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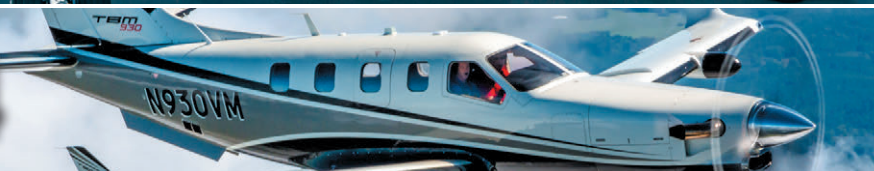
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editor's briefing

by Rebecca Groom Jacobs



Owner-Family



In October, I had the privilege of attending the Citation Jet Pilots (CJP) convention in San Antonio, Texas. Each year, the multi-day event offers a full schedule of seminars, exhibitors and speakers surrounding Citation ownership. Though familiar with aircraft owner's groups, I had yet to attend a convention and looked forward to better understanding the fundamentals and benefits of membership.

I travelled to SAT via the airlines, but upon landing, promptly made my way over to Million Air to observe some of the CJP arrivals. I was especially interested to see how Citation owners were faring with the bleak IFR conditions (800-foot ceiling, visibility 1-3 miles, and rain). Sure enough, the

approach controllers had their hands full vectoring various aircraft onto the final approach course. Despite the obstacles, however, dozens of Citations were still able to make it in throughout the day and park alongside their "kin" on the crowded ramp.

When I arrived at the welcome reception that evening, I was immediately overwhelmed by the sheer size of the group. As it turns out, this was a record-breaking year for the organization. There were nearly 500 members in attendance – an impressive feat considering the organization is just in its tenth year. Afterward, CJP Vice Chairman Marc Dulude commented, "Ten years ago, we were just a handful of jet owners sharing stories in an effort to become better and safer pilots. Now, with over 1,000 members, we continue to fulfill that mission but with an industry-wide influence and voice."

Judging by the 60+ exhibitors, I would have to agree that voice was evident. One of CJP's most important roles is as a conduit between owners and companies that support the Citation fleet. I got to witness firsthand the open communication taking place throughout the convention as owners attended company presentations, visited with exhibitors and shared experiences during manufacturer-led breakout sessions. The common goal among all attendees was clear: keep the Citation fleet flying safely and efficiently.

Perhaps one of the greatest benefits of an owner's association membership, however, is the comradery. Members frequently share common interests beyond flying, and develop lifelong friendships. When it comes to their aircraft, they listen and learn from one another while sharing experiences, oftentimes via an online forum – a place where owners, members and even manufacturers are able to ask questions and share insights.

The convention was a whirlwind of informative sessions and memorable social occasions. Despite my first-timer status, I felt warmly welcomed by the CJP owner-family.

Rebecca Jacobs

Airmail

In Response to Dianne White's "The Hero's Honor They Deserve"

Our small world continues to intersect. I read your feature about WASP pilot Elaine Harmon (October, 2018). I flew Mrs. Harmon from Fort Worth to Avenger Field in Sweetwater, Texas in 2008 at the last WASP reunion. The WASP ladies held their final reunion in Dallas and someone sent out a call for volunteer aircraft to ferry the ladies to Sweetwater to see their old training site. I could not pass up that honor. We flew about 30 WASPs and their escorts from Fort Worth Alliance Airport in a convoy that included a B-25, T-6, DC-3 and various GA types (me in my Cessna 340). She was accompanied by her daughter and son-in-law.

We landed at the tiny Sweetwater field and toured the WASP Museum. Volunteers served a lunch and the women AF pilots from Dyess AFB in Abilene attended to meet the WASP ladies. After lunch, a B-1 made a low pass over the field with a female crew on board. Then, the active duty female AF pilots paired up with the WASP ladies and removed their wings and pinned them on the WASP pilots. Grown men wept; me too.

Elaine sat up front with me on the trip back to Fort Worth. She told me that when she joined the WASPs, her mother disowned her and did not speak to her for several years because she thought it unseemly for a married woman to join the WASPs. Elaine gave me a pair of WASP wings that I treasure. We stayed in touch over the years. I sent her a news clipping of her photograph receiving the Gold Medal from President Obama. She wrote back with a nice note and a copy of the picture of her in flight suit that is in your article.

Mike Gaston
Colorado Springs, CO

In Response to Kevin Ware's "Airport Day"

I landed overseas a few hours ago after an 11-hour flight, and after a few meetings sat down with a cup (large) of coffee and just finished reading your "Airport Day" article in *T&T* (September, 2018). I have flown into many "triangle" airports and noticed that every single one was always described as "this was originally a USMIL airport..."

A number of years ago, but not too many, I was flying a Cessna 172 and taxiing to the line at Galveston (GLS) when my left tire blew. Thankfully, the local tech was able to take care of it but during the three hours to get it sorted, a 75-year-old gentleman described that the field had a long history before WWII but with the onset of the war, the U.S. Army took over the field and replaced the runways with three runways, each 6,000 feet in length, in a triangular pattern. Ever since that day, I have always noticed those airports sporting those characteristics, but had no idea that the "200-hour taildragger pilot" was the reason. Very informative. I enjoyed the article. Thanks for writing it.

RH
Tulsa, OK



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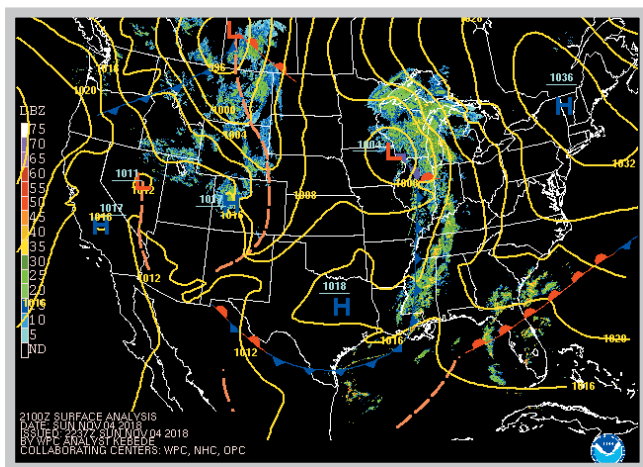
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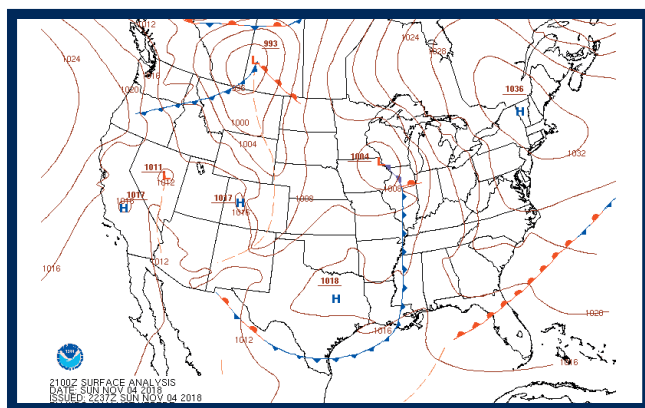
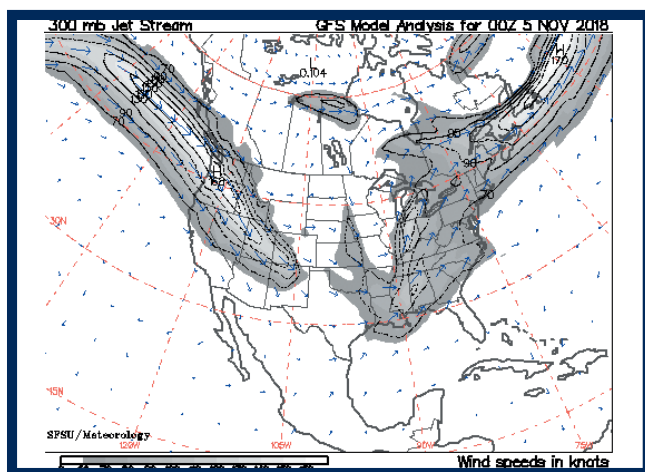


A Rough Ride



▲ The surface map and radar returns the afternoon of my flight.

The Nov. 4 jet stream analysis provides a clear indication where turbulence and wind shear might be found, especially when considered along with the surface analysis map. ▼



In early November, my husband and I had traveled to Pensacola, Fla., to celebrate our daughter's completion of a phase of her pilot training at the Naval Air Station and catch the Blue Angels final performance of 2018. After a memorable few days, we turned our attention to the flight home to Kansas City.

As often typical this time of year in the northern hemisphere, the struggle between seasons is underway as the polar jet moves south and brings the season's first significant cold fronts. Thus, this was the case on the day of our intended flight. After much analysis, we determined that the front was slow moving with widely scattered precipitation anticipated. The front was forecasted to run out of energy mid-afternoon and become stationary. Closer to the low-pressure center located in Iowa, convection was forecasted down through eastern Missouri to Memphis. Sure enough that morning, cells were starting to manifest north of our route on the radar. We decided to launch midday as the front ran out of gas.

At about 140 nm from the front, the ride was smooth with light rain and pockets of moderate rain. From a strategic point that far out, Nexrad confirmed what we were expecting to see: large areas of green and smaller yellow returns...nothing that looked terribly concerning (read: convective). By the time we reached the front in VMC between layers, our Memphis Center frequency was inundated with aircraft – from FL450 down to 6,000 feet – reporting moderate turbulence. A Citation 40 nm north of our route climbing through 11,000 reported wind shear and severe turbulence. I pulled back the power in anticipation, and within minutes it hit: some of the worst wind shear we've experienced in three decades of flying.

