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PILOT REPORT

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Third-generation offers upgraded performance, convenience and technology



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Operating Into Turkey
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While tensions exist, there's still business to be done



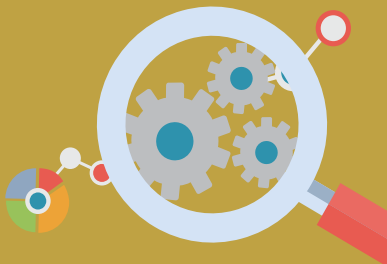
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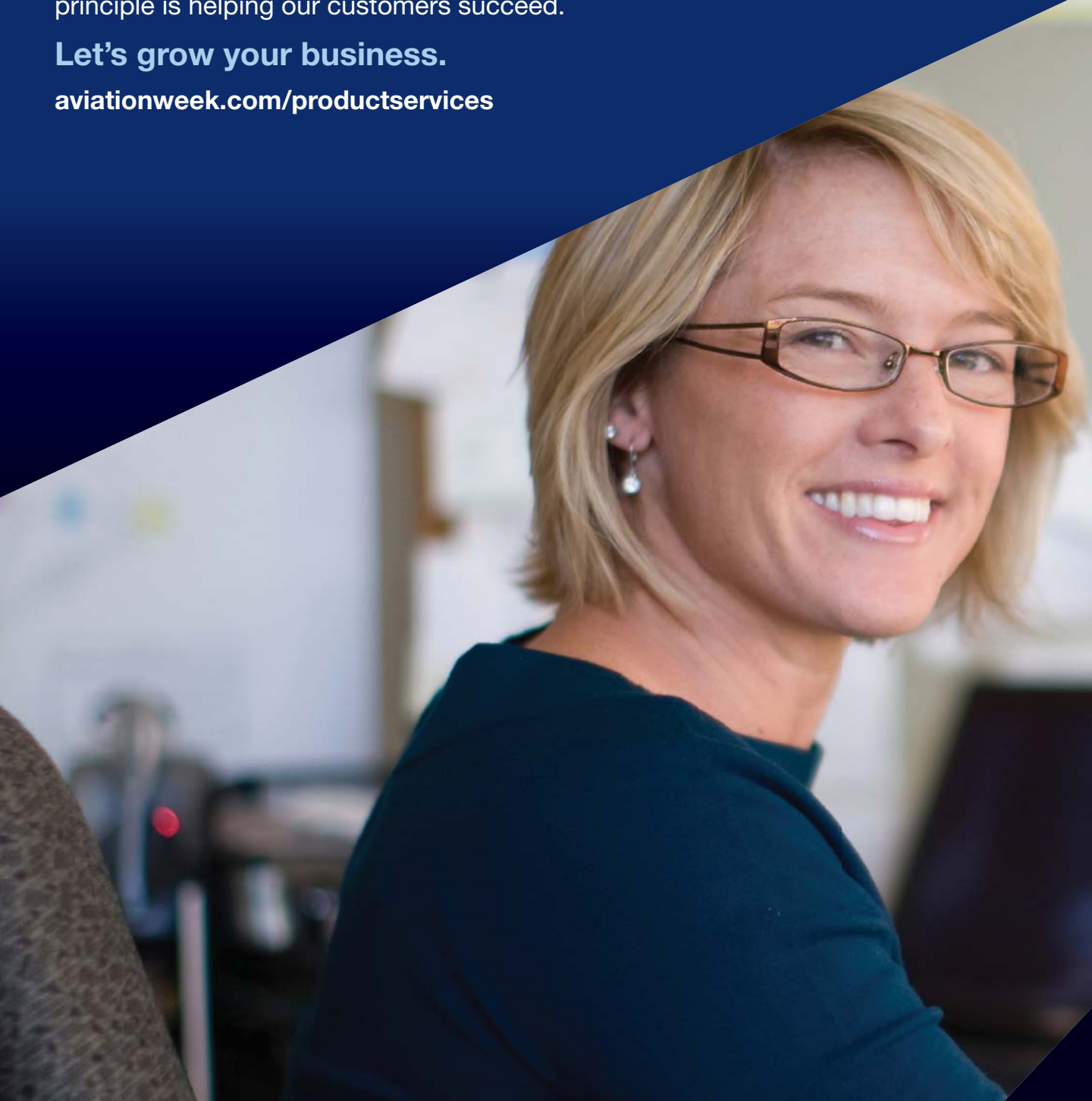
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Know. Predict. Connect.

How can we help you navigate, recover and grow?

The daunting challenges that currently face humanity will leave an indelible mark, but there will come a point when the COVID-19 crisis begins to fade and we adjust to life in the aftermath of this pandemic.

The Aviation Week Network has helped to keep our industry abreast of global developments during every major crisis since we launched the first edition of *Aviation and Aeronautical Engineering* on Aug. 1, 1916, in the middle of the World War I.

And today — more than at any point in our history — the Aviation Week Network is uniquely positioned to help the world’s aviation community make sense of seemingly overwhelming challenges.

Recent additions of CAPA, ASM and Routes to our team mean that we have the entire information spectrum covered in all regions, from daily news to detailed analysis from the industry’s most experienced and connected team of experts, a unique portfolio of data and forecasts and all forms of face-to-face and digital events. The Aviation Week Network can help the industry through the coming weeks and months by supporting situational awareness, critical decision-making and, ultimately, a return to growth.

We are committed to action and are introducing more robust ways for you to know, predict and connect as we all navigate the crisis and position for the future.

Know. Predict. Connect.

The first step has been about situational awareness as the crisis unfolds and morphs every day around the world:

- So far, our global team of aerospace journalists and analysts have produced **more than 4,000 articles, podcasts and news briefs** covering the crisis, diving deep to help each of our customer communities: Air Transport, Defense & Space, Aerospace, Business Aviation and MRO.
- We have launched a **curated landing page** to help you navigate that content across our portfolio along with the first of an expert-webinar series to share predictions, advice, viewpoints and best practices.

See the landing page: [AviationWeek.com/COVID19](https://aviationweek.com/COVID19)

Register for our webinar series: [AviationWeek.com/COVID19/webinar](https://aviationweek.com/COVID19/webinar)

At the same time, we are ramping up our analytical and forward-looking intelligence and data. Finally, we are pursuing innovative ways to reestablish buyer-seller relationships in the absence of face-to-face platforms across the aviation community.

There is much, much more to come. Is it helpful? What can we do better? I'd love to hear from you.

As a recent Aviation Week editorial said: “This is without doubt the greatest crisis aviation has faced since the dawn of the commercial jet age more than six decades ago....The coming days will be dark, but rest assured the industry will recover and once again prosper.” The Aviation Week Network is proud to stand alongside our partners during this unprecedented period of challenge, helping to keep the market informed and focused on a bright future.

I'll keep you up-to-date on new initiatives in this letter in the coming weeks.



Greg Hamilton,
President, Aviation Week Network

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After This Passes

The pandemic will end. What then?

MY ELDEST IS ABOUT TO RETIRE FROM THE U.S. COAST GUARD AFTER 20 years as a cutterman, HH-65 pilot, working intelligence in Washington, a Black Sea embassy assignment, and finally international relations and planning for Pacific region partnerships. In response to my query about his next step, he said he was interested in civilian aerospace. Oh, boy.

As I write this, workers at Piper Aircraft in Vero Beach, Florida, are fashioning transparent face shields for medical personnel while doctors and nurses in New York are treating patients afflicted with COVID-19 while wearing face masks fetched from China by a pair of NetJets aircraft. Simultaneously, the Flexjet fleet, among the many, is being sanitized with anti-bacterial agents; training centers are so bereft of trainees that CAE shuttered several; Textron, Bombardier, Spirit, GE Aviation and other manufacturers have furloughed thousands of employees; and Patient Airlift Services canceled all flights to protect pilots and passengers against the coronavirus.

The contraction of all industries, very much including aerospace, is without precedent and spurred by a lethal, fast-spreading, global invisible menace with no known opponent. It's really quite terrifying. The enormity of the virus's physical and economic impact upon the world is impossible to calculate and its duration unknown as well.

But here's the thing: This pandemic will end, just as have all those that preceded it.

So, rather than focus on the terrible present — and God bless the first responders, those manning the emergency rooms and ICUs, and everyone working to assist and protect them — I wondered what consequences the crisis of 2020 might have on business aviation in the years going forward. Will there be any and, if so, will they be helpful or not?

Although I've been a member of the community for longer than I care to admit, I readily acknowledge I'm no sage about its future course. But I do know a few who qualify. And while the coronavirus calamity is unlike anything any living person has experienced — and thus its “novel” adjective — many have been through distressful cycles, economic reversals and technological advances, and that experience could help to set expectations for what's coming.

This time around, helping me see what might lie ahead was a familiar, sagacious group of business aviation veterans including Lou Seno, chairman of JSSI and a former leading aircraft leasing pro; Rolland “Rollie” Vincent, a well-known industry consultant,

former aircraft manufacturing executive and partner with Jetnet in the iQ business aviation seminar series; Charlie Priester, chairman of the Chicago-based business aircraft management and charter operation founded by his father 70+ years ago; and Dick Van Gemert, the former head of the Xerox flight department and general services and founder of New World Jet, among other things.

While this estimable foursome were not in complete agreement on what may be forthcoming, there was general consensus on the possible:

- ▶ There will be consolidations of businesses, some failures and the fleet will likely be impacted as a result. When aircraft are redundant or shareholders get worried or angry, the flight department often wrongly takes the hit. Moreover, the decline in the number of types of new aircraft being marketed is continuing.

- ▶ The drastic reduction in scheduled and private flying has generated daily data on the commensurate reduction in CO2 emissions. The “plane shamers” have taken note and are now focused on calculating pounds of contamination by seat. Not good for the community.

- ▶ The near universal embrace of videoconferencing is here and will affect some business travel plans negatively. However, the importance of in-person, face-to-face meetings in deal making will continue to be key. Business aviation facilitates that activity.

- ▶ The aversion toward airline travel, both domestic and international, could enhance the value of business aircraft since it minimizes interaction with large groups of strangers, assures a germ-free cabin environment and eliminates any need for transfers. However, an unintended consequence, already demonstrated, is that some owners will choose to withdraw their aircraft from charter service.

As one of the solons correctly noted, “A time of crisis is a time for innovation.” Well, this is that time, and everyone is alert to novel (sorry about that) solutions, practices or technology going forward. There's no telling what those might be, but the movement toward what Wheels Up's Kenny Dichter calls “the democratization” of business aviation, that is lowering the price of entry and participation, is a worthy aspiration. And the promise of drones or urban air mobility technology is another.

Meanwhile, there are armies of homebound employees and those like my near-retiree eager to get aviation moving again. That can't happen soon enough. **BCA**



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NEWS / ANALYSIS / TRENDS / ISSUES

CAE Lays Off Staffers and Closes Training Centers



Beginning March 27, CAE temporarily laid off more than 400 staff members and cut the salaries of managers. In addition, it closed three training centers in Peru, Belgium and Italy and said more closures could follow. It asked for federal government aid. “We’re going into this with a sound balance sheet,” CAE CFO Sonya Branco said at the time. They had ample liquidity to weather the storm, she added.

Rolls-Royce Pauses Engineering and Production



Rolls-Royce halted engineering and production operations for a week in late March at its UK facilities as a result of the viral invasion. The company said the halt would allow it to modify its operations in line with UK government guidelines, particularly in terms of social distancing among workers. Rolls-Royce said the changes would allow it to sustain modified operations and activities over a longer period and allow it to support its customers.



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▶ **ON MARCH 25, BOMBARDIER TEMPORARILY SUSPENDED** aircraft and rail production and other work considered nonessential at most of its Canadian operations. Work was scheduled to resume in late April. In addition, the company planned to furlough a small number of employees in Wichita but keep the site operational. The suspension in Canada



followed mandates from the governments of Quebec and Ontario to help slow the spread of the virus that causes COVID-19. Bombardier also suspended its 2020 financial guidance while it evaluated the impact of the temporary closure and other actions taken in response to the pandemic. The company’s service and support network was continuing to operate, but strict screening, disinfection, distancing and hygiene measures were being implemented. The company also suspended work at its Belfast, Northern Ireland, facility, which builds the wings for the Airbus A220 along with the tail and fuselage sections for the Global 7500; it was to restart April 20.

▶ **GE AVIATION, THE LEADING DIVISION WITHIN GENERAL ELECTRIC**, cut 10% of its U.S. workforce in late March in anticipation of a steep falloff in maintenance, repair and overhaul (MRO) work. The furlough was planned for three months, and the company said it will continue to let go outsourced workers and put a freeze on hiring in the wake of the novel coronavirus. In addition, it canceled salaried merit increases and dramatically curtailed nonessential spending. The moves marked a reversal of the company’s outlook from late February when top executives confidently told Wall Street and others they expected the COVID-19 illness to be just a blip for the aerospace industry.

▶ **DESPITE SHUTTERING VOOM, ITS ON-DEMAND HELICOPTER** booking service operating in São Paulo, Mexico City and the San Francisco Bay Area, Airbus reaffirmed its support of the urban air mobility (UAM) technology and marketplace in which it said it will continue to invest. The grounding of Voom came in late March, another victim of the novel



coronavirus crisis. “This is just one chapter in urban air mobility [UAM], with so much more to come,” Voom CEO Clement Monnet said in announcing the closure. “It is not a question of whether the UAM market will open up, but when . . . Airbus continues to invest in UAM and will be able to leverage the knowledge gained through

Voom.” Launched in 2016 as a project within Airbus’ Silicon Valley outpost A-Cubed, Voom later became part of the company’s UAM business unit. Operations began in August 2017 in São Paulo, expanding to Mexico City in March 2018 and San Francisco in September 2019.

▶ **SPIRIT AEROSYSTEMS, BOEING’S LARGEST SUPPLIER**, temporarily halted work at its Wichita and Tulsa, Oklahoma, facilities after Boeing announced a temporary shutdown of its Puget Sound facilities in Washington state. The aerostructures maker warned that more layoffs could follow depending on the rate of production when Boeing restarted. Earlier this year, Spirit laid off around 3,200 workers in Wichita and Oklahoma after Boeing stopped production of the 737 MAX. But the company said operations will continue in support of U.S. defense customers — it is involved in the B-21, CH-53K and other programs — as well as with Airbus, aftermarket and MRO, third-party fabrication work. It said the employees in those activities should expect to work their regular schedules.

► **EMBRAER EXECUTIVE JETS ANNOUNCED MARCH 27 THAT IT** earned a “hat trick,” receiving type certification for its Phenom 300E light jet from three aviation authorities: the National Civil Aviation Agency of Brazil (ANAC), the European Union Aviation Safety Agency (EASA) and the FAA. The Phenom 300E is an upgraded version of the Phenom 300,



with the E for Enhanced referring to a redesigned cabin and other upgrades. The aircraft achieved certification with a 2,010-nm range, high-speed cruise of 454 kt. and a maximum payload of 2,636 lb. It also received avionics upgrades and enhancements to lower cabin noise. The Phenom 300E’s avionics

upgrade includes a runway overrun awareness and alerting system, predictive wind shear, emergency descent mode and other features. Pilot and copilot seat tracking has increased to provide almost 40% more legroom. It is available for delivery now.

► **AVFUEL HAS LAUNCHED A VOLUNTARY CARBON OFFSET PROGRAM** “committed to helping the industry reach its carbon neutrality goals.” The program assists interested operations in one of two ways: designating a specific number of gallons to offset when creating an Avfuel Contract Fuel authorization or opting to offset emissions from all gallons of fuel purchased through Avfuel. “Aviation currently accounts for 2% of the world’s CO₂ emissions,” said C.R. Sincock, Avfuel’s executive vice president. “Other than utilizing sustainable aviation fuel, carbon offsetting is going to be the key way to reduce industry emissions in the near term.” **Companies can zero out their CO₂ greenhouse gas emissions by purchasing carbon credits** (certificates showing the offset of one ton of CO₂) that is then invested in certified projects with a positive impact upon the environment. The Avfuel program uses a carbon offsetting calculator with a standardized industry formula. Measured in accordance with the Greenhouse Gas Protocol and the ISO 14064 standard and based upon carbon dioxide emissions coefficients as assigned by the U.S. Energy Information Administration, it is used to calculate the number of carbon credits required to offset gallons of fuel uplifted.

► **LYNN TILTON STEPPED DOWN IN LATE MARCH AS CEO** of MD Helicopters (MDH) after bankruptcy judges ordered her to sell companies to repay collateralized loan obligations worth nearly \$2 billion. Although she withdrew from active management of the helicopter maker and other Patriarch Partners portfolio companies, Tilton remains the largest single shareholder and a major creditor of MDH. Through Patriarch, her private equity company, Tilton specialized in buying up and turning around distressed companies using a series of collateralized loan obligations known as the Zohar funds, which she controlled until 2016. Those funds went bankrupt two years later. Tilton took over MDH in 2005. Included in the sale were the MD 500E and MD 530F single-engine helicopters, the MD 520N and MD 600N



single-engine NOTAR rotorcraft, and the MD 900 Explorer twin. She went on to turn around the company’s fortunes, helping it to secure a number of major U.S. Army contracts and delivering helicopters to Afghanistan, Kenya and Lebanon. At Heli-Expo 2020 in January, she announced that the company was close to restoring production of the MD 902 after a decade-long hiatus in production.

New Generation Dornier Seastar Prototype Flies



Dornier Seawings completed the first flight of its new-generation Dornier Seastar amphibious aircraft on March 28 when the prototype took off from Oberpfaffenhofen airfield in Germany, flying for 31 min. in what the company said was a “major milestone and achievement for the program.” The flight follows extensive ground testing, engine runs and approvals from EASA.

Thrush Aircraft Reports ‘Strong’ First Quarter



Following completion of a restructuring from Chapter 11 bankruptcy in 2019, agplane maker Thrush Aircraft said it turned in a “strong” first quarter in 2020 and more than doubled its number of employees to 103. The company’s 2020 order book includes 17 aircraft for spray and firefighting operations, including the Thrush 510P, 510G and 710P. Last year, the Albany, Georgia, manufacturer delivered 26 aircraft, compared to 38 in 2018.

Textron Completes Initial SkyCourier Ground Engine Tests



In late March, Textron Aviation announced it had completed initial ground engine tests on its prototype Cessna SkyCourier high-wing, utility twin turboprop. It said the testing verified the functionality of the fuel system, the Pratt & Whitney Canada PT6A-65SC engines and the interface with the avionics and electrical systems. The manufacturer is advancing in the assembly of the aircraft and an additional five flight- and ground-test articles. First flight is expected this year.

RUAG Reconfigures EC635 for COVID-19 Patients



RUAG MRO Switzerland has modified the EC635 helicopter for COVID-19 patients. The repurposed helicopter's large dimensions make it ideal for use as a mission aircraft. The Swiss Air Force commissioned RUAG to modify the infrastructure of the helicopter to transport patients. Its spatial separation of the cockpit from the cabin aids in protecting the pilots from the virus. The aircraft is currently used for individual and patient transport for the Swiss Army and is equipped with standard materials for medical care.

▶ **ALAIN BELLEMARE IS STEPPING DOWN AS PRESIDENT AND CEO** of Bombardier, having overseen a radical reshaping of the Canadian company in a bid to restore its financial health. **He will be replaced by Eric Martel, current president and CEO of Hydro-Quebec and a former Bombardier executive.** After joining Bombardier in 2015, Bellemare launched a five-year turnaround plan to restore profitability and reduce debt in the wake of the heavy financial drain of developing the C Series narrowbody airliner. The restructuring was completed in February with the agreement to sell Bombardier's rail transportation business to France's Alstom for \$8.2 billion. This leaves the company as a business jet manufacturer only. Martel is a former president of Bombardier's business aviation and customer services divisions. According to Chairman Pierre Beaudoin, "Eric is the right leader at the right time for Bombardier" and has "a deep understanding of our organization and product portfolio as well as of the global business aircraft industry."



When Bellemare replaced Beaudoin as CEO, the company was on the brink of bankruptcy because of delays and mounting costs in developing the C Series. He had been CEO of United Technologies' Propulsion & Aerospace Systems business, having previously led Pratt & Whitney Canada. Among Bellemare's first actions were to cancel development of the Learjet 85 and stretch out development of

the Global 7500 to reduce spending. In 2016, he persuaded the Quebec provincial government to invest \$1 billion in the C Series program and the following year transferred a controlling 50.01% stake in that program to Airbus. The company then sold the Dash 8 program to Canada's Longview Aviation Capital, the CRJ program to Mitsubishi, its business-aviation training business to CAE and its aerostructures factories in Northern Ireland and Morocco to Spirit AeroSystems. Bellemare completed Bombardier's exit from the commercial aircraft market in February with the sale of its remaining stake in the C Series, now the A220, to Airbus. With large debt repayments looming in 2021, that left the company looking for a buyer for either its aircraft or underperforming train business. In the end, the Alstom deal came through, leaving Bombardier as a business-jet-only manufacturer.

▶ **GOGO BUSINESS AVIATION HAS PETITIONED THE U.S. PATENT** and Trademark Office challenging the validity of Patent No. 9,312,947 to SmartSky Networks for a terrestrial-based, high-speed data communications mesh network. "We have submitted evidence of published materials clearly showing that well before SmartSky asserts to have invented the concepts in the '947 patent, others had conceived of the claimed subject matter," said Sergio Aguirre, Gogo Business Aviation president. "Further, we believe there are many of SmartSky's patents that are not valid. This is only one of many patents we could have challenged in a patent review." SmartSky said it is confident the Patent Office will uphold its grant of the patent, one it says resulted from an extensive, three-year examination process. **"SmartSky has developed, demonstrated and is deploying a game-changing, air-to-ground [ATG] network," SmartSky President Ryan Stone said.** "Creating a 10x or better inflight connectivity experience required substantial innovation." He said Gogo is challenging a patent covering the use of software-defined radios for beamforming to deliver continuous and uninterrupted high-speed data communication to aircraft, but that SmartSky's efforts have resulted in more than 150 domestic and international patents with another 116 pending. Gogo's objection, he said, "validates SmartSky's longstanding position that our intellectual property is absolutely critical to the essential function of a next-generation ATG network."

► **RESPONDING TO A CONGRESSIONAL DIRECTIVE TO** exercise leadership in enabling the return of supersonic air travel, the FAA has proposed noise certification regulations for new supersonic aircraft that cover landing and takeoff noise, but it did not lift the existing prohibition on civil supersonic flight over land. Released March 30, the Notice of Proposed Rulemaking (NPRM) addresses noise standards for supersonic aircraft with a maximum takeoff weight no greater than 150,000 lb. and a maximum cruise speed of up to Mach 1.8. Thus, **the proposal would include Aerion's AS2 supersonic business jet but would not appear to cover Boom Supersonic's larger Overture airliner**, which is being designed to carry up to 75 passengers at speeds up to Mach 2.2. The agency said other classes of airplanes and their respective noise levels would be added later. Using the same noise certification methodology applied to subsonic aircraft, the NPRM



proposes two sets of limits, for supersonic aircraft with three engines — such as the AS2 and Overture — and those with two. As proposed, a 150,000-lb. gross-weight aircraft with three engines would have a noise limit at the lateral certification measurement point of 96.5 EPNdB, a flyover limit of 94 EPNdB and an approach limit of 100.2 EPNdB. For a similarly sized two-engine supersonic aircraft, the lateral and approach limits are the same, but the flyover limit is reduced to 91 EPNdB. For comparison, under current Stage 5 rules, a 150,000-lb. gross-weight subsonic aircraft has limits of 96.5 EPNdB for lateral noise, 91 EPNdB for flyover and 100.2 EPNdB for approach. So, the major difference in the NPRM is a higher proposed limit on flyover noise for three-engine supersonic aircraft. The flyover measure point is a location on the ground under the climb-out flight path 3.5 nm from the start of the takeoff roll. Flyover is therefore a key measure of community noise exposure for supersonic aircraft.

