JANUARY 2019 $10.00 www.bcadigital.com

BCA

Business & Commercial Aviation

OPERATORS SURVEY

Boeing Business Jet

Why go big? Because you can.

ALSO IN THIS ISSUE

AVIATION WEEK NETWORK

AIR CHARTER SAFETY FOUNDATION

FLYING CHARTER?
DO YOUR DUE DILIGENCE.

LOOK FOR THIS LOGO!

AIR CHARTER SAFETY FOUNDATION
AUDIT REGISTERED

Registered operators who have successfully completed the independent ACSF Industry Audit Standard meet the highest standards for safety and security in the on-demand charter industry.

Brought to you by these ACSF audit-registered operators:

ADVANCED AIR
EXECUTIVE FLITEWAYS ...where Excellence is in the Air.
EXECUTIVE JET MANAGEMENT A NETJETS COMPANY
FLEXJET
KEYSTONE AVIATION
L.J. Aviation
MAYO AVIATION
NORTHERN JET MANAGEMENT
SUN AIR JETS

...and these ACSF members:

AVJET A JET AVIATION COMPANY
CAE
flightOptions
Gulfstream A GENERAL DYNAMICS COMPANY
JET AVIATION A GENERAL DYNAMICS COMPANY
NAPA JET CENTER
NATA National Air Transportation Association
sentient jet
SHORT HILLS AVIATION SERVICES
Beechcraft Cessna Hawker TEXTRON AVIATION
USAIG UNITED STATES AIRCRAFT INSURANCE GROUP

+1-888-723-3135 **Join more than 175 member companies today!** **Visit acsf.aero/join**

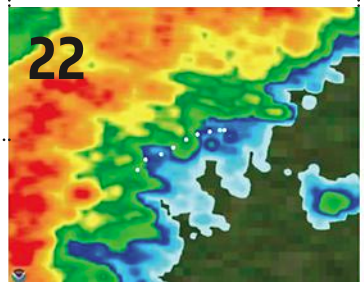
The Air Charter Safety Foundation is a nonprofit, tax-exempt, 501(c)(3) organization.

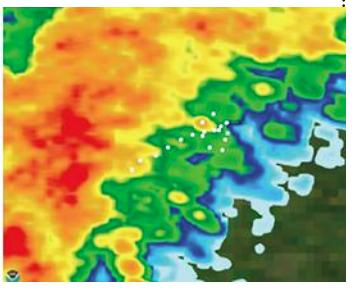
BCA
Business & Commercial Aviation

CONTENTS JANUARY 2019

Keep up with all the news and blogs from BCA editors "like" us on facebook
facebook.com/avweekbca
and follow us on twitter
twitter.com/avweekbca

Features





13 Intelligence

Edited by William Garvey, Jessica A. Salerno and Molly McMillian

Fast Five Rolland "Rollie" Vincent, President, Rolland Vincent Associates and JetNet iQ Creator/Director

Departments

DIGITAL EXTRAS

Tap this icon in articles in the digital edition of BCA for exclusive features. If you have not signed up to receive your digital subscription, go to
AviationWeek.com/bcacustomers

For the latest developments, go to
www.bcadigital.com
Selected articles from BCA and The Weekly of Business Aviation, as well as breaking news stories and daily news updates

COVER
Courtesy of Boeing Business Jets

BCA
Business & Commercial Aviation

Editor-in-Chief	**William Garvey** — william.garvey@informa.com
Executive Editor	**Jessica A. Salerno** — jessica.salerno@informa.com
Senior Editor/Chief Pilot	**Fred George** — fred.george@informa.com
Safety Editor	**Richard N. Aarons** — bcasafety@gmail.com
International Operations/ Features Editor	**David Esler** — david.esler@comcast.net
News Editor	**Molly McMillin** — molly.mcmillin@informa.com
Art Direction	**Lisa Caputo** — lcaputo@aviationweek.com
Art Department	**Scott Marshall** — scott.marshall@aviationweek.com
	Colin Throm — colin.throm@aviationweek.com
Associate Producer	**Bridget Horan** — bridget.horan@aviationweek.com
Contributors	**James Albright**— james@code7700.com **Mal Gormley** — malgormley@gmail.com **Kent S. Jackson** — kjackson@jetlaw.com **Ross Detwiler** — rossdetwiler.com **Patrick Veillette, Ph.D.** — jumprsaway@aol.com **Ringston Media** — info@ringstonmedia.com
Editorial Offices	520 Folly Rd., Ste. 238, Charleston, S.C. (520) 577-5124 · (843) 718-2458
Publisher	**Beth Wagner** — beth.wagner@aviationweek.com Phone: (202) 517-1061
Managing Director, Directories	**Frank Craven** — frank.craven@informa.com Phone: (913) 967-1729
Managing Director, Business Aviation Intelligence/ Data Services	**Anne McMahon** — anne.mcmahon@aviationweek.com Phone: (646) 291-6353
Director of Sales, Business Aviation	**Elizabeth Zlitni** — elizabeth.zlitni@informa.com Phone: (913) 967-1348
Advertising Production Coordinator	**Kara Walby** — kara.walby@informa.com Informa, 9800 Metcalf Ave., Overland Park, KS 66212 Phone: (913) 967-7476 · Fax: (913) 514-7303
Senior Manager, User Marketing	**Tyler Motsinger** — tyler.motsinger@informa.com Phone: (913) 967-1623
Head of Business Aviation Fleet Data	**Nigel Prevett** — nigel.prevett@aviationweek.com Phone: (407) 243-6887
Head of Valuations, Business Aviation	**Chris Reynolds** — chris.reynolds@informa.com Phone: (913) 967-1956
Subscription Information	***BCA* Customer Service:** (800) 525-5003; +1 (847) 9147 Email: bca@omeda.com **Manage Your Subscription:** aviationweek.com/bcasubscribers
Reprints	**Wright's Media** **Nick Iademarco** — niademarco@wrightsmedia.com Phone: (877) 652-5295 · Fax: (281) 419-5712
President, Aviation Week Network	**Gregory Hamilton**—hamilton@aviationweek.com
Managing Director—Civil Aviation	**Iain Blackhall** — iain.blackhall@aviationweek.com
Administrative Offices	605 3rd Ave., New York, N.Y. 10158

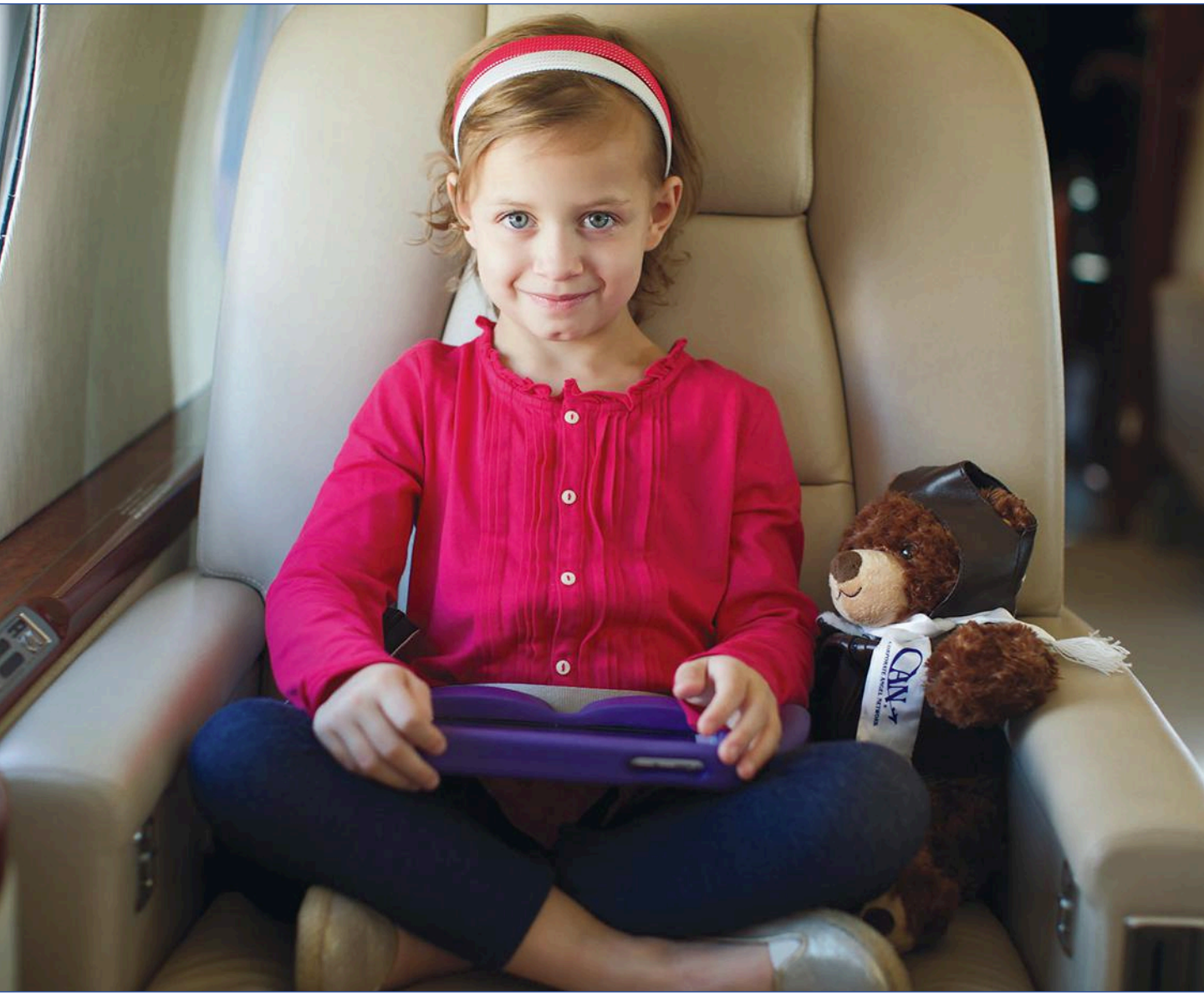
An Informa business

BCA - Business & Commercial Aviation (ISSN 0191-4642) is published monthly by Informa Media Inc., 9800 Metcalf Ave., Overland Park, KS 66212-2216. Also the publisher of *Aviation Daily*, *Aviation Week & Space Technology*, *The Weekly of Business Aviation* and *World Aerospace Database*. Single copy: Current and back issues, $10.00 Domestic/Canada/Mexico. $15.00 International. Subscriptions (1 year, 12 issues): United States and Canada, $59.00; all other countries, $79.00. For single copies/back copies call Customer Service at (800) 525-5003 in the United States and (847) 763-9147 for all other countries. Periodicals postage paid at Kansas City, MO and additional mailing offices. Registered for GST as GST #R126431964. Canada Post Publication Mail Agreement Number 40026880. Editorial contributions should be addressed to BCA, 520 Folly Rd., Ste. 238, Charleston, S.C. 29412, editorial address and must be accompanied by return postage. Publisher assumes no responsibility for safety of artwork, photographs or manuscripts. USPS 503-450.

Printed in the U.S.A.

Postmaster: Send address corrections to BCA - Business & Commercial Aviation, P.O. Box 1174 Skokie, IL 60076-8174. (Present subscribers include label)

Cancer Patients Fly Free...



...in Empty Seats on Corporate Jets.

Corporate Angel Network arranges free flights to treatment for cancer patients in the empty seats on corporate jets.

Since 1981, Corporate Angel Network, a not-for-profit organization, has worked with more than 500 corporations including half the *Fortune* 100, to fly more than 54,000 cancer patients to specialized treatment and currently transports 225 patients each month.

The process is simple. Call or visit our website for more information.

54,000 flights and counting!

Corporate Angel Network

(866) 328-1313 WWW.CORPANGELNETWORK.ORG
TWITTER: @CORPANGELNET
INSTAGRAM: @CORPORATEANGELNETWORK

BRINGING CANCER PATIENTS CLOSER TO THEIR CURE.

BCA

Advertising Sales

Publisher
Beth Wagner – beth.wagner@aviationweek.com
(202) 517-1061

Director of Sales
Elizabeth Zlitni – elizabeth.zlitni@informa.com
(913) 967-1348

North America Advertising Sales

Pacific Region
Leah Vickers – leah.vickers@aviationweek.com
(949) 481-4519
Miguel Ornelas – miguel.ornelas@aviationweek.com
(661) 480-7000

Midwest Region
Leah Vickers – leah.vickers@aviationweek.com
(949) 481-4519
Rob Howlett – rob.howlett@aviationweek.com
(949) 481-4519

Eastern Region
Cheryl Mahon — cheryl.mahon@aviationweek.com
(949) 481-4519

Florida, Georgia, South Carolina
Beth Eddy – betheddy@aviationexhibits.com
(561) 279-4646

Canada
David Seaberg – david.seaberg@vicbrownmedia.com
(416) 787-0914

Strategic Account Managers
Tom Davis – tom.davis@aviationweek.com
(469) 854-6717
Matt Holdreith – matt.holdreith@informa.com
(646) 719-0767

FBO Advertising Sales

Jodi Espinoza – jespinoza@acukwik.com
(913) 967-1651
Sara Hellon – sara.hellon@informa.com
(913) 967-1833
Jennifer Shafer-Doyle – jennifer.shafer@informa.com
(913) 967-1833

Worldwide Advertising Sales

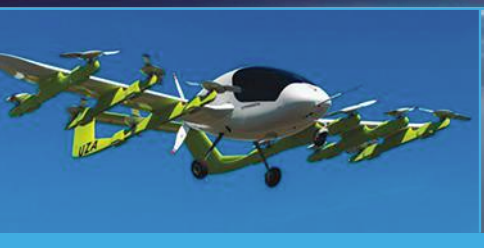
Francine Brasseur – francine.brasseur@informa.com
+(617) 649-0411
Bettina Gentile – bettina.gentile@informa.com
(617) 649-0414
Michele Markarian – michele.markarian@informa.com
(617) 649-0420

Europe
David McMullen – david.mcmullen@aviationweek.co.uk
+44 (0) 1925 596176
Andrea Prudente – andrea.prudente@aviationweek.com
+44 207 152 4524

Israel
Tamir Eshel – invision@netvision.net.il
+972 (9) 891-1792

URBAN AIR MOBILITY CONFERENCE

April 9-10, 2019 • Atlanta, GA



Is Urban Air Transport the answer to the problem of dense urban spaces or some "transportation unicorn"?

Find out this April when Aviation Week Network Launches the Urban Air Mobility Conference

What to Expect in 2019 – Dawn of a New Era

Join manufacturers, disruptors, regulators, technology innovators, municipal leaders, and the infrastructure & investment community as they work to create on-demand aviation for smart cities and a new future for manned and unmanned air transportation.

Coverage will include:

- Airframers/Disruptors Developing and Flying Early eVTOL Prototypes
- Electric Distributed Propulsion: Progress, Power and Reliability
- Barriers: Noise – Emissions – Public Perception
- Supply Chain 2023: Developing Capability for UAM
- Regulations: Compliance, Quality and Safety for the Global UAM Market
- Public-Private Partnerships
- Air Traffic Management: Adaptation and Integration
- Infrastructure: Vertiports in Cities and Airports
- Investment in Start-ups and Infrastructure

Speakers include:

Michael Dyment
Managing Partner
Nexa Capital Partners, LLC

Parimal (PK) Kopardekar PhD
Acting Director of NASA Aeronautics Research Institute (NARI), NASA Ames Research Center

Ben Marcus
Chairman & Co-Founder
AirMap

Raj Singh
Managing Director
JetBlue Technology Ventures

Steve Weidner
UAS National Representative
National Air Traffic Controllers Association (NATCA)

Learn more at: uam.aviationweek.com

Produced by AVIATION WEEK NETWORK

Sapphire Urban Air Mobility Economics and Global Markets 2020-2040 NEXA Advisors

Supported by GAMA

William Garvey
Editor-in-Chief
william.garvey@informa.com

Taking the Pulse

A community **on the move**

AT THIS POINT, BUSINESS AND GENERAL AVIATION CONSTITUTE A pretty staid, predictable and, critics might say, unexciting industry. And by some measures, that's absolutely true.

After all, we're still manufacturing King Airs, Skyhawk 172s and Senecas, all of which were originally designed by guys wearing white shirts, skinny ties and using slide rules. A powerplant of choice remains Lycoming's O-360, which first spun a prop during Dwight Eisenhower's first term in the White House. While Nancy Narco retired long ago, steam gauges and twist selectors remain very much in use. After all, on average, the fleet and its operators are middle aged or qualify for Medicare. As for Unicom, 100LL, VORTACs? Check, check and check.

And yet a quick review of the community's activity in the year just ended underscores a vibrancy, inventiveness and urgency suggesting quite a different assessment. Not all the news was good, but the industry advanced markedly and nurtured new technologies that hold exceptional promise.

A brief rundown:

Pilatus began deliveries of its PC-24, a quick-change passenger/cargo jet able to operate out of unimproved strips.

The National Aeronautic Association awarded the single-engine, single-pilot Cirrus Vision Jet the Robert J. Collier Trophy as America's "greatest achievement in aeronautics or astronautics" in the previous year.

Bye Aerospace flew its all-electric Sun Flyer 2, and the Aspen Flying Club quickly signed for 30 of them.

JetBlue Airways increased its investment in JetSuiteX, a scheduled charter operator, to 10% and began selling tickets and placing its code on some JetSuiteX flights.

Meanwhile, JetSuite signed on as the launch customer for Zunum Aero's hybrid-electric regional aircraft, scheduled for delivery in 2022.

The U.S. Department of Transportation selected five locales for testing of small drones to help develop regulations allowing widespread commercial drone use.

HondaJet maker Honda Aircraft received the American Institute of Aeronautics and Astronautics Foundation Award for Excellence.

SureFly, a full-size, 1,500-lb., multi-rotor hybrid-electric helicopter, achieved first flight.

Rolls-Royce unveiled its Pearl turbofan, which Bombardier selected to power its new Global 5500 and 6500 large-cabin, long-range jets.

Gulfstream's G500 received both its type and production certificates and began deliveries of the PW800-powered model.

VistaJet Global, Thomas Flohr's newly formed holding company, acquired XOJet, bringing to 115 the business jets in its combined fleet, the largest owner-operated non-fractional fleet in the world.

Bombardier's Global 7500, its new, four-section, ultra-long-range jet, received its type certification.

General Electric announced that the Aerion AS2 supersonic business jet would be powered by its Affinity twin-shaft, twin-fan turbofan.

A move to privatize air traffic control in the U.S., a proposal long and strongly opposed by the business aviation industry, was defeated and its chief advocate in the Congress announced his retirement.

Diamond Aircraft Industries flew a modified DA40, marking the first flight of a multiengine hybrid-electric aircraft. The aircraft was fitted with two 75-kW electric motors mounted on a canard foreplane powered by a diesel generator in the nose.

United Technologies acquired Rockwell Collins for a record-setting $30 billion and announced it will henceforth focus on aerospace and divest its elevator and heating and cooling businesses.

These advances were not shared universally. Indeed, a range of companies including Piaggio, One Aviation, PrivatAir and Nordam Group all sought bankruptcy court protection. Meanwhile, consolidations, acquisitions and divestments — notably Bombardier of it CSeries, Downsview operation, Q400 and CL-415 manufacturing and pilot training — continued at a vigorous pace and across the board from FBO chains to WACO, the biplane maker.

Where from here? This new year — our 61st — promises to be just as energized.

Now, with its new satellite constellation complete, Iridium expects to begin delivering broadband connectivity to aircraft flight decks supporting EFBs, graphical weather and even ADS-B for the Aireon network.

Terrafugia says it plans to bring the first production Transition flying car to market. Price ranges from $400,000 to $500,000, depending on options.

Gulfstream expects to begin delivering its G600 and Bombardier its Global 5500 and 6500.

Textron Aviation plans to initiate flight tests of its GE Catalyst-powered Denali. And Boom Technology says it will launch the XB-1 "Baby Boom" demonstrator of its supersonic airliner.

An Aviation Week Intelligence Network forecast predicts manufacturers will deliver 792 business jets this year and 8,683 by 2028.

Drone Delivery Canada will begin transporting mail, packages and medical supplies to native communities in northern Ontario using its Sparrow multicopter drone. Meanwhile, Google parent Alphabet's drone delivery service will begin a trial program in Helsinki.

Matters that could have significant impact on business aviation include Brexit, Britain's exit from the European Union, the imposition of heavy tariffs by the U.S. and, despite 10 years of preparation, the arrival of the ADS-B deadline, which could ground thousands of business aircraft a year from now.

Staid? Predictable? Unexciting? Valium, anyone? **BCA**

ALPHA
BRAVO
COLLINS

We are Collins Aerospace. With our customers we chart new journeys and reunite families. We protect nations and save lives. We fuse intelligence and partnership to tackle the toughest challenges in our industry. And every day, we imagine ways to make the skies and spaces we touch smarter, safer and more amazing than ever.

UTC Aerospace Systems and Rockwell Collins are now Collins Aerospace.

TOGETHER, WE ARE
REDEFINING AEROSPACE

Collins Aerospace

collinsaerospace.com

ALPHA

BRAVO

COLLINS

DELTA

ECHO

FOXTROT

GOLF

HOTEL

INDIA

JULIET

We are Collins Aerospace. With our customers we chart new journeys and reunite families. We protect nations and save lives. We fuse intelligence and partnership to tackle the toughest challenges in our industry. And every day, we imagine ways to make the skies and spaces we touch smarter, safer and more amazing than ever.

UTC Aerospace Systems and Rockwell Collins are now Collins Aerospace.

TOGETHER, WE ARE REDEFINING AEROSPACE

Collins Aerospace

collinsaerospace.com

Readers' Feedback

From the Web

Comments regarding Point of Law, "Increasing Charter Air Transportation Options," by Kent Jackson, December 2019

Why did it take 14 yr. for these recommendations to be made? They all seem reasonable to me, although I am unsure how these recommendations would have prevented the crash. Hopefully, the crew's failure to deice is covered in other recommendations.

davevecchi@comcast.net

Comments regarding "Premeditated Stupidity," by James Albright, December 2018

Although I enjoyed this article, I disagree with the author's analysis of the "stupidities" of the Pinnacle pilots. FL 410 is legal and within the envelope of the aircraft. The error was misusing the autopilot to make the climb and not monitoring airspeed. From the NTSB report:

The airplane could not sustain the required airspeed while climbing at 500 fpm, which resulted in the 40-kt. loss of airspeed, and, once level at 41,000 ft., the airplane was operating in a "region of reversed command" in which available thrust was not sufficient to increase airspeed. The flight crew should have used the autopilot airspeed mode rather than the vertical speed mode to prevent the loss of airspeed. The Safety Board concludes that the flight crew's inappropriate use of the vertical speed mode during the climb was a misuse of automation that allowed the airplane to reach 41,000 ft. in a critically low energy state.

aaatwood@sbcglobal.net

The rule I always come back to is that as I pilot, I am flying over people's homes, schools, businesses, etc. (in dense New York airspace, too). I have a responsibility to all those below me not to make risky or stupid decisions when in the air.

frgpilot@yahoo.com

This is the best professional, yet direct and to-the-point delivery of a "scolding/warning" backed up by facts and history that I've read yet. Kudos to Mr. Albright, and like Tiger Tim, please consider more postings.

formerAFguy


Safety

Premeditated Stupidity

A planned mistake is something worse

The 90/270

I have read all of these stories many times and used them in teaching scenarios but cannot resist reading them again whenever they are introduced to as examples of mismanaged risk/reward ratios. Mr. Albright's personal story is very amusing and serves to remind us also that the biggest threat to a skilled and confident pilot is actually his own skill and confidence. Don't fool yourself, physics trumps everything!

tgale@telus.net

What a *great* article James. I was nine years old in 1943, when I knew I wanted to be in aviation . . . and I had no idea why! At the tender age of 11, I had a job of washing airplanes at the one remaining airport on Staten Island — a borough of New York City — and received a ride in an airplane that could take-off and land on water, as well as on land. So, that began my adventure in aviation that has lasted for more than 60 yr. While no longer piloting, I mentor and review many, *many* aviation topics with youngsters and 'oldsters' quite often, Your list of nine "Surviving the Urge to be Stupid" items is something I will use in the future in my mentoring particularly with the youngsters. Thank you, *thank you,* James. Keep up the very fine aviation communications you do!

jgodston@gmail.com

Extremely good advice and insight for any pilot . . . at any stage in their careers. A further hazard to look out for . . . I personally exhibited . . . please consider . . . "So stupid . . . that you don't know . . . your stupid." Thanks to all.

Observing

Comments regarding Cause & Circumstance, "A Near Catastrophe," by Richard N. Aarons, December 2018

Very well written article. Backing up a visual approach with the ILS or other electronic guidance is always a good idea — even more so when fatigued, in a complex environment, and at night.

minepr@comcast.net

Idea — the FAA should look to engineer a lighting system that would actually be the runway number made of small LED lights that would make the runway number visible at night from farther away, It would be embedded in the runway surface in a manner that would not damage wheels, or where wheels would damage the lighting,

frgpilot@yahoo.com

A great idea, but it's all about money unfortunately. The FAA can't do anything without Congress approving the funding. The old axiom of you don't get the traffic light until someone gets killed holds up here as well.

jimbo0117

I will continue to point out what I used to teach my students as an Air Force instructor pilot that 98% of aircraft accidents occur before the airplane ever leaves the ground. Yes, the 98% is made up by me for effect but certainly it is true for the vast majority of aircraft accidents and this one fits the mold.

drshrader@earthlink.net

I like the Foreflight briefing that lists runway closures first. This incident could happen to anyone. If you don't think so, you don't understand risk.

sledogpilot@gmail.com

Great report. Many issues. My personal demon is NOTAMS, I get 25 pages of NOTAMS for every flight. Ninety-nine percent are distractions. You'd think in this iPad age we could have an app to filter the "183-ft. tower on the 248-deg. radial 9.3 mi. from the airport" from the important stuff.

One lesser thing that stood out to me is the radio call from an aircraft holding for takeoff: "Where is that guy going?" followed by "He's on the taxiway." The proper terminology for a pilot on the ground observing an aircraft about to crash should be: "Aircraft short final San Francisco go-round go-around go-around!"

jarmor4@gmail.com

Cause & Circumstance

A Near Catastrophe

Within feet of becoming the worst air disaster ever

Comments about "Handling Wet and Contaminated Runways," by James Albright, November 2018

Great article. Suggest the difference between "landing distance," which is the FAR Part 23/25 certification rules term, and "landing field length" (LFL), which is the Part 121 term be explained. Some confusion can exist when comparing airline Part 121 operations with Part 91 general/business operations due to different operational regulation requirements. You are right on in saying the pilots need to know what is the basis of the data in *their* pilot user handbook, be it AFM or FCOM.

Also, thrust reversers (TRs) are typically more effective at high speed than slow speed, so getting them out ASAP is important. I noticed that picture of the SC accident shows the TRs stowed.

Suggest, explaining the physics involved, *and* the certification basis, *and* the operational rules, *and* the difference between the regulation defined/required data and the individual OEM's advisory data is involved. An article on directional control on lower friction runways would be a good companion to this one. Perhaps it already exists.

XDACer

Great article. Can add more to the lessons learned. Pilot reports on braking action give a picture of the braking that is incomplete because the report comes from someone who has just successfully landed and safely turned off the runway. The report does not address the condition at the far end of the runway. Note the opposite ends of a runway, particularly if seen from above. The surface is black with multiple streaks of rubber where aircraft have touched down over and over. No big deal until you are in an aircraft performing a max effort abort or landing on a contaminated surface. The best surface for stopping is the length of the runway some 1,500 ft. from both ends. If the aircraft isn't effectively stopped prior to that point now the wet/snowy/slushy surface is also rubber coated underneath! Been there, done that, and used all but the very last foot landing on an 8,000-ft. runway. What a surprise. Everything was fine until that last 1,500 ft., and the sensation was almost that of acceleration in spite of max braking. Seemed like forever to bleed off the last few knots and come to a stop. Had to look out the side window to see if the aircraft was still on pavement.

a300bob@gmail.com

surprises, I know there is no substitute for adequate training and knowledge of the aircraft. A little luck also helps. Keep publishing.

rlathrop@msn.com

A beautifully comprehensive article — should be required reading for anybody flying today, regardless of aircraft type. Thanks.

jlee.nk7b@gmail.com

Thank you, Mr. Goodrich — A well-written explanation of why a performance engineer recommended not adding 15% for a non-grooved, wet runway, but 30%-40% to the required landing distance.

kari.johnson@jetlinx.com

"Mr. Albright's personal story is very amusing and serves to remind us also that the biggest threat to a skilled and confident pilot is actually his own skill and confidence."

Comments about Cause & Cirumstance, "A Perfect Trap: Rapidly Changing Weather and Visual Illusions," by Richard N. Aarons, November 2018

You'll also note the airport diagram says altimeter setting hPa and they give you inHg. I noticed that the altimeter setting with the new tower gave an elevation that was higher than the actual airport, probably because the pressure is read near ground level by the met office and the tower has an altimeter they set to the airport altitude at ground level when they are quite a bit higher. It gives a lower pressure and means you are lower than you think.

bwanapayne@gmail.com

Comments regarding "Performance Margins: The Science And Supposition Behind The Numbers," by Mark H. Goodrich, October 2018

Good article. Thanks. Recently trained pilots (last 20 years or so) are constantly urged to trust and use the automation, and the approved performance information without question. A healthy skepticism goes a long way to staying alive. After 55 years and 22,000+ hr. in the cockpit, and a few unpleasant

Comments regarding "A Glaring Problem," by Patrick Veillette, November 2018

Aircraft certification rules do not allow opaque sun visors like cars have. This makes most aircraft sun visors useless, which leads to using charts, checklists, magazines, etc., propped up in the windshield as makeshift sun blocks. It would be nice to have decent visors that actually block the sun in our aircraft. Listening FAA?

billg@flightstar.com

This reminds me of the fatal crash of Afriqiyah Airways Flight 771 A330 in 2010, which landed facing the rising sun. There were several causes for the crash including loss of visual ground reference and lack of crew coordination plus opposite control inputs from the captain and the pilot, and the infamous Airbus sidestick with no visual control of which pilot in control does.

bernard.guillaume@esa.int

If you would like to submit a comment on an article in BCA, or voice your opinion on an aviation related topic, send an email to jessica.salerno@informa.com or william.garvey@informa.com

FlightSafety is Here For YOU

Your Success

Relax. Our instructors work to ensure YOU have an exceptional training experience with a positive outcome.

Your Proficiency

Be the very best. We are committed to helping YOU achieve and maintain the highest level of skills and safety.

Your Satisfaction

Count on us. We all have the same goal: providing YOU with the highest-quality training and outstanding service.

BUILT OVER TIME
TRUST
EARNED EVERY DAY

Train with FlightSafety and benefit from our unequaled experience, team of master instructors and safety-focused programs using state-of-the-art simulation technology. Trust that we'll always go above and beyond for you and your flight department and deliver the value you deserve and expect. It's all about you.

FlightSafety international

flightsafety.com • 314.785.7815

INTELLIGENCE

Edited by **William Garvey, Jessica A. Salerno and Molly McMillin**
william.garvey@informan.com
jessica.salerno@informa.com
molly.mcmillin@informa.com

NEWS / ANALYSIS / TRENDS / ISSUES

IN ADDRESSING ANALYSTS LAST MONTH, Bombardier executives said the company's aerospace focus will be on the high end of the business-jet market and building up its aerostructures division around contracts with Airbus. And, while "exploring strategic options" for its CRJ regional jet after agreeing to sell its Q400 turboprop, the near-term focus is on making the program profitable so it can participate in a forecast market for 3,000 aircraft to replace retiring regional jets. Bombardier's plans to complete its turnaround in 2020 are built on ramping up production of the Global 7500 business jet and its share of the Airbus 220 program, formerly the CSeries, while cutting costs on the CRJ. **The aircraft and train manufacturer is projecting revenues of more than $20 billion in 2020, up from an estimated $16.5 billion in 2018,** and sustainable free cashflow of $750 million to $1 billion. The majority of that revenue growth, more than 60%, is to come from the large-cabin, long-range Global 7500, of which it plans to deliver 15-20 in 2019, 35-40 aircraft in 2020 then stabilize at 40 a year. At the same time, the company plans to continue growing its aerostructures and aftermarket revenues. Total deliveries of 150-155 business jets are forecast for 2019, up from 135 in 2018. This means production of Learjet 70/75, Challenger 350/650 and Global 5000/6000 models will be maintained at 2018 levels, says David Coleal, Bombardier Business Aircraft president. The 2019 total will include delivery of the first two or three Global 6500s at the end of the year, replacing a similar number of Global 6000s.