In addition to the effects of turbulence, we observed tremendous variations in indicated wind direction – shifting from 10 kts tailwind to 48 kts headwind. Groundspeed varied wildly, and the autopilot got a workout to maintain heading and altitude. All the time, I kept my hand on the yoke and eyes on airspeed, ready to hand-fly if necessary. Meanwhile, our ForeFlight map became heavily populated with PIREPs all around us, reporting moderate turbulence. We added ours to the collection. A good friend who happened to be passing overhead at FL450 in a CJ3 told us later that the turbulence “rocked their world” as they passed over the front.

We have all been taught that whether or not wind shear conditions are expected, the pilot must be able to recognize it when it occurs. What are the indications you're in a wind shear event?

Let's review:

- Indicated airspeed variations in excess of 15 kts;
- Groundspeed variations (decreasing headwind or increasing tailwind, or a shift from head wind to tail wind);
- Vertical-speed excursions of 500 fpm or more;
- Pitch attitude excursions of five degrees or more;
- Glideslope deviation of one dot or more;
- Heading variations of 10 degrees or more.

Wind shear may be vertical or horizontal, or a mixture of both types and is usually associated with fronts, jet streams, thunderstorms or convective clouds, mountain waves or microbursts. At higher altitudes, clear air turbulence is often associated with wind shear and can be violent. In the worst cases, it can lead to loss of control.

As Advisory Circular No 00-30C notes, wind-shift areas associated with pressure troughs and ridges are frequently turbulent. This accurately describes what we flew through on that day.

While prediction tools, forecasting models and onboard turbulence detection are getting better and better, wind shear and severe turbulence continue to bend aircraft and cause onboard injuries. Beyond the severe jolts, which can cause structural damage, airspeed fluctuations and G-loading can lead to a high-altitude upset.

If you aren't already, get familiar with the NWS' Graphical Turbulence Guidance Model; it provides an analysis and forecast for clear air turbulence as well as mountain waves, and it includes turbulence information beginning at 2,000 MSL all the way to FL450. Also, turbulence guidance is now available as an ADS-B product, so that you have access when connected to an ADS-B input source. (On ForeFlight's map, there is a slider that allows you to view the layer at the altitude of your choosing.) It also uses a more nuanced color gradient scale based on the eddy dissipation rate, or EDR, which is a universal measure of the rate at which energy dissipates in the atmosphere. These are automated forecasts without human input like you'll find with AIRMET Tango and SIGMETs for turbulence. ForeFlight has some excellent blog posts on their website that fully explains the NWS GTG products and how they are created. It's worth a read or review.

In addition, we have access to real-time conditions through graphical PIREPs – an incredibly useful tool for in-flight decision-making. Finally, queries to ATC can help draw out more details on what others have reported. Together, all of these tools give us the ability to better flight plan and make in-cockpit decisions to minimize our exposure to dangerous turbulence. However, the most important tool is the one between your ears: that's where you can interject experience, knowledge plus a measure of conservatism and humility to your decision.

Today, I have the benefit of hindsight to analyze whether I should have launched. But perhaps more importantly, I now have some valuable experienced-based insight that I can apply to future go or no-go decisions. **T&T**

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Supporting the Supply Chain

Known as King Air landing gear overhaul experts, Aerospace Turbine Rotables challenges dependability and costs with its pool stock of repaired components and 46 years of MRO solutions.

by **MeLinda Schnyder**

Dave Seavey walks through the 72,000-square-foot Aerospace Turbine Rotables facility in Wichita, Kansas, like a kid on a playground, fascinated by one shiny object after another. Aircraft parts have been in his blood since his first aviation job: the second shift in the parts department at United Beechcraft. He was a “Beechcrafter” from 1974 until 2002, when he went to work for one of the suppliers he’d worked with throughout his career.

He knew the people at Aerospace Turbine Rotables and liked their MRO (maintenance, repair, and overhaul) solutions that tackle the rising costs, long lead times and uncertain availability that many owner/operators face. The company started in 1972 and cut its teeth on Wichita-born Beechcraft and Cessna fleets. By the time Seavey joined as vice president and general manager, Aerospace Turbine Rotables had grown alongside the expanding King Air fleet.

Two-thirds of the company’s activity supports the turbine owner-operator, either directly or through their maintenance provider or parts distributor. With an estimated four King Air aircraft coming due for their 6-year inspection every business day, there’s a steady flow of operators looking for alternatives to new part replacement.

Seavey recently took us on a tour of the facility, which the firm moved into in 2015 to double its square footage in south Wichita. Here’s what he shared about the MRO business:

TWIN & TURBINE: *You first experienced Aero Electric, the company that eventually became Aerospace Turbine Rotables, as a customer, correct?*

SEAVEY: Yes, I worked with Phil Rapp, one of the founders of Aero Electric, when I worked at United Beechcraft. We needed some help with landing gear overhaul programs, flap actuators and gearbox overhauls. That was in the 1970s and these are the programs that eventually grew to become an essential part of what is now the Aerospace Turbine Rotables business.

TWIN & TURBINE: So, you played a part in the company growing from an electrical MRO facility primarily serving the piston market to a business providing a wide range of MRO solutions for the King Air family of airframes?

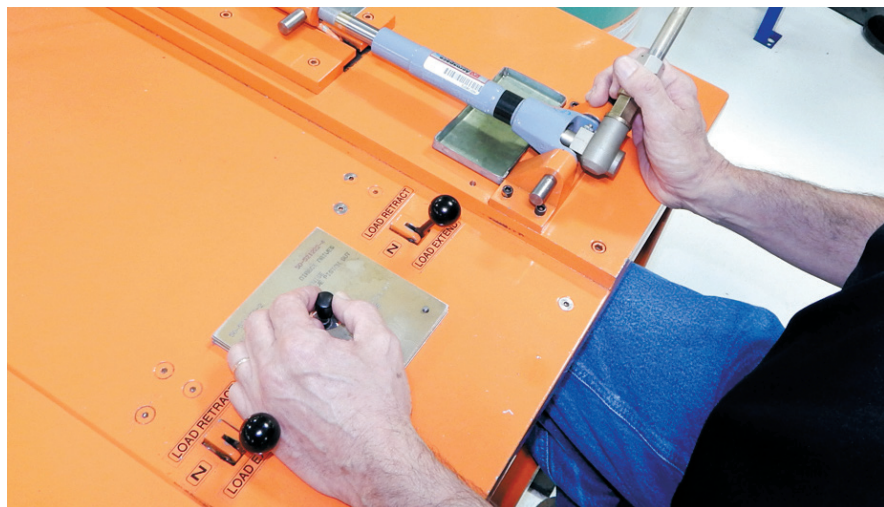
SEAVEY: We are the largest King Air landing gear MRO shop in the world, and we have developed many additional product lines with the landing gear in order to provide the owners/operators of this great aircraft with more robust solutions. We provide MRO services for the drag legs, retract actuators, retract motor/gearbox, wheels, brakes, flap motor/gearbox, flap actuators, mechanical trim actuators, control surfaces, radomes, exterior lights, tach generators, O2 cylinders, O2 regulators and crew O2 masks. Our Parker Stratoflex hose shop builds and ships King Air engine hose kits for every King Air/Super King Air model. In addition, our sister company, Piedmont Propulsion Services in Winston Salem, North Carolina, provides MRO services for the propellers and prop governors for a wide range of turboprops.

TWIN & TURBINE: First Aviation Services acquired Aerospace Turbine Rotables in December 2009. How has that changed the business?

SEAVEY: A decade ago, our company was well recognized and appreciated for our diverse capabilities on the King Air. Today, we have expanded our portfolio to include Global Express, Challenger, Gulfstream, Learjet, Pilatus and Phenom. Not only do we provide landing gear overhaul services for these airframes, but we also offer solutions for hydraulic system components, flutter dampers, safety equipment, lighting products and structures.

TWIN & TURBINE: Can you explain how your team embraces the concept of keeping operating costs down and flight hours up?

SEAVEY: In our segment, cost-effective repairs and healthy repair part supply chains are critical to success, and have been important elements of our business. We have made significant investments in both our pool stock of repaired parts and our OEM (original equipment manufacturer) and PMA (Parts Manufacturer Approval) parts inventories. In fact,



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TWIN & TURBINE: *Your engineering team has designed an entire family of PMA parts for the King Air?*

SEAVEY: We had found it necessary to go out and approve a part that was either unaffordable or unavailable for us to use. For example, a ring used in all three of the struts of a King Air landing gear suddenly became a shortage item. So we reverse engineered it, developed a replacement, received FAA approval through the PMA process and had them built by a quality supplier. Today we exclusively use our PMA ring. Even though it was designed just to eliminate a gap in supply for a very important part, once designed it was a fraction of the OEM cost and it was reliable.

TWIN & TURBINE: *And, your pool stock contributes to delivering fast turnarounds?*

SEAVEY: If you look at a King Air in the 6-year landing gear inspection, the plating process typically takes a week to have cadmium plating restored, and it takes two weeks to have chrome plating restored. So, if you have a part where the upper half is chrome and the lower half is cad, it takes three weeks to go through the entire process. Most King Air operators would rather not ground their aircraft for three or four weeks to have their part reconditioned. Instead, they may opt for the \$24,000 piston axle so they can fly. We have invested millions of dollars into the repairable parts that are part of the landing gear assemblies. There's almost nothing that a customer needs on a landing gear that we can't provide out of our pool stocks.

