Piston to Turbine Part II / Owner's Corner: TBM 910 / Performance and Temperature

TWIN & TURBINE

FOR THE PILOTS OF OWNER-FLOWN, CABIN-CLASS AIRCRAFT

MAY 2022 $3.95 US
VOLUME 26 NUMBER 5

EXPECTING THE UNEXPECTED

THE EVOLUTION OF THREAT AND ERROR MANAGEMENT

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Photo Courtesy of Jessica Ambats

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Editor's Briefing

by **Rebecca Groom**

Stick Back

May is a special aviation month for me. On May 30, 2010, I soloed in a Piper J-3 Cub and my completely unplanned, unexpected venture into the general aviation industry began.

To commemorate the occasion, here is a little story I wrote several years ago summarizing my very memorable entrance into piloting – one I surprisingly have yet to share here. I hope you enjoy!

Four days. I soloed in four days. Not even an entire workweek had passed, and my world changed. And it was not until afterward that I realized soloing that quickly was not the norm, especially in a Piper J-3 Cub. But in actuality, no part of my entry into flight training could really be considered normal today.

I grew up around general aviation from the get-go, with multiple pilots in the family and a frequent backseat passenger in our Bonanza. I undoubtedly enjoyed flying, but the idea of actually piloting was intimidating. I preferred just to gaze out the window, enjoy the view and sort through my adolescent thoughts. Plus, I had several other hobbies and interests to distract me. But little did I know, the so-called flying bug would catch up to me nonetheless.

In 2010, like most college students, my bank account was low and the need for a job was high. So, while home for summer break, my friend and I decided to apply at the new local airport restaurant together (Stearman Field Bar & Grill at 1K1). A week later, I was offered the waitress position I applied for. But then another offer came I was in no way expecting: flight lessons.

Airport owner, and family friend, Dwayne Clemens wanted to teach me to fly – for fun. A proposal that is unheard of nowadays. But lucky for me, Dwayne is not known to be conventional. I will never forget the big grin on his face when he plopped down in front of me at the restaurant as I filled out paperwork and said, "Let's teach you to fly in the Cub and surprise your Dad." Needless to say, there was no turning him down. I began flying the next week.

We flew two flights a day for the first four days – one at sunrise and one at sundown to avoid the relentless Kansas heat and wind. I practiced taxiing, stalls, steep turns, slow flight, and takeoffs and landings on the airport's grass runway. The lightness and ease of the Cub's controls and maneuverability amazed me. No complex buttons, knobs or radio posed intimidation. I had only the feel of the airplane and its handful of basic instruments. Quick, regular scans of the panel and then my eyes went back outside (a fundamental lesson I am eternally grateful for).

On the fourth day, Dwayne and I were wrapping up the evening with touch and goes. After completing three smooth landings, we were on downwind for a full stop when he asked how I felt about soloing. Butterflies instantly fluttered in my stomach. Was I ready? Although it had only been four days, I built up eight hours in my logbook and felt comfortable with the airplane. (Growing up riding horses, tractors and dirt bikes assuredly aided my confidence and comfortability). And it would be cool to solo on my Dad's birthday...yes, let's do it.

One magnificent go-around later, I made an unforgettable phone call to my father with the exciting news. His resounding "WHAT," followed by nervous laughter and speechlessness, gave me my first clue I might have accomplished something a bit untraditional. But once the shock subsided and words came back, he was incredibly proud. He then demanded to speak with Dwayne and requested no more solos for another 10 hours. We obliged. T&T

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by **Dianne White**

Mother Nature's Crazy Train:
The More You Know

PHOTO COURTESY OF CLAY HAMMOND

Springtime is when Mother Nature is at her most neurotic. If you've spent any time in the Midwest, you know what I'm talking about. One minute she's serving up warm sunrays and gentle breezes, and hours later, you're running for cover as tornado sirens blare. Growing up in the 1970s, I remember Disney explaining that springtime rain was a gentle, rejuvenating event. Like in the movie Bambi: "Drip, drip, drop little April showers, what can compare to your beautiful sound."

East of the Rockies, that's simply false advertising. When Mother Nature sends the rain, she sends it in torrents. And sometimes, she throws in a tornado, ice, wind shear, and unpredictable surface winds.

In early April, I had three successive trips planned that featured every weather event that Mother Nature could conjure up. For ten straight days, I had my head buried in ForeFlight, Windy, and aviationweather.gov, attempting to thread the needle for my departures and arrivals. On the first trip, I waited out a fast-moving cold front that started out as an impenetrable 300-nm long line of thunderstorms and ended with icing through the lower flight levels. The worst icing was easy to circumvent, and the flight was uneventful.

The second trip was scheduled just ahead of another strong cold front. Cloud bases were in the marginal VFR range as warm, moist air was being pulled from the Gulf. Moderate turbulence started at 3,000 and went well into the flight levels. Everyone – not just the American Airlines pilots – was complaining and looking for a smooth slice of air. At the surface, winds were predictably gusty but violently indecisive. Surface winds at my destination in Kansas City were variable from 170 to 230 at speeds ranging from 15 kts to well over 30 kts. That approach and landing had my full attention.

The last trip was to coincide with the arrival of yet another fast-moving system that brought multiple lines of thunderstorms, wind, and LIFR conditions. I scrubbed the flight and joined my meeting via Zoom instead. In the hours after I made the no-go call, I couldn't help myself but watch the airborne aircraft along my proposed route of flight and wonder. Did they have some special weather insight I didn't? Are the weather conditions what they expected? Do they wish they were on the ground?

Regardless of the equipment we fly, no single factor impacts our flying more than weather. But how do we gain scenario-based knowledge about weather? Getting out there and flying in it plays a big part. As you gain hours in the left seat, you get better at understanding weather systems and interpreting weather data. But it is only one ingredient in managing adverse weather risks. Aviation weather is a lifelong study that requires continuing education.

During our primary training, there's a lot of focus on skills and procedures, but not on weather training. Sure, there's always the exception to the rule, but most of us received our PPL with dismal weather knowledge. As we progressed through our ratings and to more sophisticated aircraft, aviation weather training was secondary. If that was NOT true, we would not see weather-related crashes in the numbers that we do across the GA fleet. According to an NTSB safety study, "It appears that pilots generally require formal training to obtain weather knowledge and cannot be expected to acquire it on their own as they simply gain more flight experience." Even with all of the fantastic tools we have onboard – and they are truly game-changing – nothing replaces a solid foundation of weather intelligence.

As we move through Mother Nature's season of neurosis, commit to upping your weather knowledge game. You obviously know avoiding thunderstorms is mandatory. But how should you deviate? Can you "read" the environment

to know how a system will play out? What sources do you trust, and which ones are simply algorithmic crystal balls with pretty graphics?

Just like you train and practice to keep your skills sharp, do the same for your weather intelligence. There is no shortage of great weather books, including "Flying America's Weather" by Tom Horne; Scott Dennstaedt's "Pilot Weather: From Solo to the Airlines." If you plan to go to Oshkosh this year, make it a priority to attend one or more weather seminars. There is probably no one place on Earth where there will be such a large number of aviation meteorology experts on hand.

Finally, if you belong to an aircraft type club or one of the major aviation associations, check out their video libraries and resources. Spend a few minutes per week banking some weather knowledge. It could very well help you make the right call when Mother Nature's crazy train is bearing down on you. Be safe. 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 Northwest Arkansas and can be reached at* **editor@diannewhite.com.**

PHOTO COURTESY OF JESSICA AMBATS

EXPECTING THE UNEXPECTED

THE EVOLUTION OF THREAT AND ERROR MANAGEMENT

by **Stan Dunn**

United Airlines flight 173 departed Denver's Stapleton Airport on the afternoon of December 28, 1978, bound for Portland, Oregon. Sitting in the left seat was a journeyman captain who had accumulated nearly 28,000 hours of flight time in a career spanning three decades. The flight plan called for 31,900 lbs of fuel to be consumed on the hop. The aircraft departed the gate with an additional 14,800 lbs in order to meet IFR requirements plus a 20-minute buffer (46,700 lbs total). Remarkably, the Douglas DC-8 would crash in a wooded area short of Portland's Runway 28L three hours later due to fuel exhaustion. Of the 189 occupants aboard the flight, 10 perished. Another 23 suffered serious injury. Ironically, the empty fuel tanks saved lives by eliminating the potential for a post-crash fire.

the DC-8 had multiple fuel tanks, at the time it only had 4,000 lbs total.

