **BCA**



Hoist-equipped rescue helicopters become the primary means for rescuing stranded tourists when aerial cableways experience a mechanical failure.

The Rescue Squad

In 1952, Dr. Rudolf Bucher, a physician, founded Swiss Air-Rescue, an organization that would evolve into today's Rega, and on Dec. 22 of that year Sepp Bauer carried out its first helicopter rescue, in Davos, using a Hiller 360 helicopter.

The next February in the Netherlands dikes collapsed, flooding hundreds of villages. Asked to assist, rescue-parachutists from Swiss Air-Rescue worked the area nonstop for three days and nights.

Many more times the unique capabilities of Swiss Air-Rescue would be called upon by foreign countries to help with natural disaster response. For example, in March 1977, Bucharest, Romania, was hit by a severe earthquake. Even though this occurred during the height of the Cold War, this western rescue organization was allowed to proceed behind the Iron Curtain to help citizens of the eastern bloc country. Again, in October 1983 in Eastern Turkey and September 1985 in Mexico City resources of Swiss Air-Rescue would be dispatched to assist in disaster relief.

In 1966, Swiss Air-Rescue sponsored the first international symposium on the famed Eiger glacier. There, Swiss Air-Rescue presented its novel rescue line and horizontal net, used for rescuing injured people from inaccessible places where it was impossible for a helicopter to land. The organization has continued to develop new techniques and more capable aircraft to operate in the demanding Alps.

In March 1983, the four-person cable cars on the Scuol-Motta Naluns cableway were stranded. In an aerial dance in which pilots and hoist operators had to carefully coordinate their timing to get the rescue hoist gently dropped onto the cable cars, the two Rega helicopters managed to rescue 80 people from the cars.

Famously, on Sept. 28, 1980, at an in-country air show, a parachutist jumping from a Pilatus Turbo Porter got his parachute tangled in the tailwheel and was unable to free himself. With the jumper being hauled behind, the Pilatus couldn't land since doing so would have ended in the man's death.

In a feat worthy of a James Bond film, Rega pilot Andres Haeefele maneuvered his helicopter precisely above the jump plane, allowing a rescuer hanging from a cable below to cut the skydiver free from his parachute. Upon falling free from the Pilatus, the jumper deployed his backup parachute and landed without further incident. **BCA**

aircraft. The kit weighs 127 kg to support a 1-kg baby. Also, in 2017, Rega equipped its rescue helicopters and ambulance jets with a newly designed video laryngoscope, which provides images to help secure a patient's airway.

One of the difficulties of being a pioneer in modifying these aircraft in such a manner is that the Swiss certification authorities have never seen such mods and thus the review and approval process is lengthy.

A Different Kind of Funding

Another unique aspect about Rega is its status as a privately run, non-profit foundation that operates independently of the government or any other financial interests. The operation is funded by its "patrons," essentially individual annual subscribers who number nearly 3.5 million in a country with 8.5 million residents, or 41% of the Swiss population. Those funds support the company of 410 employees, most of whom are flight coordinators, medical personnel and mechanics, along with 72 pilots.

In grateful acknowledgement of this support, Rega can waive the costs of rescue missions carried out on patrons' behalf in the event that insurance companies or any other third party are not liable to pay. (Unofficial travel tip: If you contemplate doing any hiking or skiing in Switzerland, I highly recommend buying one of the well-recognized Rega "rescue cards." The annual subscription card costs just 30 Swiss francs, or about the same in U.S. dollars, for an individual or 70 Swiss francs for a family and is arguably one of the best insurance policies you'll ever buy.)

If those individuals being airlifted are not Rega patrons, the service is charged to their insurance providers and any unpaid balance is their responsibility.

What started as innovative ideas by aviators concerned with providing humanitarian rescue in the alpine environment has evolved into an organization that provides expedited patient care for transit to higher levels of medical care. The innovations by this respected Swiss rescue organization have aided patients needing care not only in remote Swiss alpine locations but also throughout the world. **BCA**

Editor's Note: Rega has been selected by Aviation Week Network editors and contributors to receive the Business Aviation Operations Laureate. The award will be presented in Washington, D.C., on March 12, 2020.



Aeromedical transport of patients needing advanced care sometimes requires specialized equipment. The premature birth portable kit in the lower right photo is designed to be capable with all aircraft. The kit weighs 127 kg to support a 1-kg baby.

One Little Difference

Delayed action with **bad consequences**

BY **ROSS DETWILER** rossdetwiler.com



PORT AUTHORITY OF NEW YORK AND NEW JERSEY, PHOTO DAVID FUTCH, LAGUARDIA AIRPORT OPERATIONS

What follows are two landings on shorter, wintry runways with unfortunate outcomes, both resulting in part from tardy procedures. And both could have been avoided altogether by simply landing elsewhere.

What follows are two landings on shorter, wintry runways with unfortunate outcomes, both caused in part by tardy procedures. And both could have been avoided altogether by simply landing elsewhere.

Automatic terminal information

service (ATIS) “Bravo” was current on Oct. 27, 2016, when the first officer (F/O), who was the pilot flying the chartered Boeing 737-7, began to brief the instrument landing system approach for Runway 22 at New York’s LaGuardia Airport (KLGA). The broadcast indicated visibility, 3 mi. in rain; ceiling, 1,500 ft.

broken, overcast at 2,200 ft.; wind from 130 deg. at 9 kt.; and that braking action advisories were in effect. (The airplane’s automatic speed brake module had been deactivated two days earlier and deferred in accordance with the operator’s minimum equipment list, which was appropriate.)

In post-flight interviews, the pilot stated that the flight had been completely normal from departure in Kansas until final approach, when it encountered moderate to heavy rain.

The flight crew completed the approach briefing after descending

through 18,000 ft. MSL and completed the landing checklist when the airplane was near the final approach fix. The airplane was configured for landing with the autobrake set to 3 (highest setting before max) and the flaps set to 30 deg. ATIS information “Charlie” was current at that time and indicated visibility, 3 mi. in rain; ceiling, 900 ft. broken, overcast at 1,500 ft.; and wind from 120 deg. at 9 kt. Previous flights described breaking out 2 to 300 ft. above the ground with light and occasional moderate turbulence.

Flight Parameters

To be stabilized, all of the following conditions must be achieved prior to, or upon, reaching stabilization height:

- ▶ The aircraft is on the correct lateral flight plan.
- ▶ The aircraft is in the desired landing configuration.
- ▶ The thrust is stabilized above idle, to maintain the target speed on the desired glidepath.
- ▶ There is no excessive flight parameter deviation.

If the aircraft is not stabilized on the approach path in landing configuration, at 1,000 ft. (above TDZE) in instrument conditions, or at 500 ft. (above TDZE) in visual conditions, a go-around must be initiated. Or if an aircraft is not stabilized as described in stabilized approach or flight parameters, a go-around should be initiated.

Flight data recorder (FDR) information and post-incident flight crew statements indicate that the airplane was stabilized on the approach in accordance with the operator’s procedures until the flare. The airplane crossed the runway threshold at 66 ft. radio altitude at a descent rate of 750 ft. per minute. When the airplane had traveled about 2,500 ft. beyond the runway threshold, its descent rate decreased to near zero, and it floated during the flare. Its pitch attitude started to increase in the flare from 2.8 deg. at a radio altitude of about 38 ft., which is high compared to the 20 ft. recommended by the Boeing 737 Flight Crew Training Manual.

Further, the F/O didn’t fully reduce the throttles to idle until about 16 sec. after the flare was initiated and after the airplane had touched down. The initiation of the flare at a relatively high altitude above the runway and the significant delay in the reduction of thrust resulted in the airplane floating down the runway, prompting the captain to

About That ‘Little Difference’

There are chilling similarities in the two incidents detailed in this month’s *Cause & Circumstance*. Each involved highly experienced and competent crews. Each flight was at night, in weather and terminating on a contaminated or very wet runway. Each aircraft went off the departure end of the runway. Finally, each operated normally, except for one thing.

While the late flare or the decision to land with a tailwind component probably less than 1 kt. above policy are certainly contributing factors and there may have been options at different points, the “One Little Difference” assured the unfortunate results.

That little difference was not the same for each flight. One of the flights had systems operating in “manual” that they were used to using in “auto,” the other had a system in “auto” that they were used to using in “manual.” The reports have much discussion about going around when the approach is not stabilized. But go-arounds are possible only up to a certain point. When that has passed as a viable alternative, its attempted use could be disastrous. Further, both approaches were, in fact, stable — “textbook,” in fact, until they weren’t. The time lapse from a very good or perfect outcome to the overrun being nearly unavoidable was less than 3 sec. in both of these incidents. Not the perfect situation for learning . . . or remembering.

Fortunately, all the pilots involved knew they were committed to trying to stop, even when they felt they couldn’t. In the LGA landing, the speed brakes had to be deployed manually. This was all in accordance with approved MEL procedures. But the pilot apparently zeroed in on the long float and finally the touchdown. That duress caused him (my opinion) to forget to deploy the speed brakes for nearly 5 sec. Automatically, they would have deployed on wheel spin and probably have allowed the plane to stop or at least be much slower upon departing the runway.

We are so used to automatic deployment of the ground spoilers that we forget just how important that feature is in the deceleration and stopping of a large airplane. When I first came into this business, I started flying a Gulfstream II as a copilot. There had been an accident just before I was hired in which it was thought the ground spoilers had deployed in flight. Along with other possibilities, it was thought this led to the loss of the airplane and crew. Therefore, for the first months that I flew a GII, the automatic ground spoilers were selected off. We deployed speed brakes, of course, and got used to it.

However, I’ll never forget the first time the spoilers were again armed and used on touchdown. When the plane landed, you could instantly feel the deceleration. It was very similar to what I felt in fighters when the drag chute deployed. Additionally, the plane seemed to instantly “squat” or take all its weight off the wings and put it on the gear. Automatic deployment of the ground spoilers and/or speed brakes is critical on a contaminated runway.

The crews of both aircraft had selected autobrakes. As a result, both airplanes had heavy braking within 1 sec. of touchdown. That was good. I have experienced exceptionally good autobrakes in the Bombardier Global Express. I used to use them in the “low” setting on even clear, calm days. Why? Think of this: When you make a normal landing, you hopefully get a nice smooth touch, then smile to yourself as you do . . . then start to ease the nose down so as not to drop it hard . . . then you settle the rudders to get the plane tracking straight . . . then ease your feet up to the brakes . . . and then and only then, you start braking — easy, at first.

With autobrakes on, you are braking the entire time all the forgoing is happening. The result on that clear calm day is about a 1,000-ft. shorter ground run. ▶

Cause & Circumstance

I particularly liked the autobrakes when landing during the notorious fall crosswinds at Westchester County Airport (KHPN). If I were using them due to a high crosswind, or contaminated runway, I went to the highest position.

Events such as those seen in videos of airliners landing in strong crosswinds and going back and forth several times, nearly catching a wing, could be avoided because by the time the second “hooh-haah” began, the plane would be taxiing. There is no way that a pilot can get the initial application of brakes quicker and more positively than with a good autobrake system. And remember, those autobrakes are setting a deceleration schedule, not a braking application schedule. That is why the pressures in the 737 Flight Operation Manual are much less for autobrakes than the maximum manual brake pressure available. The max available is not necessary most of the time.