Bombardier has built a $250 million contingency into its 2019 working capital plans in case issues surface in ramping up Global 7500 production, but Coleal says all aerostructures, avionics and components for 2019 deliveries are in the production system and the aircraft are in assembly, flight test or completion and the supply base is in the middle of doubling production rate to support 2020 deliveries.

Revenues at Bombardier Business Aircraft are forecast to increase to $6.25 billion in 2019, up from around $5 billion in 2018, and to more than $8.5 billion in 2020. This includes continued double-digit growth in aftermarket service sales as the company works to double the capture rate from within its 4,700-aircraft installed base by 2020, up from 28% in 2015.

Although its heavy investment in new aircraft programs is now past, and the Global 7500 is sold out through 2021, **CEO Alain Bellemare said the company has no plans to revive the Learjet 85,** which was cancelled during flight testing in 2015 because of development issues and a steep decline in the light-jet market. Going forward, he continued, the focus will be on the company's higher end aircraft. **— Graham Warwick**

ISRAEL AEROSPACE INDUSTRIES (IAI) PRESIDENT AND CEO Nimrod Shefer says his company is reviewing all of its operations, including its business jet activity. IAI currently manufactures the G280 for Gulfstream, but the downturn in the executive jet market has left the group looking for alternative work. While there's been speculation about shutting down the G280 line, Shefer says that IAI is committed to the twinjet and its relationship with Gulfstream and "will continue to fulfill our part in the collaboration in the best way possible." IAI delivered 25 green G280s to Gulfstream in 2017 and 25 in 2018, according to data from the Aviation Week Network. Sources have said that developing a new business jet or serving as a subcontractor on another program has become "crucially important" to increasing income and preserving IAI's design and manufacture capabilities. **— Arie Egozi**

Jet-A and Avgas Per Gallon Fuel Prices

December 2018

Jet-A

Region	High	Low	Average
Eastern	$8.78	$4.35	$6.29
New England	$7.51	$3.77	$5.22
Great Lakes	$7.34	$3.90	$5.57
Central	$7.70	$3.27	$5.00
Southern	$8.28	$4.20	$6.04
Southwest	$6.84	$3.16	$5.26
NW Mountain	$7.79	$3.55	$5.35
Western Pacific	$8.34	$4.10	$5.99
Nationwide	**$7.95**	**$3.79**	**$5.59**

Avgas

Region	High	Low	Average
Eastern	$4.48	$4.70	$6.51
New England	$7.45	$4.50	$5.91
Great Lakes	$8.59	$4.89	$6.07
Central	$7.69	$4.39	$5.47
Southern	$8.24	$4.25	$6.15
Southwest	$7.17	$3.91	$5.50
NW Mountain	$8.46	$4.65	$5.92
Western Pacific	$8.52	$5.00	$6.30
Nationwide	**$8.08**	**$4.54**	**$5.98**

The tables above show results of a fuel price survey of U.S. fuel suppliers performed in December 2018. 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

For the latest news and information, go to **www.bcadigital.com**

Aerkomm Updates IFEC For Airbus Corporate Jet

Airbus and Aerkomm signed a new agreement regarding the Aerkomm K++ inflight entertainment and connectivity (IFEC) system on Airbus Corporate Jets. Once K++ has been certified with Airbus design approval and has obtained relevant certifications from aviation regulators, the system will be available for installation on single-aisle corporate aircraft, as well as the OEM's airline equivalents for post-delivery modification.

Pilatus Delivers PC-24 Medevac

Pilatus recently delivered its first PC-24 aircraft with a medevac interior to the Royal Flying Doctor Service of Australia. The interior was installed in partnership with Aerolite AG, a Swiss company specializing in medical interiors. The aircraft, which can land on unimproved fields, includes beds for three patients and additional seats for medical staff. It also features a large cargo door and an electric stretcher device to facilitate patient loading and unloading. The service says it has "several" PC-24s on order.

AMPRIUS, THE PROVIDER OF THE BATTERIES for Airbus' record-breaking Zephyr solar-powered stratospheric unmanned aircraft says it is working with electric vertical-take-off-and-landing (eVTOL) developers on applications for its high energy-density lithium-ion cells.Where conventional lithium-ion batteries have graphite anodes and an energy density of 300-320 Wh/kg at best, Amprius' cells use a silicon nanowire anode and have a specific energy of 435 Wh/kg. And according to Jon Bornstein, company president and COO, the difference is "enormous." Such cells could enable Uber to meet its battery energy-density target, making its Elevate vision for eVTOL urban air taxis commercially feasible provided other key requirements such as adequate life and high charging and discharging rates can be met.

The Amprius cells helped enable the first production Zephyr S stratospheric UAV to stay aloft for almost 26 days in its first flight in July-August. This smashed the record of 14 days set in 2010 by the Zephyr 7 prototype, which used lithium-sulfur batteries.

Contracts to supply cells to Airbus for Zephyr will drive the production ramp-up this year. Amprius is focusing on the aerospace market and high-performance UAVs as it works to build up volume. "We are near to flying on something else, but Airbus is the furthest along with the Zephyr," Bornstein says.

He admits that initial cells are "very expensive," but as production volume grows he expects them to be close to cost parity with conventional lithium-ion cells by mid-2020s, when some believe the urban air mobility market will take off. **— Graham Warwick**

WACO AIRCRAFT CORP. HAS BEEN ACQUIRED BY THE DIMOR GROUP of Fort Lauderdale, Florida, which plans to grow the company. The acquisition includes Centennial Aircraft Services, an FBO and FAA Part 145 maintenance facility in Battle Creek, Michigan, which is also the location where Waco builds the three-seat Waco YMF-5 D land aircraft, YMF-5 F amphibian and 180-hp Great Lakes 2T-1A-2 aerobat. Terms of the deal were not disclosed. Centennial will continue to supply maintenance, restoration and spare parts. Distribution of the aircraft in Europe will be handled through a branch of Dimor Group based at Dubendorf airport near Zurich. Dimor purchased Waco from Peter Bowers, the majority owner, who will remain as the president, and his father, Jon Bowers.

Dimor Group will continue to support Waco biplanes and intends to bring some other vintage aircraft back into production. Of the sale to Dimor, he said, "I'm convinced it's going to be very good for the company," the airport and Battle Creek, adding, "We firmly believe they will be a good steward of the Waco tradition and brand. We are looking forward to working together to build a great future for the company." Dimor Group was established in 2018 to buy, sell and rent aircraft and to provide aircraft maintenance and repair services. Dimor Aero is located in Cologne, Germany.

HONEYWELL PLANS TO MOVE ITS CORPORATE HEADQUARTERS to Charlotte, North Carolina, from Morris Plains, New Jersey, and also move its Safety and Productivity Solutions business group there from Fort Mill, South Carolina. The moves were contingent on North Carolina legislators approving a job-development grant to the company. Initially, about 150-200 New Jersey-based senior management positions and about 100 South Carolina-based positions were to relocate to Charlotte by September 2019. The company said it plans on gradually adding about 500 Honeywell positions to the Charlotte campus over the next five years, bringing total employment there to about 750 by the end of 2024.

EUROPE'S PRIVATAIR IS CLIPPING ITS WINGS. According to a statement by the carrier, "Over the past few weeks, a number of events have had a significant impact on the companies' future business forecast and viability, which forced the companies to file for insolvency." The company did not provide additional details. The filing occurred Dec. 5 and involves both its Swiss and German operations. The company had offered scheduled services on behalf of other airlines, business aviation charters, crew and pilot training, as well as a ground services joint venture with Swissport called PrivatPort. Created in 1977, PrivatAir had 226 employees based in Germany, Portugal and Switzerland. It also used 65 contract crew members on a Jeddah-Riyadh shuttle for Saudi Arabian Airlines using A319s in a 48-seat business-class configuration. PrivatAir had previously operated wet-lease services on behalf of several carriers, including Swiss International, SAS Scandinavian Airlines and Lufthansa. For the latter, it had operated Boeing 737-700s from Frankfurt to Nairobi, Kenya, as well as Frankfurt to Pune, India, configured in a 20-seat business- and 66-seat economy-class layout. A Lufthansa A319 now operates the Pune route with a stop in Baku, Azerbaijan. Over the years, PrivatAir had operated A319s, along with Boeing 767s, 757s and business jets—including BBJs. **— Kurt Hofmann**

ONE AVIATION, MAKER OF THE ECLIPSE 550 VERY LIGHT JET, filed for Chapter 11 bankruptcy protection last October. However, it says it has secured financial backing to emerge and once it does, it plans to buy existing Eclipse 500 and 550s, upgrade and resell them as the GSE, a remanufactured aircraft. CEO Alan Klapmeier says the improvements will include the Garmin G3000 avionics and enhanced interiors. A project schedule has yet to be determined, but he says it will take "a year plus," after One Aviation emerges from Chapter 11. "We believe that the product will sell because it's a differentiated airplane," he said.

He also remains hopeful that the company will continue plans for the much-improved Eclipse 700 aircraft, known as "Project Canada," at a later date. The changes, Klapmeier says, mean "there won't be any new 550s essentially ever again." Klapmeier said. A hearing on One Aviation's Chapter 11 bankruptcy, filed in the U.S. District Court for the District of Delaware, is scheduled for Jan. 30. As part of its reorganization plan, U.S.-based Citiking International, a U.S. financial entity set up by a Chinese group to complete the deal, has stepped in to keep One Aviation, which includes Eclipse Aerospace and Kestrel Aircraft, solvent. If approved by the court, Citiking would become the company's owner.

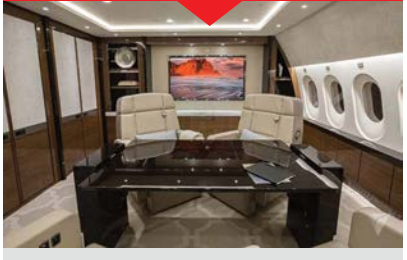
According to court documents, Citiking has a commitment to the company of $8 million in a revolving line of credit. One Aviation's reorganization plan includes a post-Chapter 11 debt facility of $17 million. The bankruptcy court must decide whether to approve the plan. In the meantime, One Aviation is functioning and operating better, according to Klapmeier who noted, "We're in a better place than we were six months ago."

Eclipse has 286 aircraft in service around the world. This is the second bankruptcy for the entity. The original company was liquidated in 2008. Its assets were bought, which formed the basis of the new company, now in bankruptcy as well.

FAA Opens New Atlanta Flight Operations Facility

The FAA has opened its new Atlanta Flight Operations Facility at Cobb County International Airport in Kennesaw, Georgia. The 32,050-sq.-ft. facility, which includes a 23,100-sq.-ft. hangar, will enable the agency to continue support of the National Airspace System, it said. FAA pilots fly specially-equipped King Air 300 aircraft to conduct airborne inspections of space- and ground-based instrument flight procedures. They also validate electronic signals in space transmitted from ground navigation systems. The facility will accommodate six King Air 300 aircraft and includes shop space for aircraft maintenance and repair and space to accommodate 26 FAA employees.

Greenpoint Completes Second V-VIP 787-7 Completion



Greenpoint Technologies, a business jet completion center, has delivered its second V-VIP 787-8 interior completion to a customer, who declined to be identified. The interior includes an open living space with distinct, private rooms, a gym, a grand master suite with a lounge and office, large service galleys and extensive crew accommodations.

Universal Avionics Earns TSO for Touchscreen Control Display

Universal Avionics, based in Tucson, Arizona, has received an FAA Technical Standard Order (TSO) for its new touchscreen control display unit for the InSight Display System. The STC is expected in the first quarter of 2019.

HondaJet Elite Earns Japanese Approval

Honda Aircraft Co.'s HondaJet Elite has received type certification from Japanese authorities. Honda began sales in Japan in June through its dealer, HondaJet Japan. Since then, Honda has taken more than 10 orders for the aircraft in Japan. Deliveries are scheduled to begin by year's end. "We are proud to have obtained type certification in Japan, the home of Honda, and we are pleased our efforts in the development of advanced technologies are being recognized," said Michimasa Fujino, Honda Aircraft president and CEO.

IN LATE NOVEMBER, THE PIAGGIO Aerospace board declared the Italian planemaker insolvent and requested it go into receivership. Best known for its P.180 Avanti twin pusher turboprop and development of the P.1HH Hammerhead unmanned aircraft, Piaggio is owned by the Abu Dhabi-based Mubadala group. **Piaggio said that "continued uncertainty and current market conditions mean the company is no longer financially sustainable."** Local trade unions immediately called for government support to protect Piaggio's 1,200 workers. The company has been struggling for several years after a downturn in the executive aviation market. Attempts to diversify with the development of the P.1HH Hammerhead took a turn for the worse when the first prototype was lost during flight testing, setting the program back almost a year. And while the project was backed by the air force, Italy's center-left government elected in March appeared unwilling to give it the green light. In late 2017, Mubadala and Piaggio's management revealed a five-year plan to restore the company to profitability and eliminate debts, including some to Leonardo. But Piaggio said the "fundamental assumptions of the restructuring plan ... have not materialized." Reports suggest that just two P.180 Avantis were delivered from the Villanova d'Albenga production line last year.

NEXTANT AEROSPACE HAS RECEIVED a Supplemental Type Certificate (STC) for the 604XT Pro Line Fusion flight deck. "In collaboration with Rockwell Collins and Bombardier, we have maintained a carefully crafted plan to advance the steps required to receive the STC on schedule," said Mark O'Donnell, Nextant Aerospace executive vice president. Three Challenger 604XT large cabin business jets are in-house and ready for installation of the Pro Line Fusion, with seven more scheduled before year's end. First customer delivery is scheduled for December, O'Donnell said. The company has pre-sold more than 25 installations. "**Customer interest and market demand has been phenomenal for the Pro Line Fusion upgrade,**" O'Donnell said. The upgraded flight deck, which completes Phase 1 of the aircraft's transformation plan, includes the touchscreen Pro Line Fusion Synthetic Vision with Airport Dome, WAAS/LVP, and ADS-B Out with the option to include Safe Flight AutoPower FANS-1A and Link 2000+. Additional phases of Challenger 604XT upgrades include modernized interior cabin design options and aerodynamic enhancements for better performance, the company said. Nextant is evaluating and finalizing performance enhancements engineered for a 500-nm-range improvement with a service ceiling expansion to 45,000 ft., it said. "With Phase 1 avionics transformation accomplished, we are accelerating our efforts on the interior cabin redesigns to increase functionality, enrich comfort and provide more customization options for clients," O'Donnell said.

DASSAULT AVIATION HAS BEEN AWARDED a contract to study a future maritime surveillance aircraft based on its Falcon 2000 LXS business jet. The contract, issued by French defense materiel agency DGA, calls upon Dassault to study the potential modifications and adaption work required to make the Falcon 2000 ready for the French Avsimar program to develop a surveillance and maritime response aircraft. The mission is currently performed by a fleet of Dassault Falcon 50Ms and Falcon 200 Guardians. The Falcon 50Ms perform the missions from mainland France while the Guardians operate from French overseas territories in Polynesia and New Caledonia. The DGA says the current aircraft will be 40 years old by the time they are retired. The Avsimar program has already identified the Falcon 2000, which the DGA says is faster and more durable than the types currently in service. The studies will pave the way for an acquisition decision in 2020. — **Tony Osborne**

AVIATION WEEK

Fleet&MRO FORECASTS

COMMERCIAL | BUSINESS | HELICOPTERS | MILITARY

Discover New Business for the Next 10 Years

With moderate growth of 1.4% expected on deliveries of civil operated turbofan and turboprop aircraft over the next decade, rely on the **2019 Business Aviation Fleet & MRO Forecast** to help you create plans and strategies to maximize revenue generation.

- Determine **MRO requirements**, broken down by **size class**, **aircraft model** and **region**, as well as **expense category** and see how these match your capabilities
- Acquire granular details of **deliveries and retirements** going out 10 years
- Ascertain the **MRO demand through 2028**, including how it is segmented by airframe, component, engine and modification maintenance

Trust Aviation Week Network's **2019 Business Aviation Fleet & MRO Forecast** to provide the data, intelligence and insight you need to capitilize on the business and fleet opportunities that lie ahead.

For more information on Aviation Week Network's

Fleet & MRO Forecasts

go to pages.aviationweek.com/forecasts
or call 866.857.0148 or +1.847.763.9147

AVIATION WEEK NETWORK

PrivateFly Begins London-Geneva Flights For Ski Season

PrivateFly, an on-demand charter service provider, has begun private jet flights between London Luton and Geneva during ski season, which runs Dec. 1 through Feb. 28, for a fixed price of $6,827. The company will use Nextant 400XTi private jets for groups of up to six passengers. The price is 30% less than usual market pricing, the private jet booking company said. Customers traveling to the slopes can also book a private helicopter transfer from Geneva airport to their ski resort.

Dolvik Terminal Gets an Upgrade

Air BP has upgraded the infrastructure at its fuel terminal in Dolvik, Norway. Improvements include an upgraded pipeline and new fuel tanks with the capacity to store 8 million liters of Jet A-1. The project included the rebuilding of three fuel tanks, construction of a new jetty, integration of two fuel systems, improvements to on-site safety mechanisms and control system enhancements, it said. The improvements will lower carbon emissions and deliver a more efficient supply route.

IN THE ARENA OF ENVIRONMENTAL RESPONSIBILITY Wilson Air Center in Chattanooga, Tennessee has become a showcase as one of a few FBOs with a Platinum Certification from Leadership in Energy and Environmental Design (LEED), as well as LEED Gold Certification for three of its hangars and two of its office facilities. LEED is the most widely used green building rating system in the world.

The FBO at Chattanooga Metropolitan Airport/Lovell Field, in the foothills of Tennessee's Blue Ridge Mountains, won Platinum in 2012 and hasn't stopped moving forward since.

As evidence of the airport's commitment to the environment, the KCHA solar farm of 3,000+ solar panels is expected to provide the airport with 100% of its electrical power by the end of this month, including the FBO terminal and its heated hangars totaling 60,000 sq. ft. The FBO facility is owned by the airport and managed by Wilson Air. Both the airport and FBO are changing over to electric ground support equipment and have been installing charging stations. In addition, the landscaping of the FBO campus features indigenous greenery requiring minimal water for hydration.

Wilson Air offers the expected amenities, including a pilot lounge with kitchenette, snooze rooms and shower facilities, a fully equipped business center, weather stations, personalized aircraft and ground concierge services, and permanent and transient hangar storage.

FBO General Manager Glenn Rivenbark said there are no special events that regularly drive up aircraft movements at his facility. However, he noted there is the occasional scramble to meet unexpected VIP arrivals, such as a simultaneous visit last year by Air Force One and Air Force Two, carrying President Trump and Vice President Pence, respectively. Both politicians were in the area in support of Rep. Marsha Blackburn who was running for the U.S. Senate from Tennessee, and Brian Kemp who was running for governor of Georgia. Both candidates won.

But whether it's day-to-day operations or an unexpected arrival, the Shell-branded FBO places continuing emphasis on environmental responsibility, from bicycle storage racks, to encourage the use of a "clean" way to travel in the airport area, to reserved parking for low-emission and fuel-efficient vehicles.

THE CITATION JET PILOTS OWNER PILOT ASSOCIATION'S 10th annual convention in San Antonio in October drew record attendance of 474 people and 65 exhibits. CPJ has more than 1,000 members.

JET AVIATION HAS SIGNED A PREFERRED fixed base operation service agreement with Excellent Air, a German-based charter service operating what it says is Europe's largest fleet of Cessna Citation CJ2 aircraft, along with several Citation XLSs. The aircraft are based in Memmingen, Germany.

KRIMSON, BASED IN ADDIS ABABA, Ethiopia, has obtained a business aviation license from the Ethiopian Civil Aviation Authority (ECAA), one of the first business aviation licenses issued by the authority, it said. The license is required for any business handling any part of the flight support spectrum, including processing of landing permits, immigration arrangements, travel and hotel accommodations, refueling or any other service that facilitates aviation activity, the company said. Krimson offers flight support, ground handling, charter brokerage and other aviation services in Ethiopia and East Africa. "We are extremely pleased to have attained this license," said Dawit Lemma, Krimson managing director and founder. "After four years of operations, it demonstrates that we have the necessary competencies, internal knowledge, and professionalism to enable civil aviation in Ethiopia." Holding the license will give Krimson's international customers confidence that they are working with a company that has adapted or adopted international standards, he said. The application process was rigorous and requires companies to substantiate their professional experience, employee suitability, financial health, sector knowledge and technical understanding of the required norms to operate within civil aviation, Lemma said. Only a limited number of licenses have been made available to companies, Krimson said.

CUTTER AVIATION TOOK DELIVERY OF ITS 20TH HondaJet light jet during a Nov. 14 ceremony at HondaJet headquarters in Greensboro, North Carolina. Cutter Aviation offers aircraft fuel and line services, maintenance, aircraft charter and management and aircraft sales. It operates eight locations in the Southwest. The aircraft comes with Honda Aircraft's new performance package announced earlier this year, which includes the Garmin 3000 avionics software updates, shorter takeoff field length, increased maximum takeoff weight and more mission capabilities, Cutter said. Cutter Aviation's HondaJet Southwest division is the number one HondaJet dealer in the world, based on the number of aircraft sold and delivered, Cutter said. It is an authorized sales and service center with sales locations in Carlsbad, California; Phoenix and Dallas, and maintenance support in Phoenix, Dallas and San Antonio.

TUBREAUX AVIATION SERVICES, based in Shreveport, Louisiana, has joined the Avfuel branded fixed base operator network, including Avuel Contract Fuel and AvTrip rewards.

VERTIS AVIATION IN SWITZERLAND has added a second Boeing Business Jet to its international charter fleet. It will be operated by Longtail Aviation in Bermuda. Vertis is experiencing a rise in demand for aircraft to accommodate complex trips, the company said.

THE B-29 SUPERFORTRESS KNOWN HAS DOC has a new home in Wichita. A new 32,000-sq.-ft. hangar and education center is completed and the aircraft, restored to flying condition, has officially moved in. Restoration began in 2000 and was completed in 2016. Construction began in November 2017. Work on an education and visitors' center continues. The project needs to raise $800,000 to help finish the work. Volunteers have raised $5.7 million of the $6.5 million project. The money was enough to finish the structure. Construction on the $6.5 million facility began in November of 2017, and while the hangar and maintenance portions of the facility are completed, work continues on the education and visitors center portion of the project. The work includes the need to raise an additional $800,000 to help finish the education and visitors center.

Huron FBO Has New Owner, Name

Huron Regional Airport's fixed base operator in South Dakota has a new owner and a new name. The FBO's name has changed from Skyways to ***Fly Jet Center.*** *The FBO has also been renovated to include a pilot's lounge, conference room, flight planning room, heated hangar space and other amenities. Jon Mende of Warwick, New York, recently purchased the company from Danny Hofer, Skyway's founder. Hofer will remain general manager. Tanyika Sims is president and chief operating officer.*

West Star Expands Chattanooga MRO Facility

West Star Aviation has expanded its MRO Chattanooga, Tennessee, facility. The expansion at Metropolitan Airport includes a 65,000-sq. ft. maintenance facility with 40,000 sq. ft. of hangar space and more than 25,000 sq. ft. of office and support space. It also includes a 45,000-sq. ft. paint facility that can accommodate business aircraft, the company said.

INTERVIEW BY **WILLIAM GARVEY**

Rolland "Rollie" Vincent

President, Rolland Vincent Associates and JetNet iQ Creator/ Director, Plano, Texas

A 35+ year veteran in the aviation industry, Vincent has served as a knowledgeable consultant and in executive positions at Textron, Bombardier and the International Civil Aviation Organization in various roles in strategy, marketing, business development, economics and statistics. In 2010, he partnered with Jetnet LLC of Utica, New York, to create Jetnet iQ, a source of independent international business aviation market intelligence. A private pilot born and raised in Canada, Vincent earned bachelor's and master's degrees in economic geography and an MBA in international business and marketing from McGill University in Montreal.

TAP HERE in the digital edition of ***BCA*** to hear more from this Interview or go to **aviationweek.com/fastfive**

Questions for Rolland "Rollie" Vincent

1 ***BCA*'s 2018 *Purchase Planning Handbook* listed 42 models of in-production business jets. Is that sustainable?**

Vincent: There's not enough volume in this market for 42 models, nor for 10 airframe manufacturers. Some exist for reasons other than making money, I think that's pretty clear, and each wants to carve its niche. So long as there are investors to support that activity, then on they go. But the math doesn't work. The more fish you have in the aquarium, the less food there is for each fish, and that's what we're looking at. The market is very flat. We've all been waiting for the volume recovery to kick in post 2008, but that's not happened. It's hard to even call it a recovery. And now as we head into 2019, we've got Brexit, a higher interest rate environment and international threats. People are concerned about what this means for investments and bonds, and it definitely seems that a slowdown is coming.

2 **Are some models or companies particularly vulnerable?**

Vincent: The big question is Learjet. Bombardier has got a jewel in the coal bin but doesn't seem to know what to do with it. It's a shame. There's still life in this well-loved brand, but the company has been signaling for at least five years that it is no longer in love with that end of the market. They're clearly shopping it, if they could get the right price or somebody to joint venture with them. What they won't do is sell to a competitor like Textron and/or Embraer. Beyond that, I'm concerned about Honda. I don't know where it's going. It's nice to see someone coming into our industry with such a huge brand, but has it been a successful investment? No, clearly not. They're not making any money. And 2019 is going to be very challenging for them. The light jet market shows no signs of recovery, and no one has bought their engine, even though it's a good one. The Japanese have a 50-year strategic plan; I get that. And for a $120 billion company, HondaJet represents pocket change. But at some point, someone is going to speak up and ask, "What are we doing here?"

3 **At the other end of the business jet spectrum, will users pay double the subsonic costs to fly supersonic?**

Vincent: Oh yeah. There's absolutely a market and it's expanding. The population of high-net-worth individuals is growing faster than the general population — 6% to 7% annually. Costs are not as big a factor as the environmental impact of such aircraft. That will make them very controversial. But I predict there will be as many as three manufacturers competing in that market in the next 12 to 15 years.

4 **Expanding on industry concerns, what do you see as business aviation's greatest vulnerabilities?**

Vincent: Public opinion. Our carbon footprint is awful, and that's an area of exposure. But more importantly, we're not well understood by the general public, and frankly, we are not well liked. That's hard to say when you live in the industry and earn your living from it. But we're considered elite and represent a very small portion of the population. That is a huge vulnerability. You don't get politicians really excited about something that touches so small a portion of their constituency.

5 **Business aviation's strong suits are its privacy, flexibility, security and providing face-to-face exposure to customers and employees. Is the cost of those attributes still justifiable when technology offers so many alternatives?**

Vincent: I'm in New York City right now on the start of a road trip. I know almost all the people I'm going to see. I suppose I could have done conference calls or emailed them. We're all busy, after all. So, why a road trip? To show up and be sitting there in the lobby, waiting as a partner or client comes to meet with you — that's respectful and powerful. To create business, which is really what these tools help us do, there's nothing like the respect that's obvious when you show up and say, "I'm so happy to see you." And it really signals to the other person that yours is a successful company, since you have your own airplane and the flexibility it provides. It makes a statement, and that doesn't get old. **BCA**

AC-U-KWIK

Things change. **Do you know what to expect when you arrive?**

2019 Editions Now Available to Order!

The Airport and FBO data your trust, in the format you choose.
Print | Online | Digital App

Now Available to Order at
acukwik.com/products

AVIATION WEEK NETWORK

Richard N. Aarons
Safety Editor
bcasafety@gmail.com

A 'Go' Gone Wrong

A faulty decision **made under pressure**

BY **RICHARD N. AARONS** bcasafety@gmail.com

Too often we see an NTSB finding that states: "The probable cause(s) of this accident [involving a highly experienced airman] is determined to be the pilot's decision to initiate and continue flight into known adverse weather conditions, which resulted in spatial disorientation, a loss of airplane control and a subsequent in-flight breakup.

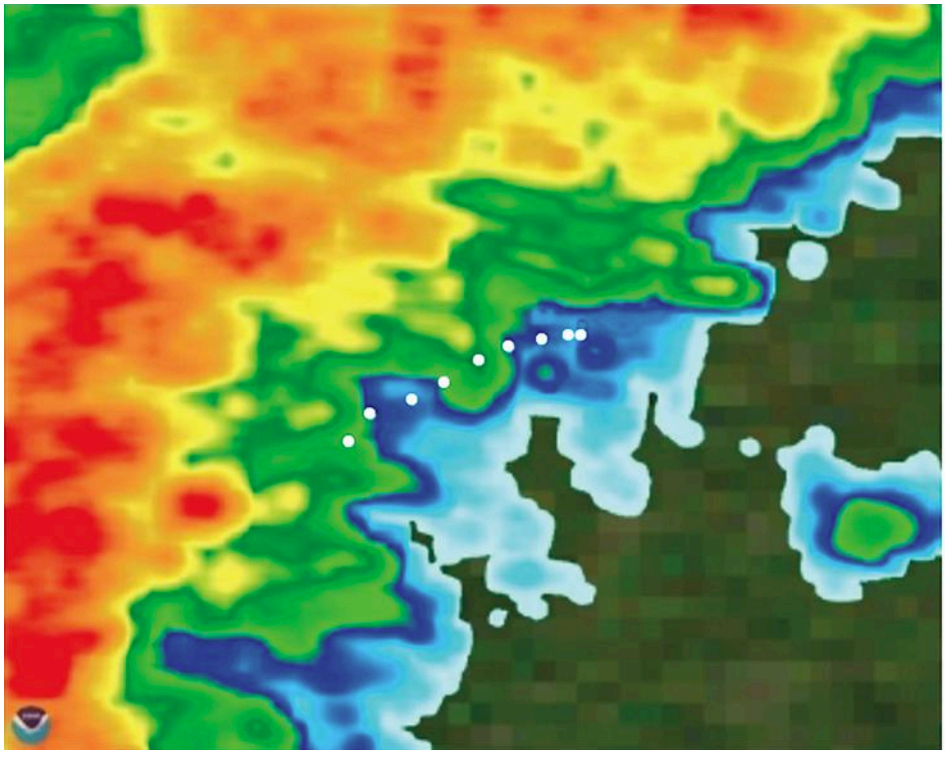
Such is the case with a Key Lime Air Fairchild SA227 (Swearingen Metroliner) that broke up in cumulus activity over Camilla, Georgia, on Dec. 5, 2016, killing its pilot, the lone occupant on the FAR Part 135 IFR cargo flight.

The ATP airman was well-respected and highly experienced. He had accumulated 11,133 hr., with some 4,647 hr. in the make and model. He had flown 74 hr. in the previous 90 days and 29 hr. in the previous 30 days. From 2008 to 2016, company records revealed no unsatisfactory competency/proficiency checks.

The pilot's primary flight assignment was to operate single-pilot cargo flights between Northwest Florida Beaches Airport (KECP) near Panama City and Southwest Georgia Regional Airport (KABY) near Albany. He was the only Key Lime Air pilot based at KECP. The flight was scheduled to depart every weekday, Monday through Friday, at 2130 EST. Upon arrival at KABY, the pilot would typically spend the night at the airport and return to flight duty at 0730 to complete the return flight.

The pilot's most recent flight duty had ended on Dec. 3, 2016, at 0830. He had been off duty until he checked in with Key Lime Air Dispatch about 1 hr. before the accident flight. What follows comes from the Safety Board's investigation into this crash.

About 1 hr. before the scheduled departure time of 2130, the pilot completed a routine check-in call with the Key Lime Air flight follower assigned to cargo flights, who was one of two flight followers working that night at the operator's headquarters and dispatch office in Englewood, Colorado. The departure time



WSR-88D 0.5° base reflectivity image at 2221:47 (left) and 2228:12 (right) with radar-derived flight track overlaid (white dots).

and weather conditions were discussed. The pilot told the cargo flight follower that he was "holding on the ground" for convective activity that was "extreme" and had "tornado activity." The pilot delayed the departure to continue to evaluate the weather conditions along his route.