► **UNDER A PROPOSED NEW REGULATION, OPERATORS** employing professional pilots would be required to enter and share pilot records in an FAA-managed Pilot Records Database (PRD) before making hiring decisions. Published in the Federal Register on March 30, the Notice of Proposed Rulemaking (NPRM) **affects air carriers, public aircraft operations, air tour operators, fractional ownership programs and corporate flight departments.** Pilots would be required to provide consent for an air carrier to access their records during the hiring process. The records-sharing requirement also would apply to commercial drone operators holding FAR Part 107 remote pilot certificates when an unmanned aircraft system is used in air carrier operations. Operators would incur costs to train and register as users of the electronic database and to report pilot records to the PRD. The NPRM separately proposes a user fee to cover the FAA's operation and maintenance costs of the database, amounting to an estimated \$1.9 million annually over 10 years. Comments on the proposed rule are due by June 29. "This proposed rule would enhance aviation safety by assisting air carriers in making informed hiring and personnel management decisions using the most accurate and complete pilot records available and electronically accessible," the NPRM states. Those records, the FAA said, "would remain in the PRD for the life of the pilot." The proposed rule is a response to several open NTSB recommendations, including those stemming from the crash of Colgan Air Flight 3407 in February 2009, and requirements that Congress enacted in the Airline Safety and FAA Extension Act of 2010. The latter legislation required the agency to establish an electronic PRD, and reauthorization legislation passed in 2016 called for the FAA to establish a PRD by April 30, 2017.

FAA OKs Appareo Transponders for Part 27 Helicopters



Appareo, a designer, developer and manufacturer of electronic and software products for aerospace, has received FAA approval to install Stratus transponders in FAR Part 27 aircraft. The Stratus ES/ESG approved model list includes Bell, Leonardo, Robinson and Airbus helicopters. The ES-H and Stratus ESG-H are now available through authorized Appareo dealers.

Leonardo Completes Acquisition of Kopter Group



Leonardo has completed its \$185 million takeover of Switzerland's Kopter Group from private equity firm Lynwood. It means that Leonardo has secured a new, mature single-engine helicopter development program at a fraction of the cost it would have taken to develop such a platform in-house. Kopter's SH09 is the newest single-engine light helicopter design in decades and has been developed to compete directly with Airbus' H125 Ecureuil/AStar and Bell's Model 407.

Aircraft Interior Purification System Modified for Ground Use



International Aero Engineering and Aviation Clean Air (ACA) are teaming up to offer an ionization purification system as a portable ion distribution unit for ground use only. The unit will be used for disinfecting aircraft interiors and uses the same technology as ACA's patented airborne system that is licensed for aircraft installation by an FAA STC.

BBJ Joins Silver Air Charter Fleet



Silver Air, a private jet management and charter company, has added a Boeing Business Jet (BBJ) with unrestricted charter access based in West Palm Beach, Florida. The BBJ will be available for charter this spring. Silver Air says it is the only operator of BBJs with unrestricted charter availability. The new BBJ features an 18-passenger configuration with a master bedroom, shower, conference group, lounge area and three lavatories.

▶ **ORGANIZERS FIRST POSTPONED BUT SUBSEQUENTLY CANCELED** the Sun 'n Fun Aerospace Expo and have announced the Lakeland, Florida, event will next be held in April 2021. Meanwhile, as of early April, the leadership of EAA AirVenture said it will decide in May as to whether to go forward with the July 20-26 gathering in Oshkosh, Wis-



consin. The annual Sun 'n Fun Expo is said to provide more than \$2 million a year for science, technology, engineering and math education programs, flight training and aerospace-related college scholarships. To continue the resources, its organizers plan

to host events and content online in a new series called Sun 'n Fun at Home. It is also planning an overhaul of its website, www.flysnf.org, in order to support the digital experience. While the Experimental Aircraft Association (EAA) contemplates the viability of AirVenture 2020, two significant events also originally scheduled for late June and July in Wisconsin



– the Democratic National Convention and Summerfest 2020 music festival – were postponed due to COVID-19. That may be a factor in the EAA's ultimate decision. "Events are starting to move out," said Jack Pelton, EAA chairman and CEO. "We have time to wait, but it is not looking good." Another factor is

whether the EAA's corps of 5,000 volunteers are willing to participate in the wake of the coronavirus crisis. Many are seniors and thus in a high-risk category.

▶ **BCA PUBLISHER FRANK CRAVEN HAS JOINED THE BOARD** of Trustees of the National Aviation Hall of Fame after receiving a unanimous vote by the sitting members. He will serve a three-year term. Headquartered in Dayton, Ohio, and congressionally chartered, the Hall is dedicated to honoring "aerospace legends" and inspiring future leaders.

▶ **TWO BUSINESS AVIATION NOTABLES FLEW WEST RECENTLY.** Joe Clark, founder and CEO of Aviation Partners Inc. (API), passed away unexpectedly on March 30. Peter Fleiss, the former executive director of the Corporate Angel Network (CAN), succumbed after a series of health issues on April 3. A consummate pilot and long-time aviation entrepreneur, Clark collapsed hours after a morning flight in his single-engine GameBird aerobat and never recovered. He was 78. A long-time Seattle resident, he helped found the blended winglet company in 1991 and went on to install the fuel-saving airfoils on more than 9,000 business jets and Boeing airliners to date. Prior to API, Clark co-founded Horizon Air, which he later sold to Alaska Airlines. He began his business aviation career in 1966 by starting Jet Air, the first Learjet dealer for the Pacific Northwest and Canada. The inspiration behind Jet Air was provided by Clay Lacy, who famously gave Clark his first flight in a Learjet, rolling it several times during climb-out. Clark said that event changed his career path and created a lifelong friendship with Lacy. **Prior to taking the helm at CAN, Fleiss worked at Safe Flight Instrument Corp.** in White Plains, New York, in close collaboration with company founder and president Leonard Greene. It was Greene who helped found CAN, which provides cancer patients with free travel to treatment facilities, and in December 1981 piloted the first CAN flight. Fleiss took charge of CAN's operation in 2005 and over the next 11 years grew its member companies to include over 500 supporters, encompassing half of the Fortune 100. His efforts resulted in tripling the number of cancer patients flown, leading to 50,000 patient flights just before his retirement in 2016. "Peter was instrumental in developing CAN into the organization it is today," said CAN Executive Director Gina Russo. "His continued commitment to the mission was well-known by patients and business aviation peers alike." She said Fleiss' legacy "will live on through CAN's mission and we will continue to follow in his footsteps to reach new heights."

► **THE U.S. AIR FORCE IS SCRAMBLING TO ACQUIRE GULFSTREAM G550s** to complete the EC-37B Compass Call acquisition program in advance of a possible production line shutdown, despite no official change in Gulfstream's outlook for the long-range business jet. The service selected the G550 Conformal Airborne Early Warning airframe in 2017 to rehost an electronic warfare payload from a fleet of aging C-130Hs. **But it has so far received funding to buy only the first five of 10 G550 airframes to be modified into the EC-37B, with a sixth requested in the budget for fiscal 2021.**



Gulfstream has not announced a schedule for shutting down the G550 line, but a lawmaker and senior Air Force acquisition official referred to the aircraft during a March 10 hearing as if a Gulfstream decision to terminate commercial production had already been made. Rep. Don Bacon (R-Neb.) also suggested during the House Armed Services Committee hearing that the Air Force is already discussing workarounds, such as acquiring a mixed fleet of new and used G550s for the EC-37B. "Now the Gulfstream production line is going to stop, and we're talking about buying used ones," he says. In response during the hearing, Will Roper, assistant secretary of the Air Force for acquisition, technology and logistics, did not dispute Bacon's characterization of the problem. In addition to buying used aircraft, he hinted that another option is to buy more airframes before the production line closes to perhaps keep them in storage until modification funds become available. "We are working many options to try to accelerate how quickly we can deliver the capability," Roper says. "We're in discussions with the vendors, and so those aren't things that I can share publicly." Gulfstream is transitioning large-cabin business jet production to a new line of G500s and G600s, but a spokesperson said it "is committed to supporting the Gulfstream G550 program, with manufacturing and customer deliveries scheduled into 2021."

► **UPS FLIGHT FORWARD (UPSFF), A DELIVERY-BY-DRONE SERVICE,** is to collaborate with Germany's Wingcopter on development of a longer-range unmanned aircraft to expand those services in the U.S. and elsewhere. Wingcopter's tilt-prop UAV transitions from a multicopter for vertical takeoff and landing in confined spaces to efficient, high-speed wing-borne flight. UPSFF is already using Matternet's M2 quadcopter to transport medical samples at WakeMed Hospital in Raleigh, North Carolina. Working with CVS Pharmacy, UPSFF has also used the M2 drone to deliver prescription medicines to homes in Cary, North Carolina. Wingcopter's hybrid rotary/fixed-wing UAV "will allow UPSFF to begin developing solutions that, if



approved, will go well beyond the health-care and retail industries," the company says, citing technology, manufacturing, hospitality, entertainment and other markets. Noting that "drone delivery is not a one-size-fits-all operation," Bala Ganesh, vice president of the UPS Advanced Technology Group, says UPSFF is building a network of technology part-

ners to broaden its capability to serve customers. Wingcopter has previously worked with Deutsche Post DHL, delivering medicines in East Africa in 2018 with the DHL Parcelcopter 4.0 version of its UAV. And working with Unicef, Wingcopter in 2019 delivered vaccines on demand to health centers on the Pacific island of Vanuatu. In late 2019, Wingcopter participated in an Irish demonstration of insulin delivery to offshore islands. And in February, the company began flying pigment samples between two Merck factories in Germany under a government-funded, intrafactory logistics project with Frankfurt University of Applied Sciences.

Jet-A and Avgas Per-Gallon Fuel Prices April 2020

Jet-A			
Region	High	Low	Average
Eastern	\$7.57	\$3.30	\$5.45
New England	\$7.05	\$2.60	\$4.84
Great Lakes	\$7.06	\$2.98	\$4.82
Central	\$6.35	\$2.57	\$4.33
Southern	\$7.34	\$3.45	\$5.40
Southwest	\$6.75	\$2.17	\$4.67
NW Mountain	\$7.52	\$2.40	\$4.60
Western Pacific	\$7.96	\$3.95	\$5.55
Nationwide	\$7.20	\$2.93	\$4.96

Avgas			
Region	High	Low	Average
Eastern	\$8.25	\$4.50	\$6.09
New England	\$7.45	\$4.50	\$5.71
Great Lakes	\$8.59	\$4.45	\$5.93
Central	\$7.59	\$4.05	\$5.28
Southern	\$9.40	\$3.95	\$5.89
Southwest	\$7.19	\$3.73	\$5.45
NW Mountain	\$6.45	\$4.49	\$5.51
Western Pacific	\$8.52	\$4.31	\$6.10
Nationwide	\$7.93	\$4.25	\$5.75

The tables above show results of a fuel price survey of U.S. fuel suppliers performed in April 2020. This survey was conducted by Aviation Research Group/U.S. and reflects prices reported from over 200 FBOs located within the 48 contiguous United States. Prices are full retail and include all taxes and fees.

For additional information, contact Aviation Research/U.S. Inc. at (513) 852-5110 or on the internet at www.aviationresearch.com

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Mark Clark

President and Owner
Courtesy Aircraft
Rockford, Illinois

A youngster when his father founded Courtesy in 1957 as a Cessna dealer, Clark grew up with the scent of avgas and the sound of spinning props. He was thoroughly smitten with aviation, after a 35-min. ride in a P-51 Mustang at 14, with warbirds in particular. He earned his pilot's license at 16, began flying a North American T-6 Texan two years later, and sold his first surplus military bird as well. After graduating with a marketing degree from Bradley University in downstate Peoria, he began selling airplanes in earnest, and has been doing so ever since. He bought Courtesy from his father in 1983 and focused on marketing exotic machines along with standard civilian birds. He holds a Commercial license and an unlimited letter of authorization in all makes and models of high-performance former military aircraft, type ratings in the B-24 and A-26 and numerous other warbirds, along with an A&P certificate. He has logged some 7,000 piloting hours, more than 1,500 in high-performance ex-military aircraft, and owns a Cessna Conquest.



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

Questions for Mark Clark

1 Courtesy's well known for moving warbirds — how many?

Clark: In a typical year, we'll be involved in 40, 50 and upward of 60 transactions. About 80% of those will be former military aircraft, from SNJs and P-40s to B-17s. Over the years I've sold 80 Mustangs. But we sell everything, from J3s through Citations. Right now our inventory includes an AirCam on floats, a P-40, Harrier jump jets and a ski-equipped Noorduyn Norseman. All totaled we've sold and delivered over 3,000 aircraft, many of them multiple times.

2 What kind of restrictions are imposed on former warbirds?

Clark: That depends. For a variety of American-built models including the Beech T-34, Piper L-4, Stinson L-5 and North American T6 and SNJ, their manufacturers applied for and received standard civilian type certificates. So, their TCs are no different than those for a Cessna 172 or Beech Bonanza and have no restrictions. However, all the others, including all the jets and foreign-made aircraft, go into the Experimental category. Also, all the foreign aircraft must receive an import permit from the federal Bureau of Alcohol, Tobacco, Firearms and Explosives. All aircraft must be certified as airworthy and then are issued a special airworthiness certificate, usually with several pages of operating limitations. Of course, all weaponry and targeting equipment must be removed and any drop tanks secured so they cannot be jettisoned.

3 And the pilots?

Clark: Anybody with enough money can buy one of these things, but if you don't have a lot of experience, you won't be allowed to fly those in the Experimental category. The FAA watches that closely. Consider the T-28 Trojan. It's a trainer but with retractable gear, a 1,425-hp Wright radial and a max takeoff weight of over 8,000 lb. So, if you don't have a lot of time in complex, heavy aircraft you'll have to get it. There's instruction available and you'll need to safely operate the aircraft. Most of the maneuvering skills demanded are of ATP tolerances. And keep in mind, insurance companies have their own requirements and they can be even more rigid.

4 Production of many of these airplanes ended 60 to 80 years ago. What about maintenance?

Clark: There's actually a pretty good network out there. This is a small community and I can help point owners in a direction. For example, I know of a half dozen shops that work on P-40s and P-51s. The support is actually quite good. The fact is the people in those places love working on warbirds, especially World War II aircraft. They have a passion for them.

5 That war's veterans are disappearing; what's the impact?

Clark: I knew you'd ask that. We're still close enough to World War II so the buyers are still connected but through their fathers' or grandfathers' service. One customer wants to buy an AT-6 because that was the aircraft his grandfather trained in before moving into a P-51. The buyer said he can't afford a Mustang but can learn like his grandfather in a Texan. And beyond that, there are Corsairs, Skyraiders and Bird Dogs from the Korean War and beyond. So, this will continue. **BCA**

An aerial night view of a city, likely New York City, with a jet wing visible in the upper right corner. The city lights are reflected in the water, and the sky is dark blue.

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Embraer Phenom 300E Enhanced



Third-generation offers **upgraded performance, convenience and technology**

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

PHOTOGRAPHY COURTESY OF EMBRAER

Embraer's engineers are putting the hammer down to keep the Phenom 300 in its position as the best-selling light jet for the last decade. More than 500 units have been delivered since its entry into service in 2009. This is due in large part to sizable orders from all three major fractional ownership business jet operators: Flight Options, NetJets and Executive Air Share. No other light jet has been endorsed by these big three.

Embraer introduced the Phenom

300E, a second-generation model, in 2017 and it entered service a year later. It features improved acoustical insulation, an Embraer-designed interior with a 3-in.-wider dropped aisle, an inch more headroom, a Lufthansa Techniks Nice HD infotainment system and passenger chairs designed and manufactured by Embraer Aero Seating Technologies in Titusville, Florida.

In response to customer feedback, several new interior completion options were added to the Phenom 300E,

including choices of stitching styles, chair back insert patterns, leathers, fabrics, carpets and furniture finishes. All this boosted empty weight. Add in 250 lb. of typical customer upgrades and available payload with full tanks shrank to 1,110 lb. for a two-pilot Phenom 300E.

The third and latest version, the Phenom 300E Enhanced, is due for introduction in May 2020 at serial number 560. This newest version gets increased operating weights for more loading flexibility with the goal of enabling two-crew



aircraft to carry six passengers with full fuel. A software throttle push inside the full authority digital engine control (FADEC) increases engine thrust to offset the higher operating weights, thereby preserving takeoff performance and improving climb and cruise performance. Pratt & Whitney's Eagle Service Plan hourly maintenance rates, though, remain unchanged. There's also a slight increase in published range performance, mainly due to fine-tuning flight test data.

A high-style Bossa Nova Edition interior, created by Embraer design guru Jay Beaver and adapted from the Praetor 600 cabin, now is an option for the Phenom 300E Enhanced. It features chair back inserts with an Ipanema Beach boardwalk-like tile pattern, high-tech carbon-fiber panels and subtle bright-red accents. Improved acoustical insulation sops up more N1 fan noise, especially during climb. A trio of bleed-air system check valves have been redesigned for quieter operations. The air-conditioning system gets a new muffler to reduce sound and a new noise

barrier for the cabin door quashes high frequency sound. Passengers perceive considerably lower interior noise levels as a result of these changes.

The cabin gets an optional 4G Gogo Avance L5 air-to-ground internet box, capable of peak 9.8-mpbs speeds and upgradable to 5G connectivity when the ground station network is complete. Video and audio streaming is supported. Gogo's Talk & Text feature provides Wi-Fi calling for mobile phones. Avance L5 includes an upgraded inflight entertainment (IFE) storage system that holds dozens of movie and music selections.

The forward cabin galley and storage compartments have been reconfigured to provide a much needed 3.5-in. increase in pilot legroom. That may not seem like a large improvement, but the crew seats now track back 40% farther.

This newest version of the category-leading aircraft carries a base price of \$9.65 million, but with popular options we estimate the final tally at \$10.15 million.

G3000 Integration and Improved Functionality

The Prodigy flight deck, powered by Garmin G3000 avionics, has 10 times faster, more powerful processors, higher resolution displays and new features that boost safety margins and reduce pilot workload. The avionics are better integrated with almost all controls available through the touch-screen panels. The FMS initialization process has been streamlined for quicker time to taxi for takeoff. The FMS is now capable of computing advisory takeoff/landing distance data as well as climb/cruise/descent performance projections.

Embraer has become the first aircraft manufacturer to earn certification of a runway overrun awareness and alerting system (ROAAS) whose goal is to reduce the risk of overrun during landing rollout. This virtual copilot function evaluates landing approach speed, predicted touchdown point and computed stopping distance, including adjustments for contaminated runway surfaces, in comparison to landing distance available. It also warns pilots if they're at risk of an overrun due to excessive float in the flare.

The Garmin system's baseline features also include an automatic emergency descent mode, graphic entry and display of weight and balance loading, ADS-B In and digital VOR bearing indication



The Phenom 300 has been the best selling light jet for a decade, with more than 500 deliveries. Third-generation Phenom 300E Enhanced gets a thrust boost and needed weight increases.

on the PFD, plus autopilot coupled go-around, synthetic azimuth and glidepath for VFR approach guidance, VNAV for non-precision approaches and enhanced HSI symbology, along with support for QFE (baro pressure setting for height above field elevation) and stabilized approach advisories.

New options include predictive wind-shear from the optional turbulence detection radar, FAA data comm for digital clearance delivery and en route CPDLC in the future, and electronic IFR and VFR en route charts. An optional third VHF transceiver is required for FAA data comm functions.

The twin G3000 backbone chassis are upgraded to support new functions. The latest versions of the G3000 have many G1000 NXi features, including faster processors. HF transceiver and SELCAL control, CVR/FDR test and several maintenance data logging functions now are accomplished through upgraded touchscreen panels. The glareshield flight guidance panel has been modified to support new functions, including FMS speed command and additional VNAV functions.

Garmin's own GTS 8000 TCAS II and GTX 3000 Mode S ES transponders replace similar ACSS units. The swap allows the Garmin data loader to be used for software updates, and the new units integrate and filter traffic information provided by the ADS-B In and TCAS II systems.

The all-digital 40-watt GWX 75 weather radar replaces the GWX 70 in first- and second-generation aircraft. Doppler turbulence detection and ground-clutter suppression are optional features.

This version of Prodigy Touch, however, lacks some features found in other aircraft equipped with G3000 avionics. Autothrottles, full integration of ADS-B In weather for computing TOLD data, cross-functional data sharing and Flightstream 510 Bluetooth/Wi-Fi connectivity for tablet computers are not included.

Let's Fly

We strapped into the left seat of s.n. 505-537 with engineering test pilot Steve Baerst in the right seat and instructor and demo pilot Sebastian Arrazola on the jump seat as safety pilot. Loaded with more than 400 lb. of options, including the Bossa Nova interior, HF transceiver and Gogo Avance L5 system, plus LHT Nice enhanced cabin management system, radio altimeter, dual transponders and DME, the aircraft's two-pilot BOW was 12,232 lb. In this configuration, the aircraft can carry five passengers with



The optional Bossa Nova interior and upgraded interior furnishings are unsurpassed for comfort, style and quality.

full tanks. Final weight limits for the new model are pending certification.

The day we flew the aircraft, zero fuel weight was 12,432 lb., with only three of us aboard, and there was 4,050 lb. of fuel in the wings. Ramp weight was 16,482 lb. at Orlando Melbourne International Airport (KMLB), Embraer's Florida headquarters facility. The new graphic weight and balance feature provided a complete CG map on the MFD from engine start to tanks dry, confirming that the aircraft would remain well within the loading envelope.

Airport elevation was 33 ft., barometer was 30.19 and OAT was 17C. Using flaps 1, computed takeoff distance was 2,959 ft.; Runway 27L has 10,181 ft. available for departure. Takeoff speeds were 104 KIAS for V₁, 113 KIAS for rotation, 116 KIAS for the V₂ one-engine-inoperative (OEI) takeoff safety speed and 131 KIAS for VFS flap retraction/final segment.

Already connected to ground power, the aircraft's electrically powered vapor-cycle air-conditioner and cabin air circulation fans were available as needed. While the OAT was uncharacteristically cool for Florida, we've previously noted that the Phenom 300's cabin cooling works impressively well in hot weather.

Checklists are short for this aircraft and preflight chores are simpler aboard the Phenom 300E because of better integration of FMS initialization procedures, including the new graphic weight and balance and TOLD data computer functions. Embraer is one of the few light jet manufacturers that requires the flight crew to enter OAT for the FADECs to compute takeoff rated thrust. We first entered the 17C for the engines and then had to enter it a second time for FMS TOLD computation because the data is not shared between these FMS functions.

