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SEPTEMBER 2019 $3.95 US
VOLUME 23 NUMBER 9

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Twin & Turbine (ISSN 1945-6514), USPS 24432 is published monthly by Village Press, Inc. with advertising offices located at 2779 Aero Park Drive, Traverse City, Michigan 49686. Telephone (231) 946-3712. Printed in the United States of America. Periodical Postage Paid at Traverse City, MI.

SUBSCRIPTIONS: *Twin & Turbine* is distributed at no charge to all registered owners of cabin-class aircraft. The mailing list is updated monthly. All others may subscribe by writing to: *Twin & Turbine,* P.O. Box 968, Traverse City, MI 49685, or by calling 1-800-447-7367. Rates for the United States and its possessions follow: one year $15.00; two years $29.00. Canadian subscriptions are one year $24.00; two years $46.00, including GST tax. Overseas subscriptions are one year $52.00; two years $99.00, U.S. funds. Single copies $6.50.

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POSTMASTER: Send address changes and inquiries to Twin & Turbine, Village Press, Inc., P.O. Box 968, Traverse City, MI 49685.

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SEPTEMBER2019 • **VOL. 23, NO. 9**

COVER PHOTO:
Daher TBM 850
Photo Courtesy of Paul Bowen Photography

Issues of Twin & Turbine are available for free *www.twinandturbine.com*

by **Rebecca Groom Jacobs**

A Career Shaped by Turboprops

In light of the pre-owned turboprop series kicking off this issue, I asked my father Randy Groom to recount some of his personal experiences and observations after selling turboprops (in addition to pistons and jets) for 30-plus years. Below he paints a picture of the product changes and industry trends seen in the turboprop market since the beginning of his career.

For nearly 40 years, turboprops were the bread and butter of my professional career. They provided for my family, allowed me to live in some very nice places (yes, including Wichita), sent my kids to college and allowed me to travel the world. So, when Rebecca asked if I would provide a little personal history and perspective on turboprops, I said sure.

1980s

1980 started to show signs of major turbulence in the industry although, at the time, Beech was still in full throttle production of King Airs. I vividly remember the company proudly announcing that they hit a production peak of 50 King Airs a month and dealers were fighting over their allocation. The company at that time was building seven different models of the King Air including the C90, E90, F90, A100, B100, Super King Air 200 (both standard door and cargo door versions) and the military C12 version of the Super King Air 200. The company also built one more turboprop at the time, the single-engine T34C Mentor military trainer.

Beech also seriously explored a whole new concept – a pressurized single-engine turboprop named the Lightning. Two proof of concepts prototypes were built, one with a Garrett engine and one with a PT6. Personally, I thought they were breathtakingly beautiful airplanes. But when the production and finance leaders crunched the numbers, it was thought that the airplane would price out in excess of $1 million dollars and the program was canceled. One can only speculate what the single-engine turboprop landscape would look like today if the Lightning had been given the go-ahead.

Back in those days, the King Airs had a dizzying level of competition from other twin turboprops. This included the Cessna model 425 Corsair and the Cessna Conquest. Piper had its Cheyenne I, II and III models. Aero Commander had their high-wing 690, Mitsubishi had a short and long-cabin version of the MU-2 Series, and Fairchild had its Merlin series.

And if that wasn't already enough competition, customers had the option to buy a Cessna Citation I or II model jet for roughly the same price as a King Air 200. That decision process was complicated with the emotion of buying a jet clashing with some of the mission and economic sensibilities of buying a turboprop. We won some and lost some when it came to competing with the Citations. But by far, the biggest competitor to selling a new King Air was a used King Air – a fact that still rings true today (and has probably been the case with all manufacturers since the Wright Brothers).

1990s

One by one the twin-turboprop competition started to fade away in the mid-80s with Cessna discontinuing the Conquests, Mitsubishi stopping MU-2 production and Fairchild halting the Merlins, with Commander calling it quits as well. Piper hung on until the early 90s with their Cheyennes, albeit at low production levels. So, for a little while, Beech got to enjoy being the turboprop king and only having to worry about the pesky Citations and used King Airs.

Of course, no Beechcraft history is complete without mentioning the Starship. The model 2000 Starship was conceived in the early 80s and ultimately was certified in 1989 with the goal of replacing the venerable King Air. Unfortunately, the aircraft was slower, noisier and less reliable than the King Air 300 of the time. The cabin was bigger and more comfortable, and the airplane certainly had a commanding ramp presence. But by any measure, the Starship was the biggest failure in the history of General Aviation up to that time, and was only more recently eclipsed.

In the midst of struggling with the Starship, another group of turboprop competition started to creep into the picture that Beech never took seriously. Socata certified and introduced their TBM 700 model in 1990 and Pilatus rolled out the PC-12 in 1994. Later, Piper introduced their Meridian turboprop. Beech never thought that a single-engine turboprop could find its way into being a mainstream corporate aircraft. It was a major miscalculation.

Today

Today, I have had the opportunity to fly, experience and appreciate virtually all the turboprops being produced, both singles and twins. In my consulting work, I have also had the privilege to work with Piper, Pilatus, TBM and Kodiak dealers giving me an even greater appreciation for those products and how they have expanded the market reach to a whole new set of customers. It will be fascinating to watch as new turboprop engine technology brings forth the potential to significantly improve efficiency and operating costs. T&T

Randy Groom *is president of his consulting business Groom Aviation. He has held senior leadership positions with Piedmont Hawthorne Aviation, Piper Aircraft and Beechcraft where he served as president. He has 11,000 hours of flight experience and is a proud owner of a Beechcraft Bonanza and Aviat Husky. Randy can be contacted at* **randy@groomaviation.com.**

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What Makes a Turboprop Safer?
Answer: You


PHOTO COURTESY OF CLINT GOFF

Two engines or one? If your aircraft is equipped with the highly reliable Pratt & Whitney Canada PT-6 turboprop engine, are you really safer in a twin rather than a single?

This perennial debate gets resurrected every time there is a high-profile crash. And we've had a few in the last few months that caught our attention. In June, a Cessna 425 Conquest I crashed in Missouri after the pilot reported having a right engine problem on descent through 17,000 feet. After reporting to ATC that the engine was still stuck at full power and he was shutting it down, he requested to divert to the closest airport. While maneuvering to land, the plane crashed into a grain silo in a nearby field, killing the pilot, the sole occupant.

Then in July a King Air B350i with 10 on board crashed on takeoff from the Addison, Texas airport, killing all on board. A dramatic surveillance video of the flight's last few seconds – one I'd like to forget – shows the aircraft in a powerful roll to the left prior to impacting a hangar. According to the NTSB, the two-person crew made comments "consistent with confusion" 12 seconds before the crash, followed by a comment about a left engine problem. As you may know, the 350i is the rare GA turboprop that requires a type rating.

There have been several unfortunate single-engine turboprop crashes this summer, too. Some were fatal, and others resulted in injuries.

Do the accidents stats provide any clarity? According to an analysis by AOPA, between 2005 and 2014, the majority of the accident turboprops (125, or 57 percent) were twin-engine models, which showed no survival advantage. Lethality was identical at 37 percent in both singles and twins.

This leads to the question of pilot competency. Many years ago, when I started my multi-engine rating, the first thing my instructor did was hand me an FAA publication entitled "Flying Twins Safety" and told me to go home and commit its key points to memory. When I started to pen this column, I dug it out to make sure I had the title correct. It, like me, has aged a bit and has a few more wrinkles but no worse for the wear.

Flipping it open, the first line of the booklet says, "The major difference between flying a twin and a single-engine airplane is knowing how to manage the flight if one engine loses power." Thus, we spend much of our time during multi-engine training practicing engine-out scenarios and understanding thrust asymmetry, the critical engine and VMC. Once we set the date of our check ride, our skills are most likely sharp, and we are proficient at every engine failure circumstance. In addition, our senses are heightened, as we are expecting that darn left engine to fail at any moment.

What happens over time as that "training muscle" weakens? Do we grow complacent as we always expect the PT6 to perform reliably? Advanced ratings and total logbook time may help, but it's interesting to note that one-third of the pilots involved in turboprop accidents (twin and single) between 2005 and 2014 held ATP certificates.

That leaves us with three important things to consider that have nothing to do with the twin-versus-single debate: Time in type; recency of experience; and our mental "fit to fly" attitude when we climb into the left seat. While mechanical failures in our turbine equipment are thankfully rare, they can and do happen. Are we prepared for when they do?

While we are on the subject of "fitness to fly," I highly recommend you watch an excellent video recently published on YouTube by the AOPA Air Safety Institute titled "Real Pilot Story from the Field: No Go-Around – A lesson from the Backcountry."

Todd Simmons, his brother and two friends recount their backcountry flying trip into the "no-go around" strip of Dewey Moore in Idaho. An experienced pilot, Todd attempted the impossible go-around in his Carbon Cub that ended in a

stall/spin. (You may recall this accident was in the news as Todd is the president of customer experience at Cirrus Aircraft.) Thanks to the clear-headed actions of his brother and friends, Todd is alive today. He talks about the mistakes he made with zero ego.

It is sobering to listen to his brother tell how they found Todd, performed triage and the eventual rescue. Some excellent lessons for all of us on what emergency equipment we should have on board and on our person – even if you are not back-country flying. The video also brings into sharp relief how quickly a fun day of flying can turn deadly.