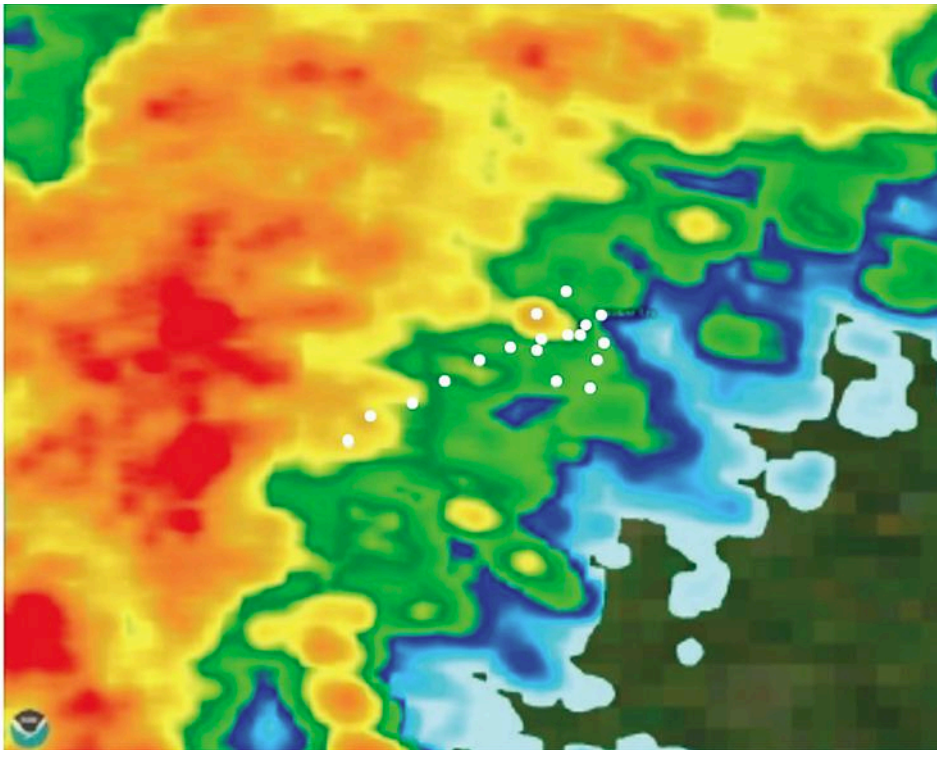
At 2140, the customer (UPS) called the operator's dispatch office, wanting to confirm that the flight (LYM308) would depart, noting if it didn't depart soon, the cargo would "not make service." About 2 min. later, the other flight follower, who was not assigned to the cargo flights, called the pilot, informing him that UPS had called the dispatch office to ask whether the flight was going to depart. According to this non-cargo flight follower, the pilot explained that he would be departing immediately and would try to fly a clear-weather corridor extending northeast toward KABY. The pilot added that if he couldn't get through the storms to his left, he would make Tallahassee International Airport (KTLH) his alternate. The flight departed about 12 min. later at 2154.

ATC voice communication transcripts revealed that, at 2215, the Jacksonville Center controller who was working the flight advised the pilot of a "ragged line of moderate, heavy and extreme precipitation" along his planned route of flight. The controller also stated, "I don't show any breaks in the weather." The controller then cleared the pilot to descend at his discretion from 7,000 ft. MSL to 3,000 ft. MSL.

Subsequently, the controller suggested a route of flight that would have required

a diversion to the northeast for 70 nm to avoid the most severe weather. The pilot responded that he had enough fuel for such a diversion but that he would "see what the radar is painting" after completing the descent to 3,000 ft. MSL.

About 1 min., 30 sec. later, at 2218, during the airplane's descent from 7,000 ft. to 3,000 ft., the controller stated, "I just lost you on radar. I don't show a transponder; it might have to do with the weather."



NTSB

Some 40 sec. later, the pilot advised the controller that he intended to deviate to the right of the course, and the controller told the pilot that he could turn left and right as needed. Shortly thereafter, the pilot stated, "we're going to turn back around to Tallahassee." The controller cleared the pilot direct to KTLH and instructed him to maintain 3,000 ft.

The pilot responded, "present position direct Tallahassee and we'll try to maintain 3,000 here." The air traffic controller then asked, "Do you want to climb back up? I can offer you any altitude." The pilot responded, "We'll see if we can get it up to about 3,000." The air traffic controller then recommended a heading of 180 deg. to "get you clear of the weather quicker," and the pilot responded with "All right, 180." There were no further communications from the pilot.

At about 2220, radar data showed the airplane enter a right turn that continued through about 540 deg. before radar contact was lost at 2222:24. Throughout the final turn, the airplane's reported altitude was near 3,500 ft. A study of the airplane's radar track revealed that its calibrated airspeed varied between 198 and 130 kt., with estimated bank angles between 40 and 50 deg. The airplane's calculated load factor for this radar-recorded portion of the flight was about 1.3 G.

The wreckage was located about 3.4 mi. east-southeast of Camilla, Georgia, and was scattered over a large area that included a cotton field and dense forest. The debris field was about 2,640 ft. long and 1,500 ft. wide and oriented on a heading of 049 deg. true. The wings outboard of the engine nacelles, wing extensions, empennage, ailerons and cargo door separated from the airplane during the accident sequence and were located along the debris path leading to the main wreckage. The first components located along the debris field were the outboard sections of both wings, which exhibited damage and paint transfer consistent with contact with the fuselage. Additional components located along the debris path included the empennage and the mid-span portions of both wings. The fuselage was at the end of the debris path beside a residence. The fuselage, cockpit, cabin section, inboard wings and both engines were damaged by the postcrash fire.

The examination revealed that the left outboard wing separated from the airplane just outboard of the nacelle, and the left wingtip extension separated from the outboard wing. The leading edge was separated into several pieces. The left aileron was separated from the wing and recovered in three pieces.

Examination of the right wing revealed the right outboard wing separated from the airplane just outboard of the nacelle and the wing tip extension separated from the outboard wing. All the right outboard wing structure was recovered away from the main wreckage. The wing structure exhibited substantial twisting and crushing damage in a fore-aft direction. The right aileron was separated from the wing and only the inboard portion was recovered.

There was significant fire damage to the fuselage and the forward cargo door frame with some areas consumed by fire. The fuselage was on its right side and displayed lateral crushing damage. The cargo door separated during the accident sequence and was recovered away from the main wreckage. The flanges for the dorsal fin on the top of the fuselage were flattened to the right. The attach fittings for the pitch trim actuator remained installed on the upper fuselage and the actuator rod ends were installed in the fittings. The rod ends were fractured from the trim actuator. The trim actuator was not recovered.

Examination of the horizontal stabilizers revealed they separated from the airplane during the accident sequence. They were recovered away from the main wreckage. The left elevator was intact and installed on the horizontal stabilizer between the center and outboard hinges. The right horizontal stabilizer revealed it was mostly intact but damaged.

The empennage, vertical stabilizer and rudder were recovered in several pieces away from the main wreckage. The fuselage/empennage structure was mostly intact.

All the fracture surfaces examined had a dull, grainy appearance consistent with overstress separation. There was no evidence of pre-existing cracking noted at any of the separation points.

The type and degree of damage observed to the engines and propellers were consistent with both engines being under power and operating at the time of impact. No evidence of pre-existing conditions was found that would

have prevented normal operation of either engine.

All the propeller blades from both assemblies were accounted for at the time of the examination. Both propeller assemblies had sudden failure damage as the result of impact. The examination found no evidence of any fatigue failure or pre-impact malfunction.

The Division of Forensics Sciences, Georgia Bureau of Investigation performed an autopsy on the pilot. The cause of death was multiple blunt force trauma. The FAA's Bioaeronautical Sciences Research Laboratory, Oklahoma City, Oklahoma, performed forensic toxicology on specimens from the pilot with positive results for dextromethorphan, a cough suppressant commonly used in over-the-counter preparations.

The Weather

Weather at the accident site was night IFR. Albany — 14 mi. from the accident site — was reporting scattered clouds at 2,600 ft., visibility 8 mi. and wind 14 kt. out of the east in light drizzle.

The National Weather Service (NWS) surface analysis chart for 2200 depicted a low-pressure system over Louisiana located along a frontal wave with a cold front extending southward into the Gulf of Mexico and a stationary front extending eastward along the Gulf Coast into the Florida panhandle and southern Georgia, and then into the Atlantic Ocean. A high-pressure system was located over North Carolina. The stationary front was depicted over the flight route and near the accident site.

The station models in the immediate area surrounding the accident site showed a counterclockwise wind-flow pattern suggesting that a low-pressure area was developing along the stationary front. The surrounding stations also reported moderate to heavy rain and thunderstorms. The station model for Albany reported wind from the north about 10 kt., moderate rain, overcast cloud cover, and a temperature and dew point of 60F. To the south of the front over the Florida panhandle, southerly winds of 10 to 15 kt. were indicated with temperatures and dew points in the 70s.

The NWS national composite radar image for 2220 showed that the accident site was located along the leading edge of a line of convection with reflectivities ranging from 50 to 60 decibels (dBZ) immediately west of the site. The line extended from the Gulf of Mexico immediately west of Panama City, Florida, northeastward to the cities of Albany, Vidalia and Statesboro, Georgia, and then eastward through Savannah and into the Atlantic. Other, more scattered or less organized areas of echoes were located across northern Florida, south and east of Tallahassee, to the west of Jacksonville, and into southeastern Georgia. A narrow corridor clear of echoes extended from Panama City to Tallahassee to Moultrie, Georgia. This corridor was located immediately east of the accident site.

The NWS Storm Prediction Center (SPC) graphic convective outlook issued at 2000 depicted where organized thunderstorms were expected to develop and the potential for severe thunderstorms during the period. The chart showed a slight risk of severe thunderstorms over extreme southeast Louisiana and Mississippi, southern Alabama, southwest Georgia and the Florida panhandle, which included the accident site. A marginal risk of thunderstorms surrounded the area and included southern Alabama and Georgia and northern Florida. The slight-risk area implied that an area of organized scattered severe storms was possible, with either short-lived and/or not widespread, isolated intense storms possible. It also implied that one or more tornadoes, reports of intense winds, and 1-in. and possibly 2-in. hail were expected within the designated area.

The automated special observation at KABY at 2221 included wind from 090 deg. at 13 kt.; visibility, 8 sm in rain; clouds, scattered at 2,600 ft. AGL and broken at 12,000 ft. AGL; temperature and dewpoint, 16C; and altimeter, 29.81 in. of mercury.

The automated special observation at KTLH at 2234 included wind from 190 deg. at 16 kt.; visibility, 10 sm in rain; clouds, broken at 800 ft. AGL and overcast at 1,200 ft. AGL; temperature, 24C; dewpoint, 23C; and altimeter, 29.93 in. of mercury.

The closest Weather Surveillance Radar was at NWS Tallahassee, about 50 mi. south of the accident site. Based on the radar scans between 1,960 to 7,000 ft. during the minutes of the flight prior to the accident, the accident flight tracked along the leading edge of a line of heavy-intensity echoes and was operating in light intensity precipitation. The next base reflectivity image for those elevations at 2228:12 showed rapidly developing echoes over the preceding flight track (which ended at 2222:24 in the vicinity of the accident site), indicating heavy-intensity precipitation.

The base reflectivity image at 2234:39 continued to show echoes increasing in intensity over the accident site, indicating heavy to extreme intensity. Several small bowing segments were also indicated to the southwest. The radar records for 2221 and 2228 showed echo tops near 30,000 to 35,000 ft. over the last 4 min. along the flight track and the accident site, with echo tops to 45,000 ft. immediately west of the accident site.

Safety Management

The operator did not have a formal Title 14 CFR Part 5 safety management system (SMS) implemented at the time of the accident nor was it required to have such a program. The operator's technical programs director reported establishing a "system safety-based program" in 2012. As part of that program, the operator's company operations manual (COM) required a flight risk assessment tool (FRAT) to be completed before every cargo flight. The FRAT was a worksheet that assigned numerical risk values to a variety of conditions that a flight might experience. The FRAT concluded with a total score that placed a flight in a "Go," "Consult" or "Permission Needed" category.

According to the COM, a dispatcher or flight follower was required to complete the FRAT, and it was to be preserved for 30 days electronically. During post-accident interviews, the operator's director of operations (DO) reported that a FRAT had not been completed for the accident flight, and in addition, he reported that there was no record that a FRAT had been completed for flight LYM308 in the past 30 days. The DO stated that the failure to complete FRATs for night cargo flights was a "management oversight" and that the management team was not aware that the FRATs were not being completed for night cargo flights.

During a post-accident interview, the flight follower who was assigned to the cargo operations the night of the accident stated that he did not complete the FRAT for the accident flight. He further stated, "At no point in my initial training or when I started did anyone, or any of my coworkers, or any of my bosses, or anyone in the company, tell me that we were responsible for doing FRATs for any cargo flight at all."

According to the other flight follower on duty the night of the accident, the dispatch office only completed the FRATs

for passenger flights, and, to his understanding, FRATs were not required for cargo flights.

Investigators completed a FRAT for the accident flight using the known risk conditions based upon the available evidence. The resultant score of 19 would have placed the flight in the "Go" category.

According to the COM, the DO "is authorized to exercise operational control in all aspects of Key Lime Air's operations." The COM further stated that "the pilot in command (PIC) is authorized to exercise operational control in all areas allowing the safe completion of each flight to which he/she is assigned." The PIC's areas of operational control included:

- The PIC must obtain and check current and forecast weather for the applicable airports. The PIC will do all flight planning to each flight they are assigned.
- The PIC must select an alternate airport if applicable for the intended flight.
- The PIC will load the aircraft within its applicable CG limits and weight limitations.
- The PIC will check to make sure the aircraft is in airworthy condition prior to flight.

According to the COM, a dispatcher had operational control over scheduling of crews and aircraft and for monitoring the progress of flights. A review of the operations specifications and COM found no requirement for flight followers to release cargo flights, as they did not have operational control over flights.

Analysis

Safety Board investigators spent months putting the whole story together. Here's their analysis of the accident with emphasis on the go/no-go decisions made by the pilot.

Examination of the wreckage indicated that the airplane experienced an inflight breakup at relatively low altitude, consistent with radar data that showed the airplane's last recorded altitudes to be around 3,500 ft. MSL. The symmetrical nature of the breakup, damage to the outboard wings, and damage to the upper fuselage were all signatures indicative that the left and right wings failed in positive overload almost simultaneously. There was no evidence of pre-existing cracking noted at any of the separation points, nor was there evidence of any mechanical anomalies that would have prevented normal operation.

The Spatial Disorientation Trap

The FAA states (and all pilots are instructed) that sight, supported by other senses, allows a pilot to maintain orientation while flying. However, when visibility is restricted (*i.e.,* no visual reference to the horizon or surface is detected), the body's supporting senses can conflict with what is seen. When this spatial disorientation occurs, sensory conflicts and optical illusions often make it difficult for a pilot to tell which way is up.

The *FAA Airplane Flying Handbook* (FAA-H-8083-3B) — you can find it online at **https://www.faa.gov/regulations_policies/handbooks_manuals/aviation/airplane_handbook/** — describes some hazards associated with flying when visual references, such as the ground or horizon, are obscured. It states, "The vestibular sense (motion sensing by the inner ear) in particular tends to confuse the pilot. Because of inertia, the sensory areas of the inner ear cannot detect slight changes in the attitude of the airplane, nor can they accurately sense attitude changes that occur at a uniform rate over a period of time. On the other hand, false sensations are often generated; leading the pilot to believe the attitude of the airplane has changed when in fact, it has not. These false sensations result in the pilot experiencing spatial disorientation."

Somatogravic illusions include "the head-up illusion." This illusion involves a forward linear acceleration, such as takeoff, during which the pilot perceives that the nose of the aircraft is pitching up. The pilot's response to this illusion would be to push the control yoke forward to pitch the nose of the aircraft down.

FAA Advisory Circular (AC) 60-22 — *Aeronautical Decision Making* — found at **https://www.faa.gov/regulations_policies/advisory_circulars/index.cfm/go/document.information/documentID/22624** —states, "Pilots, particularly those with considerable experience, as a rule always try to complete a flight as planned, please passengers, meet schedules and generally demonstrate that they have 'the right stuff.'" One of the common behavioral traps that the AC describes is "get-there-itis." The text states, "Common among pilots, get-there-itis clouds the vision and impairs judgment by causing a fixation on the original goal or destination combined with a total disregard for any alternative course of action."

Turbulence is present in all thunderstorms. Severe or extreme turbulence is common. Gust loads can be severe enough to stall an aircraft at maneuvering speed or to cause structural damage at cruising speed. The strongest turbulence occurs with shear between updrafts and downdrafts. Outside the cumulonimbus cloud, turbulence has been encountered several thousand feet above, and 20 mi. laterally from, a severe storm.

The Turbulence Reporting Criteria Table in the FAA Aeronautical Information Manual provides the following definitions:

Severe: Turbulence that causes large, abrupt changes in altitude and/or attitude. It usually causes large variations in indicated airspeed. Aircraft may be momentarily out of control.

Extreme: Turbulence in which the aircraft is violently tossed about and is practically impossible to control. It may cause structural damage.

Readers may find these publications worth review from time to time. Certainly, all flight crews want to "get the job done." However, too often, the risk side of the equation does not get the attention it deserves. **BCA**

Review of base reflectivity weather radar data showed that, while the pilot was maneuvering to divert to the alternate airport, the airplane was operating in an area of light precipitation that rapidly intensified to heavy precipitation, as shown by radar scans completed shortly after the accident.

During this time, the flight was likely operating in clouds along the leading edge of the convective line, where the pilot most likely would have encountered updrafts and severe or greater turbulence. The low visibility conditions that existed during the flight, which was conducted at night and in instrument meteorological conditions, coupled with the turbulence the flight likely encountered, were conducive to the development of spatial disorientation. Additionally, the airplane's maneuvering during the final moments of the flight was consistent with a loss of control due to spatial disorientation. The pilot's continued flight into known convective weather conditions and his delayed decision to divert the flight directly contributed to the accident.

Although the operator had a system safety-based program, the responsibility

Accidents in Brief

Compiled by Jessica A. Salerno

Selected accidents and incidents in November 2018. The following NTSB information is preliminary.

November 29 — About 1421 EST, a Piper PA-30 (N7751Y) crashed following a loss of control shortly after takeoff from the Marion Municipal Airport (MZZ), Marion, Indiana. The airline transport certificated pilot was killed and the airplane was destroyed. The Piper was registered to and operated by a private individual as a PAR Part 91 personal flight. It was VFR at the time of the accident, and a flight plan had not been filed. The local flight was originating at the time of the accident.

According to witness information, the airplane departed Runway 22, climbed to about 500 ft. AGL and began a left turn. During the left turn, the airplane "nose dived" in a downward spiral toward the ground. The airplane crashed and a post-impact fire ensued.

According to local authorities and witness information, the pilot, who was also an airframe and powerplant mechanic, had been troubleshooting an unspecified problem with the left engine. One witness described the accident flight as "test flight."

The airplane wreckage was located in a soft and wet harvested soybean field about one-quarter mile south of MZZ. Post-accident examination of the airplane showed the fuselage, empennage, and inboard sections of both wings were consumed by post-impact fire. The left engine and propeller assembly remained partially attached to the airframe. One propeller blade showed no damage, and one propeller blade was straight and bent aft. The right engine remained partially attached to the airframe, and the right propeller assembly was separated from the engine, aft of the crankshaft flange. One blade was twisted and bent forward, and one blade was twisted and bent aft.

November 18 — At 2240 CDT a Cessna 441 (N441CX) was destroyed when it broke up inflight and crashed in an open field near Harmon, North Dakota. The airline transport certificated pilot, flight nurse and paramedic were killed. The airplane was registered to and operated by Bismarck Air Medical under the provisions FAR Part 135. It was VFR at the time of the accident, and an IFR flight plan had been filed for the air medical cross-country flight. The flight originated from Bismarck Municipal Airport (BIS), Bismarck, North Dakota, at 2230, and was en route to Sloulin Field International Airport (ISN), Williston, North Dakota. Preliminary information indicated the crew was en route to ISN to pick up a neonatal infant for transport back to BIS. Radar data indicated the airplane climbed on a direct course until reaching 14,000 ft. ASL. Ground speed was at 240 kt. The airplane then entered a steep right bank and radar contact was lost. No distress calls were received.

Wreckage was scattered for about 1 mi. long and 600 ft. wide on snow-covered terrain. The cockpit area, cabin area, empennage, both engines and propellers, and both wings were identified and recovered. Flight control continuity was established.

November 26 — About 1950 MST, a Mooney M20C (N113TA) crashed about one-third miles south of the Santa Fe Municipal Airport (SAF), Santa Fe, New Mexico. The pilot was fatally injured. The airplane was destroyed by impact forces and a post-impact fire. The Mooney was registered to Nelson Flying Service and operated by the pilot as a Part 91 positioning flight. Night VFR conditions prevailed. The flight was not operated on flight plan. The flight originated from the Phoenix Goodyear Airport (GYR), Goodyear, Arizona about 1500 and was destined for the Colorado Plains Airport (AKO), Akron, Colorado.

A friend reported that the pilot had recently purchased the airplane and was planning to relocate it to AKO in order to have an annual inspection completed. Employees of the Lux Air Jet Center at GYR reported that the pilot had completed some maintenance on the airplane during the preceding few weeks. However, they had not provided any maintenance services to the pilot and, to their knowledge, there had been no other third-party maintenance work done on the airplane. The airplane was fueled about one month before the accident flight at the request of the pilot.

A witness stated that he observed the airplane twice shortly before the accident. Initially, he heard the airplane but did not see it. He was only able to locate it from the ambient lighting surrounding the airport because there were "no lights whatsoever on the airplane." The airplane appeared to be on an "abbreviated" left downwind for Runway 20 at SAF. In both instances, the airplane turned and crossed over the approach end of the runway before he lost sight of it. His perception was that

for the safe outcome of the flight was left solely to the pilot. Written company policy required completion of a FRAT before each flight by the assigned flight follower; however, a FRAT was not completed for the accident flight. The flight followers responsible for completing the FRATs were not trained to complete them for night cargo flights, and the operator's management was not aware that the FRATs were not being completed for night cargo flights. Further, if a FRAT had been completed for the accident flight, the resultant score would have allowed the flight to commence into known hazardous weather conditions without any further review. If greater oversight had been provided by the operator, it is possible that the flight may have been canceled or re-routed due to the severity of the convective weather conditions present along the planned route of flight.

Perhaps the bottom line for pilots is that, in the end, it's the PIC's go/no-go decision. Professionals want to complete the job, especially when the pressure is on. However, getting the job done means getting it done safely. (See "The Spatial Disorientation Trap" sidebar.) **BCA**

the pilot was not trying to land at that time, rather he may have been trying to attract the attention of the tower controller. The airplane appeared to be in a "clean" configuration, with the landing gear and wing flaps retracted. The engine sounded as if it was at a "medium" power setting and he did not suspect any issues with the engine. Shortly after losing sight of the airplane the second time, he heard sirens related to the emergency response to the accident.

The airplane crashed in a shallow ravine south of the airport. The fuselage and empennage were consumed by a post-impact fire. The wings were located in position relative to the fuselage and exhibited leading-edge crushing damage along the entire span of both wings. The inboard portions of the wings were damaged by the post-impact fire. The engine and propeller were located with the wreckage.

▶ **November 23 — About 1733 PST,** the pilot of a Cessna 208B (N781FE) became incapacitated after he reached the airport run-up area at Meadows Field Airport (BFL), Bakersfield, California. The airline transport pilot received minor injuries and the airplane was not damaged. The airplane was owned by FedEx Corporation and operated by Westair, Inc., under the provisions of Part 135 as an on-demand, scheduled cargo flight. Visual meteorological conditions (VMC) prevailed, and an instrument flight rules flight plan was filed for the cross-country flight that was destined for Ontario, California.

According to the pilot, he notified the company of his arrival at the airport at 1610 and taxied the airplane to the FedEx ramp located at the southeast corner of the airport. He met with FedEx personnel who loaded boxes into the upper cargo area of the airplane. The pilot counted a total of about 41 large boxes, totaling about 36 kg of dry ice among the shipping containers. A FedEx dangerous goods representative approved the shipment as the dry ice weight furnished by the shipper was below the company's operating limit of 76 kg, a weight limitation provided by FedEx for the shipment of dry ice specifically as cargo onboard its Cessna 208B airplanes. He did not open the shipping containers. After the loading was completed, the pilot finished his paperwork and started the airplane at 1729. While taxing to Runway 30R the pilot felt "strong sleepiness" accompanied by difficulty breathing. He stopped the airplane at the runway run-up area and closed his eyes.

After the pilot failed to respond to air traffic controllers for 25 minutes, a firefighter illuminated the cockpit and observed an occupant with his head rolled back and his mouth open. The firefighter placed wheel chocks in front of the main landing gear tires to prevent the airplane from advancing. Following several unsuccessful attempts to get the pilot's attention, the firefighter administered a sternal rub, which caused the pilot to move. The firefighter engaged the fuel cutoff to shut down the engine and subsequently disengaged the electrical system. During this time the pilot became more conscious, but his speech was unintelligible. However, moments later the pilot was able to demonstrate to the firefighter that he was coherent by answering a series of relatable questions. The pilot exited the airplane on his own and was transported to the hospital by an ambulance.

An FAA inspector performed a post-incident examination of the airplane the following morning at the request of the NTSB investigator-in-charge. His inspection discovered numerous boxes labeled "Dry Ice," positioned behind the pilot and stacked to the ceiling of the upper cargo pod. The shipping contents were refrigerated inside thermal bags that had been filled with dry ice pellets and the bags were loosely closed and taped.

▶ **November 16 — About 1130 CDT, a** Bell OH-58C (N510CP) struck powerlines and came to rest in the Coosa River, near Clanton, Alabama. The helicopter was owned and operated by the Columbus Georgia Police Department. The commercial pilot and student pilot passenger were killed. Visual meteorological conditions prevailed, and no flight plan was filed. The positioning flight was conducted under Part 91 and was destined for Chilton County Airport (02A), Clanton, Alabama. The flight departed Columbus Airport (CSG), Columbus, Georgia, about 1025 EST and stopped at Auburn University Regional Airport (AUO), Auburn, Alabama, to pick up the passenger before continuing to 02A.

According to witness statements, the helicopter approached the river from the east and flew north over the river. It was flying low, made a left turn and then flew south over the river. One witness observed the helicopter "catch" the powerlines, turn and impact the water. Another witness lost sight of the helicopter before hearing an explosion. Both witnesses saw the helicopter in the water and noted that the powerlines were no longer there. Examination of the wreckage was pending its recovery from the river. **BCA**

Quest Kodiak 100 Series II

Still rugged as a bear but without the rough claws

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

Walk up to a Series II Kodiak and you'll be hard-pressed to notice differences between it and the original model unless you've logged hundreds of hours in type. It still appears to be the result of aviation Darwinism, an ursine-like utility aircraft whose progenitors survived, if not thrived, in the rugged outback of its namesake Alaskan archipelago.

Its robust aluminum fuselage is designed to be repaired in the field, prolonging its life in the wilderness. The 54-in.-by-57-in. cargo door is large enough to load a 10-ft., 1,500-lb. grizzly. Its single Pratt & Whitney Canada PT6A-34 grew up helping power crop dusters, so it's accustomed to dense dirt clouds, short cycles and rough handling. Its small diameter, four-blade Hartzell propeller assures 19 in. of clearance under its nose from rocks, weeds and debris, plus ample thrust for short-field takeoffs. Its bear-sized landing gear is agile and tough enough to scramble over rubble and rocks.

The Series II, though, has several improvements from the original aircraft, says Mark Brown, Quest Aircraft's marketing director and chief demo pilot. This version has graduated the firm's finishing school in Sandpoint, Idaho, making it a more refined companion of pilots and passengers who want to explore the outdoors in comfort. Gone are the wind leaks, exhaust odors and sun glare in the cockpit thanks to upgraded door and wing root seals, plus new sun shades behind the windshield.

The flight deck's Garmin G1000NXi integrated avionics kit looks much like the original G1000 system, having three 10-in. flat-panel screens and twin audio control panels. But the NXi starts up and responds considerably quicker than the baseline G1000 because it has dual-core processors. Pilots now can choose a variety of PFD insets, including mini moving maps from the MFD that display traffic, terrain, waypoints and weather. The PFD inset, for instance, can display returns from the optional onboard weather radar, while the MFD displays XM radio weather graphics.

PHOTOS: QUEST AIRCRAFT

The NXi has computing power to spare, provisioning it for future enhancements.

Garmin's Flight Stream 510 Bluetooth adapter provides easy uploading of flight plans and navigation database updates from tablet devices. It's compatible with both Garmin Pilot and ForeFlight Mobile, the app we used for our demo flight.

Let's Go Flying

We climbed into the left seat of s.n. 247 on a windy afternoon at San Diego's Montgomery-Gibbs Executive Airport (KMYF), while Brown took the right seat as guide and instructor pilot. Climbing aboard, we noticed the new two-position doorstops on the left and right sides that firmly hold the doors either partially or fully opened. The partially open stop makes the door easier to reach and close once you're seated in the cockpit.

The instrument panel is cleaner because an integrated standby instrument with LCD screen replaces three standalone gauges. The update makes possible left- and right-side glove boxes, ideal for stowing small PDAs. Optional on the Series II are front-seat or all-seat Bose A20 active noise attenuating headsets ($1,095 each) that use own ship's DC power, eliminating the need for AA batteries. Also optional are CVR and combined CVR/FDR boxes with high-impact-tolerant memory modules.

The aircraft was fitted with optional vapor-cycle air-conditioning, beefier rough-field wheels and tires that allow a boost in max landing weight from 6,690 lb. to equal the 7,255-lb. MTOW limit. The aircraft also had a TKS deice system, 10-place oxygen equipment and the gentrified Timberline cabin upgrade. The interior upgrade included a commodious Filson field bag to hold your Canon EOS R for shooting wildlife, a pocket for Brooks Brothers deerskin, cashmere-lined gloves and reward treats for the family Labrador retriever.

That added $305,600 and 618 lb. to the base Series II airplane, for a full BCA-equipped price of $2,455,000 and 4,417-lb. EOW. Not included were the digital camera, leather gloves and canine compatriot.

Additional options, but not included on this aircraft, are a single-point pressure refueling kit, which is almost essential when the aircraft sits atop the optional Aerocet 6650 amphib floats; solid-state Garmin GWX-70 weather radar with optional Doppler turbulence detection and ground clutter suppression; 63-cu.-ft. external baggage belly pod; and a traffic awareness system. However, ADS-B In, displayed on one's iPad running ForeFlight or Garmin Pilot, provides traffic and weather graphics in the U.S. and Alaska.

Starting the engine involves boost pump, ignition and starter motor turned on, condition lever to idle at 14% N2 gas generator rpm and monitor engine indications to assure safe start.

Brown uploaded the flight plan from his iPad running ForeFlight Mobile. USB charging ports assure tablets are available for the entire mission. Our route would take us eastbound from Montgomery Field, over the Cuyamaca

Improved door seals prevent exhaust odors from entering the cabin.

Sixteen-gallon TKS system protects prop, windshield and wings. It's replaced by a hydraulic power pack when the aircraft is fitted with floats.

Beefier optional heavy-duty landing gear affords a 565-lb. boost in operating weights.

Optional mud flaps help prevent ravel and stone damage to horizontal stabilizer.

Optional single-point pressure refueling virtually is a must when aircraft is fitted with floats.

The Garmin G1000 NXi has twice the computing power, crisper displays and Flight Stream 510 Wi Fi/Bluetooth interface for uploading flight plans and updating databases.

Displays may be configured as full screen, as show above, or split screen with a moving map and an electronic chart of checklist.

Optional Timberline interior cossets the gentry when it flies between home, resort, lodge and yacht.

Mountains in east San Diego County and then down to Agua Caliente Hot Springs (L54), which hosts a 2,500-ft. paved strip hemmed in by high terrain on its west side.

With two of us up front and 1,000 lb. of fuel aboard, our computed takeoff weight was 5,600 lb. Field elevation was 427 ft. and OAT was 24C.

Selecting flaps 20 deg. for takeoff, we pushed up the power to the max for takeoff. The -34 is flat rated to ISA+6C, so we were limited by the 790C ITT takeoff temp redline rather than max torque. Nevertheless, with 710 of 750 shp available, takeoff performance was still impressive. We rotated at 60 KIAS and lifted off in about 600 ft. We were 100 ft. above the pavement before we were 1,000 ft. from where we started the takeoff roll.

Retracting the large, slotted Fowler flaps, there was little apparent change in pitch feel because the aircraft has an automatic pitch trim system that helps neutralize the pitch moment associated with changing flap position.

We settled into a 100 KIAS climb, turned right downwind toward the east San Diego County desert and leveled off at 3,500 ft. well before reaching the boundary of Montgomery Field's Class D airspace.

With clearance from SOCAL approach, we climbed to 7,500 ft. through San Diego's Class B airspace, pulled back the prop to 2,000 rpm and settled into a 170 KTAS cruise while burning about 340 pph. The Series II appears to be quieter than the original model and it's certainly free of exhaust odor intrusion. Better door and wing root sealing also helps to improve air-conditioning and heating system performance.