TWIN & TURBINE: *What savings can an operator expect when choosing to repair or exchange versus replacing with new parts?*

SEAVEY: Recently we had a call from an operator who had received a quotation from his maintenance provider for the overhaul of his nose landing gear. The quotation was for more than \$70,000. The customer was rightly perplexed with the expense of the quotation but understood

that the three primary components on the King Air nose landing gear were found to be unserviceable on his unit. His brace had a worn bore, his barrel had worn internal bushings and the beginnings of corrosion in the lower neck, and his chrome had pitting on the forward surface. The OEM price of the new replacement parts were \$26,000 for the brace, \$11,000 for the barrel and \$30,000 for the piston/axle and that was without labor. We examined the gear and found the components to be repairable. Our final invoice was under \$9,000 and included repair of the worn bore in the brace, reconditioning of the barrel correcting both the worn bushings and eliminating the corrosion, replacement of the repairable piston with a reconditioned unit with new chrome, and installation of a reconditioned axle.

TWIN & TURBINE: You've amassed quite a bit of data during 46 years in business. Any trends you're noticing among the parts you receive from King Air operators?

SEAVEY: Our experience provides us with a unique perspective on the value of proper maintenance and reconditioning. For example, the barrel on the nose

landing gear of the King Air is a \$14,000 part. We recondition them for \$2,500 to \$3,500. That reconditioning occurs at the 6-year cycle. Skipping the reconditioning can render the barrel unserviceable at the next 6-year interval due to corrosion, which could have been treated and corrected at the previous inspection. Not being aware of the reconditioning process can result in a \$10,000 to \$12,000 cost. Our experience is focused on reducing BER (beyond economic repair) items. We reduce premature failures, unscheduled maintenance requirements and cost. Every time we eliminate an in-service failure of a component, we have eliminated a risk and a potential safety event. **T&T**

McLinda Schnyder is a writer and editor based in Wichita, Kansas. She writes most often about aviation, business and travel. She worked 12 years in the corporate communications departments for Beechcraft and Cessna Aircraft Company. McLinda can be reached at mvschnyder@gmail.com.

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by Randy Groom

Upgrading to Garmin G500 TXi

It's common knowledge that upgrading an older airplane's panel is an expensive affair. So how do owners justify taking a legal, functioning legacy stack of avionics and replacing them with all-new technology? Some simply seek the "latest and greatest" for their aircraft. Some start with the steps necessary to become ADS-B compliant and then keep on going. Some are focused on the new capability and situational awareness that a new panel can provide.

In my case, all the above played a role in my decision to install the Garmin G500 TXi system in my aircraft. However, my primary motivation was the worsening reliability from my old avionics – I was becoming less and less comfortable operating them IFR. I've owned the same airplane for the last 18 years, a 1984 Beechcraft Bonanza A36, N42BA. My vintage Bendix/King avionics (aka steam gauges) had served me well, but one-by-one unsettling issues were becoming more frequent. So, safety was my primary motivation to stop dragging my feet and start investigating a new glass panel – but doing so didn't come without some trepidation.

First, a little background. I have had the opportunity over the years to operate several different aircraft with glass panels ranging from the early Electronic Flight Instrument (EFIS) days to Garmin G1000 in Bonanzas and Barons to Rockwell Collins Proline 21 in King Airs and the Beech Premier. But I never really spent the time required to become truly efficient with any of them. Usually, I had a safety pilot that helped me punch the right buttons at the right time.

I learned the hard way that not being familiar with a "Technically Advanced Cockpit" can create a step back in safety for someone not familiar with the equipment. I vividly recall one trip where I took a new G58 Baron from the Beechcraft factory to Stillwater, Oklahoma where I was to speak to the University's Flying Club. I had been "checked out" in the G1000-equipped Bonanzas and Barons but must admit the checkout was rather brief. It was an IFR day, and I filed direct for the short 40-minute flight. Approaching Stillwater, Ft. Worth Center cleared me for the ILS. I then suddenly realized that I could not recall how to switch from GPS mode to Localizer. I asked Center to hang on for a moment as I was locked up mentally on what to do.

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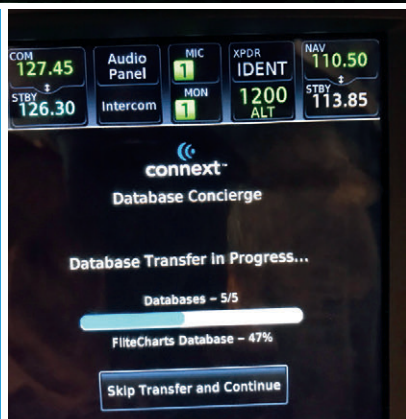
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After what seemed like an eternity (for myself and the Ft. Worth controller) I figured it out and was able to make the switch and shoot the ILS. I was so rattled by the experience that I flew home that night VFR under about a 1,200-foot overcast. I was determined not

to venture into the clouds again until I was more thoroughly acquainted with the equipment.

That was about 12 years ago, and today, virtually all my flying is in my A36. As part of my consulting business, I still attend many of the major aviation trade shows including Oshkosh, Sun 'n Fun and NBAA. I have always made it a point at each to swing by the Garmin booth and drool over their latest equipment. But when they announced the G500 TXi, I knew it was the answer for me. I've had the good fortune of knowing several of the Garmin leaders from my Beechcraft and Piper days and as before, they were incredibly patient and helpful as I deliberated my options, of which there are many.

I also began searching within a 100-mile radius of my home in Vero Beach for a place that I felt most comfortable handing my airplane over for such major surgery. I settled on Tomlinson Avionics in Fort Myers, Florida. They were very responsive, and I liked the fact that the owner, Ralph Tomlinson, has decades of experience with Beechcraft, and most notably owned a Bonanza himself. It is a family business run by Ralph and his son Phil, and they quickly put me at ease that I had made a good choice.

Once I decided to take the G500 TXi plunge, there were a surprising amount of decisions that needed to be made, and options to consider. How much was I comfortable spending? Would I rather the single large 10.6-inch landscape display for the Primary Flight Display (PFD) or the two 7-inch portrait displays? (If I chose the single large display, I would need to select a separate backup standby unit, or if I chose the two 7-inch portrait displays, I would need to order two separate Attitude Heading Reference Systems (AHRS) for IFR operations). Did I want engine instruments to be incorporated into the unit? Did I want the new GFC500 autopilot? Oh, and how about adding a new GTN750 to

the stack? I already had upgraded to ADS-B via a Garmin 345 from a prior installation.

After a lot of deliberation and a review of the balance in my checkbook, I chose the single 10.6-inch landscape display and the L3 EF1500 as the backup. I struggled with whether to electronically display the engine gauges and decided against it since (1) those gauges are like an "old friend" to me and (2) I didn't want to take anything away from the real estate available on my new big PFD. I did knuckle under and add the GTN750 to the stack as it provides a lot of capability and situational awareness on top of the G500 TXi. I also added the Flightstream 510 for seamless downloading of database updates, a 406 MHz ELT, some hard-wired LEMO plug jacks for cockpit headsets and several USB charging ports to keep my passengers happy. At this point, my checkbook balance was pretty much decimated so I couldn't stomach the step up to the new Garmin autopilot. I just hoped that the KFC200 would integrate into the new system without a hitch (maybe I'll step up to the new autopilot in a year or two).

Tomlinson was very careful to make sure that we were in total agreement on the layout of the panel. Ralph paid incredible attention to make sure it looked aesthetically pleasing and balanced. I would say he is really into the "feng shui" of panels, something I consider important as well. Every detail was covered down to the font size of my new "N" number display and its exact placement.

It wasn't easy when the day came for me to drop 42BA off for its transformation, but I felt confident that my aircraft was in good hands. The original plan was for it to be down for about six weeks, but that stretched into a tad over two months as both the TXi and L3 backup were on backorder. Ralph kept me posted regularly. During that time, I downloaded the G500 TXi training material from Garmin and began to familiarize myself with the new equipment I was about to receive.

Finally, the day came for me to see and fly my new panel. Ralph and another technician came along for what turned out to be a flawless first flight. But I couldn't help but notice that despite some practice on my home computer, I was struggling to keep up and comfortably operate my newfound capability. Knowing how to quickly and efficiently make the system operate to its potential was going to take some time.

One of the most pleasant surprises that I had with the system was the fact that my old KFC200 worked smoothly with the new equipment and, even better, I now had an altitude capture capability, something that I never had before. There is no question that the new Garmin autopilot would bring a lot more capability and safety to the table, but for now, I was delighted that my pocketbook compromise worked pretty darn well.

I promised Ralph and Phil that I was going to fly home carefully and strictly VFR. The flight was uneventful and gave me some time to poke at my new touchscreen capability and marvel at the ADS-B traffic and weather displayed on both the TXi and the GTN750.

Determined not to make the same mistake I made a dozen years ago on my trip to Stillwater, I soon got with a friend who is an excellent instructor and very familiar with the G500 system. While the TXi itself was new to him, he's the type of person to



study up on the differences, and he saved me the misery of trying to pour over manuals. We spent a lot of time on the ground with power connected to the airplane and bit by bit I started to gain confidence in operating the system. We flew several times and shot a variety of approaches into multiple airports. While I still couldn't make the new system "sing," he and I agreed that I was safe, while perhaps not getting into "hard" IFR situations.

Since then I have flown at least a dozen times, and the airplane and new avionics continues to perform flawlessly. With each flight, I become more confident and comfortable with the system. And without a doubt, I feel like I have accomplished my original goal of enhancing the safety and reliability of 42BA for years to come. **T&T**

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Daher is renowned for blending speed and functional beauty – their newest model, the TBM 930, is no exception.

by Joe Casey

I consider my home in aviation to be the single-engine turbine market. I love the business-savvy, efficiency-driven, “get ‘er done” mindset common among the pilots in this special niche in aviation. They are movers and shakers in the business world, and they don’t see any reason why they can’t take the controls and “fly it themselves.” But above all else, they value their time. It is their most important commodity. And one of the best ways to maximize time if you’re a frequent traveler is to take an airplane. Single-engine turbine pilots figure it might as well be in their own airplane.