In the last five minutes, they cover four key takeaways that apply to us and the planes we fly:

1. Are the pilot and the machine both ready for this mission?
2. Do I have recent experience in this airplane and in this environment? (You may have lots of total experience, but nothing replaces RECENT experience).
3. Before engine start-up, slow down, think through critical decision points, and be ready to act. If you do, you'll most likely make good choices.
4. Train, train, train, especially get stall/spin training – it may save your life. Todd's friend Jeff Smith had these sobering words: "From the beginning we are taught the stall/spin is a situation we avoid. The training we did is not sufficient to make you understand how violent that event can be if you let it happen. It's made me think about the quality of my airmanship."

Before the next time you fly – whether single or twin – slow down and think through your action plan. Visualize the steps you'll take from the moment a failure occurs to the time you land. In addition, what are the potential threats you face on this flight? Weather? Complicated airspace? Fatigue? MMOPA has a free FRAT tool available in the Apple app store that is useful in helping gauge the riskiness of your contemplated flight. While tailored to the PA46, it is useful for a pilot of any aircraft.

My daughter, who is in Navy flight training, "chair flies" every flight, mentally reviewing and challenging herself on the emergency memory items. It is a cultural habit within her community that will ensure her head is in the game from engine start to shut-down. It's a habit that I'm trying to develop as well.

Regardless, if you fly a King Air or a Kodiak, do this: plan, prepare and execute every flight with precision, no matter if it's 30 minutes or 3 hours.

Stay hungry for safety. T&T

Dianne White *is the executive director of MMOPA and editor of MMOPA Magazine. For a total of 14 years, she was editor of Twin & Turbine and has worked in the business aviation industry for nearly 30 years. She also serves on the board of directors for Angel Flight Central. An active multi-engine, instrument-rated pilot, Dianne lives in the Kansas City area and can be reached at* **editor@dian-newhite.com.**


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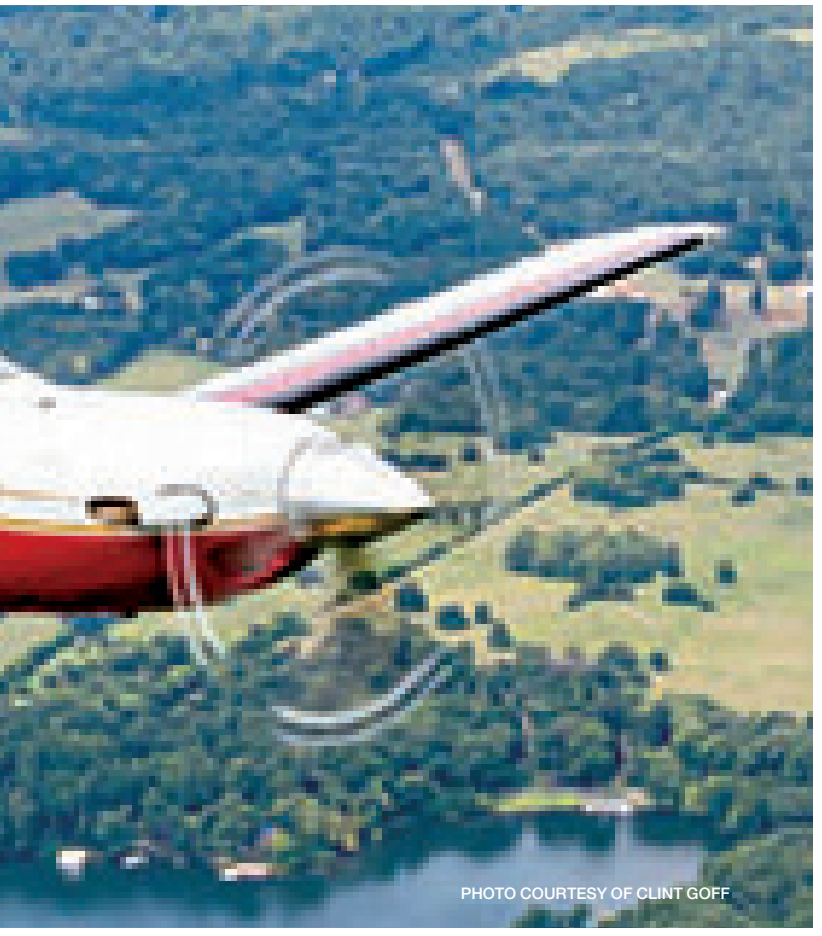

PHOTO COURTESY OF CLINT GOFF

PHOTO COURTESY OF DAHER

Top Turboprop Series:

Pre-Owned Piper Meridian and Daher TBM 700C2

by **Joe Casey**

In my experience, the single-engine turbine market has been on fire for the last few years. I train prolifically in this market and have noted strong demand for training services from pilots who are moving up in performance or size. I think every piston pilot has a desire to one day own and operate a turbine, and today there are plenty of single-engine turbines to consider.

I often train in the turbine PA46 (M600/M500/Meridian/JetPROP) world, as well as the TBM series of airplanes. So, I naturally get a lot of opportunities to discuss the differences between these airplanes with prospective clients. Two of the variants frequently contrasted in those families of aircraft is the Piper Meridian and the Daher TBM 700C2. I can testify that both are wonderful airplanes. They are different in many ways, but those differences are commonly compared since they are in the same purchase price range.

With its higher max gross weight (MGW), I think the 700C2 is the best variant of the 700 series of TBMs, and it is certainly my favorite TBM that can be bought for under $1.5 million. I think history will show that the 700C2 will be a popular variant of the TBM series for years to come. It is a true "sweet spot" in the production history of the TBM lineage.

Similarly, the early G1000 Meridians are a "best of breed" variant of the PA-46T line. All offer the GWI increase (not installed in the earlier Meridians), stunningly gorgeous interior schemes and feature the widely popular Garmin G1000 avionics suite.

Today, about $1.3 million can buy a nice TBM 700C2 with a mid-life engine, decent avionics and slightly worn but acceptable aesthetics. That same amount of money will buy an earlier (2009-2011) G1000 Meridian with around 1,000 hours on the airframe and engine. So, what's the meaningful difference between the two airplanes?

Size

Although the TBM looks bigger when standing next to the airplane, the actual living space is not that much more than a Meridian. When sitting in the pilot seat, there may be a tiny amount of additional headroom, but not much. However, entering a TBM is certainly simpler, both in the front and the back. The door is much larger and easier for the uninitiated to operate. But, the real difference is that the Meridian pilot must climb over the spar while there is no spar in the TBM cabin. This can be a bigger deal if you have mobility issues, but for most pilots, the spar is a surmountable problem (pun intended).

I do have one customer who upgraded to a TBM 700C2 from a Meridian, and he swears that "climbing over the spar" was the single reason that he upgraded. He felt it to be the right decision because he could not fold well enough to get into the front of a Meridian. I'm 6-foot-4 and can fit, but I have a lot of experience figuring out the best way to finagle myself into the seat. A taller or heavier pilot can certainly do it with some practice.

When it comes to the size of the cockpit and cabin, a slight advantage goes to the TBM.

Performance

There's also not much variance in the short-field performance between the two airplanes. Both are fairly adept at getting off the runway respectably. I have a TBM client who operates out of a 3,700-foot landing strip and he has no troubles at all. While both POHs will advise that the aircraft can operate from strips shorter than 3,000 feet, there is simply not much margin for pilot error on such a short strip. I'd have to think long and hard before I'd accept such repeated risk in either a Meridian or TBM. As far as landing and takeoff distance, the two airplanes are very similar.

Concerning other performance factors, the TBM 700C2 (285 average KTAS) will cruise about 20 KTAS faster than the Meridian (265 average KTAS) and arrive at FL280 a few minutes earlier due to a slightly better climb rate. However, most experienced pilots know that 20 knots in airspeed and a few hundred feet per minute in climb in a turbine is not a game-changer. Block-to-block flight times for the Meridian and TBM 700C2 are very similar to each other, and the ride will be equitably good on both. How good? The TBM 700C2 enjoys a large and beefy wing, which to me is the best part of the TBM fleet. The large wing affords plenty of room to store large amounts of fuel, offers a smooth ride with slightly higher wing loading than the Meridian, and allows for a much higher V_{mo} (max operating speed).

Range

With the high fuel loads, the TBM 700C2 offers significantly greater range than the Meridian. I advise clients that the Meridian is a good "750 nm airplane"

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meaning with full fuel, the Meridian can be expected to make about 750 nm unless the headwinds are punishing. But, the TBM 700C2 can easily fly another 350 nm beyond the Meridian, making it a true 1,100 nm airplane (and sometimes more if the winds are favorable and the pilot operates at a lesser power setting). There is a significant advantage to the TBM when range is considered.

A pilot can tell the strength of a wing by considering the amount of excess airspeed available on the airspeed indicator above cruise speed. When V_{mo} is significantly above cruise speed, you know a strong wing is bolted on the airframe. When operating the Meridian, indicated cruise speed (KIAS) is usually about 163 KIAS at high altitude and V_{mo} is 188 KIAS. So, there's only about 25 KIAS available to increase in the descent – and that is only available in smooth air. In a Meridian, the pilot always pulls the power back to descend from altitude.

In the TBM 700C2, the cruise speed is about 193 KIAS and V_{mo} is 266 KIAS. So, when the TBM pilot wants to descend, it's a simple matter of pointing the nose downward and leaving the power at cruise for a significant portion of the overall descent.

With all of this talk about the strength of a wing, don't let it be said that the Meridian has a weak wing – it doesn't. The wing on a Meridian is plenty strong, but the TBM has a higher V_{mo} and V_a (maneuvering speed) and typifies the added benefit that comes with the beefier, stronger TBM airframe and wing.

Useful Load

When it comes to useful load, the TBM 700C2 is the clear winner. With full fuel, the typical G1000 Meridian can carry about three to four people (depending upon individual weight) with a few small bags. Whereas, the TBM 700C2 can easily carry five average people with everyone bringing along a roller bag as well. The TBM simply carries more.