Embraer has yet to certify Garmin's

Flightstream 510 Wi-Fi/Bluetooth link that allows flight plans to be uploaded to the aircraft from tablets running either Foreflight or Garmin Pilot. That shortcoming wasn't an issue because Baerst already had created and stored a flight plan that would take us on the preferred route to the W-139E and F warning areas east of Jacksonville, where we would check cruise performance and perform a few basic air-work maneuvers. But for everyday operations, we find the ability to perform preflight planning on a tablet, file the desired flight plan with the FAA and then upload to the aircraft to be a useful, time-saving feature.

We started the first engine using the ground power unit, then the second using the aircraft battery and generator-assisted cross-start. We noted that the FADEC on the engine furnishing supplemental power for the cross-start automatically increases idle rpm to boost generator output.

Taxiing out of the chocks, we used a healthy throttle push to accelerate quickly straight ahead before chopping power to make a tight turn with the tail sweeping in front of Embraer's headquarters building. Nosewheel steering through the rudder pedals is soft, so it takes differential braking and thrust to maintain tight turns.

The carbon brakes are quite effective, but response is not immediate and braking action is grabby when cold. It takes a light touch on the pedals and patience to provide a smooth taxi experience for the passengers.

We departed from Runway 27L and then received ATC vectors toward the oceanic warning areas off Florida's east coast. The aircraft is easy to fly, with well-harmonized control forces in pitch, roll and yaw. It's quite stable in pitch and the substantial increase in stick-force-per-G prevents overcontrol. En route to the

EMBRAER

warning areas, we switched range several times on the displays. Image change response to these inputs was noticeably and appreciably faster thanks to the more powerful G3000 enhanced processors. Now, zoom-in and zoom-out functions are nearly instantaneous.

We climbed directly to FL 450 and accelerated to max cruise. In ISA-3C conditions and at a weight of 15,500 lb., the new model cruised at 433 KTAS (Mach 0.759) while burning 924 lb./hr. at max cruise thrust. The original aircraft would have flown at 409 KTAS while consuming 850 lb./hr., according to the Flight Planning Guide. Baerst commented that fuel flow for the new model is the same as the old version at equal cruise speeds. We also noted the cabin altitude was only 6,600 ft. at FL 450, a tribute to the aircraft's 9.4-psi pressurization system.

Down at FL 330, in ISA+8C conditions and at a weight of 15,300 lb., the aircraft cruised at 469 KTAS (Mach 0.793) while burning 1,548 lb./hr. We have no equivalent

cruise performance comparison data for the original aircraft at ISA+8C, but in ISA conditions, it would cruise at 440 KTAS while burning about 1,490 lb./hr., again according to the Flight Planning Guide.

We returned to Melbourne for three approaches to Runway 27L. The first two were ROAAS demonstrations. Baerst explained that the system uses weight and balance, air data, GPS position and velocity, wet versus dry runway surface, and aircraft systems status, among other factors, to compute whether the aircraft is at risk of a runway overrun. It cannot compute stopping distance for runways contaminated with frozen precipitation and it won't warn if the aircraft will touch down short of the threshold.

On the first approach, we intentionally added 20 kt. to the aircraft's 111 KIAS VREF landing speed. Passing through 1,000 ft., the system activated. As we descended through 500 ft. AGL, we heard "Caution. Overrun. Caution. Overrun" and a visual alert popped up on the PFD. Then

at 100 ft., just prior to reaching the runway threshold, we heard "Overrun, Go Around. Overrun, Go Around."

We heeded the advisories and executed a missed approach. Notably, the overrun alerts also were logged by the aircraft's flight data recorder for post-flight analysis. On the missed, we turned downwind to the south to remain in the VFR pattern and set up for the second ROAAS demonstration.

This time, we approached Runway 27L on speed. But at 50 ft. over the threshold, we began a long, slow flare as though we were pursuing the perfect, softest kiss of the tires on the tarmac. We floated a few feet above the runway surface, well beyond the large touchdown zone stripes, failing to touch down properly.

Using inputs from the optional radio altimeter, along with GPS position and velocity, among other variables, ROAAS triggered a "Long Flare! Long Flare!" audio alert. Had we touched down, it's likely that we next would



A Prodigy flight deck, powered by Garmin G3000, is upgraded with 10X faster processors that support a host of new standard and optional functions.

Pilot Report

have heard “Overrun, Brakes! Overrun, Brakes!”.

Instead, we executed a go around and again joined the downwind VFR pattern south of the runway in preparation for a final full-stop landing. This time, we crossed the threshold at 50 ft. AGL at VREF, stabilized on the VASI visual glidepath. At 30 ft., we slowly reduced thrust to idle and began the flare. But there was considerable ground effect just a few knots below VREF, so we floated excessively. Touchdown was long but smooth because of the long-travel, trailing-link main landing gear.

Memo to self: Anticipate plenty of ground effect; avoid the float; smartly reduce thrust at 50 ft. AGL; maintain pitch attitude and allow the aircraft to decelerate to touch down on the big stripes.

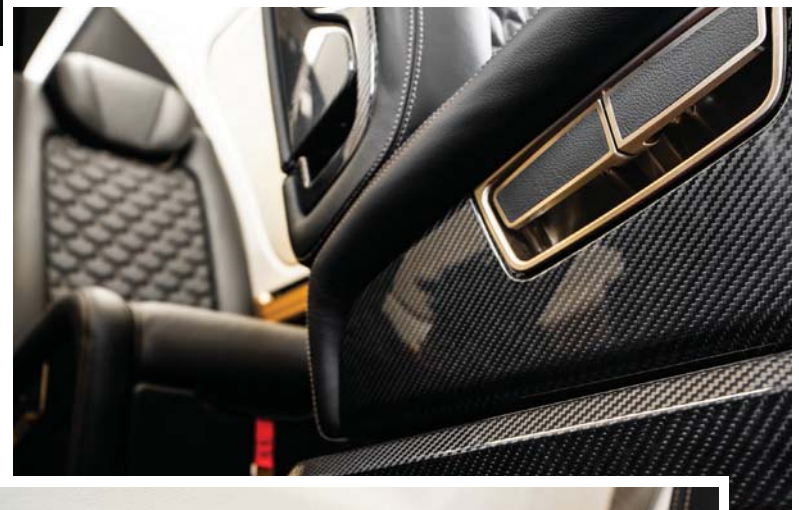
Braking action on roll-out was powerful, but grabby. However, as the carbon-brake heat packs began to warm, brake response became smoother.

Opportunities for Growth

The Phenom 300E Enhanced has clear performance, comfort and technology improvements that distinguish it from its predecessor aircraft. Pilots will appreciate the 3.5-in. increase in legroom. The weight boosts that increase loading flexibility are more than offset by stronger engine performance. Perceived noise levels in the cabin are noticeably lower and the innovative style of the optional Bossa Nova interior is unmatched. The new FMS TOLD computer and graphic weight and balance functions reduce pilot workload. The optional runway overrun awareness and alerting system is a significant safety enhancement — it's virtual must, in our opinion, especially for single-pilot operators.

However, there still are opportunities for growth. Crisper nosewheel steering through the rudder pedals would be a plus, as would smoother brake response. Buyers in upper-end light jets increasingly expect autothrottles to be optional, if not standard, equipment. Garmin's emergency Autoland system has gained plenty of attention from single-pilot operators and some say they believe it ought to be offered as a future option on the Phenom 300E Enhanced.

And the level of integration between various Prodigy Touch FMS functions, ADS-B In weather and connectivity



Bossa Nova interior blends Ipanema style with engineering substance; popular floor plan features two side-facing seats, up front across the galley, a center club section and two forward facing chairs in the aft cabin. A belted potty seat is standard.

with tablet computers is not yet on par with best-in-class G3000 platforms, such as the HondaJet Elite.

Embraer, though, is best-in-class at listening to and learning from its customers. The Phenom 300E Enhanced is a far more capable aircraft than the version we first flew in 2009. It's not the

end state for the model. Instead, it's an important milestone marking progress on a path of continuous improvement. It's a convincing sign that Embraer intends to keep this light jet the best-selling model in its class. That leaves all other light jet contenders competing for second place. **BCA**

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Operating Into Turkey

While tensions exist, there's still business to be done

BY DAVID ESLER david.esler@comcast.net



The nation of Turkey exists with one foot in antiquity and the other in modernity. One of the most ancient civilizations on earth, it has progressed from its Anatolian origins in the first millennium CE through an empirical adventure that lasted 500 years and dominated Southeastern Europe to evolve into the advanced and ostensibly secular nation that it is today.

In addition, Turkey has always had one foot in Europe and the other in Asia, bridging the eastern and western parts of the Eurasian land mass, and as such, has been a crossroads for everything from trade and commerce to migration and the movement of armies throughout

history. This continues today, as it hosts a thriving business community, grudgingly accepts and monitors a flow of migrants across its border from beleaguered Syria, and deploys its troops into the neighboring state to fight Syrian President Bashar Assad's Russian-backed army, ISIS terrorists and the stateless Kurds, who since antiquity have claimed the eastern third of Anatolia as their homeland.

Since the republic's first president, Kemal Ataturk, recast and modernized the then predominately Muslim country during the 1920s, Turkey has entertained a fascination with the West. One could say that until recently, Turkey existed

in the image of Ataturk, whose vision for the country was inarguably western and secular in dress, mores, philosophy, politics and business practices.

First World ... But Not EU

Accordingly, the country is a charter member of the United Nations and G20 and an early member of the North Atlantic Treaty Organization (NATO), the International Monetary Fund (IMF) and the World Bank. It became an associate member of the European Economic Community (EEC, predecessor of the EU) in 1963 and, from 2005, was in line for EU membership until 2018 when the



FLORIDA CHUCK/ISTOCK

Turkey bridges the ancient and the modern. Istanbul — medieval Constantinople — which straddles the Bosphorus and separates Europe from Asia, ranks as the largest city in both Europe and the Middle East with a population of 15 million.

who died in 1938, including freedom of the press. Some of this has occurred in reaction to terrorism by Kurdish insurgents. Responding to a long history of Turkish discrimination and atrocities and led by the PKK (Kurdish Workers Party), the insurgency is agitating for either autonomy within Turkey or creation of an independent Kurdistan. Terrorist incidents have occurred, most notably an attack in April 2015 by three men at the main passenger terminal at Istanbul Ataturk International Airport in which 44 people were killed and another 239 injured. Since the insurgency began in 1984, more than 40,000 people have died, most of them Turkish Kurd civilians.

On the other hand, Turkey has been subject to international condemnation for the mistreatment of its minorities, with the European Court of Human Rights having documented more than 1,600 human rights violations between 1998 and 2008 involving murder and torture. Following an attempted coup against Erdogan in July 2016, the government began a mass purging, ultimately dismissing 160,000 judges, teachers, police and civil servants, almost half of whom were formally arrested. The news media has also been targeted, with 160 journalists imprisoned and 130 media organizations, including 16 television outlets and 45 newspapers, shut down by the government. To cap this off, the government has also begun limiting internal access to various nodes and websites on the internet.

As noted, Turkey has taken an active role in the Syrian conflict, sending thousands of troops, bolstered by armor and artillery, across its southern border to engage Syrian government forces and their Russian backers. In addition to long-simmering differences with Syria's Assad, Erdogan wants to shut off the flood of refugees driven out of Syria and pouring into Turkey, more than 3.5 million so far, the majority attempting to get to Europe. Turkey had refused, at the request of the EU, to open its western border with Greece to allow refugees into Europe.

However, in early March, Erdogan relented and opened the gates to the West, telling the EU, "Now they're your problem." The Greeks were incensed and immediately barred the refugees

from entering their territory, leading to violence and some refugee injuries and death. Erdogan grouches that the EU has not released funding to Turkey promised last year to support housing and care of the refugees; the EU counters that it has released the funds. As this is written in early March, the situation remains in flux and highly flammable.

Turkey's incursion into Syria also gives Erdogan free rein to torment Kurdish fighters battling ISIS terrorists, after the U.S. pulled troops training and fighting alongside them. Meanwhile, Turkey has paid for its action in the war, having lost 26 of its troops during a February bombing raid that may have been perpetrated by Russian aircraft. While the origins of the raid are so far unclear, it is understood that Russia controls the skies above northwest Syria where Turkish troops are fighting. (After the raid and other losses fighting Syrian troops, in early March, Erdogan traveled to Moscow in an attempt to broker a cease fire.

Risky Russian Relationship

Turkey navigates a complex relationship with Russia, on one hand recently purchasing an advanced anti-aircraft missile system from Moscow and on the other directly pushing back against Assad, whom Russia is backing in order to maintain a presence in the Middle East and ensure continued access to its naval base on the Syrian Mediterranean coast. Further, as a result of the missile system buy and rumors that Erdogan is considering exiting Turkey from NATO, not to mention the government's festering human rights abuses and hobbling of the Turkish press, the country currently has few friends in the West, especially among the EU.

Slightly larger than Texas at 302,534 sq. mi. (7,873,562 sq. km), Turkey embraces 82,017,514 people, 70-75% of whom identify as Turkish and about 19% as Kurdish. Other ethnic groups include Arabs, Laz and Circassians. It is notable that during World War I, the remnant government of what was the Ottoman Empire committed genocides against Turkey's Armenian, Assyrian and Pontic Greek subjects, scars of which persist today among descendants of those peoples. (The Turkish War of Independence, led by Ataturk in the early 1920s, abolished

latter ended the courting process, primarily due to policies enacted by Turkey's current president, Recep Tayyip Erdogan, and the country's drift toward nationalism and coziness with Russia.

Formerly a parliamentary republic, Turkey converted to a presidential system after a 2017 referendum, conferring increased powers to Erdogan, who a year later engineered with the Turkish Assembly an option where he could serve as president for life, if he so chooses. Since then, his administration has enacted measures increasing the influence of Islam in government affairs and reversing many secular policies dating from the rule of Ataturk,

the monarchy, effectively ending the Ottoman Empire.) Of the total population, 99.8% are Muslims, with the remainder identifying as Christian and Jewish.

Istanbul, straddling the Bosphorus Strait that connects the Black and Marmara Seas (and thence, the Aegean and Mediterranean Seas), is Turkey's largest city, accounting for 20% of the country's population. Ankara, located inland in the roughly north-central region of the Anatolian Peninsula, is Turkey's capital.

Despite Turkey's apparent turn toward authoritarian government, the country continues to maintain a free-market economy and close business relationships with the West. Industry, distinguished by automotive manufacturing, petrochemicals, electronics, textiles, clothing and a thriving services sector, drives the economy, while traditional agriculture still contributes 25% of the gross domestic product, which in 2017 totaled an estimated \$2.186 trillion. Other industries include mining of coal, chromate, copper and boron; steel production; and food processing. Agricultural products include tobacco, cotton, grain, olives, citrus, nuts and livestock. In 2017, the labor force numbered 31.3 million, and exports that year amounted to \$166.2 billion.

After a severe financial crisis in 2001, the government instituted financial reforms that ushered in an era of strong growth averaging 6% annually until the global recession of 2008. A government-sponsored privatization program reduced state involvement in industry, banking, transport, power generation and communication. While the GDP contracted in 2009, well-regulated financial markets and banking helped the country through the global crisis, and in 2010-11 the GDP surged again, this time to 9%, as exports and investment recovered.

While this is impressive, it should be noted that in 2016 and 2017, three credit rating agencies downgraded Turkey's sovereign credit ratings, citing concerns about the rule of law and the pace of economic reforms. Following years of stability and economic growth, the recent political turbulence, domestic uncertainty and security concerns are precipitating market volatility, casting shadows on the country's economic outlook. In particular, Turkey runs a large account deficit, forcing it to rely on external

investment to finance growth, which some economists say leaves it vulnerable to destabilizing shifts in investor confidence. Other worrisome trends include rising inflation and unemployment beginning in 2017, spurred by the

ICAO identifier LTFM. Operations were limited until April 2019, when all scheduled commercial passenger flights were transferred to the new field from Istanbul's venerable Ataturk International Airport (LTBA), which is now reserved



Turkish currency's continuing depreciation against the dollar.

Aviation — an Instrument of Pride

The preceding has not prevented Turkey from making big investments in its aviation infrastructure, however. In October 2018, the government officially opened its new multi-billion-dollar Istanbul super port on the European side of the city, so far identified simply as Istanbul Airport with the newly assigned

exclusively for general and business aviation and air cargo operations.

Located near the Black Sea, 35 km (22 sm) north of the Istanbul business district, when construction began in 2014, LTFM was intended to be the world's largest airport, servicing up to 200 million passengers a year. Only partially completed now with four runways in place (and three now in operation), plans call for the addition of four more runways — and possibly four more after that for a total of 12 — when construction is finished, projected for 2025. Everything about the new

Istanbul Airport is grand: 16 taxiways, 70 million sq. ft. of apron space capable of absorbing parking for 500 aircraft (43 million sq. ft. completed so far), the largest terminal under one roof at 15.5 million sq. ft. (three more huge

major passenger and cargo hub in the expanded region and wants to go head to head with Al Maktoum to accomplish that goal.

Al Maktoum, which opened in 2010, has also been touted by the UAE as the

Turkish Air, the flag carrier of Turkey, is also engaged in a simmering rivalry with the UAE's Emirates state airline over a sort of hegemony in the air. Currently the largest airline in the Middle East and fully owned by the UAE government, Emirates serves 150 destinations with an all-widebody fleet of 270 aircraft, including 115 Airbus A380s. Turkish Air, 49% of which is government-owned and the remainder publicly traded, currently fields a diverse fleet of 357 aircraft and claims to be the world's largest airline by destinations: 315 in 126 countries.

Welcoming Business Aviation

Meanwhile, at the new Istanbul Airport, two sets of parallels are separated by airport support facilities. On the west side of the field are Runways 16L/34R, 12,303 ft. long by 147 ft. wide, and 16R/34L, 12,303 ft. by 196 ft. On the east side of the support infrastructure are 17L/35R, 13,451 ft. by 196 ft., and 17R/35L, 13,451 ft. by 147 ft. All are surfaced in asphalt with PCN values of 96/F/A/W/T. ILS, DME and VOR approaches are available. Farther east from the 17/35 runways is the massive passenger terminal, road network and auto park. The field elevation is 325 ft. In its first full year of operation, the airport served 52.5 million passengers, the majority of them international, and handled nearly 330,000 operations.

LTFM initially prohibited business aviation; it now not only welcomes it but has erected a general aviation terminal, or GAT, to provide a modicum of support for visiting operators. The GAT provides a location for handlers' offices, customs processing and a fuel desk. Gozen Air Services is the prime fueler and ramp services provider; it also is a major handler for the region and operates at Istanbul's two other airports.

But there are caveats to consider. The new Istanbul Airport is an option if an operator's business is north of the city, as surface travel time to downtown has to be considered. Then, according to Gokmen Sendag, Universal Weather and Aviation's man on the ground at Istanbul, at its present state of existence, there is no dedicated parking for general aviation. And because the airport is so huge, it can take up to 35 min. of taxi time after rollout to reach assigned parking.



New Istanbul International Airport, which opened in 2018, now vies with UAE's Al Maktoum International as world's largest airdrome. The field's service area, shown here, separates two sets of parallel runways measuring up to 13,451 ft.

DEDMITYAY/ISTOCK

terminals planned), and parking for up to 70,000 cars. Total projected cost of the project is €7 billion (approximately \$8 billion).

In addition to being the largest airport in Europe, it may even eclipse Al Maktoum International Airport (OMDW) in the desert southwest of Dubai in the United Arab Emirates (UAE) to become the more dominant. Indeed, in addition to accommodating traffic growth that was beginning to swamp Ataturk International, the new Istanbul facility makes a bold statement that Turkey intends to be the

world's largest airport — in its case, in terms of cargo processed through the facility. But things apparently haven't gone entirely as its developers hoped. First, while six parallel runways were planned, each 14,800 ft. long, only two were laid, both in different orientations, one (2/30) at 14,764 ft. and the other (13/31) 6,020 ft. Early goals for the field were 13 million tons of cargo and 260 million passengers per year, with the latter eventually increasing to 700 million passengers annually. So far, none of these goals has been met and the field remains unfinished.

“They park you close to the international terminal, taking another 15 min. for passengers to reach the GAT for CIQ,” he told *BCA*. “Then it takes 10 min. to clear, on average.” So, the new airport is not recommended now unless operators take into consideration the time and fuel burn for taxiing. “When it is completed,” Sendag pointed out, “there will be a runway close to the general aviation area, reducing taxi time to dedicated general aviation parking to 10 min.”

Back to Ataturk

So, currently, Ataturk International, located on the Marmara Sea coast on the south and European side of Istanbul, remains the preferred airport for business aviation. Dating from 1924, when its namesake was presiding over the republic, Ataturk ranks as one of the first commercial airports in Europe. In 2018, the last full year in which Ataturk hosted airline traffic, nearly 68 million passengers passed through its terminals, making it the fifth busiest airport in Europe. Prior to the opening of the new Istanbul Airport, Ataturk was often so congested that operators had to drop passengers and divert to other airports for parking. But today, with the airport accepting only air freight and general aviation, LTBA is the prime choice for business aviation, augmented by its location within the city limits.

“Ataturk International used to be difficult to get into due to the requirement for commercial slots, but with the new airport, that has changed,” said Steve Leathem, international flight planner at Jeppesen Flight Support U.K. “Tech stops and diversions into Ataturk, however, are now prohibited via permanent NOTAM, as a lot of the services there have been relocated up to the new airport.” For tech stops, Leathem recommends Corlu (LTBU) to the west of Istanbul.

“Ataturk is still OK for business, though,” Leathem continued, “and the best place to go, as it’s in the heart of the city. Ataturk still requires slots, however. The new airport is a 90-min. drive to the city center during rush hour, so Ataturk remains the better choice in terms of proximity to the business district.”

Ataturk has three runways: two parallels, 18L/36R and 18R/36L, both 9,842 ft. by 148 ft., concrete, PCN 100RAWT; and 5/23, 7,546 ft. by 197 ft., grooved asphalt, PCN 100RAXT. All are equipped with ILS approaches. Field elevation



EVERETT COLLECTION/ISTOCK

The sculpture-like control tower for New Istanbul International Airport.

is 163 ft. There is no noise curfew, as Ataturk is a 24/7 airport.

According to Sendag, under the new status at LTBA, confirmations for arrival and parking can be obtained within a few minutes. Obtaining slots, on the other hand, can be iffy. As at most busy airports, slot availability is best for late in the day or early in the morning, otherwise operators have to take what is available and attempt to make improvements as they approach their dates of departure. Slot validity times for arrival are +/- 20 min. and for departure +30 and -10 min.

While there are no FBOs at Ataturk, there is a GAT where licensed handlers coordinate services for visiting operators. Aircraft parking is a 5-min. car ride to the GAT, and some parking slots are within walking distance. Unlike Istanbul Airport, taxi time to parking is no longer than 5 min. “Customs clearance takes another 5 min.,”

Sendag said, “so total time from rollout to sidewalk can be as short as 15 min.

“Aircraft service is located in the same area as parking,” he continued, “so ground handling is easy. All the vendors are close to the parking. If your business is on the east side of the Bosphorus, it takes 90 min. by road to get there from Ataturk. In addition to driving, public transportation is good and costs about \$10 but takes 2.5 hr. either by train line or bus.” Helicopter service is also available, provided by Kaan Air, with two of its 12 helicopters now permanently based in Istanbul specifically for transportation between the city’s airports, especially during the busy summer season when Istanbul fills with tourists.

