Navigating FAA Medicals / Owner's Corner: Epic E1000 GX / The New Bose A30

TWIN & TURBINE

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

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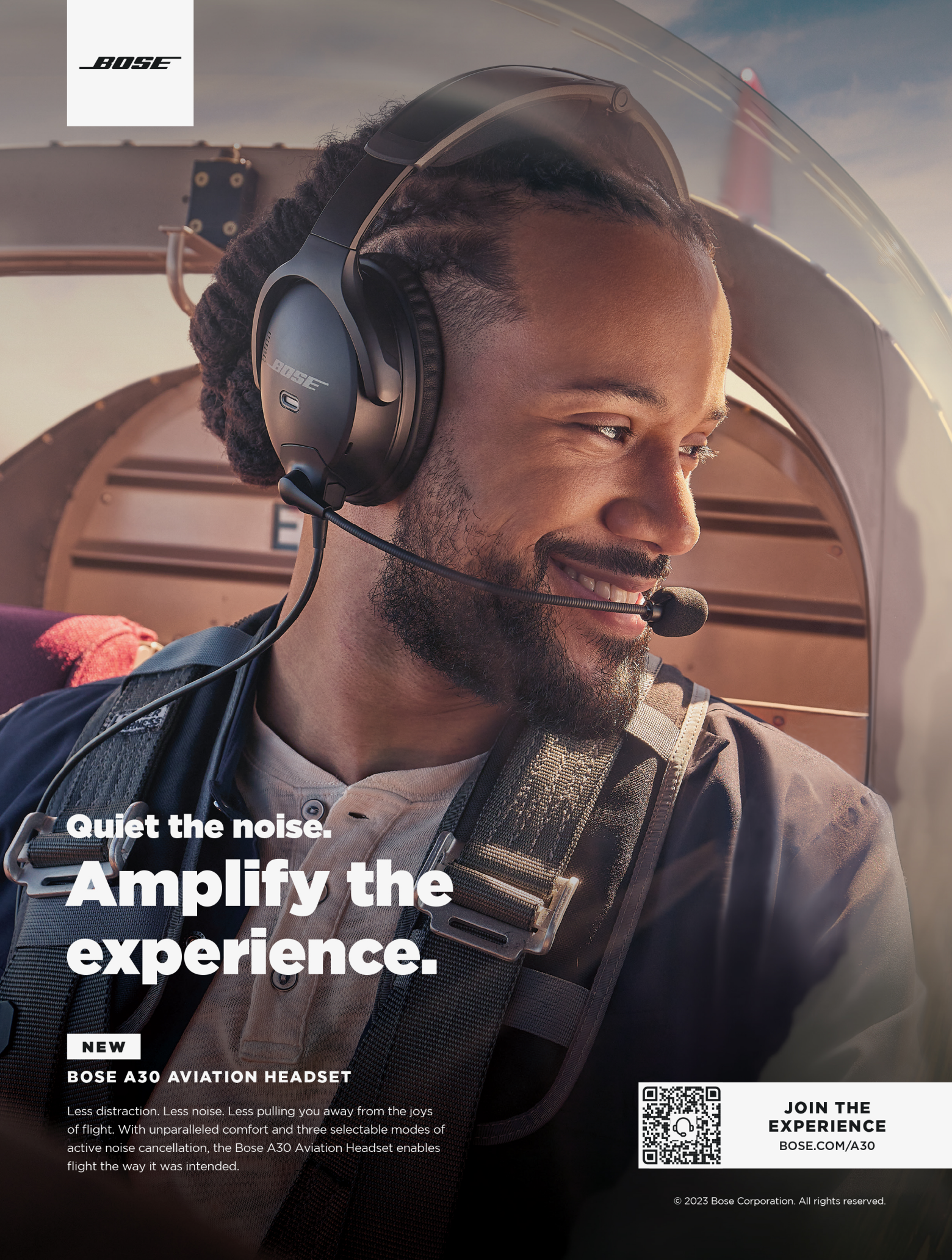
A FLIGHT REVIEW WITH HISTORY