So, if your predominant mission is to fly 1,000 nm with four people and bags, the TBM 700C2 will complete the mission nonstop. The Meridian will also accomplish that mission, but will depart without full fuel and require a fuel stop along the way. But this leads us to where the Meridian has a distinct advantage: operating and maintenance costs.

Operating Costs

Not only is the Meridian going to burn significantly less fuel, it has a lesser engine reserve. The -42A on the Meridian will cost about $100,000 less to overhaul than the -64 found on the TBM 700C2. And the TBO on the -64 (3,000 or 3,500 depending on a few factors) is less than the TBO on the -42A (3,600 hours). So, the engine and feeding of the engine on the TBM will cost more than the Meridian.

The Meridian also has a significantly lesser maintenance requirement. The Meridian will undergo an "annual inspection" every year, and that annual inspection will average about $20,000 at one of the PA46-centric maintenance facilities. Yes, I know I'm going to get pushback from some that think they can operate a Meridian for less at annual, but I believe $20,000 is a good budget number for a Meridian annual inspection. There are a few hour-based maintenance items, but the airplane does not have any "gotchas" (super-expensive inspections) in the maintenance manual, and there will rarely be an item that will blow the budget completely.

For a TBM, there's an A, B and C-Inspection in sequential years, and every item on those lists will be accomplished in that inspection. The C-Inspection is the most intensive and will come at the highest cost. I've seen C-Inspection invoices that were over $80,000 and there were not very many "additional items" on those high invoices. And some inspections occur based on hours and cycles. The inspection list for a TBM is much more robust than the Meridian.

There's another factor that makes the TBM more expensive to operate than a Meridian. If you own a TBM, you'll rarely take it to your local mechanic. You'll almost always need to take it to an authorized service center. Rarely will a local mechanic be a "TBM expert" and feel comfortable enough to provide ongoing maintenance. While the level of maintenance at just about any TBM service center is super high,

you'll never necessarily "get a deal." On the other hand, there are service centers all over the United States for the Meridian, along with some very good independent PA46-only shops as well. Your local mechanic can likely perform some of the lighter work, and possibly even accomplish an annual inspection.

The Decision

So, which airplane should you buy? If you are a Meridian owner, should you upgrade? If you ask me, it comes down to one simple question: Are you willing to make a fuel stop?

The dreaded fuel stop. That is the deciding factor in this dilemma.

If you have a long way to go and you must carry four-plus people on a regular basis, and you are unwilling to make that fuel stop, then the TBM 700C2 is probably the airplane for you. If you have the identical mission, know how to do math, and don't mind making a fuel stop, the Meridian is your airplane. Both are plenty rugged, gorgeous and safe. Both can accomplish the mission – but the Meridian will be cheaper to operate.

To me, a fuel stop always seems worse when planning. After a fuel stop, I almost always think, "I needed to walk around" or "I never want to be in an airplane more than 3 hours anyway." But sometimes the fuel stop has to be made when the weather is less than ideal, and can occasionally be an issue that nixes the entire mission. Consider how problematic the routine fuel stop will be for you and weigh the added cost. Solving that question will help you make the best decision. Either way, if you've got the coin, both are stellar aircraft that will put a smile on your face when you open that hangar door. T&T

Joe Casey *is an FAA-DPE and an ATP, CFI, CFII (A/H), MEI, CFIG, CFIH, as well as a U.S. Army UH-60 standardization instructor/examiner. An MMOPA Board member, he has been a PA46 instructor for 16-plus years and has accumulated 12,000-plus hours of flight time, 5,500 of which has been in the PA46. Contact Joe at: www.flycasey.com, by email at* **joe@flycasey.com**, *or by phone at 903.721.9549.*

Five on the Fly

by **Rebecca Groom Jacobs**

PHOTO COURTESY OF CAN

WHO:
Samantha Lohse

POSITION:
Senior Program Manager

HOME BASE:
White Plains, NY

1. *Can you summarize the history and mission of Corporate Angel Network (CAN)?*

Corporate Angel Network arranges free travel on business aircraft for cancer patients traveling to and from treatment. Established in 1981, Corporate Angel Network has arranged more than 60,000 flights and continues to transport over 250 patients per month.

2. *Why is this transportation so beneficial to these patients and their families?*

Business jet travel makes it possible for patients, especially those in locations far away from the treatment centers best suited for their specific needs, to travel to specialized medical centers. Patients often have physical or financial barriers that may prohibit commercial travel.

3. *What is a typical mission?*

CAN serves both children and adults who need to travel – whether it's for treatment, a consult or a follow-up procedure. Patients either call or email the CAN office with their travel request, and the team goes to work looking for a corporate flight match. Once a flight is found and approved, the CAN team coordinates with both the flight department and the patient to ensure a smooth process.

4. *Can you share an example of one of the patient stories? How did the network provide the care he/she required?*

In June, CAN coordinated a multi-leg flight with two different corporations for a cancer patient traveling home. Had CAN not been able to provide a flight, the patient would have had to stay for two weeks until her next treatment. Because CAN was able to fly

her home directly after treatment, and a return flight for her next appointment, she was able to walk with her high school graduating class.

5. *What are ways owner-pilots and industry professionals can get involved and support the program?*

There are a number of ways the business aviation community can support Corporate Angel Network. For a corporation interested in donating a seat, it would become an in-network provider and share its flight schedule with CAN on a regular basis. It is important to note that the flight does not need to be empty – patients frequently fly with executives and other team members.

For those who are unable to provide flight lift, we can partner together on marketing initiatives, co-host events and more.

Last, but not least, is the Fund an Angel Cocktail Reception, held on the second night of NBAA-BACE each fall. This brings the aviation industry's top leaders and influencers together for two hours to network and help raise critical funds for CAN's mission. Companies may support CAN by becoming an event sponsor, donating an auction item, or purchasing tickets to attend. Visit *www.fundanangel.org* for more information.

The Latest on the
Cessna Denali and SkyCourier

by **Rich Pickett**

IMAGES COURTESY OF TEXTRON AVIATION

Textron Aviation currently has 19 aircraft in production and is continuing the progression with the development of two new turboprops – the single-engine Cessna Denali and twin-engine Cessna SkyCourier. Differing in design and mission, the products represent new opportunities for the company.

We recently visited with Textron Aviation's Martin Tuck (technical marketing advisor), Matt Warner (turboprop communications specialist) and Brian Rohloff (vice president of sales) to obtain the latest progress and specifications for both aircraft.

Cessna Denali

The Cessna Denali, first announced at the 2015 EAA AirVenture, is a clean-sheet design from tip to tail. The aircraft is a pressurized single-engine turboprop, with a maximum operating altitude of FL310, cruise speed of 285 KTAS and high-speed range of 1,600 nm (with one pilot and four passengers). The Cessna Denali inherits many design traits from Textron Aviation's latest jets and has a list price of $5.35 million. The closest competing turboprop aircraft in current production is the Pilatus PC-12. From strictly a price perspective, the Cessna Denali will also compete with light jets such as the HondaJet Elite, Phenom 100EV and Cessna Citation M2.

New Powerplant

While the PC-12 and the TBM 940 utilize versions of Pratt & Whitney Canada's PT-6A engine, the Cessna Denali will be the launch aircraft for GE Aviation's new "Catalyst" turboprop engine. General Electric's Catalyst makes extensive use of modern additive manufacturing (technology highlighted in our August

2019 issue). In talking with Paul Corkery, turboprop manager for GE Aviation, this manufacturing technique allows GE to reduce 855 parts that might have previously been manufactured using traditional processes to 12 by way of 3D printing. The resulting component is a single piece which not only reduces complexity and weight but can also increase cooling efficiency. In July, I had the opportunity to inspect a 3D printed model of the Catalyst engine as well as an actual Inconel 718 alloy component with an intricate internal design. The internal channels and structures would have been difficult, if not impossible, to duplicate using previous processes.

I also discussed the design with Simone Castellani, systems manager at Avio Aero – a GE Aviation company. Avio Aero had the opportunity to optimize the operation of the Catalyst based on years of experience designing larger commercial turbine powerplants. In addition to a substantial reduction in the engine's part count, GE will use innovative designs to eliminate the traditional propeller governor as well as incorporate a jet-like dual-channel FADEPC (Full Authority Digital Engine and Propeller Control). This feature will control virtually all aspects of the engine and propeller operation from start to cruise to descent. The pilot will move the single-power lever to idle position, press the start button, and the FADEPC will take over the start process. This system will offer pilots and owners advantages in efficiency along with protection from exceedance of temperature or torque limitations, reducing potential engine damage.

The engine will turn a McCauley Blackmac five-blade composite propeller and provide 1,300 shaft horsepower. With the new design, GE is offering a 4,000-hour TBO with no fixed hot section inspections between overhauls. The engine also incorporates a sophisticated trend monitoring capability. As GE gains operational experience with the engine, the TBO is planned to increase to 5,000 hours.

As of this writing, the Catalyst has undergone more than 1,200 hours of operation in test cells and recently completed high-altitude testing in a chamber that replicated a flight altitude of FL410 – extremely impressive for a turboprop. This fall, GE will mount the Catalyst on one wing of a Beechcraft King Air 350i for in-flight testing.

Flight Deck

The Cessna Denali will utilize the widely-implemented Garmin G3000 avionics suite. Textron Aviation has taken advantage of the integration features of the G3000 to integrate most of the systems into the GTC (Garmin Touch Controllers). This will provide pilots a very clean cockpit, with fewer switches and controls than traditional flight decks.