Across the Bosphorus

The third option at Istanbul is Sabiha Gokcen International Airport (LTFJ)

located on the Asian side of the city. “Where your meeting is will determine which airport to file for,” Sendag pointed out. “If on the east side of the Bosphorus, you might choose Sabiha Gokcen International, but it can be restrictive, as it is reserved mostly for charters, and operators have to apply for landing and parking slots. That can take up to 36 hr. for response, and they might give you a slot that will not correspond with your schedule.” Prior permission is required (PPR) to get in there with a minimum 48-hr. lead time for applying.

Sabiha observes the same slot windows as Ataturk, and management of the traffic is shared between the two. Permit requests for Sabiha are often rejected, as the airport authorities are trying to send as much general aviation to Ataturk as possible. Thus, commercial operators will always have precedence over general aviation in terms of access and fueling. Due to ongoing runway construction, slots are allocated for only the non-busy times of day, and are often refused. As a result, slots should be requested a minimum of five days ahead so handlers can monitor the local situation and take advantage of opportunities that might arise.

Sabiha’s single runway (6/24), is 9,843 ft. long by 148 ft. wide, concrete, assigned a PCN of 100RAXT, and equipped with an ILS. Elevation is 312 ft. Despite the restrictions, there is a functioning GAT at the airport, and customs clearance is said to be easy. Maximum stay at Sabiha is only 24 hr., and if passengers need to remain on the Asian side of Istanbul longer, it might be necessary for the operator to reposition the aircraft to another airport. A work-around for well-heeled operators is to request hangarage to the tune of \$600 to \$1,000 a day depending on aircraft size.

More on slots, as all three Istanbul airports require them. When operating to and from Turkey, it is important to understand, as Jeppesen’s Ian Humphrey, vendor relations manager in the UK, explains, that “Turkey, from a flight planning perspective, operates within the jurisdiction of Eurocontrol. When you file for Turkey, you file with Eurocontrol.” (See “Eurocontrol and Business Aviation, Parts 1 and 2,” *BCA*, October and November 2019.)

Note that weather and traffic delays are managed by Eurocontrol, which is to say, Eurocontrol will institute a delay to manage the traffic in an affected region, and an operator’s slots will then become essentially irrelevant. In other words, the Eurocontrol slot system will override

airport slots, and Eurocontrol will assign the operator a new departure slot.

In the air, again, Eurocontrol will have precedence, and if the operator is delayed on arriving, Eurocontrol will work the aircraft into the airport with its managed flow. On the ground, an operator’s slot will slide forward or back as Eurocontrol sorts out the traffic from its Network Operations center in Brussels. If an operator is early for a departure, and the aircraft is buttoned up and ready to go, the crew can call the tower with a ready message. The tower — at its option — can contact Eurocontrol and attempt to get the aircraft out and into the flow early, as the controllers will try to help when they can.

Security at Istanbul’s airports is considered good, especially since the 2015 terrorist attack at Ataturk, and is handled by state police. But for operators who want more, such as guards for their aircraft or to accompany passengers, all three airports host licensed security companies. “In general, Istanbul is a safe city — but note that there are more than three million refugees in the country at the present time,” Sendag observed.

Tekirdag Corlu Ataturk Airport (LTBU), not to be confused with Istanbul’s Ataturk International Airport and mentioned earlier as a good venue for refueling (tech) stops, is a joint civil/military field serving the city of Corlu in northwestern Turkey near the Greek border. The airport is 6.5 sm east of the city and about 15 sm north of the Marmara Sea. A 24-hr. airport, it has a single concrete-surfaced runway: 5/23, 9,844 ft. by 148 ft. TACAN, VOR-DME and NDB approaches are available. Elevation is 574 ft. Jet-A-1 fuel without icing inhibitor is available. As the field is shared with the Turkish Air Force, and probably sited at Corlu because it is near the Greek border (remember the long-standing rivalry between the two countries), prior permission will be required to operate there.

Smaller airports in the south “can be very congested with holiday traffic in the summertime,” Humphrey said. Izmir (LTBJ) and Bodrum (LTFE) are popular examples that are said to be stable and safe.

You’re in Eurocontrol Country

When planning routes in or out of Turkey, bear in mind that Eurocontrol maintains a predetermined route “catalog.” “Route selection in Europe is much more regulated than in the U.S.,”

Humphrey pointed out. “The route you get may or may not be the most efficient, as it is subject to flight management. You have to make sure your plan passes a validation check by Eurocontrol to make sure you are on the right route at the right altitude and going in the right direction.”

Operators can check their routing against the Central Flow Management Unit (CFMU) Network Operations Portal at <https://www.public.nm.eurocontrol.int/PUBPORTAL/gateway/spec/index.html> to make sure that what they’re planning to do is correct. “It has lots of information on it,” Humphrey said. “You can buy a paid subscription that allows you to view other people’s flight plans, as well, as another mode of checking your routing. You can propose a flight plan routing, and the system will look at it and present you with acceptable options, if necessary. Whatever goes for Eurocontrol goes for Turkey, as well, so there is a standard in place here.” Make sure the flight plan has been filed at least 3 hr. before entering Turkish airspace.

“For business aviation, if the aircraft you are operating is registered in an ICAO member state and has more than 19 seats, you will require a permit to land in Turkey,” Leatham said. There is a minimum lead time of five days for applying from the Turkish airports authority (Devlet Hava Meydanlari Isletmesi, or DHMI), and the permit is valid for 72 hr. “With less than 19 seats,” Leatham continued, “you do not need an overflight or landing permit. But make sure that in line 18 of your flight plan that you specify the purpose of the flight [e.g., business].”

And there is an insurance requirement that must be met before permits are authorized. For aircraft with MTOWs greater than 50,000 kg (110,231 lb.), or cargo-configured aircraft regardless of weight, an original copy of the operator’s insurance policy with a rider for Turkey must be sent by postal mail, recorded or courier, to the Sivil Havacilik Genel Mudurlugu at Gazi Mustafa Kemal Boulevard No: 128, A Maltepe-Cankaya, Ankara 06570, Turkey. (“Original” in this case, means the document must be printed in the original ink under the insurer’s letterhead and signed, dated and stamped.) “They will then load it on their website, and once on the system, if you do require a permit, you can apply,” Leatham said. “If they do not have a copy on their system, they can refuse the permit. If you have



When the new Istanbul International Airport opened, all passenger airline service was moved to the field from Ataturk International Airport, which is now exclusively used for general aviation and air cargo operations.

any doubt that you need a permit, check with your agent, as you do not want to turn up there without one.” Now, that’s for the “heavy iron”: BBJs, AC319s and other VIP-converted airliners. For aircraft lighter than the 50,000-kg threshold, an emailed copy (in PDF format) of the Turkey-specific insurance document is acceptable.

Visas, which are dependent on nationality, the reason for visiting and length of stay, can be obtained on line for U.S. citizens and are also available on arrival. Crewmembers do not need visas for stays up to 120 hr. (or five days) but must complete GenDecs and have official crew IDs to qualify for the privilege. Aircraft documents required include registration, airworthiness certificate and insurance policy with a rider covering Turkey.

Operating in Turkey

In terms of operating in Turkish airspace, “EASA rules are the paradigm, even though Turkey is not a European Union member,” Humphrey said, and its airspace is interwoven with EU airspace. Altimetry in Turkey is QNH expressed in feet, and the country is WGS 84 compliant.

“In Eastern Turkey,” he continued, “you will be in proximity to countries that are not particularly stable at the moment. Pick your routings carefully

and make sure there is nothing going on beneath them that would be dangerous.” Check the Ops Group weekly briefing for good up-to-date intelligence on this region and what to avoid.

Turkey is often used for overflights between Europe and the Middle East, but plan carefully, Humphrey recommends, by checking NOTAMs and other information sources, as things can change very quickly. “There may not be restrictions, but there can be dangers,” he warned. “Avoid going anywhere near the Syrian border. If flying from Iran and Iraq [or going the other way] there are only certain waypoints you can use to transfer into Turkey. They connect with airways that will orient you to Istanbul and enable you to avoid the southeast portion of Turkey and the Syrian border. That area is a non-official no-fly zone — it is universally understood that it is to be avoided.” Note that, given the hostilities beneath that airspace, there is a very real danger that an aircraft straying in there could be shot down.

Be aware, too, that due to the longstanding conflict between Greece and Turkey (dating back about 3,000 years), it is prohibited to fly directly between southern Cyprus (the Greek portion of the bisected island) and Turkey or Turkey to the Greek Cypriot side of the island.

“Finally,” Humphrey advised, with

a chuckle, “note that you will see FIR NOTAMs in Turkey delegitimizing certain Greek NOTAMs — and vice versa. It seems the two countries argue via NOTAM; just disregard them and move on.”

A pilot and retired corporate aviation manager interviewed by *BCA* who often flew his principals to Turkey described ATC “as good as anywhere in Europe. We went there 20 times. We never shot an approach below 1,200 ft. when we broke out. It was generally clear at night. We experienced some rain and once, snow flurries. Once we went to Bodrum, a modern well-run airport, landed there, parked on the ramp, and saw little traffic except a couple other business jets. We took a ride down to the seaport Goechke and had a nice time, and people were friendly — but this was in 2009. We were amazed at how clean and pretty the country was — it was a postcard.”

We can add that from a touring point of view, Turkey offers incredible sight-seeing, from the Hagia Sophia church, mosque and now secular museum, built in 537, and the Sultan Ahmed Mosque (the so-called “Blue Mosque”), an art treasure in its own right, both in Istanbul, to some of the finest and best-preserved Greek Hellenic ruins and artifacts in the southwestern part of the country. Then there is the Bosphorus itself, the waterway that divides Europe from Asia and connects major seas. And this just scratches Turkey’s surface. There are, for example, ruins in this crossroad of history more than 11,000 years old, including at a place named Gobekli Tepe, the oldest religious structure yet found.

Turkey is very European in the way it operates, Humphrey insisted, as it emulates Europe and has in the past wanted to be an EU member. “Everywhere we went in Turkey, everything works, they are savvy technically,” the retired av manager added. On the other hand, though, “The farther east you go, the less European it becomes,” Humphrey pointed out. “If you are flying an N-registered aircraft, you are generally safe and accepted.”

But because of unrest in recent years, the drift toward authoritarianism and a greater Islamic participation in the government, attitudes could change — and quickly. So always check ahead to know the political situation before going and exercise sensible vigilance and security when on the ground. **BCA**



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Fatal Photo Shoot

Harnessed passengers **unable to break free**

BY **ROSS DETWILER** rossdetwiler.com

On March 11, 2018, at about 1908 EDT, an Airbus Helicopters AS350 B2 (N350LH), lost engine power during cruise flight, and the pilot performed an autorotative descent and ditching onto the East River in New York City. The pilot survived, sustaining minor injuries, but all five passengers drowned.

The flight was operated by Liberty Helicopters Inc., per a contract with NYONair (originally called New York On Air). Both companies considered the flight to be an aerial photography mission operated under FAR Part 91. In the NTSB's subsequent meeting with Liberty's chief pilot, there was much discussion about what would otherwise appear to be a commercial Part 135 charter flight operating under the auspices of the lesser supervised Part 91 due to a regulation that allows for such photographic flights.

VFR weather conditions prevailed, and no flight plan was filed for the intended 30-min. local flight, which departed from Kearny Heliport, Kearny, New Jersey, at about 1850. It proceeded over the Passaic

River and the North Newark Reach to Bayonne, where it crossed eastbound toward the Statue of Liberty.

The operator allowed the five passengers (one in the front seat, four in the rear) to take photographs of various landmarks while they extended their legs outside the helicopter during portions of the flight. Another Liberty helicopter took off at approximately the same time and the two flew within sight of each other for, at least, the first part of the flight. These aerial photo shoots are advertised as "shoe selfies."

The accident pilot later talked about the amount of moving around and shuffling that was being done as the passengers took pictures of the Statue of Liberty and other landmarks. Coincidentally, much promotion of the service is actually done by passengers who post their images on Instagram and through Snapchat type messages. For the accident and other FlyNYON flights, Liberty removed the AS350 B2's two right and front left doors and the left sliding door was locked open.

Briefing

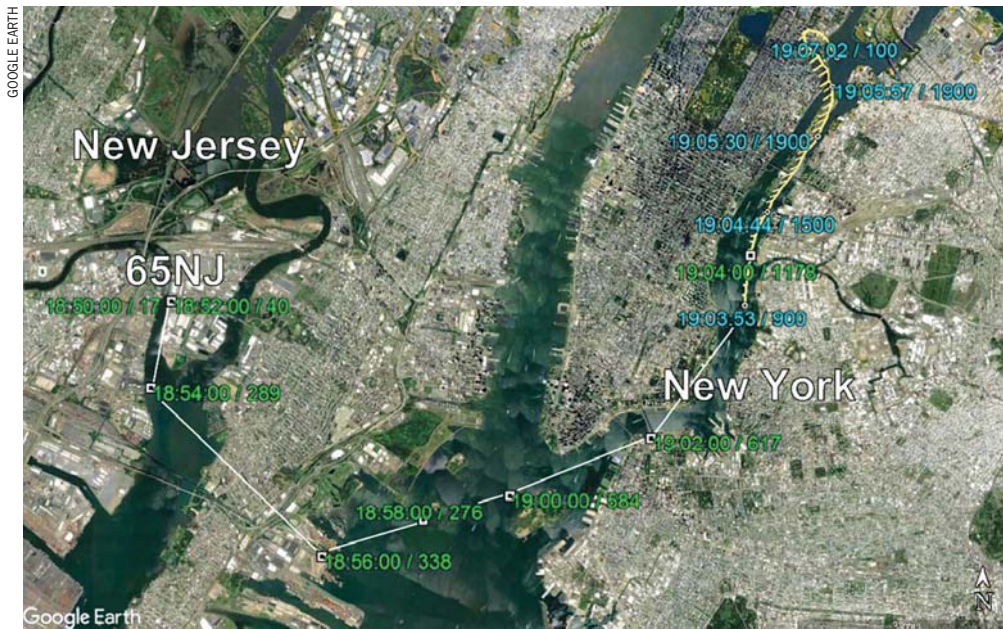
Prior to the accident flight's departure, each passenger was fitted with a NYONair-provided harness/tether system that NYONair developed with the intent to prevent passengers from falling out of the helicopter. The system used on the accident flight consisted of a full-body, workplace type fall-protection harness that was secured with a locking carabiner to a tether strap, the other end of which was secured to an anchor point in the cabin. Each passenger also wore the helicopter's installed, FAA-approved restraints while seated. The pilot (who was seated in the front right seat) wore only an installed, FAA-approved restraint.

According to Liberty personnel interviewed by the NTSB, the passengers went to the harness room to be fitted and were briefed so that they fully understood the loading process. They made sure nothing was in the passengers' pockets and then put all their belongings in a bin and double checked that step. They said they explained exactly what

they were doing when harnessing the passengers.

The passenger representative said she explained to the passengers that they had a cutter on the left side of the harness to be used in case of an emergency. She stated she would always review the information with the passengers and ask, "What is the cutter there for?" She said all of the accident passengers knew they had a cutter and they all knew how to use it if necessary.

When asked if she specifically remembered going over all those details with the passengers on the accident flight, she stated, "Yes, yes." When asked to confirm the cutter was on the left side of all the



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Cause & Circumstance

NTSB



Harness worn by passengers.

harnesses, she replied, “Yes.” She also stated that all the harnessing was done at the terminal, before they loaded the passengers into the vans to take them to the heliport.

Cabin Set-Up and Videos

After the flight departed, and consistent with the standard operating procedures (SOPs) used for FlyNYON flights, the passengers were allowed (when instructed by the pilot) to position themselves to extend their legs outside the helicopter. The two passengers who had been seated in the rear inboard seats

removed their FAA-approved restraints and sat on the cabin floor, but wearing their harness/tether systems. The passengers seated in the outboard seats were allowed to rotate outboard in their seats. To enable such freedom of movement, the SOPs allowed the passengers to wear their lap belts adjusted loosely and the shoulder harness routed under their arms.

The fifth passenger was seated in the front left seat of the helicopter and had been instructed that the way to take the “shoe selfies” was to lean back, raise his feet and shoot the picture. Videos show that once the helicopter was airborne, passengers began using their personal electronic devices (PEDs) to shoot videos and photos. Throughout the flight, it appeared the passengers were sharing photos over a cell network to social media photography/video apps and, in some instances, were interacting with one another. The number of “shoe selfies” taken were not specifically

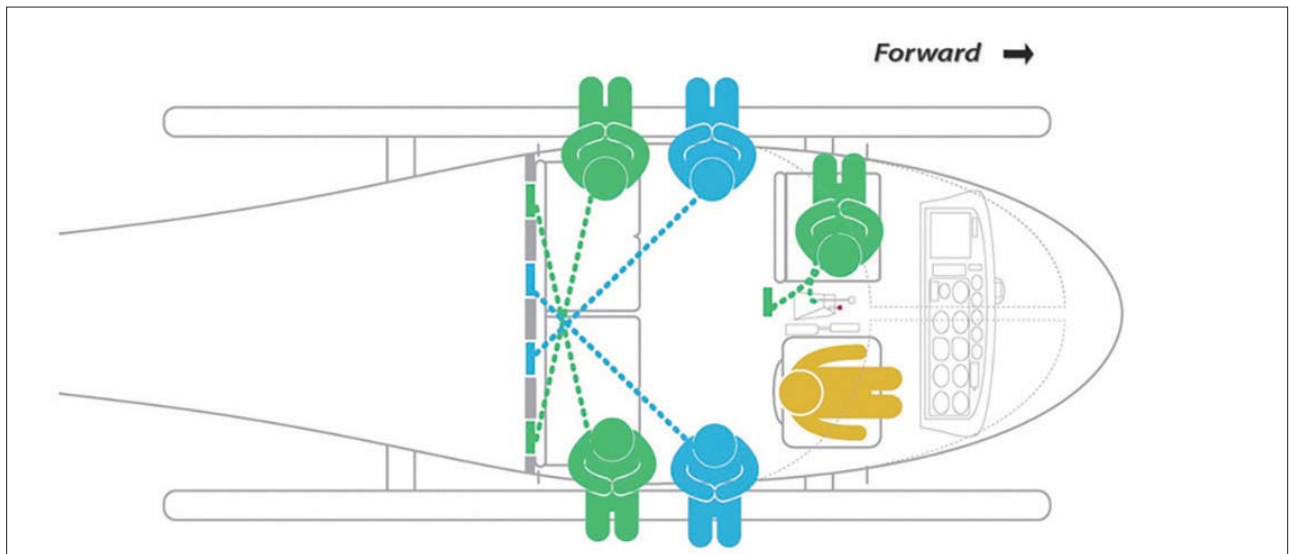
quantified but were numerous and frequently taken near landmarks.

A review of onboard video showed that, when the flight was proceeding northwest over Manhattan toward Central Park at an altitude of 1,900 ft., the front passenger, who was facing outboard in his seat with his legs outside the helicopter, leaned back several times to take photographs using a smartphone.

The onboard GoPro video showed that, each time he leaned back, the tail of the tether attached to the back of his harness hung down loosely near the helicopter’s floor-mounted controls. At one point, when he pulled himself up to adjust his seating position, the tail of his tether remained taut but appeared to pop upward. Two seconds later, the helicopter’s engine sounds decreased, and the helicopter began to descend.

The Ditching

As the pilot performed the emergency procedures to execute an autorotation and address the apparent loss of engine power, he noticed that the fuel shutoff lever (FSOL) was in the closed position. It had been inadvertently moved to that position by the tail of the front passenger’s tether, which had become caught on it.



Figures not drawn to scale

Note the depicted “loop” in the front passenger harness and the red dot indicating the position of the fuel shut off handle

NTSB

Although the pilot pushed the FSOL down to restore fuel flow and attempted to relight the engine, power was not restored. In his post-accident debrief, the pilot stated that the engine responded immediately with a temperature increase, but the aircraft was too low to allow sufficient time to come to power.

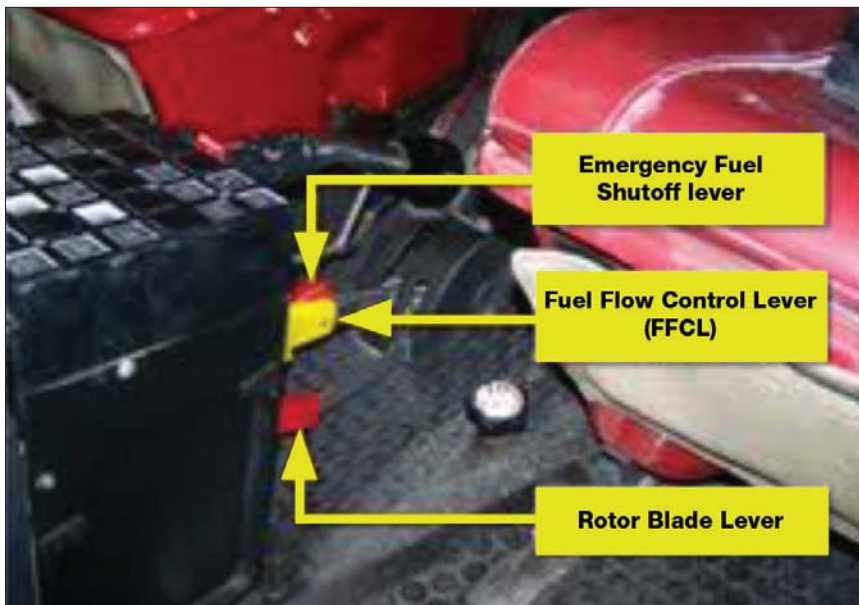
The pilot pulled the activation handle to deploy the helicopter's emergency flotation system, and ditched the aircraft on the East River.

The flotation system installed on the AS350 B2 contains two pressurized gas reservoir assemblies that inflate, via hoses, six skid-mounted floats. Three floats are mounted to each side of the skids; each float contains two chambers. The floats on both sides of the skids are identified as "forward," "mid" and "aft," i.e. "left-forward" identifies the forward-most float installed on the left skid. Each float is packaged within its own float cover.

The reservoir assemblies are mounted to the airframe via loop clamps. One reservoir assembly is mounted underneath the left baggage compartment while the other is mounted underneath the right baggage compartment. Each assembly is composed of a valve and a cylinder. The valve is opened via a mechanical pull cable system that the pilot activates with a handle mounted on the cyclic stick, near the base of the cyclic grip.

The pilot deploys the floats by pulling the activation handle aft. The float activation handle is offset from the cyclic grip by about 32 deg. to the right to prevent interference with the grip when the activation handle is pulled aft. A shear pin, installed within the activation handle, is intended to prevent inadvertent activation of the float system.

When asked to describe how the float system was deployed during the accident flight, the pilot stated that when it came time to deploy the floats, he "took [his] left hand off of the collective and placed it on top of the cyclic . . . and gripped the [activation] handle with [his] right hand and pulled it back fully and completely." He stated that he heard a "pop" sound, which to him indicated that the float system deployed, and that "after pulling the [activation] handle, [he] returned [his] hands to the regular positioning and grip on the collective and cyclic." The pilot stated that there was extra drag after the floats had deployed and that he could see parts of the left front float and right front float after the deployment.



Passenger seat on right (viewed from front) showing the nearness of mechanical fuel shut off handles to where the passenger's harness loop would have been when turned to his left and then leaned back.