The captain instructed the flight engineer to calculate landing weight based on "another fifteen minutes" of flight. The captain suggested that they would have "three or four thousand pounds" of fuel remaining at touchdown. The flight engineer countered: "Not enough. Fifteen minutes is gonna really run us low on fuel here." The aircraft continued to hold for several more minutes. Upon inquiry from Portland Approach, the captain reported: "…about four thousand, well, make it three thousand pounds of fuel." The DC-8 was burning 220 lbs per minute. If a calculation had been made, it would have indicated that a paltry 13 minutes of endurance remained.

During the approach into Portland, the first officer (who was flying) requested flaps 15 and gear down. Post-accident interviews indicated an abnormal thump followed the attempt to lower the gear. The annunciator lights on the main gear panel failed to illuminate, indicating an unsafe condition. The captain contacted approach control and requested a holding pattern so the crew could troubleshoot the issue.

The DC-8 had a device that extended from the wing when the respective gear was down (which served as a backup to the indicating lights on the flight deck). The abnormal checklist stated that a normal approach and landing could be performed if these wing mounted devices were observed. The flight engineer verified that they were present. The captain initiated a conversation with United Airlines maintenance personnel. He reported 7,000 lbs of fuel remaining and his intention to continue holding for "another 15 to 20 minutes" (he wanted to provide flight attendants the ability to comprehensively prepare passengers for an emergency landing). In the configuration that the DC-8 maintained throughout the episode (gear down, flaps at 15-degrees), the NTSB calculated a consumption rate of 13,209 lbs per hour. Seven-thousand pounds of fuel, as such, represented 32-minutes of endurance. Had the captain stuck to his original timeline, the aircraft would have landed with 15 minutes of fuel remaining. Six minutes after this conversation, the first officer asked the flight engineer, "How much fuel we got?" The flight engineer responded, "Five thousand." Two minutes later, the first officer repeated the question, receiving the same answer. Seconds later, the captain noted that "the [fuel] feed pump [lights] are starting to blink." Eight minutes later, the first officer again asked about the fuel. The flight engineer answered (somewhat befuddling): "four thousand – in each – pounds." Though

The next several minutes were eaten up with conversation about the readiness of the cabin and questions regarding whether spoilers or anti-skid would be functional on the ground. At 1806, the first officer announced that the number four engine was failing. The captain – who was engaged in a conversation with the lead flight attendant – apparently missed the comment. Ten seconds later, the first officer stated, "We're going to lose an engine." The captain asked, "Why?"

A jumbled conversation followed in which both the first officer and the flight engineer quickly identified that the engine was fuel starved. Within 30 seconds of the initial failure, a second engine on the same wing flamed out. Both engines fed from the same fuel tank. The crew began cross-feeding and were able to relight the two engines via the opposite wing fuel supply, but within a few minutes that tank was empty as well. All four engines flamed out in quick succession.

The captain appeared to be genuinely puzzled when the first engine failed. It is clear that he did not immediately correlate the failure to a dangerously low quantity of fuel onboard. The flight engineer also expressed surprise but was quicker at

recognizing the root cause. The first officer immediately suggested that the engine was fuel-starved, clearly indicating that he had been aware of the dwindling fuel supply prior to the flameout. Yet instead of directly challenging the captain on the decision to delay a landing attempt, he instead resorted to questioning the flight engineer about the fuel status. Most likely he was hoping that the captain and flight engineer would catch the hint and develop a game plan. The NTSB faulted the captain for failing to maintain situational awareness, and the first officer and flight engineer for failing to directly challenge the captain's decision-making process.

A New Understanding of Error

Threats are encountered on every flight. They mostly represent conditions that cannot be changed. Errors are the result of inappropriate actions taken by pilots. The longstanding attempt to eliminate pilot error in aviation has proven an elusive goal. A better strategy is to focus on minimizing the impact of errors when they occur. Trapping an error is nearly as good as avoiding one. Under this model, the difference between a threat and an error is largely procedural. A landing gear malfunction during final approach (for example) represents a threat. In the case of United 173, another threat was the hierarchy that existed among the flight crew. The captain possessed an extraordinary amount of experience. It is understandable why the first officer and flight engineer would have been reluctant to directly challenge him. The captain failed to actively include the first officer and flight engineer in his decision-making process, which represented an error.

Communication with ATC was likewise inadequate, another error. Plenty of resources were available to the captain, yet he failed to trigger them effectively. His loss of situational awareness regarding fuel endurance was the final nail in the coffin. It is worth noting that many of his errors resulted from his singular focus on a necessary event: Ensuring that the passengers were briefed should an evacuation become necessary.

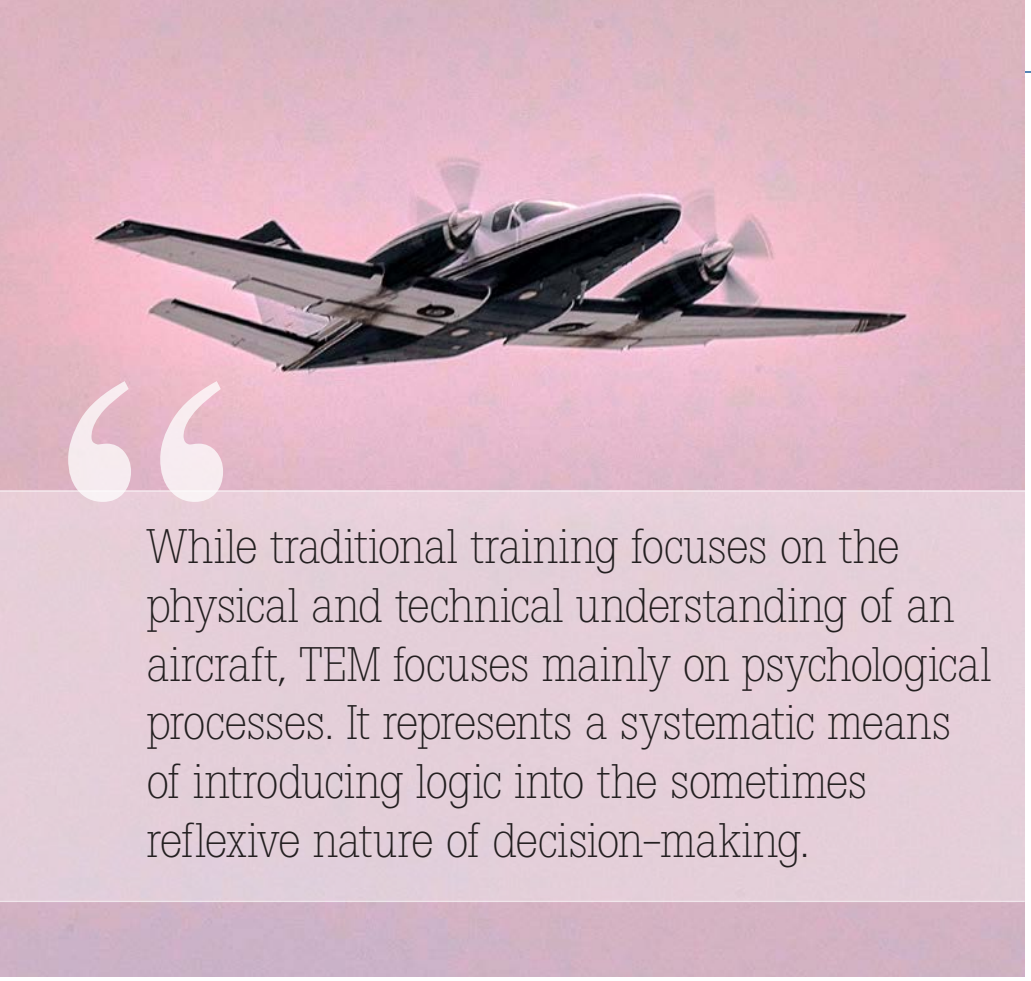
The problem was not that errors occurred but that the crew failed to trap them. The abnormal gear procedure on the DC-8 directed the crew to execute a normal approach in the event that the gear indicators on the wing were extended, which they were. The first officer never directly challenged the captain regarding diminishing fuel reserves even though the subject was clearly on his mind. The flight engineer noted that insufficient fuel remained for another turn in the hold, yet the captain failed to consider his concern. The crew did not explicitly declare an emergency until all four engines had flamed out. For the initial 45-minutes of the event, the only thing that ATC had to go on was: "We've got a gear problem. We'll let you know."