Flight Review: TBM 930



PHOTO COURTESY OF CLINT GOFF

Often, their first real business airplane is a Bonanza, Mooney, Saratoga, or Cirrus. Next, they might move up to a Malibu, Meridian, or Centurion. Once they make it to this point, the pinnacle of the owner-flown world, they will likely look – no, not look – they will gaze longingly at a TBM 900 series. Why? The TBM 900 series is at the top of the single-engine turbine market. Any aircraft offering a combination of speed and range that exceeds a TBM 900 series will require the logistical complexity of hiring professional pilots (usually two or more) and will be an inefficient fuel gulper. Neither of those situations jives with why an owner-pilot climbed the single-engine turbine ladder in the first place.

The TBM has been around since the early 90's and quickly carved a niche in the single-engine turbine world. The company's original TBM 700 is a fine airplane, but it wasn't long before it became apparent that more payload and speed were desired. In the early 2000's, the TBM 700C2 hit the market boasting a much better useful load, and soon after the TBM 850 appeared with added speed. The latter TBM 850's achieved the G1000 avionics upgrade, but the complete package was made available with the arrival of the speedy TBM 900 series. Today, Daher offers buyers the TBM 910 (Garmin G1000) and the TBM 930 (Garmin G3000).

In October, I had the chance to fly the latest TBM 930 model when David Crockett flew to my home airport, Cherokee County Airport in Jacksonville, Texas (KJSO). No, I am not referring to the Alamo hero and “king of the wild frontier.” David is a vastly experienced and super knowledgeable TBM guru from Cutter Aviation in San Antonio. When he arrived in the 930, so did plenty of others from about the airport. Photographer Clint Goff and pilot Jimmy Stewart arrived to coordinate the aerial flight, and following them were other gawkers from KJSO just interested in seeing the gorgeous aircraft. Luckily, the dreary morning gave way to a beautiful afternoon, which afforded us the chance to get plenty of aerial shots as well as put the TBM 930 through its paces.

In a nutshell, my overall impressions of the TBM 930 are: 1) It's a complete package 2) The airplane is unabashedly gorgeous 3) I cannot fathom how they are going to further improve upon this model. The 930 is not a reinvention of the TBM series of airplanes, but it is the version with all the bells and whistles Daher could think to include. Of all of the TBMs, it is the fastest, goes the farthest, and offers the most technologically-advanced avionics and every creature-comfort available. Daher created a thing of functional beauty.

The Worldwide General Aviation

owner/operators and chief pilots of these air

100%
TOTAL MARKET COVERAGE

Jets – 15,487

Chief Pilots & Owners

Count	Aircraft
55	AIRBUS ACJ319
25	ASTRA 1125
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
171	CITATION M2
381	CITATION MUSTANG
125	CITATION S/II
256	CITATION SOVEREIGN
68	CITATION SOVEREIGN+
241	CITATION ULTRA

236	CITATION V
28	CITATION VI
97	CITATION VII
255	CITATION X
25	CITATION X+
212	CITATION XLS
209	CITATION XLS+
1	DIAMOND I
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
75	FALCON 10
21	FALCON 100
19	FALCON 200
186	FALCON 2000
21	FALCON 2000EX
58	FALCON 20C
15	FALCON 20C-5
23	FALCON 20D
2	FALCON 20D-5
31	FALCON 20E
9	FALCON 20E-5
68	FALCON 20F
64	FALCON 20F-5
194	FALCON 50
8	FALCON 50-40
91	FALCON 50EX
153	FALCON 900
23	FALCON 900C
102	FALCON 900EX
180	GLOBAL 5000
127	GLOBAL EXPRESS
19	GULFSTREAM G-100
206	GULFSTREAM G-200
8	GULFSTREAM G-300
22	GULFSTREAM G-400
283	GULFSTREAM G-450
7	GULFSTREAM G-500
471	GULFSTREAM G-550

62	GULFSTREAM G-II
22	GULFSTREAM G-IIB
128	GULFSTREAM G-III
170	GULFSTREAM G-IV
283	GULFSTREAM G-IVSP
170	GULFSTREAM G-V
34	HAWKER 1000A
5	HAWKER 125-1A
7	HAWKER 125-1AS
4	HAWKER 125-3A/RA
11	HAWKER 125-400A
13	HAWKER 125-400AS
12	HAWKER 125-400B
11	HAWKER 125-600A
3	HAWKER 125-600AS
103	HAWKER 125-700A
59	HAWKER 4000
187	HAWKER 400XP
34	HAWKER 750
180	HAWKER 800A
33	HAWKER 800B
353	HAWKER 800XP
40	HAWKER 800XPI
81	HAWKER 850XP
155	HAWKER 900XP
6	JET COMMANDER 1121
4	JET COMMANDER 1121B
1	JETSTAR 6
5	JETSTAR 731
12	JETSTAR II
8	LEARJET 23
17	LEARJET 24
1	LEARJET 24A
11	LEARJET 24B
34	LEARJET 24D
10	LEARJET 24E
7	LEARJET 24F
11	LEARJET 25
36	LEARJET 25B
9	LEARJET 25C
92	LEARJET 25D
3	LEARJET 28
28	LEARJET 31
167	LEARJET 31A

33	LEARJET 35
352	LEARJET 35A
13	LEARJET 36
32	LEARJET 36A
30	LEARJET 40
192	LEARJET 45
166	LEARJET 45XR
100	LEARJET 55
4	LEARJET 55B
12	LEARJET 55C
256	LEARJET 60
467	PILATUS PC-12/45
110	PREMIER I
6	SABRELINER 40
17	SABRELINER 40A
3	SABRELINER 40EL
1	SABRELINER 40R
21	SABRELINER 60
18	SABRELINER 60ELXM
2	SABRELINER 60EX
62	SABRELINER 65
13	SABRELINER 80
6	SABRELINER 80SC
71	WESTWIND 1
5	WESTWIND 1123
29	WESTWIND 1124
62	WESTWIND 2

Turboprops – 11,093

Chief Pilots & Owners

Count	Aircraft
2	PIPER MALIBU
362	CARAVAN 208
1206	CARAVAN 208B
2	CARAVAN II
33	CHEYENNE 400
137	CHEYENNE I
13	CHEYENNE IA
262	CHEYENNE II
57	CHEYENNE III
38	CHEYENNE IIIA
51	CHEYENNE IIXL
22	CHEYENNE IV

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61 JETSTREAM 41
30 KING AIR 100
514 KING AIR 200
20 KING AIR 200C
17 KING AIR 200T
153 KING AIR 250
177 KING AIR 300
11 KING AIR 300LW
558 KING AIR 350
61 KING AIR 350C
314 KING AIR 350I
19 KING AIR 90
11 KING AIR A/B90
58 KING AIR A100
210 KING AIR A200
54 KING AIR A90
106 KING AIR A90-1
93 KING AIR B100
886 KING AIR B200
100 KING AIR B200C
8 KING AIR B200CT
95 KING AIR B200GT
4 KING AIR B200SE
21 KING AIR B200T
79 KING AIR B90
332 KING AIR C90
34 KING AIR C90-1
188 KING AIR C90A
369 KING AIR C90B
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93 KING AIR C90GTI
119 KING AIR C90GTX
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242 KING AIR E90
155 KING AIR F90
25 KING AIR F90-1
8 MERLIN 300

25 MERLIN IIB
19 MERLIN III
26 MERLIN IIIA
47 MERLIN IIIB
19 MERLIN IIIC
4 MERLIN IV
9 MERLIN IV-A
8 MERLIN IV-C
63 MITSUBISHI MARQUEE
1 MITSUBISHI MU-2D
23 MITSUBISHI MU-2F
18 MITSUBISHI MU-2J
33 MITSUBISHI MU-2K
11 MITSUBISHI MU-2L
18 MITSUBISHI MU-2M
17 MITSUBISHI MU-2N
24 MITSUBISHI MU-2P
36 MITSUBISHI SOLITAIRE
567 PILATUS PC-12 NG
149 PILATUS PC-12/47
228 PIPER JETPROP
46 PIPER M500
59 PIPER M600
481 PIPER MERIDIAN
3 ROCKWELL 680T TURBO
5 ROCKWELL 680V TURBO II
5 ROCKWELL 680W TURBO II
4 ROCKWELL 681 HAWK
98 SOCATA TBM-700A
68 SOCATA TBM-700B
292 SOCATA TBM-850
102 SOCATA TBM-900
5 STARSHIP 2000A
70 TURBO COMMANDER 1000
38 TURBO COMMANDER 690
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
37	BARON 56 TC
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
442	PIPER CHIEFTAIN
314	PIPER MERIDIAN
25	PIPER MOJAVE
315	PIPER NAVAJO
13	ROCKWELL 500 SHRIKE
24	ROCKWELL 500A SHRIKE
77	ROCKWELL 500B SHRIKE
44	ROCKWELL 500S SHRIKE
5	ROCKWELL 500U SHRIKE
12	ROCKWELL 520
	COMMANDER
5	ROCKWELL 560

COMMANDER

11 ROCKWELL 560A
COMMANDER
7 ROCKWELL 560E
COMMANDER
7 ROCKWELL 560F
COMMANDER
13 ROCKWELL 680 SUPER
3 ROCKWELL 680E
14 ROCKWELL 680F
COMMANDER
14 ROCKWELL 680FL
GRAND COMMANDER
6 ROCKWELL 680FLP
GRAND LINER

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Owners

Count	Aircraft
225	BEECH BONANZA
429	CESSNA 182
54	CESSNA 206
393	CESSNA P210N
21	CESSNA P210R
52	CESSNA T182
1	CESSNA T206
782	CIRRUS SR20
2920	CIRRUS SR22
238	PIPER MALIBU
104	PIPER MATRIX
449	PIPER MIRAGE

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▲ Once the mode is engaged by the pilot via a master control in the cockpit, each occupant can select either light or moderate heat settings for their individual seat.