DORNIER DO 28



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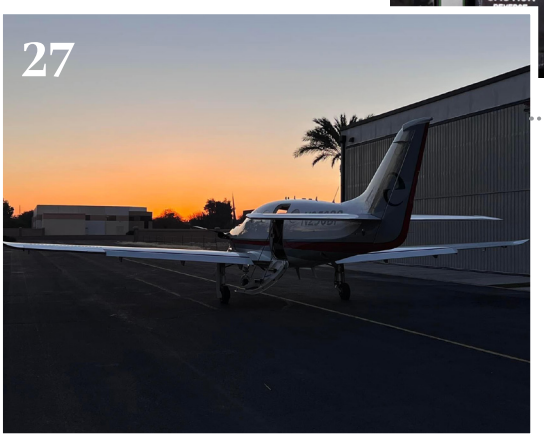

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Editor's Briefing

by **Lance Phillips**

The Next Chapter

As we start a new chapter at Twin & Turbine, I want to recognize and thank those who came before me. Rebecca Groom and I have worked on multiple projects throughout the years, and I have grown to trust and respect all she does. She was part of the team that helped launch the new Textron Aviation brand initiatives when Beechcraft was acquired. Later, she wrote the Mooney Aircraft newsletters to Mooney owners worldwide.

At Twin & Turbine, Rebecca provided an excellent resource for owners and pilots of cabin-class aircraft. She overhauled the website, updated the look and feel of the print publication, and kicked off several new editorial series.

I was honored and intrigued when Rebecca reached out a few months ago about possibly taking her place. Over the years, I have provided marketing support and content creation (including editorial review and art direction, photography, writing, and management of the teams producing that work) in the aviation, automotive, and creative industries. And the idea of leading a publication that I have enjoyed holding in my hands for years excited me.

In my short time working on this issue, my first one, I have come to admire the talented Twin & Turbine writers. This month, we get a history lesson and a flight review focusing on a unique set of two Dornier Do 28 aircraft in Wisconsin. Next, navigating FAA medical certification since 2020 has become murkier, especially as upticks in emotional and physical ailments have left many pilots with little information and few options. But there are ways to prepare more effectively for your next medical certificate renewal exam. In addition, we learn what it's like to own and operate the Epic E1000 GX. Closing out this issue are reports on upset recovery philosophies, icy weather troubles, and updates on the newest cockpit technologies. At Sun N Fun, Bose announced its new A30 aviation headset, and Twin & Turbine had the opportunity to provide one of the most in-depth reviews of the successor to the company's industry-leading A20.

In upcoming issues, I intend to continue Rebecca's initiative of providing owners and pilots of cabin-class twin and turbine-powered aircraft with relevant, fun, and up-to-date information. My experience as a professional pilot and an aviation business pro will enable me to provide you, the reader, with a compelling resource to improve your understanding, skills, and overall enjoyment of our special aircraft and aviation environment.

With all that in mind, I want to have an open-door policy. In this case, the open door is an email. Please let me know when I can do something better or if we can highlight a particular area you want to know more about. Pilots operate in a relatively unforgiving environment, so we always continue learning and want to get better and know more about what we do. The same goes for an aviation publication. Thanks so much for your continued readership.

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Bose A30 Aviation Headset

New Features, Comfort Focus

by **Rich Pickett**

PHOTOS BY RICH PICKETT

One of the best ways to help reduce fatigue in the cockpit, and protect your hearing simultaneously, is to wear a quality headset. When I first started flying, there were few options, and we now have a wide variety, satisfying an equally varied pilot preference profile. The singular defining moment in headset technology was the release in 1989 of aviation's first commercial acoustic noise cancellation (ANC) headset by Bose.

Building on that success, Bose continued to innovate, bringing the Bose X headset to market in 1998, followed by the Bose A20 in 2010. Over the product life of the A20, Bose continued to improve the product, adding Bluetooth connectivity and other features in 2015 and later. Expanding into the super-lightweight market for lower noise environments, such as jets, with their 4.5 oz Bose ProFlight in 2018, followed by the ProFlight Series 2 in 2019, both of which I have reviewed in Twin & Turbine.