The first indication that the landing would be abnormal was when the captain requested crash and fire rescue "in the event [it] should become necessary." Controllers initiated emergency procedures following the exchange. This occurred 12 minutes prior to the crash. Even after the initial two engines had flamed out, the crew failed to inform ATC of their dire status. Instead, they coyly requested "clearance for an approach into two eight left, now." The abnormal gear checklist that began the ordeal had only taken 15-minutes to complete. The remaining 40 minutes of follow-on activity generated sufficient error, omission, fixation, and poor communication to produce a fatal accident.

Threat and Error Management

The NTSB recommended aircrew "assertiveness" training as a result. This rapidly morphed into what we now call Crew Resource Management (CRM). It would initially focus on enhancing the "challenge-response" dynamic among flight crew. It did not take long before the umbrella of CRM expanded to include resources outside of the flight deck as well: ATC, passengers, flight attendants, maintenance workers, and any other of a slew of supporting personnel who contribute to safe flight. Single-Pilot Resource Management (SRM) naturally arose from the realization that every pilot has a multitude of external resources available to assist in decision-making.

It is important to distinguish between "single-pilot" and "single-occupant." Having a second individual onboard – even if they have little knowledge of aviation – can represent a profound resource. Briefing a passenger not only helps to put them at ease but also forces us to utilize a part of our brain that naturally critiques our own impulse. Even a highly experienced pilot sometimes overlooks relevant information. Communication is an effective way to trap those errors.



> While traditional training focuses on the physical and technical understanding of an aircraft, TEM focuses mainly on psychological processes. It represents a systematic means of introducing logic into the sometimes reflexive nature of decision-making.

The development of CRM/SRM began the long arc toward the multidisciplinary field of Human Factors, which utilizes everything from psychology to statistics. Before this, aviation safety largely focused on two goals: eliminate pilot error and develop more resilient aircraft systems. While the second goal has largely been achieved, pilot error as a root cause of accidents has remained persistent. The core tenant of Human Factors is that we all make errors. I have participated in hundreds of training events (both as an applicant and as an evaluator), and I have yet to witness a perfect check ride. A high-performance aircraft is complex by nature, with many different systems and operating parameters to manage. Toss in an external environment that includes adverse weather, ATC congestion and mechanical issues, and you have a recipe for distraction. Every flight requires a particular series of steps to be taken in order to achieve a successful outcome. Errors can occur at any point but are much more likely to develop when a pilot is startled by an unexpected scenario. The compression of time that occurs during flight greatly increases the odds that those errors will lead to an undesirable aircraft state.

The Swiss cheese model is one of the better-known allegories used to describe the process of capturing errors. The holes in the cheese represent the threats and errors that we experience every flight. The cheese slices represent the barriers that we utilize to resist those errors. A checklist is a prime example of a barrier. Used properly, it ensures that an error is recognized prior to a critical phase of flight. If a runway change necessitates a new aircraft configuration after the takeoff checklist has already been performed, the slice of cheese has a potential hole (which can be solved by running the checklist again). Forgetting to actually run the checklist is another hole. It is worth noting that the "error" holes become larger or smaller depending upon workload. When task saturated, the "holes in the cheese" can be nearly the size of the slice itself. The goal of Threat and Error Management (TEM) is to produce enough "slices of cheese" so that all errors will be trapped prior to a complete loss of situational awareness.

While flight training programs largely focus on the pilot's role in managing risks and mitigating errors, the final solution involves other working groups as well. Have you ever wondered why ATC requires fuel remaining to be reported in hours and minutes following the declaration of an emergency? Knowing the total amount of fuel onboard is obviously useful for firefighters in understanding the potential for a post-accident blaze, but this is something more efficiently accomplished by reporting in pounds or gallons. During the event with United Airlines flight 173, the captain reported fuel remaining in pounds. Had ATC instead required him to report fuel remaining in minutes, he would have rapidly figured out that "three thousand pounds of fuel" actually meant 13 minutes of endurance. Confronted by this, he would have undoubtedly requested an immediate approach. The requirement to report fuel as a time-sensitive resource orients a pilot towards landing before a greater crisis develops, and it provides ATC with a comprehensive understanding in order to back up a potentially task-saturated individual.

Over the past two decades, the NTSB has found pilots at fault in approximately 85 percent of aviation accidents. The FAA has understandably placed emphasis on teaching TEM during regular aviation training cycles. While traditional training focuses on the physical and technical understanding of an aircraft, TEM focuses mainly on psychological processes. It represents a systematic means of introducing logic into the sometimes reflexive nature of decision-making. One vital element of TEM is to acknowledge threats explicitly before takeoff and landing. Even if you are flying alone, it is a good idea to perform these briefings verbally. Talking to yourself feels silly, but it is calming and provokes critical thinking.

Talking is also quite useful in ensuring the completion of checklists. Nearly all pilots develop a "beat and tempo" when verbalizing a checklist. If you inadvertently miss an item, it disrupts the tempo and brings it to your attention. If you are a single-occupant, discussing the flight with a weather briefer introduces a dispassionate third-party opinion (a conversation

increasingly omitted in the era of internet weather products). If another pilot is aboard, discussing weather, terrain, unusual approaches, or any other threat is a vital part of the briefing process. Non-pilot passengers almost always appreciate a pre-flight briefing as well. And though you may not want to dwell on risks per se, you can still work them in ("it'll be a beautiful departure surrounded by the mountains in this box canyon").

Flying involves a baseline of risk. An issue discovered in the air occasionally calls for an innovative response, but it is almost always better to focus on established solutions (generally in the form of an approved checklist). It is important to remember that many threats produce follow-on threats. Fixation produces errors. You cannot think yourself out of an emergency. Run the appropriate abnormal procedure, communicate unambiguously with ATC, and get the aircraft on the ground. An unremarkable decision made decisively is better than a bout of brilliance made after much delay. An average decision clearly communicated is superior to genius in silence. When faced with a threat, the best mitigation strategy is to follow established procedures and move on.

Most of the major issues that a pilot confronts while in command have already been codified by regulations and aircraft-specific procedures. It is not always necessary to consult the books when "correcting the obvious," but these documents remain the most trustworthy resource available when troubleshooting more complex issues. Remember, in aviation, you cannot eliminate every threat or error. You can only manage them. T&T

Stan Dunn *has 8,000-plus hours in turbine-powered aircraft, with three years of experience as an instructor and evaluator for airline pilots. Stan publishes detailed coverage of aviation accidents at bellmanmultimedia.com/flying. You can contact Stan at* **Stan@bellmanmultimedia.com**.

Piston to Turbine

When is it the Right Move? Part II

by **Joe Casey**

PHOTOS COURTESY OF CLINT GOFF

Continued from the April 2022 issue…

What About the Performance?

You get a lot more performance in a turbine. The Cessna 210 with a Silver Eagle Conversion is a rocket ship compared to the piston Cessna 210P. The JetPROP makes that lackluster Mirage into a screaming machine. You can hardly find a Queen Air still flying, but the King Air 90 is found on nearly every airport with a runway over 5,000 feet. And the Royal Turbine Duke makes the piston Duke look like child's play. Make no mistake, the turbine offers better performance. Any increase in horsepower sends those horses directly to performance if all the other factors remain the same.

And then there's the experience of operating a turbine – is it really that much fun? Is it exhilarating to advance the power lever on an airplane that has a tremendous thrust-to-weight ratio? It is an experience every pilot should experience once in their lifetime.

Bottom line, operating a turbine will put a smile on your face. But, the smile wears off after a while. The Van's RV series of airplanes is a wonderfully designed experimental airplane, and they've coined the phrase the "RV grin" to describe the subtle smile they propose is found on the pilot operating an RV airplane. I would say there is also such thing as a "turbine grin." Even after 10,000-plus hours in turbine airplanes, I still get a slight grin when I advance the power levers on an airplane with a solid power-to-weight ratio such as the King Air 300, JetPROP, Turbine Duke, or TBM 940.