▲ The TBM 930 model features the latest version of the Garmin G3000 integrated avionics system.



▲ Daher has incorporated touches such as heated seats, dual-zone climate control, enhanced lighting, and top grain leather seats with detailed stitching.

As someone who has climbed over the spar in the PA46 series of airplanes for nearly two decades, I think the pilot-side door is simply awesome as it provides super-easy access to either of the front seats. The back-seaters also have easy access with a huge rear-entry door that is easy to open, and only requires the push of a button to close. For anyone familiar with the pains of opening and closing a King Air door, this door is bigger, easier to operate, and safer.

The first thing you notice when climbing in is the quality of the interior – and I do not just mean fine leather. Daher has added exceptional touches such as heated seats, dual-zone climate controls, excellent lighting, and craftsmanship above and beyond the expected.

The second thing you notice (especially if you are a 6'4" pilot) is the space. The front seat legroom is generous, and I did not hit my head on the ceiling once. I also really appreciate the small space between the pedals which allows my feet to extend

completely. The adjustable rudder pedals add another dimension of ergonomic flexibility not found on many other single-engine turbines.

Taxiing out was Cessna172-easy, but you could tell there were horses under the hood awaiting their opportunity to run. David and I ran through the various checklists, all which would be normal for any turbine pilot, and soon we were airborne. The initial climb rate was more than 2,000 fpm, but we had a three-quarter-full tank of fuel and no passengers, so I was not surprised. We found 5,500 feet MSL quickly and met up with our photo airplane, a Cessna 182 (Jimmy and Clint) on the TCAS alerts on the MFD. I was able to explore the low-speed capabilities of the 930 by deploying a notch of flaps and reining in the horses. Docile, steady, and predictable – those adjectives best describe the 930 in slow flight. My job was to fly the 930 smoothly and precisely while the Cessna 182 flew off of our right side in formation taking pictures.

The smoother and steadier I flew, the better and easier for Clint and Jimmy. Helping me do so was a plethora of G3000-gadgets: AOA, flight path marker, and safety features like USP and envelope protection. I felt like Chuck Yeager anchoring our formation.

Once the photo mission was complete, I took the 930 up higher to explore the stall characteristics. The stall break is certainly noticeable in the TBM series. If you fly through the cacophony of noises and alarms warning you of the approaching high angle of attack, you find that a wing will drop in the stall (for me it was the left wing) – this is likely due to the big propeller up front. It is easily recoverable with a nudge forward on the yoke, but the wing-drop is more prevalent than the PA-46 series, King Air series, and most single-engine trainers.

David allowed me to do all of the flying on this test flight, which is a nice change for a career flight instructor. When I flew the GPS approach to Runway 32 at KJSO, I let the autopilot fly the initial portions of the approach, and switched everything off and hand-flew the glide-slope down. I touched down smoothly and with no darting of the nose wheel. Without trying to land short, I easily turned off at the mid-field taxiway, effectively landing in 2,500 feet without the use brakes and only a small amount of reverse prop. The airplane will go fast for sure, but it handles the short fields with ease.

Owning a TBM 930 provides you with the newest and best of the TBMs, but it also means you want and value the best avionics money can buy. The Garmin G3000 is singularly outstanding, providing a myriad of ways to present just about any piece of flight information desired.

Screens can be either full or split, and anything can be seemingly presented anywhere. Want the approach plate on the PFD? Not a problem – split the screen and pop it up. Like vertical and horizontal radar? Ditto – you can have both presented at the same time on different screens. Want to go basic and just have flight information in front of you? Easy.

You can display so much data before you that it is quite simple to put your favorite data on a particular screen. I have a standard setup that I like: approach plate on the far left in the PFD, flight instruments on the right side of the PFD, the map view on the left side of the MFD, and the radar on the right. Once I put the info on the screen in the TBM, I did not have to change screens. With some other avionics suites, you have to shift data on the fewer (or singular) screens, effectively removing some data from view. In the G3000, there's so much screen space that everything is in front of you and few changes are required.

But let's get to it – how fast will it really fly? Will the TBM 900 series actually cruise at 325 KTAS?

I recently trained with a client for his “mentor training” and we flew from Texas up to the Pacific Northwest, and then on to Alaska. We routinely saw 325 KTAS during the trip, and even saw 330 KTAS at optimal altitudes and temperatures. For this article, I contacted some of my TBM clients, and they too report seeing speeds like this regularly. While some airplanes have sales reports with inflated cruise numbers, the TBM series is as-advertised. I also asked several of my clients who own TBM 930s why they bought one. Although asked separately, the answers were very similar from each client.

“This was the only single-engine turbine airplane that can carry four-plus people with bags, go 1,000-plus nm, and land on a 3,000-foot strip,” related one client. “I’m a big guy, and I can’t get over the spar on some of the other turbines, so the pilot door was the deciding factor,” said another. “I like to be able to keep the power up in the descent, making the final portions of my trips faster,” reported a third.

Every single client I asked said in one way or another, “I want to go as fast as possible, but I don’t want the expense of a jet.”

When David departed KJSO, several of the locals (including me) went to the runway edge to watch the TBM departure. We all tried to figure out the place to be to get the best view. Of course, that placement depended upon how quickly the TBM would leave the ground. We set up at midfield, and all of us were amazed to see the 930 lift off in just over 1,000 feet of runway, and then climb like the proverbial bat. Once it was out of sight, we continued to stand and discuss the TBM and came up with the same conclusion, “What an airplane!” **T&T**

Joe Casey is an FAA-DPE and an ATP, CFI, CFII (A/H), MEI, CFGI, CFIIH, 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.

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FIVE *on the* FLY



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WHO:
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Regional Aircraft
Sales Manager,
Cutter Aviation, TBM

HOME BASE:
San Antonio, TX

RATINGS:
Commercial,
ASEL,
AMEL,
CFII ASEL

HOURS:
7,300 (with 3,000+
hours in TBMs)

by Rebecca Groom Jacobs

1. Can you summarize Cutter Aviation's history serving the aviation community?

Cutter is the oldest, continuously operated family-owned aircraft sales and service company in the world, having started 90 years ago. Today, we are the largest distributor of four major brands of aircraft: Piper, TBM, Pilatus, and HondaJet. We also offer three in-house full-service centers that specialize in the maintenance of those brands. We have been a leader in this business for years, and with the fourth generation of Cutter now coming onboard, we will be a leader in this business for many more.

2. What are the top reasons you see owner-pilots stepping up into turbine aircraft?

Most buyers stepping up to a turbine do so because of the increase in performance and reliability. Pressurization and known ice capability often play a big part as well. For those stepping up to TBM specifically, the number one reason we see is they want the best of the best – that is how they perceive the TBM and the PT6A engine. Pilots and even non-pilots have heard of the reputation, quality, efficiency, and performance of the TBM and the PT6A. We find it is a life goal of many pilots to own one in their lifetime.

3. The TBM is the fastest single-engine turboprop on the market. How do you prepare customers who are moving up from lesser performance?

Training is the key to any transition. With each TBM sold, we evaluate the buyer's previous experience and create a training program custom to their needs. In some cases, a low-time pilot may need several months and many hours of real-world flying with a mentor following initial training to be comfortable and safe. Highly experienced pilots can typically get away with an initial training program alone. The TBM lands at 85 KIAS and has approach speeds similar to just about any high-performance single-engine piston plane which makes the transition easier.

4. Excluding speed, what other qualities of the TBM do you also like to highlight?

Quality of build: I believe no other company produces a better designed or constructed civilian airplane of this type. One could argue that some are equals, but none are truly better. The quality is easy to see and prove.

Ease of flying: This is best shown in a demo flight, but there is nothing difficult about a TBM when it comes to flying the plane. It is a very stable, docile plane that with the right training and experience anyone can fly.

Ownership experience: Between the factory, distributors and the TBM owners, this is a one of a kind group – almost like an exclusive club. Everyone involved is very supportive of the product and strive to make the ownership experience the best it can be. (Also, it bears mentioning that the factory-paid 5-year warranty and maintenance program is unmatched).

Good looks: The TBM is one of the best-looking aircraft on the market today. It looks fast just sitting on the ramp. There are a lot of jets out there that tend to blend together. But if you pull up in a TBM, people notice.

5. What is one of the most interesting or fun aircraft you have ever flown?

In my 30 years of flying, I have worked over 21 years for either a manufacturer or a distributor of new aircraft. I rarely fly anything that has more than 100 hours on it, and in most cases, the planes are less than 90 days old. So, it is impossible not to love flying new aircraft and enjoying the power of the latest avionics. That being said, I do also

have a fondness for old classic planes – especially those designed in the 1930s through the 50s. I think for the sheer enjoyment of flying, my favorite (fun) plane would be a 1948 Cessna 170 with fabric wings and 145 hp engine. I had the pleasure of flying that one for about four years – simple stick and rudder at its finest. Airplanes I have not yet had the chance to experience but would be on my bucket list, are the DC-3 and the Beech 18. **T&T**

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Behind the Scenes: Pilot Training

PHOTOS COURTESY OF TRU SIMULATION + TRAINING

by Rebecca Groom Jacobs

What qualities are training providers looking for when they hire in an instructor? How is the volatility of the pilot market altering the training business? What tips do instructors have for pilots preparing for a training course? During a recent visit to TRU Simulation + Training in Tampa, we got specific in our exploration to uncover a behind-the-scene look into the training market. The goal: learn more about the people who enable owner-pilots to operate their equipment safely and efficiently.

TRU Simulation + Training

TRU was introduced in 2014 when parent company Textron acquired and combined the capabilities of several companies in the flight simulation and pilot training industry, one of which included ProFlight, a Cessna CitationJet and Conquest training provider based in Carlsbad, California. The 50,000-square foot Tampa facility is now the company's largest, offering programs for all Citation 525 variants (except the CJ4, which is available at the Carlsbad location) as well as the Citation Latitude, Sovereign+, the Beechcraft King Air 90/250/350, and as of just recently, the XLS+.