After spending time in the Cessna Denali mock-up, I found the flight deck to be very comfortable, even for tall pilots. It is easy to get into the seats, and once in them, you have ample room and excellent visibility.

Textron Aviation is including AReS, their automated systems diagnostics capability, standard. If operators wish to have in-flight transmission of the data, they can opt for the Garmin GSR 56 Iridium transceiver. With this capability, maintenance staff would be prepared to address any in-flight anomalies before the pilot even lands.

PHOTO BY AUTHOR

An overhead close-up of the GE Aviation Catalyst mockup.

Cabin

The Cessna Denali will offer best-in-class pressurization of 7.55 PSID (Pounds per Square Inch Differential), which will provide crew and passengers a cabin altitude of 6,100 feet at FL310, the maximum operating altitude. This alone will provide a significant amount of passenger comfort, especially on long-range flights.

The Cessna Denali will initially have two seating configurations: A six-seat executive option with a forward refreshment center and optionally-belted aft toilet; or a commuter option with nine seats in the cabin, but no refreshment or toilet installation. The toilet can either be a permanent externally-serviceable option or one that is self-contained and removable. Operators cannot switch between the executive and commuter cabin implementations.

In the cabin, which incorporates styling features from the Citation line, I was impressed by the large windows and expansive view. The Pilatus PC-12 and Cessna Denali have the same cabin length, while the Cessna Denali is taller by 2 inches and wider by 5 inches. The forward door will offer a stair design that is similar to Cessna's newest jets. In addition, the airplane will have a standard rear cabin door that is the same width as the PC-12, but a few inches taller. I've used the large door of the PC-12 to load an X-ray machine on a pallet during relief work in Haiti, and I can envision the Cessna Denali will be equally useful in such situations.

Next Steps

I've viewed the construction of the Cessna Denali prototype, as well as the two production test articles that will be used in the certification. It is impressive to see the design using many processes that Textron Aviation utilizes in their newest jets, including monolithic machining (machining components from a single piece of material rather than forming them). With first test flights expected by the end of this year and production in late 2020, it will be exciting to soon see a new single-engine turboprop in the air.

Cessna SkyCourier

When the need is to move large cargo over short distances, many operators including FedEx opt for the Cessna Caravan. From its first flight in December 1982, the Caravan has proven itself to be a versatile aircraft, giving operators options from freighter and executive transport to amphibious operations.

With the success of the Cessna Caravan, and the increasing need for similar transportation but increased cabin payload, Textron Aviation embarked on the development of the Cessna SkyCourier, a high-wing twin-engine turboprop. FedEx is the launch customer with an initial order for 50 aircraft.

Performance

The Cessna SkyCourier is designed to be a workhorse, with the ability to fly multiple flights in a single day into a variety of airports. The airplane has an MTOW of 18,560 pounds and will be certified under the updated Part 23 category requirements. With a maximum cruise of 200 KTAS and typical high speed cruise of 190 KTAS, the Cessna SkyCourier will be able to fly up to 900 nm at maximum range speed of 165 to 170 KTAS.

Textron Aviation is utilizing Maintenance Steering Group (MSG-3) design principles which were created to specifically improve the engineering, and subsequent maintenance, of aircraft. These principles are instrumental in reducing ongoing operating costs for owners. The Cessna SkyCourier will offer extended inspections in comparison with other comparable aircraft using these techniques. Fewer inspections result in a significant decrease in maintenance costs for operators.

Powerplant

The engine will be a Pratt & Whitney Canada PT6A-65SC, with the "SC" standing for SkyCourier. The PT6A-65SC will include a torque limiter and maintenance-related improvements and offer a TBO of 6,000 hours. The SkyCourier will also utilize PWC's FAST trend monitoring. FAST, which stands for Full Flight Data Acquisition Storage and Transmission, will be able to transmit engine operating data within minutes of engine shutdown. This extensive monitoring will enable maintenance on-condition

Cessna Denali

Base Price (2019 US Dollars)	$5.35 M
Maximum Takeoff Weight	TBD
Maximum Ramp Weight	TBD
Fuel Fuel Payload	1,100 lbs
Engine	GE Aviation Catalyst
Shaft Horsepower	1,300
Propeller	McCauley 5-Blade Composite
Maximum Cruise Speed	285 KTAS
High Speed Range - Pilot + 4 Pax	1,600 nm
Maximum Operating Altitude	31,000 ft
Cabin Altitude at 31,000 ft	6,100 ft
Dimensions	
Length	48 ft 9 in
Height	15 ft 2 in
Wingspan	54 ft 3 in
Cabin	
Length	16 ft 9 in
Width	5 ft 3 in
Height	4 ft 10 in

Cessna SkyCourier

Base Price - Freighter (2019 US Dollars)	$5.5 M
Base Price - Passenger (2019 US Dollars)	$6.5 M
Maximum Takeoff Weight	18,560 lbs
Fuel Fuel Payload (Plus Pilot)	1,800 lbs
Engine	2 - PWC PT6A-65SC
Shaft Horsepower	1,100
Propeller	McCauley 4-Blade Aluminum
Maximum Cruise Speed	200 KTAS
Maximum Operating Altitude	25,000 ft
Range - Pilot + 9 Pax (1,800 lb. Payload)	900 nm
Range - Pilot + 5,000 lb. Payload	400 nm
Dimensions	
Length	54 ft 10 in
Height	21 ft 0 in
Wingspan	72 ft 0 in
Cabin	
Maximum Passengers	19
Length	28 ft 4 in
Widtth	6 ft 2 in
Height	5 ft 11 in

rather than specific cycles or hours. The new engine will offer 1,100 shaft horsepower driving the McCauley four-bladed aluminum propeller and remote oil level sensing directly on the Garmin G3000 for easy inspection. For operators desiring more extensive systems monitoring, the Textron AReS diagnostic system is an option.

Cabin

Initially, the plane will be offered in either a dedicated freighter configuration (with no cabin windows, or a flexible design with windows and the capability to carry passengers), or cargo, or both. The advantage of the latter is the aircraft can be used to carry up to 19 passengers during the day then quickly transformed for cargo at night. For passengers, the Cessna SkyCourier offers expansive windows and USB power ports at each seat. Both configurations will have the same large cargo door in the rear, as well as forward crew doors on each side for easy access to the flight deck and cabin.

In the cargo configuration, the Cessna SkyCourier will have a maximum cargo payload of 6,000 pounds. If the operator configures the aircraft in the commuter configuration, the maximum payload decreases to 5,000 pounds due to the weight of the different interior.


PHOTO BY AUTHOR

The SkyCourier will be equipped with the latest G1000 NXi integrated flight deck with 12-inch displays. Since FedEx is the launch customer, this configuration will provide continuity with similar avionics in the Cessna Caravan. As with the Caravan, the Cessna SkyCourier will offer FIKI as an option, which dramatically reduces costs for those operators where in-flight icing is not an issue.

For the targeted operations, most flights will be at lower altitudes, however, the unpressurized Cessna SkyCourier does have a maximum operating altitude of FL250. Since the aircraft is designed to be rugged, it offers a fixed-gear as well as single-point refueling to speed the turnaround process for high utilization.

First flight is expected in 2019, and the current list price for the freighter version is $5.5 million with the commuter version sitting at $6.5 million. As with the Caravan, I wouldn't be surprised if the possibilities for the Cessna SkyCourier continue to expand as the plane develops and customers see the potential capabilities. T&T

After 11,000 hours of piloting more than 90 aircraft models, **Rich Pickett** *still has a passion for flying. Rich holds an ATP, CFII SME, SES, glider licenses, and type ratings in the L29, L39, Citation 500/510s/525s, Eclipse 500S and DA10. His company, Personal Wings, provides training, mentoring and aircraft services. You can contact Rich at* **rich@personalwings.com**.

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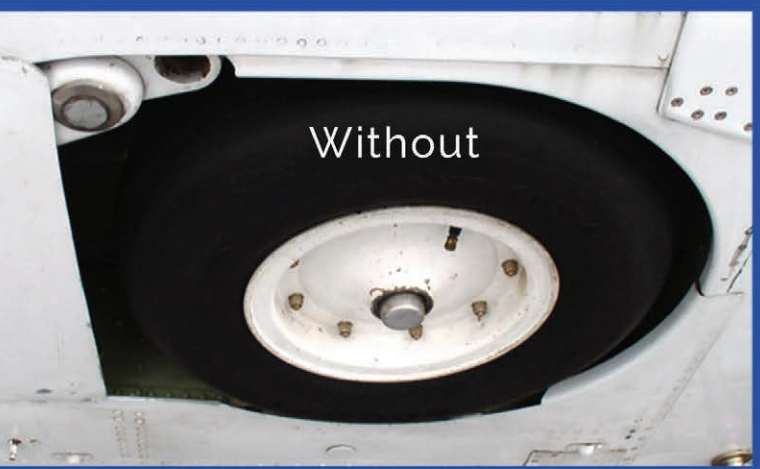

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Intro to Aerobatics

Sequel to "Fly It Like a Fighter"

by **Jared Jacobs**

As professional aviators, we can watch air show routines and especially appreciate the years of practice and countless flight hours it must take for aerobatic performers to hone their skills – fast, loud and low; abrupt pushes, pulls and tumbles; violent, precise and crisp. It is an incredible thing to witness. But how many of us view these maneuvers as opportunities to improve our safety and skills for everyday flying?

A step above and beyond upset recovery training, aerobatic training explores all edges of the envelope. I got my first taste of such training at the Peter O'Knight Airport in Tampa, Florida with instructor Daniel Greenwald.