I've owned every model in Bose's product line and flown over 10,000 hours with them in pistons, jets, and rotorcraft. Recently Bose offered Twin & Turbine the opportunity to evaluate a new product before its public release at SUN n' FUN Aerospace Expo. That product is the Bose A30 Aviation Headset. Having flown with the A20 for 12 years and being very pleased with the performance, I wondered how they could improve this successful product.

At first glance, the new model looks very similar to their previous flagship, the A20. A closer look at the headset reveals some physical differences, starting with a redesigned box and case. The weight of the A30 is the same as its predecessor (12 oz/340 g), with the same ear cushions. Beyond that, there are significant differences. The headband is now aluminum and has a sleek black design versus magnesium; the headband cushion is cloth/foam.

Building upon the slimmer (3.5mm) down cable on the ProFlight Series 2, at 4.0 mm, the A30's cable is nearly 20% smaller than the A20's. That may sound insignificant; however, I noticed a difference with the cable being easier to handle. Considering that this small cable houses 14 conductors, more than any of its predecessors, it is impressive! The Bose A30 needs this many wires

to communicate between the control module and sophisticated technology in the earcups, including new microprocessors. The A30 also incorporates a new, smaller boom microphone similar to the latest ProFlight. It proved to be crystal-clear in both hot-mic and PTT environments.

Another feature based upon the ProFlight, the Bose A30 incorporates a toolless swappable microphone/cable assembly. An improvement over the A20, you can easily install it on either earcup, a feature that previously required a screwdriver to make the switch. It helps simplify cord management, dependent upon crew position.

With the A30, Bose has reduced the head clamping force by 20% over the A20, something definitely noticeable in use. Bose also lowered the center of gravity towards the earcups, reducing the on-head weight by 6 grams. All of these changes result in more comfort for pilots and passengers.

New Control Module

The active technology in the A30 is divided between the earcups, with their external and internal acoustic sensors, internal speakers, microprocessors, and the control module on the down cable. The new module still offers the same features of the A20, including the 3.5mm input jack, with some substantial changes. The apparent external difference is the three-position ANC level selector, similar to the ProFlight. In High, all frequencies are attenuated; selecting Medium reduces cancellation with some frequency shaping. Placing the ANC in Low results in the lowest noise cancellation, however, with a gain in the voice range frequencies (300-3300 Hz) while facilitating external communication. This mode is also activated in a single ear cup by Tap Control, a new feature of the A30, which can be enabled with a switch inside the Control Module.

Inside the Control Module is another new switch – Emergency Revision. In the unlikely event of issues with the headset, selecting this switch will inactivate all functions except attenuation and intercom. If you look closely, you will also note a micro-USB connector. While not discussed in the documentation, I surmise it is for future software firmware updates in the field.

Tap Control Feature

One of the unique features of the Bose ProFlight is Tap Control which is now integral to the A30. When you want to converse with a passenger or crew without removing your headset, double-tap the outside earcup closest to that person. The ANC isn't simply reduced to the lowest level; the voice frequencies are enhanced, making it even more effective than removing the headset. This feature is designed primarily for lower-noise environments since it won't activate in high-noise situations to offer sufficient hearing protection. When the conversation is over, double–tap again, or select a different level of ANC. It couldn't be simpler.

Flying with the Bose A30

Flying 500-700 hours annually, with some months approaching 100 hours, I have ample opportunity to test the efficacy of headsets in various environments. Some of my flight days are long and occasionally involve different aircraft types in a single day.

In the jets, my go-to headset is the Bose ProFlight Series 2, which is extremely lightweight and great in the lower noise environments of these aircraft. I also fly with my Bose A20s in some of the jets, including the Cirrus Vision Jet, but primarily utilize this headset in turboprop and piston aircraft (airplanes and rotorcraft).