Going Under

However, the floats did not fully inflate on one side, and as a result the helicopter rolled right in the water and became fully inverted and submerged about 11 sec. after it touched down.

The pilot was able to release his restraint while under water and successfully egress from the helicopter. Tragically, none of the passengers were able to do so.

A medical report stated that the pilot had eight abrasions to his left knuckles, and contusions inside his right hand's palm. He said a bruise on his right hand between his thumb and index finger was caused by squeezing the cyclic prior to impact. He also had a cut at the bottom of the knuckle for his left index finger from actuating the emergency fuel shut-off lever back to the cockpit floor.

The onboard GoPro showed that all passengers survived the landing on the water. Their attempts to unhook the harnesses and move out were also recorded in detail as the cabin sank and filled with water. The recording ended with the cabin becoming too dark to discern what was happening as it filled. Water impact occurred at about 1908. Rescue divers arrived 30 min. later.

The accident helicopter remained submerged until March 12, and once recovered revealed no evidence of an inflight break up. No major components were missing. Two witness videos

captured the ditching and the GoPro video recorder was recovered from the accident helicopter as well.

The Findings

After examining all the information collected by its investigators, the NTSB determined the probable cause of the accident to be Liberty Helicopters' use of a NYONair-provided passenger harness/tether system, which caught on and activated the floor-mounted engine fuel shutoff lever and resulted in the inflight loss of engine power and subsequent ditching.

Furthermore, it found that contributing to the accident were Liberty's and NYONair's "deficient safety management which did not adequately mitigate foreseeable risks associated with the harness/tether system interfering with the floor-mounted controls and hindering passenger egress" and Liberty allowing NYONair to influence the operational control of its flights for the latter.

In addition, it faulted the FAA's "inadequate oversight of Title 14 Code of Federal Regulations Part 91 revenue passenger-carrying operations."

And finally, it found that contributing to the severity of the accident were the rapid capsizing of the helicopter due to partial inflation of the emergency flotation system and the use by Liberty and NYONair of a harness/tether system that hindered passenger egress. **BCA**

Getting It

NTSB Chairman Robert Sumwalt accused the doors-off helicopter photo tour company NYONair, parent of Fly-NYON, of turning “a perfectly good helicopter into a death trap” and characterizing that as “madness.” He has a point.

I’ve been getting in and out of aircraft seat belts and shoulder harnesses for well over 55 years. While flying an F-100 Super Sabre on an attack mission in Laos in 1969, I was shot down by AAA. I spent a long 2 hr. in a very tall tree in the jungle, trying to get out of a quick-escape Air Force parachute harness on which I’d been trained for hours and hours, including being placed in an artificial tree, undoing the harness and lowering myself to the ground. But that training never addressed the conditions in which I found myself.

Oh, I was cool, with pieces coming off the airplane, as I ejected, during free fall and parachute ride down. I actually radioed my No. 3 during the descent. Several hundred feet above the trees, I deployed my life raft as trained; it inflated and hung below 50 ft. of line. But then the raft and rope got caught on the trees and dumped me into the jungle canopy. As the branches sprung me back upward, the chute came in around me. Suddenly, I was upside down, 30 ft. off the ground, snarled in parachute risers and initially unable to even move my arms and legs. I knew I’d eventually work free, but there was nothing I could do if an unfriendly came along the path below me. None did, but the “cool” had utterly abandoned me in the meantime.

Survival Systems USA Inc., in Groton, Connecticut, offers wonderful training for people who travel

by air, over water or near water. In my case, this included being strapped in a simulated helicopter fuselage, dunked in water and rolled over, just as happened with the Liberty helicopter upon ditching in the East River. Exiting an inverted, submerged helicopter was a difficult, but doable, task — the second time I tried. Prior to the first dunking, I was briefed for an extended period of time on what to do, what to expect and how to move. I also knew that when I went under, there would be two or three guys in scuba gear within feet of me at all times. The water was contained in a well-lit pool, crystal clear, and a flick of my wrist was all that was needed to be released from my seat. Indeed, we had to learn not to release too early when a fuselage is rolling under water.

Now, I picture myself going through the briefing that was given to the passengers on that tragic photographic flight over New York City. Upon being told about a knife tucked in the upper left of my harness for cutting my way free should the helicopter sink in cold, dark water while surrounded by five other people frantically trying to get out of the machine, I’d have smiled and asked the whereabouts of a Coke machine since I’d need something to drink while I waited for my pals to return from their “shoe selfie” sortie.

I don’t consider myself any smarter than the rest of the professional pilots and cabin personnel reading this article, but the pictures of people smiling, waving, moving about and hanging out of a flying machine several thousand feet in the air are unsettling. I have no way of judging the safety of such

behavior; I just don’t know enough about helicopters. But I do know such activity isn’t safe enough for me. Too many things can go wrong.

Since the Liberty accident, the FAA has mandated that passengers be fitted with quick-release harnesses as company pilots had previously recommended. The sight-seeing flights continue. But not with me, thank you.

At Survival Systems, we trained with only an FAA-approved seat belt to release. Our company chairman mandated that executives who regularly used the Sikorsky S-76 attend the course with we pilots, and in regular operations we never moved around in our helicopter’s cabin except to lean forward for a snack and pass it around. Does all that mean we would have done any better than the five photographers in this story? No, but it means we’d have had much better odds. That’s what safety is about: managing risk.

How do we as professionals imbue our passengers with the understanding that something can go wrong — and that if it does, we can manage better with a clear understanding of the factors involved, and by applying that understanding most likely survive?

Believe me, most passengers don’t seem to get it. I once had a very senior executive come to the front of a Falcon 50 as we were starting an instrument approach. I assumed he just wanted to have a quick look and would sit down. But as we were coming through about 1,500 ft., he struck up a conversation. I couldn’t believe it and as politely as I could asked him to return to the cabin. Passengers don’t get it.

We have to “get it” for them. **BCA**

Accidents in Brief

Compiled by Jessica A. Salerno

Selected accidents and incidents in March 2020.

The following NTSB information is preliminary.

► March 17 — About 1545 EDT, a

Cirrus SR22 (N150X) was substantially damaged when it was involved in an accident near Conway, South Carolina. The pilot stated that he departed from Hammond Northshore Regional Airport (HDC) about 1215 on an IFR clearance and proceeded toward the destination airport, but elected to divert to Myrtle Beach International Airport (MYR) due to the low ceiling at the destination. He was told to expect the ILS approach to Runway 18 and was vectored to the initial approach fix (IAF). While in IFR he flew toward the IAF with autopilot on and in NAV mode, and he also reduced engine power to lose altitude. As the flight approached the IAF the airplane was still high, “. . . not as stable as he wanted to be,” and had a tendency to turn to the left. He increased engine power to maintain altitude or climb as necessary and had trouble stabilizing the instruments, adding that it felt like he was “fighting [the airplane]” in the roll axis. He realized that the flight was too slow and when attempting to correct, felt the airplane getting away from him and was likely in an unusual attitude. He activated the Cirrus Airframe Parachute System, and while descending under canopy, secured the engine and prepared for the touchdown, which occurred on all landing gears. The airplane’s nose gear collapsed, and the rudder partially separated.

► March 17 — About 0919 CDT, a

Cessna 208B (N274PM) was destroyed when it was involved in an accident about 7 nm northwest of La Crosse, Kansas. The airline transport pilot was killed in the accident. The airplane was operated Part 135 on-demand cargo flight. Due to the COVID-19 pandemic, the NTSB did not respond to the accident site. The Planemasters Ltd. flight, PMS1670, was being operated on an IFR flight plan from Wichita Dwight D Eisenhower National Airport (ICT), Wichita, Kansas,

to Hays Regional Airport (HYS), Hays, Kansas. A review of FAA preliminary ARC communications and commercially available radar and ADS-B data revealed that the flight departed ICT about 0751 CDT. At 0825, the HYS automated weather observation service was reporting, in part, winds from 080 deg. at 11 kt., visibility 1 sm, and overcast clouds at 200 ft. AGL. About 0831, the radar and ADS-B data were lost as the airplane descended through 4,000 ft. while being vectored for the ILS approach to Runway 34. Shortly thereafter, the pilot executed a missed approach. The pilot stated to ATC his intention to attempt the ILS approach to Runway 34 a second time.

At 0841, the HYS AWOS indicated that visibility had dropped to one-quarter sm in fog. About 0853, radar and ADS-B data were again lost as the airplane descended on the ILS. About 0859, the airplane was reacquired by radar northwest of HYS. At that time, the pilot stated his intention to divert to Great Bend Airport (GBD), Great Bend, Kansas. A review of radar and ADS-B data showed the airplane begin a turn to the south toward GBD while climbing to about 7,000 ft. About 0918, the airplane began a descent and left turn. The last radar and ADS-B targets were observed about 0918:48.

The wreckage was discovered in a field about 0945. The airplane’s tail and wings were visible above ground, with the forward fuselage and engine section buried several feet under the terrain, consistent with a near-vertical, high-speed impact.

► March 5 — About 1130 Hawaii

standard time, a Airbus EC130 B4 helicopter (N11QK) was heavily damaged when it was involved in an accident, about 6 mi. north of Kalapana, Hawaii. Of the six occupants on board, the commercial pilot and three passengers were uninjured, and two passengers sustained minor injuries. The helicopter was operated as a Part 135 flight.

According to the pilot, the accident helicopter was the second of two commercial air tour helicopters departing Hilo International Airport (PHTO). After departure, they flew in a southerly direction and remained slightly offshore for a short time before turning west along the shoreline. The two helicopters

proceeded to a geographic area known as the “Old Ocean Entry.” As the helicopter passed over the shoreline, the pilot noticed a significant, high frequency airframe vibration. He said that as soon as the vibration started, the tail rotor chip annunciator light briefly illuminated, and as the vibration continued, the tail rotor chip light “flickered.” He selected a large open area as a precautionary landing site and slowed the helicopter on the approach. As the helicopter slowed, he raised the collective, and applied right tail rotor pedal, but the nose of the helicopter veered to the left. At about 200 ft. AGL, with the right tail rotor pedal fully depressed, the helicopter began to spin to the left. In an effort to stop the spin, he attempted to gain forward airspeed, but eventually closed the engine throttle and preformed a hovering autorotation. He said the helicopter descended, touched down hard, and subsequently rolled on its right side, sustaining substantial damage.

► March 3 — About 0847 CST, a

Cessna 172S (N157SF) was destroyed when it crashed near Lincoln, Illinois. The air transport pilot and two passengers were killed. The airplane was operated as a Part 91 survey flight to conduct an aerial survey of a bald eagle (*Haliaeetus leucocephalus*) nest near Lincoln. At the time of the accident, the pilot was employed as the chief flight instructor at Synergy Flight Center, however he was also employed as a regional airline pilot. For the accident flight, the owner reported the pilot was flying with two ecologists from Shoener Environmental and the ecologists would use cameras to document the bald eagle nest. A review of L3Harris Technologies OpsVue track data showed that after departure at 0804, the airplane traveled south near Le Roy, Illinois, before traveling southwest near Heyworth, Illinois. It continued southwest toward Lincoln. Northwest of Lincoln, the Cessna entered a right descending turn, orbiting around a heavily wooded area that is intersected by the Kickapoo Creek and Highway I-55. The data showed that during the turn, the airplane was losing altitude and ground speed. The track data was lost at 0846. The last track data indicated the airplane was about 1,075 ft. MSL, at an estimated ground speed of 50 kt., and was traveling southwest. **BCA**

The Organization Failed . . .

If I wrote the **accident report**

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

I graduated from the U.S. Air Force's Aircraft Mishap Investigation Course in 1985 and although I've only written two official accident reports, the course changed the way I fly airplanes and evaluate such documents. If you have anything to do with the ownership, management, scheduling or any other aspect of operating airplanes, the words "the organization failed" should concern you. That word, "failed," doesn't seem to be used as often as deserved.

The most important lesson in an aircraft accident investigation is that you've not gotten to the bottom of things until you can point to someone involved who failed. Spoiler alert: That someone isn't always the pilot. In fact, it rarely is.

In today's politically correct society finger-pointing is discouraged. We want to find out what is wrong but not who is wrong. If you are in the business of making everyone happy, that might be the right approach. But if you are in the business of accident prevention, who is wrong is precisely what needs to be determined. And you will almost always have to cast your aim higher than at the two people sitting in Row One of an airplane. Sure, the pilots have a great deal to do with every aircraft accident. But as Capt. Warren Vanderburgh, author of the original American Airlines series about automation dependency, says, "We made you that way." And the "we" to whom he refers is the organization.

The Airline Failed

Vanderburgh was a U.S. Air Force pilot for 27 years and followed that with 32 years at American where he earned rock star status at the company's Flight Academy. I think his reputation as an exceptional instructor pilot was well deserved and his teaching on automation dependency has changed the way many



KIRTLAND AIR FORCE BASE, USAF

Students at the U.S. Air Force's Aircraft Mishap Investigation Course examine the wreckage of an F-16 Fighting Falcon.

of us approach cockpit automation. As he said, we are "children of the magenta." He describes several examples of pilots in his simulator failing to drop down levels of automation to prevent disaster. After each story he says, "I am so sorry, I did not mean to make you like this."

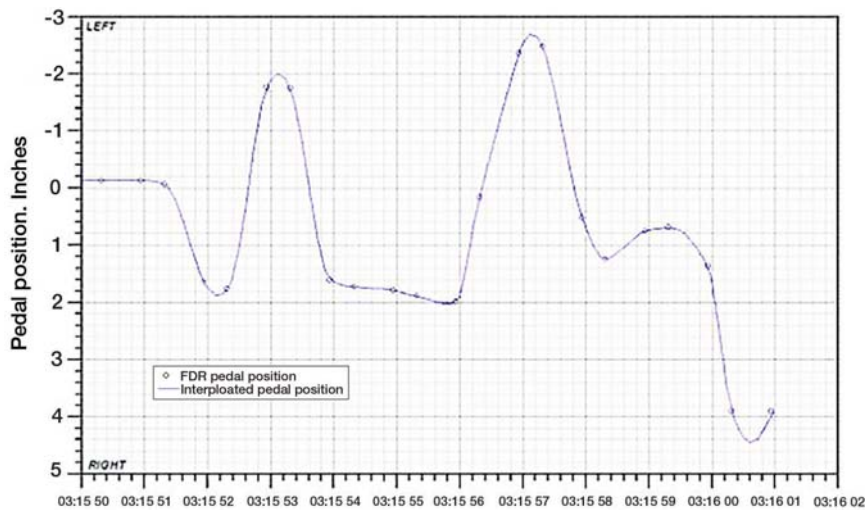
But he is also credited with another course called the Advanced Aircraft Maneuvering Program, which can be summed up by saying: Fly the airplane; don't let the airplane fly you. The program received some criticism from NASA, Boeing, Airbus and the FAA for the use of rudder in correcting bank angles. This might work on smaller aircraft but can lead to disastrous results in a large, transport category airplane. Some who attended the course deny that the use of rudder was encouraged, but others complained that it was.

I spoke with a member of the NTSB investigating the accident that follows who says the use of rudder was indeed sanctioned by the course. It is apparent

that at least one pilot took away the idea that the aggressive use of rudder was acceptable. The result was the crash of American Airlines Flight 587, an Airbus A300, while departing New York's JFK International (KJFK) on Nov. 12, 2001, after twice flying through the wake turbulence of a Boeing 747 and killing all 260 passengers and crew and five persons on the ground.

The first encounter was at low speed and the first officer's (F/O) control inputs appeared to be perfectly normal. The second encounter was at 250 kt., the maximum permitted below 10,000 ft., and the F/O's rudder inputs were larger and included several reversals. He didn't understand that his aircraft's full rudder deflection at that speed could be reached with as little as 1.25-in. rudder pedal movement and 10 lb. of pressure. He also didn't understand the dangers of rapid rudder reversal.

Airbus, for its part, said the ailerons and spoilers were effective for roll



SOURCE: NTSB AIRCRAFT ACCIDENT REPORT AAR - 04/04

Rudder pedal movements during American Airlines Flight 587's second wake event.

is sound, but not so easy in practice:

“The control of a divergent Dutch roll is not difficult so long as it is handled properly. Let us assume that your aeroplane develops a diverging Dutch roll. The first thing to do is nothing — repeat nothing. Too many pilots have grabbed the aeroplane in a rush, done the wrong thing and made matters a lot worse. Don't worry about a few seconds delay because it won't get much worse in this time. Just watch the rolling motion and get the pattern fixed in your mind. Then, when you are good and ready, give one firm but gentle correction on the aileron control against the upcoming wing. Don't hold it on too long — just in and out — or you will spoil the effect. You have then, in one smooth controlled action, killed the biggest part of the roll. You will be left with a residual wriggle, which you can take out, still on ailerons alone, in your own time.”

Ask anyone who has many hours flying aircraft with this type of negative stability and you will hear that it is no big deal, just counter with opposite aileron that you immediately reverse and ensure each opposite movement is smaller than the previous. Watching it happen, it looks like a flick of a wrist magically stops the Dutch roll. Now watch someone without the necessary experience, and you will see a sickening roll and yaw that increases in intensity, sometimes with fatal results.

Commercial airlines recognized this tendency in the Boeing 707 and quickly adopted yaw dampers that solved

control down to stall speed and to use rudder as necessary to avoid sideslip but not as a primary source of roll control. But looking for someone to blame, many singled out the advanced aircraft maneuvering course. I think Vanderburgh's reputation with the company sank as a result, and that is unfortunate since many of his lessons remain valid to this day, especially the one that says, “We made you that way.”

The NTSB determined that the probable cause of the accident “was the in-flight separation of the vertical stabilizer as a result of the loads beyond ultimate design that were created by the first officer's unnecessary and excessive rudder pedal inputs.” They found as contributing factors the Airbus A300-600 rudder system design and elements of the airline's Advanced Aircraft Maneuvering Program. If I were writing the accident report, I would say the cause was that the airline failed to ensure all of its pilots were properly trained in upset recovery. That may seem unfair in that most American Airlines pilots seemed to learn the correct lessons imparted by the company's highly robust simulator upset recovery program. But at least one pilot never got the message. That is a common theme among very large organizations.

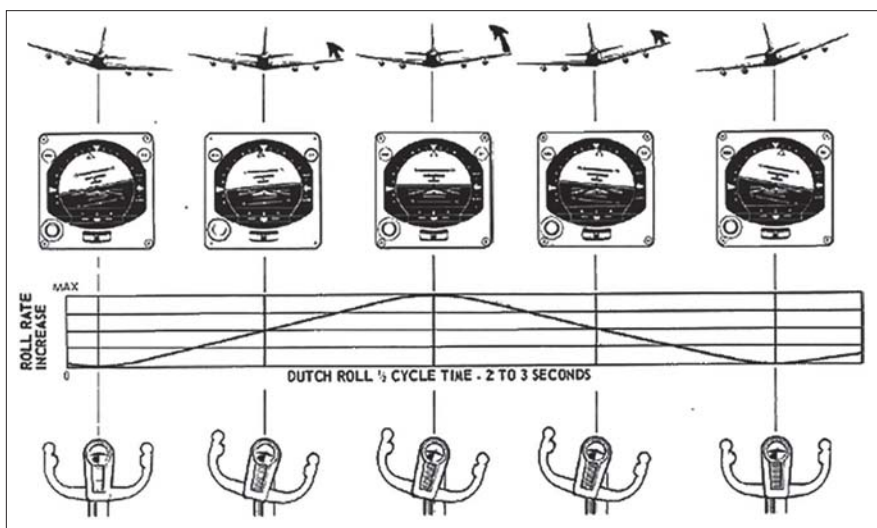
The Air Force Failed

I have a few years flying an Air Force aircraft that seemed ancient at the time but is still flying 40 years after I first took to the skies with it. The KC-135A Stratotanker was a forerunner of the venerable Boeing 707, though it began its life with the designation of Boeing 717. The aircraft became operational in 1956 and over the years included several variants; in all, 732 were built.

By the time I got into the airplane in 1980, 56 of them had been destroyed through crashes and other events the

Air Force likes to call “mishaps.” That's a loss rate of 2.24 aircraft per year. That rate held up through about 1990. Since that year, six have been lost, slicing the rate to one airplane every five years. The difference has mostly been attributable to technology: better engines, better avionics and adoption of many of the things the rest of the Boeing 707 world had taken for granted. For example, consider the humble yaw damper.

Thanks to aircraft with either benign Dutch roll tendencies or automatic yaw dampers, nowadays the subject of Dutch rolls tends to be an academic one. But not too long ago, dealing with it was a primary pilot skill for some airplanes. My favorite book on the topic is *Handling the Big Jets* by D.P. Davies. He writes, “Negative stability is potentially dangerous because sooner or later, depending on the rate of divergence, the aeroplane will either get out of hand or demand a constant very high level of skill and attention to maintain control.” His technique to get out of a Dutch roll



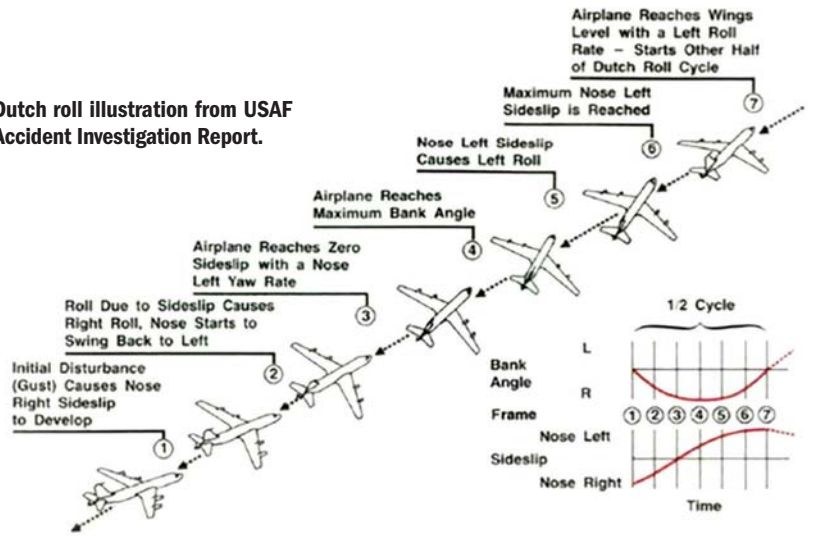
Dutch roll technique from USAF KC-135A Flight Manual, 1966.

everything. The Air Force, in its own style, decided its pilots could handle the problem with a little training. And that training required a lot of skill and nerve from instructors, since the training could not be duplicated in simulators and had to happen very low to the ground.

On Aug. 27, 1985, an instructor pilot was flying with a student crew on their second training sortie at Beale Air Force Base, California (KBAB). A very good instructor pilot would let the new copilot get very low to the ground before ordering a go-around to maximize the training. Any copilot's second flight in the KC-135A was bound to be exciting, with large bank angles low to the ground. This instructor pilot was very good but let the copilot stray too far and they ended up hitting the runway with their left outboard engine. The engine failed and the instructor took the airplane and executed a go-around. The instructor's control inputs were timely and correct until turning on downwind, when he allowed the airplane's nose to climb too high. The airplane stalled, the aircraft banked sharply and dove to the ground. All seven on board were killed.