Both flights went into what I’ll call panic manual braking. At the time that the pilots did so, that action should have had no adverse effect. The anti-skid would still yield virtually the same deceleration in manual as in high or max autobrakes and they both had already had the advantage of having the brakes come on sooner, automatically, than would’ve been possible without the autobrakes.

In the Midway accident, had the thrust reversers deployed when the captain first tried them, or even 4 to 5 sec. later, the plane would have stopped. How many of us have pulled on thrust reversers and had to try two or three times to get them because all the interlocks had not yet closed? But there was one little difference. The captain was using autobrakes for the first time on the line.

When the autobrakes went into the “poor” part of the runway braking they were on a very high setting. This probably caused them to release through anti-skid. That operation, in a system that he was not familiar with, distracted the pilot and caused him to literally forget the thrust reversers (my fact-supported opinion). The company had just recently discussed them in RBFs (read before flight) and this was his first actual use of the system.

This distraction caused the captain to give up deploying the reversers and, instantly, the flight was not going to stop. A very fortunate factor for the second operation was that crew resource management was such that the captain had briefed the F/O saying, “anything you don’t like, point out to me.” This atmosphere caused the F/O to take it upon himself to knock the captain’s hands off the throttles and initiate reverse thrust on own, lowering the EOR departure speed.

Think that autobrake learning curve was steep or the speed brake manual-deployment difficult? Let me give you one more quick example, this one leading to disaster, of another crew faced with “One Little Difference.” The pilots were landing at Congonhas-Deputado Freitas Nobre Airport in São Paulo and attempting to use only one reverser as the other was locked out (in accordance with the MEL). That was the only difference from the normal two-reverser operation.

The weather prevailing along the route and at the destination was adverse, and the crew had to make a few deviations. Up to the moment of the landing, the flight occurred within the expected routine.

According to information provided to the tower controller by crews that had landed on it earlier, Runway 35L at Congonhas was wet and slippery.

The flight touched down at 18:54 local time at a speed of 142 kt. There existed a simplified procedure for landing with a deactivated thrust reverser in which crews had to select reversers for both engines after landing. Computer logic would determine which reverser was inoperative and thus block the increase in power (on the appropriate engine). This simplified procedure, however, added an additional 55 meters in the calculations of the runway length required for landing if the runway was contaminated. ▶

tell the F/O to get the airplane on the ground, stating first “down” and then about 3 sec. later, “down, down, down, down. You’re 3,000 ft. remaining.”

The airplane eventually touched down 4,242 ft. beyond the runway threshold. According to the operator’s procedures, the touchdown zone for Runway 22 was the first third of the 7,001-ft.-long runway beginning at the threshold, or 2,334 ft. The airplane’s groundspeed at touchdown was 130 kt.

Two of the witnesses, a limo driver and a police officer, both stated that they thought the airplane was moving much faster than other landings they had observed both that night and other nights with the same airplane at the same facility.

The captain manually deployed the speed brakes about 5 sec. after touchdown and after the airplane had traveled about 1,250 ft. farther down the runway. The company’s “Speed Brake Not Armed” procedure calls for immediate deployment after touchdown. Maximum reverse thrust was commanded about 3.5 sec. after the speed brakes were deployed, and, with fully extended speed brakes and maximum wheel brakes (which were applied at main gear touchdown) the airplane achieved increasingly effective deceleration. Its groundspeed was about 35 kt. when it entered the EMAS (engineered materials arrestor system) overrun area. With the effective deceleration provided by the fully extended speed brakes, maximum wheel brakes and reverse thrust,



the flight crew would have been able to safely stop the airplane if it had touched down within the touchdown zone.

The captain later stated that he had considered calling for a go-around before touchdown, but the “moment had slipped past and it was too late.” He said that “there was little time to verbalize it” and that he instructed the F/O to get the airplane on the ground rather than call for a go-around. He reported that, in hindsight, he should have called for a go-around the moment that he recognized the airplane was floating in the flare. For his part, the F/O said that he did not consider a go-around because he did not think that the situation was abnormal at that time.

Following the incident, the operator incorporated go-around training scenarios in which flight crews must decide to go around rather than being instructed to do so. It also added a training module emphasizing that “if touchdown is predicted to be outside of the [touchdown zone], go around” and intended to require a go-around if landing outside of the touchdown zone were predicted. The operator also intended to incorporate go-around planning into the approach briefing.

Analysis of the FDR showed that 1 sec. after touchdown the nosegear became airborne again for 2.25 sec. This further added to the stopping distance for the flight.

Under the existing conditions, according to the final report, the captain’s manual deployment of the speed brakes

Unfortunately, the flight crew failed to use this procedure and left the thrust lever of engine No. 2 in a climb or “CL” position where auto-thrust tried to maintain the speed previously selected. Another factor was the non-deflection of the ground spoilers, since, in accordance with the operational logic, both thrust levers must be at the “IDLE” position, or one of them be at “IDLE” and the other at “REV” (reverse), for the ground spoilers to be deflected.

The non-deflection of the ground spoilers significantly degraded the aircraft braking capability, increasing the distance necessary for a full stop of the airplane by about 50%.

Additionally, the autobrake function, although armed, was not activated, because the opening of the ground spoilers is a prerequisite for such activation.

When the nosegear touched the runway, about 2.5 sec. after the left main gear, the No. 1 engine thrust lever was moved to the “REV” position. With this action, the auto-thrust function of the aircraft was disconnected and the thrust lock function was activated, with the purpose of preventing the acceleration to reach the climb power level.

As a result, this function froze the No. 2 engine power in the value it was at at that moment (EPR2 = 1.18). The thrust lock function is disabled by the movement of the thrust lever, but since this movement did not occur, the No. 2 engine remained with that power until the collision that followed.

About 6 sec. after the main gear touched the runway, there was the first activation of the brakes by means of the pedals, which reached the maximum deflection 5 sec. later.

One Little Difference?

Personally, I’d have had to think about that sequence, talk about it, see it in a simulator and practice it. There is no time at 142 kt. to put this all together. There was no time at 100 kt. to learn the operations of and feelings of an auto-brake system, or in the LGA incident no time to forget the speed brake/spoilers had to be deployed manually.

The KLGA incident was in dire straits when the go-around was not accomplished as the airplane passed the one-third mark but still salvageable had the speed brakes been activated in a timely fashion. The situation at KMDW deteriorated when the thrust reverser deployment time coincided with the anti-skid release of autobrakes due to decreased friction. In the Brazilian incident, one seeming little difference opened a Pandora’s box of consequences that couldn’t be put in order once they commenced.

Finally, a Falcon 900EX went off the end of Runway 16 at KHPN in a snow-storm about 10 years ago. Both pilots later said touchdown was well within the first third, spoilers deployed (manually) and thrust reversers functioned. All seemed to be going well until the last third of the runway when deceleration just stopped. The ride was smooth, the anti-skid was wide open, but there was virtually no deceleration. They went off the end of the runway at about 10 kt. and stopped in less than 100 ft. in the overrun.

What Happened?

Right after the airport truck did a runway condition reading and returned to the terminal to update the ATIS with the relatively good report, a heavy mist, almost rain, commenced for about 15 min. The KHPN runway at that time was such that more moisture gathered in the southern end than the northern end. Then the temperature went below freezing and it turned to snow. Our airplane arrived after the snow began. ▶



PORT AUTHORITY OF NEW YORK AND NEW JERSEY PHOTO DAVID FUTCH, LAGUARDIA AIRPORT OPERATIONS

Cause & Circumstance

When the Falcon went off the end of the runway and the field closed, the boss went out to the airplane with a van to assist the passengers. He entered the runway from the last taxiway and drove perpendicularly and very slowly across the runway and coasted to a stop. When he got out of the van, he fell down. Another vehicle coming slowly down the runway from operations went by and on into the overrun, unable to stop. The point is that even when you are 100% familiar with the procedures you're using there is always a possibility that cats are still running around outside the bag.

The takeaway from all this is that landing on contaminated runways, at night, in instrument conditions is a situation that requires an exact knowledge of what to expect and when. If anything at all is not exactly normal, it must be briefed, re-briefed and discussed thoroughly. Then, even when all the "ducks line up," Mother Nature can throw a curve.

Plunk down on the first part of the runway, immediately activate ground spoiler (automatic or manual), immediately go to max braking (autobrake if available) and max reverse ASAP. Unless you're on a very long runway for your operation, if that firm touchdown at the front end of the runway doesn't occur and you don't go around, then you're committed to stopping. Be careful out there . . . **BCA**

was not timely. NTSB analysis of FDR data for previous landings in the incident airplane determined an average of 0.5 sec. for manual deployment of the speed brakes. Using the same touchdown point as in the incident, post-incident simulations suggest that, if the speed brakes had been deployed 1 sec. after touchdown followed by maximum reverse thrust commanded within 2 sec., the airplane would have remained on the runway surface.

Further, the airline had a procedure in which the captain was to make callouts that state that he had control of the airplane when he assumed control on the ground. Contrary to those procedures,

the incident captain did not make those callouts. Further, he took control of the airplane with the copilot still considering himself to be in control and commanded directional control inputs that countered those by the F/O. The captain later reported that he had forgotten that an EMAS was installed at the end of Runway 22 and attempted to avoid the road beyond the runway's end by applying right rudder because he thought it would be better to veer to the right. However, the F/O officer applied left rudder to maintain alignment with the runway centerline and to counter the airplane pulling "really hard" to the right because of the captain's inputs. The breakdown

of crew resource management during the landing roll and the captain's failure to call for a go-around demonstrated his lack of command authority, which contributed to the incident.

The crew felt the flight had proceeded normally until the overrun and neither felt uncomfortable with the other's performance. The company was building a new safety management system (SMS) and had not yet reached the deadline for the completion of the administration of the plan. And a tool "designed to help with safety risk assessment, assurance and risk management" was still under development.

The NTSB determined the probable causes of this incident to be the F/O's failure to attain the proper touchdown point and the flight crew's failure to call for a go-around, which resulted in the airplane landing more than halfway down the runway.

Contributing to the incident were the F/O's initiation of the landing flare at a relatively high altitude and his delay in reducing the throttles to idle, the captain's delay in manually deploying the speed brakes after touchdown, the captain's lack of command authority, and a lack of robust training provided by the operator to support the flight crew's decision-making concerning when to call for a go-around.

Eleven years earlier, on Dec. 8, 2005, about 1914 Central Standard Time, another Boeing 737-7 ran off the departure end of Runway 31C after landing at Chicago Midway International Airport (KMDW). The airplane rolled through

Accidents in Brief

Compiled by Jessica A. Salerno

► December 25, 2019 — About 1713

CST, a single-engine, turbine-powered Bell 407 (N663SF) was substantially damaged when it crashed while attempting to land at the Headland Municipal Airport (OJ6), Headland, Alabama. The commercial pilot was fatally injured, and the flight nurse and paramedic were not injured. The helicopter was operated by Viking, LLC, doing business as Survival Flight, Inc, as

a medical emergency flight conducted under FAR Part 135. A company visual flight rules flight plan was filed, and VFR conditions prevailed for the flight that departed OJ6 about 1654.