Crossing the ridgeline of the Laguna Mountains, we pulled back the power to near idle and plunged down to 2,000-ft. pattern altitude at Agua Caliente Springs (L54). With winds out of the west, we used right traffic to landing on Runway 29. At 2,500-ft. long and 60-ft. wide, it provided generous margins for less-than-perfect pilot technique on landing.

Coming in from the east side, there weren't any obstacles to challenge us on the approach. Recommended approach speed with flaps 35 deg. for landing was 74 KIAS. Landing field elevation was 1,220 ft. and it was a toasty 35C outside. The Kodiak's optional air-conditioning kept us comfortable at 21C in the cockpit.

On short final, the aircraft felt fast, but the airspeed indicator was pegged on 74 kt. Crossing the threshold, I gradually pulled the power to idle, flared high and plopped gracelessly on to the pavement. Memo to self: Should have learned last time I flew the aircraft. Slow to 65 KIAS over the threshold, start the round out much closer to the surface and let it settle onto the runway at about 55 KIAS.

Taking off from Agua Caliente on the 35C day, we had to monitor max engine temp carefully to avoid exceeding the 790C ITT redline. It was a reminder

that when departing short, unimproved strips at relatively high operating weights, it's essential to check takeoff performance numbers in the AFM.

However, with 600 shp available and at 5,300 lb., the aircraft climbed off the hard pavement and out of the valley at well over 1,000 fpm.

After another less-than-ideal landing at Agua Caliente, we flew over to Jacumba (L78), another rural airport in east San Diego County with 2,562 ft. of pavement. Landing on Runway 25, I slowed down to 65 KIAS over the threshold, resulting in an improved touchdown. Still, I'll need a lot more practice to use the 1,000- to 1,500-ft. strips for which the aircraft was designed.

Returning to Montgomery Field, we took full advantage of the aircraft's Flightstream 510 data link for ADS-B In to display on our iPads the dozens of aircraft operating in San Diego's Class B airspace.

Total fuel consumed for the 90-min. mission was about 500 lb., right in line with Brown's predictions for the aircraft.

On Aerocet 6650 Amphib Floats

The Kodiak 100 was designed from the outset in 1998 to pair ideally with Aerocet carbon-fiber floats — both amphib and wheel-less. Tom Hamilton, principal designer of the Kodiak 100, even put in spacers at the attachment points between the forward structural cabin bulkhead and the tubular engine mounts that could be replaced with forward attachment fittings for floats.

In 1986, Hamilton founded Aerocet Inc., now a leader in carbon-fiber float design. But when that business started to wind down, he started serious design work on a rugged bush airplane to replace the aging single-engine prop aircraft used by missionary groups to support their work in Asia, South America and Africa. The Kodiak 100 was the final result of his efforts.

Hamilton knew that conventional aluminum floats imposed great weight and drag penalties. Seawater corrosion and chronic leakage were other drawbacks. With composite floats, he was able to optimize the aircraft's weight and durability while making it easier to mold in complex contours for aerodynamic and hydrodynamic performance. There are no exposed seams, rivets or joints on the bottoms or sides to create extra drag in the water.

Hamilton says Aerocet carbon-fiber amphib floats are at least 380-lb. lighter than conventional aluminum counterparts. The entire system adds about 700 lb. to the aircraft's empty weight, according to the flight manual of the aircraft we flew. Straight floats are 300+ lb. lighter in weight as they lack landing gear, brakes, hydraulic actuating system, cockpit controls and indicators.

Brown says that the aircraft cruises 8-kt. faster with Aerocet floats than with aluminum floats, and that's indeed what we experienced when we flew the aircraft so equipped in summer 2017. They're so watertight that the sumps only need to be drained every two weeks instead of every 12 to 24 hr. The only way water can get into the dry float bays is through the door seals of the storage compartments.

Straight floats are priced at $325,000. Installation takes about 35 hr. The amphib floats are priced at $400,000 and they take 85 to 100 hr. to install. The amphib float system includes a 500-psi electrically powered pump and a backup, hand-operated hydraulic pump to actuate the landing gear, plus cockpit controls and indicators for the landing gear and water rudders.

Quest Aircraft CEO Rob Wells believes there will be strong demand for the aircraft with Aerocet floats, in spite of its near $3 million price tag. The matchup is well-suited for shuttling high-end hotel guests between jetports and beachside resort properties, or between general aviation fields and hunting and fishing lodges. The floats easily can handle 18- to 20-in. waves in windswept lagoons, well-sheltered harbors and small lakes.

Wells also believes Quest will find potential buyers who operate in the Caribbean, Bahamas and Florida, as well as Canada, Michigan and Minnesota. There also are plenty of owner pilots in the Pacific Northwest and Alaska with the means to acquire high-performance floatplanes to complement their fixed-wing business aircraft fleets.

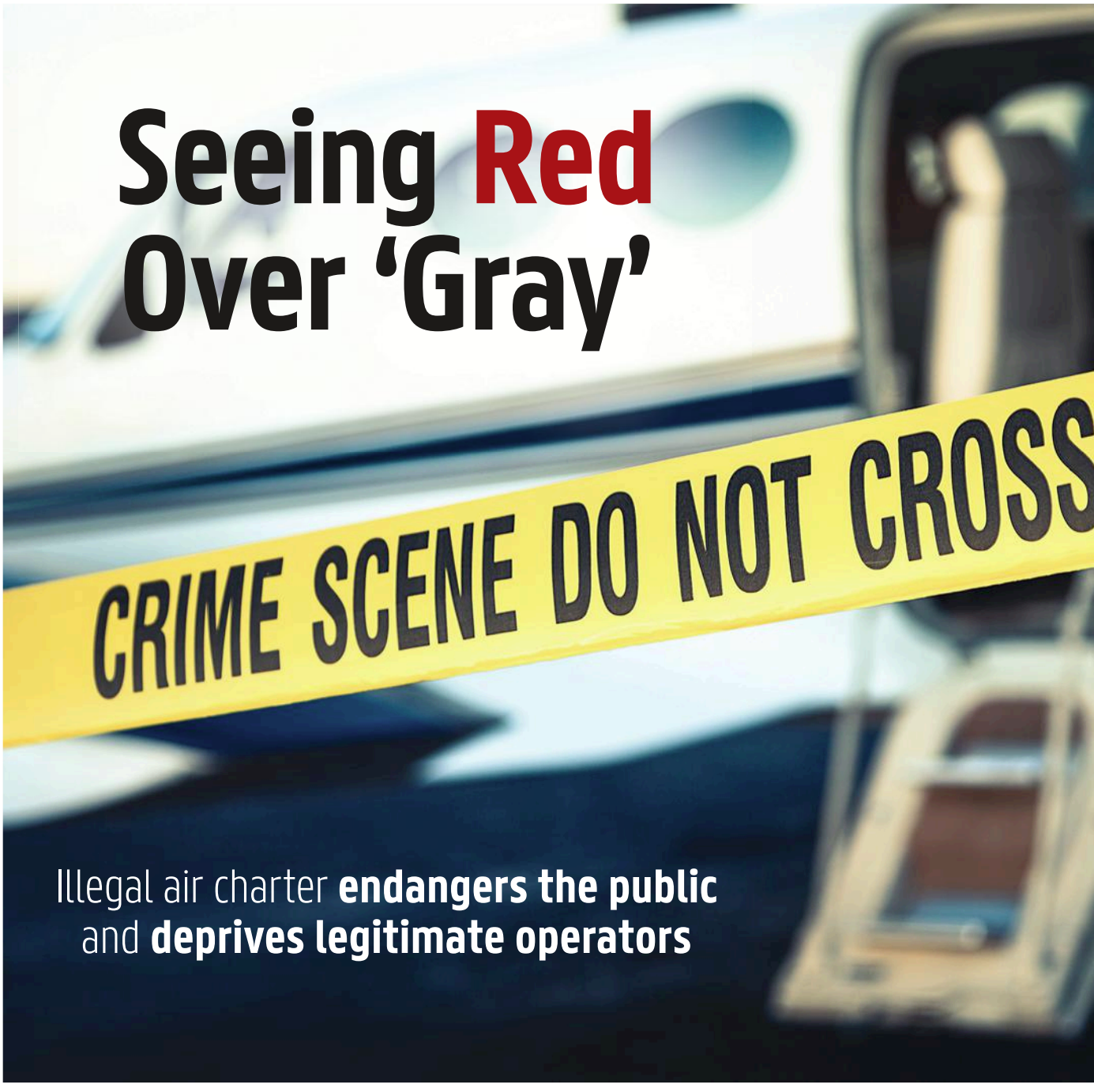
Aerocet floats, made of carbon fiber, add about 700 lb. of empty weight, still 380-lb. lighter than aluminum floats.

"It's in a sweet spot because of its STOL characteristics, strong power-to-weight ratio, lightweight floats and storage volume," he said. "As a float plane, it takes full advantage of the Kodiak's inherent performance, so it comes off the water a lot faster than most competitors, perhaps 50% faster than some single-engine turboprops."

The Kodiak 100 began life as a powerful, rugged, utilitarian STOL turboprop bush plane designed to support missionary organizations. Those same attributes also make it ideally suited for floatplane operations and many other missions. It's bigger than a de Havilland DHC-2 Beaver and smaller than a DHC-3 Otter or Cessna Caravan. But it's more powerful than either vintage de Havilland and it offers superior takeoff performance to a Cessna Caravan on floats.

The original Kodiak 100 set a new and higher standard for bush and floatplane performance. The Series II sacrifices nothing in utility, while raising the bar for refinement. **BCA**

Seeing Red Over 'Gray'



Illegal air charter **endangers the public** and **deprives legitimate operators**

BY **DAVID ESLER** david.esler@comcast.net

The assessment of a $3.3 million penalty last June by the FAA against a Michigan business aircraft operator for allegedly performing "hundreds" of bogus charters has sent a clear (albeit belated) message to the U.S. business and general aviation communities that if you engage in illegal charter flights — either intentionally or out of ignorance — the feds are watching and will track you down. Both the Department of Transportation and the Department of Justice have endorsed the FAA action.

Hinman Company of Portage, operating under subsidiary Hincojet LLC, is accused by the U.S. District Court of Michigan of conducting 850 flights in Beechjet 400A and Hawker 900X jets that were essentially commercial in nature but for which it did not have the federally required FAR Part 135 Air Carrier Certificate. Hincojet allegedly pulled this off through time shares — six of them in all — on its aircraft through which it exceeded the FAR-stipulated allowances for charging users: basically, the cost for all fluids plus an additional charge equal to 100% of the direct operating costs for each flight.

By charging its customers more than FAR Part 91.501(d) allows (as well

on multiple occasions, double-billing time-share clients for legs), the FAA asserts, Hincojet entered the realm of commercial operations for which it lacked authorization.

In addition, the agency said, "Hinman failed to meet the FAA's requirements for record keeping, including pilot records and load manifests, for each flight. The company also had no Part 135 training program in place, and the pilots operating the flights were not authorized to conduct [them] under Part 135. . . ."

The Hinman case — if guilt is proved in the court — could be an example of "gray charter," the term for illegal commercial air transportation, in which unwitting passengers pay to be flown by an unqualified operator. Also referred to as "Part 134½," gray charter runs the gamut from openly criminal activity — i.e., Part 91 operators intentionally posing as commercial entities without Part 135 approval — to inadvertently violating the commercial FARs simply by accident or out of ignorance of the rules. (And as an FAA examiner once said to us, "Ignorance of the FARs is not an excuse — it's a violation.")

John McCraw, the National Air Transportation Association's director of regulatory affairs, defines gray charter as "a complex set of errors where the flights people are paying for are not operated within the rules — that is, within the realm of the operations certificate and its requirements." Behind that, he elaborated, "is a lot of complexity that can result in gray charter. So, we are trying to define it and better educate both the consumers and the operators — the people getting into agreements on airplanes who may not understand the legalities or understand that they're getting into a situation where they can be responsible for a lot more than they realized as an aircraft owner or a leaser/lessee."

Gray charter hurts two ways. First, it cheats and potentially endangers the lives of unsuspecting passengers who pay for transportation aboard aircraft that may not meet commercial maintenance standards and are flown by pilots with questionable training and experience. Secondly, it robs business from legitimate, Part 135-approved operators in the area. According to McGraw, bogus charter is "the No. 1" complaint among NATA members at the organization's town hall meetings, especially over the last two years. And the problem appears to be growing.

'The Clueless and the Criminal'

"It is taking place everywhere," McGraw observed, "but anecdotally, it seems to be more prevalent in the South. But I doubt that geography plays a role in whether people follow the rules or not." Who is doing it? "The malefactors make themselves look like legitimate operators — they advertise and even maintain websites. 'Optics' — a nice shiny jet on the ramp — can convince people who are not armed with the right information to make an informed decision that a charter operator is legitimate."

The industry lacks statistics on just how big the gray charter problem is, but McGraw said the NATA has accumulated a lot of "anecdotal evidence." He said the organization sees examples of both the "clueless and the criminal." For example, it recently found a charity organization that was auctioning off flights in an airplane owned by one of its members and had no idea this was illegal. "That was a model for the clueless," McGraw said. Another example involved country club members who owned airplanes, got together and decided to sell time-share memberships, operating the airplanes with pilots not under their employ who lacked proper certification and no proper lease agreements in place. (What could possibly go wrong? See later for a discussion on leasing and the traps it can contain.)

"Then there are recent cases where a crew wasn't qualified to fly the airplane," McGraw continued. "This represented willful disregard for the regulations — the criminal. And NATA members are aware of operators on their fields doing this illegally. What we're trying to do is highlight this to the FAA when there is evidence of malfeasance."

Ah, the FAA, which seems to have taken a renewed interest in illegal charter after legitimate operators pleaded with their Flight Standards District Offices (FSDOs) for years to check out the bogus operator "holding out" (*i.e.,* posing as a certificated commercial operator) on the other side of the field. Now, the agency is taking a proactive approach to identifying the various forms of illegal charter and shutting down or otherwise punishing operators practicing them.

Ian Gregor, the FAA's Pacific Division communications manager, is tasked with educating the media on the gray charter threat. He explained that, "Illegal charters can take a variety of forms." A few of these include providers operating without required certificates and/or under incorrect rules; use of aircraft that are not on operators' FAA-authorized aircraft lists; use of unqualified pilots; offering ride-sharing; attempting to transfer

operational control to customers; and operators and customers cooperating to concoct leases that don't include crewmembers (i.e., dry leases), but providers then direct customers to use specific flight crews.

Examples of these infractions — in addition to the Hincojet case — include three enforcement actions in 2018 against business and general aviation operators:

▶ Steele Aviation, Beverly Hills, California. In December 2018, FAA proposed a $624,000 civil penalty against Steele for allegedly conducting "illegal passenger-carrying flights", a second bust for the operator in less than a year for unauthorized operations.

In 2015 and -16, Steele was accused of having dispatched 79 flights for which passengers paid fares aboard a Gulfstream IV and a Hawker 125 when neither aircraft was listed aboard the Operations Specifications (OpsSpec) of the operator's Air Carrier Certificate. Furthermore, pilots operating these flights failed to meet Part 135 training requirements and the SIC lacked proper pilot anæd medical certificates. In January 2018, FAA imposed a $167,500 civil penalty against the operator for those infractions, terming Steele's actions as "careless" and "reckless."

In the latest case, the Feds allege that between October 2016 and February 2018, Steele dispatched 16 commercial flights aboard Cessna Citation and Hawker 125-800 aircraft even though it lacked the ACC for these operations. The flights involved transporting the same paying passenger throughout California and to Washington.

▶ In January 2018, the feds issued an Emergency Order of Revocation against TapJets Inc., of Spring, Texas, and Fargo, North Dakota, for allegedly operating 10 passenger flights between September 2016 and January 2017 flown by unqualified pilots, one of whom served as SIC while holding a student pilot certificate. Meanwhile, 14 other flights were operated in aircraft not listed on TapJet's ACC. The FAA described the company's attitude toward regulatory compliance as "cavalier."

▶ Another Emergency Order of Revocation was levied by the FAA against Carolina, Puerto Rico, operator Air America Inc., for conducting multiple flights in 2017 by an unqualified pilot lacking proper training, and for duty time violations, operating overweight and improperly loaded aircraft, and failing to keep proper pilot records. This activity led to the crash in June of a Piper Aztec, killing a passenger. The company has surrendered its ACC to the FAA.

> The FAA, which seems to have taken a renewed interest in illegal chater after legitimate operators pleaded with the **FSDOs for years to check out the bogus operators "holding out" on the other side of the field.**

The Permutations of Part 91

Despite alleged scams and the thwarting of regulations, it's important to remember that there are many permutations of Part 91 operations that are perfectly legal. That's the beauty of the noncommercial regulation in that it allows operators the flexibility to address multiple needs. So, "We should be a little bit careful discussing illegal charter," Nel Stubbs, vice president at aviation consultants Conklin & de Decker, cautioned, since not all operations that can be conducted under the regulation justify an "illegal" classification.

"Part 91 operators/owners can let other people use their aircraft through time shares, interchanges, personal use and dry leases," Stubbs pointed out. "In addition, a Part 91 operator may be able to carry federal and/or state elected officials and receive payment and that's legal under Part 91.321." The same operator can carry friends and relatives as long as they don't pay a fare to the operator as they would on a Part 135 charter. "They are my guests," Stubbs said, "but I have to claim personal-use income on my tax return if I do this. It's only when someone does 'Time Shares R Us' that it becomes a problem." (And see Hinman vs. U.S.)

Here are definitions of various arrangements or operations that can be made or conducted under Part 91, as per Stubbs. We begin with leases:

▶ A wet lease is the lease of an aircraft with crew for compensation or hire. "Operational control stays with the lessor," Stubbs said. (Part 91.501 covers several areas where a Part 91 operator can provide aircraft and crew for compensation, such as time shares, interchanges, inter-company charge-backs and demonstration flights, in large, turbine-powered aircraft.)

▶ A dry lease is the lease of an aircraft without crew ("crew" meaning any crewmember, even a cabin attendant). Operational control goes to the lessee, and this is significant under the regulation. "Lessees need to understand that they will have to get their own crew, insurance, and maybe even an RVSM LOA," Stubbs said, "and that they will hold the risk and liability associated with the operational control of an aircraft. The owner/lessor cannot recommend or provide any crew. A question for the owner/lessor is, 'Do I want to give up operational control of my aircraft?' On the flip side, does the lessee want operational control?" And if the owner places a crewmember, *e.g.,* a flight attendant, aboard the aircraft to keep an eye on it, it automatically converts to a wet lease. (Which the FAA refers to as a "sham" and some in the industry sarcastically call a "damp" lease.)

▶ A time share is the lease of an aircraft with crew to another person or entity. "This also qualifies as a wet lease," Stubbs explained, "however, there is a restriction in 91.501(d) on what can be charged . . . [basically], two times the cost of fuel and other direct operating costs such as landing fees, catering, crew expenses, and so forth. What can't be charged are pilot salaries, maintenance fees and deicing, to name a few." In addition, for aircraft that weigh more than 12,500 lb., the lease must comply with truth-in-leasing requirements of Part 91.23. Agreements must be in writing and amounts paid are subject to commercial federal excise taxes (FETs).

▶ Under interchanges, operators are trading hour for hour, and this triggers federal excise taxes as well.

"Costs between the users are equal — in theory," Stubbs said. As with a time share, the agreement must be in writing and commercial FET will apply to the Fair Market Value (FMV) of the interchange.

▶ While a demonstration flight is not a lease, the restriction on what can be charged is the same as under a time-share agreement. Again, the amounts paid are subject to commercial FET.

Camouflaged Charter

A vulnerability of leasing and other Part 91-allowable arrangements is that they can be employed as camouflage for illegal charter schemes. According to NATA charter guru Jacque Rosser, leases are a favorite tool for gray operators "by making it appear that passengers have actually dry leased the airplane and have operational control of it. In other words, it's set up to appear like a dry lease."

Rosser cited the notorious Darby/AlphaJet/Platinum Part 135 "certificate-sharing" scheme early in the century that ended in a runway overrun at Teterboro in 2005, destroying a Bombardier Challenger 600, damaging a commercial building, and seriously injuring people on board and in a car on the roadway beyond the runway's end. The post-accident investigation revealed that one operator operating under a dba ("doing business as") was "renting" the Part 135 certificate from the other for $2,000 per flight. Neither the aircraft nor the flight crew met Part 135 requirements, and, incredibly, the crew believed they were flying a Part 91 mission. "After that," Rosser said, "there was a huge emphasis on operational control [by the FAA]."

(Note that in the controversial rewriting of Paragraph A008 in the Part 135 Ops Spec section delineating operational control, special consideration was given to managed aircraft used for charter to set aside the virtual wet-lease state of aircraft and flight crews that owners contract to charter/management companies. See "The FAA's New 'Ops Spec' for Charter — Will It Work?" *BCA*, June 2006, page 50.)

The key is that the party with operational control has accountability and authority for the flight, Rosser emphasized. "And if you lease an airplane, the problem emerges when it is a wet lease that includes the crew and full responsibility for the airplane — and [in the eyes of the authorities] that constitutes commercial air transportation. You have these systems that someone has organized in such a way that it appears the aircraft has been dry leased and the lessee is hiring crew. The reality is that in some of these systems, the crew is coming with the airplane, and they are not assuming operational control, the lessee is.

"People involved in these schemes know darn well what they're doing," she continued. "The perpetrators include both the clueless and the intentional. And from what our members are reporting, it's growing."

In the Hinman/Hincojet case, the operator had entered into time-sharing agreements under Part 91. "These can be legitimate if they're done correctly . . . [and] there are some things you can be reimbursed for," Rosser said. "What they were doing is hard to identify, if there is no routine inspection of private operators [by the FSDO holding the operator's certificate]. Someone with firsthand knowledge has to make a report to the FAA if they are seeing 'blips on the radar.' Hinman is accused of having conducted more than 800 illegal flights. That paints a pretty interesting picture, and it will be interesting to see how it plays out.

"The fact that [the Department of] Justice took it up is significant," she continued, "since it raises the consciousness of aircraft owners that there are consequences to going outside the rules. The fine [that was assessed] is significant." It is not

Publications That Offer Guidelines for Operators and Consumers

The NBAA and the National Air Transportation Association have published consumer guides to explain the ins and outs of air charter and how to evaluate providers. Following the 2005 Teterboro Bombardier Challenger accident, the NBAA commissioned its Aircraft Charter Consumer Guide. Simultaneously, the NATA released two pamphlets, "Chartering an Aircraft: A Consumer Guide" and "Risk of Illegal Charter." Finally, FAA Advisory Circular AC 91-37B, Truth in Leasing, provides information and guidance for lessees and "conditional buyers" of U.S.-registered aircraft and a primer on operational control and how to evaluate a leasing agreement. All are free and downloadable at the organizations' websites, **http://www.nbaa.org/charter** and **http://www.nata.aero**, and at the FAA's site at **http://www.faa.gov**. **BCA**

The Illegal Charter Reporting Hot Line

Operated by the Air Charter Safety Foundation, the Illegal Charter Reporting Hotline is open to employees or agents of FAR Part 135 on-demand certificate holders and the general public to file reports of suspected illegal commercial flights, "where an aircraft operator without a Part 135 certificate is accepting compensation for transportation in violation of both FAA and Department of Transportation regulations." The toll-free hotline, **(888) 759-3581**, is staffed by an independent third party with knowledge of the air charter industry. Reports can be filed anonymously if desired, and all reporters will be provided with a case code for follow-up. The FAA will be provided with details to initiate an investigation, and the National Air Transportation Association will regularly contact the FAA to ensure that cases are being followed up for appropriate action. **BCA**

necessarily the profit motive that is in question here, Rosser maintains, but that the operator is essentially conducting commercial air transportation without proper authority, in this case, a Part 135 certificate. Hincojet is accused of charging its time-share customers more than the allotted expenses; thus the customers were essentially paying a "fare" (*i.e.,* the operator's overcharge) converting the time shares to a commercial air transportation operation.

Offsetting Operating Costs

Why are owners engaging in these schemes? "They are trying to offset the operating cost of the airplanes," Rosser answered. "If you want to truly do that, the only legal way is Part 135 and willingness to bear its costs. If someone is trying to sell you on one of these schemes, you have to ask yourself 'Why you'd do that instead of going full 135?' If your goal is to offset the cost of ownership, you have to carefully scrutinize a scheme to determine that it's not illegal air transportation."

In an operator's due diligence, it helps to have proper counsel, *i.e.,* an aviation lawyer, who understands the regulatory thicket and what to look for. "It is eye-opening," Rosser said, "how heavily the feds are into how aircraft are being used, even on a private basis. [That is, the new, elevated level of federal oversight.] You have to consider your potential exposure if you're embarking on one of these schemes. Every flight from the time you began your illegal operation is a violation. Maintenance issues, pilot issues, all the requirements of Part 135 can really getcha." McGraw also pointed out that there are IRS tax issues to consider, as well. "If you are making money on illegal charters you have a tax obligation . . . and this might lead to apprehension for violating FARs," he said.

As reported in "New Concepts in Charter" (*BCA,* April 2017, page 52 and May 2017, page 56), other business models for charter are cropping up, some of which reflect questionable legality. One of these is flight sharing, a web-based child of the internet with sites that advertise open-seat trips on private aircraft, some even listing city pairs, all set up with prices. "They will pair you with a general aviation pilot," McGraw said, "or you can outright charter a plane to where you want to go. The FAA is very concerned about this and is investigating and taking actions."

Some of these web-based ride-sharing sites have been violated more than once by the FAA. "If they see one that looks suspicious," McGraw said, "the

Illegal Charter: The European Perspective

No, BACA — "The Air Charter Association" — headquartered in London is not the *British* Air Charter Association. Rather, it's — and this is ever so Monty Python British — the *Baltic* Air Charter Association. Say what?

BACA has nothing to with the Baltic Sea or Baltic countries of Lithuania, Latvia or Estonia. It is so named because it was started in the 1930s by the Baltic Exchange, a marine brokerage organization, to represent the needs of British air charter operators. Today, its headquarters is located in the Baltic Exchange building in London.

The Baltic Exchange was founded in 1744 and continues to exist as an advocacy organization for the international maritime industry and freight market and as an information provider, *i.e.,* a database collector on maritime contracts and activities. (To that end, it maintains seven indices on various maritime business categories.) Its 650 international member companies encompass the majority of world shipping interests and commit to a code of business conduct that extends to BACA and the air charter industry.

"We are a trade association that is focused on the charter brokering market, predominantly in Europe," Richard Mumford, BACA's chairman, told *BCA.* "We are dedicated to raising the standards of conduct among brokers. We have 240 corporate members earning £10 billion annually." About a third of BACA's membership are brokers, a third operators and the remainder suppliers like handling agents, fuel sellers, etc.

"With that," Mumford continued, "we look to have clarity between commercial and private operations, because all of our members fly charters with customers under commercial AOCs, and obviously they have a strong view of the use of private aircraft that are effectively flying paying customers on bogus charters. And, yes, there are illegal charters that are flown out of ignorance."

But in either case, Mumford emphasized, "you fundamentally are putting customers on an aircraft that is not subject to a commercial maintenance program and other considerations like pilot certification and training. Do the people on the aircraft know the difference? That they are being protected by the commercial standards?"

And it seems that the children of the internet have migrated to Europe. "There's this new body of flights called cost-sharing platforms," Mumford said. "You have a website, and private pilots can advertise there to carry passengers on their aircraft and are allowed to do it if they don't charge more than the cost of the flight. This has resulted in all sorts of flights on all sorts of aircraft that are not being commercially maintained and the public doesn't understand the difference between the two things. It's being twisted into a commercial enterprise."

BACA has been lobbying the U.K.'s Civil Aviation Authority (CAA) to police this relatively new activity, but Mumford said the agency is distracted at the moment by Brexit, the U.K.'s initiative to depart from membership in the European

first step is to send in an inspector to determine if the scheme is legal. The inspector explains how the website operator has violated federal regulations, and if the offender shows remorse and promises not to do it again, the case ends there without punishment. But there is at least one case where the website operator committed a second case of this."

Then there are bogus "flight training" schemes in which the operator arranges flights under the subterfuge of providing flight instruction to the customer when, actually, the flight is just air transportation. "There are a lot of different ways people are willfully or out of ignorance doing this," McGraw observed. "Another thing that is eroding the regulations is flight sharing. And certificate sharing is still an issue and needs to be looked at."

A decade ago when illegal charter was coming to the fore as never before, Rosser and her colleagues in aviation advocacy organizations like the NATA and the NBAA, as well as legitimate charter operators, were pleading with the FAA to take action against perpetrators. Understaffed and preoccupied with recurrent reauthorizations and congressional budget battles, the agency failed to react on a meaningful basis. It simply didn't have the resources, especially at the FSDO level. Thus, the advocacy groups took up the cudgel on behalf of their members and the larger needs of aviation safety to augment the FAA and apply pressure on it to act.

The Air Charter Safety Foundation, for example, instituted the Illegal Charter Reporting Hotline on the premise that the best source for determining illegal activities in the field is the community of legitimate Part 135 operators, since they generally become aware of the perpetrators faster than anyone else (although the non-aviation public can use the resource, as well). When reports are phoned in, they are forwarded to the FAA, which is theoretically obligated to investigate all complaints. The reports also serve as an informal statistical database on illegal activity.

During the first couple years of its existence, the Hotline was popular with Part 135 operators and received a lot of calls, Rosser and McGraw said. But when operators noted that FAA response to their reports was tepid — that is, that not many field investigations were being seen — reports began to tail off. The perception was that the reports were not being taken seriously and thus there was no point in going to the trouble of reporting malefactors. And while the FAA had formed Special Emphasis Investigation Teams (SEITs) for, among other subjects, operational control, such a focus did not exist for illegal charter activities — until recently.

Union requiring the CAA to divorce itself from the European Aviation Safety Agency (EASA), which has proven to be a difficult exercise.

Exploiting Leasing Loopholes

And the Brits and Euros are having their own issues around leasing. "Instead of chartering, you lease the aircraft for a day, and the customer becomes the operator of the aircraft — but it's operated as a private flight," Mumford said. "The customer doesn't know any of that, and the idea that the customer has to know all this is ridiculous. It's a wet lease, a device to get around the commercial rules, a loophole in the law. It is a perversion of the appropriate commercial rules, and we're seeing a lot of it. Some commercial operators are fudging on this to use the Pilatus PC-12 to avoid the twin-engine charter rule." (In the U.K., single-engine aircraft cannot be operated on charter flights; however, the CAA is expected to relax the that ban for commercial ops soon.)

Worse, Mumford claimed, BACA sees "a share" of illegal charters coming into Europe from the U.S. on privately designated flights. "Sometimes these are aircraft operated under AOCs but reported as private flights. There are reasons why someone would want to do that, like runway performance, where a private flight can get into an airport that commercial rules would prevent a commercial one to access. We are trying to narrow the regulatory rules so there is less incentive to do this." Furthermore, it has been known for years that some U.S. Part 135 operators are flying paying local passengers on return trips from the U.K. and Europe to avoid deadhead losses, thus violating cabotage rules.

Just as in the U.S., no statistics exist on the breadth of the illegal charter problem, mainly because U.K. regulatory authorities are even less able than the FAA to take action, so no statistics are being accumulated. "There have to be consequences to the infractions for people to take reporting them seriously," Mumford said. "Our members often see these schemes, but when they report them, very little seems to happen. So, over the years, the market has become cynical about it, as they weren't seeing results. When you make the effort to prosecute bad behavior, you create an example to discourage other potential perpetrators."

Last summer, BACA took a leaf from the NATA's playbook, parlayed with the European Business Aviation Association (EBAA), and agreed that since the government authorities weren't addressing operator infractions on either side of the English Channel, the two organizations needed set up their own reporting system. The idea, Mumford explained, is "to get people to report to us so we can build up cases and take them to the regulators and force them to do something about it.

"We are looking for a 'super case' that is made out for us as a fait accompli," he continued. "It may take a couple years to do that. But in the meantime, we need to build confidence within the market. There is very low confidence among our membership that there is anything that is being done. Worse, when you talk to people in the market, they feel the only way proper traction will happen is when there is an accident, as cynical as that may seem. At Biggin Hill, there was an accident a few years ago where a private flight posing as a charter killed the crew and passengers, and yet we still didn't get the results [from the CAA] we'd been hoping for." **BCA**

Reenergized FAA Response

Eventually, the industry had to take the initiative to push the FAA to enforce its own regulations. One example of this was NATA's Illegal Charter Task Force, assembled specifically to inform FAA staff members at the Washington, D.C., headquarters and in the field of the proliferation of improper leasing schemes and encourage meaningful action to mitigate them. Perhaps because of industry pressure and a gradual recognition of the magnitude of the illegal charter problem, the agency has appeared to adopt a new stance, as evidenced by the federal actions against alleged FAR violators cited in this report.