The Air Force mishap report cites as the first finding that the copilot "induced lateral instability while on short final" and that the instructor pilot "failed to adequately intervene." Perhaps both those findings are true. But consider the copilot had about 200 hr. total flying time and a year of experience. The instructor pilot

Dutch roll illustration from USAF Accident Investigation Report.



that would take most pilots considerable experience to master. And I'd further note that the Air Force required its KC-135A instructor pilots to allow unqualified pilots fly the aircraft very near the margins of controlled flight in an attempt to teach those techniques.

To its credit, the Air Force came up with a very good course in asymmetric flight for KC-135A pilots and eventually installed very good yaw dampers. And that leads us to the second crash involving KC-135 yaw dampers.

In the late 1990s, the service upgraded the engines, avionics and much of the safety equipment of the KC-135A fleet, producing over 400 KC-135Rs. A full-time yaw damper made Dutch roll a thing of the past and Dutch roll techniques took on a much lower priority.

On May 3, 2015, a KC-135R departed Bishkek-Manas International Airport (UCFM) in Kyrgyzstan for a combat aerial refueling mission. A flight control malfunction during takeoff caused the aircraft's nose to slowly drift from side to side, or "rudder hunt." The crew did not properly diagnose the condition and the rudder hunt progressed into a

Dutch roll. The crew initiated a turn to their on-course heading, using a small amount of rudder. The use of rudder increased the aircraft's oscillatory instability. The Dutch roll very quickly increased to a point at which the aircraft's tail section separated from the aircraft, which crashed, killing all three crewmembers.

The aircraft flight manual called for either turning off the yaw damper or rudder power to reduce the rudder hunt and prohibited the use of rudder in this

situation. The Air Force investigation determined that the aircraft was still in a flyable condition when the pilot applied and varied left rudder pressure several times and then reversed pressure to the right. The pilot was found "causal" because of the inappropriate rudder inputs. If I were writing the accident report, I would say that the Air Force failed to train its pilots to adequately recognize the conditions of Dutch roll in an airplane prone to it, and how to handle the condition manually.

So far, I have pointed fingers and second guessed the actions of an airline and of a very large military organization. Bureaucracies seem prone to these kinds of things. But so, too, are smaller organizations in which there is some distance between decision makers and those carrying out those decisions.

The Organization Failed

I have flown for a few organizations in which an executive assistant simply called a scheduler with a foreign destination in mind and assumed everything would be just as safe and routine as a hop to domestic airport. In my experience, however, a word of caution from the captain was always heeded: "I can't take you to your ski holiday in Switzerland without some simulator training first," or "Your airplane is not allowed into London City because it isn't approved for steep approaches," or "I am not willing to fly to that valley airport at night or in the weather because they don't have radar coverage." In every example, the pilot's word prevailed. But that isn't always the case.

On Sept. 4, 1991, Gulfstream GII N204C, which was owned by E.I. du Pont de Nemours & Co. and leased by Conoco, crashed while attempting to land at Kota Kinabalu Airport (WBKK), Malaysia on what should have been a routine fuel stop. It appears the pilots were uncertain of



KC-135A 59-1443 just prior to impact

had 2,700 hr. and was tasked with allowing the situation to push right up to the boundaries of safety without crossing the line to unsafe.

If I were writing the report on that accident, I would have noted that the Air Force failed to install commercially available yaw dampers on the KC-135A fleet, even though they had been available for at least 20 years. Instead, the service required new KC-135A pilots to learn difficult Dutch roll compensation techniques

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their position while descending on an instrument approach and executed a go around in a lackadaisical manner. One pilot was recorded saying, “I don’t like what we got here, I’m climbing this sucker outta here.”

A cursory look at the events of that day reveals the pilots were undisciplined in their instrument procedures, and failed to plan their descent to properly execute the approach from the correct altitude and at the expected clearance limit. Their radio phraseology was poor and nonstandard. So, the accident resulted from the pilots erring multiple times. But that is just the tip of the iceberg.

The case of N204C is murky because the official accident report isn’t available, the first draft of the accident history was written by the company’s legal team, and the Flight Safety Foundation used that draft for a video covering controlled flight into terrain. Roger K. Parsons, a research scientist hired by Conoco before it was acquired by DuPont, lost his wife in the crash and has investigated the accident in great detail. He charges that mismanagement of aviation resources by senior DuPont officers and directors was the primary cause of the disaster.

Parsons points out that the inexperienced pilots were poor choices to assign on such a demanding trip. The accident aircraft was not equipped with a ground proximity warning system (GPWS) that was installed on the company’s newer Gulfstream GIV. Pilot training and aircraft equipment were cut to meet budget reduction objectives. Some pilots who voiced concern for diminishing safety standards were fired. One 30-year DuPont pilot wrote letters to the three directors of aviation between 1988 and 1991, to a DuPont chief counsel and to the company CEO, “warning these men that a fatal accident would certainly occur if DuPont continued to require poorly trained and ill-prepared pilots to fly demanding trips of questionable safety.”

I suspect stories like this can be found in many business aviation accidents, but not always due to a company’s willful desire to cut costs and quell descent. It is just as likely to be a lack of oversight; assuming everything is OK because nothing bad had ever happened previously. But how does a company CEO without an aviation background assure oversight of an endeavor he or she is not qualified to judge?

How to Avoid Failure

The crash of Gulfstream GIV N121JM at Hanscom Field (KBED), Bedford,



NAI COLIN NASON

Massachusetts, on May 31, 2014, provided the industry with a wakeup call. The crew managed to get themselves into takeoff position without having verbalized a single checklist, ending up with the flight controls locked and the engines at less than full thrust. They then attempted to unlock their flight controls — which would have been impossible at the speed attempted — rather than abort. They ended up in a fiery crash, killing themselves and everyone aboard. And yet the crew was trained at the premier GIV training center and had received glowing comments in two safety management system (SMS) audits.

As NTSB member (and now Chairman) Robert L. Sumwalt observed: “Although the crewmembers may have become complacent, I have to believe the owners of this airplane expected the pilots to always operate in conformity with — or exceed — their training, aircraft manufacturer requirements and industry best practices. Yet, as evidence showed in this investigation, once seated in their cockpit, these crewmembers operated in a manner that was far, far from acceptable.”

In this case, the owner of the aircraft died at the hands of these complacent pilots. It appears he died thinking he had the best two pilots up front; the training and audits he paid for told him just that. There can be no doubt that these pilots failed to behave in the professional manner that was expected of them. But I also think we as an industry failed these pilots. In the words of Capt. Vanderburgh, “I am so sorry. I did not mean to make you like this.”

I think there is something we can do about this and I take as an example a former colleague of mine who was fired from his position as chief pilot for a startup company in Silicon Valley. Our flight department was stunned when he was hired away from us, as this particular pilot was sloppy in procedure and technique. One day he was our worst pilot, the next he was leading a new flight department carrying around a CEO we all recognized from the daily financial news. This particular CEO must have sensed something, because he invited a pilot from another company to ride along in the jump seat.

Our former colleague was in his usual form, ignoring checklists and over-speeding flaps. The report was not flattering, and our former colleague was given a small severance and asked to leave.

If it sounds like I am advocating our CEOs and owners to start suspecting those they have entrusted with their lives, I am not. I am saying that we pilots should keep an eye on each other and invite critique as often as we can get it. I like to call this a “peer review.”

In practice it goes like this: You invite someone from outside your flight department to join you on an operational trip. You ask them to ride along and observe. After the flight is over, you earnestly ask, “How did we do and how can we do better?” If you choose your peer carefully and if you are operating outside of industry best practices, the critique should provide a wakeup call. When you reciprocate, you have the responsibility of providing honest critique of your own. And if you notice your peer has the potential of ending up in an NTSB report, you will have more work to do.

Of course, inviting a jump seat pilot on a trip with your passengers will require a permission step you might be reluctant to take. But the peer review can be seen as the highest level of professionalism and can go a long way to reassure those in back that the two up front are worthy of trust. There are a few things to do first. Your company probably has a non-disclosure agreement (NDA) for your peer to sign. You might also want to consider a hold harmless agreement (HHA). Finally, a “Peer Review Observation Form” (see the accompanying sidebar) can be useful to guide your peer’s observations.

If you are a crewmember in a flight department, I encourage you to come up with your own peer review program. If you are the company officer responsible for the flight department, I encourage you to explore the idea; it is cheap insurance.

Chairman Sumwalt concluded his remarks about the Bedford GIV with, “You can fool the auditors, but never fool yourself.” I contend it is awfully hard to fool a peer who does the same thing you do for a living. **BCA**

PEER REVIEW OBSERVATION

Name: _____
 Base: _____ Date: _____
 License Checked: _____ Medical Date: _____
 Crew Position Leg 1/2: _____ / _____

Trip Cities: _____
 A/C Type & Reg: _____
 E = Exceeds Standards
 S = Meets Standards

Flight Preparation	E/S	Remarks
---------------------------	------------	----------------

- | | | |
|-------------------------|-------|-------|
| 1. Flight planning | _____ | _____ |
| 2. Cockpit publications | _____ | _____ |
| a. FOM, MEL, Safety | _____ | _____ |
| b. Checklist | _____ | _____ |
| 3. Crew briefing | _____ | _____ |

Conduct of Flight(s)	E/S	Remarks
-----------------------------	------------	----------------

- | | | |
|----------------------------|-------|-------|
| 4. Clearances | _____ | _____ |
| 5. Takeoff briefing | _____ | _____ |
| 6. Lookout doctrine | _____ | _____ |
| 7. Radio procedures | _____ | _____ |
| 8. Altitude callouts | _____ | _____ |
| 9. Checklist procedures | _____ | _____ |
| 10. Approach briefing | _____ | _____ |
| 11. Stabilized approaches | _____ | _____ |
| 12. Post-flight activities | _____ | _____ |

Human Factors	E/S	Remarks
----------------------	------------	----------------

- | | | |
|-----------------------------|-------|-------|
| 13. Crew communications | _____ | _____ |
| 14. Automated cockpit/FMS | _____ | _____ |
| 15. Decision making | _____ | _____ |
| 16. Flight management (PIC) | _____ | _____ |
| 17. Crew duties (SIC) | _____ | _____ |
| 18. Crew coordination | _____ | _____ |
| 19. Synergy/crew concept | _____ | _____ |

Overall Remarks: _____

Review Pilot: _____
 (Signature): _____

Observed Pilot: _____
 (Signature): _____

SOURCE: BCA



Tackling Turbulence

Simply put, **seat belts are still key**

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

ILDAR IMASHEV/ISTOCK

Rows of ambulances were lining up at the jetway at New York's JFK International Airport (KJFK) when a Turkish Airlines Boeing 777 pulled into the gate on March 9, 2019, all there to whisk 30 injured occupants to nearby hospitals. Afterward, passengers recounted and videos confirmed bodies being tossed into the overheads and blood everywhere. Some vowed never to fly again.

Unfortunately, what happened on Turkish Flight 001 is hardly without precedent. And injuries from inflight turbulence will happen again.

According to NTSB Senior Meteorologist Donald Eick, turbulence has caused more serious injuries to passengers than any other class of accident. Between 2000 and 2011, 71% of air carrier weather-related accidents were due in part to turbulence. On average, FAR Part 121 carriers experience 27 "significant turbulence" events annually, resulting in 14 serious and 69 minor injuries.

These short-lived but violent encounters can even be fatal.

Pacific Nightmare

On Dec. 28, 1997, a United Airlines Boeing 747 cruising at a cloud-free FL 310 en route from Tokyo to Honolulu encountered clear air turbulence (CAT) so severe that one seat-beltless woman was thrown upward and smashed into

the ceiling so forcefully, she was killed. Another 18 passengers received serious injuries and 171 suffered minor injuries.

The official accident report reveals the flight crew had tried to make the best decisions possible with the information available but also illuminates the difficulty in doing so when in oceanic airspace. According to the captain, a veteran of 30-40 Pacific crossings, because of his concern about turbulence, he chose an oceanic track that had no SIGMETs near it. Further, he briefed the purser of the possibility of turbulence approximately 2 hr. after takeoff.

During the en route climb the captain made a PA announcement including a request that each passenger keep his or her seat belt fastened when seated. However, most of the passengers spoke only Japanese and a bilingual flight attendant did not fully translate into Japanese one of the captain's instructions to fasten seat belts, although such an announcement was made and translated several times prior to the CAT encounter.

One hour, 40 min. into the flight the airplane encountered what the captain described as "wave action" and he turned the seat belt sign on as a precaution. PA announcements were made in English and Japanese. The captain radioed a Northwest flight up ahead requesting its experience and was told the ride was smooth with occasional light

turbulence. No more than 2 min. later, the United aircraft was in turbulence. Seconds later there was another episode, at which point the captain instructed the flight attendants to sit down. He ordered the first officer to reduce speed and the aircraft slowed to 330-340 KIAS. At the time of the encounters the total air temperature read approximately -40C to -44C. There was no rapid change in wind direction or speed before or after the encounter.

After the flight crew dealt with several warning lights, the captain asked the second officer to check on the condition of the cabin crew and passengers. After he returned to the cockpit with a preliminary report, the captain went back to observe the damage and injuries himself.

The nearest suitable landing airport was Midway Island, which the captain considered appropriate if there were structural damage to the aircraft, but he favored Narita for medical treatment for the injured. In addition, a medical doctor who was a passenger suggested getting medical aid as soon as possible. After assessing the aircraft's airworthiness and collecting information on the injuries — a process that took about 20 min. — the captain used his emergency authority to turn off course and climb 500 ft. Upon request, Tokyo ATC quickly granted a clearance back to Narita and emergency services met the aircraft when it landed.

The NTSB has issued abundant recommendations for countering exposure to inflight turbulence. We all need to put them to practice.

The upper air data at the time of the turbulence encounter showed westerly winds at 105 kt. at 30,000 ft. and 125 kt. at 34,000 ft. Significant horizontal wind shears were evident in the area. The flight data recorder indicated that while the aircraft was cruising at FL 310, it experienced a +1.814 vertical acceleration, followed 6 sec. later by a -0.824 one. The aircraft rolled 18 deg. right-wing down and recovered to wings level shortly thereafter. Altitude excursions were nominal.

The NTSB determined the probable cause of the accident to be the PIC's inadvertent flight into adverse weather conditions, and the difficulty of obtaining adequate weather forecasts of over-ocean turbulence. It is significant to note that none of the passengers who sustained serious injuries were wearing their seat belts at the time.

Mitigating Turbulence

Load factor variations generated by turbulence are not necessarily the same throughout an aircraft. According to the Airbus document "Managing Severe Turbulence," the vertical longitudinal motions are concentrated within a few seconds and injuries generally occur to non-buckled passengers and cabin crew when the vertical load factor decreases under 0 G before increasing again. Turbulence has a great impact on those in the aft cabin, which is where nearly eight out of 10 injuries have occurred, according to the training video "Turbulence Education and Training Aid."

Most injuries result when non-buckled passengers or cabin crewmembers are tossed during turbulence. Advisory Circular 120-88A, "Preventing Injuries Caused by Turbulence," dated Jan. 19, 2006, strongly suggests that during a turbulence encounter passengers and cabin crew be sitting with seat belts fastened. From 1980-2003, only four belted people received serious injuries during turbulence. Yet despite the mandatory before-takeoff briefings about seat belt usage, too many passengers release their buckle at cruise.

During turbulence any loose object can become a projectile. Soda cans can fly across a cabin with enough energy to cause severe harm. Food service carts not attached to the floor can crush the unlucky. Coffee pots can scald. Flimsy

Turbulence and Flight Attendants

According to Sara Nelson, president of the Association of Flight Attendants-CWA, turbulence "is one of the highest causes of serious on-the-job injury to flight attendants." She goes on to note that "the forces created in sudden clear-air turbulence can throw bodies and unsecure items forcefully through the cabin much like the impact of a high-speed collision" and just as deadly.

According to the Bureau of Labor Statistics (BLS), flight attendants have a higher injury rate than police officers. Harvard's School of Public Health conducted one of the most comprehensive studies on flight attendant safety in 2007. It discovered that 47% of all participants had been injured in the previous year. Musculoskeletal injuries accounted for one-third of reported injuries.

BLS data from 2006-2010 showed that flight attendants had an injury rate six times higher than the average for all private industries. The Turbulence Joint Safety Analysis Team found that a flight attendant's risk of serious injury is 26 times greater than that of their passengers. Furthermore, the team determined that for every report of a serious turbulence-related injury to a flight attendant, 70 minor injuries occurred. Cabin crewmembers often suffer serious injuries because they are standing or walking in the cabin when turbulence strikes.

On Dec. 6, 2017, a Spirit Airlines Airbus A321 encountered turbulence during approach to Fort Lauderdale-Hollywood, Florida, International Airport (KFLL), seriously injuring a flight attendant. There had been no reports of turbulence in the area, and the five flight attendants were conducting their final cabin checks when all were thrown to the floor; one who had sustained an ankle injury remained there for the rest of the flight. After landing, all five were taken to a hospital where one was diagnosed with a fracture.

On May 2, 2017, a JetBlue Airbus A320 departed Boston Logan Airport (KBOS) for New York's JFK International (KJFK). One flight attendant stated that because the ride was "slightly bumpy," she remained seated for an additional 5 to 10 min. after the cabin received the double chime indicating that the flight had passed 10,000 ft. Once it seemed to have smoothed out, she stood up and began to prepare for cabin service. Shortly after her standing, however, the airplane shook violently, tossing her off her feet, and she landed on her right ankle, ending up on the galley floor. She sat in a passenger seat for the rest of the flight with her foot elevated and ice applied. The flight was met by emergency medical personnel and the flight attendant was transported to a hospital where she was diagnosed with a broken ankle.

Knowing that turbulence is ahead does not necessarily mean a pilot can avoid it. However, the information would alert passengers and flight attendants to fasten their seat belts. Flight attendants should rightly expect pilots to give timely briefings about turbulence, including the estimated time until reaching the turbulence area, the estimated intensity and duration, and necessary actions before and after entering turbulence conditions. **BCA**

latches on overhead bins can fail, thereby launching loose luggage as blunt missiles.

Unfortunately, unrestrained infants are especially prone to being ripped free from a parent's protective arms by turbulence. A United Boeing 737 en route from Denver to Billings, Montana, on Feb. 17, 2014, encountered severe turbulence at FL 340. An infant was flung from its mother's arms but fortunately landed in an adjacent seat. Unfortunately, three of the flight attendants aboard were injured, one with a severe head wound. The flight crew declared an emergency and upon landing those injured were rushed to the hospital.

Quite correctly, the FAA urges passengers to use an approved child-safety seat when flying with children under two years of age.

Avoiding Turbulence

Again citing Airbus' "Managing Severe Turbulence," weather information available before takeoff and weather briefings have to be as complete as possible, and depending on context, this information has to be updated in flight as often as possible. In some severe turbulence events, post-flight investigations revealed that an appropriate update of weather information in flight would have very likely allowed its avoidance.

Up until recently the only routine observations of turbulence have been those provided verbally as pilot reports (PIREPs) in the U.S. and as air reports (AIREPs) internationally. Unfortunately, PIREPs can err substantially in the activity's reported intensity, position and time.

Transcontinental flights have the benefit of reports from heavily traveled air lanes. By contrast, flights over some oceanic regions are notoriously "data sparse."

And even though formal definitions of the severity categories are provided in terms of normal accelerations or airspeed fluctuations, in practice the measures are subjective and aircraft dependent, meaning that a heavily loaded Boeing 727 with its highly swept wing will experience less aircraft disturbance than a lightly loaded straight-wing King Air. Pilot observations are therefore often unreliable for providing consistent information about atmospheric turbulence levels.

Airborne weather radar does not assure protection from turbulence. An Airbus review of previous turbulence encounters revealed that some flight crews lacked a full appreciation of the intensity and extent of the weather in their vicinity. As a result, they failed to deviate soon or far enough to avoid the weather.

As is well known, airborne weather radar detects precipitation but not wind, ice, fog or CAT. When properly utilized, the equipment can be quite efficient in the detection and avoidance of convective clouds laden with droplets. It is only helpful for the avoidance of turbulence associated with detectable precipitation — in other words, associated with convective storms. And to do so, it must be properly tuned (tilt, weather mode and range control) to present an optimum weather radar picture. Also, the flight crew must perform regular vertical scans and interpret the screen display correctly. For example, a tilt setting in cruise too

close to the horizon will only scan in a high range of altitude where precipitation particles are in ice form and poorly reflect radar signals.

Satellites can be used to predict the turbulence associated with convection, and the new generation of satellites (GOES-16) with higher spatial and temporal resolutions have the potential to improve turbulence avoidance by helping identify deep convection and detecting gravity waves.

Analysis by Airbus found that a large part of turbulence events come from aircraft incursions into cumulonimbus that were either not localized by the crew or not avoided with sufficient margin.

Furthermore, turbulence associated with cumulonimbus is not only contained within the cloud. And since current weather radars cannot detect dry turbulence, it is essential to take adequate precautionary measures, and to do so especially in the "clear air" above a thunderstorm.

Cabin Preparation

Aircraft cabins are not designed to provide readily available restraints in case of turbulence. For example, the lav and galley often lack safety features such as hand holds for support when passengers or crew are unrestrained during unexpected encounters.

Accordingly, it's good practice to keep the cabin as ready as possible for turbulence and to periodically check that passengers are wearing seat belts, that bins are latched, and carts and other loose items stowed.

Summary

The costs to operators that result from turbulence encounters can be substantial and involve medical attention, liability suits, lengthy absences of injured cabin crewmembers, higher insurance premiums and workers compensation, along with repairs to the aircraft and the loss of aircraft availability due to inspections. Moreover, any inflight injury to passengers or crew may require a flight divert and emergency landing, which can be a costly necessity when operating in remote or oceanic airspace.

The NTSB has issued abundant recommendations for countering exposure to inflight turbulence. We all need to put them to practice.

And people in back, please keep those seat belts buckled. They're there to keep you pain free. **BCA**

Will LIDAR Help?

Light detection and ranging (LIDAR) is able to sense clear-air turbulence (CAT). According to the National Oceanic and Atmospheric Administration, it uses light in the form of a pulsed laser to measure variable distances.

The technology projects a laser ahead of the aircraft and an optical sensor detects scattered laser light reflected back by aerosol microparticles suspended in the atmosphere. This differs from conventional radar, which is dependent on the reflected radar signal energy from precipitation particles.

LIDAR technology could warn pilots of turbulence ahead, thus allowing timely decisions to avoid the area and warn passengers and cabin crew. Recent airborne tests have illustrated the system's ability to detect the air density fluctuations associated with light-to-moderate CAT at 5 km or moderate CAT at 10 km.

Unfortunately, LIDAR technology currently costs more to install than its predicted savings. So, this type of sensor is currently primarily used for atmospheric research. But work is underway to make the technology cost-effective soon and available for broader application. **BCA**

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conditions, long-term corticosteroid use or severe obesity, especially if accompanied by liver or kidney disease, are more at risk. Chinese scientists also hypothesize that their statistics are skewed because the vast majority of people who contract COVID-19 quickly recover and never report their symptoms to medical authorities. At this point, the testing is inadequate to determine the true rate of infection.

SARS-CoV-2 is spreading far faster than previous coronaviruses, such as the 2002 SARS-CoV-1, especially as the world population has grown more than 20% since 2002 and there is much more affordable access to international air travel. The rate at which the infection spreads from one person to others, known as R_0 (R naught) or R -factor, is between two to three, perhaps higher because of the unique characteristics of this form of coronavirus compared to other strains. One person infects three, three infect nine, nine infect 27, 27 infect 81. In contrast, common flu bugs have R_0 factors of about 1.0 to 1.3.