The flight nurse, who was seated in the aft right seat, stated that they had initially responded to an accident in Bonifay, Florida. The flight was cancelled en route, and they were returning to base. The flight nurse said the return flight was normal, and the helicopter was "working beautifully." The pilot approached the helipad slightly faster than normal. As it neared the helipad, the helicopter made an abrupt "roll" to the left. The pilot did not say anything and did not correct for the roll. The helicopter

impacted terrain and it "battered" around on the ground before coming to a stop on its left side. The flight nurse said that he and the flight paramedic unbuckled their restraints, exited the helicopter from the aft right door, and immediately tended to the pilot. The flight nurse said his first instinct was that the pilot had some sort of cardiac event. Using his flashlight, he could see that the pilot's face was blue, he was not breathing, and was unresponsive. The engine was still running, so another pilot (who witnessed and responded to the accident) did an emergency shutdown, and all three of them pulled the pilot out of the helicopter from the windshield and immediately initiated CPR. **BCA**

a blast fence and an airport perimeter fence, and then onto an adjacent roadway where it struck an automobile before coming to a stop.

The collision killed a child in the car and seriously injured another person in it; three other persons in the automobile received minor injuries. Eighteen of the 103 people in the airplane received minor injuries, and the airplane was substantially damaged.

The flight had departed nearly 2 hr. late, due to a weather-related gate hold, from Baltimore/Washington International Thurgood Marshall Airport (KBWI) in Maryland, about 1758 Eastern Standard Time. Instrument meteorological conditions prevailed at the time of the accident flight, which operated on an instrument flight rules flight plan.

While en route, the pilots read the ATIS information several times and input data into the onboard performance computer. According to investigators, the flight crew input all possible wind and runway condition scenarios and set parameters for which they would not attempt the approach. Through these exercises they determined that they would stop 560 ft. from the end of the runway with “fair” conditions and 30 ft. from the end of the runway if conditions were “poor.” The performance computer could only take one condition, “poor” or “fair” at a time.

There was discussion in the cockpit about using the autobrake system, as this was a relatively new procedure with the airline. The captain was initially hesitant, but eventually the F/O convinced him to use them. The captain mentioned that he had seen them work in the simulator and in a previous trainer mission and was very impressed with their operation.

Arriving in the Chicago area they were initially given a hold while the runway was being plowed.

According to the cockpit voice recorder (CVR) transcript, when the pilots contacted the KMDW air traffic control tower at 1909:53.7, controllers advised them to “continue for 31C the winds zero nine zero at nine, braking action reported good for the first half, poor for the second half.” About 1912:28, the F/O received a landing clearance.

FDR information indicated that the airplane was aligned on the runway centerline as it touched down at an airspeed of about 124 kt. The speed brakes deployed and the brake pressure increased within about 1 sec. Both pilots described the touchdown as “firm.” That was as



intended as the captain stated he did not want to follow HGS flare guidance as he felt it would land them too far down the runway.

The captain stated that he tried to deploy the thrust reversers immediately after touchdown but had difficulty moving the thrust reverser levers to the reverse thrust position. He further stated that he felt the anti-skid system cycle after the airplane touched down but then felt it stop cycling, and that the airplane seemed to accelerate. He said that he subsequently applied the wheel brakes manually but made no further effort to activate the thrust reversers. He told investigators that he believed that the use of the autobrake system distracted his attention from the thrust reversers after his initial attempt to deploy them.

The F/O said that, when he sensed a decrease in the airplane’s deceleration during the landing sequence, he exclaimed, “brakes, brakes, brakes,” and manually applied the brakes. He stated that he then looked at the throttle console and saw that the thrust reverse levers were still in the stowed position. The F/O moved the captain’s hand away from the thrust reverser levers and, about 15 sec. after touchdown, initiated deployment of the thrust reversers to the maximum reverse setting. FDR evidence confirmed the systems functions described by the pilots and indicated that full thrust reverser deployment occurred about 18 sec. after touchdown.

The F/O stated that, after the airplane came to a rest, he performed the emergency evacuation checklist while the captain checked on the passengers in the cabin. The passengers evacuated through the forward left and the right rear cabin doors.

Pilot and forward flight attendant

NTSB investigators document information and gather evidence the morning after the Oct. 27, 2016, runway excursion of a chartered Eastern Air Lines Boeing 737-700 at New York LaGuardia Airport (NTSB photo by Peter Knudson)

debriefings indicate a very orderly evacuation was performed with the captain and flight attendant standing near the forward left exit door and not allowing passengers to carry luggage off the airplane. The copilot was stationed on the ground and a dead-heading pilot reported to the captain when the airplane was empty. The captain returned to the cockpit one last time to ensure it was secure.

Among the findings by the NTSB:

(1) The company failed to provide its pilots with clear and consistent guidance and training regarding company policies and procedures related to arrival landing distance calculations.

(2) Programming and design of the aircraft’s onboard performance computer was inadequate since it did not present inherent assumptions in the program critical to pilot decision making.

(3) New autobrake procedures were implemented without a familiarization period.

(4) There was a failure to include a margin of safety in the arrival assessment to account for operational uncertainties.

Also contributing to the accident was the pilots’ failure to divert to another airport given reports that included poor braking action and a tailwind component greater than 5 kt. And contributing to the severity of the accident was the absence of an EMAS, which was needed because of the limited runway safety area beyond the departure end of Runway 31C. **BCA**

There I was . . .

. . . flat on my back, out of airspeed and out of ideas.

BY JAMES ALBRIGHT james@code7700.com

I first heard about being, “. . . on my back, out of airspeed and out of ideas . . .,” as an U.S. Air Force cadet with zero hours in my logbook. For greatest impact, you say it with your left hand inverted above as your right is aimed at it from below, ready to unload an imaginary spray of bullets. We cadets howled with laughter whenever we heard these kinds of fighter pilot yarns, but I don't think a lot of us understood what it meant. It would be a few years later when I found myself in an Air Force airplane upside-down, at a very low airspeed, worried about my wingman running out of speed and having us both fall out of the sky at the same time. Note to self: don't do that again!

And that is the point. We pilots like to tell stories about things that happened to us as a way of (1) entertaining our friends, (2) showing how brave we are, and, perhaps, (3) helping our fellow pilots to avoid a similar situation. Many pilots look upon their past mistakes as “dirty laundry” and the less said about it the better. I think we would all benefit from airing some of that laundry. Learning from your mistake can help others avoid a similar fate. Psychologists will tell us that we learn more easily and remember with greater clarity from a well-told story than from a sterile textbook. In the classic military aviator sense, these stories are told in the “ready room” with fellow aviators ready to laugh, commiserate and learn. But these tales can be equally impactful if shared one-on-one. You can find them in published sources, too, including *Business & Commercial Aviation* (BCA) magazine. The story that had the greatest impact on my flying career actually came from a television interview. But my favorite comes from an astronaut.

From the Ready Room: “Carrier pressure”

U.S. Navy Captain Jim Wetherbee, now retired, was a NASA Space Shuttle



German fighter pilot ace Hans-Joachim Marseille, “talking” with his hands, 1919-1942

astronaut with six trips in space, five as the commander following service as a Navy pilot. He writes in his book, *Controlling Risk in a Dangerous World*, of an episode in 1979 as he was returning from his first deployment aboard the USS John F. Kennedy. He launched from the aircraft carrier heading for Naval Air Station Cecil Field in Jacksonville, Florida, and for his first landing on dry land in seven months. However, “the runway ignored its orders and hosted a thunderstorm just prior to my arrival.”

Notably, his aircraft was still set up for carrier operations, meaning the tires were filled to much higher “carrier pressure” so as to withstand the excessive forces during arrested landings — what carrier pilots acknowledge are “controlled crashes.” The downside of this higher pressure is less tire contact

area where the rubber meets the runway, resulting in reduced friction and less steering control during landing and rollout.

When landing on a wet runway with carrier pressure, pilots are expected to drop their tailhooks to make arrested landings. But since this would close the runway until the arresting gear is reset, pilots often choose to leave the tailhook retracted over the approach end to see how difficult aircraft control is. Some runways are set up with another arresting cable for what you might call a “second chance.”

Well, Wetherbee landed his airplane, tailhook retracted, and had no problems for the first 6,500 ft. of the 8,000-ft. runway. After he passed the long-field arresting cable, which represented his last opportunity to drop the hook, his automatic antiskid system began to shunt hydraulic pressure away from his brakes to prevent lockup as the tires were beginning to hydroplane over the wet surface. As he puts it, “I made a bad decision on the wet runway and suddenly lost control of my \$3 million, single-seat, light attack, A-7 Corsair aircraft.” He turned the antiskid system off, causing one tire to grab while the other continued to slide.

At that point, “My airplane immediately turned ninety degrees to the left, and I was skidding sideways while continuing to track straight down the runway at forty knots, with my right wing pointed forward. I found myself stable yet out of control, looking over my right shoulder at the end of the runway approaching quickly, without slowing down. After a few seconds, I realized my main wheel was headed directly for an arresting gear stanchion at the runway threshold and mud beyond that. If the wheel dug in, my sideways momentum would flip the airplane on its back. A hilariously good story for other pilots in the ready-room and at my wake.”

“As I was skidding sideways, heading for an embarrassing death,” he continues, “a colorful tale I heard six months

earlier during our deployment flashed into my mind. In an instant, that story helped me save my airplane.”

The tale: “An F-14 Tomcat pilot was telling us about a dumb action (his words) he took during his landing on a wet runway with carrier pressure in his tires. He blew a tire, lost control, spun around, and somehow ended up traveling straight along the centerline of the runway but backward. Without thinking, he reactively jammed both brake pedals to the floorboard. Bad idea. The rearward momentum of the center of gravity popped the nose of his aircraft up until the tail feathers of his exhaust pipe scraped along the runway. His other main tire blew. Both brakes seized, and the locked wheels ground themselves down to square nubs, as his airplane came to a stop in a spray of sparks. Through all the laughter in the wardroom, he admitted, ‘Since I was going backward, rather than stepping on the brakes, all I had to do was go zone-5 afterburner on both engines.’ At the time, I joined the other pilots and laughed just as loudly at his incompetence. On the inside, though, I silently concluded I never would have thought of that now-obvious solution.”

Capt. Wetherbee continues: “Back to my impending death. Without forming any words or taking any time, my brain recalled the relevant part of the Tomcat driver’s story, and the automatic processing in my mind quickly invented a solution. I waited until I was

approaching the final taxiway in my sideways skid. As the off-ramp reached the two o’clock position relative to my nose, I applied full power to the engine. The big, lazy turbofan spooled up with its usual delay, and by the time the taxiway was at my one o’clock position, sufficient thrust was beginning to build to push my airplane toward the taxiway. The plane exited the runway straight onto the centerline of the last taxiway before disaster. I retarded the throttle quickly, and the A-7 gently skidded to a stop, as if I had planned my graceful slide all along.”

So, he credits that Tomcat pilot for saving his life that day. For those of us who make a living landing only on solid land, the chances for this kind of excitement is thankfully reduced. However, not every war story has to save a life to be useful, some might merely save your career.

From One Pilot to Another: “That Sinking Feeling”

During most of my Air Force career my only involvement with the Lockheed C-5 Galaxy was as a customer. Many of my airplanes required extensive support equipment and the best way to get that from one part of the globe to another was with heavy airlift aircraft. My first real interaction with C-5 pilots was at the Pentagon, where I was a Program Element Monitor (PEM). That position

involves control of operating, maintenance, and acquisition funding for various weapon systems, such as aircraft. Our office had a PEM for each major airlift aircraft, including the C-5.