To me, it is less exhilarating and more of an appreciation of what a turbine can do. I've loaded up 10 people, a ton of bags, and full fuel in a King Air 350 and the beast jumps off the runway in less than 3,000 feet, travels 1,200 nm, all flying at 300 KTAS…yes, I grin on that flight. I've climbed in a JetPROP, made a left turn, and looked down at the airport I just departed and admired the incredibly steep downward angle that my eyes are looking – and there's

a grin. I've departed in a Turbine Duke on a 5,000-foot runway and been at traffic pattern altitude before I got to the end of the runway – more grinning.

Why Would Anyone Not Move to a Turbine?

If you've got the coin and mission to make the transition to a turbine, you'll assuredly become a better overall pilot with added skills and new experiences to draw from. But there are also some really good reasons to stay in the piston world and almost all of them have to do with money.

First, a turbine is definitely going to cost you more cash to acquire. A large piston engine will cost about $100,000 to purchase, and a new conversion to a turbine will cost about $600,000. So, there's a half-million-dollar delta to consider. I've found this to be about accurate for any converted airplane (JetPROP, Silver Eagle, Turbine Bonanza, etc.). A comparably equipped JetPROP from the same year as a Mirage will cost you about a $500,000 more. A single engine from-the-factory turbine (M500/M600, TBM, PC12, etc.) could cost you far more than an STC-converted turbine airplane. So, getting into a turbine will cost you at least a half-million more than a piston airplane, potentially more.

But, some turbines don't cost all that much more to operate. A Mirage and JetPROP can be operated for about the same cost per mile. The turbine will burn more fuel, but jet fuel costs less per gallon, and the turbine goes faster. An oil change will happen every 25 to 35 hours in a piston, but a turbine has an oil change every 800 hours. The turbine will cost more per hour to fly, but it gets a lot more done in that hour. I rarely hear from people who moved into the turbine world who are unaware of the normal operating expenses. It's the abnormal expenses that cause a turbine pilot to cuss. I call it "turbine stupid" when a pilot makes a mistake in a turbine then gets to pay "turbine stupid tax."

The classic case is a hot start. Every turbine has temperature limits, and when those limits are exceeded during the start sequence, it is called a "hot start." The good news is that a hot start is almost entirely predictable and preventable. No person should ever start an engine while being distracted or without proper training. A few seconds of distraction in a turbine can cost you dearly. Your turbine CFI will teach you how to avoid a hot start, but if you ignore those teachings, you'll get to write a check.

When a hot start occurs, the engine will get a hot section inspection (HSI). A HSI is when the hot section is removed from an engine and sent to an engine shop. For this pleasure alone, you'll pay about $15,000. Then, the engine shop will remove (and sacrifice) two blades from the compressor turbine, cutting them into pieces to look at the metal under a magnification. If the blades are heat damaged, all of the compressor turbine blades will be replaced. And there are about 43 compressor blades in a small PT6 engine. Each one costs about $2,000. That's about $86,000 for those doing mental math. But, the financial fun is not over yet. If the compressor turbine blades are heat damaged, they'll sacrifice two blades from the power turbine and look at them under magnification. If they are heat damaged, all the blades on the first stage power turbine are replaced at another $2,000 each. And then, on some turbines, there's a second stage power turbine with even more blades. The bottom line is that a hot start can easily cost $200,000 before combustion liners, stators, and other parts of the engine are considered.

But, the stupidity doesn't stop there. A foreign object damage (FOD) event is when an object (ice, pebble, other debris) goes into the intake of the turbine. The compressor turns over 35,000 rpm in most turbines, and any debris will cause huge issues to the compressor. We can see the first stage compressor with a mirror or borescope, but if there's damage to the first stage compressor blades, there's almost always damage to every other stage in the engine. Damage to the first stage compressor that is not "blendable" (think sand down or smooth out) will result in the engine coming off the airplane and being sent to an engine shop. The costs of a FOD event are super-hard to predict, but none of the numbers are small. Sometimes a FOD event is covered by insurance, but sometimes not. Read your policy carefully. Most every turbine has an "ice door" or an inlet particle separator (IPS), and most are controlled by the pilot. Woe to the pilot who forgets to turn on the ice protection when entering icing conditions, lands the airplane on a contaminated surface without the ice door ON, or who uses excessive reverse/beta frequently. A single hunk of ice slung from the prop can FOD an engine completely.

Then there's the borescope. Every 400 hours you'll want to conduct a fuel nozzle flow inspection. This is a super

important part of the maintenance schedule. When the nozzles are removed it is a great time for your maintenance provider to stick a borescope into the engine to look around. What if they see converging cracks in a stator? Excessive corrosion? Liner rubbing? You guessed it…the engine will come off and get sent to the engine shop, and the costs will shock you.

So, the key to operating a turbine cheaply is to avoid "turbine stupid" and avoid sending your engine to the engine shop. Do all the routine maintenance required. Don't hot start or over-torque your engine. Let nothing but air enter the front air scoop, and be sure to conduct engine washes regularly. If you can avoid the engine shop, you'll have a (relatively) inexpensive ownership experience for your turbine.

This is completely different than a piston experience. If you treat your piston poorly, you might have to conduct a top overhaul ($25,000 to 30,000 for a big Continental or Lycoming). A complete exhaust system will ping you for $15,000. But, none of these numbers are comparable to the financial obscenity of turbine stupid tax. I've had piston owners sing the blues about an unexpected top overhaul. Those same owners would cry a river at a $200,000 hot start event.

My point in all of this? If you own a turbine, you need to keep a cash reserve just in case turbine stupid happens and you have to pay stupid tax. If a buyer tells me, "I think I can stretch to buy a turbine," I usually talk them out of it. If you buy a turbine, you need to be financially stout enough to handle a negative event.

Let's Say You Upgrade to a Turbine

So, how can you best make the transition with wisdom? I have two big recommendations that you already know were coming. They are simple but very true: find the experts and do your homework.

There are times when you simply need an advocate, an agent, or a mentor to help you. Notwithstanding aviation, most of us understand this. When you enter the turbine world, don't do it alone. You need to have someone on your side who knows what you don't know and who "dances in that marketplace every day." It is a brave new world, and you need to admit to yourself that you don't know what you don't know. All of your aviation experience has led you here, but it has not prepared you for the dangers that lurk in the supposed "good life" found in left seat of a turbine you own. You need a mentor, an agent, an advocate. And be prepared to pay this person well.

Aviation is a super-small world, and a person cannot make it in this world as a buyer agent (that's what I call this service in my business) and be an idiot. Interview the field of potential buyer agents offering their services and ask them how many deals they did in the last year in the type of airplane you are hoping to purchase. Ask them

for references. These people probably don't advertise… they won't have to. Why? Because smart buyers follow my secondary bit of advice: do your homework.

Join the type club that represents the type of airplane you are considering. Find out who is the go-to person in that market. Talk to the owner of the maintenance shop that only does work on the type of airplane you want to buy and research forums. There will be a shortlist of names that will pop up again and again, and those are the names that you should interview. A wise business leader once told me, "In a deal, the one with the most information usually wins." Sage advice.

So, you've found a buyer agent, you've done your homework, and now you are the proud new owner of a turbine. What is your next step?

Well, while you were doing your previous homework, you should have also been making mental notes about the various instructors that serve that community that you have joined. Pick one of the really good CFIs and treat that CFI well. Get on their dance card. And, getting on that dance card will not be easy. The best of the best CFIs in any small niche market are incredibly in demand. They'll usually be booked up months in advance.

Don't just look at availability, look at personality too. This is not easy to do, but you should be able to look at the instructor's writings, videos and recommendations from clients. A good instructor will be integrally involved in the market you join and should already have prolific data infused into that market. You will spend lots of time in a very small space (a cockpit) with this instructor, and you want to make sure that CFI teaches in a way that you'll respond to well and learn the most from. Find someone that you want to be around.

Then, once you find that right instructor, come to training with the mindset of being a sponge. Soak up the knowledge. Don't come to try and convince the CFI of what you already know. There's nothing worse for a mature CFI than for a "know it all" client to come and try to prove why their training event should be half the length of everyone else. The time you spend with your CFI is precious, so make sure you come to training with an "I'm here to learn!" attitude.