Pre-Flight Briefing

"Do you know what a D-ring is?" Dan asks as he hands me a packed parachute.

This isn't a common pre-flight briefing for me, so I listen intently to his description of the parachute harness and operating procedure (due to the nature of the training, we are both required to wear parachutes). The pack is secured, and I am soon sitting in the front seat of Dan's Extra.

A familiar feeling of nervous anticipation is creeping up on me again. Even though I just completed a few aerobatic maneuvers in an L-39 Albatros, I know the Extra is a different animal. With a G loading limit of +/- 10 G's, the pilot (me) is much more likely to break than the airplane. Dan is all too familiar with this hesitation and knows exactly what to say.

"I want to step you up through the maneuvers slowly," Dan explains. "We start with the low G maneuvers followed by the rapid roll maneuvers and then if you're up for it, the tumbles. Part of the training is learning the physiology of flight. Anyone can get sick when they are riding along in this airplane. My goal is that you will not get sick. My goal is that you will have fun and will want to do this again."

I feel reassured as Dan situates himself behind me and the canopy is closed.

Looking forward from the front seat is a totally different picture than that of the Citations I typically fly. Two lonely gauges stare back at me from the panel – an airspeed indicator on the left and an altimeter on the right. Apparently, any additional instrumentation would only serve as a distraction. Between these two gauges and the excellent visibility out of the canopy, I'll have all the information that I need.

With the sun beaming in, Dan quickly gets things going and we S-turn our way to the end of the runway. It is a blustery day, so Dan performs the tricky crosswind takeoff. After popping off the ground and getting trimmed out for climb, the controls are passed to me with instructions to climb eastbound to 4,500 feet.

I expected an aircraft with a 270-degree per second roll rate to be twitchy, or even squirrely to control, but I am immediately surprised to find the aircraft is an intuitive flyer. It is much lighter and nimbler than anything I have ever experienced, providing instant results thanks to the pushrod control arms running from the stick directly to the oversized flight controls. With little more than fingertips on the center control stick, it seems that all I need to do is think about what I want and it responds.

Low G Maneuvers

With an initial understanding of the Extra's handling characteristics from flying to the practice area, it is now time to really get to know the bird. Steep turns are up first, so I begin a roll to the left. My eyes instinctively come inside the cockpit to look for the attitude indicator to get an idea of my bank angle. No such

Professional pilot Jared Jacobs preparing to taxi out for his first aerobatic flight.

luck! My eyes dart back outside as I try to set a sufficiently steep bank angle.

As if he were sensing my every thought, Dan says, "Just look outside and try to maintain your altitude as you continue to roll. I'll tell you when you have enough in."

I keep banking and pulling, banking and pulling. I feel that I am nearly at knife edge in the turn and my body is getting heavier and heavier in the seat when Dan finally instructs, "Good! Hold that" at what I would estimate is 80 degrees. We continue around in the turn until my inputs become less frequent and jerky, and instead more steady. I then roll straight from the left steep turn directly into one to the right, with Dan and the airplane providing ample feedback as we go.

Next, we proceed into a normal power-off stall with full recovery using only a reduction in angle of attack. Following this we go through another stall maneuver known as the falling leaf. In this procedure, the stalled state is maintained by keeping the stick back and the wing drop is combatted by using the rudder. As the airplane falls through the sky, with the wings dipping alternatingly, we are causing one wing to be slightly more stalled than the other but then reverse the condition through the use of the rudder. After a few cycles of hanging on the ragged edge of the envelope, we simply reduce the elevator back pressure which reduces the angle of attack of both wings simultaneously, allowing for a full recovery from the stall.

"We have just flown a coordinated stall and a slightly uncoordinated stall. Now let's see what happens when we are completely uncoordinated," says Dan.

We set up for another stall, but this time I add in left aileron and right rudder pressure. If my cockpit was equipped with a turn coordinator, I imagine that the ball would have been roughly half deflection out of center skidding to the outside of the turn. Predictably the "less stalled" left wing comes up and over the top as the "more stalled" right wing falls. I follow the same procedures I followed years ago in a Cessna 152 to recover: power idle, ailerons neutral, full opposite rudder pressure and elevator forward to reduce the angle of attack. No surprises there.

But what Dan shows me next I have never seen before. This time it is an uncoordinated turning stall to the right, but once we enter the incipient phase of the spin, he further aggravates the spin by doing everything wrong. He pulls the stick back and to the right as he pushes the left rudder pedal to the stop and guns the power. We have entered a flat spin. Except for the sound of the motor, it is eerily quiet in the cockpit as the aircraft falls straight towards the earth while rotating around its vertical axis. The airspeed indicator in front of me reads "0" as the altimeter is unwinding like a clock. It is an oddly beautiful thing to experience.

After a few rotations, Dan follows the same recovery procedure that I did, and we are quickly back to flying straight and level.

Roll Maneuvers

"How are you feeling?" Dan asks.

"Really good, actually," I respond honestly.

This will be one of many wellness checks that Dan performs throughout the flight. To be honest, if I had been feeling bad and called it quits at this juncture, I would have felt that it was a successful day. Getting to know the Extra and exploring some slow speed and even no speed envelope flying is a real proficiency booster. But the first few maneuvers peaked my appetite – I wanted more.

With no previous experience in rolls, I assumed I would start with slow rolls then progress the roll rate as I became comfortable. But in reality, slow rolls are one of the more complex aerobatic maneuvers which require precision and a thorough understanding of how to disconnect the flight controls from their typical roles (e.g., rudder can serve as pitch in knife-edge flying), so my first attempt was the simpler aileron roll.

"Start by pitching the nose up slightly, then try to push the stick all the way to the stop," Dan explains.

I complied and finally got to see the full effect of the roll rate that the Extra is known for. When I shoved the controls of the fingertip flyer and pushed the control stick to the left-hand limit of its travel, there was no possible way for my eyes to track the horizon as it spun rapidly around me. I overshot my intended roll-out point by at least 20 degrees. After another a couple of attempts, I can time the release of the control forces to cease the roll rate right as we return to wings level after the full 360-degree roll.

Dan then shows me the appropriate way to perform a slow roll. He talks me through the complexities of starting the

roll with slight back pressure, left aileron and left rudder, but as we approach knife edge, smoothly switching to slight right rudder pressure to keep the nose pointed up. We continue over to inverted flight, which requires forward elevator pressure and a check to be sure that enough aileron pressure is being held to continue the roll. Now, rolling out of inverted flight, these "backward" control inputs can be removed and slowly returned to normal. The slow roll is a beautifully choreographed dance between man and machine when done correctly.

Unfortunately, my first attempt results in a two-step instead of tango, but it opens my eyes to just how much learning to fly aerobatics has to offer seasoned pilots. We spend years learning to fly straight and level "normal" attitude flying, incorrectly thinking that this realm is the one and only: pull and we go up, push and we go down. We avoid all things beyond 30-degrees left and right, or 10-degrees pitch up or down. We are often blind to the upside-down world that exists and the duality of the rules we thought we understood. Aerobatic training opens this portal to us.

Speaking of upside-down, it is time for inverted flying. Dan has me complete half of a slow roll and then hold the airplane in the inverted position.

I am not exaggerating when I say I have never felt something quite as uncomfortable as inverted flying. The weight of your body rests on your shoulder and lap harnesses. Your feet fall away from the rudder pedals. Making sense of the horizon and other visual cues is challenging and confounded by the fact that constant forward stick pressure is required to keep from descending. It feels like every little correction that I make pushes me harder into the restraints and more blood to my head. The positive G's of the next maneuver, the loop, is a welcome return to normal.

Combination and G Maneuvers

As we continue, Dan coaches me using lessons learned and muscle memory built from our previous maneuvers as building blocks to others. For example, roughly speaking, if you can combine the slow roll and a loop, you should have a barrel roll. Having already practiced these two maneuvers separately, along with the skills learned from my earlier L-39 training, it takes me only a couple of tries and Dan chiming in "freeze the stick" to keep me from overcontrolling. Everything then seems to fall in place with the control movements, and I feel like I am tracing the inside of a barrel in the sky.

Feeling that I have accomplished a great deal, I ask Dan to do a little bit of showing off. "I've always loved torque rolls, could you show me one?" I ask.

"Sure!" Dan responds and takes the controls, quickly pitching the nose up vertically. In only a matter of seconds, we are hanging on the propeller, completely stationary. Then, with a nudge of aileron, we began to rotate around the longitudinal axis of the airplane. Dan then gives a slight tug on the elevator and we flip over backward and speed back down vertically. The only thing

that could make it better would be a huge column of smoke billowing out around us.

Sensing that I want to see more, Dan shows me a hammerhead, a segmented roll and a few other tricks that I couldn't tell you the name if I tried.

Post-Flight Briefing

With two feet firmly back on the ground and a refreshing ginger ale to settle any hint of an upset stomach, Dan and I sit in the shade of his hangar to debrief.

"Today, you experienced all the regimes of flight. You gained at least a little bit of comfort with aerobatic flight, and you learned a few new sight pictures."

I cannot help but laugh a little. Judging by his relaxed tone and mannerisms, I may as well have been doing pattern work as a private pilot student. But in my mind, all I can think is, "That was without a doubt one of the coolest experiences I will ever have while flying!" All I want to do is give high fives and pose for pictures in front of the airplane. But that is just the adrenaline talking. As I listen to Dan breaking down the maneuvers one by one and the key takeaways of each, I return to reality.