For our first evaluation of the Bose A30, my son Tigre and I decided to test it in our Cessna T206H on a flight through the San Diego Harbor, including a series of takeoffs and landings at our airport, Montgomery-Gibbs (KMYF) in San Diego. The T206 is a great airplane; however, the noise level is exceptionally high on takeoff, which makes it a perfect test environment. When I first put on the A30 in the T206, I could attest that Bose's claim of a lower clamping force was accurate. The reduced pressure is welcome after

having flown with the Bose A20 on some very long days. Headset fit is very personal, and since the ear cup shape is identical to the A20, if the latter fits you, the A30 will also!

The environment of our Cessna T206 proved to be an excellent evaluation test bed for the variable ANC modes. The High level of ANC is comparable or better to the A20's and offers maximum noise reduction across the entire frequency spectrum. Selecting the Medium level was a different experience, with less ANC but still very useful. In Low, the voice frequencies were increased, and the noise level was substantially higher. Except when necessary to better hear external sounds, pilots would not use anything other than the High ANC in such a noisy environment and turn off Tap Control to prevent activation.

Tigre and I swapped the Bose A20 and A30 headsets throughout the flight for a near-simultaneous comparison. We both felt the ANC was similar; however, I perceived it as better on the A30s. We both remarked on the reduced clamping force of the A30 --- but were happy with both units.

On to the Jets

Tigre and I decided our following test environment would be the Citation Jet (CJ), one of the jets we manage and fly. This particular CJ, equipped with the G1000 suite, has one of the quietest cockpits of the jets I've flown, similar to the PC-24, measured by our sound meter. The next day we hopped in the CJ on a flight back from Cabo San Lucas to San Diego for the evaluation. In that jet, we have a Bose ProFlight and an A20, another excellent testing environment.

I enjoy the light weight of the ProFlight, which has excellent performance; however, the A20 offers a bit more noise reduction, which makes sense due to the physical mass – although

technically, the active ANC in the ProFlight is more advanced. I used the Tap Control with the ProFlight and looked forward to testing the feature in the A30. The comfort of the A30 was excellent on the flight, and I opted to use it as my primary headset. We tested all modes of ANC. Sometimes it was difficult for us to consistently activate the Tap Control, which works best if you double-tap with your fingernail directly on the earcup. It was almost easier for us to select Low on the ANC level control switch. We both felt that keeping the ANC in High was the best mode for us, except when talking to our passengers, primarily due to the cancellation across all frequencies.

We also wanted to test the new A30 on a more extended flight, so two days after our Baja trip, we took off to fly from San Diego to Ft. Lauderdale for a few days in the CJ. The longer you fly with the A30, the more you notice the reduced clamping force and comfort, which we confirmed on fifteen hours of flying over two days.

Our ANC decibel testing (A-weighting) noted a 30 Db reduction in High, 10 Db in Mid, and 5-10 in Low. Our testing wasn't a fully-engineered testing environment but reflected in-flight testing inside the ear cups.

Audio Response

The Bose headset meets the FAA TSO and E/TSO-149 standards, passing 145 certification tests. This standard is very complex and includes an audio specification targeted towards spoken communication – microphone and speaker.

ATC and Intercom audio in the Bose A30 utilizes one Equalizer (EQ) circuit tailored to this requirement – hence the crystal-clear speech quality. The 3.5mm sound input jack uses a separate EQ tuned slightly differently, balanced for both sound quality for music and voice. When connected to a Bluetooth source, a third EQ is activated that utilizes what Dr. Amar Bose termed the 'golden curve' for the music input. In discussions with Matt Ruwe, senior product line manager at Bose, he mentioned that including three EQs provides for the optimization of sound, dependent upon the source, which makes sense. In this way, you don't have to compromise with varied inputs. We noticed that the sound quality while using Bluetooth was terrific and definitely a different experience than when using the 3.5mm input source.