Making the turbine transition is not for everyone. But for the pilot looking for more power, performance, reliability, and a new skill set, it just might be the right move to make. You'll learn all sorts of new phrases and terms. You'll get used to raw power, performance, and a slow response in power adjustments. You'll learn a whole new way to get the most out of your engine's performance. And, you'll be a lot better pilot at the end of the training. T&T

Joe Casey *is an FAA-DPE and an ATP, CFI, CFII (A/H), MEI, CFIG, CFIH, as well as a retired U.S. Army UH60 standardization instruc-tor/examiner. An active instructor in the PA46 and King Air markets, he has accumulated 14,300-plus hours of flight time, with more than 5,200 dual-given as a flight instructor. Contact Joe at* **joe@flycasey.com** *or 903.721.9549.*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Elliott Aviation

by **Lance Phillips**

They say that adaptation to change and an ability to grow through adversity are the qualities that make people and companies successful. When something has been able to not only survive but thrive for nearly 90 years, it means they've checked the adaptation and growth-through-adversity boxes throughout that time. In 1936, the world had not yet entered into war and the United States was starting to feel some relief after years of the Great Depression. This time period shaped many people's lives. Those who were able to adapt and grow were lean, hardened and didn't suffer the inessential. Those who were able to adapt together as a team were unbeatable.

Herbert Roscoe Elliott, Jr. was born to parents Herbert Sr. and Ida Mae on July 3, 1915, in a little town on the western border of Iowa called Kingsley. The family later moved to the other side of the state, where Herb graduated from Davenport High School, situated along the Illinois River. He had saved enough while playing in a local band to buy an airplane for $350. Soon enough there was an opportunity to start a business, in aviation no less. Herb founded Elliott Flying Service at Cram Field in Davenport and hired Arlene Stoltenberg, his girlfriend from high school who he had met in 1933, as the bookkeeper. Arlene was also bitten by the aviation bug. She soloed in a Piper Cub in 1936 and was later licensed.

Herb Elliott was a proud military airman, but he was also interested in starting a family. He married Arlene, who was originally from Plainview, Iowa, on May 20, 1939. The team was solidified.

As the United States entered the war after the attack on Pearl Harbor, Herb and Arlene repositioned south to Bonham, Texas, close to the Oklahoma border, where Herb served as a civilian flight instructor for the Army Air Corps. He later transitioned to the U.S. Air Force ferrying aircraft all over the world. While living in Texas, their daughter Pamela Sue joined the Elliott team.

After the war, Herb and Arlene, with their new baby Pam, returned to Davenport and resumed business at Cram Field's grass strip. Arlene joined Elliott Flying Service in 1946 as full-time bookkeeper, receptionist and scheduler. The team expanded

and incorporated dealerships in Piper and Beech aircraft, and Elliott became the first independent contractor to offer twin-engine charters from the Quad Cities. In 1947, they became an exclusive dealer of Beechcraft products. During this time, Elliott added aircraft maintenance services to its sales and flight instruction portfolio.

In 1954, Herb and Arlene welcomed their son, Wynn, into the world. Wynn would go on to become instrumental in tremendous growth at Elliott. He would also lead the company into its third era as an independent aviation powerhouse. The company opened a location in Des Moines in 1958, moved its headquarters to Moline, Illinois, in 1961, and debuted its Minneapolis facility in 1972.


Herb and Arlene Elliott.

Over the years, Herb and Arlene received numerous civic and industry awards. In the mid 1970s, Beechcraft presented the Elliott's with the first-ever "Team of the Year" award to replace its "Man of the Year" award. The couple is listed in the Beechcraft Hall of Fame and has received the National Air Transportation Association's Distinguished Service Award. Herb and Arlene were also the first married couple to share induction into the Quad City Area Junior Achievement Business Hall of Fame.

In 1974, Arlene was appointed to the Board of Directors of the First Trust & Savings Bank in Davenport. She was the first female board member of any Quad City area bank and served as a member of the board for more than 20 years. She also served as board secretary for the Community Foundation of the Great River Bend in the 1990s.

Arlene chose to focus on promoting general aviation and is widely credited with persuading banks to finance purchases of business aircraft, which enabled a broader range of entrepreneurs to gain access to these powerful business tools. She also served as the primary financial officer for Elliott Aviation for much of her career and treasurer on the Elliott Aviation Board of Directors. In recognition of her more than 60 years in the industry, in 1999, Arlene was inducted into the Women In Aviation International Pioneer Hall of Fame. The Elliotts' passion for aviation enabled the company to grow from humble beginnings to nationally recognized prominence as a full-service business aircraft sales and technical services company with facilities and dealerships in the Quad Cities, Des Moines, Iowa, Minneapolis, Minn., and Omaha, Neb.

Wynn assumed the company's helm in 1993, overseeing its entire network of operations and extensive expansions. And in 1995, Elliott Flying Service changed its name to Elliott Aviation, a decision by Wynn to better position the brand in the ultra-competitive business aviation environment. After all of the changes during the 1990s, Beechcraft became Elliott Aviation's largest customer. Elliott's list of STCs and exclusive noise-canceling systems installed on new King Airs positioned the company well to weather all of the changes.

A new aircraft completion center and a paint facility opened in Moline in 2003. The completion center offers turnkey custom interior design services, custom woodworking, cabinetry, avionics installations and modifications, noise reduction installations, and paint.

Then in December 2005, we lost a true aviation pioneer and successful entrepreneur in Herb Elliott. His recognitions and affiliations included receiving two of the National Air Transportation Association's awards, the Distinguished Service Award and the William A. Ong Memorial Award, as well as induction into the Iowa Aviation Hall of Fame. His 90 years were dedicated to his family, his community and to the aviation industry he loved. Don Herrman, a former Elliott employee and friend of Herb's, said, "Herb frequently expressed his belief that the most important word in the dictionary is imagination."

In 2008, Elliott Aviation completed its new $8 million facility at Des Moines International Airport. The year also marked the 50th-anniversary celebration of Elliott Aviation's existence in Des Moines. 2008 also saw the start of Elliott Aviation's industry-leading Garmin G1000 retrofit program in the King Air with their first installation in a C90. Garmin G1000 retrofits began in the King Air 200 series in 2009.

Elliott Aviation's co-founder, Arlene Elliott, passed away, surrounded by family in Naples, Florida, at the age of 91 in 2010. Wynn said, "My mom was a loving wife and a wonderful mother, grandmother and great-grandmother. But more than that, she was truly an aviation pioneer and one of the first great women in the industry."

The next decade was filled with incredible activity. In 2011, the company opened its accessory shop to overhaul and repair landing gear and other aircraft accessories. Wynn also brought in industry veteran Greg Sahr to oversee sales, marketing and business development. Elliott became an authorized service center for the Embraer Phenom 100 and 300. In 2012, Elliott Aviation began installing Garmin G1000 retrofits in King Air 300/350 and celebrated its 50th G1000 retrofit. 2014 saw a focus on the sales side as the aircraft sales division of the company, which had been operating under the name Elliott Aviation, was renamed Elliott Jets to better reflect the types of aircraft the company was selling. Elliott's relationship with Garmin has only strengthened throughout the years. In 2019, the company installed its first Garmin G5000 in a Citation Excel, which started an industry-leading program in the Citation Excel/XLS.

Greg Sahr would go on to do a lot more within the company. Prior to joining Elliott, he had built his career in the avionics world, starting out as an installer at ElectroSonics. Sahr would move up to hold several leadership positions within the company before it was acquired by Garrett Aviation. He would then hone his sales skills at Garrett in the maintenance and avionics businesses before it was sold to the Carlyle Group ,which was then rebranded to Landmark Aviation. He then moved into a sales leadership role within Landmark, where he quickly rebuilt and led his Central U.S. sales team to become the top region in only 18 months. Landmark was later acquired by StandardAero, which only gave Sahr more opportunities for success, expanding his sales leadership role to cover the entire Western U.S. and continued to be recognized as leading the top sales teams once again.

At Elliott Aviation, Greg Sahr rebuilt and restructured the tech sales and marketing team, increasing maintenance, repair and overhaul sales. He oversaw the sales launches of

Elliott's accessory and landing gear overhaul shop, aftermarket avionics initiatives and led sales for the company's G1000 King Air retrofit program.