Just as in the L-39 upset training course, aerobatics is much more than a way to have a good time or show off in an airplane. It is as fundamental as learning to fly straight and level in your first hours of private pilot training. Just because we prefer to fly aircraft right-side up does not preclude the chance that someday we find ourselves in an aircraft out of our control or beyond our comfort zone outside the 30-degree bank left and right and 10 degrees nose up or down. What do we do then?

Beyond simply experiencing what it is like to be outside the "normal" flight envelope, aerobatic flight training will also improve stick and rudder skills and general knowledge of aerodynamics. And in the day and age of the magenta line, when everyone is accused of being too reliant on automation to fly the aircraft, what better way to increase our flying skills than to push them beyond our previous limits?

The classic example is the jet that was caught in wake turbulence and flipped over. The pilot, having completed some level of aerobatic training, recognizes the situation and simply completes the roll like it is no big deal. Dan sums it up nicely in this quote:

"Every pilot should at least do upset recovery training, and even better, a beginner aerobatic course. You don't want your first time flying upside down to be in an emergency. We want it to be done in a controlled environment. This way, when you do experience it due to turbulence, wingtip vortices, disorientation, etc. – you can recover from it much more safely." T&T

Jared T. Jacobs *is an ATP-rated turbine pilot, instructor and mentor. He currently flies corporate aircraft both single-pilot and as crew for a Fortune 500 company. Jared can be reached at* **jaredjacobs2@gmail.com**.

Bose Releases
ProFlight Series 2

by **Rich Pickett**

PHOTO COURTESY OF BOSE


PHOTO BY AUTHOR

PHOTO BY AUTHOR

Bose debuted its latest aviation headset, the ProFlight Series 2, at this year's EAA AirVenture. Since the original version launched in April of 2018, the company has continued to update and improve the product.

The ProFlight is primarily targeted for pilots flying turbine aircraft, but I've used the headset in several types of aircraft including my Cirrus SR22 and Eclipse to several turboprops and other jets. While it works in higher noise environments such as the SR22 and turboprops, it was designed to excel in the jet cockpit (and is my primary headset in those aircraft).

After using the ProFlight for more than a year, I discovered a few features with potential room for improvement. Bose listened to my comments along with others from the pilot community, and the new Series 2 reflects their commitment to refine the product.

Series 2 Updates

One thing I noticed with the original ProFlight was the cord pulls slightly on the headband, mainly due to the lightness of the band. It isn't a significant issue but can be a minor annoyance. Bose rectified the issue by designing a new cord that is lighter, thinner and more flexible. In my test flights with the new headset, now even lighter at 4.5 ounces, it is definitely more comfortable. Bose also added handy "wings" on the microphone to aid in placement of the boom.

With the ProFlight, Bose introduced an innovative feature referred to as Tap Control. With a simple double-tap of the earbud, the pilot can reduce the noise canceling in that particular ear to help facilitate conversation with passengers who might come up to the cockpit. This can be completed without the need to remove the earpiece. With the first version of the headset, occasionally this feature would spontaneously activate. Bose addressed this issue by adjusting the sensitivity profile, which virtually eliminates accidental activation. I use the Tap Control feature frequently in the jets I fly, and during my flights with the ProFlight Series 2, it has worked flawlessly.

Bose also improved the frequency profile for their active noise cancellation with the Series 2, especially with regards to voice frequencies. I noticed the adjusted profile provides a more natural listening experience when utilizing the Tap Control function.

While Bluetooth connectivity was originally standard with the ProFlight, Bose now offers that functionality as an option, giving pilots flexibility which may be especially important for Part 121 and other operations. Additionally, Bose heard from professional pilots that a method to attach the headset case to the outside of their luggage would be useful. So when designing the case for the Series 2, Bose included a handy carabiner.

Bose offers three different sizes of earbuds, which should work for the majority of pilots. Or if pilots desire a personalized fit, Bose partnered with Avery Sound to offer custom-molded ear tips. Pilots can either create their own molds from Avery Sound kits or visit an audiologist to create an impression which Avery Sound can then utilize to create the custom ear tip.

Sales of the ProFlight Series 2 begin this month. The non-Bluetooth version will be $945.95, with the Bluetooth option priced at $1,045.95. Bose is also expanding the warranty to 5 years, which is automatically applied to the first ProFlight version as well.

Upgrading Your ProFlight Series 1

In addition to the longer warranty (at no additional cost), existing ProFlight headset owners will soon be able to upgrade their equipment. Starting in October, Bose will offer an upgrade path that includes a new microphone, cable and control module. The upgraded unit will provide all of Series 2 improvements mentioned above with the exception of the new low ANC frequency profile. Owners will be charged $295.95 for the new unit, then receive 50 percent of the purchase back when their unit is received. The upgrade will also include the new Series 2 case. To obtain more information on the ProFlight upgrade, pilots can visit *www.boseaviation.com/tradein.* T&T

After 11,000 hours of piloting more than 90 aircraft models, **Rich Pickett** *still has a passion for flying. Rich holds an ATP, CFII SME, SES, glider licenses, and type ratings in the L29, L39, Citation 500/510s/525s, Eclipse 500S and DA10. His company, Personal Wings, provides training, mentoring and aircraft services. You can contact Rich at* **rich@personalwings.com**.

The Touch

by **Kevin Ware**

I am sitting in the jump seat of a CJ2 brandishing my seldom-used CFI ticket and CE-525 type rating to complete a 61.55 ride for the pilot in the right front seat. It turns out that the pilot, Carolyn, let her second-in-command authorization run out a week ago and she and her husband John have a trip scheduled to the Midwest this week – not leaving much time for her to run back to FlightSafety where she normally does re-currency training. As an instructor, sitting in the jump seat gives you an entirely different perspective than being up front and actively involved in the aircraft's flight path. You have more time to carefully observe how pilots handle themselves, right down to the smallest detail.

Most people can be trained to fly airplanes, but after spending my first 3,000 hours doing flight instruction, I came to realize that some simply have the "touch" more so than others, and Carolyn (like many women) is one of those. She did not start flying until well into adulthood, and only then (still with some hesitation) after her husband suggested she would be good at it. Yet, even though still considering herself a "fluffy" beginner, she seems to have mastered control feel in a way many pilots can only envy. I can see that none of her movements are sudden or of wide magnitude. Her hand movements are also very purposeful, with her fingers landing directly on the control or switch she is after without any insecure wandering. This is usually the case in pilots who have the locations of everything well embedded in their tactile memory (which in my observations, female student pilots seem particularly skilled). Another thing I notice is although she sits in the right seat, she is the Pilot Flying (PF), and in an understated but calm way is directive to the Pilot Monitoring (her husband John) who is sitting on the left.

We do the usual air maneuvers like steep turns, approaches to a stall and slow flight, all of which she has no issues. Then, as part of the 61.55 check ride,

we make an instrument approach into Runway 16 at Paine Field (PAE), where the Boeing 747 plant is located. The tower is running traffic off of Runway 34 which results in our need to break right at the missed approach point and enter downwind for that runway on the west side of the airport. I deliberately asked Carol to do this approach because it puts her in a position where she cannot see the runway she is about to land and makes for a good check on how she handles crew communication.

Well before we arrive at the base turn, she asks John, who is sitting in the left seat and can clearly see the runway, to call out the base turn. He does so after about a minute, and Carol rolls into a 30-degree left bank turn, then nicely rolls out at heading 070 – perfect for the base leg. She still can't see the runway, however, so again asks John to call the turn to final then finish the landing checklist. He obliges, and she gradually rolls into another 30-degree banked turn and comes back on the trim wheel slightly to prevent an increase in descent rate. At the same time, she squeezes in a touch of power to 63 percent, which I note keeps the indicated airspeed at exactly 120 knots when full flaps are deployed, or about 10 knots above V_{ref}. From that point on, there is very little of the fumbling type power variations so often seen on final, the sound of which passengers can find disconcerting. At about 100 feet and just short of the runway, the power is reduced to idle. The slightly high ref speed results in a nice gradual descent to a gentle "in the zone" touchdown, with the nose wheel then softly placed on the pavement.

A CJ with its Williams engines does not have traditional thrust reversers, but rather a couple of paddles that stick out to divert thrust somewhat away from straight ahead. Carolyn gets those out, then starts a gradual braking action so that we are quite slow by the time we make the exit ramp about 4,000 feet down the 10,000-foot runway. She crosses the yellow hold line then slowly brings the airplane to a stop while John is calling ground control. No jerky movement there, and as we taxi back for another takeoff, I start thinking, "What is it about women pilots? They always seem to so gentle with how they handle the controls – maybe us males could learn something from them."

Some time goes by, and I don't see much of Carolyn and John until I find myself in the back of their new Bell 407 helicopter. In the left front seat is a very experienced former Bell test pilot who is spending the better part of the week putting on a Bell 407 training course for all of us. Carolyn's husband John is in the right rear seat, and we are heading back to their home in the San Juan Islands just north of Seattle. I am along for the ride because once we drop them off at their home airport, I will move to the front to show the instructor that I too can fly the helicopter.

Just before we leave the mainland and head out over Puget Sound, the instructor decides to practice a few autorotations. The power gets rolled back and the pitch is adjusted to maintain airspeed. Sounds simple enough, but from my point of view in the back seat, I can only see the brown plowed fields of the Skagit Valley coming toward me at an alarming rate. This is partially because from the back seat, I am looking down the tunnel of the helicopter's cabin. The other reason is that a Bell 407 has a relatively light four-bladed rotor system, and requires a fairly negative pitch attitude to maintain airspeed during an

autorotation. Finally, when I can clearly see small clumps of dirt scattered by the plow, the nose gently pitches up, making only the blue sky visible. This decreases forward motion and increases main rotor RPM, at which time the nose drops back to the horizon as Carolyn goes forward with the cyclic and up with the collective at about 5 feet above the ground – the maneuver's endpoint. I think to myself, "That was well done. Some pilots just have the touch." I hope with all my helicopter time, plus helicopter CFI rating, I can perform just as well on the return trip.