"I see a lot of momentum behind this right now within the FAA, as well as within the industry," Rosser said. "What's come out of the [2018] FAA reauthorization in terms of reports — a self-analysis of their effectiveness and what their challenges are in carrying out their mission — is how effective the agency is in policing illegal activity. What are the options? How hard is it for them to investigate? What can we do to help the local inspectors? Giving them better tools is what the reauthorization report is all about.

"We are looking at the 10 years of the Air Charter Safety Foundation Hotline," she continued. "What are the obstacles the FAA is faced with in acting on it? Enforcement actions take a long time and are conducted in silence, so how do we improve the feedback loop for operators who report malfeasance? We have to give inspectors the authority and approval to look at these things and give them the tools to know what to look for."

Concerning the poor optics between Hotline reporting and the perception of inaction by the FAA, the NATA has held discussions with the agency about providing feedback. "When civil penalties occur, we will advertise them so our members can see specific examples of what can happen when they don't follow the rules," McGraw said. "Some of these bad actors are taking business away from our legitimate members."

And finally, an SEIT has been formed to focus specifically on illegal charter. "Because FSDOs investigate most suspected illegal Part 135 cases, it's not possible to determine how many enforcement actions the FAA has taken against such operators," the FAA's Gregor said. "However, the FAA's Special Emphasis Investigation Team alone has initiated cases that resulted in more than 85 actions against pilots, operators and others. These actions include license suspensions, revocations and civil penalties. Some cases are resolved by the operator agreeing to comply with the regulations going forward."

Get Educated

It is obvious that one of the most effective tools to assist the FAA in fighting gray charter is the education of aircraft owners, charter operators and customers. Both the FAA and the advocacy organizations, principally the NATA and the NBAA, have developed publications describing what operators can and cannot do and what charter customers need to know in order to evaluate whether an enterprise purporting to be a commercial operator is legitimate. (See "Publications That Offer Guidelines for Operators and Consumers" sidebar.) "We are trying to reach out as much as we can to media where aircraft owners are available to educate them on what the rules are and why they need to proceed with caution," Rosser said. "We're working with the FAA on guidance documents and revising our own documents like the NATA Chartering Guide to make them more current and valuable, putting things in terms that owners can understand. The FAA has a lot of information but needs to make it more user friendly with an easier user interface."

Since business aviation flight departments often charter aircraft for supplemental lift, it behooves whomever is responsible in the organization — scheduler/dispatcher, aviation manager, or executive travel department — to know how to vet a Part 135 operator. To that end, the NATA's McGraw offered this advice with key questions to ask: Do you hold an FAA Part 135 certificate? Can I see it? Gregor at the FAA added that in addition to the Part 135 certificate, a customer can ask to see the operator's Ops Spec, which will list specific aircraft for which the operator has been approved.

Continued McGraw: "If the price is too good to be true, it probably is. It takes quite a bit of money to operate a Part 135 operation legally, and that has to be passed on to the consumer. I have seen operators who have third-party accreditations on their websites that are false. So ask, 'Can you show me a valid accreditation?' You can look up Part 135 operators and their N-numbered aircraft on the FAA website. [Click on "Part 135 Aircraft Listing from Ops Spec D085."] But we need a better interface available for this. Consumers need more and better tools."

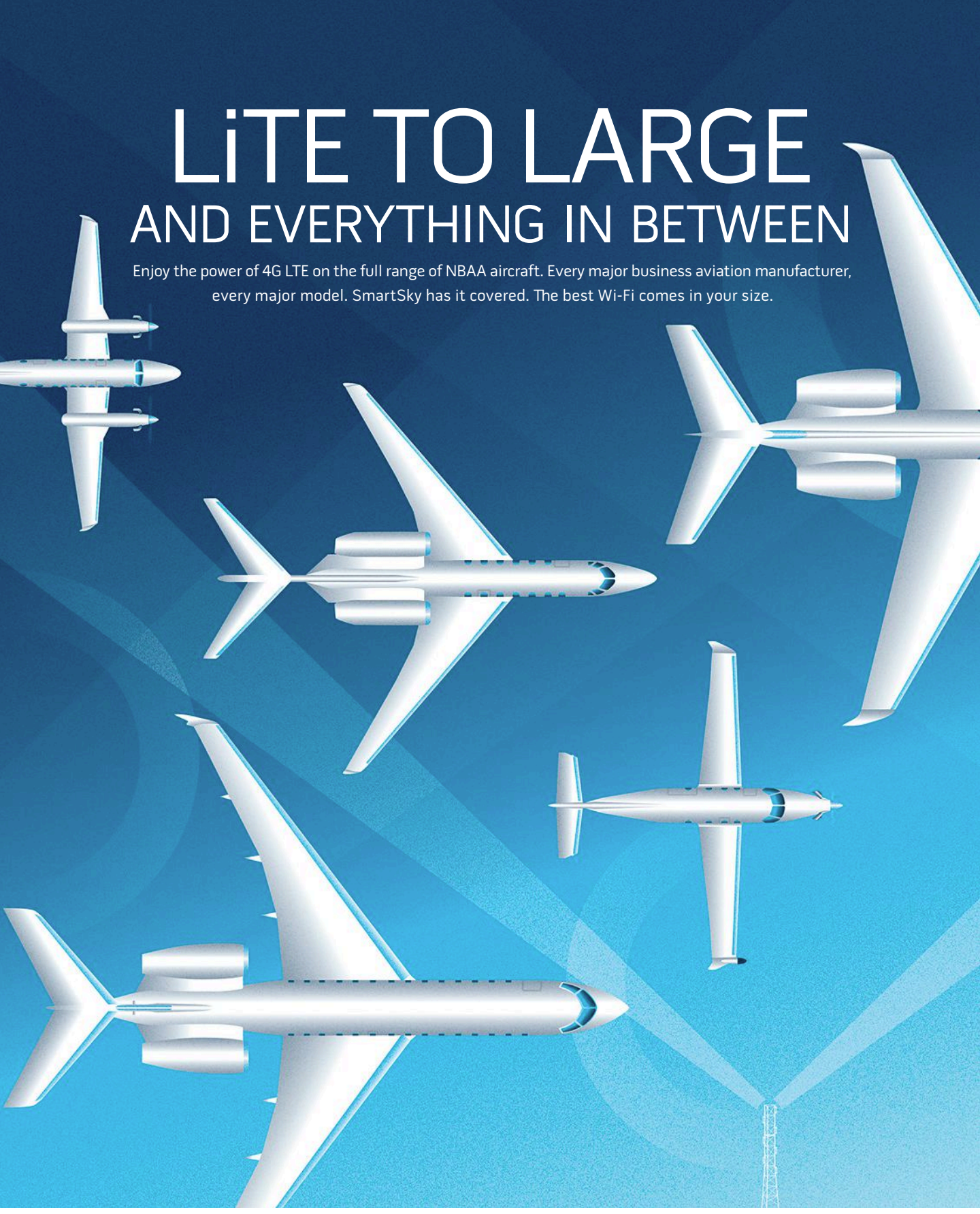
Added Rosser, "If you are looking to charter a plane, and the person you're working with is telling you to have two separate invoices — one for the pilots and one for the flight — you are leasing, not chartering, and you are supposed to have operational control, which means that you're liable for the flight. That's a big red flag. If you need transportation and you're getting separate invoices, you are probably doing an illegal charter."

Gregor has his own red flags suggesting that a company may not be an authentic Part 135 operator:

- If the company provides the aircraft and at least one crewmember yet attempts to transfer operational control to a customer via any document.
- A lack of federal excise tax charged to the customer. Legitimate operators have to charge this.
- Lack of a safety briefing or passenger briefing cards on board.
- Any evasiveness to questions or concerns. Legitimate operators should be transparent.
- If the pilot or someone associated with the company coaches passengers on what to say or do if an FAA inspector meets the aircraft at its destination.

Working with reputable charter brokers can alleviate a lot of worry for the non-aviation executive tasked with acquiring a charter. However, it is essential to understand the relationship between the broker and charter provider and the issue of who has operational control. Any broker advertising that it operates "a fleet" or has "access to hundreds of aircraft" should be avoided. As Rosser points out, under the Department of Transportation's unfair and deceptive practices rules, brokers cannot represent themselves as air carriers. A revision of those rules, codified under DOT 14 CFR, Part 295, plus an amendment to Part 298, is scheduled to go into effect on Feb. 14, 2019.

Concludes Nel Stubbs: "Gray charter boils down to the unaware, the uninformed and the criminal. What can you do, what can't you do? Owners, lessors, lessees and operators need to be educated." **BCA**



Checking Your Angst

Dealing with **check ride nerves** and **inflight mistakes**

BY **JAMES ALBRIGHT** james@7700code.com

Do you get nervous before a check ride? It's only natural. Have you ever made a mistake early during a check ride and then had to worry about it as you tried to concentrate during the rest of the flight? That's a natural reaction, too. But dealing with nerves before and during a check ride is a skill you can master.

I am writing this from a hotel room in West Lafayette, Indiana, on the day of my 40th year graduation reunion from Air Force ROTC here at Purdue University. My class includes an astronaut, three test pilots, two more with time in the SR-71, quite a few airline pilots, and me. It is, obviously, a time for reflection.

The Purdue University Engineering Mall

JAMES ALBRIGHT

As we flew to Indianapolis in the back of an almost full regional jet, my wife took the occasion to reread my first book, Flight Lessons 1, to reflect on our days at Purdue and U.S. Air Force pilot training. As she got to the part about my first flight in the Cessna T-37 she asked, "Wasn't it exciting?" I said, "No, not particularly." We've been married for 45 years and she is used to that kind of stoicism, but still she said, "How can that be?" As we waited for our luggage after the flight, I checked my email and found a letter from a BCA reader who wanted to know how I dealt with check ride nerves, making mistakes during a check ride, and dealing with a check ride failure. I thought about that for a while and realized that my answer about excitement and dealing with the check ride questions were the same.

One of the many purposes of a check ride in Air Force undergraduate pilot training is to place the student under considerable stress so as to ensure they can deal with stress that is sure to come later in their military career. You might see some of that early on in an airline, too. But sooner or later the event becomes simply an exercise in ensuring the pilot being checked can achieve the standards set by those doing the training. The single most important fact in all of this for us is this: A check ride is more of an evaluation of the training program than of the student. If the trainers did a good job, the student will pass. If the student fails, the training department failed the student. So that being said, how can you temper any nervousness?

(1) Practice, practice, practice — Maximize your simulator practice and when that is done, try some "chair flying." (More about that shortly.)

(2) Study, study, study — Learn systems, procedures, checklists and callouts so they become automatic. Being able to recite an emergency procedure automatically is a great way to build confidence and eliminate any awkward pauses in the simulator. I'm not saying do everything as quickly as possible and without reference to checklists or taking advantage of the rest of the crew. But knowing procedures allows you to fly with confidence. As the engine is on fire after takeoff, novice pilots fret that they should be doing something, anything! An expert pilot realizes the best thing to do is fly the airplane, take care of any immediate action items, and then climb to the minimum altitude before taking the next steps.

(3) Arrive at the check ride well rested, and in good spirits. I used to counsel my students to simply relax. "Don't be nervous, and that's an order!" As silly as that may sound, it is good advice. Stop the nerves by ordering yourself to stop being nervous. Give that a try; it works for me.

(4) Treat the evaluator as a human being — In those awkward moments before "fight's on," make small talk with the evaluator. This can be about the weather, the local area, hobbies or your favorite war stories. You might have more practical experience in type and a good "there I was" story is sure to get the evaluator's interest. Get the evaluator talking. This does a couple of things for you: It gets the evaluator to start thinking of you as human and it tells your subconscious that the person running the panel is no different from you.

A Flashback to My First Check Ride

I was a 22-year-old second lieutenant and didn't have a pilot's license when I showed up for Air Force Undergraduate Pilot Training (UPT) at Williams Air Force Base, Arizona. My first instructor pilot was 24-year-old 1st Lt. David Clary, a magnificent instructor. He showed up at UPT two years earlier and was handed me and another second

lieutenant for his first try at being an instructor pilot. I say he was magnificent because he was. (He went on to become a major general.)

Like me, Clary was half Japanese, soft spoken, and an engineer by education. As I hoped to one day become, he was highly knowledgeable, unflappable under pressure, and never at a loss in any situation. My fellow student was Roger Jeeter (not his real name), a recent graduate from the Air Force Academy. Roger was very smart and had no problems flying the airplane with one exception: spin recovery. Once the airplane started spinning, Roger was a mess. Our first check rides were scheduled for the same day, Roger going first.

"A check ride is like any other flight," Clary explained. "You've already practiced every maneuver, every situation, every possible scenario. You are just duplicating what you already know. Don't second guess yourself, don't get wrapped up in little things that aren't perfect. If you make a mistake, that is automatically history. Shift your brain to the next event and move on."

Tom Wolfe's brilliant book, The Right Stuff, was to come out later that year, followed by the movie four years later. But reflecting on Clary's advice, I realize now the wisdom of his words back then. Wolfe describes the intense training pumped into early Mercury astronauts so that the space flights had already been practiced with such detail that the astronauts didn't have time to contemplate fear, anxiety, excitement or any other type of emotion. They were simply duplicating their performances in training.

Our UPT experience was similar in many ways. Air Force pilot training is unlike civilian pilot training because of the time constraint. Back then you had 48 weeks and just under 200 hr. of flight time to learn every facet of aerobatics, formation, low level navigation and instrument flight in the T-37 and T-38. Half your time was solo. If you failed to measure up, you were history. My class of 77 students, for example, graduated only 44. So how do you make automatic everything needed for a flight when flight and simulator hours are limited? You introduce another concept of military aviation: "chair flying."

When dealing with something new, you need to make it "un-new" and almost automatic. One of our earliest challenges was learning the overhead visual pattern. Once you had it down, you never gave it a second thought. But until then, it was filled with opportunities to have an instructor in the other seat take the airplane away from you. Even solo, instructors on the ground stood ready with a radio call or a pyrotechnic flare to send you around. That's how many of us students first became acquainted with the flight properties of our kitchen chairs.

Practicing the overhead pattern in my T-37 chair gave my wife an opportunity for a laugh or two and I am grateful she didn't have a cellphone camera in 1979. You simply sit in the chair as if in your cockpit. (I've heard some pilots would do this wearing their flight helmets and Nomex gloves, but I didn't take it to this extreme.) Then you placed your hands on an imaginary stick and throttles, and started talking your way through:

▶ "Set about 80% to hold 200 kt." You visualized the indicators.

▶ "Fly over the runway at 1,000 ft. AGL." You visualize the view outside the cockpit, trying to allow the time to elapse as it will in the airplane.

▶ "At the midfield break, roll 60 deg. bank left, pull back to maintain level flight." You move the imaginary stick. If you have a tendency to do something wrong, you can articulate the corrective action.

▶ "Remember to give the stick a couple shots of back trim as the speed bleeds, roll wings level after 180 deg., extend the speed brake, and check that the runway is about halfway down your left wing." I hear the Air Force gave up on these very tight patterns years later, but for us you could place the runway so that it intersected the midpoint of the wing and be spaced correctly.

▶ "Extend the flaps." Your hand hits the imaginary flap handle.

▶ "Extend the gear."

▶ "Look for the touchdown point over your left shoulder, roll 45 deg. of bank left, let the nose fall 15 deg., back pressure and trim." Your hands move and you make your gear down call.

▶ "Hook 21, gear down, touch and go."

▶ "Move the throttles until you just hear the thrust attenuators, keep 120 kt., check halfway through the turn that you've lost half the altitude."

▶ At this point I had a tendency to lean in my chair and my wife had a tendency to laugh.

▶ "Adjust bank to roll out on centerline. Add power to keep 100 kt. The first bars on the runway should be halfway up the windshield."

And so it went. I did that until I didn't need to, when all of it became automatic. Clary would make us close our eyes at his desk and go through the procedures. Sitting firmly on the ground, Roger seemed to get all the procedures just right, but he confessed to me the spin recovery often tripped him up in the airplane. I was certain he was going to "ace" the first check ride, but he didn't.

Our check rides had three possible grades: Q1, Q2 or Q3. A Q1 meant you passed. A Q2 meant you passed but there were things that needed to be retrained and reevaluated. A Q3 meant it went so badly, the entire check ride had to be repeated. You got a total of three tries, but after that, you packed your bags and looked for a job in the Air Force that didn't involve flying airplanes. We called the Q3 a "hook," from the old vaudeville days where a bad act was dragged off the stage with a big, theatrical hook.

"Hooked it," Roger said after his first check ride.

Clary didn't have the details from the evaluator pilot before it was my turn, but he probably suspected and gave me some last-minute advice: "If you make any mistakes, don't worry about it. Nobody flies a perfect airplane and I've never flown a perfect check ride. Remember each event is a separate event. Your grade depends on everything as a total."

Dealing With Mistakes

This may come as a surprise to new professional pilots, but there are three kinds of mistakes made during a check ride: those made by the examinee, those made by the examiner, and those made by the aircraft (or simulator). When you are in the "heat of battle" it is difficult to distinguish which is at fault. But even when you make the mistake, that isn't the end of the check ride. In fact, how you deal with that can actually work in your favor.

(1) You made the mistake — Most mistakes are not critical and will not merit mention in the critique. Even those that do can be overridden by the rest of the flight. In fact, even when you know the mistake will result in a failure, doing well from that point on will lessen the impact. As an examiner, once I've witnessed such an event, I am looking for other things to either add to or subtract from the critique. I would rather say, "It was a flawless flight, except . . ." than, "Where do I begin?"

(2) The evaluator made the mistake — This was one of my greatest fears as an evaluator and when it happens, it places a great deal of stress on the evaluator. If you suspect your evaluator is the guilty party, try to press on and not make a big

U.S. AIR FORCE

Even wearing a flight suit, the evaluator is just another imperfect, human pilot.

deal of it. The evaluator will be grateful and that makes the rest of the check ride, believe it or not, easier.

(3) The aircraft (or simulator) made the mistake — This is the best kind of mistake because you and the evaluator are off the hook. Try to laugh it off as one of those things. In a simulator environment, the evaluator will feel some responsibility, and this actually makes the rest of the ride easier for you.

My First Check Ride

My first check ride seemed to be going very well. The only maneuver I really struggled with was a simple loop, but that went perfectly. In fact, I stole a look at the evaluator's kneeboard and saw the letters "EX" up and down against everything I had done thus far. "Show me a spin," he said. I did a few clearing turns and tucked my area map into my right leg flight suit pocket. "Loose items," I said. "Secured," he said.

The T-37 spin entry involves pointing the nose straight up with the throttles at a medium setting. Once the wings start to buffet you fed in rudder and when the airplane stalled it almost immediately wrapped itself into a spin. At that point you waited for the evaluator to say, "Recover" and that's what you did. The recovery involved six steps that ended up with the aircraft pointing straight down at zero G, after which the last step was, "recover from dive." Pointing straight down at the ground completely weightless usually kicked up decades of dust from all over the airplane and the cockpit was eerily quiet.

I got all the steps right and just as we went to zero G, an area chart appeared from beneath my ejection seat and unfolded itself right in front of me. "Loose items stowed, huh?" the evaluator yelled as he grabbed the chart. It was a "hookable" offense. My long line of "EX" entries was interrupted with a "U" and I still had half the ride to go. Clary's words reminded me that the spin was one event. I had more to go.

Fortunately, the rest of the ride was filled with more "EX" events and maybe one or two "G" events. During the debrief the evaluator said as much. "You fly an excellent airplane, lieutenant. It is a damned shame I'm going to have to hook you." He held up the area chart, accentuating my failure.

"I understand, sir," I said. "I would have bet a month's pay that I zipped that map into my pocket." I reached down to my zipped pocket and felt something inside. I opened the pocket and pulled out my area chart. The evaluator looked at my chart and the one in his hand. "Well how about that," he said. "Good job then. Congratulations you just passed your first check ride."

There were congratulations all around the flight room. About half our class hooked that first check ride. As it turned out, Roger did very well during his flight until the spin. At that point he fell apart. "You would have gotten a Q2 if you performed to your normal level, Roger," Clary said. "And then you wouldn't have to recheck, you would just need to go up again with an instructor to demonstrate the spin. So, remember next time, push mistakes out of your head!" But Roger couldn't do that. He repeated his performance two more times and was gone a week later. I finished 20 years as an Air Force pilot with a clean record, not a single busted check ride in eight aircraft types. That isn't too common, but what is even more rare is the fact I did bust a check ride that was "unbusted" in the end. And I think that episode teaches volumes on how to bust with style.

Dealing With Check Ride Failure

Being told that you are "not good enough" in any endeavor hurts. If you ever get to the point where failing a check ride isn't a big deal, then you are doing it too often and perhaps it is time to look for another line of work. So, it isn't a good experience. But there is a right way to deal with it.

(1) Realize that the maxim, "On any given day the best pilot can fail and the worst pilot can pass," is true. I've seen this happen many times. When it happens to someone I respect, I am surprised, but it doesn't diminish my view of them.

(2) Realize you have been presented an opportunity to learn. No matter the cause of the failure, there are lessons to be learned.

(3) Realize your character is being tested and how you react says more about you than the check ride itself. You have something in common with the evaluator and every other pilot who will hear about the check ride. They have all been "under the gun" too and they will empathize with you. Reacting positively will do much to enhance your reputation and will make the re-check that much easier. Reacting negatively will subconsciously make your next efforts that much harder.

A Painful Flashback

Years later, I was flying as a captain in rank and an aircraft commander in crew position, in an Air Force EC-135J (Boeing 707). My copilot was a first lieutenant and the navigator was a captain just a year junior to me. We were flying from March AFB (now Air Reserve Base), California (KRIV) back to our home base, Honolulu International Airport, Hawaii (PHNL) when an evaluator showed up and announced we were getting a route check ride. "Just do your normal good jobs and get us home," he said.

Our usual passengers were a U.S. Navy battle staff in charge of the Pacific nuclear submarine fleet. They quite often requested we delay our takeoff until the subs were in place so they could exercise our communications systems. That particular morning the call for a delay came after engine start and after we had begun our taxi. We negotiated

with tower and found a spot out of the way near the end of the runway to wait. It was a summer morning with an approaching weather system and rising temperatures. The copilot busied himself with updating the temperature and posting new takeoff performance data every few minutes. This involved about 10 min. of chasing lines on charts and producing about 10 different numbers, such as power settings and speeds to fly. The most important number was our decision speed, what we called "S-1" but is more commonly known as "V-1" to most civilians. If we had an engine failure during takeoff before S-1 we would abort, after S-1 we would continue the takeoff.

After the copilot dutifully posted new takeoff data, I would review the numbers and say, "OK." For one of his efforts I said, "S-1 looks low." He re-chased the charts and said, "No, it's OK."

After an hour of this the ceiling had come down and it started to rain just as the passengers announced they were ready. I waited patiently for the copilot to add the wet runway to his takeoff data and looked at the new numbers he scratched out in grease pencil. "Are you sure about S-1?" I asked. He showed me the applicable page and the wet runway correction. "I guess so," I said. And we took off.

We disappeared into the muck at about 1,000 ft. and even though it was about noon, the world became dark. And then it became bright again with a crack of lightning right on the nose of the aircraft. My flight instruments froze and the cockpit went dark except for the copilot's instruments, which had an emergency power system. "You got the airplane," I said. He remained motionless. There is an old joke in the Air Force that goes, "All hell broke loose and my copilot turned into a zombie!" So, there I was. I flew the airplane cross-cockpit and started to formulate a plan when departure control added to our problems. "LA center has lost all radar; all aircraft revert to non-radar procedures."

I looked down to the VOR needles on the copilot's side of the aircraft and noticed they were split. Both VOR receivers were tuned to the correct frequency. "Nav, pilot," I said over the interphone, "which VOR needle is right?" I heard nothing. I stole a look behind me and realized I now had two zombies in the cockpit. The evaluator, sitting in the jump seat, shrugged his shoulders. As I brought my eyes back forward I noticed a generator had dropped off line. I cycled the switch and my side of the cockpit came back to life. As the lights returned my zombies came back to the living and center announced their radar was back. It was a nightmare that lasted less than 60 sec.

After we landed, the evaluator asked us to meet him in the squadron commander's office, never a good sign. As we entered, the evaluator pulled me to one side and said, "I'm really sorry I have to do this." He revealed that our S-1 was 5 kt. in error and the tolerance was only 2 kt. He lauded my performance after the lightning strike but lambasted the copilot and navigator. He busted both of us pilots because of the S-1 error and the navigator because of his zombie-like performance. The copilot and navigator immediately started to argue.

"Calm down you two," I said. "We made mistakes and we are fortunate to have lived through those mistakes, so we can learn from them. So, that's what we have to do now."

I was, of course, devastated. I had gone through seven years as an Air Force pilot with a perfect record. The evaluator, the squadron commander and everyone in the chain of command came to my defense, saying my reaction only solidified their confidence in me. I lived with this for about two months. The higher command reviewed the check ride and decided the evaluator made a mistake and ordered my evaluation results be changed to a pass. So, in a weird twist of fate, I didn't bust a check ride, after all, but was rewarded for having reacted to a bust with style.

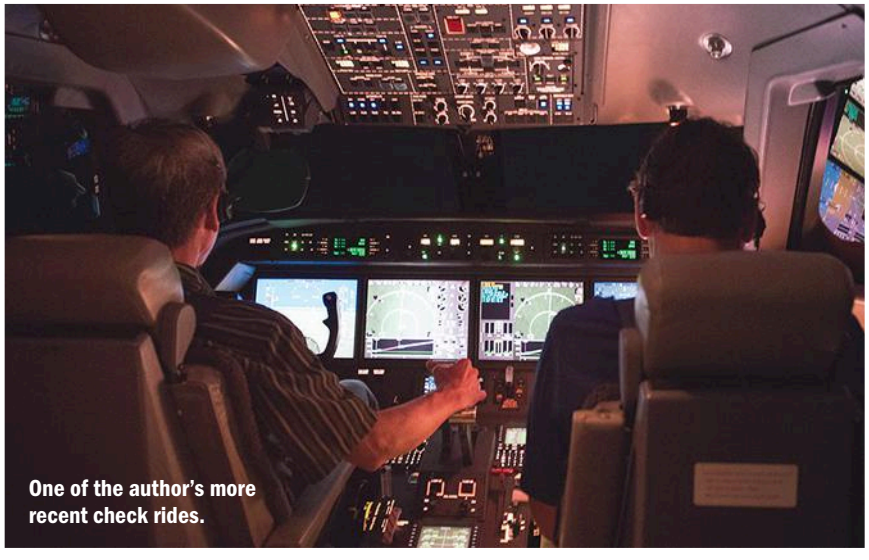
Part of my reward was an instant upgrade to instructor pilot and shortly thereafter, to evaluator pilot. In the many years since, I have reprised my military evaluator pilot role with a few turns as a check airman. I have had to "hook" a few pilots in that time and must say it is a gut-wrenching experience. In one case the busted pilot took the company to court but lost. With each bust I think back to my flight with two zombies. Sometimes how you bust is as important as how you pass.

Putting It All Together

Our reunion was great, and it was fun to trade "there I was" stories with classmates who had their own harrowing moments to relive and lessons learned over 40 years of defying gravity. I finally composed an answer to the *BCA* reader asking about check ride nerves. I think chair flying is a great technique to learn something new. I haven't been to an initial course in 10 years and have only employed the technique a few times when learning something new, such as landing using a forward-looking infrared system. But it is a technique worth considering.

I also reminded the reader about the need to look at each event in the check ride as a separate event. In 1st Lt. Clary's words, "Shift your brain to the next event and move on."

Finally, I reminded the reader that every check ride is like a training flight on steroids; they are opportunities to learn. No pilot is perfect, no flight is perfect, and no check ride is flown flawlessly. The evaluator is charged with certifying you on a laundry list of items to mark "EX," "G" or "U." Sometimes, the evaluator's hands are tied, but sometimes he or she has a bit of latitude. Your grace under fire can determine how much of that latitude is used in your favor. **BCA**



One of the author's more recent check rides.

JAMES ALBRIGHT

Thin Margins in Wintry Takeoffs

ISTOCKPHOTO

Anti-icing, along with **ground effect and crosswinds, can significantly reduce stall AOA**

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

For many years the application of the "clean wing policy" has successfully allowed aircraft to take off when conditions are conducive to icing. While anti-icing fluids negate the serious effects of wing icing, recent research has determined that the fluids themselves extract a significant penalty from the wing's aerodynamic capabilities, especially from high-performance wings commonly on jets that cruise at transonic speeds. The effect is manifested most during the takeoff rotation.

In addition, swept-wing aircraft experience crucial aerodynamic penalties due to ground effect. And if crosswinds are present, further aerodynamic compromise can lessen the margin of safety even more.

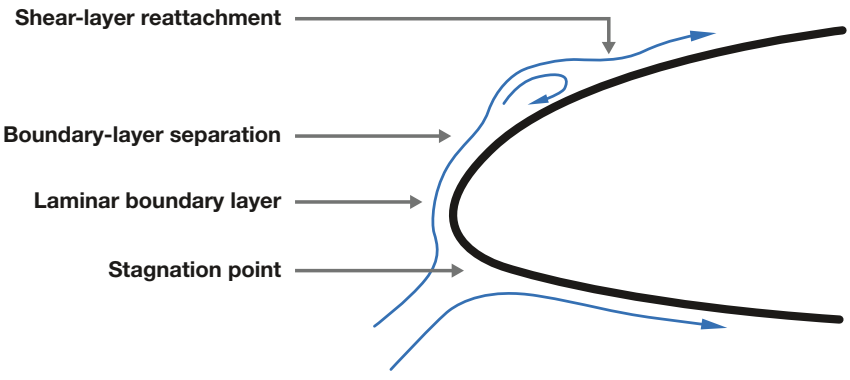
High-Performance Wings

Most commercial aircraft that cruise at transonic flight speeds are fitted with supercritical airfoils whose stall behavior is unlike that of the thick, generic wings used in many ground training programs. The boundary layer along the leading edge of a supercritical wing begins thin and laminar at low angles of attack (AOA). Then, above a certain AOA the laminar boundary layer partially separates, forming a "short bubble," behind which the turbulent boundary layer reattaches.

The bubble has an overall negligible effect on the pressure distribution around the wing and remains stable without creating any discernable handling or performance effects while the airfoil remains in the normal (linear) portion of its lift curve. However, as AOA increases further, an adverse pressure gradient builds, and within the thin boundary layer, at high AOA a shockwave can form even though the aircraft's speed may be relatively low. A critical point is reached at which the short bubble "bursts" and the airflow detaches suddenly and completely from the leading edge to the trailing edge. A serious consequence is the lack of aerodynamic stall warning and an abrupt loss of lift.

Clinton E. Tanner, Bombardier's senior technical advisor in flight sciences, presented "The Effect of Wing Leading Edge Contamination on the Stall Characteristics of Aircraft" at the SAE Aircraft & Engine Icing International Conference in September 2007, further discussing the aerodynamic characteristics of high-performance wing sections.

The accompanying figure is a typical lift-curve slope of a "hard" wing, or one without moveable leading edge devices, often found on regional and business jets. Notice the abrupt loss of lift at the stall AOA, a characteristic of thin wings exhibiting a leading-edge stall behavior. Wings of this design tend to stall abruptly without warning such as airframe buffet. Accordingly, such wings require a stall protection system such as a stick pusher triggered



CLINTON TANNER

Airflow along an airfoil exhibiting "leading-edge stall" behavior. Note the "short bubble" at a critical point on the leading edge. When the angle of attack is increased to a critical point, the bubble "bursts," causing a separation of airflow over the rest of the wing with no aerodynamic warning of the stall.

at a below-stall AOA to meet certification requirements.

Incidentally, an aircraft's field performance would be based on the lift obtained at the stick pusher firing angle, not on the maximum lift attained at the point of natural stall. V2+10 is the normal takeoff speed of the aircraft in an all-engine condition. The AOA for normal operations is well below the critical AOA for natural aerodynamic stall. Auto-ignition protection is provided to the engine because at high AOA, unstable airflow ingestion into the engine could cause compressor stalls. It is calibrated to trigger at a lower AOA than the stick-shaker warning.