In May of 2013, Wynn Elliott named Sahr president of Elliott Aviation, focusing on strengthening Elliott Aviation's brand, enhancing the customer experience, increasing efficiencies, solidifying industry partnerships and developing new business opportunities.

In 2017, Elliott aviation expanded its engineering and product development team, which was the beginning of an effort and vision of capitalizing on an identified gap in LED lighting products in the industry. Today, this has become an additional division of Elliott Aviation with a nationwide established dealer network doing business as Prizm Aircraft Products.

2020 was another exciting year. Elliott Aviation was purchased by Summit Park, a private equity company out of Charlotte, NC. Wynn Elliott retained a minority share of the company throughout the process. Greg Sahr then took over for Wynn Elliott as CEO of the company.

In January 2021, Elliott grew even more by adding a fourth MRO facility, acquiring Atlanta's The Maintenance Group. The Maintenance Group has been successfully operating at the DeKalb-Peachtree Airport (PDK) in Atlanta, GA, for over 25 years. The acquisition of TMG adds Gulfstream, Falcon and Challenger airframe service capabilities to Elliott Aviation's portfolio of qualifications. The Maintenance Group is equipped to handle major airframe inspections, structural repairs and modifications, wing corrosion repair, DAR import/export airworthiness approvals, STC installation & certification projects, and pre-purchase inspections. It also adds more than 40,000 additional square feet to Elliott Aviation's nationwide footprint.

"Elliott Aviation has been on a mission to expand our MRO footprint to a southeast-based maintenance location and increase our capabilities to new airframes for nearly a year," said Greg Sahr at the time. "We are happy to welcome a highly-talented group of experienced maintenance technicians in a geography that will help us expand our overall maintenance capabilities. We've built our 85-year-old brand on providing unmatched quality, uncompromising integrity, and unbeatable service, and we're looking forward to providing this same level of great service to both our customers and employees in Atlanta." In December 2021, Elliott Aviation of Atlanta was officially launched.

The transition from a little grass strip in eastern Iowa to one of the world's most prestigious MRO, avionics, and aircraft sales organizations has taken almost 90 years. As we can see, the ideals held dear to Herb and Arlene are still alive and well in Greg Sahr and the rest of his team at Elliott. T&T

Lance Phillips *is an aviation professional, writer, pilot and photographer. He is executive director for the Pinnacle Air Network and owns Phillips Aero Services, an aviation marketing services provider. You can contact Lance at* **lance@phillipsaeroservices.com.**

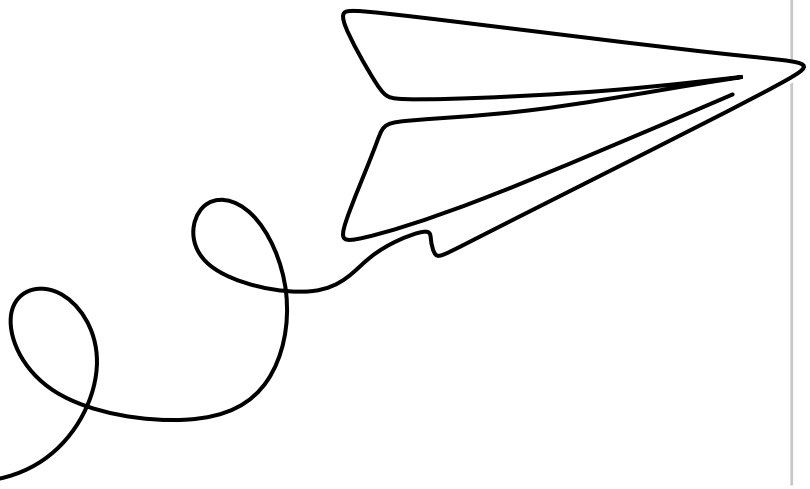
by **Kevin R. Dingman**

Paper Airplanes – Reloaded

High Flight

Oh! I have slipped the surly bonds of earth
And danced the skies on laughter-silvered wings;
Sunward I've climbed, and joined the
  tumbling mirth
Of sun-split clouds – and done a hundred things
You have not dreamed of – wheeled and
  soared and swung
High in the sunlit silence. Hov'ring there,
I've chased the shouting wind along, and flung
My eager craft through footless halls of air.
Up, up the long, delirious, burning blue
I've topped the wind-swept heights with
  easy grace
Where never lark, or even eagle flew –
And, while with silent lifting mind I've trod
The high untrespassed sanctity of space,
Put out my hand and touched the face of God.

– John Gillespie Magee, Jr.



In recognition of Armed Forces Day (May 16) and Memorial Day (May 25), I thought it appropriate to revisit a story from my USAF days. While much less life-altering and traumatic than recent global military actions, it's more like the majestic flying described in High Flight.

Once in high school my English teacher had me "write sentences" as a punishment. You know, write 100 times: "I will not talk out of turn in class?" I'd been caught throwing (who'd-a-guessed) a paper airplane in class. If I hadn't constructed it so well, it may not have been airborne long, and my transgression would have gone undetected. It was, however, and remained aloft long enough to be seen by all. I was already learning to fly real airplanes by this point in High School, and all of my classmates knew it. So my response to the teacher's query drew quite a cheer, despite his angst.

I'm a Test Pilot

Being the wise guy that I sometimes still am today, my response to his question of "Why'd you throw that?" was proudly, "I'm a Test Pilot." Yep, I had to write 500 times by tomorrow "I-am-a-Test-Pilot." No contraction and use capitals in the title. One hundred sentences was the norm, but he was upset with me to the 500-sentence level. Now that I think about it, I had to write sentences a lot in school. I enjoyed writing them. Some kind of psychological thing is still with me today: fill in lines in the logbook, track stocks, make lists and check things off, write stories. Motivational speakers tell you if you say something positive about yourself over and over, it will help keep you motivated until you get to that goal. I didn't need the 500 sentences to motivate me, but they didn't hurt. Glad he didn't have me write: "Flying Costs Too Much."

Fast forward: Visibility today is at least 100 miles. Looking out the side of the tinted canopy, I watch as the airport below me drops away at over 50,000 feet per minute. The distant horizon is in view beyond the mountains of Vegas within two seconds of the 6G pull I had initiated a moment ago and 90 degrees from its previous position. Glancing at the artificial horizon, the airplane symbol is fixed in the little round section that shows straight up – the exact center

of the blue. I'm by myself in the most modern single-seat, single-engine jet in the world, letting more than 25,000 pounds of thrust push me up, for the moment, faster than the Shuttle and faster than Apollo. My thrust-to-weight ratio today is almost 1:1. I'm in a vertical climb and barely decelerating. Talk about making the sun rise and set with my gloved hand. Is this fun or what!

Twist My Arm

Despite the motivational 500-sentences, this day, I'm not a test pilot; I'm the squadron FCF Pilot (Functional Check Flight Pilot). I fly with the 430th Tactical Fighter Squadron Tigers, 474th Tactical Fighter Wing, Nellis Air Force Base, Nevada. This F-16A has a newly installed motor from Pratt, and it needs somebody to wring it out. Twist my arm. Fifteen seconds ago, I had pushed the single throttle forward to MIL power, checked the gauges, then rotated it slightly outboard and shoved it the rest of the way to full AB. That's the way fighter guys say it, by the way. MIL is short for Military and pronounced "mill" as in sawmill, and A-B (said as two letters) is Afterburner. MIL is full power and AB is full power plus a bunch of raw fuel dumped into the exhaust section just after the last turbine section, then lit on fire. At night you can see a 30-foot plume, and the sound is…the sound of freedom.

The F-16 has five stages of AB and one of my jobs today is to make sure all five will light. It happens fast, so you have to know what to listen for and, more accurately, feel for. Five distinct kicks in the hind end. The only indications in the cockpit are the exhaust nozzle position going full open and the fuel flow gauge pegging off-scale high – close to 60,000 pounds per hour. At $5.00 per gallon, that's about $12.30 per second.