Twenty minutes later, we arrive over the short, uphill grass airstrip at which Carolyn and her husband base their helicopter. The San Juan Islands are notorious for their overpopulation of blacktail deer as there are few natural predators and hunting is rarely allowed. In addition, the deer are quite skilled at swimming from one rocky island to another, usually favoring those on which humans have built nice grassy runways. This periodically leads to unpleasant deer and airplane encounters, usually fatal to the deer and occasionally to the airplane's occupants. Knowing this fact, it is worrisome when I look down at the grass runway to see a herd of deer nonchalantly wandering around and large enough to have fed the entire Lewis and Clark expedition for a month.

Given that tail rotors and deer do not mix well, the instructor and I must be thinking the same thing when I hear him ask Carolyn what she intends to do about the deer. She laughs briefly into the mic and says she has the deer "trained." Sure enough, as she starts the approach, the deer briefly look up and seemingly without a care in the world, slowly wander away from our landing zone. We hover over to the cement pad near the hangar, touch down gently, then the power is slowly rolled off and the turbine placed at idle for the prescribed cooling period. The deer wander back to their original locations. Some pilots quite obviously have the touch.

Not once during the helicopter flight, or the earlier CJ trip, were the controls moved suddenly or forcefully by the pilot. Both machines seemed to flow very smoothly through the air to exactly where they were supposed to go. The truth is most of us have to work very hard to have that happen, while others just seem to have the "touch" – and they are often women. T&T

Kevin Ware *is an ATP who also holds CFI, MEII and helicopter ratings, has more than 10,000 hours and is typed in several different business jets. He has been flying for a living on and off since he was 20, and currently works as a contract pilot for various corporations in the Seattle area. When not working as a pilot he is employed part time as an emergency and urgent care physician. He can be reached at* **kevin.ware2@aol.com**.

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31	ASTRA 1125SP
51	ASTRA 1125SPX
36	BEECHJET 400
238	BEECHJET 400A
124	BOEING BBJ
371	CHALLENGER 300
55	CHALLENGER 600
38	CHALLENGER 601-1A
109	CHALLENGER 601-3A
51	CHALLENGER 601-3R
289	CHALLENGER 604
9	CHALLENGER 800
166	CITATION 500
285	CITATION 525
266	CITATION BRAVO
153	CITATION CJ1
85	CITATION CJ1+
194	CITATION CJ2
163	CITATION CJ2+
357	CITATION CJ3
92	CITATION CJ3+
240	CITATION CJ4
152	CITATION ENCORE
50	CITATION ENCORE+
297	CITATION EXCEL
18	CITATION I
242	CITATION I/SP
451	CITATION II
58	CITATION II/SP
161	CITATION III
64	CITATION LATITUDE
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381	CITATION MUSTANG
125	CITATION S/II
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212	CITATION XLS
209	CITATION XLS+
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42	DIAMOND IA
3	DORNIER ENVOY 3
232	ECLIPSE EA500
52	EMBRAER LEGACY 500
135	EMBRAER LEGACY 600
58	EMBRAER LEGACY 650
232	EMBRAER PHENOM 100
261	EMBRAER PHENOM 300
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19	FALCON 200
186	FALCON 2000
21	FALCON 2000EX
58	FALCON 20C
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9	FALCON 20E-5
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140	TURBO COMMANDER 690A
139	TURBO COMMANDER 690B
79	TURBO COMMANDER 840
24	TURBO COMMANDER 900
56	TURBO COMMANDER 980

Twin Piston – 6,507

Owners

Count	Aircraft
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1433	BARON 58
2	BARON 58 PA
345	BARON 58P
108	BARON 58TC
3	BARON A56TC
321	BARON G58
188	BEECH DUKE B60
162	CESSNA 340
520	CESSNA 340A
70	CESSNA 402B BUSINESS LINER
133	CESSNA 402C
24	CESSNA 404 TITAN
247	CESSNA 414
357	CESSNA 414A CHANCELLOR
43	CESSNA 421
38	CESSNA 421A
335	CESSNA 421B
607	CESSNA 421C
53	CESSNA T303
106	PIPER 601P AEROSTAR
24	PIPER 602P AEROSTAR
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25	PIPER MOJAVE
315	PIPER NAVAJO
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24	ROCKWELL 500A SHRIKE
77	ROCKWELL 500B SHRIKE
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5	ROCKWELL 560 COMMANDER
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7	ROCKWELL 560E COMMANDER
7	ROCKWELL 560F COMMANDER
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by **Kevin R. Dingman**

Participation Trophy

Generations

Silent – 1928-1945 – Strong work ethic, humility, prudent saver

Boomers – 1946-1964 – Idealistic, revolutionary, collectivist

Generation X – 1965-1980 – Materialistic, competitive, individualistic

Millennials (Gen Y) – 1981-1996 – Globalist, questioning, self-oriented

Gen Z – 1997-? – "Communaholic," dialoguer, realistic

Squarely in the middle of the boomers, I grew up in aviation at the end of the last GA boom. The year that I started high school, a brand-new Cessna 172 was $33,950 and they built 750 of them. The favorite flavor of flight school fuel was red 80 octane, and a third-class physical was completed as if you were applying to be a Mercury astronaut. I paid $16 per hour to rent a new Mooney Cadet and $8 for a not-so-new instructor, all while earning $1.25 per hour washing airplanes and pumping that red fuel. It was a time when you needed a restricted radiotelephone operator permit to use the airplane radio, and your flight instructor chastised you for not only piloting errors but for improper use of the radio. After soloing, your shirttail was ceremoniously and publicly cut off, potentially exposing non-pierced nipples and navels. Those good times were followed by more great flying in the military and Part 121.

No Such Thing as Bad Student,

Only Bad Teacher.

Teacher Say, Student Do.

– Mr. Miyagi (Pat Morita –"The Karate Kid")

Shake My Hose

The United States Air Force UPT (Undergraduate Pilot Training) instructors would grab your oxygen hose at the mask and shake you to enforce a point and openly embarrass you in front of squadron mates. Soloing the T-37 resulted in being thrown into a congratulatory dunk tank. During my new hire B-727 engineer training, the ground school instructor slapped me in the head for allowing my family to do Jepp revisions. And the two stripe (career flight engineer) sim instructor swore profusely

at my fighter pilot arrogance and helplessness while learning "the panel." I can't write about the traditions and humiliation tactics in the military fighter community for similar achievements and events because those words, actions and training techniques are now considered inappropriate and hurtful to one's delicate feelings. Did this old-school style of training, initiation and buddy-bonding make me more respectful, learn faster and become a better pilot and captain? Hell yes, it did. Things have changed.

I'm Tellin' Mom

While taxiing for takeoff in a B-737 at a busy hub airport, the captain noticed the FO was bobbing his head as if to music. Sure enough, the copilot had Bluetoothed his newfangled, noise-canceling, fuel-injected, turbocharged, 4WD aviation headset to his SiriusXM satellite-enabled smartphone (also fuel injected with 4WD) and was grooving to some tunes – not from the 60s, 70s or 80s. Shocked, the captain instructed the brand-new, on probation FO to turn it off. His relaxed, matter-of-fact response was, "I won't miss any radio calls." Thinking that this was a satisfactory response, the FO continued with his head-bobbing disregard for the captain's authority, FAR's, company policy and most notably: the fear of a violent oxygen hose shaking or a backhand to the side of his head. The captain once again insisted that the FO discontinue listening to music. After a surprisingly indignant confrontation with rolled eyes to the cockpit ceiling (no, not the "flight deck" ceiling) and a disgusted blow of resignation, the FO complied.

Here's the kicker that has become the all-too-typical, go-to scenario in today's "safe zone, no hurt feelings" environment: In response to the FO's formal complaint to management (yes, he went and told his mommy), the company's HR department called the above captain to have him explain why he had been verbally abusing the poor, young, traumatized FO. Fortunately, after the captain explained his actions as PIC, the FO was subsequently fired. This is not, however, the case across different workgroups.

Do These Earbuds Make My Brain Look Small?

A young pilot wishing to ride the jumpseat appeared in the cockpit. He needed a ride to the airline's main hub to operate a flight later that night to London as a 777 FO. He was unshaven, in work-in-the-yard clothes and once the cockpit door was closed, pulled out a small pillow from his bag, removed his shoes and "laid" down in the jumpseat. Just prior to takeoff, the captain had to tell him to sit up and fasten his belt and harness. After passing through a cloud deck and continuing the climb to cruise, an FO at one of the regional carriers remarked to his captain, "Wow, this is great. I've never been on top of the clouds before."

Part 121 operations require that the captain provide a pre-flight briefing to not only cockpit crew members, but the lead flight attendant as well. While attempting to gain the attention of the flight attendant for this briefing, who was on her cell phone staring at the captain while she talked for several more minutes, the FA sarcastically quipped to the person on the other end of the phone, "I guess the captain wants to talk to me, I'll call you back in a second." On another flight, the FA had to be asked to not only remove a display of jewelry on the galley shelf that she was attempting to sell to crew members but also to remove earbuds (and nowadays, AirPods) in order to hear the captain's briefing.

Passengers now carry their belongings in plastic bags, wear all manner of pants, skorts, leggings, shirts with varying degrees of sexual and political statements and footwear ranging from sandals to toe-socks. I reckon it's a generational difference that will soon be acceptable among working crew members as the term "casual Fridays" is retired.