Moreover, “silent transmission” of the virus can occur during the period after a person becomes infected but before experiencing COVID-19 symptoms. This phenomena became apparent on the cruise ship *Diamond Princess* in February when more than 600 people aboard tested positive but fewer than half showed symptoms. All those infected potentially were contagious.

SARS-CoV-2 spread from China to other regions in early 2020, recently including the U.S. The first case in the U.S. was confirmed in January. It slowly ramped up to eight in early February, then 42 in early March. But then in mid-March, COVID-19 began to spike exponentially in the U.S. By late March, more than 112,000 cases had been confirmed, almost half of which were in New York City. The Big Apple is becoming America’s Wuhan Virus Central, with New Orleans emerging as another center.

As with COVID-19 outbreaks in China,

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

Scientists named it SARS-CoV-2, short for Severe Acute Respiratory Syndrome caused by a second-generation coronavirus. It’s the seventh strain of betacoronavirus that has infected humans and it spreads up to 10 times as fast as the original 2002 SARS-CoV bug. Other coronaviruses include Middle East Respiratory Syndrome (MERS) and four milder viruses that cause common colds.

First discovered in the 1960s, these germs get their names from the crown-like spikes on their surfaces. SARS-CoV-2 began as a mutant form of betacoronavirus that originated in bats, perhaps ones that were slaughtered in so-called “wet markets” in Wuhan or Guangdong. Transferring and mutating between species of different wild animals in very close proximity inside the markets, this novel virus finally morphed

into a zoonotic form that infected people.

Because this is a novel virus, humans have no natural immunity to it. Even so, 80+% of the people who come down with COVID-19 (coronavirus disease discovered in 2019), the illness caused by SARS-CoV-2, experience mild to moderate symptoms, including fever; dry cough and shortness of breath.

The other 20% can become seriously or fatally ill. Pneumonia is a major cause. Doctors at China’s Centers for Disease Control determined that people over the age of 65 are particularly at risk from COVID-19, especially if they have pre-existing medical conditions, such as diabetes, lung disease or hypertension. The U.S. Centers for Disease Control and Prevention also warns that people undergoing cancer treatment and with compromised immune systems, or those with heart

Iran and Italy, the rapid spread of COVID-19 in the U.S. threatens to overwhelm health care facilities. The University of Washington's Institute for Health Metrics and Evaluation (IHME) projected the U.S. epidemic to peak in mid-April 2020 with more than 460,000 cases. Between now and early August, the IHME estimates that more than 81,000 people will die of the disease, with 79,000+ by June 1.

At present, there is no vaccine, no cure, no medicines proven to fight the virus. Limited clinical trials using protease inhibitors, such as lopinavir and ritonavir, and/or chloroquine or hydroxychloroquine approved to fight malaria, have yielded mixed results, anecdotally positive in some cases. Health officials say we're months away from getting a SARS-CoV-2 antiviral vaccine approved.

So, it's critical to flatten the exponential expansion of the disease, drag it down into a months-long, gradual rise and fall of those infected in order to buy time to beat the bug and avoid overwhelming hospitals and healthcare providers. It's back to basics, just as it was with the bubonic plague in the 14th century: Social distancing, self-quarantining, strict personal hygiene, shelter in place. Do it long enough and wait out the disease. But the months-long pause could result in devastating economic consequences the likes of which no one has experienced.

Here's what some aviation organizations are doing to combat SARS-CoV-2 while maintaining essential services.

NBAA's Resource Center

The NBAA provides a broad range of resources and references to help members protect against the spread of coronavirus. Information from the NBAA is available on U.S. ports of entry for international flights, restrictions on arrivals from specific countries, updates on ATC facilities closures due to virus contamination and individual state shelter-in-place orders. There are links to the FAA's SAFO 20003 (Safety Alert for Operators) on COVID-19 as well as the CDC website.

Elevated body temperature often is the first sign of COVID-19. SAFO 20003 emphasizes self-quarantining for anyone who has a fever of 100.4F (38C) or higher, staying away from crowds, avoiding public transportation and maintaining a distance of 6+ ft. between people. It recommends only using ground transportation arranged by one's employer, staying inside hotel rooms as much as possible and using room service or food delivery services rather than eating in restaurants. Other precautions include frequent 20-sec. soap-and-water hand washing, use of 60% minimum alcohol hand sanitizers and avoiding touching one's face. The FAA also recommends choosing lodging facilities close to airports and checking ahead to determine how well they're cleaned and sanitized.

The advisory also suggests finding contact information for local health departments, taking one's temperature twice daily, and checking for cough and shortness of breath — all early warning signs of the onset of COVID-19. And, of course, steer clear of sick people, being mindful of the fact that in the early stages of COVID-19, the symptoms can mimic the common cold or seasonal flu.

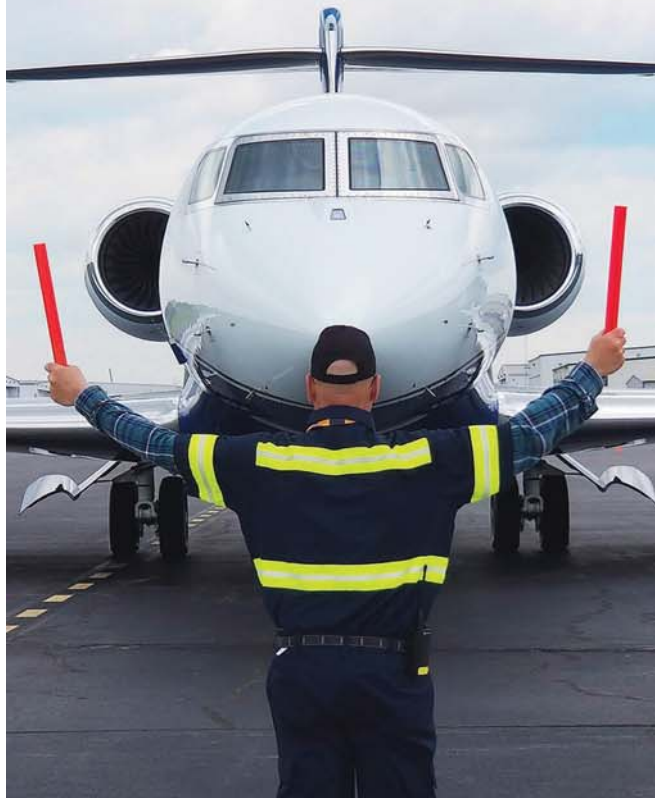
The SARS-CoV-2 virus can remain active on hard surfaces for 72 hr. or more, cardboard for 24 hr. and aerosols (cough and sneeze droplets) for 3 hr. or more, according to a study in the New England Journal of Medicine. The NBAA provides an "Aircraft Disinfection and Cleaning Procedures" guide that recommends cleaners don personal protective equipment (PPE) for enhanced cleaning of aircraft on which people with



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COVID-19-like symptoms have traveled. It details sanitizing procedures and products that are effective. The association also provides links to aircraft manufacturers' documents, including Bombardier, Dassault, Embraer, Gulfstream and Textron, that suggest recommended sanitizing products least likely to damage interior furnishings.

It's critical to assume that PPE, including gloves, is contaminated after cleaning and sanitizing processes are complete and thus after use must be put into bio-safe containers for disposal or transport to cleaning facilities. Cleaning staff are advised to take warm, soapy showers and dress in clean clothes before coming into contact with other people, offices or homes. Clothes hampers need to be cleaned and disinfected after contaminated PPE has been removed for cleaning.

The CDC provides comprehensive instructions for how to clean surfaces to remove grime, germs and impurities and then how to disinfect with chemicals to kill germs. It lists 350+ EPA-approved disinfectants, along with

well-proven diluted solutions of household chlorine bleach or 70% alcohol. The University of Virginia also recommends certain glutaraldehyde, phenolic and iodine compounds.

As coronavirus remains active on surfaces, the CDC recommends cleaning and sanitizing anything that people might touch in homes and offices, including landline and mobile phones, door and cabinet knobs, light switches, bathroom fixtures, soap dispensers and faucets, tables, desks and work surfaces, and staircase handrails. Computer screens, keyboards and cursor control devices must not be overlooked as germ sources.

Oddly, neither the NBAA nor the CDC discuss using face masks. We've witnessed new ab initio pilots arriving from mainland China on international airline flights, destined to undergo pilot training in the U.S. These days, they all wear masks and observe strict personal hygiene protocols. They'll wave, but they don't shake hands or make personal contact. Six months ago, we saw them smile and shake hands. When asked about these disciplines, they say it's not just

about avoiding catching the disease, but also about preventing its spread from themselves to others, should they be infected but have yet to show symptoms.

Risk Management Protocols

Matt Hagans, CEO of Eagle Creek Aviation, the Indianapolis-based family of aircraft charter, management, sales, maintenance and FBO companies, takes heed of NBAA, World Health Organization and CDC guidelines and directives, as well as best practices recommended by aviation industry specialists. In addition to daily cleaning of facilities, he also has all surfaces that people might touch cleaned and disinfected at least three times throughout the work day.

Pilots and staff are adhering to social distancing, handwashing and covering their coughs. At the first sign of cold, flu or COVID-19 symptoms, employees are sent home for quarantine, assured their jobs are secure when they've recovered and are able to return to work.

Charter and managed aircraft are cleaned and disinfected after each flight,

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using products recommended by aircraft manufacturers and/or “hospital grade,” EPA-approved chemicals. Hagans considers these protocols to be a personal responsibility, as some of his clients are elderly, have pre-existing medical conditions or are undergoing cancer treatment that compromises their immune systems.

Aircraft inducted for maintenance are cleaned and disinfected using the same procedures as charter and managed aircraft to assure they’re germ-free when delivered to customers.

Another large, midwestern operator that wishes to remain anonymous explains that it’s considered to be an “essential business” in accordance with its state health department’s stay-at-home order intended to curb the spread of the virus.

“Essential also means we have to be extra vigilant, super proactive. An epidemic could shut us down,” says a company official. Nonessential staff members have been sent home. The company is using videoconferencing in place of face-to-face meetings whenever possible.

He added, “We’ve halted all domestic travel, except for emergencies. International travel must be pre-approved. We’ve recalled most of our international people. Those returning from China or Italy are self-quarantined for 14 days.”

But the MRO business unit still has to provide essential AOG maintenance issues, so it’s keeping its technicians at work and taking steps to prevent the spread of COVID-19 among the staff. It’s splitting shifts to reduce the number of employees on site at any one time. It’s staggering work breaks and using multiple break rooms to reduce the number of people who congregate.

Furthermore, it’s locking down most entry doors and restricting access through only a select few points. Employees entering the premises are screened for body temperature. Fever frequently is the first symptom of a COVID-19 infection. “This is everybody, every day,” says the official.

Anybody who exhibits mild cold or flu symptoms immediately is sent home for at least three days. If the employee is asymptomatic after 72 hr, he or she can return to work. However, if symptoms persist or worsen after three days, the firm requires employees to self-quarantine for a total of 14 days.

The company has designated monitors who enforce its rules. It also strongly encourages staff members to observe social distancing and shelter-in-place protocols when off work.

Still, some people are minimizing the risks of spreading the disease, sloughing off the guidelines, meeting their friends and partying after work, says the official. Many openly talk about their social gatherings and post pictures of events on social media.

“They can do as they please after work. But they may find we won’t let them return to work here,” he added. “This is all about risk management.”

Interiors of aircraft inducted for maintenance are considered contaminated. Mechanics first work on the outside of the aircraft. If access to the flight deck or cabin is required for maintenance, staff members in PPE carefully disinfect those areas to be occupied by mechanics. Access to the inside of aircraft is limited to only those areas where maintenance functions will be performed.

Cleveland-based Constant Aviation announced that it is treating the entire 160+ Flexjet fleet with MicroShield 360, an antimicrobial coating that is electrostatically applied after first cleaning and disinfecting aircraft interiors.

The firm “has been evaluating a number of products over the past year and MicroShield’s solution and electrostatic application process offers an incomparable aviation solution,” said Constant CEO David Davies. “Since becoming the only MRO certified to apply MicroShield to aircraft, we have applied the product to more than 40 aircraft via our MRO facilities and we are nearly finished applying MicroShield to the entire Flexjet fleet.”

It costs about \$3,000 to apply MicroShield 360 to large-cabin aircraft, but according to Constant it is effective in killing 99.99% of bacteria, along with reducing “viruses, mold, algae, yeast, mildew, fungi and odors.” The EPA-approved product is clear, colorless and odorless, proven safe and hypo-allergenic for humans and pets, say company officials.

Post-COVID-19 Protocols

The SARS-CoV-2 pandemic serves as a wake-up call for the aviation community, a warning that even more virulent and contagious zoonotic diseases may emerge from bats and other animals. The world population is projected to grow to 8.5 billion by 2030, 9.7 billion by 2050 and 10.9 billion by the end of the century, according to the United Nations. Ready access to international airline travel, coupled to forecast population growth, potentially will increase the spread of disease exponentially.

Thus, the business aircraft community cannot relax from strict cleaning and disinfecting procedures, along with comprehensive personal hygiene protocols, after the COVID-19 pandemic has passed. People must assume their hands are contaminated after opening doors, holding handrails, handling packages, touching tools, manipulating cockpit controls, hoisting luggage, using a handkerchief or even shaking hands. Handwashing and hand sanitizing will be even more critical before touching food or face.

Aircraft should be cleaned and disinfected often. Flight decks are known to be germ-laden, so they too should get special attention. One airline pilot tells BCA that he assumes everything up front is contaminated. He won’t touch a crew meal without using hand sanitizer.

New technologies are emerging to disinfect facilities and aircraft. One firm, for instance, is developing a mobile ultraviolet germicidal irradiation (UVGI) system that uses short-wave (UV C) light to neutralize or kill germs by destroying RNA and DNA. Such systems already are in use by more than 300 hospitals. Using a similar system adapted for aviation use, technicians could sweep through an entire large-cabin business aircraft interior in 10 min.

Regardless of promising new technologies, personal and corporate responsibility remains key to preventing the spread of disease. Those with cold or flu symptoms, such as coughing and sneezing, will quite likely feel peer pressure to wear face masks if coming into contact with others. People will feel increasing pressure to self-quarantine at the first sign of illness. No longer will it be acceptable, much less encouraged, to come to work with a cold or the flu. Employers will feel compelled to authorize sick leave to ensure employees don’t return to work until they’re healthy. Working at home and videoconferencing will likely become more commonplace to promote social distancing.

As noted, disease prevention is all about risk management. As always, business aircraft operators need to identify, rate and mitigate risks, including this new one, while continuing to provide travel services. COVID-19 was a surprise attack that is causing severe health and economic consequences.

Prompt, decisive, prophylactic action can help flatten future pandemic mountains into molehills. But only if we heed the hard lessons we’re learning from the 2020 global health crisis. **BCA**

Ensuring Corporate Relevance

A flight department must contribute as a full member of a larger team, or else

BY **MARK H. Goodrich** mark@markgoodrich.com

In the early 1960s, business and corporate aviation was getting its first real foothold as more owner-flown single-engine and light-twin models were giving way to professionally flown cabin-twins, turboprops and early turbojets. Light and medium twins had been staples in the hangars of even the country's largest companies, except for a few that opted for surplus military airplanes, some of which were World War II bombers and transports outfitted with executive interiors. Those corporate DC-3s and Lodestars were then disappearing from the ramps, and industry publications were replete with advertising and news releases touting new aircraft models, such as the King Air, Sabreliner and JetStar. Learjets were several years away, and Citations would not be seen for another decade. Helicopters were a near exclusive of the military services.

While professional business pilots had been around since the 1920s, through the 1950s they tended to be former wartime squadron mates of a company executive.

Long-time readers of *BCA* well remember the musings of J. Sheldon "Torch" Lewis in his *Greenhouse Patter* column, in which the lives and times of he and his fellow early corporate pilots were recounted in entertaining detail. Always printed on the final pages of each issue, most readers turned to his column first. Those who don't remember Torch's columns will be well served by looking them up and revisiting (borrowing a phrase from the "Lone Ranger" TV program) "those thrilling days of yesteryear."

It was during the 1960s and 1970s that corporate aviation really came into its own. By then it was peopled with professional pilots whose skills matched those flying for the scheduled airlines but who transported the movers and shakers of the expanding corporatocracy on missions of capitalism, in their own aircraft and on their own schedules. Airplanes, systems and avionics were becoming more sophisticated; airspace more complicated and more regulated. Due to the mergers and acquisitions that were a forecast of the future, businesses were

becoming larger, with subsidiary operations increasingly spread across the U.S. and beyond. The ability to fly farther, faster and in most weather conditions became more important, and business aviation was compelled to support those requirements with aircraft and aircrew able to meet those new realities.

As that new era unfolded, many corporate pilots were not even instrument rated, or for those who had been originally trained during the war, at least not instrument current. But the next decade saw a sea change as ratings and proficiency expanded to meet the increasing sophistication and capabilities of the business aviation fleet. To those then flying, it seemed as though the changes were monumental, but over the next several decades, they were to see technologies advance at an exponential rate.

As ol' Torch might have said after a morning of EFB, NEF, FMS, PDC, EDCT, SID, LNAV, VNAV, RVSM, TCAS, STAR, GPS, ILS PRM and ASA, "You know, Hersch, the days are clearly over when we could just fire up the old girl on 30

Resist any impulse to jump the chain of command by bringing problems directly to senior managers riding as passengers.

minutes' notice, fly over to Chicago and land." He might even have mused about whether, given the rate that aviation was depleting the world's supply of acronyms, there would be any left for use by our grandchildren.

The role of the pilot within the corporate organization has also changed. In the early days, it was usually just one pilot and an executive or two on board. Suddenly, even companies with piston or turboprop aircraft were using two pilots for the enhanced safety, improved efficiency and lower insurance rates that resulted. As the size of the corporate organization grew, its aviation operation also expanded commensurately and in many ways becoming a small airline not limited to just flight operations, but including dispatch, maintenance and line functions. The average flight department was no longer a one-man band, foretelling the trend that continues to this day.

One result of this evolution is that all members of a modern flight department must appreciate their roles within it and the broader organization. Flight department managers are responsible for the establishment of standards, training, oversight, enforcement and supporting documentation to ensure the department operates well and as an integrated part of the overall corporate structure. Individual pilots and mechanics have not only departmental duties and responsibilities, but also those as corporation employees and representatives.

In some cases, that requires the political skill to stand one's ground where an ultimate decision about safety is at issue, while presenting it to senior management in a way that makes clear no affront to their managerial authority is intended. The modern flight department must retain the authority to make safety decisions, but will be expected to justify those decisions, as are other departments in their respective areas of expertise. Most modern flight departments effectively use the policies and procedures documentation of the company — usually developed and managed by the human resources (HR) department — to define their departmental authority, and the reasons for and limitations to that authority.

There is no "one size fits all" set of criteria for how a flight department should work within its particular corporate environment, but the following are offered

as a primer regarding some of the things that you might consider with respect to your flight department.

Keep your position within the company in perspective. A level of professional intimacy is inherent because of the frequent personal interaction between senior executives and flight crew personnel, but it does not imply personal friendships. You can and should be cordial, but do not lose sight of your position with the company, and maintain the professional distance that accords senior managers the respect to which their positions entitle them.

Respect your chain of reporting. Resist any impulse to jump the chain of command by bringing problems directly to senior managers riding as passengers. It is easy to rationalize that their proximity gives you direct access around your official chain of reporting. Even if asked by an executive to provide some sort of information, it is important to report that request and bring the manager to whom you report into the loop, asking how he or she would prefer to see the matter handled. Breaching corporate protocol can be the start of a very turbulent flight.

Work to establish relationships with other departments. Always working with and through your reporting point within the organization, seek meetings with executive managers who will most often use aviation services, usually including the CEO and COO. Your questions will include how the flight department can best assist the other company functions, and the implicit message is that you understand the only reason for the existence of the flight department is to support the organization.

Make clear that you want the flight department to serve the interests of the company as seen by the executive management. Do not overlook that, whether its business is in service or manufacturing, the fundamental purpose of the company is to make money. Senior managers will evaluate your department through that prism, and you must make clear that efficiency — defined as effectiveness over expense and tempered by requirements to operate safely — is also your focus.

Flight department operations will often include activities that also require involvement of the financial, HR, legal and risk management departments. Your efforts to affirmatively reach out to the managers in these areas will demonstrate that you want the flight department to be an efficient contributor to the company's success, and your concern

as to flight department issues that also impact the work of other company departments.

Flight department budgeting is of significant importance to both the department and the company. Meet with the CFO and let him or her know that you want to develop a two-way communication protocol that allows all concerned to have a dependable budget but acknowledging the variables that make the flight department unique. If the CFO understands how unforeseen expenses can occur in the context of Airworthiness Directive compliance requirements, or engine issues, it allows the finance department to structure a reserve fund or other mechanism in advance to cover such contingencies. This approach is far superior to first educating the finance department about such things after the unexpected expense arrives without notice.

Often the flight department will learn through industry trade associations, publications or other information sources about pending legislation that may impact the way in which tax laws affect the ownership and operation of the company aircraft. Such information should be promptly shared with the finance department. Let the CFO know that you would like to work with a team of people from both the flight and finance departments on budget development, and for the purpose of quickly bringing the finance department into the loop if and when circumstances change from those assumed in the budgeting process. For example, world events may indicate that fuel expenses could increase beyond the forecasts originally used for budgeting. Executive management and finance are always concerned about presenting earnings forecasts to the market that are borne out by financial results. Your efforts to help provide data that allows finance to stabilize the sometimes less-than-stable realities of aircraft operation will demonstrate your interest in the company beyond the hangar walls.

A recurring problem across the industry is that flight departments somehow slip through the cracks where HR is concerned. This is most often because the department is located away from the main company premises, coupled with its characteristically lower number of employees. The unique requirements for aviation professionals also present some issues that are different from the normal processes of evaluation and hiring. More than a few flight department managers



Ensure that professionalism and ethics guide your operations.

Even when asked about things that are closer to flight department operations, such as the evaluation of a new or different aircraft type, it is best to not “shoot from the hip.” Rather, note that there are many issues to consider, offer to pull together some preliminary data, and suggest that a team of people from at least the flight, finance and executive management areas should work on the matter. Team with a reputable consultant to be certain that all possible issues are considered.

VAH/FILMS

have been distressed to learn that HR has hired a new crewmember absent any advice from the department itself as to qualifications or experience requirements. Affirmative efforts to educate HR employees in advance will help to ensure that the standards and processes used to locate, interview and hire for the flight department will include input from the department itself.

Federal and state laws, and regulations promulgated under and in support of those laws, apply to the flight department as they do to other departments of the company. Those laws and regulations are diverse, and the specialized knowledge of HR personnel can be critical to operating legally. Everyone has heard about the Occupational Safety and Health Administration (OSHA), and most aviation professionals know there are federal regulations of the Department of Transportation addressing hazardous materials. But few know the extent of those requirements, or the myriad laws and regulations of both federal and state agencies that govern employment practices.

Consequently, manuals must be developed, approved and maintained, including requirements for training, record keeping and the reporting of defined events. Which laws and regulations apply depends upon the state in which you are located, and specific facts, such as whether a fuel farm or maintenance facility is operated to support your aircraft. A working relationship with HR can be the key to avoid becoming an embarrassment to the corporation. In too

many cases, the failure of the flight and HR departments to effectively interact on such issues first comes to light in the context of regulatory violations, appearance in an administrative law court and fines.