The C-5 PEM was a very smart officer who had a good reputation in the office and had an appealing, easy-going nature. Every now and then someone would ask if he had “that sinking feeling” and there would be a few laughs. Finally, I had to ask. He reluctantly explained.

He recalled his time as, “a pretty new C-5 aircraft commander but I was getting more than just the normal flights so I was thinking that not much was out there that could surprise me. I got sent to a small airport in Central America that I had never been to but Mother MAC [Military Airlift Command] said it was okay, so we went. We flew down empty; our job was to land, pick up a load of Army tanks, and then takeoff and come home. It was going to be a long day, but not too bad.”

“We landed and I taxied to the ramp where I saw the tanks were waiting for us,” he continued. “After we shut down, the load masters got busy loading the tanks and the engineers went downstairs to do whatever it is engineers do. I was alone in the cockpit doing paperwork and heard some noises I had never heard before. I looked outside the cockpit and I got this sinking feeling. I ran downstairs and saw that the tanks had been loaded and then I went to the ramp where I saw every one of our wheels

JIM WEATHERBEE



A-7E Corsair II of VA-146, Nov. 16, 1974



C-5 Galaxy taking off from Sierra Leone

USAF

were sunk into the tarmac about half a foot.”

He explained that the MAC flight planners saw that a C-5A had been there before, dropping the tanks off, but in that instance the aircraft was not allowed to leave the runway until the tanks had been offloaded. Nobody told him that. But the damage was done, and he would forever be known as the “Major with the sinking feeling.”

Years later, many years later, I flew a Gulfstream G-V into Rhodes, Greece. I had been there before, but never to the ramp we were assigned. Looking around on our ramp I didn’t see any other airplanes. I asked our handler about the strength of the ramp and he told me to relax, they once had a Boeing 737 on that ramp. I had the presence of mind to ask when -- five years ago, was the answer -- and was starting to resign myself that there wasn’t much left to do.

However, in looking at the adjacent ramp I saw what had to be the oldest Boeing 737 I had ever seen since the Air Force. It had to be a -100 model. “Like that one?” I asked. “Yes,” he responded. I looked to my fellow pilot and said, “I have a sinking feeling.”

“I am worried about the pavement strength,” I told our handler. “We need to go to the main ramp or find another airport.”

“Do not worry, captain!” he said. “We have metal plates for your Gulfstream, we can put them in front of the wheels and tow the airplane on top of them. We do this only if the captain asks for it.”

“I’m asking for that,” I said. Within a few minutes a forklift came by and lowered a metal plate in front of each main gear. The plates were each an inch thick and 10 ft. by 10 ft. square. That night I found an Internet connection and got smart about Aircraft Classification Numbers (ACN) versus Pavement Classification Numbers (PCN). (See “Landing Assured, Departure Not,” *BCA*, March 2015). Our G-V had a higher ACN than that old Boeing 737 because our wheels are more narrowly spaced on each landing gear leg and between the left and right gear. The metal plates

significantly lowered our ACN. Seven days later our airplane was where we left it. We fueled, and we left.

Now the following statement is pure speculation on my part. But I like to credit Major Sinking Feeling with helping me to avoid a similar fate.

From My Favorite Magazine: “Cross With Care”

We often think that the most relevant advice about how to fly airplanes has to come from a textbook or a flight manual, but those sources aren’t always up-to-date in the case of the textbook or complete in the case of the flight manual. There may be no better example of this than with handling crosswind landings.



Crosswind landing crab sequence, MROC, 21 Feb 2012,

BERNAL SABORIO

Our June 2015 issue tackled this condition head on in an article titled, “Cross With Care,” written by yours truly.

I got the idea for the feature while holding short of Runway 19 at New Jersey’s Teterboro Airport (KTEB), and watching a Gulfstream G550 landing. The pilot was side-slipping the airplane with a healthy bank angle and I was wondering if he was going to somehow avoid hitting a wingtip before touchdown. In the last few seconds he leveled the wings, the airplane drifted downwind ten or twenty feet, and he landed. It was a messy day to land but using the wrong technique didn’t help.

I checked the Gulfstream G550 flight manual and was surprised to see the crosswind landing procedure was gone. I called Gulfstream’s top test pilot who

dug into the matter and discovered it was a mistake and vowed to restore the missing pages. But along the way he confirmed: the correct way to land a Gulfstream G550 in a crosswind is to maintain a crab until approaching touchdown at which point rudder is applied to align the aircraft fuselage with the runway and opposite aileron to achieve zero drift. Some call this “kicking out the crab” or simply a “de-crab.” In any case, it is the best method to avoid striking a wingtip which can happen with only 7 deg. of bank in that airplane.

When “Cross with Care” was published, two things happened: It received good reviews and I received a lot of emails from pilots who were very surprised by what they had read. It seems they had been taught since Day One to always land wing low. That is the right procedure for many airplanes, but not all.

A year later I got invited to lunch by an avid *BCA* reader who wanted to thank me for our publication and one particular article. He flew for a large Gulfstream G650 flight department in Europe where every pilot loved flying the airplane except in gusty crosswinds,

which he described as “hellish.” I told him that I thought the airplane was quite docile in a crosswind. “It is,” he said, “but only if you know the correct procedure!” None of their pilots had ever heard about the de-crab method until they read “Cross with Care.”

A TV Interview: “A Mentor I’ve Never Met”

In 1981, I was a USAF Strategic Air Command (SAC) KC-135A tanker copilot assigned to Loring Air Force Base, Maine. This was during the Cold War where most of our time was spent on alert, meaning we were confined to facilities so that we would be ready to hop into our airplanes and fly north to end

life on earth as we know it. Fortunately, that never happened and we spent more time on the ground ready to fly than actually flying. When we got tasked to airline down to Montgomery, Alabama to pick up a depot bird, I was more than ready to go.

The airline trip to Montgomery was pleasant enough. The hotel was passable and had a working room air conditioner and a television that got five channels, four more than what we got up in northern Aroostook County, Maine. I flipped through the channels and stopped on a shot of an airline captain with the obligatory four silver stripes on his shoulders talking with a model of a cargo DC-8 beside him. He had a grim look on his face and was talking about the scariest landing of his life.

"We were carrying a load of cattle," he said, "each in a small pen to keep them from moving about. You can't have cattle walking about the length of the airplane, the CG change would overwhelm the airplane's horizontal stabilizer." Cows and center of gravity? I was hooked.

"So, each cow is in his own pen, but they are standing. Or they were standing. We hit the runway so hard that all twenty-five cows broke each of their four legs. They all had to be destroyed." The captain fought back tears.

He went on to describe his DC-8, an older cargo version which had just been upgraded with an inertial navigation system (INS). He had never used one before but was fascinated by its ability to report the airplane's ground speed instantaneously. I had never seen an INS at that point in my short career, but I understood the principles. Three spinning gyroscopes equipped with force meters could detect aircraft movement. You ended up with very accurate heading and speed information.

"We were on approach to runway two-two-left at JFK," he said, "and the copilot and I bugged 145 on our airspeed indicators. That number was a little higher than normal, but we were heavy. Everything seemed normal, but the INS said our ground speed was only 100 kt. I wondered how that was possible. The tower reported the winds were right down the runway at 15 kt. It seemed to me we were missing 30 kt."

"Well," he continued, "at least it was right down the runway. So, I continued what I was doing, keeping the airplane flying down the ILS." This airline captain appeared to be in his 50s, was very well spoken, and had a grave calm about him. "Right around 300 ft., I felt

the airplane start to sink. The airspeed indicator was falling fast. I pushed the throttles forward a little at first, and then a lot. By the time we were at fifty feet I had them to the firewall but it was too late. I managed to get us to brick one of the overrun, but we hit hard."

"I've done a lot of soul searching after that," the captain said, "and I started to wonder about those missing 30 kt. What if the wind that day was greater a few hundred feet up than it was on the surface? When we lost all that headwind, wouldn't that have caused the sudden sinking?"

In 1975 this was a revolutionary thought. Even in 1981, when I heard this story, hardly anyone had heard of wind-shear, much less used the term.

"So, I thought," the captain concluded, "if you know the magnitude of your headwind on the runway, and if you know the magnitude of your headwind in the air, why not come up with a minimum acceptable ground speed on approach?"

It was brilliant. He had conveyed a method of beating this kind of wind-shear. I logged it all away for future use.

The next morning, we showed up at the plant at 0900 as ordered and were told our KC-135A would be ready soon. They let us onto the airplane about 1200, but the paperwork wasn't ready so we had to wait. They let me into the flight deck to stow my gear and I spotted two new boxes, one on each side of

the cockpit. I recognized them immediately, inertial nav systems. In a box in the cargo compartment I found a 100-page instruction manual and while we waited, I read. It was good stuff.

The paperwork was eventually completed and our airplane was released. I hopped into the right seat and turned the INS to "align," and punched in the latitude and longitude. As the inertials started to count down their alignment I could hardly wait.

By the time we made it off the ground, it was already pretty late. The INS were counting up the latitude and down the longitude as we made our way northeast. I didn't figure out the waypoint system yet, so all I had was the orange glow of the lat/long on one side of the cockpit, and an instantaneous readout of our magnetic course and ground speed on the other. Still, it was pretty cosmic.

About an hour south of Loring, I got the weather via HF phone patch. "It sounds bad," I told the aircraft commander. "They are saying the winds are 350 at 40, ceiling is 200 ft., right at minimums. Forty knots of wind, I don't think I've ever seen that before."

The aircraft commander sat in his pilot's seat thinking. Finally, he keyed the interphone. "I think it's time for some copilot training tonight, you want the landing co?"

"Sure!" I said. As we got closer the automated weather report started coming in. The winds were still reported to

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Boeing KC-135A in depot maintenance, Tinker AFB, Oklahoma

be down the runway but now they were up to 50 kt.

The command post frequency, UHF 311, was usually reserved for the pilot. But I toggled the mike anyway. “Has anyone landed recently?” I asked.

“Just one,” they reported, “another tanker. He said the winds were challenging.” I wasn’t really sure that added anything to my knowledge. Fifty knots of wind! At least they were right down the runway, no crosswind controls required. But fifty knots!

At around 5,000 ft. and turning to align with the instrument landing system, I was at 250 kt. and getting ready to slow for landing gear extension. My normal timing cues were not working. It was taking forever to get to the glideslope intercept point.

Why were things happening in slow motion? I looked down to my INS and saw the answer: our ground speed was only 110 kt.! How was this possible? I was still cruising along at 250. I didn’t know the INS could give me a wind readout—I hadn’t read that far into the manual—but if I was indicating 250 kt. and my ground speed was 110, the winds at 5,000 ft. must have been 140 kt. I was going to lose 90 kt. somewhere between 5,000 ft. and the runway.

On television the previous night that airline captain cautioned to never let your ground speed get below the expected ground speed crossing the runway threshold. What does that mean? Of course, it means you should go around and find someplace else to land. But in our SAC-trained killer minds, that option never occurred to us. I couldn’t put it all together while hand flying the airplane with all that wind.