Going Straight Up Over Government Property

Somewhere close to 150 knots I apply very slight back pressure on the side stick (that only moves a half-inch total), and the jet's in the air as I reach for the gear handle. I release the back pressure on the stick so little that it's more like a thought than action. I'm level at 20 feet, gear up, accelerating above the hot desert runway; I can see the heat waves. If I let it continue, I'll be supersonic by a half-mile off the end of the runway and out of fuel in seven minutes. Not today, though. For this takeoff my goal is to get some energy as quickly as possible in case something bad happens and keep me, my jet, and its pieces-parts on government property if it does. At 350 KIAS, I pull back on the stick again – this time to 6G's. The back pressure on the stick to get to 6 G's is less than five pounds. I'm going straight up over government property.

By the time I've watched the altimeter spin for eight seconds, it's time to pull over onto my back at 15,000 feet then roll upright. I pull the throttle out of AB, check the engine gauges again, point my nose toward the MOA and slow my climb to 8,000 feet per minute. I'm headed for the FCF area and a working altitude of 25,000 feet. I'll cruise out there at about 350 KIAS. So far, I'm one minute into the flight. Another five and I'll be in the MOA at altitude. This new motor is awesome.

Now, there is something you have to know about these FCF flights. Remember the scenes from the movie "Apollo Thirteen" where they're trying to power up the spacecraft and get it oriented for re-entry after being cold-soaked for three days? Hundreds of checklist steps all done in a precise order? That's kind of the way the FCF profile

goes. You have about 10,000 things to do and check, and you've already used up a third of your gas just getting off the ground and to the test area.

Most Never Get North of Mach 2

As soon as you hit the test corridor, you plug it back into burner and do the speed check. By the time you get to fly the F-16, you've already been supersonic a few times so that's no big deal. Most pilots never get north of Mach 2, however, except FCF pilots. The actual speed I'm checking is classified, but it's on the checklist to verify that you can get to it. The new motor does it easily. It's also at these speeds that the stabilator starts to work as a "taileron" taking over from the flaperons.

Now, for you aero folks (short for aerospace engineers) and RC builders, the stabilator vs. elevon vs. taileron debate is ongoing. We F-16 guys used to say stabilator when the true engineering name would be elevon. In the 16, the "horizontal tail" is actually a combination elevator, stabilizer, and aileron. So taileron, elevon, and stabilator all are correct. In any case, whatever it's called, it's a "made-up" word. Made up by you aero people.

In the style of professor William Strunk Jr., who coined the word "studentry" over student body, I thought maybe I'd make up a new word to describe the horizontal tail functions: Staba-later-on. Pronounced Stabalator with "on" added to the end. Take the hyphens out when you quote me. "I respect a man who knows how to spell a word more than one way."

(Mark Twain) The rudder isn't like a Bonanza rudervator, though. The F-16 has a "mostly" normal rudder. It's controlled by the computer, including correcting for yaw when you shoot the gun.

The next test is one we used to call a "gut-check." If the test fails, you have to restart the motor – if it will start. The engine has some self-protection features to prevent it from "blowing out" if the commanded fuel flow drops off while the airflow is still large. At Mach 2 plus, the airflow is large. The test is to briskly pull the throttle all the way from full AB to idle. If it blows out, you wait until you're subsonic and restart it…maybe. Or worse, if the IGV's (inlet guide vanes) "flat plate" and severely limit airflow through the engine, you will kind of explode due to the back pressure in the long inlet to the motor. Today it works. Thank you, Lord.

Stay tuned for "Paper Airplanes – Reloaded" Part II in the June issue… T&T

Kevin Dingman *has been flying for more than 40 years. He's an ATP typed in the B737, DC9 and CE-650 with 25,000 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 retired from a major airline, flies the Cessna Citation for RAI Jets, and owns and operates a Beechcraft Duke.Contact Kevin at* **dinger10d@gmail.com**.

Love, Guac and JET-A

Monty Moran recognized the importance of others' contributions and how their skills fit into the big picture from a young age. This talent was honed during his tenure as the co-Chief Executive Officer of Chipotle Mexican Grill. During Moran's 12 years at the helm of the fast-casual restaurant, the company grew from a handful of restaurants to almost 2,500 restaurants and nearly 75,000 employees.

After stepping away from the company's operations in December 2016, Moran opted to pursue a longstanding dream. "I had always wanted to be a pilot, but a kid on the playground during elementary school said it wouldn't be possible because I was too tall. The internet didn't exist back then, so there was no easy way for me to fact check what he said, so I dropped it."

But, nearly 40 years later, flying was finally something that Monty could pursue – and no one was going to tell him it wasn't possible this time. "After 23 years of being a CEO, both at Chipotle and a law firm [Messner Reeves LLP in Denver], I finally had the time to learn to fly. It was the first thing I did once I retired."

"So, I called Journeys Aviation at KBDU [Boulder Municipal Airport] and said I wanted to learn how to fly. They said 'of course' and asked how quickly I wanted to start." Now with the time to dedicate to his lifelong interest in aviation, Moran eagerly replied, "Is there availability this afternoon?"

The next day, he completed an inaugural lesson in a Cessna 172. He soared through initial training, and five months after his first lesson, Moran received his Private Pilot Certificate. The milestone was only the first step in his aviation obsession. The newly minted pilot's next question was, *What plane will best fit my mission, and where do I go from here?*

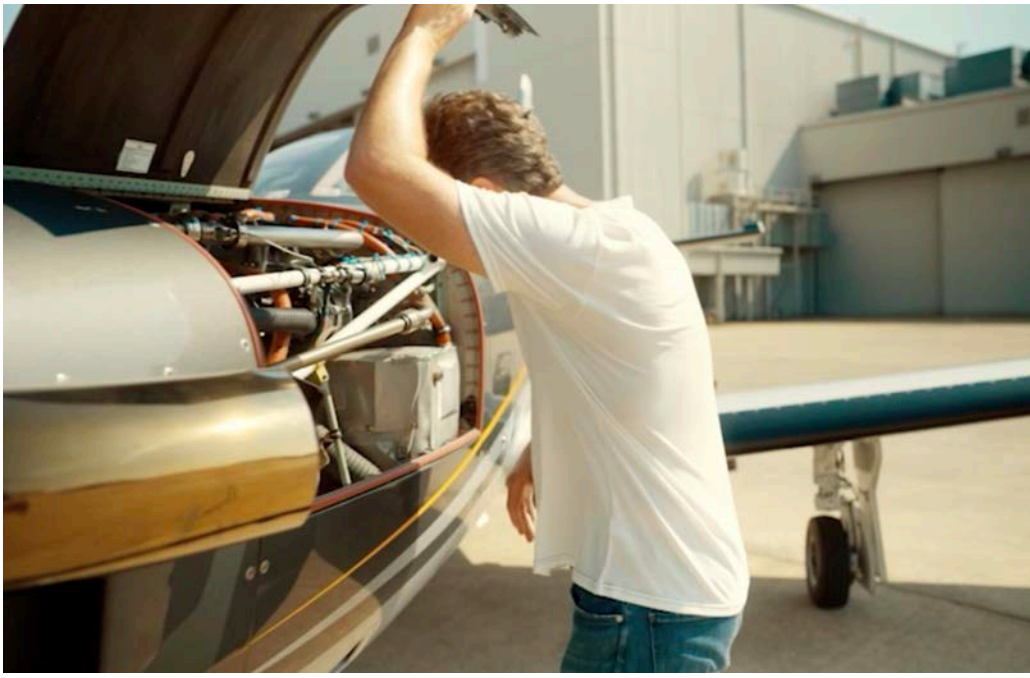
His first aircraft search led him to a 1991 Beechcraft Bonanza A36. Moran says, "It was a cream puff, an absolutely beautiful airplane with new propeller and avionics." Moran

also noted what made it really special was that this A36 was the exact plane that had previously belonged to his good friend, Kyle Deaton. Deaton initially re-sparked Moran's interest in flying after giving him a ride in the same plane years before.

Moran immediately began working towards an Instrument Rating after acquiring the Bonanza in 2017. The training was instrumental in his continued aviation journey, providing him flexibility in weather and the ability to tackle Class A airspace. Another integral component was an early introduction and emphasis on crosswind landings. Having lived in the North Central Colorado area for most of his life, Moran was no stranger to its volatile weather. "With high altitudes, temperature variations, strong wind, thunderstorms, and other challenges, overall, Boulder is generally a hard place to land."