The company has grown significantly over the last few years, with owner-pilots vocally appreciating the online ground school option, on-site ground simulators (referred to as the Integra™) and knowledgeable instructors.

"When we purchased ProFlight, it was firmly established that we wanted to preserve the quality of instruction, which meant pilots with applicable real-world experience," said David Smith, vice president of training centers. "Our instruction is geared toward active flyers and GA pilots – we want our people to bring more to the discussion than just the systems."

Smith added that instructors are encouraged to continue building time once they join the company. Typically, this is achieved through contract corporate jobs or flights with the demonstration team from sister company, Textron Aviation. "We work hard to make operating the actual aircraft a normal part of their job. Because of this experience, our instructors are able to be active in forums and discussions even outside of the classroom. They can weigh in on operator's decisions and SOPs (standard operating procedures)."

Like the rest of the industry, TRU is experiencing challenges recruiting instructors as the airlines continue to ratchet up their efforts to attract pilots. But the company seems to have struck an effective balance in their hiring methods, focusing on retirees and young, family-forward pilots seeking more time at home than the typical airline schedule would allow. With their convenient location in Florida, TRU smartly offers various retirement packages to draw those pilots ready to settle down, but not ready to fully retire. The years of valuable real-world experience they bring

nicely aligns with the company's mission to retain quality instruction. Instructing is not an easy job, however. It requires considerable attention and energy.

"I think the job of an instructor like this is one of the most challenging ones," said Smith. "You are someone's world for the period of time they are here. And like a parent, you are constantly taking care of their needs, correcting bad behaviors and instilling knowledge. But at the same time, it can be a very rewarding one."

Meet Two Instructors

To better understand life as an instructor and gather some insider tips, *Twin & Turbine* visited with two TRU instructors: Darrell Pope (King Air instructor; 15,000+ hours) and Larry Provenzano (Citation instructor; 13,000+ hours).





Unique to TRU, half of the ground school is conducted in the flight training device known as the Integra – a full-flight cabin with the same control loading, flight dynamics, and avionics components as the real aircraft.

TWIN & TURBINE: Can you tell me about your aviation background?

POPE: Primarily, I am a former military pilot – 28 years of active duty. I have been retired from the military for 20 years but have served in various aviation roles. I was with a freight company (became DHL) for 11 years, and then I flew with a small aviation company out of Virginia for eight years performing government contract work. I tried to retire at that point officially, but for me, that did not work. I soon found TRU online, liked the idea of teaching and have been here for nearly a year.

PROVENZANO: I have been flying for over 30 years. After I earned all of my ratings, I flew traffic reporting to build 1,200 hours. Following that job, I flew cancelled bank checks in a number of aircraft like the 210, 310, Shrike Commander, and later the MU2. I then did freight for 11 years before getting my first corporate job and my first type rating in a Beechjet. I also flew a CJ2 for a private owner for a period. Today, I have six different type ratings.

TWIN & TURBINE: Can you walk me through a typical day in the life of a TRU instructor?

POPE: First, I will admit that I came here thinking this was going to be an easy job. But once I got here and started teaching, I discovered it is actually challenging – but I enjoy the challenge. If it's a ground school day, I'll show up at least an hour ahead to prepare the lesson and paperwork. Then it's four hours teaching in the classroom followed by four hours in the Integra. On a sim day, we will complete a five-hour block (2.5 hours for each client). This is followed by a debriefing. It normally ends up being a solid 8-hour day.

PROVENZANO: It depends on the schedule. But I'd say typically ground school starts at 8 a.m., so I will arrive at 7 to get the lesson prepared prior to the students' arrival. On a sim day, I will

do the same thing to ensure there are no surprises or delays with the equipment when the student arrives. But the schedule constantly changes based on the number of pilots and the need. There is a lot of variation among the CJs as well, particularly with avionics. I have to mentally prepare myself for which product I am going to be teaching that day.

TWIN & TURBINE: In your opinion, what are the benefits of sim flying versus in-aircraft?

POPE: The sim allows you to do and practice all of the malfunctions and emergencies you cannot simulate in the real airplane. The technology today is phenomenal; the simulator mimics precisely what the actual airplane will feel like. So, it is all about teaching what the airplane is capable of doing, how the airplane will handle in a situation, and how the client can come out of that situation safely.

PROVENZANO: The ability to fly into various airports is very beneficial. We can easily practice at airports that present different challenges with weather, runway or altitudes. Also, it's helpful when we complete a procedure, and we have the option to restart, reset, and do it as many times as needed until the client is proficient. And of course, the biggest thing is you can do things in the simulator that you could never do in the plane for safety reasons.

TWIN & TURBINE: What do you enjoy most about working with owner-pilots?

POPE: They come to us with their expectations of how they are going to employ the airplane – whether it be flying into Aspen, Colorado or landing at their ranch in Brazil. They fly the same airplane day in and day out, and because it is their personal investment, they tend to want to know more about the specifics about the airplane. If they can identify issues, it saves time and money in maintaining the airplane. It is my

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TRU Tampa Facility: Facts at a Glance

- *Number of Employees:* 197
- *Number of Instructors:* 22
- *Courses Offered:* CJ3/CJ2+/CJ1+/CJ2/CJ1; King Air 350/250/90; M2/CJ3+; Latitude/Sovereign+; XLS+
- *Number of Sims:* Seven
- *Number of Flight Training Devices:* Five
- *Number of Pilots Trained Annually:* 1,500
- *Add-on Training Options:* Pinch Hitter courses; Reduced Vertical Separation Minimum (RVSM training); High Altitude endorsements; Scenario-based Training (CJP Gold Standard)

first time working with this group, and I really enjoy their passion and interest.

PROVENZANO: With the M2, the majority are owner-operators. In a lot of cases, they have never flown a jet. For me, it is rewarding to take someone who came in knowing nothing about jet-flying to when they leave and are proficient in the avionics, systems and procedures – hands down my favorite part of this job. Even those who come in with a lot of experience should always be leaving here having learned something new.

TWIN & TURBINE: What common mistakes do you see among owners attending courses?

POPE: It depends upon their background. Have they been flying something of lesser performance? In many cases, there is the challenge of bringing them from the piston world into the turbine world – or from single-engine flying to multi.

PROVENZANO: Often, I run into owner-operators who are not used to doing callouts – or speaking aloud in the cockpit at all. A good example is the takeoff briefing. If they are not used to doing one, we will practice it every day to get

them in the habit. I need to be able to hear what they are thinking in their head.

TWIN & TURBINE: Do you have any tips or recommendations for someone about to take a course?

POPE: Come with an open mind and good attitude. It is amazing to see a client walk in who has little turbine experience then leave here with a big smile. Our goal is to have them be comfortable with their equipment, and I think we do a great job in that.

PROVENZANO: I would recommend reading up on limitations and memory items. That seems to be the weak point. If a situation arises, there are some things you need to know even before grabbing the checklist. Also, take advantage of the Integras while you are here, especially for the M2 and CJ3+ – they are gold. If you can sit there in your time off and practice the Garmin, you will be in so much better shape before you get in the full-motion simulator. Makes a world of difference.

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A Medical Look at Hypoxia

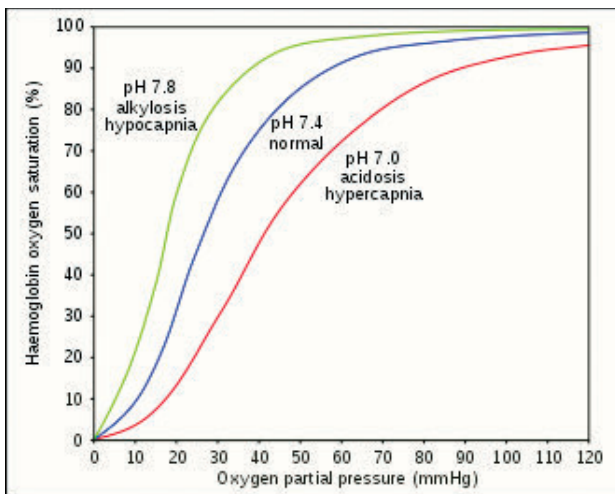
Is it actually safe to operate pressurized aircraft at cabin altitudes above 10,000 feet?

by Kevin Ware

Over the years, there have been numerous NTSB reports of pilots flying pressurized twin and turbine aircraft in the mid to high 20 flight levels, failing to respond to radar controllers and ultimately crashing. One of particular note occurred several years ago when a pilot of a pressurized piston twin took off from New Orleans and headed on an IFR flight plan across the Gulf of Mexico toward the central Florida coast. About an hour into the flight, when well off-shore, he stopped responding to calls from the controllers, causing them to scramble two Air Force jets to intercept the aircraft and see what was going on. The military pilots then reported seeing an elderly male pilot slumped over the control wheel and apparently unconscious. They followed the airplane as it began a gradual descent of wide circles until it crashed into the ocean and disappeared in 10,000 feet of water. The aircraft and its pilot were never seen again.

The NTSB blamed the crash on an aircraft pressurization failure, which lacking any evidence to the contrary was not an unreasonable thing to do. But when all factors are considered, the risk of that pilot having an incapacitating physiologic event at altitude may have actually been a much better explanation. Which begs the question, just how safe is it for pilots (especially of a certain age) to be flying these aircraft in the flight levels at or near their maximum operating altitude with cabin altitudes of 10,000–12,000 feet?