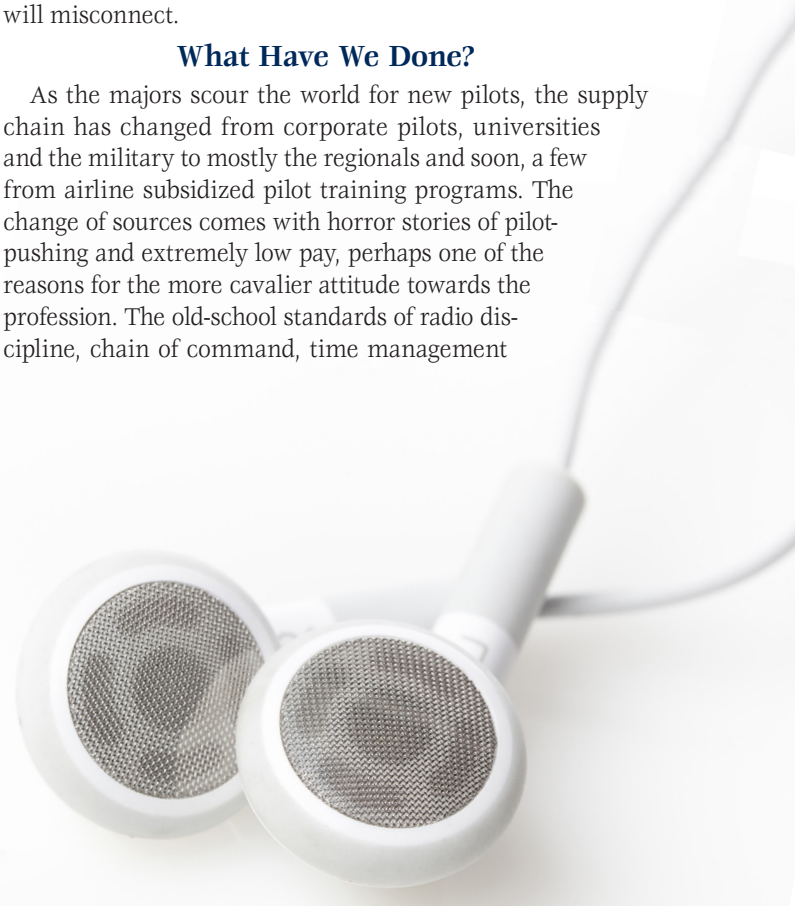
M-I-L-LEN-NIA…..L!

"You've Gotta Love Millennials" – Micah Tyler

Sometimes millennials don't shave before work and FAs (male and female) exert their "rights" by wearing a skirt with no hose, no makeup, multiple piercings in places that weren't designed by God to have holes, or they wear tennis shoes with no socks. I'm glad that, at least so far, neither gender has viewed using toilet paper or toothpaste as an affront against their personal freedom, the gender to which they "choose to identify" or their right to avoid personal hygiene. Sometimes Gen X think the 0630 hotel van pickup time is exactly 0630. Even though by then, the van is full of other crew members who were in the lobby at 0620 and aboard the van at 0625. And then there are those who show up at the plane just 10 minutes before boarding. These same folks often only run the deice system when the "book" says to – even if we are taking ice outside of some engineer's "parameters." Or they want to the fly FMS economy cruise speed whether it's too fast for the existing ride condition or too slow for the $80,000 worth of connecting passengers that will misconnect.

What Have We Done?

As the majors scour the world for new pilots, the supply chain has changed from corporate pilots, universities and the military to mostly the regionals and soon, a few from airline subsidized pilot training programs. The change of sources comes with horror stories of pilot-pushing and extremely low pay, perhaps one of the reasons for the more cavalier attitude towards the profession. The old-school standards of radio discipline, chain of command, time management



and professional dress are changing. I worry that Generation Y airline pilots were mentored too quickly and by captains working under intimidation from a management that knew their pilots needed a solid pre-employment reference for the majors.

For the most part, life with the regionals was a continual sense of paying your dues on the way to the majors; obeying the master in order to receive an honorable release from servitude. An entire crop of burgeoning airline pilots was mentored in this caustic environment, wearing down young pilots into a nub of acquiescence. Simultaneously, due to mergers, 9/11 and bankruptcies, my generation allowed pilot pay to drop significantly lower than historical and inflation-adjusted norms would command. Thankfully, this type of treatment and food stamp-level pay has changed as the long-anticipated pilot shortage has become a reality. While it arrived too late for the generation of pilots already at the majors, perhaps the younglings will renew the profession to its former glory.

Essential Oils

At the majors, most FO's flew for 12 to 18 years with old-school captains before they upgraded to the left seat. And these old-school mentors felt little pressure from management to fly when sick, fly poorly maintained airplanes or in dangerous weather. In the U.S., we are retiring thousands of such pilots each year for the next 5 to 10 years. And while the captains and FOs flying today may have 45 to 70 years of combined flying experience, the flying time of a new captain and a new FO's added together will soon not be as much as one retiring captain. These new folks have never heard of The Three Stooges, Ripcord, Sky King, Super Tramp or The Animals. No wonder they have little in common with Boomers. And ya gotta love the brilliant new radio lingo they use like "cool beans" and "my bad." But despite these differences in generational characteristics and experience levels, the pilot partition of Gen Y and Z continues to show impressive skill and intelligence. Their level of adaptability noticeably exceeds previous generations, and not just in their ability to use Bluetooth electronics and essential oils. So, we may not be doomed after all – if we can just get past the piercings, tattoos, their attitude and those damned earbuds. T&T

Kevin Dingman *has been flying for more than 40 years. He's an ATP typed in the B737 and DC9 with 23,000 hours in his logbook. A retired Air Force major, he flew the F-16 and later performed as an USAF Civil Air Patrol Liaison Officer. He flies volunteer missions for the Christian organiz tion Wings of Mercy, is employed by a major airline, and owns and operates a Beechcraft Duke.Contact Kevin at* **dinger10d@gmail.com**.

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Load Shed

We have all heard this term before. It usually appears in a discussion of the electrical system during our initial or recurrent training, as in, which systems systems are lost in the event of an engine failure. I would like to use it another way. Follow along on this circuitous analogy.

Professional athletes are trained to do one thing – play the game. Their support system is designed to handle all their personal needs. When they arrive at the hotel, they don't stop at the desk to check in. Instead, the key to their room is on a small lobby table. They just pick it up and head to their room.

All they need to do is play the game.

Likewise, the airline pilot has a huge support system to help them get safely from point A to point B: weather forecasters, dispatchers, maintenance technicians, baggage handlers, flight attendants. All the flight crew must do is fly the airplane.

How about your support system? Here's the list:

1. You

As owner pilots, we are tasked with doing it all. We adapt to that challenge with varying degrees of success. Has this ever happened to you?

9 a.m. Arrive at the airport to prepare the airplane.

9:15 Discover that the right main air pressure is 8 pounds low.

9:16 Drag nitrogen bottle out of hangar and fill tire.

9:30 Wife arrives with many bags and dog.

9:31 Dog runs inside hangar and poops on floor.

9:35 Rest of family arrives with too many bags.

9:40 Notice a line of thunderstorms approaching from the west.

9:45 Rush to load up, brief the passengers, copy the clearance and beat the weather.

As PIC, we must deal with all the above and sometimes more. And we seem to accept the stress this incredible workload presents as some kind of challenge to our "manhood." Regardless of our flying skills, it's just unlikely that we are going to "perform" as well as the athlete or airline captain.

We can do better than that. We can "load shed" the excessive workload. How? By utilizing the "lead passenger" concept.

Developed in corporate flying operations, this idea focuses on selecting one frequent passenger to handle many of the support functions of the flight – answering questions, loading the catering, adjusting seatbelts, supporting the passenger safety briefing, communicating concerns to the PIC, etc. The lead passenger may often be the spouse, or in a business setting, a frequent flying associate. Importantly, all the passengers must know who this person is and what their role is.

In the event of an emergency, the lead passenger is trained in the removal of emergency exits, donning O2 masks or the exact location of the flashlight and fire extinguisher. They could have their own "checklist" of items to review. The lead passenger does not relieve the PIC of the traditional passenger safety responsibilities, but they could be used to assist in the process. Passengers will likely feel more at ease knowing that someone in the cabin is there to help.

One dark night over the Rockies in IMC conditions at FL410, my friend Larry King had an exasperated passenger tap him on the shoulder and say, "Hey, we're on fire back here!"

It took several terrifying moments for Larry to realize that the passengers were just "hot."

A lead passenger could have handled the situation without ever distracting the pilot so that you can perform like a pro.

Fly safe.

David Miller *has owned and flown a variety of aircraft types, from turboprops to midsize jets, for more than 40 years. With 5,000-plus hours in his logbook, David is also Chairman Emeritus of the Citation Jet Pilots Safety & Education Foundation. You can contact David at* **davidmiller1@sbcglobal.net**

Fund an Angel Cocktail Reception

Wednesday, October 23 | 6–8 P.M. | Wynn Las Vegas

The 10th Annual Fund an Angel Cocktail Reception, held on the second day of the NBAA Business Aviation Convention & Exhibition (NBAA-BACE), is an invaluable networking event for business aviation leaders and influencers. The reception will feature an auction to benefit Corporate Angel Network (CAN), which organizes critical flights for cancer patients to treatment centers throughout the country.

"Corporate Angel Network has helped to open up trials and treatment for Ava that we otherwise could not afford. They help to ensure she gets the medical care that she needs."

– Ava's Parents

Learn More and Reserve Tickets: fundanangel.org

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