Moran's instrument checkride tested both his newly acquired knowledge as a pilot as well as his high-Colorado landing skills. "My autopilot failed during my checkride. After confirming with the examiner that I could still finish, I hand flew the remainder of the flight. It was extremely turbulent, and we were bumping around like crazy. On the final landing, I was crabbing sideways and landed on one wheel. To which the examiner said, 'Now that's a crosswind landing!'"

After several hours of tough flying that resulted in a new ticket, Moran was tired but excited. The excitement soon translated to the next chapter in his logbook.



Since retiring from the corporate world, Moran not only pursued flying but sought the answer to a more esoteric question: *How can I best demonstrate how people from varying backgrounds are united in their common struggle to find meaning and purpose?* The personal quest now serves as the basis for the documentary series Moran produces and stars in called "CONNECTED: A Search for Unity." The show, now in its second season, runs on PBS stations across the country. In addition to showcasing people with unique insights, the docuseries is largely enabled by Moran's use of private aviation.

His chariot of choice to filming locations is a TBM 910 that he has now owned for four years. On top of noting that the plane has been able to get into all types of airports needed for filming needs, Moran has a lot of praise for the aircraft.

"I have about 800 hours in the TBM 910. It climbs fast, cruises smooth, has a great onboard weather radar, as well as a great autopilot that has never clicked off for me, even in the heaviest turbulence." He added, "Also, it climbs faster than a lot of jets. Sometimes, you can tell that ATC is surprised that I'm already at their assigned altitude."

This time, his purchasing decision was largely driven by safety. He didn't feel comfortable moving into another airplane that wasn't a twin or turbine primarily to the fact that he routinely flies over mountainous terrain. While potentially a unique rationale for an upgrade compared to other turboprop operators, he has nonetheless enjoyed the improved safety margins, speed, and range that the TBM has afforded.

Moran initially considered a turbine-converted Bonanza for sale when his friend Deaton asked the owner to bring it to Colorado for a test flight. But after flying it, he soon saw another airplane land at the airport

that caught his eye. It was a TBM 850. After taking a closer look, he started dreaming. "I really couldn't get my mind off it. I had a new obsession. That night I started looking online for one and then started to talk with sales representatives."

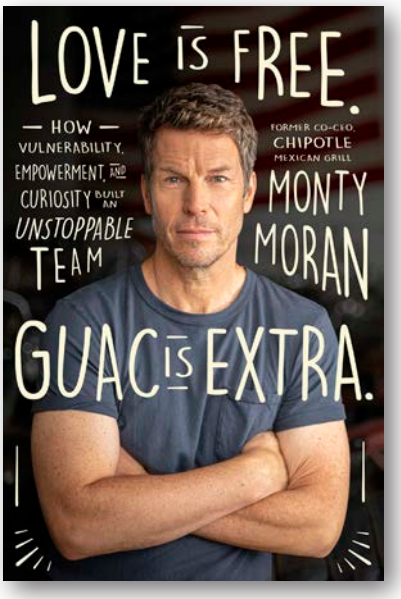
The conversations went well for Moran, leading him to the 2018 TBM 910. He was initially concerned about being a lower-time pilot with no turboprop time, but with the help of professionals, they outlined a path forward – with 100 hours of transition time with a mentor pilot included with the new purchase. The airplane was brought to Colorado for him to see.

If the Turbine Bonanza was a head-turner on the ramp, the French-made single-engine turboprop was a showstopper. Shining in the high Rocky Mountain sun, the aircraft taxied across the ramp and rolled into Moran's view. No sooner had the propeller stopped spinning did the ex-CEO, now passionate aviator, begin intently walking towards the new arrival. As Moran requested to peek inside, the exiting pilot struck up a conversation with him. Terry Winson, as he introduced himself, was the President of Avex, the TBM distributor in the Southwestern United States.

Knowing that Moran was in the market for a new plane, Winson thought he would turbocharge the sales process and craft an impromptu meeting. He offered a test flight that day, but Moran, unfortunately, couldn't accept. "I have to go and pick my daughter up to make a commercial flight to California to go to Disneyland." But as one may guess, the airline trip was canceled in favor of left seat time in the six-seater. After belting his daughter in the

back, and with the very experienced Terry Winson in the right seat, off they went. No sooner had they landed at Santa Monica Municipal Airport (KSMO) when Moran proclaimed, "I'll take it!"

Since that two-and-a-half-hour flight, the aircraft has been an integral part of Moran's life. This has been true whether for personal travel or in support of his humanitarian efforts. Today, he flies the TBM to a variety of locations within the contiguous United States. Most often these flights are with Moran as the sole occupant, occasionally a few passengers. And just as he sought to grow as a leader in his previous roles, he is consistently working to better himself as a pilot.



Drawing a flying parallel from his own definition of "leadership" detailed in the self-written memoir "Love Is Free. Guac Is Extra," a pilot is someone who is a leader of their airplane. They work to understand its quirks, limitations, and potential to reach their desired outcome, guiding it down a mutually beneficial path of success. T&T

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Taking Your Temperature

No, this is not a piece about the importance of flying healthily. Instead, it's a reminder of the effects of temperature on the performance of your airplane – especially turbine-powered jets. And specifically, the temperature at cruising altitude.

I am an expert on the subject because I passed a three-hour credit course on "climatology" in college.

Of course, any airplane's performance is affected by temperature, density altitude, weight, etc. Years ago, the aviation community decided to base performance data on a "standard atmosphere." I guess they all got together for drinks and agreed on exactly what that would look like, but it allowed each airplane's performance to be measured equally. They called it the International Standard Atmosphere, or ISA. Each altitude was given a standard temperature. If on a given day the actual temperature is warmer than the standard, we call it ISA plus "X."

And here's where that temperature thing becomes important.

If you are running a foot race in Aspen, Colorado, the high altitude lessens your performance. If the temperature is also really hot, your performance will decrease even more. The same goes for your airplane. Remember, I passed a college course in this stuff.

Some airplanes are affected more than others.

In my C90 King Air, a really warm day, say ISA + 10 degrees C (Celsius), had no significant effect on fuel burn or performance mainly because the King Air flies at lower altitudes, say 25,000 feet. But your average single-pilot jet cruising at 41,000 to 45,000 feet is a different animal. Jets must cruise at high altitudes to achieve the range and fuel burn advertised in their brochures.

To compound the issue, some jets have more "excess" thrust than others making it easier for them to achieve performance numbers even in ISA+ temperatures.

For example, the Citation CJ3+ is "overpowered" in that its engines can meet performance numbers even in ISA+ situations. My sweet little Mustang, not so much. The engines on the Mustang perform well at ISA + 0 temperatures but warm up the air just a little bit, and the airplane is not happy.

A recent flight home from Columbus, Ohio (KCMH) illustrated this dramatically. My flight up from Dallas with CJP CEO Trent Corcia was a nonstop breeze in slightly over two hours, with a 70-knot tailwind. The temperatures along the route at FL 390 were ISA + 0, a standard atmosphere. The Mustang was very happy. Less than 24 hours later, an approaching cold front totally changed the picture. My planned nonstop return was possible only if I could cruise at FL400. Temperatures in the climb out of Columbus were forecast to be ISA minus 5. The Mustang loves that situation. But climbing through FL240 the temps were forecast to increase to ISA plus 9!

I knew from about 1,000 hours in the airplane that it would not be possible to climb up to FL400 in such warm air. And the increased fuel burn at a reachable altitude of FL360 would make a nonstop trip impossible. I stopped in Little Rock for fuel.

Take your temperature before every flight.

Fly safe. T&T

David Miller *has owned and flown a variety of aircraft from light twins to midsize jets for more than 50 years. With 6,000 plus hours in his logbook, David is the Director of Programs and Safety Education for the Citation Jet Pilot's Safety Foundation. You can contact David at* **davidmiller1@sbcglobal.net**.

What Can You Expect From a High Efficiency Cowling? Ask the Man Who Flies One.

Sir,

Wanted to let you know that we have been keeping track and monitoring the improved performance of our PC-12 NG. We are seeing better performance, and with our movements around North America, we have tested it in Midland, TX, to Northern Canada. We are seeing increase performance at cruise and in the climb. I do think that we are truly getting the value out of the modification.

Regards,

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