The truth of the matter is, sudden depressurization events in general aviation aircraft are not common. The reason for this is that the pressure differential is quite low, and the basic structure is well designed for that purpose. Plus, most airframes simply do not have that much time or “cycles” on them. Slow depressurization events following maintenance are more common as they result from work done that compromises the cabin’s sealed structure. But these are generally carefully checked for on post maintenance flights and fairly obvious to the pilot. Particularly if the aircraft is piston-



◀ When a pressurized piston or turboprop aircraft operates in the high 20 flight levels, the pilot's body is only being supplied with half of the oxygen available at sea level. This triggers the "Bohr Effect" (illustrated here), further decreasing the amount of oxygen available to the brain and heart.

powered, engine failure can also cause a partial loss of pressurization in a twin (and a complete loss in a pressurized single) because the remaining engine simply does not put out enough air through the turbocharger to keep the cabin fully inflated. But the failure of piston engines is quite rare especially at altitude.

So, there is a tendency to think that if the airplane is pressurized, then it must be safe for any pilot to personally fly

it for hours at a time near its maximal approved altitude. Though that may generally be true for the airframe and engines, it is a dangerous and false assumption for many pilots. This is because there is a series of physiologic events that accelerate and compound each other, making the risk of failure on the part of the pilot quite high relative to that of the aircraft. It is imperative both piston and turbine pilots know and understand the causes for this assumption.

In the mid-to-high 20 flight levels, many pressurized pistons, and even some turboprop aircraft, have cabin altitudes at or above 10,000 feet. If the aircraft is piston-powered, the engines will have nearly sea level air pressure being supplied to them by the turbochargers and not even "know" they are up that high. The cabin altitude, however, is way up there at about 12,000 feet, which is often as high as the pilot has ever been in his entire life. And depending upon his age and underlying health status, this is already a potentially dangerous thing to do, even if sitting there. (By comparison, the pilots and passengers in a B787 at FL410 are sitting in a cabin at no more than 6,000 feet, and should that cabin altitude climb to 12,000 feet, it is considered an emergency).

The physiologic problem that needs to be understood is that of lowered blood oxygen levels – something dangerous for all pilots but more so as age and other health problems accumulate. Although the amount of oxygen in the air is a constant 21.9 percent of volume regardless of altitude, as one goes up, the air pressure itself decreases causing the available or partial pressure oxygen also to decrease. At 12,000 feet, the useful available oxygen is about half of that at sea level (13 percent vs. 21 percent), and this shortage of oxygen triggers a number of physiologic events which gradually accelerate and compound each other, particularly in pilots with a little grey hair and other medical issues.

Physiologically, the first thing that happens is the level of oxygen saturation in the blood goes down, a condition known as "hypoxia." A medical term in which "hypo-" means "low" and "-oxia" means oxygen. The body attempts to compensate for hypoxia by increasing its respiratory rate, which helps improve the oxygen deficiency a bit, but also causes a lowering of carbon dioxide (CO₂) in the blood, a condition known as "hypocapnia." As hypocapnia develops, the hemoglobin molecules in each red blood cell which pick up oxygen as they pass through the alveoli of the lungs, paradoxically start to get very reluctant to release that oxygen when they arrive at areas of the body requiring it. This is called the "Bohr" effect, named after



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◀ The best solution to recognizing the gradual onset of hypoxia is to wear a pulse oximeter anytime the cabin altitude is above 5,000 feet.

ated blood available to key organs. And again, the issue continues to compound itself.

The heart's timing mechanism known as the sinoatrial node (or SA node) is a key receiver of oxygenated blood and is very sensitive to any decrease in oxygen levels. As the amount of available oxygen drops, the SA node becomes very unhappy about this and can frequently start to misfire, which is similar to upsetting the timing mechanism on a piston engine. All of a sudden, the efficiency of the heart as a pump is drastically reduced, and with it even a further decrease in oxygenated blood to both the heart itself (which in turns makes the misfiring even more pronounced) and also to the brain. The latter usually produces a loss of consciousness from which spontaneous recovery is improbable, and death usually follows.

In summary, when a pressurized piston or turboprop aircraft is in the high 20 flight levels and operating just as it was designed (cabin altitude of 10,000–12,000 feet), the pilot's body is only being supplied with half the oxygen available at sea level. This, in turn, triggers the Bohr effect, further decreasing the amount of oxygen available to the brain and heart, which if the pilot is of mature age, are already compromised due to the narrowing of blood vessels. Finally, the heart's timing mechanism becomes irritated causing it to misfire, which can rapidly lead to loss of consciousness and death. Depending upon who else is on board, a fatal crash of confusing cause usually follows.

Given this physiologic reality, is it really safe for pilots with grey hair and some common health issues such as elevated cholesterol, high blood pressure, and possible arterial narrowing, to operate pressurized aircraft at their highest legal altitudes with cabin altitudes? The answer is probably not. But, if the pilot is willing, some steps can

be taken to lower the physiologic risk to a more acceptable level, and it involves the use of supplemental oxygen.

Supplemental oxygen is something that needs to be used before hypoxia is present because its effect on the brain is very insidious and makes such recognition of what is occurring, and the logical solutions that would follow, nearly impossible. The best solution to recognizing the gradual onset of hypoxia is to wear a pulse oximeter anytime the cabin altitude is above 5,000 feet and watch the numbers on the dial. These are simple to use and available from various aviation supply stores for a very nominal amount. Their application should ideally be on the "FL180 checklist" along with switching altimeters to 29.92. It is also a good idea to brief any passenger sitting in the right seat to keep an eye on the oximeter readings. If the blood oxygen level as shown on the oximetry starts to drop into the low 90s, then the pilot should automatically go on supplemental oxygen even if the aircraft is at an altitude below FL180. In the relatively low flight level altitudes piston aircraft fly, pilots do not require a huge oxygen flow to fix the problem of hypoxia; usually, just a 2-liter flow of oxygen via nasal prongs will restore the partial pressure of that gas to that of an airline cabin.

Some pilots, however, are hesitant to use supplemental oxygen even if the pulse oximeter shows it is indicated because they feel it should be saved for an "emergency." Part of this is due to poor



the physiologist who described it in the early 1900s. It is also known to medical students as the "oxygen/hemoglobin dissociation curve," the graph for which they must thoroughly understand and memorize. The graph is not linear, but has an exponential downward curve, meaning that the problem accelerates or becomes worse and worse very quickly. This results in even less oxygen being supplied to needy tissues like the heart and brain at a rate faster than the altitude is changing. So now, even though the airplane's pressurization system is operating as it was designed to with a perfectly legal cabin altitude between 10,000 and 12,000 feet, the pilot's body has much less oxygen in the bloodstream. And because of the oxygen/hemoglobin dissociation curve, what oxygen there is in the bloodstream is not as available to the needy tissues as it was even a couple of thousand feet lower. And this is just the beginning of the problem.

There is another phenomenon that also decreases potential oxygen to essential organs like the heart and brain, and that is a gradual narrowing of the inside of the blood vessels or so-called "arteriosclerosis." This happens to everyone as they age but occurs earlier and faster in people with a history of high cholesterol, high blood pressure, poor exercise habits, diabetes, and nicotine use. So, whether the result of a perfectly normal aging process or common health issues, the size of the internal diameter of blood vessels is smaller, which further limits the amount of already poorly oxygen-

training wherein the oxygen masks are never used unless there is an emergency caused by an abrupt depressurization event. The other explanation is that the typical pressurized piston aircraft has a limited inbuilt oxygen supply which is frequently difficult and expensive for the pilot to have re-filled, and therefore needs to be "saved" or at least used very conservatively. The resupply problem can be a real one, but a very convenient way around this is a portable oxygen bottle that can be filled by any local medical oxygen supplier at minimal cost. One rumored concern about using medical oxygen is that it is not "dry" enough and as a result, moisture could form in the supply tubes which can clog them shut. This concern originated in WWII when bomber crews were flying in non-pressurized and non-heated cabins in freezing temperatures in the high flight levels, but is not applicable to the heated and pressurized general aviation aircraft we have today. A portable medical oxygen tank and its supply lines will almost always work just fine in a heated aircraft cabin.

Pressurization makes a significant contribution to the potential safety of flight because it enables the aircraft to overfly otherwise bad weather, and as long as the aircraft's altitude does not exceed far above FL180, the cabin altitudes are as physiologically safe that of an airliner or newer executive jet. Above that altitude, however, the tradeoff starts to shift the other way depending to a large extent upon the pilot's age, medical history, and physical condition. The older the pilot, the higher the risk, particularly if he or she has some adverse health history such as known coronary artery disease, high cholesterol, diabetes, or high blood pressure. But for nearly everyone, using supplemental oxygen whenever the pressurized piston aircraft goes above about FL180 will convert the physiologic risk to that of driving across most mountain passes in the western United States.

Now, all this discussion about physiologic risks, oximeters, and the use of supplemental oxygen may sound like a needless hassle. But if you feel that way,

have your spouse or close relative read this *Twin & Turbine* article. It would be wise to follow the advice that I am sure will follow. Be safe out there. **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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From the Flight Deck

by Kevin R. Dingman



Compassionate or Curmudgeon

Flying and the Christmas hustle-bustle-burn-out.



COMPASSION — The feeling that arises when you are confronted with another's suffering and feel motivated to relieve that suffering—showing sympathy and concern for others.

CURMUDGEON — A cranky, crusty, ill-tempered individual, full of stubborn ideas or opinions who is always angry, unhappy and seldom socializes with others.

Christmas is a festival commemorating the birth of Jesus Christ, observed on December 25 as a religious and cultural celebration among billions of people around the world – and it can be maddening. Sadness, self-reflection, loneliness, guilt, headaches, overeating, fatigue and anxiety are common side effects of this, the most wonderful time of the year. The religious, mental and physical stresses of the holiday scramble should invoke an honest assessment of our fitness to fly and our capacity to play well with others. Fortunately, there are remedies for these holiday maladies that may include aviation and flying your airplane.