Ground Effect

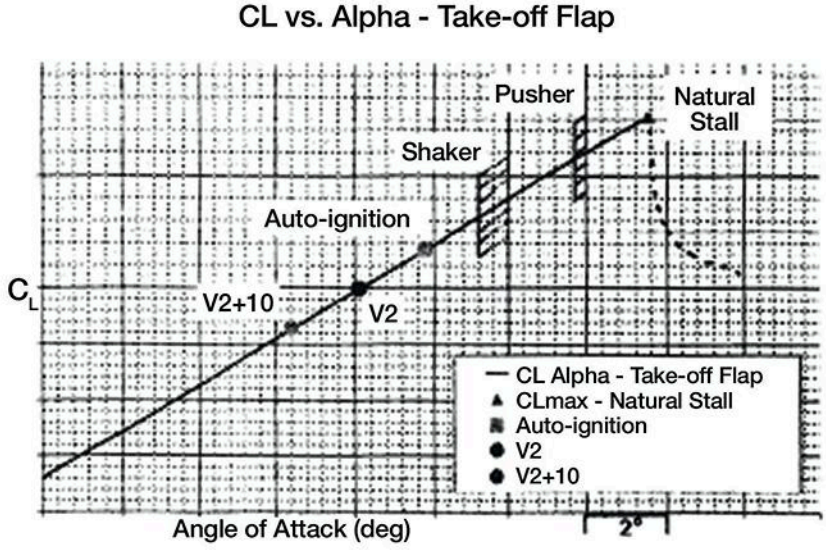
When an aircraft is close to the ground, negative changes occur to its aerodynamics, especially on swept-wing jets. This is particularly true during the landing flare and takeoff rotation when the aircraft is at a precarious energy state with very little margin for error. As the aircraft rotates, the tips on a swept wing are momentarily closer to the runway, changing the airflow significantly, and further increasing the negative impact of ground effect.

The tragic loss of a Gulfstream G650 during certification flight-testing at Roswell, New Mexico, in April 2011 highlighted some of these characteristics. The aircraft was conducting a planned one-engine-inoperative (OEI) takeoff when a stall on the outboard section of the right wing produced a rolling moment that the experienced flight test crew was unable to control. The right wingtip contacted the runway and the aircraft departed the right side of the runway. It then struck a concrete structure and an airport weather station, resulting in extensive structural damage and a post-crash fire that completely consumed the fuselage and cabin interior. The NTSB's investigation found that the airplane stalled while lifting off the ground and noted some of the common misconceptions and misunderstandings about ground effect. (See the "Ground Effect and Airflow" sidebar for further description of the changes to the airflow in ground effect.)

The NTSB's John O'Callaghan, a national resource specialist in aircraft performance, noted that all aircraft stall at approximately 2-4 deg. lower AOA with the wheels on the ground. Flight test reports noted "post stall roll-off is abrupt and will saturate lateral control power." The catastrophic roll-off of the wing in the Roswell accident was due in part to the absence of warning before the stall in ground effect.

Before the accident, Gulfstream estimated that the in-ground-effect stall AOA would be 13.1 deg. and set the AOA threshold for the activation of the stick-shaker warning at 12.3 deg. The company's post-accident computational fluid dynamics (CFD) analysis indicated that the maximum lift coefficient of the G650 in ground effect was actually lower than the maximum lift coefficient in free air and found that the decrement from the free-air stall AOA to the in-ground-effect stall AOA was about 3 deg. Flight test engineers had incorrectly assumed that the maximum lift would be the same both in and out of ground effect.

Because the maximum lift and stall AOA in ground effect were overestimated, the airplane's AOA threshold for stick-shaker activation and the pitch limit indicator were set too high. Moreover, the flight crew received no tactile or visual warning before the actual stall occurred. The airplane stalled at an AOA that was below the in-ground-effect stall AOA predicted by Gulfstream and



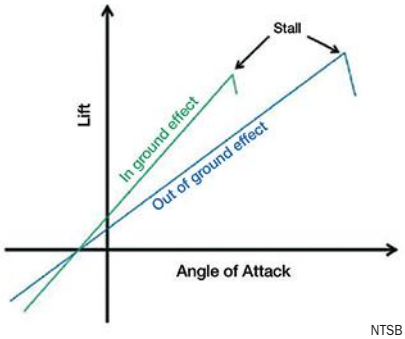
Credit: Clinton E. Tanner, "The Effect of Wing Leading Edge Contamination on the Stall Characteristics of Aircraft

Lift curve of a high-speed "hard" wing design in the takeoff configuration. Shown are the relative positions of the operational takeoff speeds versus the aerodynamic natural stall. Notice the abrupt loss of lift at the stall AOA, a characteristic of thin wings exhibiting a leading-edge stall behavior. A 2-deg. AOA margin is provided by the stall protection system from the natural stall.

the AOA threshold for the activation of the stick-shaker stall warning.

The NTSB determined, through conversations with Gulfstream, other manufacturers and the FAA, that the potential for the maximum lift coefficient in ground effect to be reduced might not be recognized industry-wide. Given the results of Gulfstream's CFD analysis and the findings of the NTSB's accident investigation, it was determined that the maximum lift coefficient for at least some airplanes could be reduced in ground effect. Further, assumptions to the contrary could result in an overestimation of the stall AOA in ground effect and could increase the risk of a stall in ground effect with little or no warning.

The aerodynamic stall of a wing that exhibits leading-edge stall behavior is negatively influenced by contamination, especially when the contamination is located near the leading edge. On a day when precipitation necessitates application of anti-icing fluids, the thickened solution is meant to keep the wing from suffering the substantial loss of lift from contamination. However, this

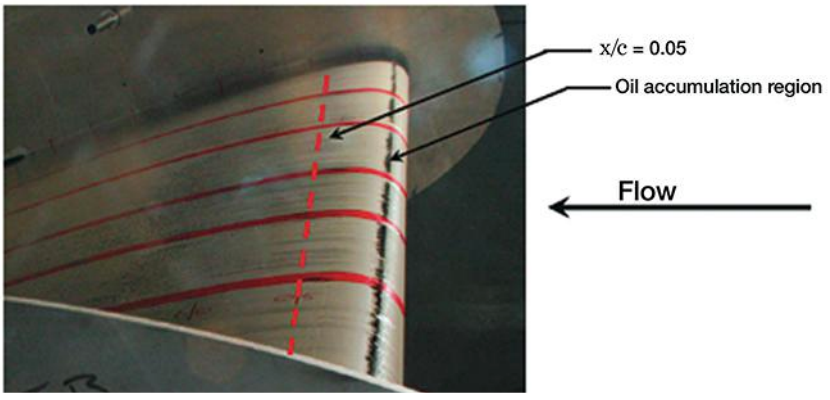


NTSB

This figure shows the differences in a wing's lift as a function of AOA. Note that the stall AOA for a wing in ground effect occurs at a lower AOA than when free of ground effect, and the maximum lift of the wing is also reduced.

does not mean that a deiced wing is without performance degradation.

During application, gravity causes the anti-icing fluid to naturally flow around the leading edge and to the wing's lower surface. As the airplane accelerates in the initial stages of takeoff, the shearing forces near the leading edge are relatively low due to the low AOA and low initial speeds. There is some shearing of the fluid as the airplane's speed rises, resulting in the primary wave of fluid flowing downstream. Upon rotation, the shear forces near the leading edge increase significantly, forming a secondary wave of fluid that flows around the leading edge.



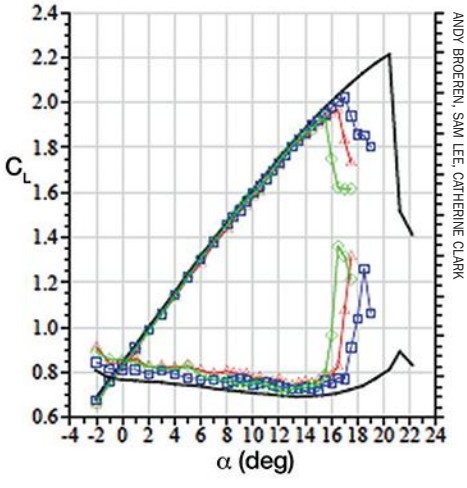
CREDIT: ANDY BROEREN OF NASA GLENN, SAM LEE OF VANTAGE PARTNERS, CATHERINE CLARK OF NRC CANADA, "AERODYNAMIC CHARACTERIZATION OF A THIN, HIGH-PERFORMANCE AIRFOIL FOR USE IN GROUND FLUIDS TESTING," AMERICAN INSTITUTE OF AERONAUTICS AND ASTRONAUTICS JOURNAL OF AIRCRAFT, 2015

Wind-tunnel testing using oil to visualize the effects of an anti-icing fluid on this airfoil at 18 deg. AOA. Notice the accumulation of the fluid in a critical location near the wing leading edge, resulting in a reduction of maximum lift and a decrease in the stalling AOA.

Wind-tunnel testing has found that the formation of the separation bubble further promotes accumulation of fluid in a critical location near the wing leading edge. This would increase the height of the secondary wave and contribute to the observed reduction in maximum lift and stalling angle for fluid/contamination cases. According to "Aerodynamic Characterization of a Thin, High-Performance Airfoil for Use in Ground Fluids Testing," a study by NASA Glenn Research Center and the National Research Council of Canada, this secondary wave of anti-icing fluid can have a significant impact on aerodynamic performance because it is located close to the wing leading edge at higher angles of attack.

The study, which employed aerodynamic performance measurements, flow visualization and boundary-layer surveys to better understand the adverse aerodynamic characteristics of anti-icing fluids on thin, high-performance wings, discovered a decrease in a wing's maximum lift coefficients ranging from 1.91 to 1.95 compared to the clean wing value of 2.2. Correspondingly, the stall angle was reduced to 15.3 deg. compared to the clean value of 20 deg. The study concluded that secondary wave effects could have a significant impact on the maximum lift coefficient and stall angle for anti-icing fluid tests on the thin, high-performance wing.

Incidentally, during preflight inspections you should examine the condition of the aerodynamic seals on your wing, particularly on "hard" wing jets. Deteriorated aerodynamic seals, particularly those near the leading edge of the wing, also cause a significant loss in the maximum lift of a wing as well as decrease the stall AOA.



ANDY BROEREN, SAM LEE, CATHERINE CLARK

In this performance chart from the combined NASA Glenn and National Research Council Canada study, the upper lines represent the airfoil's lift production versus AOA, and the lower curve is the pitching moment of the airfoil versus AOA. The black upper line exhibits classic leading-edge stall behavior of a clean airfoil at 20 deg. The blue and green lines indicate tests mimicking anti-icing fluid application. The stall AOA is reduced to 15.3 deg. by the fluids.

Crosswinds can likewise create a stall at a lower AOA. During crosswind takeoffs and landings in a swept-wing jet, the upwind wing experiences airflow that is more direct (i.e., perpendicular) to the wing's leading edge, and this generally improves the wing's performance. Conversely, the downwind wing experiences the airflow at a greater angle (essentially increasing the "sweep" of the wing), which decreases its lift, increases drag, promotes the span-wise flow of air and thereby reduces its stall AOA.

For example, a crosswind from the right effectively increases the sweep of the left wing and reduces the sweep of the right wing. Bombardier's Tanner cites flight test results showing that sideslip reduces the stall AOA of the left wing by up to 3.5 deg. when it experiences a sideslip of 20 deg. Large rudder applications during a highly dynamic stall event will also generate high sideslip angles. Either of these conditions may result in asymmetric stall of the downwind wing.

The in-depth engineering studies already cited focused solely on ground effect, crosswinds or anti-icing fluids. Tanner is concerned about the combined effects of all three on lowering the overall margin of safety during takeoffs.

Given the very real possibility that the three have an additive effect on the reduction in stall AOA, the margins over an actual aerodynamic stall during a takeoff decrease and a stall could result without aerodynamic warning. The AOA has to be reduced several degrees below the AOA at which the stall first occurred to fully re-attach the airflow. This is called aerodynamic hysteresis. Altitude may have to be sacrificed to recover the aircraft from the stall, even when the aircraft is flying close to the ground.

The airline industry has operated with relatively few incidents due to ground icing in recent decades because of the adoption of the widely accepted guidelines on ground deicing and anti-icing procedures. Airlines also benefit from operating at larger airports that have vehicles with elevated platforms and numerous personnel who are specially trained in the application of deicing and anti-icing fluids. Air carriers are required to address their ground deicing procedures during training, and the wings on larger transport aircraft are less affected by smaller-sized contaminants. This support infrastructure and focused training isn't as readily available in the business aviation environment.

A takeoff in conditions conducive to ground icing requires a methodical process to assure that contamination on critical surfaces has been eliminated. If an aircraft has been sitting on the ground in conditions conducive to wing contamination, a preflight tactile check of the airfoil is necessary. Proper application of deicing and anti-icing fluids as well as observance of the hold-over times are vital in such conditions.

And since the ground crew applying the fluids may not be familiar with which areas to avoid on your aircraft, it is incumbent on your part to familiarize them. Following the aircraft flight manual's procedures for the proper configuration during deicing and taxi is important, but these often call for taxiing in a non-takeoff configuration for the flaps, which is contrary to standard. The selection of proper takeoff speeds and pitch limits is also a necessity. As this recent research has shown, the safety margins during takeoffs in these conditions are thin. **BCA**

Ground Effect Changes Airflow

The limited aerodynamics training in most ground schools focuses on the reduction in induced drag when a wing is in ground effect. This can leave pilots with the impression that there is a total positive impact on a wing's lift and drag production while in ground effect. But that's not entirely true.

The aerodynamic forces on a wing are influenced by the passage between the lower surface of the airfoil and the ground. These occur when an aircraft is approximately one wingspan above the ground and increases progressively the closer it gets to the ground. Group proximity pushes the wingtip vortices outward along the span, leading to a decrease in downwash angle and induced drag. Airflow around the wing is forced to become parallel to the ground, rather than displaying the normal downwash pattern after leaving the wing. These increase a wing's lift and drag production, the downwash on the tail and the wing pitching moment.

A recently published study by researchers at the Beijing University of Aeronautics and Astronautics and at Washington University in St. Louis focused on airflow changes in ground effect. It found that at low to moderate angles of attack, as the airfoil gets closer to the ground, the pressure on the lower surface increases due to the airflow blocking effect from the convergent passage between the lower surface and the ground. Meanwhile, the pressure on the upper surface increases due to the reduction of effective AOA as a result of a reduction in streamlines' upward deflection. In effect, the AOA along the wing is increased, causing adverse pressure gradients that can cause early airflow separation. For high angles of attack, as the wing's distance to the ground is reduced, the separation point moves toward the leading edge of the airfoil, and the separated airflow region is enlarged because the adverse pressure gradient along the chord direction increases.

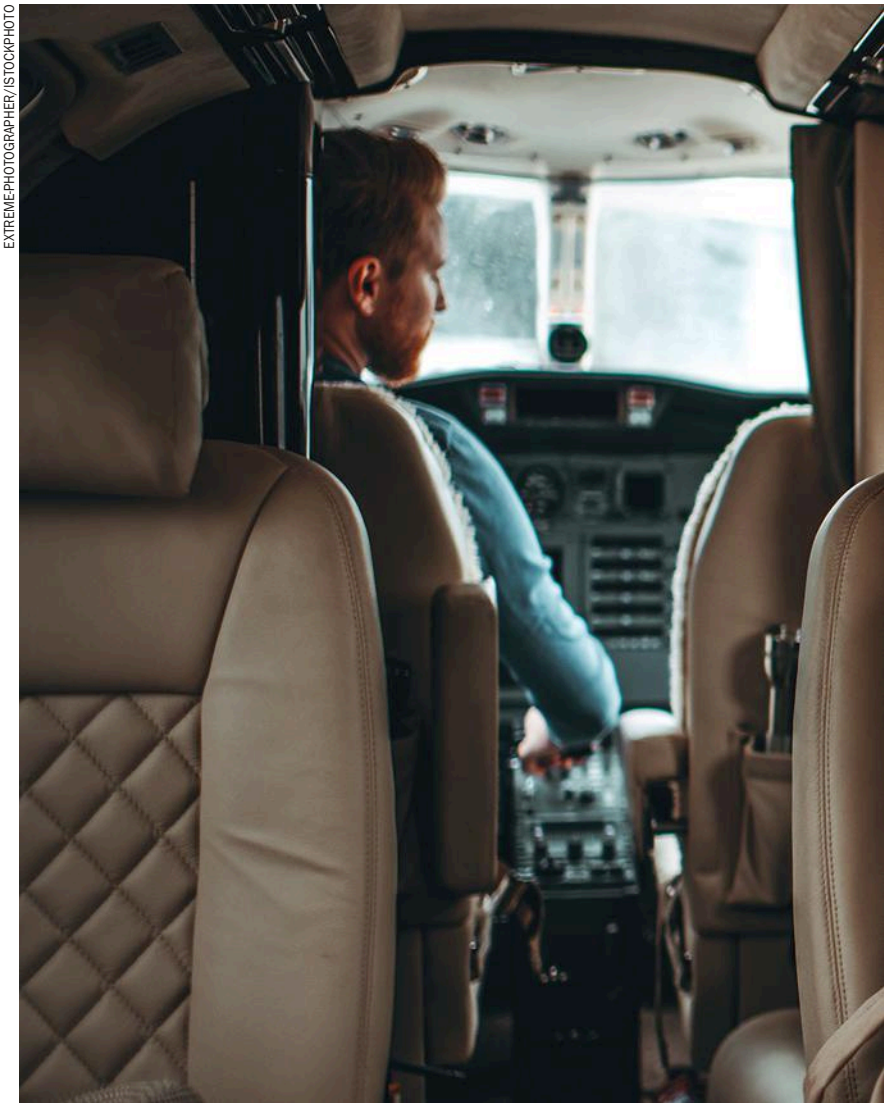
The entire wing will encounter the increased AOA effect due to the airflow modification when in ground effect. A stall may occur farther outboard on the wing due to the closer proximity of the wingtips to the ground on swept-wing aircraft at takeoff rotation and landing-flare pitch attitudes. Since these occur on the thinnest part of the wing, which generally displays a leading-edge stall behavior, this means a sudden loss of lift comes with no aerodynamic warning.

(Reference: Qiulin Qu, Wei Wang, Peiqing Liu, and Ramesh Agarwal, Airfoil Aerodynamics in Ground Effect for Wide Range of Angles of Attack, AIAA Journal, Vol. 53, No. 4, April 2015.) **BCA**

Dying to Get There?

Risk reduction for **single-pilot ops**

EXTREME-PHOTOGRAPHER/ISTOCKPHOTO



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

LeBron "King" James and his Cleveland Cavalier teammates were engaged in a pitched battle against the Boston Celtics on the evening of Thursday, Dec. 29, 2016. Longtime Cavs fan John Fleming, president of Columbus, Ohio-based Superior Beverage Co., was among the crowd at the Quicken Loans Arena in downtown Cleveland, celebrating his birthday with his family and friends.

Earlier that evening, Fleming flew from Ohio State University Airport (KOSU) in Columbus to Cleveland Burke Lakefront Airport (KBKL) in his newly purchased Cessna Citation CJ4, with his wife Suzanne, sons Jack and Andrew, friend Brian Casey, and his daughter Megan. The game was close, but ultimately the Cavs prevailed over the Celts 124 to 118. Fleming was elated. But he also may have been fatigued as he'd been up since early morning.

The Fleming party left right after the game and drove back to Lakefront to board their aircraft for the 30-min. hop back home to Columbus. They arrived back at the FBO about 10:30 p.m.. While the city lights could be seen along the shoreline, it was inky black over Lake Erie, with low clouds at 1,500 ft. and 2,300 ft. obscuring the crescent moon. Intermittent snow showers created marginal VFR visibility before the flight, but the precipitation stopped before the aircraft departed KBKL.

Fleming had logged more than 370 hr. in a Citation CE510 Mustang in the previous two years, but he had earned his CE525S type rating just three weeks prior to this night flight. His CJ4 training and PIC check had been accomplished in his own airplane rather than at an FAR Part 142 simulator training center. He had logged a scant 8.7 hr. in type as pilot in command, including his check ride. His total flight time in a CJ4 was just over 56 hr.

And in his single-pilot jets, Fleming was consistently taught by his instructor to engage the autopilot after takeoff and use the aircraft's flight guidance system to fly it to near touchdown, according to the NTSB. He was not accustomed to flying the aircraft by hand for prolonged periods.

This created a potentially fatal automation trap. The Garmin G1000 glareshield flight guidance control panel in Fleming's Mustang and the CJ4's Rockwell Collins Pro Line 21 control panel have different layouts. In the Mustang cockpit, the autopilot and yaw damper engage buttons, respectively, are on the left and right, near the bottom of the panel. Aboard the CJ4, the autopilot and yaw damper buttons are on the right and the left, near the top of the panel. Muscle memory from the Mustang could lure a pilot into thinking he'd pressed the autopilot engage button in the CJ4 when he'd only engaged the yaw damper.

Both aircraft, though, have prominent automatic flight guidance system mode annunciators displayed at the top of their PFDs that provide visual confirmation of selected and active modes.

Cleared for takeoff on Lakefront's Runway 24R at 10:55 p.m., Fleming began his takeoff roll a minute later. Tower instructed him to turn right to 330 deg. over the lake and to maintain 2,000 ft. The aircraft soared aloft at better than 6,000 fpm, with the aural altitude alerter cautioning Fleming that he was approaching level-off altitude 21 sec. after liftoff.

The aircraft ballooned through the assigned altitude and a second aural "altitude" alert was triggered 14 sec. later. Fleming pulled back on the thrust levers a few seconds later. But the aircraft started to roll, causing the enhanced GPWS's synthesized voice to warn "Bank Angle, Bank Angle."

By now, tower was quite concerned that it had apparently lost radio contact with Fleming. Ten seconds after the "Bank Angle" warning, the EGPWS warned, "Sink Rate, Sink Rate." Six seconds later, it started to repeatedly warn, "Pull Up, Pull Up" at 1.6-sec. intervals. Then, the overspeed warning was triggered as the aircraft accelerated through its 260 KIAS low-altitude redline.

Bank angle increased to 62 deg. and the aircraft slowly pitched over to 15-deg. nose down. While Fleming reduced bank angle to 25 deg., he did not arrest the acceleration or descent. Speed now topped 300 KIAS and the aircraft plunged down at 6,000 fpm. Less than 90 sec. after the aircraft began its takeoff roll, it crashed into Lake Erie, killing all on board.

The NTSB concluded that Fleming "likely experienced some level of spatial disorientation" and that he also perhaps thought the autopilot was engaged when it wasn't. It was easy to mistakenly press the yaw damper button on the Pro Line 21 flight guidance panel instead of the autopilot button because of the differences in cockpit layout between the CJ4 and the Mustang. Contributing factors were found to be pilot fatigue that "hindered his ability to manage the high workload environment," his failure to maintain an adequate instrument scan and his failure to respond with "prompt and accurate" control inputs to the warnings he was receiving from the avionics system, according to the NTSB.

The Startle Factor in IMC — Quickly Reverting to Standby Instruments

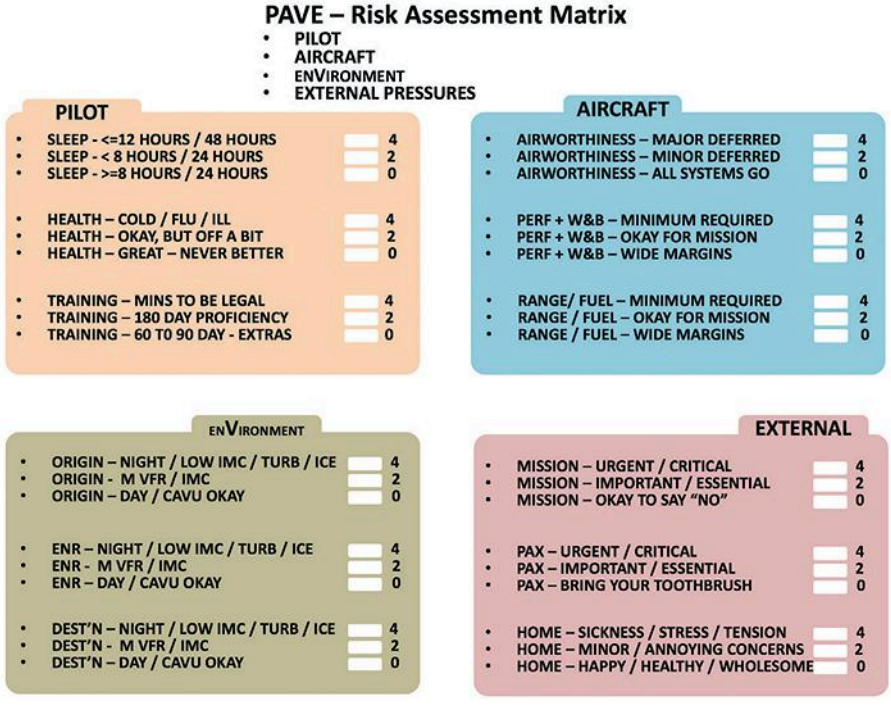
Don Baker, a successful commercial real estate developer and community philanthropist in Tucson, Arizona, and his wife, Dawn Hunter, were returning home in January 2016 from a general aviation safety conference in the Utah mountains. Rated as an airline transport pilot, Baker had logged more than 3,300 hr. total, of which almost 1,600 hr. were in his CE525 CitationJet.

The 1999 aircraft was originally equipped with Bendix/King CNI 5000 Silver Crown panel-mount avionics, but it had been upgraded with a pair of Garmin touchscreen GTN750 GPS/COM/NAV/MFD units and two Garmin GTX-33 Mode S transponders in October 2014. It also had the standard-fit SPZ-5000 integrated flight guidance system featuring left-side EADI and EHSI and standby attitude indicator. The flight guidance system and autopilot require two vertical gyro sources and a single directional gyro to function properly. It also has an analog air data system. The aircraft had been upgraded with dual Honeywell Ametek AM-250 digital air data altimeters for RVSM operations, units that also were linked to the Garmin GTX-33 transponders for Mode C altitude reporting. The left side AM-250 also supplied air data to the flight guidance system. Other mods included a Shadin ADC-200 fuel flow system and Garmin XM satellite radio weather receiver.

Baker completed semi-annual recurrent training at a Part 142 simulator training facility in August 2015. But the training facility didn't have a CitationJet simulator equipped with the non-standard Garmin avionics or the other instrument panel mods. Rather, it had the original SPZ 5000/CNI 5000 package. And the sim training center didn't provide any specific Garmin avionics training during ground school.

Baker and his wife departed Salt Lake City for Tucson on an IFR flight plan at about 09:50 a.m. on Jan. 18, 2016. Ten minutes later, he and his wife were killed in the CJ, as detailed in *BCA*'s January 2018 *Cause and Circumstance* report (page 26).

The weather conditions for the initial part of the mission would have been challenging. There were cloud layers at 3,000 ft., 3,500 ft. and 4,000 ft., with solid IMC between 9,000 ft. and FL 250. Icing conditions were forecast for the climb through FL 210 and areas of super-cooled large droplets and ice crystals were likely encountered, according to the NTSB's forensic meteorology assessment. AIRMETs had been issued for icing and mountain obscuration.



Shortly after departing Salt Lake, ATC directed Baker to climb to and maintain 14,000 ft. Three minutes later, the pilot notified ATC that his FMS had failed and he requested a climb to VMC conditions. ATC, in response, made available several headings and altitudes to help him maneuver to an area with better weather conditions. Baker transmitted that he was "losing his instruments" and having to hand-fly the aircraft, most likely because the autopilot was inoperative. He was urgently trying to "get clear of the weather." ATC controllers could almost feel the angst in his voice. Precious seconds elapsed with no corrective action being taken to regain situational awareness.

It appeared as though Baker was experiencing "spatial disorientation." An FAA Advisory Circular states that it can take up to 35 sec. to take complete control of an aircraft by reference to instruments after going from VMC to IMC. By inference, it can take several seconds to make the transition between primary flight instruments and standby or backup instruments in IMC, if there is little or no warning of the former malfunctioning.

Radar tracking backed up Baker's tension and apparent spatial disorientation. The aircraft climbed, turned right and crested 21,000 ft. Then, it entered a progressive downward spiral. It rolled partially inverted and its descent rate increased to 36,000 fpm.

Radar contact was lost as the aircraft nosedived through 16,000 ft. Already the aircraft was starting to break up due to structural overload. Witnesses heard a loud boom near the impact zone near Cedar Fort, Utah. The CitationJet's remains smacked into the ground just 30 mi. south of Salt Lake.

In its accident report, the NTSB noted that the CitationJet's emergency/abnormal checklist says that if the pilot's EADI or EHSI become inoperative and cannot be reset, then the pilot should "continue the flight by referring to the standby gyro and the pilot's air data and NAV instruments, and cross referencing the copilot's attitude and heading. The autopilot will be inoperative."

Probable causes of the accident? The pilot's loss of control due to spatial disorientation in IMC when the primary flight instruments failed. He needed to make a quick transition to scanning the standby and right-side backup instruments. A possible secondary cause was the malfunctioning of the primary flight instruments. This fatal inflight loss of control might have been prevented had the pilot been proficient in flying the aircraft after loss of the pilot's-side primary flight instruments.

Task Over-Saturation — Prevention Through Prior Planning

The Fleming and Baker accidents accentuate the consequences of startle factor, loss of situational awareness and spatial disorientation that can lead to loss of control in flight. The NBAA's "Alone in the Cockpit" Safety Committee video vividly portrays the type of high workload environment that can quickly lead to task saturation, mental overload and breakdown of SA.

In it, "Pilot John" (*Flying* magazine editor and NBAA Safety Committee member Rob Mark) is flying his single-pilot light jet home to Miami from the Caribbean. The weather conditions at Miami are changing rapidly, with numerous thunderstorms in the vicinity and shifting winds. There is plenty of arriving and departing commercial traffic at the busy international airport, requiring ATC to change altitude assignments, vectors and even landing runways in a rapid-fire sequence.

This is when task saturation sets in. The video shows a growing, palpable angst as Pilot John starts to miss radio calls while responding to altitude and heading assignments in increasingly rough weather conditions. Adding to the tension, Miami Approach directs him to hold at a FOWEE intersection, some 71 mi. southeast of the airport, as arrivals change from west to east flow in response to a change in wind direction.

"Sheez. When's the last time I held?" Pilot John asks himself about entering a holding pattern.

Now, he realizes that his fuel reserves are becoming tight. This distraction makes him forget his max endurance speed and approximate power setting. But presently Approach is vectoring him westbound to align him for landing on Runway 9. He then realizes he should have planned the flight for a nearby airport with much less traffic, such as Tamiami or Fort Lauderdale.

Thunderstorm cells are now rapidly building west of the airport, creating the potential for heavy turbulence, wind shear and microbursts. It also creates the potential for more arrival delays as air traffic control vectors him on a prolonged downwind leg.

Pilot John tells ATC he's low on fuel and he gets expedited handling for landing. But in all the confusion, he fails to program in the ILS Runway 8R into the FMS. At the same time, the ceiling and visibility deteriorate to 0.5 mi. and 200 ft. in heavy rain. The ever-tightening fuel state adds to his tension and disorientation.

He's confused when the ILS won't arm or engage and the autopilot won't engage. It's because he doesn't have the ILS procedure programmed into the FMS or proper frequency dialed into the NAV radio. He finds his programming error and makes the needed corrections. But by then he's now down to 30 min. of fuel and he can't see anything ahead of the aircraft in full IMC.

Just when he's settled down, he flies through wind shear and almost loses control of the aircraft, but he reverts to his training and regains control. He executes a missed approach and gets vectors to Fort Lauderdale Executive, where he makes a no-stress VFR landing and taxies to the ramp, grateful to be alive and safely on the ground.

Lessons learned? Thinking back on the flight, he recognizes that his failure to assess and anticipate all the risks he might potentially encounter cranked up his workload and tension to the point where he started making several errors. He didn't expect the weather to deteriorate so rapidly and he didn't use his onboard weather radar to detect and avoid thunderstorms.

The IMC caused heavy traffic saturation at the airport. As the winds shifted, there were late stage changes to the approach paths. He arrived in the terminal area with inadequate fuel reserves for weather, traffic and ATC delays, including an unexpected holding pattern assignment. And he wasn't current on holding procedures.

His tension made him forget to reprogram the FMS for the new ILS procedure. And he never activated the approach until later in the flight. Perhaps if he had used a comprehensive risk assessment matrix, he could have anticipated and avoided many of the challenges encountered.

Lessons Engraved on Tombstones

Fear of dying is a powerful motivator for pilots. At this year's NBAA Single-Pilot Safety Standdown, Dan Ramirez, XOJet's director of safety, launched into

an eight-year analysis of 7,457 business aircraft accidents broken down into turbofan, turboprop and piston airplane categories. Runway excursions accounted for 28% of the events, but a large number of these accidents were non-fatal.