I lowered the landing gear when we intercepted the glideslope and let the airspeed decay to 200 kt. My ground speed was only 60 kt. It should have been 150 kt. based on the tower-reported winds. What would that DC-8 captain have done? He would have added the difference, that’s what.

I couldn’t add 90 kt. to my speed; I wouldn’t be able to get the flaps down. The limiting speed for our full complement of flaps was 180 kt. Mother SAC wouldn’t allow us to land with anything less than all the flaps unless there was an emergency situation. This wasn’t an emergency, was it?

I decided to fly the approach and landing at 180 kt., 45 kt. faster than normal. That should be enough. I was stable on glidepath and on course, 180 kt., about 400 ft. above the treetops. At 300 ft., I

spotted the first set of approach lights and then felt the airplane sink. The airspeed indicator was unwinding so fast I thought it was broken. Then, I firewalled all four engines. We continued to drop but the airspeed slowed its plummet and as the wheels kissed the runway the airspeed indicated we were at approach speed. We were on the ground so I pulled all four throttles to idle.

Three years later, the Air Force C-141 flight manual detailed a brand new idea when combating windshear. They called it the “Minimum Acceptable VREF” technique. Minimum VREF is found by subtracting the reported runway headwind from the aircraft’s expected speed crossing the threshold. If ground speed on approach goes below Min-VREF, add the difference to approach speed. If ground speed on approach goes above Min-VREF, fly target approach speed and expect a tendency to balloon and land long at best, a microburst at worst.

Years later the Air Force abandoned the technique, fearing the math would overwhelm most pilots and the safer course would be to preach “when in doubt, go around.” That, of course, would be the wiser choice in the case of a microburst windshear, but that wasn’t our situation that night in 1981.

I’ve been telling this story for 30 years now, perhaps with a tinge of regret. Regret that I never knew identity of that DC-8 captain; I wanted very much to contact him one day to thank him. I only caught the tail end of that TV show; I never caught his name or that of his airline. Truth is, I didn’t realize just how important this information was until the next day when it saved my life and that of my crew. Over the years I’ve made efforts to find out, but nobody seemed to know.

Then, in 2015, the editor at *BCA* asked me to write an article looking at windshear, and how we’ve progressed over the years. I pulled up the National Transportation Safety Board aviation accident report on the 1975 crash of Eastern Air Lines 66 and read about a Flying Tiger Line DC-8 captain who landed just prior to the accident airplane who worried about his ground speed and pleaded with ground control to change the active runway. I thought this might be the guy. I called the Flying Tiger Line Alumni Association and found out it was him, Capt. Jack Bliss.

The Flying Tiger Line Alumni Association historian, Capt. George Gewehr, wrote to me immediately. “The Captain you are asking about was Jack Bliss.

Jack Bliss

Jack (John) Bliss “flew west” July 22, 2010. He was born in Minneapolis, MN Sept. 7, 1922 and lived in Kelseyville 22 years and San Pedro prior to that.

He leaves behind his beloved wife Patti of 55 years, six children, Roxanne Barry of Port Huneme, CA, Carol Ferguson of Grants Pass, OR, Merrilee Bliss of Aspen, CO, Michael Bliss and Kristianne Peake of Kelseyville, CA, and son, Jack Jr. of Grants Pass, OR, now deceased. Also



14 grandchildren, 17 great grandchildren, sister in law and husband Vicki and Gerry Winkle, brother in law Mike Johnston and many nephews and nieces. He is pre-deceased by his first wife Mary.

He served in the US Army Air Corps during WWII flying B24’s and B25’s.

He enjoyed a 32 year career as a Flying Tiger Line Captain and loved each airplane he flew from C-46’s to B747’s. His flights took him to every part of the world, visiting wonderful places and making many friends along the way.

He used his last years working on the “windshear problem” that has caused many airline accidents throughout the years and was determined to “give back” to the industry he so loved. In Washington D.C. he was referred to as the “Windshear Guru”.

Jack was a wonderful and inspiring man to all he met in life. He will be dearly missed by all his family and friends as a kind and gentle man who loved all of them and life immensely. Up in the clouds is where he belongs and where his heart is. We will always miss him. Private family services at a future date at Avalon Bay, Catalina Island.

LAKE COUNTY RECORDER OF KELSEYVILLE, CA

He flew west several years back, I’m thinking six years ago. If he were still here he would have loved to have heard your story. I have a newspaper clipping of him with an attached article to it. Just coincidentally I was at JFK when he landed. I had arrived from the west coast about forty minutes before Jack had landed. I had passed the very storm over the Sparta VOR that later hit JFK. When we were on the ground we were in the Tiger building and it hit us. It was a HELL of a thunderstorm and moving very fast. I was sitting in our operations office when his copilot walked in and sat down next to me. I was startled to see him and asked him, “Where in hell did you come from?” He said he just landed with Jack Bliss and that Eastern Airlines had crashed behind them. Jack had a load of live cattle on board his airplane. Needless to say, the airport was closed for a while until JFK could sort things out.”

I think it is very important for pilots to have mentors and aviation heroes. It gives us someone to aspire to and something to inspire us to learn and become better than we are. I’ve never met my mentor, but I will never forget him, either. His “There I was” story saved my life. Not every story has to be a life saver to be worthy of telling. But any story that adds to your fellow aviator’s ability to fly safely is a story that must be told. **BCA**

Passenger Preparedness

Their survival may depend on it



BY **FRED GEORGE** fred.george@informa.com

H. Beau Altman, PhD, founder of Flight Attendant and Crew Training Seminars (FACTS) and a 40+-year aviation safety innovator, says that many, if not most, business aircraft travelers ardently resist undergoing basic cabin safety training. The typical showstopper is the 3-6-hr. time commitment required for classroom instruction and structured practical drills. Notably, 90% or more, of all business aircraft operators do not have professional flight attendants aboard. Thus, the passengers must fend for themselves in the event of mishaps.

Altman uses a simple, quick and compelling test to convince business aircraft passengers that they're unlikely to survive the most common emergencies without formal training. "Give me 10 min. of your time," he asks potential participants. He seats each of those who consent in a chair and with a life vest discretely placed in a pouch underneath. He then informs them that they're aboard an aircraft that's about to ditch in deep water.

"You have 30 sec. to find your life vest, put it on and attach the chest straps," Altman says, then: "Go!" At that point, he

turns out all lights to create a pitch dark simulated cabin environment.

In reality, he waits a full minute to provide ample time for passengers to don the life vests. After 60 sec., he flicks on the lights and announces, "Time's up!"

After three decades of these demonstrations, he's seen very few business aircraft travelers who complete the life vest donning drill successfully on the first attempt. That exercise, along with some other basic demonstrations, has convinced several skeptics of the need to invest their time in formal cabin survival training. Altman says National Transportation Safety Board (NTSB) data show that up to 80% of all aircraft accidents are survivable, if occupants are proficient in emergency procedures.

Effective retention of cabin survival skills is directly dependent on the type of learning experience, says Altman. People retain 10% of what they've read, 20% of what they've heard in a lecture, 30% of what they've seen in a slideshow and 50% of what they've seen and heard in a demonstration.

Ground school, including both passive demonstration and active discussion elements, boosts retention to 70%.

The aircraft pitches, yaws and rolls violently. It crashes to a stop. All the cabin lights go out and the interior fills with smoke. Do you really know how to escape under these conditions?

But if you involve passengers in active participation sessions, retention goes up as high as 90%, assuming instructors throw in a few curveballs such as a life vest or life raft that won't inflate properly, a cabin exit that gets blocked or an emergency O₂ mask that doesn't drop from the ceiling compartment. "What's your Plan B," he might ask. Follow-on queries include: Do you know how to use garments or plastic trash bags as impromptu life jackets? Do you know where all the exits are and how to find them in the dark? Do you know where spare emergency O₂ masks might be available?

While participation training requires the most time investment and yields the highest benefits to passengers, Altman recognizes the value of introducing basic familiarization documents and working toward more intensive training systems as passengers learn more about cabin safety.

The Basics — The Pictogram Safety Briefing Card

In 1972, Altman co-designed the first non-verbal, pictogram intensive passenger safety briefing card for the aviation industry. It became the basis for his 1975 doctoral dissertation, "The Use of Pictorial Materials in Aircraft Passenger Safety," at Southern California's Claremont Graduate University. While the dissertation was relatively short (87 pages) by academic standards, it was endorsed almost immediately by aviation industry experts for its cost-effective approach to enhancing passenger safety and its commercial value to the aviation community.

The value of his pictogram safety briefing cards became all too vivid on March 27, 1977 when KLM 4805, a Boeing 747, began its takeoff roll in dense fog at the Tenerife North Airport. Seconds later, it would crash into Pan American 1736, another Boeing 747, still was on the same runway and about to turn onto an adjacent taxiway. The ensuing crash killed 583 passengers and crewmembers. Only 61 people survived.

One of the passengers who made it through the mayhem emerged from the emergency exit of the Pan Am jumbo still clutching a pictogram safety briefing card. He and his wife, who also survived, told a television news crew on scene that both had studied the briefing card before the flight, so they knew precisely how to find, open and escape through the aircraft's emergency exits.

When people learned that Altman's company had designed the innovative briefing cards for Pan Am, the firm became swamped with new orders from both airlines and business aircraft operators.

Many new business aircraft manufacturers make available pictogram passenger safety briefing cards to their customers. But these often vanish from the aircraft as they change owners over their service lives.

Replacement briefing cards may be purchased from several firms. However, the ones that show the safety features of the specific aircraft you fly are more useful than generic safety information cards. The best examples illustrate how to fasten and release safety belts, proper brace positions for high deceleration stops, location and operation of normal and emergency exits, emergency egress procedures, use of drop down oxygen masks, how to don life vests and gain access to life rafts and where to find, plus



H. BEAU ALTMAN/PHD

What's your time of useful consciousness at 45,000 ft.? Do you know how to find and don your oxygen mask in 5 seconds or less? Your life might depend on it.

how to use, fire extinguishers on specific models of aircraft.

Video Brief

Years ago, Altman produced a passenger briefing VHS video for Olan Mills' flight department in Chattanooga, Tennessee, a firm that operated Falcon 10 s.n. 34 from 1975 to 2002. Featuring Olan Mill's own Falcon pilots and usual business aircraft travelers, the video showed where passengers could properly store baggage and carry-on luggage for takeoff and landing, how to fasten and unfasten passenger seat belts, the proper seat-track and seat-back positions for landing and takeoff, use of emergency oxygen masks, response to emergency commands from pilots and all other emergency response actions for which passengers need to be prepared.

In the training video, the Olan Mills passengers actually opened both the main clam-shell entry door and right-side emergency exit. One of the passengers demonstrated how to remove the emergency exit from inside the cabin, turn it on edge and then throw it out over the wing. Not shown in the video, the exit was carefully caught by a maintenance technician outside the aircraft so that the exit hatch wouldn't crash into the wing skin.

Each of the three passengers on camera then crawled through the emergency exit, stood atop the wing and slid safely off the leading edge, no doubt wearing soft soled shoes that wouldn't mar the paint during video production. A narrator instructed the passengers to run clear of the aircraft, move away from the runway or taxiway and remain there until told where to go by airport

personnel or flight crewmembers.

After the project was completed, Olan Mills required its passengers to watch and discuss the video, resulting in up to 50% to 70% retained learning, according to Altman. Lessons learned on the instructional tape could be reinforced by placing pictogram passenger safety briefing cards aboard the aircraft.