Insurance issues are usually within the province of legal or risk management, and it is axiomatic that aircraft operation presents insurance issues different from those of other departments. Flight department audits routinely reveal problems with insurance that range from modest administrative oversights to failures to meet basic conditions of the insurance contracts that could result in a failure of coverage. Too often, such audits occur in the wake of a coverage denial. A general rule is that lawyers and risk managers know little about airplanes, and pilots know little about insurance. It is essential that they work as a team so that the intended coverage is in place, and operations are conducted so as ensure that coverage will apply in the event of a loss.

Do not oversell your areas of expertise. A pilot is often presumed to be an expert in everything aviation, from aircraft evaluation to tax laws and accounting regulations relating to aircraft use. Resist the temptation to give advice beyond your actual areas and levels of expertise. If you are aware that proposed or newly enacted legislation may be relevant, do not stray too far beyond the flight deck in an effort to seem more knowledgeable than you are. It is best to raise the issue along with the suggestion that the legal and finance departments investigate and determine the potential applicability.

You might have a favorite aircraft model or brand, but do not confuse your personal preference with what is best for the company. Be cautious about over-reliance upon any single source of data, even that from a manufacturer. Executives take this type of approach when evaluating the acquisition of a subsidiary or the construction of a new building and will appreciate your similar conservative professionalism.

Ensure that professionalism and ethics guide operations. There have been many changes to corporate flight operations over the past six decades, but safety and efficiency continue to be fundamental for any flight department managed and operated with beacons of professionalism and ethics at its core. Operations must always be conducted in a good faith effort to comply with all laws, regulations and good operating practices. Department personnel must understand that a single failure of professionalism or ethics can result in corporate ramifications far beyond an FAA enforcement proceeding or NTSB accident investigation. A high-speed pass at a remote airport, falsification of documents or attempts to work around charter regulations can have disastrous effects on such seemingly diverse factors as corporate share price or a potential merger.

Evolution exists in business, just as it does in nature, and a flight department that does not evolve to conform to the tenets of the modern business enterprise may find itself extinct — replaced by a “jet card.” **BCA**

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Force Majeure

The power is with the seller

WHEN COVID-19 WAS YOUNG AND NO ONE IMAGINED SHELTER IN place orders would result, lawyers began discussing “force majeure” and how an epidemic in China was not likely to affect domestic contracts in the U.S. Now that the virus has grounded much of aviation around the world, companies are grappling with sales and service contracts that didn’t envision a paralyzed planet.

“Force majeure,” French for “major force,” has gradually replaced “acts of God” as the legal term referencing a party’s inability to perform contracted obligations due to forces beyond their control. However, force majeure is not a constitutional or statutory right, nor a doctrine of case law, either. That means if something happens beyond your control, and you have no contract, then the law does not automatically give you protection for not performing your obligations.

For example, if you ran a charter operation, and you didn’t use contracts or Terms & Conditions (T&Cs) of any kind, but rather relied on verbal agreements, then you would have no automatic force majeure protection. If you failed to fly a charter because the pilots were sick, then you breached the charter agreement. That is why the majority of charter operations attach T&Cs to every quote. The T&Cs may not use the phrase “force majeure,” but they will certainly provide protection to the charter operator for cancellations due to weather, mechanical failures or pilot unavailability. The T&Cs typically provide that the charter operator will return the cost of the charter but won’t be responsible for anything else. Without T&Cs, the charter operator could be responsible to pay the customer for the “consequential damages” caused by the cancellation such as lost time or extra expenses, or even the cost of a lost business contract because the customer didn’t make the meeting.

Force majeure is a negotiated contract term. For instance, if you buy a new aircraft, the manufacturer will likely include the following:

Force Majeure Event. If Seller fails to deliver the Aircraft on the Delivery Date and the failure to timely deliver is the result of a Force Majeure Event which includes, but is not limited to, strikes, lockouts or other labor or industrial disturbances; riots; epidemics; war; governmental actions, inactions or regulations (including, but not limited to, partial government shutdown or Seller’s inability to obtain any governmental certification or airworthiness approval for the Aircraft); fire; weather; delay in supplier deliveries; or other cause beyond Seller’s control, Seller will not be liable to Purchaser for any damages if the Aircraft is

delivered within 180 calendar days after the Delivery Date or the parties agree to a later Delivery Date.

While no manufacturers will agree to delete this provision altogether, they might agree to shorten the period of force majeure delay. For example, instead of 180 days, a manufacturer might agree to 90 days. That means that at the end of 90 days, if the manufacturer has not delivered the aircraft, the parties can cancel the agreement and the manufacturer will refund the customer’s money. But, just like the typical charter operator, the manufacturer will insist on limiting its liability for the consequences of failing to produce the aircraft on schedule. You had to spend twice as much to get the aircraft somewhere

else? That extra cost falls under the concept of “consequential damages” and the contract will protect the manufacturer from having to pay it.

But can a buyer of products and services delay payments to the manufacturer after their business shut down for two months due to “circumstances beyond my control?”

No. For centuries, courts have been presented with force majeure contract cases. There have been many variations over the years, and there are different views among the different jurisdictions, but there are general principles that the courts uniformly follow. The first is that a court won’t “even out” an unbalanced contract. For example, if a manufacturer can delay production for six months in the event of an epidemic, that doesn’t mean that the customer can delay any progress payments.

However, the court would make the manufacturer show that the delay was in fact caused by circumstances beyond its control. The courts are also extremely wary of manufacturers and service providers who want to use force majeure clauses to cancel contracts in order to sell to a higher bidder.

For example, imagine that you had a contract to purchase a new aircraft for \$20 million. A worldwide pandemic shuts down the airlines and many of them go out of business. As the economy wakes up from its enforced slumber, the demand for business jets could spike. The manufacturer would love to cancel your contract and sell the jet to a new buyer for a higher price. Can they get away with that? If the force majeure period was short enough, and either party had the right to terminate the contract, then yes, so long as the production line was in fact stalled by the epidemic for the entire period.

Manufacturers and service providers will see a new aviation world once COVID-19 exits. And the fear of the next epidemic will color negotiations from now on. **BCA**

While no manufacturers will agree to delete this provision altogether, they might agree to shorten the period of force majeure delay.



Hawker Beechcraft Premier 1A

The light-jet orphan is a bargain



FLIGHTSAFETY/TEXTRON AVIATION

SPEED, CABIN ROOM AND PRICE ARE THREE GOOD REASONS TO consider the Premier 1A, if you're in the market for a light jet, says Gavin Woodman, co-founder of Aerocor, a business aircraft brokerage based in Los Angeles. The aircraft cruises as fast as 450 KTAS and it offers a cabin cross-section nearly as large as that of the Citation Excel.

Hawker Beech manufactured 163 units between 2005 and 2011; there are 156 aircraft in operation still and 21 are for sale. With more than 13% on the market, asking prices of \$1.3 million to \$2.1 million are soft, says Woodman.

The second-generation Premier 1A is much improved over the original model produced between 2001 and 2005. Braking feel and response is considerably improved, the lift dump function is manually controlled, the flight deck is upgraded with dual PFDs, standard IFIS and TCAS II. The IFIS supports electronic charts and XM satellite radio weather graphics.

Perennially cash-strapped Hawker Beechcraft was late in offering a WAAS GPS upgrade for Premier 1A., even though it is essential to support ADS-B OUT. Serial number 282 and subsequent aircraft have the upgrade, but it's available for earlier aircraft. The aircraft's TDR-94 transponders also need updating or replacement to meet the ADS-B requirement. LPV approach is offered as another upgrade. Elliott Aviation offers a dual Garmin GTX-3000 Mode S transponder kit with GDL-88 data link and FlightStream 110 that provides both ADS-B IN and OUT functions.

Aircraft typically are fitted with a four-seat center club section, plus two chairs in the aft cabin. The main seating area is 11.2 ft. long, about the same as that of a CJ2. There is forward, right-side refreshment center and a fully enclosed, full-width 2.3 ft.-long aft lavatory. There is a 10-cu.-ft. baggage compartment in the nose and a heated, 40-cu.-ft. baggage compartment in the aft fuselage.

Premier 1A has a completely redesigned interior, offering increased rear seat legroom and more overall headroom. Better acoustical insulation sops up more sound, but the aircraft isn't the quietest in class. The interior has more comfortable cabin chairs than its predecessor, along with higher quality cabinets and more IFE options.

Weight gain has been the bane of Premier 1A. The 212-sq.-ft. wing and 2,300-lb. thrust Williams FJ44-2A engines are undersized for a 12,500-lb. aircraft. Typically, single-pilot BOWs are close to 8,600 lb. Thus, tanks full payload is 320 lb.

Premier 1A aircraft have pleasing handling qualities with the solid feel of a midsize jet, but with the crisper control response of a light jet. It has some midsize aircraft systems, such as a 3,000-psi hydraulic system that powers the spoilers, landing gear actuators and wheel brakes. A rather cumbersome spoiler system check, though, is required before taxi. The aircraft has only one engine fire extinguisher bottle, a semi-automatic pressurization controller, short-travel, straight-leg landing gear and an annunciator light panel rather than a full EICAS.

Airport performance is not best in class. You'll need 3,792 ft. of runway to depart from a sea-level, standard day airport and 6,888 ft. when departing BCA's 5,000-ft. elevation/ISA+20C runway. Even so, the aircraft can fly four passengers 1,100 nm. Operators say they're more comfortable flying 1,000 nm legs.

Loaded to MTOW, the aircraft will climb directly its 41,000-ft. service ceiling even at ISA+10C. But such warm day conditions will knock 20 kt. off of max cruise speed as well as reduce range performance.

Operators love the aircraft's speed, but most say they need as much as one more hour of range. The 400+ nm boost would enable them to fly between the U.S. coasts virtually every day of the year with one fuel stop. It also would enable them to fly non-stop from New England to Florida in the winter.

Pilots say they plan on burning 1,200 to 1,300 lb. the first hour; 820 lb. the second hour and 900 lb. during the final hour of most high-speed cruise missions, assuming standard day conditions. Slowing down to long-range cruise adds up to 11% in travel time, but increases range by less than 100 nm. Budget fuel consumption at 154 gal. per hr., says Woodman.

Maintenance tasks are relatively easy. There are comprehensive line service and lube inspections at 200-hr. intervals, A checks at 600 hr. and B checks at 1,200 hr. There are also some calendar required inspections. Williams' TAP Blue runs close to \$300-\$340 for both engines.

The Citation CJ2 and Nextant 400XT/XTi are the Premier 1A's main competitors. The CJ2 has considerably better airport performance and it can fly four passengers more than 1,500 nm. But it's 30 to 40 kt. slower, has a smaller cabin cross-section and it's up to \$1 million more expensive. Nextant 400XT also has a tighter cabin, albeit with a flat floor. It'll fly 1,800 nm and it has considerably sportier runway performance.

So, if you're looking for a roomy cabin, comparatively high cruise speeds and excellent fuel efficiency, Premier 1A has appeal. Just mind the runway performance and tanks-full loading limitations when planning your trips. **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

► **AAR, Wood Dale**, Illinois, announced that **H. John Gilbertson, Jr.**, retired managing director of Goldman Sachs Group Inc., has been elected to the company's Board of Directors. This increases the size of the Board from 11 to 12 members.

► **British Business Aviation Association (BBGA)**, Dorton, Aylesbury, Bucks, U.K., awarded **Tim Scorer**, long-serving aviation lawyer and currently a consultant at Kennedy's Law Firm, is the recipient of the BBGA *Michael Wheatley Award for Outstanding Services* to the general aviation industry.

► **Duncan Aviation**, Lincoln, Nebraska, announced the **Pete Marte** is the manager of the company's Satellite Avionics Shops in White Plains, New York, and Oxford, Connecticut. Marte and his team routinely work at area airports including Bradley, Bridgeport and Danbury in Connecticut and Dutchess County

and Stewart in New York. **Aaron Jensen** is the new manager of the Seattle Satellite Avionics Shop based at the Boeing Airfield at King County International Airport. **Robert Montano** was named as an Engine Tech Rep, providing troubleshooting and technical support to Rolls Royce engine customers and Duncan Aviation engine line maintenance teams. **Tyler Spurling** was named assistant manager of MRO Rapid Response Team providing leadership and direction for all three of the company's main MRO facilities in Lincoln, Battle Creek and Provo.

► **General Aviation Manufacturers Association**, Washington, D.C., named three new memberships: **Epic Aircraft**, Bend, Oregon; **Calnetix Technologies**, Cerritos, California; **XTI Aircraft Company**, Englewood, Colorado.

► **Lufthansa Technik AG**, Hamburg, Germany, announced the **Dr. Detief Kayser** is the new chairman of the Supervisory Board taking over from **Carsten Spohr** as chairman. In addition, **Thorsten Dirks** was elected as a new member of the Supervisory Board.

► **Pace (TXT Group)**, Berlin, Germany, announced the appointment of **Frank Ehlermann** to the company's senior executive team. He supports the three founders of PACE in the role of Managing Director and serves as head of the Product Configuration business line.

► **Traxxall**, Montreal, Canada, announced the **Michael Fantaski** has joined the company as regional sales director based in Las Vegas, Nevada. His territory includes Washington, Oregon, Nevada, Arizona, Idaho, Montana, Alaska and Hawaii. He reports to President Mark Steinbeck. **BCA**



JOHN GILBERTSON JR.



TIM SCORER



ROBERT MONTANO



TYLER/SPURLING



DETIEF KAYSER



THORSTEN DIRKS



FRANK EHLERMANN



MICHAEL FANTASKI

If you would like to submit news of hires, promotions, appointments or awards for possible publication in On Duty, send email to jessica.salerno@informa.com or call (520) 638-8721



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Products & Services **Previews**

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

1. Flying Colours Opens Hangar at Ontario

Flying Colours has officially opened the doors of its newest, largest and most advanced paint preparation and application facility at its Peterborough, Ontario headquarters. Fully computerized and climate controlled, the pressurized cross-draft paint booth measures an impressive 138 ft. wide and 158 ft. deep with the tail height reaching 55 ft.

Flying Colours
Peterborough, Ontario
www.flyingcolourscorp.com

2. Sun Air Jets Launches New Brand

Sun Air Jets, jet charter and aircraft management company, unveiled its new brand and website, which are intended to more fully represent the company and its services. The new website features the company's diverse charter fleet, including day and night configurations and a 360-deg. virtual tour of each aircraft. Visitors can request a charter quote with the new flight booking tool.

Sun Air Jets
sunairjets.com

3. ABS Jets New FBO

The Prague and Bratislava-based business jet operator ABS-Jets has been approved by the Bratislava Airport Authority to provide full FBO services at Bratislava Airport in Slovakia. The company has operated there since 2009 supervising business aviation ground handling services. As well as comprehensive FBO services, the base in Bratislava provides line maintenance support to business jet operators and owners of Embraer Legacy 600/650 and Phenom 100/300 aircraft, and Gulfstream 650 and 550 models.

ABS Jets
Prague, Czech Republic
www.absjets.com



4. FSI Offers PC-24 Training

FlightSafety International is now offering training for the Pilatus PC-24 Super Versatile Jet at its Paris Le Bourget Learning Center. FSI also offers training for the PC-24 in Dallas, Texas. The training program uses a new PC-24 simulator equipped with the Honeywell Primus Apex avionics suite that incorporates the SmartView synthetic vision system. It also features FSI's latest advances in technology including the CrewView collimated glass mirror display and VITAL 1150 visual system. The simulator has been qualified to Level D by the FAA, EASA and the DGCA.

FlightSafety International
www.flightsafety.com

5. Online LiveLearning from FSI

FlightSafety is providing the ground school portion of its recurrent training programs online through the instructor-led LiveLearning training system. "FlightSafety worked with the FAA and other regulatory agencies to obtain approval for

this innovative new approach, which includes the requirement to complete the simulation portion of the course within 90 days of finishing the online ground school,” said Steve Gross, senior vice president, Sales and Marketing.

FlightSafety International
www.flightsafety.com

6. Elliott Technologies Expands Network

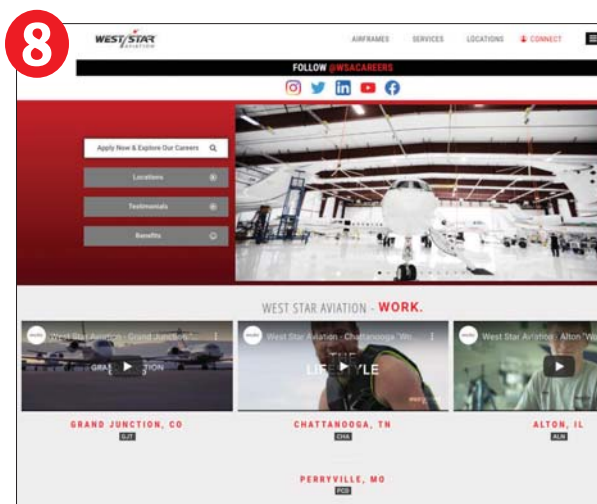
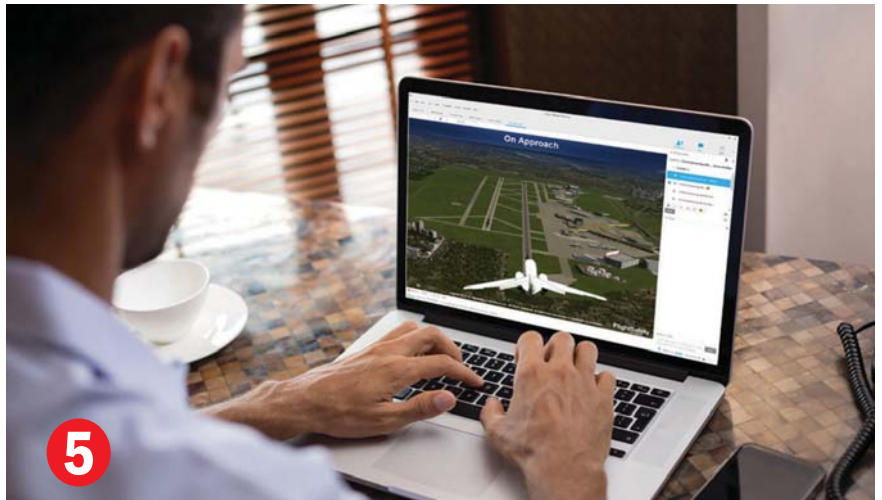
Elliott Technologies has established an agreement with Duncan Aviation, expanding their dealer network to 10. Dealers are approved to install Elliott Technologies products, including Prizm cabin LED lighting. Dealers include: AeroElite Interior, Banyan Air Service, Constant Aviation, Cutter Aviation, Duncan Aviation, Elliott Aviation, FlightStar, Flying Colours, Stevens Aerospace and west Star Aviation. Prizm cabin LED lighting features full color spectrum lighting for an aircraft that is controlled through a mobile app or existing cabin lighting controls.

Elliott Technologies
 Moline, Illinois
www.elliotttechnologies.aero

7. PrimeFlight Acquires ProFlo

PrimeFlight Aviation Services has acquired the assets of aircraft refueling equipment supplier ProFlo Industries, LLC as well as a majority stake in the South American Free Trade Zone based ProFlo LSTAM. The acquisition is being made through PrimeFlight’s ground support equipment maintenance subsidiary, Global Aviation Services, LLC based in Eagan, Minnesota. ProFlo is a global supplier of aircraft refueling equipment.

PrimeFlight
 Sugar Land, Texas
www.primeflight.com



8. West Star Enhances Website

West Star Aviation’s website has been revamped with several new enhance-

ments including easier navigation, updated design, focus on airframe-specific expertise and an all new in-depth careers page. The new Careers page offers interested applicants a variety of details and insights about the company’s various locations and benefits. “Our goal is to communicate the exciting careers available at all of our locations and maintain a steady flow of new talent at West Star Aviation,”

said Katie Johnson, vice president of Human Resources for West Star.

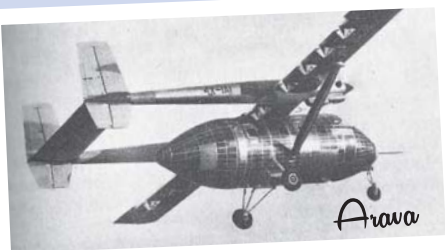
West Star Aviation
www.weststaraviation.com/careers

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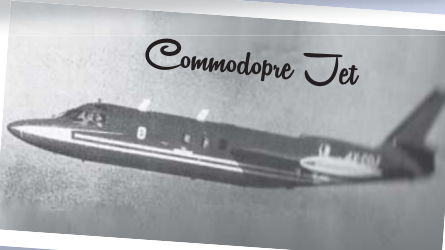
In 16,701 general aviation accidents in all operations over a three-year period from 1966-1968, the pilot was cited as cause or factor in 82% of 1,891 fatal accidents. – *BCA Staff*

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

Aircraft and parts manufacturers must report all defects, failures and malfunctions discovered in their equipment after July 2. GAMA won a 90-day extension claiming that manufacturers needed time to set up internal reporting procedures.



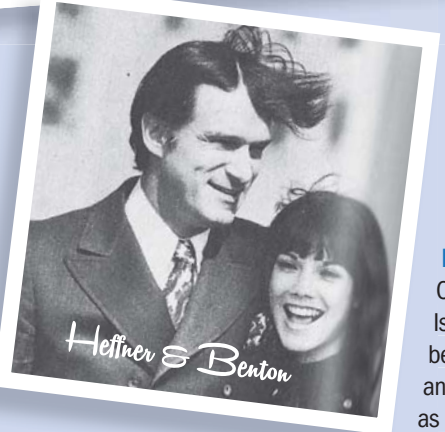
Arava



Commodore Jet



Baron 58



Hefner & Benton

The Arava is as unattractive in appearance the Otter, perhaps more so. It looks like a stubby cigar bolted under a long, thick straight, high-lift wing. Photo is an early test flight.

The first flying prototype of the Commodore Jet – actually a Model 1121 Jet Commander whose fuselage was cut and then spliced together with a 22-in. additional section. Tip tanks are from a Fouga Magister trainer; they will be larger on the production model. This particular plane was lost when a hung flap caused its crew to abandon it on its third flight.

A fourth side window, part of the rear entrance door on the right side of the Baron 58 is identifying feature. Airplane is 10 in. longer in the cabin.

Hugh Hefner showed up at La Guardia last month with the Big Bunny, five Jet Bunnies [cabin attendants] and his personal Bunny, a 22-year-old actress named Barbi Benton. (The three-man crew, all employees of Purdue Airlines, which manages the aircraft, told *BCA* they have no Bunny designation.)

Preliminary report on Pilgrim Twin Otter crash fatal to five on Feb. 10 in Long Island (NY) Sound indicates that ATC delays, below-minimums weather, faulty transponder and fuel management problems will be cited as prime causal factors in the accident. **BCA**

THE ARCHIVE



Indian-file on the taxiway at Lock Haven, Pennsylvania, for of Piper's best-selling models pose for photographer Simpson Kalisher. The line-up, foreshortened in the long lens, shows a Cherokee followed by an Aztec D, Cherokee Arrow and a Navajo. Of the aircraft shown, only the twins are built in Lock Haven; all Cherokees are built at the company's Vero Beach, Florida, plant.



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