This leaves four big culprits, the ones that command attention if you strive to avoid potentially lethal pitfalls. Inflight loss of control, such as the fatal accident involving John Fleming's CJ4, is the second leading cause, making up nearly 23% of fatal accidents. Controlled flight into terrain (CFIT) (13%), mechanical failure (12%) and undershoot/overshoot (6%) are the next highest causes.

Isolating single-pilot accidents that account for 27% of all the accidents in Ramirez' study, runway excursions, inflight loss of control, undershoot/overshoot and controlled flight into terrain are the top four accident causes.

Not surprisingly, nearly 70% of fatal accidents occur during approach and landing, according to the study, data that correlates closely with statistics compiled by the Flight Safety Foundation.

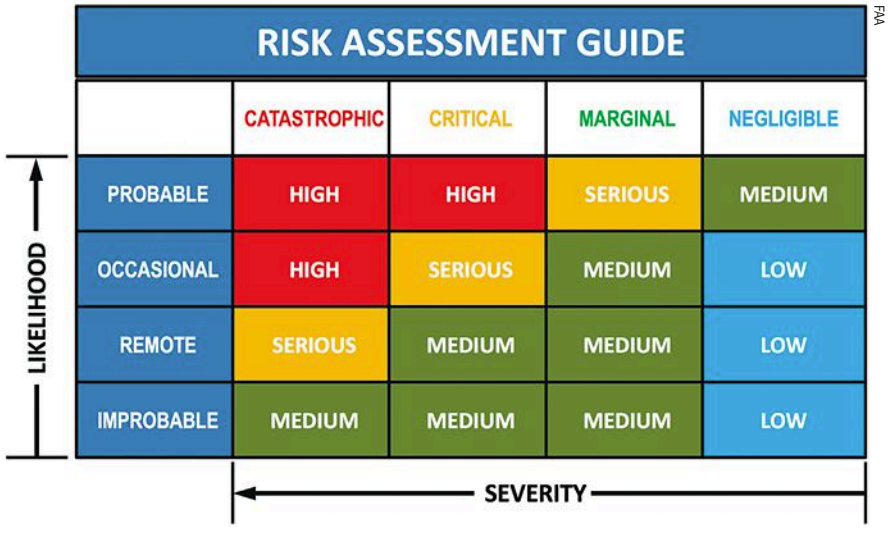
Delving deeper into the data, three-quarters of the runway excursion accidents involve poor speed management on approach. Two-thirds of the loss-of-control accidents occur in the terminal area environment, with only one in seven being experienced during high-altitude flight. More than half of the undershoot/overshoot accidents involve not touching down at the appropriate point on the runway. And more than half of the CFIT accidents were related to unknown causes, including the possibility that the pilots were unfamiliar with the terrain in the accident area.

"This is data telling us what we need to do," says Ramirez.

With those statistics in mind, Bob Wright of Wright Aviation Solutions convened four breakout groups at the Standdown to discuss top accident causes: inflight loss of control, led by APS's Paul "BJ" Randsburg; CFIT, headed up by Avsafe's W. Jeff Edwards; runway excursions, guided by Pfizer's Ben Kohler; and overshoot/undershoot events, coached by Capt. J. R. Russell of ProActive Safety Systems. Wright believes that pilots learn most effectively when they actively participate in such sessions.

Russell says the same lessons learned from each of the four groups apply to all. "It's all about evidence-based or scenario-based training, preflight preparation and proactive thinking." He says ground training ought to include recaps of accidents or incidents, such as the ones already described. The major U.S. airline for which Russell works as a Boeing 787 captain not only wraps accident or incident scenarios into its simulator training syllabi, it also requires pilots to fly line-oriented flight training (LOFT) missions with multiple emergencies and abnormalities, including having to fly all the way to landing with inoperative primary flight instruments, engine and autopilot failures and degraded systems.

After successfully completing recurrent simulator training at his airline, Russell says there are few, if any, surprises he's seen while flying the line. His carrier also uses briefing cards to review, rehearse and prepare for every phase of the mission, paying attention to mitigating potential weather, winds, airport and traffic risks.



FAA

Quantifying Risk

Recognizing, assessing and mitigating risks can be quantified by using a Risk Assessment Matrix, as illustrated on page 49. The FAA's *Risk Management Handbook*, FAA-H-8083-2, breaks this down into a four-part process called "PAVE" — Pilot, Aircraft, enVironment and External pressures. Within each category, several risk factors can be identified, assessed and scored. As with golf, lower total PAVE scores are better. Higher total PAVE scores should merit special attention. Higher scores may even require postponing or canceling the mission and rescheduling for a time when identified risks can be mitigated.

Using a Risk Assessment Guide, similar to the one shown above*, can be useful when determining a specific score to be assigned to a risk item. If, for instance, the weather at the destination airport is forecast to be daylight with ceiling and visibility unlimited (CAVU) and those conditions are not likely to change, then the relative severity is full right and probability of risk is full down, resulting in a zero point score.

In contrast, if severe thunderstorms, capable of causing catastrophic damage, are probably going to be encountered, then the relative severity is full left and the relative probability is full high. This would result in a high score — at least four points in the "V" quadrant of the PAVE matrix.

Having one or more high item scores doesn't necessarily require canceling or postponing the mission. Each item, however, requires an effective mitigation strategy. As the late Robert A. "Bob" Hoover was fond of asking, "What's your Plan B?"

Combine several risk factors such as pilot fatigue, relatively low time in the aircraft type, pitch dark, murky sky conditions and possible flight guidance mode confusion, for instance. All of these can increase the probability of reduced situational awareness and possible loss of control in flight, with catastrophic results. What if pilot Fleming had recognized and assessed these risk factors? He might have decided to cancel the flight home from Cleveland to Columbus, get a full night's sleep and return the following morning in daylight conditions.

Another example. You're flying an aircraft fitted with an aftermarket avionics package for which no simulator training

is available. While you've frequently completed recurrent training in a sim that has the factory-standard avionics kit, you've never had the opportunity to fly the same configuration in a sim and then train to proficiency with single or multiple failures. Having to revert suddenly to standby instruments when your primary EFIS fails in hard IMC and severe to extreme icing conditions can be quite disorienting. And prolonged instrument flying using standby instruments is not part of most FAR Part 142 simulation recurrent training syllabi. The risk assessment score associated with potentially losing primary instruments during actual instrument flying in a real airplane might be quite high. Are you ready to hand-fly the aircraft by reference to standby instruments for a prolonged period?

Then, take the case of Pilot John. He was facing a possible encounter with severe thunderstorms, certainly resulting in a high-risk assessment score. To mitigate the risk, he might have planned to get frequent storm track updates by means of XM satellite radio or ADS-B weather graphics while en route, assured he was proficient using a full-function onboard weather radar and anticipated arrival delays by loading the tanks with plenty of extra fuel for possible prolonged holding at the destination landing facility or a divert to a suitable alternate airport. As he also noted, it's essential to be up to snuff on holding pattern entry and procedures, including receiving and acknowledging your expected further clearance time. And being mentally prepared for executing a missed approach in case of bad weather or a disabled aircraft on the runway is essential when planning for such challenging conditions.

Pilots may not have the time to fill out a risk assessment matrix before each flight, says Russell. But they can use it as guide to identify areas of risk and get prepared to mitigate them.

Single-Pilot Tightrope

Tom Huff, the former skipper of the U.S. Navy's VF/A-87 squadron and then Commander U.S. Naval Test Wing, Patuxent River, Maryland, is now Gulfstream's aviation safety officer and the NBAA Safety Committee chairman. He says that single-pilot operators face the challenge of being their own "chief pilot, safety officer, director of maintenance, dispatcher and copilot, all rolled up into one." There are few, if any, backup mechanisms or people to trap errors that single pilots inadvertently miss. In essence, they're walking on aviation tightropes without a safety net.

"There's oversight built into large corporate flight departments and other organizations," he says, but "threat and error management systems are missing from single-pilot operations."

He also believes that many aircraft approved for single-pilot operations lack the human-centered cockpit design of military aircraft, such as the F/A-18 Hornets and Rhinos he flew. "They're designed with hands-on stick and throttle controls for single-pilot operations."

Most general aviation aircraft also lack flight operations quality assurance (FOQA) systems, such as quick access recorders (QARs) and video recorders. "They're safety assurance tools," he said. These postflight feedback mechanisms can help pilots spot errors they miss while they're fully focused on cockpit tasks. Huff believes that QARs would be a boon to improving single-pilot performance under pressure. Video recorders also can help capture images that provide better maintenance troubleshooting data, such as discrepancies between cockpit attitude indicators and actual aircraft attitude and sorting out CAS messages.

Yet, Huff is aware of the Big Brother inferences, but "Culturally, we have to get over video monitoring."

Yet preflight training, not postflight feedback, is even more critical. "So many of us dread recurrent training. Then, we feel better after completing it," he said. Still, "There is so much stuff on the FAR Part 61.58 [pilot-in-command proficiency check] dance card," he noted. And this also applies to the myriad requirements in the Part 61.56 biennial flight review and Part 61.57 recent flight experience — pilot in command.

General aviation pilots, as a whole, do not train to the same level of proficiency as airline pilots, says Russell. There just isn't enough sim time available. This would require several scenario-based simulator sessions involving multiple abnormalities and/or emergencies that have to be handled in challenging and changing weather and traffic conditions. Russell says, for instance, he's had to fly a Boeing on standby instruments with one engine inoperative down to ILS minimums in gusting, crosswind conditions during sim training at his airline.

Russell also says his airline sim training specifically includes situations or equipment malfunctions that are experienced by line pilots in everyday operations. Lessons learned from incidents, accidents and just inadvertent lapses in cockpit disciplines are fed back into the training process to reduce the probability of their happening in the future.

Type Clubs Lead

Former NASA chief astronaut Charles Precourt flies his own Citation CJ1+ and he's head of the Citation Jet Pilots (CJP) Association's safety committee. He's been instrumental in raising standards for pilot training and proficiency, using positive incentives to motivate members to participate in advanced programs.

CJP's Gold Standard Safety Award, for instance, is given to pilots who log 100 hr. of PIC turbine time in 12 months, who complete two Part 61.58 PIC proficiency checks, including at least one at a Part 142 simulator training center, and who participate in additional training courses.

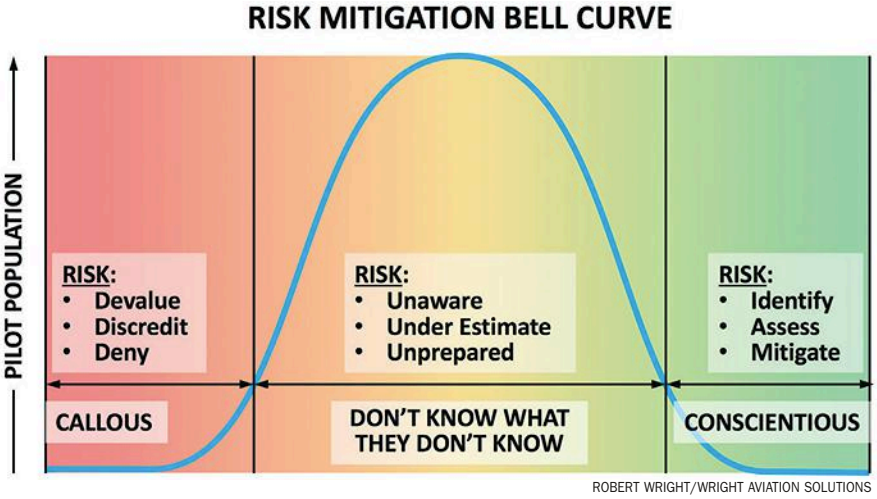
The association now publishes best standard operating practices lists for various Citation Jet models, including different ones for those with Garmin and Collins avionics packages.

In line with Russell and Huff, Precourt believes that general aviation pilots need much more scenario-based training. He's actively working with major Part 142 simulator training service providers to upgrade their syllabi with actual evidenced-based situations.

Runway overrun prevention nears the top of Precourt's sim training priorities. He cites the case of a CJ2 crew that attempted to land an aircraft on a 4,100-ft., snow-covered runway. The reduction in traction due to surface contamination actually required more than 7,000 ft. of pavement.

"They were virtually dead on downwind," says Precourt. Fortunately, both pilots survived with minor injuries. However, the aircraft was totally destroyed after careening off the end of the runway, plowing through an Armco fence bordering a perimeter road and coming to rest 300 yd. from the end of the runway.

"So many pilots just don't know what they don't know. It's not their fault," he said. "They haven't grown up in a disciplined aviation environment."



ROBERT WRIGHT/WRIGHT AVIATION SOLUTIONS

While Precourt calls mandating FOQA and QARs in general aviation aircraft "a step too far," he highly recommends installation of such systems. He believes they could be set up to provide postflight feedback directly to the pilot. He's also working with ForeFlight and Garmin Pilot to develop tracking or tracing software that would enable pilots to review approach and landing performance in private. This would include course and glidepath deviation, actual threshold crossing height and speed, touchdown point and touchdown speed. The timely and personalized review would help pilots hone their skills by using objective data.

Precourt says NASA's GII space shuttle simulator aircraft had a similar quick access tracking and playback system on board. Shuttle pilots flying simulated approach and landing patterns in it could review their performance immediately after completing the maneuver, while the aircraft was climbing back to altitude for the next simulated approach and landing sequence. The near-real-time feedback enabled him and others to refine their approach and landing technique to near perfection. To fly copilot aboard the shuttle, pilots had to log 500 approaches and landings in the aircraft. To qualify as PIC, they needed 1,000 landings.

Precourt also believes pilots need to learn from the mistakes of others, such as the ones reported in NASA's Aviation Safety Reporting System (ASRS) *Callback* monthly safety newsletters. NTSB accident reports are another excellent resource.

Not all mishaps make the news, though. At this year's CJP single-pilot safety standdown, owner-pilot David Miller talked about lessons that he's learned, especially those associated with mistakes that he and others have survived. Miller discussed many pitfalls that can trap single pilots when they're rushed, including missing simple preflight items such as baggage door latches, pitot-static covers and engine duct covers.

Miller cited mistakes he has made and what he's learned from those missteps.

Good Enough . . . Isn't

The takeaway from this year's NBAA and CJP single-pilot safety standdowns is that minimum FAA requirements for recurrent training and pilot proficiency aren't good enough to assure general aviation pilots have the skills, knowledge and judgment to handle challenges at the same level as aviators at major airlines and military organizations.

It's not that airline and military pilots are born with the "right stuff" and general aviation pilots are not. Rather, the former undergo more rigorous training and have to pass tougher initial and recurrent training tests than most of the latter.

Precourt, Wright and others believe that aircraft manufacturers, insurance companies, training service providers and type clubs, such as CJP, all have to work together to raise standards for general aviation single-pilot training. Online, computer-based training plays a key role in the plan as it enables pilots to bone up on systems, performance, regulations and weather from homes, hotels and offices. Textron's Tru Simulation division, for instance, automatically emails multiple choice quizzes to recurrent training clients as part of its virtual, continuous ground school.

But there are conspicuous holes in Part 142 training programs. Simulator companies assume that clients are current on instrument flying regulations, airspace limitations and lost communications procedures. Companies, such as King Schools, can help fill in knowledge gaps with airspace review, airport signage and IFR refresher courses that help general aviation pilots get the most out of their sim training sessions.

Some GA pilots seize every opportunity to improve their knowledge and skills. For example, Brad Pierce, president of Restaurant Equipment World in Orlando, Florida, flies his Cirrus SR22T more than 800 hr. per year on business all over the continental U.S.

"I've always taken a proactive, progressive approach to my business flying," he said. "Even after getting my instrument rating, I eased into things. I avoided getting rushed or stressed. I started by flying to the business destination the day before the appointment. Then, the following day I'd meet with the client. I'd depart the day after the appointment. I wouldn't fly unless the ceiling was at least 2,000 ft." He now flies to three or four appointments in a single day, but he eased into that pace over several months.

"I also train at least six times per year with an experienced instrument instructor who has me fly into challenging airports in the Rockies," Pierce notes. "The Cirrus has automation that's fantastic, but it's also infatuating. You have to remember the fundamentals and be able to hand-fly the aircraft in all weather conditions."

He continued, "I have no customer out there worth dying for. I use predefined criteria. I adhere to specific SOPs. I won't use airports with less than 3,000 ft. of runway, even though the aircraft only needs 1,200 ft. most of the time. I use floating personal [weather] minimums. Day 1 of flying after a long layoff, I use higher [weather] minimums than on Day 32."

But sometimes missions have to be scrubbed for safety's sake. "Above all, I've learned to say 'No,'" Pierce says.

He also says he's insistent on having the best maintenance for his aircraft. He doesn't defer squawks until the next scheduled shop visit. As he's flying a single-engine piston aircraft, he cares meticulously for the powerplant.

Pierce is looking forward to upgrading to turbine power someday. It's safe to assume he'll upgrade the intensity of his training to match the higher performance of that aircraft. He's setting an example for other single-pilot operators to follow. **BCA**

Boeing Business Jet

Why go big?

Because you can.

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

A total of nearly 150 BBJ, BBJ2 and BBJ3 aircraft have entered service since 1999, triple the number forecast by the late Borge Boeskov, first president of Boeing Business Jets. A visionary salesman, it was he who pitched the idea of creating the private Boeing to then-Chairman Phil Condit.

As Boeskov envisioned it, the BBJ would be a luxurious derivative of the Next Generation (NG) Boeing 737-700, modified to fly up 6,000+ nm. With Mach 0.78 to 0.80 cruise speeds and a top cruise altitude of FL 410, it would have adequate performance to be competitive with the longest-range purpose-built large-cabin business jets. Boeskov believed that at least 50 potential BBJ buyers existed who wanted considerably larger cabins than those of the Bombardier Global Express and Gulfstream GV for trips between Tokyo and New York, Paris and São Paulo, and Hong Kong and Los Angeles.

The BBJ promised to offer almost three times the cabin volume of the Gulfstream V or Bombardier Global, affording passengers amenities such as full-sized beds, showers and even exercise equipment to make 12- to 14-hr. trips less fatiguing.

The new model would feature a strengthened Boeing 737-700 fuselage with the beefier wing and landing gear of the Boeing 737-800, plus auxiliary belly fuel tanks to extend range as much as 80%. But as it turned out, very few customers fitted their aircraft with all nine aux tanks to achieve max range because available payload with full fuel proved to be too limited. Even when empty, each additional belly tank added about 500 lb. to the aircraft's operating weight, thereby eroding useful load. Early interior completions ballooned from 15,000 lb. to 20,000 lb., or more, as completion centers struggled to finish cabins on weight, on time and on cost.

Accordingly, most operators opted for five-tank configurations, either one forward and four aft tanks or two forward and three aft tanks. So equipped, the aircraft can fly up to 5,400 nm, sufficient range for nonstop flights between most city pairs in North America and Europe, or one-stop service between North America and Asia.

The original BBJ was followed by the BBJ2, based on the -800 jetliner, in 2002. It offers about 25% more interior

Three models based upon Boeing 737NG — (L) BBJ or B737-700IGW (increased gross weight) offers the most range, BBJ2 is B737-800 with aux belly fuel tanks and a larger cabin and (R) BBJ3 or B737-900 with an even larger customized cabin.

PHOTOS: BOEING

volume with nearly the same five aux tank range. The BBJ3, based on the -900 model, entered service in 2009. The BBJ and BBJ2 can be modified to reduce maximum cabin altitude from 8,000 ft. at FL 410 to 6,500 ft., but the tradeoff is slashing airframe economic life almost in half. Even so, modified airframes have a 26,000-cycle economic life that can be prolonged by at least 50% with stepped-up maintenance inspections. Airplanes with 8,000 -ft. maximum cabin altitudes have 50,000-cycle economic lives and 75,000-cycle service lives, several times higher than most purpose-built business jets. Most operators only fly their aircraft 200 to 250 hr. per year.

Always one to push convention, Boeskov was so impressed with a presentation by Aviation Partners Inc. President Joe Clark that he agreed to put API's winglets on the BBJ, giving it not only a distinctive look but a promised 5% range improvement. The winglets ultimately proved so effective that Boeing formed a joint venture with Seattle-based Aviation Partners and put winglets on virtually every new Boeing 737NG.

BBJ and BBJ 2 jets initially proved popular with a diverse group of operators, ranging from Fortune 100 companies such as General Electric — a 50/50 partner with Boeing on the 737NG BBJs, which just recently expired with the arrival of the new BBJ Max series — Aramco, Occidental Petroleum and Tracinda Corp., to numerous head-of-state and special missions organizations, such as the U.S. Air Force's 89th Air Wing at Joint Base Andrews, along with the governments of Australia, Colombia, United Arab Emirates and Jordan, plus Malaysia, Saudi Arabia, South Africa and Tunisia, and NetJets. A few are operated by the Las Vegas Sands and other large casinos.

However, the Deep Recession of 2008 had a pronounced effect on public corporations that operated BBJs. Shareholders and CFOs focused attention on both the aircraft operating costs and the public's negative perception of ultra large jets. So, many companies including L Brands (aka The Limited), GE and Occidental shed their aircraft. Many Chinese firms also put up their aircraft for sale in the wake of their Communist government's crackdown on conspicuous displays of wealth.

Since they are absent of such scrutiny, privately held firms and high-net-worth individuals have since emerged as a prime BBJ customer demographic. Fresno, California-based Assemi Group, Miami real estate developer Crescent Heights and Wichita-based Town and Country Food Markets, plus Funair Corp., toymaker Ty Inc. and Fortress Transportation & Instructure, along with Jeffrey Katzenberg and Stephen Spielberg, Washington Corp., Tutor-Salida and even pachinko machine king Hideyuki Busujima are among the current operators. Many aircraft carry Maltese, Cayman Islands, Isle of Man or Bermuda registrations to mask their owners' identities.

However, the majority of BBJ, BBJ2 and BBJ3 aircraft are operated by VIP air-transport divisions of government and military organizations, including those in the U.S., Australia and Africa, plus Colombia, Turkey and India. The BBJ remains a favorite air transportation asset of oil barons in the Middle East, such as royalty in Abu Dhabi, Dubai and Saudi Arabia.

"It has become attached with the egotistical uber rich," says one retired BBJ salesman. "They don't care about the image piece of it. But it also has a lot of capacity for the money. And it's a whole lot more reliable than most purpose-built business jets."

Why BBJ Instead of Other Long-Range, Large-Cabin Aircraft

Chief pilots seldom made the decision to buy the BBJ, according to the flight department heads with whom we spoke. Most say their principal wanted the aircraft for personal use, made the decision to buy it and then flight department management was charged with supporting it.

In the heyday of the program in the late 1990s, Boeskov's long-time personal relationships with corporate CEOs and heads of state had a large impact on sales. Boeskov had worked for Boeing almost continuously since 1965, except for a short stint at Mitsubishi Aircraft

Cockpit features six LCD screens, standard Collins HUD, triple IRS, CAT III-capable flight guidance system, FANS-1/A equipment, ADS-B-out and full-feature FMS. WAAS LPV and ADS-B-IN are not offered.

in San Angelo, Texas, in the early 1980s. His general aviation experience served him well at BBJ. He understood the needs of one- and two-airplane business aviation operators.

Boeskov's BBJ team also established a good reputation for product support. Tom Lindberg, then head of operations, came up with the concept of the BBJ Gold Card, a special program tailored for BBJ owners that would entitle them to priority spare parts handling, customized technical support and even fuel discounts. That was a significant marketing tool for customers who were used to being pampered by the more traditional manufacturers of purpose-built business jets.

Boeskov, who died in 2004, in large part sold the aircraft on the basis of Boeing's airline product support network. It was said that Boeing could deliver virtually any part to any place on the globe in less than 48 hr. from its $2 billion parts inventory in Seattle. Since the BBJ was based on proven B737 jetliner technology, the aircraft would be easy to fix but unlikely to break in the first place. Operators say that while support is excellent at major airports that have regular service by air carriers flying Boeing 737 jetliners, it can be a challenge at smaller general aviation airports that only get occasional visits by Boeings.

Some also say that they're compelled to park their BBJs well away from FBOs because of the aircraft's 117.4-ft. wingspan. And with a 41.2-ft.-high tail, it's nearly impossible to fit into most commercially available general aviation hangars. One operator said that he was forced to ferry the aircraft home after dropping off passengers at a destination airport because the owner didn't want to leave it out in the weather.

Outfitting early BBJs proved challenging, as already noted. Boeing only provided a 13,000-lb. interior allowance in weight buildups, which was clearly unrealistic for aircraft with aft private staterooms, showers, fully enclosed offices and three lavatories. Some of these aircraft have basic operating weights (BOW) as high as 104,000 lb., or 8,000 lb. more than a spec BBJ. The actual maximum range of these aircraft falls short of the 5,495 nm promised for aircraft with five tanks.

But advances in cabinetry, bulkheads, insulation and cabin management systems have shaved as much as 25% from interior completions. Most new BBJs now tip the scales at 99,000 lb. to 100,000 lb. empty except for operating items. They can carry 19 passengers with full fuel and interior sound levels now are on a par with most current-production purpose-built large-cabin aircraft.

How BBJs Are Configured and Used

As noted, most BBJs are fitted with five ALOFT Aircraft (formerly De Crane, nee PATS) auxiliary fuel tanks. Early BBJs tended to be nose heavy, so those aircraft were fitted with one forward and four aft aux tanks. This leaves room in the forward bay for baggage and spares. There is a total of about 400 cu. ft. of under-floor baggage volume with five tanks installed. As a result, some passenger luggage must be stowed in the cabin. Most passengers like that just fine because they have ready access to bags in the cabin but no access to anything in the belly.

While there is plenty of variation in interior configurations, the plushest parts of the interiors tend to be placed in the rear of the cabin to help compensate for the forward CG. Typically, corporate aircraft operators opt for a forward crew compartment, with crew lav, galley and crew rest areas. The main cabin may be configured with a forward seating section and a conference room grouping ahead of the wing, then a private office compartment with an adjoining passenger lav and an aft stateroom with its own lavatory. Some aircraft are configured with central galleys, dividing the cabin into fore and aft seating areas. But some owners have chosen open cabin layouts with four to five seating areas that accommodate 25 to 28 passengers. These layouts are popular with charter operators, such as H. Ross Perot Jr.'s Hillwood Airways and several firms in China, Europe and the Middle East.

Long-range cruise speed for the BBJ averages Mach 0.785, with an average fuel burn of 4,830 pph. Most people with whom we spoke routinely fly their aircraft at Mach 0.80. First-hour fuel burn is about 7,200 lb., then down to 6,000 lb. in the second hour and 5,000 lb. for each subsequent hour. Operators plan on overall fuel burns of about 5,000 pph on long-range trips at Mach 0.785.

Push the BBJ up to its Mach 0.82 MMO redline, however, and average fuel consumption increases to more than 5,700 pph. To put that into perspective, a Bombardier Global 6000 cruising at Mach 0.85 burns about half as much fuel per nautical mile as does a BBJ at Mach 0.82.

Operators with five-tank airplanes said they're comfortable flying 10 to 11 hr., and landing with 7,500- to 10,000-lb. fuel reserves. Aircraft configured with 25 to 28 passengers can fly 4,600 to 5,000 nm in no-wind conditions, depending on interior configuration.

The longest-range BBJs, the ones with nine tanks, have enough tanks-full payload to carry eight passengers more than 6,000 nm, assuming the aircraft has a 15,000-lb. interior completion. But few operators are comfortable landing with 4,900- to 5,000-lb. minimum NBAA fuel reserves. Each 1,000 lb. of

extra fuel reserve reduces range by about 100 nm.

Tanks-full passenger capacity, regardless of aux tank configuration, doesn't appear to be a limitation for most operators. Most operators fly with six to eight passengers on a routine basis. Only a few non-commercial operators ever fill all the cabin seats on their aircraft.

Stage lengths vary greatly, so it's difficult to pin down an average for the fleet. Most operators we contacted fly their aircraft routinely between North America and Europe or the Middle East. Before it became unfashionable to fly such large jets, corporations were flying their aircraft 500 to 800 hr. per year. Some high-net worth individuals fly fewer than 150 to 200 hr. per year.

Fuel consumption remains the single biggest operating expense. Operators with aircraft enrolled in GE's OnPoint engine service program say it costs about $240 to $260 per engine per hour, somewhat less than Rolls-Royce's hourly fees for Corporate Care for BR700 series engines that power Global 5000 and 6000 and Gulfstream G550 and G650 aircraft. Notably, some BBJ operators plan on keeping their CFM56 engines on wing for 25,000 to 30,000 hr. because virtually all routine maintenance can be done without removing them. Engine manufacturer CFM International — a 50/50 partnership of France's Safran and GE — conservatively estimates that the engines will go at least 12,000 to 13,000 hr. on wing for most operators.

Major airframe inspections come at 12-year intervals. Minor inspections occur at 36 months. All interior components have to be removed for the 12-year inspection and the aircraft can be down for four to eight weeks.

Landing gear overhauls also come at 12-year intervals for low-utilization operators. It costs about $250,000 to exchange the landing gear, but most operators say they don't want to trade their low-cycle undercarriage for three high-cycle landing gear previously used on a commercial jetliner. So, they send their own landing gear out for overhaul and wait up to four to six weeks for it to be returned. Cost increases to $350,000 for such custom maintenance treatment.

Anecdotal Scorecard

When asked to describe the aircraft's best features, most operators lauded the BBJ for its dispatch reliability, range, cabin room, runway performance and easy maintenance. "It just runs and runs and runs," says one West Coast operator. "What do you expect? It's a Boeing," commented another operator.

Operators credit the aircraft's design evolution from the classic series. The avionics were updated to improve reliability and make new display functions available. The rudder power control unit was redesigned for greater reliability.

The cost of spare parts was another plus for the BBJ. Wing leading edges and transparencies, for instance, are far less expensive than those on purpose-built business jets because Boeing buys up 500 shipsets each year. One exception is the cost of overhauling the carbon/carbon disc brake heat packs. They save 700 lb. of empty weight compared to steel brakes and they go about 2,200 landings between overhauls, but plan on a $50,000 to $100,000 overhaul bill.

Parts support, directly from Boeing, has been challenging for some operators. At times, they feel a bit mired in Boeing's bureaucracy. But many say they've developed good working relationships with local commercial airline operators and other BBJ operators, so they're able to get AOG spares from them on very short notice. One operator, for instance, said his BBJ was out of service in South Africa because of a brake problem. The local Boeing rep, working with the maintenance department of a local commercial operator, was able to remove and replace the brake assembly in 4 hr., according to the operator.

What are the aircraft's worst features? The comment that "It's a Boeing," also applies here. The aircraft's imposing size, particularly its high tail, attracts plenty of attention at general aviation airports. It's tough to arrive and depart from most FBOs as inconspicuously as one might in a smaller, purpose-built business jet. Operators'

Standard, retractable forward airstair is useful for autonomous operations at remote airports. Sill heights on belly baggage compartment doors are 4.7 ft. forward and 5.9 ft. aft.

Most cabin layouts feature a central conference grouping and a forward lounge with individual chairs. Not show is a spacious forward galley and crew compartment with lay-flat beds, crew lav and crew rest area.

sensitivity regarding the high-profile image of the BBJ is a prime reason why this report lacks inputs from the majority of the BBJ community and why so few folks wanted to be quoted.

Pavement weight-bearing capacity at general aviation airports is an issue. Plenty of small general aviation airports have runways long enough to accommodate the BBJ, but the asphalt could never stand the load. In addition, some airports, such as Teterboro, simply banned the BBJ by imposing arbitrary aircraft maximum weight restrictions.

"Look at your mission requirements very, very carefully," says one BBJ chief pilot. "There are plenty of airport restrictions and you can get into a lot of trouble if you don't do your homework."

Today, the BBJ has much tougher competition than it did when it made its debut in 1999. Aside from the rival jetliner-turned-business-jet Airbus ACJ, today's longest range, purpose-built business aircraft have considerably larger cabins than the GV and Global Express did 20 years ago.

In addition, Bombardier's and Gulfstream's ultra-long-range jets now cruise at Mach 0.85 for 7,500 nm or more and dash 6,400 nm at Mach 0.90, cutting an hour or more off of the longest trips flown at Mach 0.80. Speed sells. The promise of 500+ kt. cruising is a potent sales tool.

Even more space, though, has strong attraction for some buyers. The new BBJ Max 8, for instance, is 19 ft. longer than the original BBJ, providing room for a considerably larger forward galley, three VIP lavatories plus a forward crew lav, and extra private office in the aft VIP suite, in addition to the typical three-lounge configuration in the main cabin.