In 2002, Olan Mills sold the aircraft to an owner/operator in Newport Beach, California, and it was based mainly at Orange County — John Wayne Airport for the next 5 yr. Notably, when we last flew this aircraft 15+ yr. ago with the second owner, both the original briefing cards and video had long since vanished. We, as the flight crew, had to brief passengers verbally with no visual aids, perhaps slashing passengers' comprehension of emergency procedures by one-half to two-thirds, or more.

This is typical for many operators of older business aircraft. The pilots are required to provide safety briefings with no pictogram briefing cards or other visual aids.

Today, it's considerably easier to recreate and to make available cabin emergency training videos to passengers because of the ready availability of computer-generated graphics and web video. Operators don't have to rely on the availability of VHS tape and players, along with TV sets. Passengers can log into a secure website and view training videos at their convenience on laptop screens or personal electronic devices. In doing so, when they arrive at the boarding steps, they're considerably better prepared for contingencies than if they just listen to an oral briefing.



H. BEAU ALTMAN, PHD

Aircare FACTS Training

In 1998, Altman sold FACTS to Aircare International, a firm that had previously specialized in emergency medical training for cabin crews and pilots. Aircare enhanced and expanded the program over the next two decades, upgrading the FACTS motion-based simulators, adding new features, such as reduced oxygen breathing device hypoxia training, inflight fire fighting and water immersion dunkers that flip occupants upside down.

While those training programs are aimed primary toward cabin and cockpit crews, Aircare also offers “executive frequent flying” training that is especially valuable for business aircraft operators who don’t employ flight attendants.

Many corporate aircraft travelers do not recognize that, in the absence of cabin

Passenger medical emergencies are hundreds of times more likely than aircraft emergencies. Could you save another passenger's life?

crewmembers, they may not react to the initial signs of an impending aircraft emergency and respond quickly and appropriately to assure their survival.

Most FACTS programs include at least 3 hr. of classroom training in the morning and 3 hr. of practical training in the afternoon. This is a substantial time investment for many executive travelers, so relatively few business aircraft passengers have undergone the training. But only 10% of all FAR Part 91 business aircraft pilots also have attended FACTS or an equivalent program, which is to say 90% of them have not experienced a simulated crash, emergency egress, water survival training or actual firefighting. As such, they may be ill-prepared to assist passengers in emergencies even though they are proficient in handling all FAA-mandated aircraft emergencies as demonstrated during periodic FAR Part 142 simulator training.

Most business aircraft passengers, as well as flight crews, never have had to find their way from seats to emergency exits in a dark, smoke-filled cabin simulator. They’ve never been challenged to find an alternate exit in case the primary one is blocked. They’ve never had to follow a voice in the darkness from an airport rescue crewmember on top of a wing yelling “Over here! Over here!” through an emergency exit that’s been opened from the outside, says Altman. They’ve never donned a life vest or used

an oral inflation tube on a life vest because the compressed air bottle didn’t function and never deployed and inflated a life raft.

Passengers seldom are taught that a life raft can be converted into an effective weather shelter for long term survival on dry land. They don’t know how to use a signal mirror to send an SOS to a passing aircraft or rescue helicopter. They’ve never used a handheld signal flare or shot a flare gun. They’ve never fought a fire using a hand-held fire extinguisher. And they’re ill-prepared to cope with a personal electronics device lithium ion battery fire inside the cabin.

On-Site Training

To conserve their passengers’ time, a few business aircraft operators opt to conduct emergency procedures ground school and practice exercises at their own facilities. But former business aircraft operator Tennant Corp. contracted with Aircare FACTS to provide on-site classroom training for its executive travelers during morning sessions.

In that on-site program, flight physiology was a major focus. It was assumed that many passengers, for instance, may not have appreciated that in the event of a sudden cabin decompression, the time of useful consciousness without emergency oxygen is extremely brief. Or they might not have understood why it’s so vital to don their own oxygen masks first before attempting to help others.

Former flight department manager Pat Gordon then used company aircraft for many practical exercises, including emergency egress drills, donning life vests and use of drop down oxygen masks, during afternoon training sessions.

Now, such practical on-site training usually includes a first aid refresher and CPR. Written tests often are included with ground schools, enabling passengers to evaluate their own learning progress in preparing for emergencies.

For onboard emergency drills, using the actual company aircraft on which passengers fly boosts the value of cabin emergency training because they are familiar with the cabin configuration, floor plan, interior furnishings and proximity of emergency equipment aboard. Drills usually are conducted inside hangars because lights can be dimmed and hangar windows can be shaded to provide darkness, thus simulating night emergencies.

“Brace! Brace! Brace!” Prepare for a forced landing, avoid impact injury and be ready for a speedy emergency egress with no help from a flight attendant.



V H. BEAU ALTMAN, PHD

H. BEAU ALTMAN, PHD



Crawl out the emergency exit of your company's aircraft and you might find it's easy to get cut, bruised or sprained without first practicing the exercise in a controlled environment, such as inside your hangar.

Passengers often are surprised at the weight and heft of emergency exits, the difficulty of tossing them out of the aircraft and the distance between the bottom of the emergency exit and the top of the wing. On some business aircraft, it's difficult for passengers to move through an emergency exit without injuring themselves. Cuts, bruises and sprains may be expected for those who have not practiced escaping through such exits.

Once they're outside the aircraft and atop the wing, it's essential for passengers to know how to help others escape, how to aid others in moving to the edge of the wing and how to slide to the ground without injury.

The passenger resistance to such classroom and aircraft cabin emergency training can increase individuals ascend the corporate ladder, but Gordon had the full support of Tennant's chairman, thus who made the training for passengers mandatory. Non-participants were added to Tennant's "No Fly List".

Unfortunately, Altman says, in today's high-pressure, high-productivity business environment, few business aircraft operating companies seem to find the time for hands-on cabin emergency procedures training for passengers.

And excepting large cabin aircraft operations, including those of Part 135 charter companies and Part 91K fractional ownership providers, flight



Good luck in successfully boarding that life raft in deep water without practice. You could be in for a long, cold swim, if you fail.

attendants are becoming increasingly rare aboard business aircraft. The main function of cabin crew is to ensure the safety of passengers. Without flight attendants, it's up to passengers to secure their own survival in the event of aircraft mishaps. As Altman has repeatedly demonstrated in drills, the majority of untrained passengers can't perform up to snuff when confronted with the most common cabin emergencies.

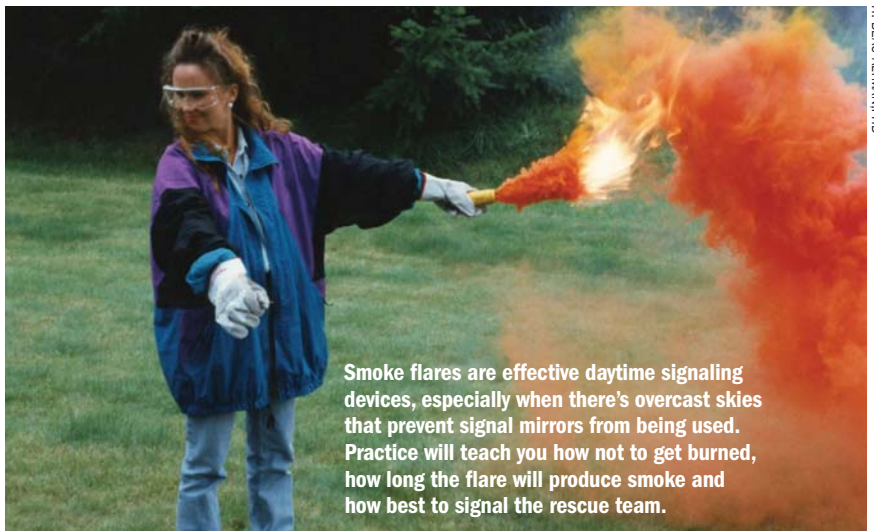
Altman has started a new program called ASCERT, short for aviation safety, crisis and emergency response training. One of its key principles is active participation in cabin safety on the part of business aircraft passengers. They become part of a crew/passenger resource management team whose members are trained to recognize unusual odors, in what to do when an oxygen mask fails to deploy, and how to assist others outside the aircraft in the

event of a forced landing or ditching, among many other emergencies.

"Safety is freedom from unacceptable risk," says Altman. "Survival depends on passenger 'response-ability'."

Even so, many executive travelers often are reluctant to buy into the concept of crew/passenger resource management, becoming part of a team effort that supports the flight department's safety management system. And yet active participation by passengers can be vital to their developing situational awareness, thereby enhancing their perception, comprehension and prediction of impending cabin emergencies and forming survival strategies.

Self-preservation instinct, however, is a powerful motivator. Once passengers grasp that should a mishap occur, they alone may be responsible for their survival, as well as that of others aboard the aircraft, they may convince themselves to learn all about cabin safety. **BCA**



Smoke flares are effective daytime signaling devices, especially when there's overcast skies that prevent signal mirrors from being used. Practice will teach you how not to get burned, how long the flare will produce smoke and how best to signal the rescue team.

H. BEAU ALTMAN, PHD

H. BEAU ALTMAN, PHD

Mollis Market Mover



KOPTER GROUP

A beefy single wins orders and, soon, certification

BY **TONY OSBORNE** tony.osborne@aviationweek.com

Although a newcomer in an industry with tall barriers to entry and entrenched players, Switzerland's fledgling Kopter Group is making significant strides in flight testing and market acceptance as it aims to put its distinctive SH09 helicopter into commercial service later this year.

"The market is big," says Kopter CEO Andreas Lowenstein, "and bigger than what the forecasters are saying." And the former Eurocopter executive says of that market, "If you come up with the right product at the right cost, safety, payload and economic performance, and if the equation is right," it will be welcoming and grow.

The new Swiss offering, which is powered by Honeywell's HTS900, has already secured some market share, with 70 firm orders announced and more imminent. Lowenstein says the company has "solidly sold" the first three years of SH09 production, with some customers now ordering for the fourth and fifth years. Interest, he says, comes from a variety of operators including emergency medical service providers and tourism industry.

Kopter has already secured a site for future final assembly in Lafayette, Louisiana and last October signed a framework agreement with Korean

Aerospace Industries (KAI) to cooperate on marketing, sales and potential assembly of the helicopter in South Korea where it could serve as a training platform for the military.

Lowenstein says the SH09's secret sauce has been its size, the helicopter offers a cabin not dissimilar in size to its twin-engine competitors, capable of seating up to eight passengers with a single pilot. At the rear under the tail boom, large clamshell doors provide access to the rear cabin to load a stretcher

or baggage. Loading at the rear can be done with the engines running thanks to the shrouded Maestro anti-torque system. The aircraft's planned maximum takeoff weight is targeted at 2.85 metric tons.

Up front, production aircraft will feature the Garmin G3000H system will be certified for instrument flight once development of a four-axis autopilot is completed. The company's roadmap for this work foresees the SH09 being IFR ready in 2022.



KOPTER GROUP

The new Swiss offering is powered by Honeywell's HTS900 engine.