Pricing and Availability

Bose offers the A30 Aviation Headset at $1,249 retail, a slight increase over the price of the A20 model, with or without Bluetooth connectivity. You can order the general aviation model with 5-pin XLR, U174, 6-pin LEMO, or dual-plug connectors, as with other Bose headsets. Next year, U384 and other connection options will be available for GA, commercial, and military markets. In aircraft equipped with power to the multi-pin connector, battery power is unnecessary, and the headsets will power on automatically with aircraft power. Adaptors for both U174 and dual-plug connectors are available with the LEMO version. Videos detailing the new Bose A30 headset can be viewed on the YouTube Personal Wings channel.

You can purchase them directly from Bose or your favorite Bose Aviation dealer.

Final Words

We've tested the Bose A30 Aviation Headset over 60 flight hours in various aircraft models, from some of the noisiest pistons to quiet jets, and are impressed with Bose's latest aviation headset. The reduced clamping force alone is a significant upgrade. In conjunction with other improvements, it is another excellent product from Bose Aviation. T&T

With 12,000+ hours of piloting more than 100 aircraft models, **Rich Pickett** *still has a passion for flying. Rich holds an ATP, CFII SME, SES, glider licenses, and type ratings in the L29, L39, Citation 500/510s/525s, Eclipse 500S, Beechcraft Premier and DA10. His company, Personal Wings, provides training, mentoring and aircraft services. You can contact Rich at* **rich@personalwings.com**.

PHOTOS BY JAY SELMAN OF JAYBIRD AVIATION PHOTOS

A FLIGHT REVIEW WITH HISTORY

DORNIER DO 28

by **Matthew McDaniel**

For years, a derelict twin mounted high on floats sat in the grass adjacent to the little terminal building at the Shawano, WI airport. Only a select few pilots could identify it by type. Dan Fulwiler says he used to stare at it, thinking how unique and cool it looked. Pepe Anderas did the same, drooling and daydreaming about the plane while wondering what in the world it could be. Pepe and Dan agree; neither imagined in their wildest dreams that each would have one of their own. Unbeknownst to them, two more mystery planes were inside a nearby hangar. They were long dormant Dornier Do. 28A-1's, patiently awaiting rescue.

In 2015, Fulwiler took ownership of N12828, and Anderas watched with interest as his friend returned her to the air later that same year. In 2019, Danny also acquired N841RS in a package deal with a Cessna 180. Mainly he bought it for fear it would be scrapped or parted out. He had asked Pepe to buy it, but Pepe saw it as too much of a project and declined. So, Dan slowly began working on it, removing its floats and remounting its landing gear. Pepe, however, began to reconsider, thinking earnestly, "Well, soon Danny will have two flying Do.28s, and I won't have any!" A deal was struck in late 2020, and Pepe began repairing the plane. By April 2021, a second Do.28 was airborne above Green Bay, WI. These fast friends have thus become the owners of the world's last two flyable A-model Dornier Do.28s. After 20 years of captivity inside a shared hangar, they are not only airworthy again, they are airborne often. As long as Danny and Pepe remain able, their rare Dorniers will not be hangar queens and will certainly not be returning to their previous states of abandonment.

Dornier Metallbau

Literally translated, "Dornier Metal Works," the German company was founded in 1914 by Claude Dornier. In 1923, it became Dornier Flugzeugwerke (aircraft factory) while taking over the production facilities of several failing aircraft companies. Dornier soon became well known for its all-metal airliners, both land, and water-based, including the massive 12-engine Do.X flying boat, at one time the largest and heaviest aircraft in the world.

During WWII, the company designed and manufactured many successful bomber and fighter designs for Germany, culminating in the fastest piston-engine fighter of the war. This push-pull twin, the Do.335

Stub wings were added to mount the new twin engines.

Arrow, first flew in Oct. 1943 and had a top speed of 474 mph. However, the lack of engine availability limited its production, and it saw no real wartime action. After the war, Dornier survived on aeronautical consultancy services in Spain and elsewhere outside Germany. In 1954, it returned to original design work with the Do.25, which failed to be selected for production by the Spanish military.