The BBJ Max 8 retains all the assets of the original BBJ, including its standard built-in airstair for the forward entry door, 5.5-ft. front and aft cargo-door sill height for hand loading of external baggage and easy servicing of the low-mounted engines. With seven aux fuel tanks in the belly, the aircraft can fly nine passengers 6,500 nm, enough to fly from Hong Kong to London. That's mainly because its Leap 1B engines, also built by CFM International, are 15% more fuel efficient than the CFM56-7 turbofans that power the original BBJs.

The BBJ Max 8 has 659 cu. ft. available for baggage with the seven tanks installed. That's about four times the volume of the original BBJ. The compartments are FAR Part 25 Class C rated with smoke detection and fire suppression systems.

Boeing also is booking orders for the BBJ Max 7, an aircraft with a shorter cabin but with 7,000-nm range. It is also marketing the BBJ Max 9, which has the longest cabin of the three and 6,375-nm range. Of the new models, company insiders say Boeing's booked 20+ orders, and just last month launched a BBJ 777X.

So, is bigger really better? It depends. Assuming your home and destination airports can accommodate the heft and size of a BBJ or BBJ Max, assuming your budget can handle up to $14,000 per hour in direct operating costs and assuming you're immune from being associated with owning the biggest jet at the local airport, then it's a qualified "yes."

Wherever you land, you're bound to become a hot topic among pilots, other aircraft owners, plane spotters and paparazzi. **BCA**

Most cabins also have an aft private stateroom with its own lavatory and shower. Walk forward, up the right side aisle, and you'll see a private den on the left with desk, chair and sofa sleeper. There's also a second passenger lav just aft of the central conference seating area.

Kent S. Jackson
Contributing Editor
kjackson@jetlaw.com

ADS-B, or Not to Be?

What if you **miss the deadline?**

THE JAN. 1, 2020, DEADLINE FOR ADS-B OUT EQUIPMENT COMPLIance looms ever closer, and the deadline has passed for exemption applications. The FAA is still offering $500 rebates to owners of fixed-wing, single-engine piston aircraft based on their purchase of avionics that have received an ADS-B Technical Standard Order authorization and meet ADS-B Out rule requirements. The program will run until Oct. 11, 2019, or until the funds for all remaining rebates are exhausted, whichever comes first. There are currently over 8,000 rebates still available.

For those of us who installed ADS-B early, the FAA has already been calling about compliance issues. The first call that I received from the FAA about my ADS-B came several months and nearly 100 flight hours after I thought that I was done. A weary FAA inspector from FAA headquarters informed me that my aircraft, and a number of others, were showing up as a flight of two on the FAA's ADS-B equipment. I called Garmin, reached an equally weary tech who had been hammered with such calls, and received the instructions for the required fix.

More months and more flight hours later, I got another call from the FAA. This time the problem was a "call sign mismatch." While I was filing flight plans and talking to ATC under a call sign, my ADS-B was transmitting my N-number, not the call sign. No controller seemed to know, but the poor inspector in charge of ADS-B seemed concerned that the mismatch might break the government computers. It took a software update before I could solve the problem, but I did so promptly, because the inspector had made a cryptic remark that there would be no enforcement action if I fixed the problem promptly. I was severely tempted to ask him about what ADS-B enforcement would look like before 2020, but I chose discretion instead.

Except for aircraft that lack electrical systems (balloons, gliders and a few taildraggers), if you fly in any airspace that requires the use of a transponder today, you will also need ADS-B Out installed and working by 2020.

But what if you miss the deadline and keep flying? The FAA Compliance and Enforcement Program (FAA Order 2150.3C) gives three categories for operation of aircraft without required equipment: "technical noncompliance," "potential effect on safety" and "likely effect on safety."

In a 2015 case involving an aircraft equipped for flight in RVSM airspace, but without an appropriate Letter of Authorization (LOA) for the operator, the pilot in command received a 60-day suspension. The NTSB also ruled that although the PIC had filed a timely form under the NASA Aviation Safety Reporting System (aka "NASA Form") after the flight, since he had deliberately flown without the required LOA, he wasn't entitled to any relief from the suspension.

For those of us who installed ADS-B early, the FAA **has already been calling about compliance issues.** The first call that I received from the FAA about my ADS-B came several months and nearly **100 flight hours after I thought that I was done.**

In time, you can expect that the FAA will categorize ADS-B cases in the "potential effect on safety" and "likely effect on safety" categories when a pilot knowingly flies without the equipment. This will mean long suspensions and/or high civil penalties. The FAA has pointed out in training materials that there are areas in which controllers are without radar coverage but will have ADS-B coverage. It would be easy for the FAA to make the case for "likely effect on safety" if ADS-B is the sole source of traffic information in a given area.

However, in time, you can also expect to see cases in the "technical noncompliance" category. "Call sign mismatch" cases might become a serious headache for airlines and other operators whose crews will need to learn to enter a transponder squawk code and a call sign into their avionics for every flight.

Want to know if your installed ADS-B really works? The FAA has a website where you can check on a specific flight: **https://adsbperformance.faa.gov/PAPRRequest.aspx**. The agency promises a report within 30 min.; my test returned a report in about 3 min. You will then need the User Guide: **https://adsbperformance.faa.gov/PAPRUsersGuide.pdf**. Anything highlighted in red on the report means a return trip to the avionics shop.

A common problem with ADS-B installations has been labeled "Air on Ground" for when the unit reports the aircraft airborne while still on the ground, due to a defective squat switch or airspeed setting. Will the FAA eventually threaten enforcement against operators for "technical noncompliance" if a properly installed unit isn't correctly functioning on every required parameter? Most likely. Such has been the case with flight data recorders for air carriers.

So, remember: Jan. 1, 2020, isn't just the deadline to have ADS-B Out installed in your aircraft. It is the deadline to have ADS-B Out installed and working correctly in your aircraft. **BCA**

Fred George
Senior Editor
fred.george@informa.com

Gulfstream V

Tokyo to New York range for **$10 million**

THE GULFSTREAM V, SIMILAR TO THE COMPANY'S PREVIOUS large cabin aircraft, makes no apologies for its size, thirst or operating costs, let alone its derivative design that dates back to the G-II, which debuted in 1967. However, it delivers more range, higher cruising altitudes and better dispatch reliability than anything else in its price class on the used market. You can buy one in good condition for as little as $10 million. Fixers are priced below $6 million, but they're no bargain because of the cost to restore them. A late model low-time creampuff commands less than $13 million.

From 1995 until 2003, when it was replaced by the G550 (aka GV-SP), Gulfstream delivered more than 190 units. The GV might not have been developed, had it not been for the perceived threat posed by Bombardier's announced Global Express in the early 1990s. Compared to Gulfstream G-IV, Bombardier's clean-sheet design promised 6,500-nm range, a considerably larger cabin, 30-kt. faster cruising speeds, higher cruising speeds, lower cabin altitudes, a quieter cabin and better runway performance. The Montreal planemaker was intent on dethroning Gulfstream as the world's premier business aircraft manufacturer.

Ted Forstmann, head of Forstmann Little, in partnership with Allen Paulson, had then recently purchased Gulfstream from the Chrysler Corp. for $850 million. They weren't about to surrender to the Canadians, but they didn't have the time or money to launch an all-new model to thwart Global Express. So, they turned to veteran Gulfstream design chief Charles Coppi for a quick, but effective counter offense.

Coppi's engineering team knew a G-IV successor would need a new wing, new engines and more fuel to be viable in this fight. Fortunately, BMW and Rolls-Royce had just formed a partnership to develop the BR700 family, a new turbofan series with more thrust and considerably better fuel specifics than G-IV's aging Rolls-Royce 611-8 Tays.

Taking full advantage of the new engines, Coppi designed a new 93.5-ft. span, semi supercritical wing that would hold nearly 41,000 lb. of fuel, or almost 12,000 lb. more than that of the G-IV. He moved the engines back by two feet by stretching the aft fuselage in order to slash interference drag between the nacelles and wing root. He stretched the forward fuselage 5 ft. to balance the aircraft.

The GV is a versatile aircraft, but few operators stretch it to its 6,400-nm range limit. Rather, they fly at Mach 0.80 in the mid- to- high-forties on missions averaging 2-2.5 hr., much the same as they did in earlier Gulfstreams. The GV can operate from a 3,200-ft. runway on a 1,000-mi. trip, but plan on 4,000 ft. to be comfortable, assuming dry pavement and ISA conditions. The longest trips require 6,110 ft. of pavement for departing a sea-level standard day airport and 9,150 ft. when taking off from *BCA*'s 5,000 ft. elevation, ISA+20C runway. Hot and high airport performance is not this aircraft's strong suit.

It's easy to hand fly. V speeds and required runway are considerably lower than that of G-IV for the same length missions.

Operators give it high marks for dispatch reliability, low cabin sound levels and good fuel efficiency relative to other aircraft of the same age and range capabilities.

Typically equipped with SATCOM, HUD, plenty of galley stores and optional gear, GV can carry six to seven passengers with full fuel. Most aircraft have forward galleys and crew lavatories. The forward crew rest area is cramped. Most operators

GULFSTREAM

normally use it as a storage closet, unless flying ultra-long missions. The three-zone cabin typically has a forward, four-chair club section, center four-seat conference grouping with opposite side credenza and aft stateroom with three place divan and one-chair work station.

What's not to like about GV? Aircraft with aft galleys are tail heavy. Forward galley aircraft are more desirable, especially when they're also fitted with the optional forward crew lavatory. This allows the passengers to have uninterrupted privacy because the crew compartment is self-sufficient.

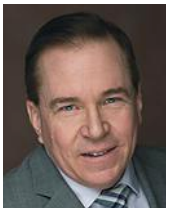
Cabin space efficiency isn't a strong suit. Passengers have about the same space as in G-IV. The aft baggage compartment is partially clogged with waste and fresh water holding tanks. Global Express's interior seems enormous by comparison.

BR710 engine maintenance cost is a big-ticket item. At 8,000 hours or ten years, whichever comes first, plan on $1.25 million per engine for overhaul. Watch out for landing gear corrosion. Such deterioration can cut into the 5,000-cycle overhaul time. Upgrading to FANS 1/A and ADS-B can cost as much as $2 million, depending upon compliance with previous service bulletins. Previous owner and maintenance shop pedigrees have sharp impact on resale values.

The GV remains popular in the resale market. About a dozen of the 192 aircraft in active service are for sale. Bombardier Global Express is the prime competitor. It offers better runway performance, a larger cabin, a softer ride and more usable baggage capacity, but less range and higher fuel consumption. The GV and Global Express are comparably priced. Assuming each is well maintained, the choice boils down to GV's superior range, altitude and fuel efficiency versus Global Express's unsurpassed cabin comfort. **BCA**

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

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


DANIEL S. NICOLAI


PETER CABOOTER


JIM BALZER


JEFF MIHALIC


JOE PING


TIM WOOD

▶ **Aerospace Industries Association**, Arlington, Virginia, appointed **William Brown** chairman of the Board of Governors for 2019. Brown is chairman, president and CEO of **Harris Corp. Kelly Ortberg**, CEO of **Collins Aerospace**, will serve as vice chairman. **Eric Fanning** has been reappointed as president and CEO. **Ginette Colot** has been reappointed secretary-treasurer.

▶ **Aerospace Center for Excellence** (AOPA), Washington, D.C., named **Ed Young** executive director. Young served as director of aviation for the state of Kansas and most recently served in the private sector consulting on airport and state aviation system planning projects. Young is currently president of the Fly Kansas Foundation.

▶ **Air Law Firm**, Shannon, Ireland, announced **David Chamberlain** as senior associate. Chamberlain joins the company from Watson Farley and Williams law firm, where he specialized in transactional work involving airliners, business jets and helicopters.

▶ **Air BP**, Middlesex, U.K., appointed **Sonya Adams** managing director for Northern, Central and Western Europe at. Adams, from Australia, joined the BP Group in 2001. For the past year, she has served as executive assistant to the CEO, BP Downstream.

▶ **Aircraft Propeller Service (APS)**, Lake Zurich, Illinois, appointed **Daniel S. Nicolai** as vice president, Operations responsible for developing all global operations strategies for APS. He has over 30 years of manufacturing experience, 15 years of which are in the aerospace industry.

▶ **Aireon**, McLean, Virginia, announced that **Peter Cabooter** has joined the executive team in the newly created position of vice president, Customer Affairs responsible for supporting existing customer worldwide and developing new relationships with Air Navigation Service Providers not currently subscribed to the Aireon service.

▶ **Amazon Air**, New York, New York, announced the **Sarah Rhoads** has been named the 2018 Air Cargo Executive of the Year by Air Cargo World, for the integral part she played the development of Amazon's air cargo operation.

▶ **Aviation Maintenance Professional**, Dallas, Texas, appointed **Jim Balzer** as COO. In cooperation with President and EEO, Dennis Moore, Balzer will oversee the company's operations, policies and long-range goals.


KATHLEEN VERRET


DAN DUNN


JANET CHEN


STUART LOCKE


EVGENIY PASHKOV

▶ **Cadence Aerospace**, Anaheim, California, named **Vivian Martinez-Wells** director, Business Development and Contracts, Aerosystems responsible for market expansion and brand projection strategies. She reports to **Robert Saia,** senior vice president, Business Development.

▶ **Delta Private Jets**, Erlanger, Kentucky, appointed **Jeff Mihalic** president and chief executive officer and **Lee Gossett** as senior vice president, Operations and Chief Operation Office. Mihalic replaced **Gary Hammes** who has taken a leadership role in **Delta Air Line Technical Operations**.

▶ **Duncan Aviation,** Lincoln, Nebraska, announced that **Nick Parsons** is a project manager at the Lincoln facility. He has been with Duncan for five years as a leader and mechanic on Challenger and Global projects.

▶ **EPIC Fuels**, Irving, Texas, announced that **Kevin Wilkerson** has joined the company as vice president of transaction processing. Wilkerson has previously held leadership roles at Colt and World Fuel Services.

▶ **FAA**, Washington, D.C., promoted **Earl Lawrence** to executive director of Aircraft Certification, succeeding **Dorenda Baker,** who has retired. Lawrence previously served as executive director of the FAA's Unmanned Aircraft Systems Integration Office.

▶ **Flight Safety**, La Guardia Airport, New York, announced that **Joe Ping**, manager, Aircraft Maintenance, Global Integrated Services, Aviation, Cummins Inc., is the 4,000th aircraft maintenance technician to successfully complete the Master technician training program. He earned his Master Technician certificate following completion of a comprehensive multi-year curriculum for the Gulfstream G280 aircraft.

▶ **Gulfstream Aerospace**, Savannah, Georgia, announced that President **Mark Burns** was one of the recipients of the 2018 National Aeronautic Association's Wesley L. McDonald Distinguished Statesman of Aviation Award. **Timothy Wood** was named regional sales manager for Africa and the Middle East and South Asia. He reports to **Nicolas Robinson,** regional senior vice president International Sales.

Looking for Help With...

Identifying Business Aviation Market Opportunities, Competitive Insight, Fleet Analysis or Custom Research?

- Market and competitive insights
- Fleet data services: historical and current fleet ownership and status; forecast and valuations
- Research and analysis offerings

To learn more about customized solutions to meet your business needs,
visit pages.aviationweek.com/IntelFleetData

or call Anne McMahon at + 1 646-291-6353 or
Thom Clayton +44 (0) 20 7017 6106

AVIATION WEEK NETWORK

Advertisers' Index

On Duty

▶ **MarketPlace Development**, Washington, D.C., appointed **Kathleen Verret** vice president, Washington Region. She will direct airport concession planning, strategies and programs at Reagan National and Dulles.

▶ **Mente Group**, Dallas, Texas, promoted 23-year business aviation executive **Dan Dunn** to executive vice president, Transactions.

▶ **Metrojet Limited**, Hong Kong, appointed **Janet Chen** regional sales manager, MRO.

▶ **National Air Transportation Association** (NATA) announced that **Ryan Waguespack** has joined the Association as vice president focusing on charter, MRO and aircraft management sectors. He most recently held the position of vice president of business development at Summit Aviation.

▶ **Oriens Aviation**, Biggin Hill Airport, Kent, UK, announced that **Stuart Locke** will be general manager for the Oriens Maintenance London Biggin Hill Airport facility. He comes to Oriens from TAG Aviation where he managed their Part 145 maintenance activity.

▶ **Passur Aerospace**, Stamford, Connecticut, announced that **John Thomas** has joined the board as vice chairman and **Brian Cook** has joined the board as a director.

▶ **Satcom Direct**, Melbourne, Florida, appointed **Evgeniy Pashkov** as regional director for EEMEA. He will oversee SD's sales and business development activities the EEMEA regional from his base in Dubai. He reports to International Vice President **Michael Skou Christensen.**

▶ **Silver Air,** Santa Barbara, California, has hired **Colleen McCauley** to serve in the newly created position of vice president of Client Services responsible for leading existing private jet management services and developing new programs.

▶ **SmartJets and VIP Completions,** Fort Lauderdale, Florida, appointed **Manny Karanos** director of Sales and Marketing for its new facilities at Fort Lauderdale International Airport.

▶ **Spirit AeroSystems**, Wichita, Kansas, announced the retirement of **Sanjay Kapoor**, executive vice president and chief financial in the first quarter of 2019. Kapoor joined Spirit in 2013.

▶ **SR Technics**, Zurich, Switzerland, named **Owen McClave** senior vice president of engine services, replacing **Roberto Furlan.** He was formerly managing editor of Vector Aerospace's UK business.

▶ **West Star Aviation**, Grand Junction, Colorado, promoted **Jeff Yeager** to program manager of the landing gear/accessory program for Grand Junction Regional Airport in Grand Junction, Colorado. Yeager joined West Star in 2011. **Steve Goede** has been named general manager of West Star Aviation's Chattanooga, Tennessee, facility. **Tom Hilboldt**, who had been managing the location, will focus on maintenance operations there. Goede previously helped develop West Star's landing gear overhaul and accessory programs for three company locations, including the Chattanooga facility.

▶ **Wyvern**, Bedford, Massachussetts, announced that **Allison Markey** has joined the company as director of audit programs. Markey is the vice chair of the International Standards for Business Aircraft Handling Standards Board. **Devin Howes** has joined the company as director of safety data systems; **Valerie Troilo** has been named operations support specialist, and **Yulia Goudreau** has joined the company as operations support specialist. **BCA**

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


REAL ALFA FLIGHT AVIATION SERVICES
GROUND HANDLING & FUELING SERVICES
FBO SERVICES · PERMITS & OVER FLIGHTS AUTHORIZATION
México · Cuba & Caribbean · Central & South America
"We have 30 years of experience in exclusive corporate aviation and charter flights. We are your best solution to travel!"
YOUR PASSPORT TO EXCLUSIVITY
operations@realalfafly.com
+52 (722) 3196 726
www.realalfafly.com

Products & Services Previews

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

1. New Application for Composite Repair

HCS9400-02 Smart Susceptor has been introduced by Heatcon Composite Systems. The innovative Smart Susceptor technology employs the use of a high-frequency inductive owner supply combined with temperature limiting heating wire to transform heat blankets into an active mechanism to improve thermal uniformity. The application of this advanced technology ensure that composite materials are properly cured and repaired, according to the company.

Heatcon Composite Systems
Seattle, Washington
(206) 575-1333
www.heatcon.com

2. Freedom to Fly

In 1939, a small group of Philadelphia businessmen came together with a mission: To give a united voice to what give a united voice to what was then called “miscellaneous aviation>’ The Aircraft Owners and Pilots Association was born. Freedom to Fly: AOPS and the History of General Aviation in America tells the story of general through the lens of its biggest advocate.

AOPA-Publications
www.aopa.org

3. VistaJet’s Wine in the Air

VistaJet has launched the VistaJet Wine Program, designed to enhance the exploration of the world of wine on its aircraft and at world destinations. Elements of the program include: The Wine in the sky Questionnaire; Signature wine List; The VistaJet Wine Club; Wine Tours and the World of Wine Concierge.

VistaJet
www.vistajet.com/wine

4. Private Jet Card Comparisons New Book

Jet Card Pricing: 19 Factors That Impact the Cost of Your Private Jet Flights, by jet card expert, Doug Gollan, guides readers through what to consider when determining which jet card program best suits their needs. Among issues covered: Federal Excise Tax, international surcharges, high-density airport surcharges, fuel surcharges, taxi time, Consumer Price Index (CPI) escalators; segment minimums, daily minimums, deicing, catering, Wi-Fi, initiation fees, dues, peak day surcharges, interchange fees, and the list goes on. The guide compares over 250 offerings by 65+ variables. Price: $19.50 on Amazon ($24.95 Kindle)

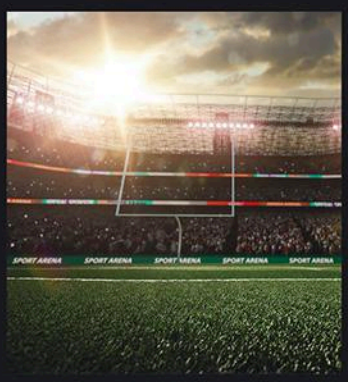
Complimentary to Private Jet Card Comparisons subscribers
privatejetcardcomparisons.com

Discover the Ultimate Difference™

- Dornier 328 & Embraer 135LR Jets
- State-of-the-Art Aircraft
- 30 Passenger Configurations
- All Leather Interiors

Our 30-seat Jets are perfect for:

Corporate Travel/
Shuttle



Sports Team/
Fan Travel

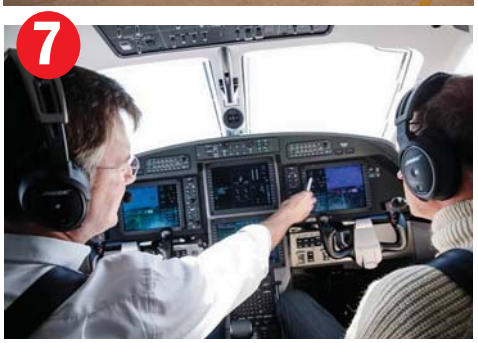
Project Travel/
Shuttle

Casino/Resort
Trips

Call Today!
Eddie Moneypenny · 330.620.9400
OR
Jeff Moneypenny · 330.620.7400

ULTIMATE
JETCHARTERS

5. Bombardier Adds Mobile Trucks, Line Maintenance Station



Bombardier has expanded its services and support network with the addition of five Mobile Response Team trucks in the U.S. and a line maintenance station at Le Bourget Airport near Paris. The Le Bourget facility is the seventh line maintenance station opened in the past 18 months, Bombardier said. The new Bombardier facility offers standard scheduled and unscheduled maintenance and Aircraft-on-Ground (AOG) maintenance support along with wheel and battery shop maintenance services. The facility is certified for Learjet 60, Challenger 300 series, Challenger 600 series and Global series business jets, including the new Global 7500. In addition, Bombardier has expanded its North American Mobile Response Team with the addition of five trucks, which brings its worldwide total to 30. The five trucks will be based in San Francisco and Santa Ana, California; Las Vegas; West Palm Beach, Florida; and Scottsdale, Arizona. "With these investments, we are adding expertise and increasing accessibility to OEM support for our European and North American operators," said Jean-Christophe Gallagher, vice president and general manager of the customer experience for Bombardier Business Aircraft.

Bombardier Aerosapce
www.bombardier.com

6. Alerion Aviation Introduces Aircraft Owner Portal

Alerion Aviation, based in Teterboro, New Jersey, has launched a new aircraft owner portal, which will allow users to access information, such as schedules, expenses, maintenance updates and passenger lists in real time.

The portal, which has been in development for two years, is in beta testing and will soon be available to clients, the company said. Owners will be able to look forward in time and backward to understand aircraft operations and trends. The portal also allows multiple owners to coordinate schedules and itineraries, Alerion said. Data is stored in the database in the cloud and protected by unique owner passwords, it said. All records, photos and aircraft documents are stored in one location and easily accessible on a computer, iPad or smartphone. The information is secure and not subject to data corruption, the company said. "A highly functional, interactive owner portal with real-time schedules, financial and maintenance information has been the 'Holy Grail' of the aircraft management business," said Bob Seidel, Alerion Aviation CEO. "I personally have been pursuing a working model for a dozen years. After two years of development, Alerion is excited to make this feature available to our managed aircraft owners and their staffs."

Alerion Aviation
www.flyalerion.com

7. Oriens Partners with Oysterair to Offer PC-12 Training

Oriens Aviation is offering Pilatus PC-12 pilot training courses at its London Biggin Hill facility in a partnership with Oysterair. A big obstacle for Pilatus PC-12 operations in the UK is a lack of pilots, Oysterair CEO Edwin Brenninkmeyer said. Oriens is a Pilatus service center and PC-12 sales distributor for the UK. It will begin offering European Aviation Safety Agency (EASA) Pilatus PC-12 SET class rating pilot training beginning in January.

Oriens Aviation
Biggin Hill Airport
www.oriensaviation.com

8. Eclipse Air Charter Opens New York City Office

Eclipse Air Charter, an on-demand charter operation based in Toronto, is opening a new office in Midtown Manhattan in New York City to meet growing demand, the company said. The team is recruiting for several new positions in New York office. "Canadian and U.S. economies are intricately linked, so it is not surprising that our rising economies are translating into higher demand in flights between the top U.S. business hubs and those in Canada," said Yasmin Alam, Eclipse Air Charter founder and managing director.

Eclipse Air Charter
www.eclipseaircharter.com

9. JetSuiteX Expands Routes

JetSuiteX, a semi-private air carrier, has expanded service with new routes from Orange County and Oakland, California, it said. It also is adding ski-season flights to Mammoth Lakes from Orange County and Burbank, California. The service will run Dec. 20 through April 7, 2019. The company launched service from Orange County in June. On Dec. 2, it added regularly scheduled service to Oakland with one daily roundtrip flight Sunday through Friday. It also increased service from Oakland to Las Vegas and Burbank and service between Orange County and Las Vegas.

JetSuiteX
www.jetsuitex.com

January 1969 News

Even now it is being **considered to take** much of the research and development authority for the **ATC system out FAA's** hands and give it to NASA's electronics labs. This would **be a mistake** – *BCA Staff*

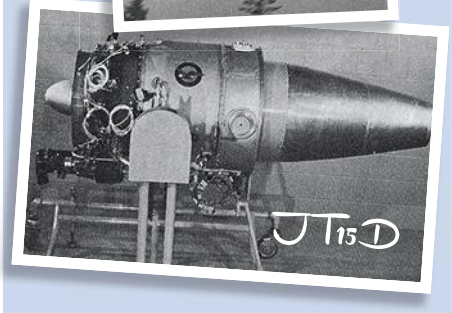
Edited by Jessica A. Salerno *jessica.salerno@informa.com*

Texas loses to California. That's the story told by American Airlines' choice of San Francisco as its West Coast maintenance site for a new $13 million super-hangar. Dallas and Los Angeles had been considered. An additional $22 million will be invested in the center and its equipment.

Author Barry Schiff and American Jet Industries test pilot Dick Hunt in the Super Pinto. A modern jet-powered Pegasus carries the hopes of American Jet Industries, Inc., and promises inexpensive jet training for civil pilots.

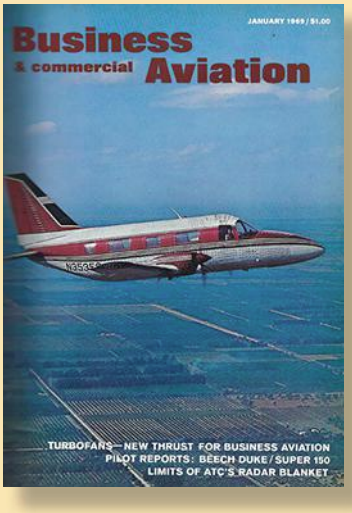
Stolmaster: Powered by two Lycoming 290-hp engines, the STOLmaster's top speed is 209 mph, while crusing at 65% power is 161 mph with a range of 1,155 nm. STOL-ish performance characteristic show a 1,290 fpm rate of climb, 985 ft. of runway to clear a 50-ft. obstacle is 820 ft. (380-ft. ground run). Price: $95,000.

STOL with creature comforts: To capitalize on growing interest in STOL aircraft, Helio has added "plush" to its Couriers, heretofore sold on performance alone. Individual adjustable seats with headrest, new rectangular windows and improved sound insulation replace Spartan trimmings. Price for the H-250 is $35,900 and for the H-295, $41,900.



United Aircraft of Canada's JT15D turbofan has been ordered by Cessna Aircraft for its forth-coming Fanjet 500. Cessna ordered $10 million worth of the engines, which bear a price tag of $60,000 each to the airplane manufacturer. (Sud Aircraft in France also plans to use it in its forth-coming Diplomate small bizjet.) **BCA**

THE ARCHIVE



The Pocono, Piper's 16-passenger answer to the need for commuter air transport, is flight tested over flatland citrus groves of south Florida. Wool tufts dotting wings, fuselage and nacelles reveal air flow patterns to pinpoint areas of high drag. The 9,500 lb. Pocono, powered by eight cylinder, 550-hp Lycoming TIO-720 engines, will cost "under $200,000" when delivered in 1070. Piper is developing the Pocono at Vero Beach, but will build a new plant at Lakeland, Florida for its production.

And here's a side advantage. If company personnel require instant "go" while you biz jet is being maintained you can call out the EJA fleet. We'll keep your schedules.

January 2019 News

There is no doubt that its preoccupation with the SST is one of the prime reasons why FAA has been such a laggard in ATC and airport development, two areas which are far more in keeping with its charter (and capabilities) than overseeing the development of what amounts to a state-of-the-art breakthrough in airplane technology.

A Turbine Aerocar we found hidden among some dusty photos of last year's Hanover Air Show. The picture is of a mock-up of one that Wagner of 799 Friedrichshafen, Flugplatz in Western Germany is building. Its turbine engine can be seen beween thee tail booms on which the blades of the rotors rest while on the road.

FAA's controversial plan to restrict peak-period arrivals at high-density airports will — according to December edict — will commence next April 27, the day chosen to coincide with schedule changes.

Contact lenses for pilots are expected to get FAA approval soon for all classes of certificated airmen. Study indicated that contact lenses gave better peripheral vision than eyeglasses, were unaffected by altitude and did not interfere with headphones. Eye standards for airmen will be eased to bring distant acuity vision in line with ICAO standards.

Bandeirante Turboprop, Brazil's first light transport, completed its maiden flight recently and launched into pre-certification testing. Aircraft, powered by two UACL PT6A-20 turboprops, is designed to gross at 9,900 lb. with room for eight passengers plus crew of two. Aircraft is built by Centro Tecnico de Aeronautica.

Last February's accident at San Francisco, in which the Navy T-33 taking off from Alameda Naval Air Station, hit the Oakland-San Francisco Bay Bridge, points out the uncomfortable proximity and direction of the main runway to the 300+ ft. height of the bridge superstructure. Aviation veterans in the bay area are not surprised at the accident, they are amazed there have not been more than the two that have occurred in some 30 years. **BCA**

THE ARCHIVE

Will Success Spoil the Merlin? Not Hardly — Just with progress, it's the only way we can continue to give you the most advanced turboprop you can buy.

General Electric CJ610 and CF700 engines power more than 500 business jet aircraft: Learjet, Jet Commander, Hansa Jet 320 and Fan Jet Falcon.

AIRCRAFT LIGHTING INT'L

Presents

PMA'd LED's FOR FALCON 900's AND 2000's

SEE YOU AT THE PBI FORUM Feb. 6, Booth 231

THE ADVANTAGES OF A.L.I.'s LED LAMPS

- Bypass AL-2004 ballasts with our Self-Ballasted System
- Greater efficiency than fluorescent tube, using roughly 90% less energy
- Longer life, no glass & reduced maintenance costs
- Keep existing dimmer modules and controllers
- Solid-state construction eliminates flickering
- Emits virtually no heat
- Contains no dangerous chemicals

AIRCRAFT LIGHTING INTERNATIONAL

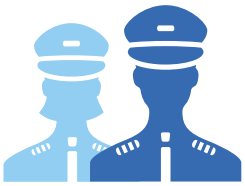
ALI-USA FAA-PMA ISO 9001:2015 AS9100D

TEL: (631) 474-2254 | sales@aircraftlighting.com | WWW.AIRCRAFTLIGHTING.COM

How does CAE elevate your training experience?

1. 

With centers located in some of the world's most desired locations

2. 

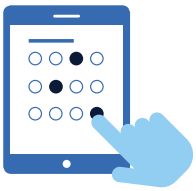
With highly skilled and dedicated instructors delivering customized training

3. 

Through a customer service team offering a friendlier, more cultural experience

4. 

By working with OEMs and NAAs to deliver programs specific to your needs

5. 

By creating and using the world's most advanced industry tools and technologies

6. 

By training more aviation personnel than anyone else globally

Work with the team that works with you.

cae.com/business-aviation

Your worldwide training partner of choice

CAE