Development of the SH09 has had fits and starts since the concept was first unveiled in 2011 by the-then Marengo Swisshelicopter. An initial prototype, P1 which flew in 2014 was a “proof of concept,” says, Michele Riccobono, Kopter’s chief technical officer and head of flight operations. P2, which flew in February 2016, took the concept a little further, but it was P3, which first took to the air in November 2018, that the company says represents a “reset” in terms of design and development.

Testing did not start well, however, when it was discovered that the castings of the upper housing of P3’s main gearbox, a critical component, were heavily defective, with engineers noting shrinkage, porosity and even areas which had been repaired with welding with the wrong filler, none of which had been reported by the supplier. The supplier was subsequently fired. While the discovery and selection of a new supplier set the program back months, the European Aviation Safety Agency (EASA) permitted some flight testing to continue using the flawed gearbox housing.

Retrofitting the gearbox with upper housing provided by the new supplier was a “relief,” said Russ Grant, Kopter’s chief test pilot, who added that the upgrade resulted in “pilots flying the helicopter rather than the helicopter flying the pilots.”

“If we had not spotted the issues, most likely we would have had a serious accident,” said Riccobono, pointing out the defective castings could only carry one-third of the intended loads.

Since the retrofit of the gearbox, the flight test team have been steadily increasing the weight of the aircraft up to 2.6 metric tons moving towards the planned maximum takeoff weight.

Flight testing is currently being performed in Pozzallo, a small heliport on the southern coast of Sicily, an area is blessed with open unrestricted airspace and much better weather than Kopter’s Alpine home.

The company is currently targeting initial certification under the EASA’s CS27 standard for small rotorcraft with the company planning to introduce additional capabilities to the aircraft through notification of design change process.

First step will be to certify the aircraft for visual flight rules operations to

Upcoming changes include a new fuel tank configuration.



KOPTER GROUP

Flight testing is currently being performed in Pozzallo, a small heliport on the southern coast of Sicily.

a density altitude of 16,000 ft. and a temperature operating range of -10-35C. The company then plans to extend that temperature range with cold weather trials in Alaska and then hot-and-high trials in Colorado.

Other upcoming changes include a new fuel tank configuration. Currently the aircraft uses tanks made of Kevlar, with two tanks fitted under the cabin and one each in the rear cabin walls for a total capacity of 750 liters, however drop tests revealed the tanks could not sustain the impact, prompting the company to adopt a new configuration developed by Safran’s Zodiac. The new configuration uses fuel bags and concertinaed fuel lines, that can cope with the impact. The SH09 will also be equipped with cockpit voice recorder

as standard equipment to support post-accident analysis. Such equipment is not standard in single-engine helicopters of this class.

Work is now underway to gear up for production in Switzerland. The company’s facilities, at Mollis will be enough for the initial production phase of around 25-30 aircraft per year, but the architects are putting finishing touches for plans for a 24,000-sq.-ft. facility which will bring together the company’s geographically separated facilities under one roof. The aim is to have the facilities ready for 2022 for an envisaged ramp-up in production.

Lowenstein says the company wants to stay under the radar, and not attract too much attention from its larger competitors. **BCA**



KOPTER GROUP



Write Your Corporate Aircraft Use Policy

Increase business use

A CORPORATE AIRCRAFT USE POLICY SETS FORTH THE WHO, when, where and why to send your people in your aircraft. For many years, the majority of corporate flight operators did not feel any need to put their policy in writing. It was simply understood.

But times have changed. Now, you need to spell out your policy for yourself, your traveling and non-traveling employees, your shareholders, the IRS, and possibly the media.

You need to put the policy in writing because the times are changing, so consider this a time to change the policy. And because you are changing the policy, consider ways to increase the business use of the aircraft. The media attacks on our industry never mention corporate shuttles. Is the “who” segment of your corporate aircraft policy too restrictive? Fix it. The cheapest way to value an employee is to determine what the company pays that employee for a day of work. If the flight department can save that amount by saving a day spent in a car or making multiple stops on the airlines, then clearly the corporate flight is smart money.

But real employee value is not what the company pays in wages. When you decide who should fly, look at the employee’s potential to make money or save money. How many more sales can a sales team make if you put more time back in their calendar?

The “who” segment of your corporate aircraft use policy is not restricted to your employees. FAR Part 91.321 allows you to carry state or federal elected officials and accept whatever reimbursement that they are required to pay. Corporate aircraft offer unmatched opportunities to talk without interruption or distraction.

The opportunity to travel quickly, efficiently and have a captive audience means that company customers and vendors should also be considered in your corporate aircraft use policy. In most instances you cannot collect reimbursement from these guests, but that is not the goal. By taking a customer or vendor with you to a meeting that you both need to attend, you may get the deal done on the way, and create new deals on the return flight. Everyone travels in order to do business face-to-face. But only corporate aircraft travelers get business done face-to-face on the way.

Also remember to include the human side of your company in the “who” calculation of aircraft use. Even the IRS has conceded that a company should not lose deductions for sending bereaved family members to a funeral in the company plane. Participation with organizations like Corporate

Angel Network should also be a part of your written policy and actual practice.

The “when” to use corporate aircraft is closely tied to “where” to use corporate aircraft. As airline schedules continue to shrink, there is only a slim chance that there is a nonstop flight when you want it to where you want to go.

The “why” of corporate aircraft use has many layers. For some companies, security is a 24/7 challenge. If a company official has achieved celebrity status, it would be difficult to protect that official in the chaos of an airline terminal. However, the key to writing an effective corporate aircraft policy is to keep it honest. If your CEO rides the subway every day without a bodyguard, then your CEO is just as safe in an airline terminal. Don’t say that corporate aircraft travel is a security necessity unless security is a real concern.

Safety plays an interesting role in travel decisions and corporate policy. Even Superman has pointed out that “Statistically speaking, flying is still the safest way to travel.” However, some corporate policies still prohibit more than one executive in the same aircraft. Given the good safety record of corporate turbine aircraft operations, companies should reconsider whether it is prudent to send each executive in a separate aircraft.

A good corporate aircraft policy should address all safety concerns. Is one of the executives a pilot? Should the executive sit in the left seat, the right seat, or in the back? These questions may be uncomfortable to answer, but answering them correctly builds an effective policy. For instance, don’t just factor in weather and rest and duty considerations. Are other employees or guests traveling on the same flight? If so, the CEO belongs in the back, cheerleading, schmoozing and getting business done. Short flight, beautiful day, no other passengers? If the CEO is current and qualified, help him or her stay current and qualified on those flights. There are many safety challenges to deal with when executives want to fly the company airplane, but there are also advantages. A CEO/pilot truly understands that no flight department can ever achieve 100% dispatch reliability.

The NBAA has created a resource that breaks down the key components of an aircraft use policy and provides sample language for each component. Topics covered in this resource include access to the aircraft, personnel travel restrictions and pilot authority, as well as an overview of the different policy requirements for business, political and humanitarian use of the aircraft. **BCA**



Cessna Citation M2

Peppiest performance of all CitationJet derivatives

CITATION M2, THE THIRD ITERATION CJ, HAS BEEN IN PRODUCTION since late 2013. More than 230 units (s.n. 685, plus s.n. 800, et seq) have been delivered. But demand is tapering off for light jets. Selling prices now range from \$2.5 million for early 2013 models to \$3.9 million, or more, for 2019 models.

However, this is an aircraft that will climb directly to FL 410 in 24 minutes and cruise at 375 KTAS while sipping 667 lb./hr. The M2 can fly one pilot and three passengers 1,300 nm in 3+30. As with most entry-level turboprop aircraft, it has limited payload with full tanks. But it can carry a pilot and six passengers more than 750 nm.

The M2 was created to offer superior cruise and range performance compared to arch-rival Embraer Phenom 100. However, newer versions of the Phenom 100 have closed the cruise speed gap at the cost of greater fuel consumption. The Phenom 100 and HondaJet Elite have larger cabins, but Textron makes the most of the M2's cabin dimensions by fitting it with some of the best seats in class.

The M2 has a higher standard level of equipment, lower cabin sound levels and superior interior fit and finish to the Phenom 100. Compared to predecessor CJ1+, the M2's fuel vent system was modified to squeeze in 89 lb. more Jet A, its 1,965 lbf Williams FJ44-1AP-21 engines were retuned for improved hot-and-high takeoff, climb and cruise thrust and its wingspan was increased 4 in. by adding a pair of small winglets. Empty weight was reduced by at least 60 lb. by installing Garmin G3000 touchscreen avionics in place of the Collins Pro Line 21 package.

Aircraft cabins typically are configured with a single side-facing seat across from the entry door, a four-chair club section in the main cabin and left hand belted potty seat with flushing toilet in the full width aft lavatory. Each pair of facing chairs in the main cabin has a fold-out work table with a leather top surface insert. Forward facing chairs have adjacent 115 VAC power outlets. Behind the pilot, there's a standard left hand refreshment center with heated beverage container, mini ice chest, cup holders, storage compartments and a trash container. The 8.5 psi cabin pressurization system provides an 8,000-ft. interior altitude at FL 410, the aircraft's maximum cruising altitude.

The main entry door swings open toward the nose, allowing

a fold-down boarding ladder to be extended. The over wing emergency exit is on the right side of the aft lavatory. The nose has a 15-cu.-ft./400-lb. baggage compartment and a second aft external baggage bay holds 30.2-cu.-ft./325-lb. of cargo.

The M2 is very much a pilot's airplane. The G3000 flight deck features three 14.1-in. WXGA displays, simple, well-positioned systems controls and an intuitive, twin touchscreen user interface. The standard package includes ADS-B In/Out, dual comm/nav/WAAS GPS radios, plus dual AHRS and digital ADCs, a single solid-state weather radar, Collins DME-4000, radio altimeter and TCAS 1 unit. Synthetic vision PFDs, Doppler turbulence detection radar and an XM satellite radio weather and entertainment system were popular options.

Engine FADECs slash pilot workload. There are throttle detents for takeoff, max continuous and max cruise thrust.

Taxiing out of the chocks, pilots will find the brakes smooth and effective. Mechanical links from the rudder pedals to the nosewheel steering provide effective and predictable directional control. All internal and external

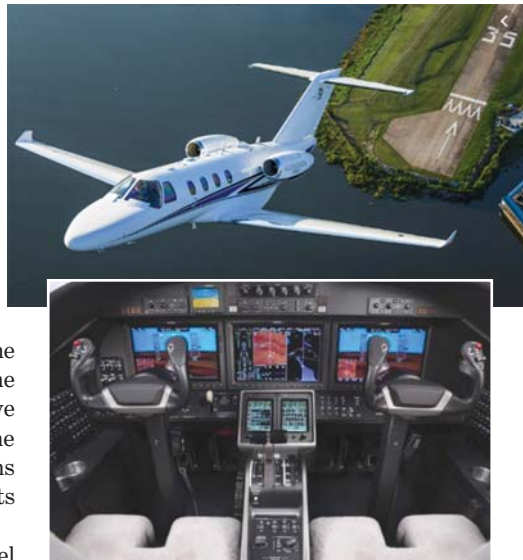
lights are long-life LEDs. Pulsing landing lights are standard.

The airplane is a delight to fly, light on the controls and nicely damped in all three axes. A yaw damper is standard, but not required for dispatch. Long-travel, trailing link main landing gear flatter pilots with cushy touchdowns. The anti-skid wheel brakes are unsurpassed in this. A 60-deg. flap and auto-speedbrake lift dump system greatly improves stopping performance, especially on contaminated runways.