A Capitalistic and Commercialized Travesty

While preparing for gatherings and searching for presents (the less formal, colloquial term for gifts), we may feel unprepared, frantic and our gift purchases inadequate. Rather than recognizing the time, effort and thoughtfulness needed to negotiate the shopping center free-for-all as a celebration of Christianity and a way of expressing our appreciation of family, friendships and community, we may unwittingly succumb to the contemporary sentence imposed upon Christmas merrymaking and gift-giving as a capitalistic and commercialized travesty against Christianity and our sanity.

The preceding extra-long sentence and misperceived travesties against religion notwithstanding, the holidays can generate psychological ramifications that challenge both our social skills and fitness to operate machinery – especially flying machinery. Ironically, once we recognize the challenges, a higher level of involvement in the seasonal activities along with a commitment to selflessness can work Christmas miracles, even if we don't live on 34th Street or in Bedford Falls.

First: Confronting the Challenges

Sadness. Christmas elicits an open-minded assessment of our persona; a soul-searching “instrument crosscheck” of our financial, physical and spiritual self. And it's this self-reflection that may cause sadness if throughout the year, while in the pursuit of profit and a pilot-y-perfect-persona, there were losses and setbacks in life that we handled more like Old Man Potter and Mr. Scrooge than Rudolph, Santa or George Bailey. If so, our Christmas gift-giving can feel like, and appear to others, as an apology for our less than gracious behavior, rather than a bell-jingling reward for a newly winged angel.

Loneliness. Some people find themselves alone at Christmas time. For the first two-thirds of my airline career, I worked all holidays including Christmas and New Year's. It was common to find myself in a hotel on Christmas Eve, Christmas morning, New Year's Eve and New Year's Day – even on Groundhog Day. If you have ever “lived on the road,” you will understand the surreal reference to the 1993 movie starring Bill Murray. In addition to the above-average hotel noise at these times as others celebrate, waking up on Christmas morning in a hotel room (every year) holds a unique loneliness and feeling of isolation. My solution was to bring gifts for the entire crew for the Christmas morning departure from the hotel. Each of my crew would receive a gift with a personalized To-From tag. The anticipation of their surprise and gratitude helped to make the Eve and morning more like home. I have never figured out how to conquer that Groundhog Day sensation, however.

Grumpiness. Some of us battle the ornery-gene coupled with a Walter Matthau like grumpy-old-men syndrome which causes an intolerance for earbud wearing, selfie-taking millennials, which can lead to road, ramp and radio rage. We Type A overachiever pilots are mission oriented and often suppress (a generous verb) our social skills, manners and grace toward said individuals (and many others so as to not exclude anybody) as we plow unrestrained toward the goal line. Perhaps, like me, last Christmas you vowed to be less plowing and more "nicer-er." Yes, I know – don't correct my grammar or I might just Walter Matthau those earbuds right off your head.

Anxiety. For those who have an anxiety disorder (3 million cases per year), Christmas can be almost unbearable. Children often spend their time in the moment, which is why they are happier and have more fun. Learning to live in the moment is a way to enjoy Christmas more easily. Plan on doing more things that you want, rather than things you have to do. It's okay to say no to things you don't want to do. Doing more of the thing you want is a great way to lower anxiety and increase your joy.

Overeating. We may feel that Christmas is a license to eat and drink to excess. And though expanding both our eating and spending limits has become part of all holiday (and Super Bowl) celebrations, Christmas overeating and overspending are chastised as an affront against God. From our perspective at the pointy end of an airplane, overeating and overdrinking can increase tiredness, grumpiness, obesity, bloating and if that doesn't get your attention: excess gas. Nobody wants that in an airplane. I suppose that could be the affront against God that got gluttony on the seven deadly sins list.

Second: A Higher Level of Involvement

While a common prescription for surviving the psychological effects of Christmas may include things like singing carols, gathering with friends and family, decorating the tree and stringing lights around the office, hangar or yard, the best way to deal with the potential exhaustion of the holidays is actually not to withdraw, but to enter the season thoughtfully with purpose and vigor; sounds like a Type

A pilot-y plan, right? Be of good cheer, give some real gifts, make some good food, and spend more time than usual with friends and family. There are also a few aviation-related activities that you may investigate throughout the year that can couple your passion for flying with giving, charity and compassion while simultaneously decreasing your coefficient of curmudgeon-ness (yes, more bad grammar). For example:

Wings of Mercy and Angel Flight.

For those that cannot afford to fly, or when commercial flights are impractical, both organizations provide free air transportation to qualified children and adults in need of medical treatment and other humanitarian needs to distant medical facilities. Volunteer pilots use their own aircraft (<http://wingsofmercy.org/>; <http://www.angelflight.com/pilots/>).

Pilots N Paws. A 501(c)(3) non-profit organization that provides a forum in which volunteers can arrange or schedule rescue flights, overnight foster care or shelter, and all other related activities. Their website is used as a meeting place for volunteers engaged in the rescuing, sheltering and adopting of animals, and by volunteer pilots and airplane owners willing to assist with animal transportation (<https://pilotsnpaws.org>).

Sky Ball. The Airpower Foundation was founded to be a nationwide 501(c)(3) non-profit dedicated to supporting active duty, reserve, and National Guard families. Sky Ball has allowed the Airpower Foundation to contribute solely to funding projects that directly support the members and families of all branches of our military, veterans and wounded, ill or injured service members and their families (www.shyballinfo.com).

Veteran Airlift Command. VAC provides free air transportation to post 9/11 combat wounded and their families for medical and other compassionate purposes through a national network of volunteer aircraft owners and pilots (<http://www.veteransairlift.org>).

Honor Flight Network. A non-profit organization created to honor America's veterans for all their sacrifices by transporting our heroes to Washington, D.C. to visit and reflect at their memorials. Priority is given to the senior veterans – World War II survivors, and to those

other veterans who may be terminally ill. An Honor Flight is conducted by non-profit organizations dedicated to transporting as many United States military veterans as possible to see the memorials of the respective war they fought, at no cost to the veterans (www.honorflight.org/).

Kris Kringle or Chris Curmudgeon

We are better throughout the year for having, in spirit, become a child again at Christmastime. – Laura Ingalls Wilder

Time is one of our most precious assets and adding Christmas responsibilities to our schedule can be overtaxing if not approached with humility, compassion and patience. For many, decorating a tree, stringing lights, giving and receiving gifts and spending time in the moment with friends and family makes Christmas the most wonderful time of the year. For many others, the celebration of Christianity is a time for reflection and prayer without many commercialized overtones, a tree or the exchange of presents – and both philosophies receive undue criticism from the other. However we choose to promote peace on earth and good will to man, and whether we are flying to the party or driving, let's not forget the reason for the season. And to take along the Roloids. Merry Christmas my friends. **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 organization Wings of Mercy, is employed by a major airline, and owns and operates a Beechcraft Duke. Contact Kevin at dinger10d@gmail.com.





A Challenging Day at the Office



Let's be honest. Most of us are pretty darn good at running a business. Or a law office. Or a medical practice. But we are all significantly challenged every time we get in an airplane. Especially when poor weather is involved along with a perceived "need to get there."

Such was the case on October 24, the arrival day for the annual Citation Jet Pilots convention. This event was special in two ways. It was our tenth meeting, a real celebration with well over 100 jets expected. And it was the first time in our history that weather was a real factor. A tropical storm poured substantial moisture into south Texas and our convention city, San Antonio. And because many of our members would be arriving from all across the United States, Canada, and Mexico, planning for an alternate was challenging.

The night before departure, San Antonio was forecast to have 2-mile visibility with rain, fog, and ceilings of 400 overcast. Austin, 60 miles away, the same. Waco, 100 miles up the road, no good. I had to use Dallas, my departure city, as a legal alternate.

At 9 a.m. on departure day, however, things looked better. As we left KADS (Addison), the SAT weather was: 04005KT 8SM -RA SCT023 BKN045 OVC130

But the original forecast was still valid. Fat with fuel, I was prepared for the worst for our 53-minute flight at FL 270.

My, how quickly things can change.

"San Antonio information Tango. Wind zero-five-zero at three. Visibility one mile. Light rain. Ceiling six hundred overcast. RVR runway one three right, five thousand. Altimeter three zero zero four. Expect ILS one three right. Advise you have information Tango."

In the descent, we picked up light icing, and I made the first PIREP of the day. As we were vectored for the approach in light rain and a smooth ride, my wife Patty began looking for ground contact. Lower and lower we descended on the ILS. At 600 above minimums, no joy. Then 500, then 400. I placed my finger on the go-around button and prepared for the missed approach. Suddenly, at 100 above, the approach lights burst into view and the wet runway appeared. My antiskid activated twice as we slowed to make the turn-off.


We taxied into a dreary, quiet, Million Air ramp.

Now, safely on the ground, we began to help others with the latest weather updates. Members from around the country exchanged information on our website. Richard, from Nebraska, couldn't find a legal alternate without making an additional fuel stop. Several arriving from the Northwest had to make two.

Moderate rain and low ceilings continued all day.

Marc Dulude, CJP chairman, broke out 50 feet above minimums in his CJ3+. Former astronaut Charlie Precourt, arriving in his CJ1+, diverted for fuel after arrivals began to hold for traffic saturation. Everyone was challenged in some way. Some decided to delay their departure and depart the next day in beautiful clear skies.

The great thing is that everyone was supported in their decision. And in the end, we all made the right choices.

Fly safe. 

With 6,000-plus hours in his logbook, David Miller has been flying for business and pleasure for more than 40 years. Having owned and flown a variety of aircraft types, from turboprops to midsize jets, Patty and David currently own and fly a Citation Mustang. You can contact David at davidmiller1@sbcglobal.net.

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