Operating costs are reasonable. Fuel burn averages about 1,000 lb./hr. for short trips and 750 lb. for long missions. Williams TAP Blue costs \$282.58 for both engines. Textron's Pro Parts runs \$145.92 and the Pro Tech maintenance plan costs \$236.24/hr., assuming the aircraft is within its 5-yr./5,000 hr. warranty period.

Textron's M2 is one of the quietest, most pilot friendly, solidly reliable, well supported light jets. It flies fast and far enough to connect most distant cities in the continental U.S. with one fuel stop. However, it's best suited for 600-800 nm trips.

For its price, the M2 provides good value today. However, more resale aircraft may become available in 2020 and that will further depress prices. For potential, time is on your side. **BCA**



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On Duty

Edited by **Jessica A. Salerno** jessica.salerno@informa.com

News of promotions, appointments and honors involving professionals within the business aviation community

► **Aircraft Electronics Association**, Lee's Summit, Missouri, named **Rachael Hill** director of advertising. Hill has served the AEA since 2018 as an independent contractor working for Avionics News and AEA Pilot's Guide.

► **Airports Council International**, Washington, D.C., announced that Greater Asheville Regional Airport Authority Executive Director **Law S. Bleiweis**, has become Chair of Airports Council International, North America.

► **Dassault Aviation**, Saint-Cloud, France, appointed **Charles Wemaere** vice president, Worldwide Spares, with responsibility for spare parts strategy and logistics efforts for the global Falcon fleet. He reports to **Pierre Thielin**, vice president, Worldwide Customer Service.

► **Desert Jet Charter**, Palm Springs, California, announced that **Shaun McQuain**, **Jeff Irvine** and **Suzanne Temesvari** have new roles. McQuain is vice president of charter operations and the 14 CFR 119.69 director of operations. He is also a pilot for Desert Jet Charter. Irvine is Desert Jet's chief pilot. And Temesvari is newly appointed as director of charter sales and logistics.

► **Duncan Aviation**, Lincoln, Nebraska, announced that **Craig Rathjen** has been named the director of Flight Operations leading the day-to-day operations of the department. He has been with Duncan since 1997. **John Kroesche**, who has been with the company since 2002, is the new chief pilot of Flight Operations. **Todd Shriner** has been named a technical representative for Bombardier products. He will provide troubleshooting and technical support for customers who operate Global, Challenger and Learjet aircraft.

► **FlightSafety International**, New York, New York, announced that **Matthew De Foe** has been promoted to manager of the company's Paris Le Bourget Learning Center. He assumes this responsibility from **Yannick Kerriou** who has left the company. **Brian Moore** has been named senior vice president, Operations. He assumes responsibility for operations at FSI's worldwide network of Learning Centers from **Dann Runik** who has left the company to pursue other opportunities. Rich High has been promoted to CEO of Flight-Safety Textron Aviation Training. He assumes this responsibility from **Brian Moore**.

► **Helicopter Association International (HAI)**, Alexandria, Virginia, named **James A. Viola** as the organization's next president and CEO. Viola replaces **Matthew S. Zuccaro**, who announced his retirement last fall. Viola most recently service as director of General Aviation Safety Assurance for the Federal Aviation Administration.

► **Ross Aviation**, Denver, Colorado, announced that **Larry Jorash** has joined the company as vice president of Operations, Integrations and Safety. He will be responsible for future FBO integrations into the company's expanding network, along with the oversight of company-wide safety programs.

► **Trenchard Aviation**, Gatwick Airport, United Kingdom, appointed **Martin Longden** vice president, interiors.

► **West Star Aviation**, East Alton, Illinois, announced **Walt Marcy** has joined the team as Avionics Technical Sales manager at the grand Junction, Colorado facility. **BCA**



CHARLES WEMAERE



CRAIG RATHJEN



JOHN KROESCHE



MATTHEW DE FOE



BRIAN MOORE



LARRY JORASH

Products & Services **Previews**

By Jessica A. Salerno jessica.salerno@informa.com



1. AOPA Reveals Fly-In Locations For 2020

The Aircraft Owners and Pilots Association (AOPA) has announced its three 2020 fly-in locations. The first of the two-day events will begin May 29-30 in San Marcos, Texas (KHYI). The second will take place June 19-20 in Casper, Wyoming (KCPR). The season will conclude Sept. 11-12 in Rochester, New York (KROC). Fly-in festivities will include car shows, rodeos, music, concerts, airshows and other activities. The Fly-in in San Marcos is co-locating the event as the featured sponsor with Go Wheels Up! Registration for all 2020 fly-ins will begin in February.

Aircraft Owners and pilots Association

www.aopa.org

2. Duncan Uses Hydrographic Printing for Interior Elements of Business Aircraft

Duncan Aviation has delivered two aircraft, a Gulfstream 150 and Challenger 300, with interior elements made with hydrographic printing. The aircraft are the first to receive countertops created by hydrographic technology, a new finish option from Duncan. In the future, Duncan will use hydrographics on other applications, such as dividers, monuments, card table inserts and other items. The three-dimensional printing technique opens up a variety of aesthetic options for interior finishes without changing cabinet veneer. Designs include wood grain, stone, metals and custom designs.

Duncan Aviation

www.duncanaviation.com

3. NetJets Launches QS Security Services

Fractional ownership company NetJets has launched a new subsidiary called QS Security Services, offering an international network of safety experts to provide travel security and personal protection to high-profile travelers.



4. Textron Completes Wing Mating of Cessna SkyCourier

Textron Aviation has completed the mating of the wings to the fuselage of its first new Cessna 408 SkyCourier, a high-wing, twin-utility turboprop, and is beginning the next phase of development. The program is progressing with the assembly of the prototype and an additional five flight and ground test articles, the company reports. Landing-gear testing and avionics ground testing continues. First flight is expected in 2020, it says. FedEx is the aircraft's launch customer with 50 firm orders and options for 50 additional aircraft. The program was unveiled in 2017. It will be offered in various configurations.

Textron Aviation

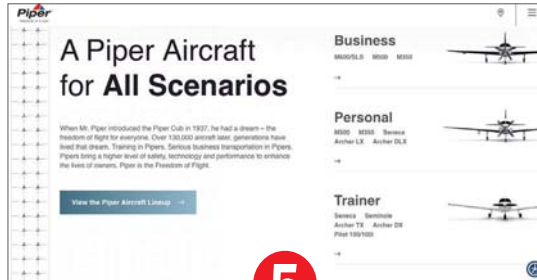
www.textron.com



5. Piper Aircraft New Website

Piper Aircraft Inc. launch of completely redesigned website — www.piper.com. The website, a project anticipated by both customers and dealers, has been designed to offer a better user-friendly experience with improved navigation and functionality while allowing customers to see the full product line up. The site offers easier access to Piper's online content areas, including in-depth profiles of the entire product line, global sales and dealer contacts, support networking, parts and warranty and technical publications, among other content.

Piper Aircraft, Inc.
www.piper.com



5



6

6. Erickson Generates Global Demand for the S-64 Air Crane

Erickson Incorporated announced new aircraft orders to be delivered in 2020 and 2021. Vigili del Fuoco (VVF), Italy, announced two S-64 aircraft sales. Erickson plans to deliver one S-64F in 2020 and the second to be delivered in 2021. Both aircraft will support VVF for firefighting and multi-mission emergency response support in Europe.

Erickson Incorporated,
Portland, Oregon
www.ericksoninc.com

7. ABS Jets FBO at Bratislava Airport

The Prague and Bratislava-based business jet operator ABS Jets has been approved to provide a full scale FBO at Bratislava Airport in Slovakia. The company has operated in Bratislava since 2009 supervising business aviation ground handling services. The FBO includes a 2,300 sq. meter hangar, tooling, luxury vehicles for transportation, a crew lounge area and support from eight Bratislava-based team members. The FBO also provides line maintenance support to Embraer Legacy 600/650, Phenom 100/300, Gulfstream 650 and 550 aircraft. Technical support can be extended to nearby Vienna Airport if required. ABS Jets also arranges ground handling services at all other Czech and Slovak airport where it does not have an official presence.

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8. Kopter's New Website

Kopter Group launched its redesigned website. The new platform offers quick and easy access to essential information and features relating to its SH09 next-generation single-engine helicopter and its customer support and services offerings. Its improved functionality and enhanced content is focused on the company's mission to provide its customers with the most versatile, safe and cost-effective mission aircraft. It includes a comprehensive media section and a detailed section on career opportunities.

Kopter Group
www.koptergroup.com

9. Thoroughbred Aviation Launches Maintenance Management Service

Thoroughbred Aviation, LLC, announced a new, innovative service to manage aircraft maintenance for aircraft operations under FAR Part 91. Features and benefits of MMS include: two levels of service and individual services allowing

for a tailored program; management and monitoring of aircraft maintenance program; forecasting, planning and management of scheduled maintenance events; coordination of AOG support when required; update and management of aircraft technical records; audit work orders post-maintenance for compliance, among other features.

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February 1970 News

Operations at greater New York's primary general aviation facility, **Teterboro Airport**, officially became the function of **Pan American World Airways** last month. —*BCA Editors*

Edited by **Jessica A. Salerno** jessica.salerno@informa.com

Pan Am will run Teterboro for its owner, Port of New York Authority, under a 30-year lease that stipulates exclusive use of the airport by general aviation, excluding scheduled airline operations other than by helicopters and air taxis.



A first for Israel. The Arava, a 20-passenger feederliner, the first plane exclusively designed and built in Israel completed a successful first flight on Nov. 27, 1969. Manufacturing and marketing (under the name "Sherpa") will be handled by Sud Aviation's light-plane division, Socata. Price will be around \$390,000.



Its delivery flight of some 5,000 mi. ended, the 200th DH 125 — one of three ordered by Sears Roebuck — takes a breather while its pilot, Desmond Penrose, visits with Little Rock Airmotive (Arkansas) executives.



Cessna's Model 414 uses the same oval fuselage of the 421 and the wings of the Model 401. It's powered by two 310-hp turbocharged Continentals, which also furnish bleed air for its 4.2-psi pressurization system.

William T. Piper, Sr. Dies at 89.

On Jan. 15 at Lock Haven, Pennsylvania. He held the post of chairman of the board until last year. Piper was 32 when the Wright Brothers flew at Kitty Hawk. In 1928, he was appointed to the board of Taylor Brothers Aircraft to oversee a \$50,000 investment to ring production of the 2-place Taylor Chummy to Brandford. Chummy became Cub, and in 1936, the company became Piper Aircraft and was moved to Lock Haven.

Pan Am delivered Fan Jet Falcons in 1969, bringing the total number of deliveries in North America to 127. Pan Am says it has orders for 12 new Falcons, six of which are "F" models with high-lift leading-edge devices on wings for improved landing characteristics and better performance. **BCA**

THE ARCHIVE



First of the small turboprops, Cessna's Citation is due to start rolling from Wichita production lines in mid-1971. At \$695,000, full equipped the 8-passenger minijet boasts 400-mph cruise-ability and the ability to get in and out of light-twin-sized strips. Unabashedly confident, Cessna sees over 1,000 of these in the biz fleet by 1979. Today, two prototypes are flying.



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