Further development led to the Do.27 in 1955, which was chosen for production by both Spanish and German military forces. During the type's subsequent decade of production, approximately 470 were built. Eventually, over 20 nations would utilize Do.27s for utility, transport, liaison, and general-purpose missions. It could accommodate 4 fully outfitted troops in the cabin and the two pilots up front. Its rugged construction and exceptional STOL capabilities kept the Do.27 in military service well into the 1980s.

After several years of Do.27 production, in 1959, Dornier developed a twin-engine version to be certified for civilian sales and marketed it for various military and governmental roles. The design goals were enhanced redundancy and performance with expanded load capabilities while retaining the basic design's ruggedness, classic taildragger configuration, and STOL pedigree.

Edge-to-edge slats enhance the wing's STOL capabilities

27 times 2 = Do.28

The similarities between the Do.27 and Do.28 are extensive. Removal of the engine from the nose allowed room for a slight expansion of the cockpit area. The cabin officially accommodates 6 (versus 4) on two bench seats in a club configuration, though it would be tight with 3 adults across each. Otherwise, the fuselage and empennage are identical. The Do.27 wing was retained on the Do.28 prototype, but a 5-foot increase in wingspan was incorporated into the production Do.28 A and B models.

Despite the commonalities, the unusual configuration of the Do.28 is unmistakable. Stub wings were added to the lower fuselage, providing engine mounting platforms. Relocating the main landing gear below the engines allowed a much wider stance than on the narrow-tracked Do.27. For the production A-1 model, Dornier settled on 250hp, carbureted, Lycoming O-540's, spinning 2-bladed, constant-speed props. The B-models upped the ante by adding fuel injection, 3-bladed propellers, and an increase to 295hp.

From any angle, the Do.28 is a unique twin. But one must admire Dornier's break with tradition for maintaining commonalities and keeping the main wing's highly effective STOL design intact. One continuous slat clings to the wing's leading edge from tip to tip.

Massive flaps can be deployed down to 45 degrees on the trailing edge. As the flaps deploy, the two-segment ailerons divide into halves. The outboard halves continue to function traditionally. However, the inboard halves become flaperons, drooping as a percentage of flap deflection and remaining functional as ailerons for roll control. The 3-surface system just adds to the Do. 28's non-traditional design philosophy. With the added lift of the lower stub wings and engine nacelles, 5 additional feet of span on

The new stub wing up close

the main wing, and the added horsepower of the second engine, the Do.28 succeeded in increasing payload by approximately 700 pounds above that of the Do.27, while retaining similar STOL capabilities.

Dornier produced 60 Do. 28A-1's before introducing the Do.28B-1 in 1963. Coincidentally, 60 B-1s were made, too, with production ending in 1966. They served in various civilian and military roles similar to the Do.27, ranging from bush flying in the heat of Africa to the cold of Greenland to covert hauling for "Air America." In 1966, the Do.28D Skyservant was tested, and production began in 1967. But, the re-use of the Do.28 designation is wildly misleading, as the D-models have essentially no commonalities with the A/B outside of their similarly unconventional configuration. The Skyservant was a clean sheet design of a much larger aircraft rather than a Do.28A/B refinement.

Tale of Two Island Hoppers

The Red One: Serial #3012 (production #11) was built in 1961 and briefly registered in Germany. Within a year, it was re-registered as OY-ALL and was hauling supplies to remote mining sites in Greenland for its Danish owners. The bright red color scheme enhanced its visibility in that hazardous role while flying between Edinburgh, Scotland, and the Faroe Islands on iceberg patrols and search and rescue missions. In those days, it landed on wheel-penetration skis. In 1983, it entered service with the Isle Royale Seaplane Service, which was contracted to transport tourists between Michigan's Upper Peninsula and Isle Royale National Park, far out into Lake Superior. In that role, "Ruby" (as she is now affectionately referred to by her owner) was mounted on straight floats. She labored as an island hopper for 18 years until 2001, when the service was grounded after 9/11 and Ruby (still on floats) was pushed into the back of a Shawano, WI hangar, where she would collect dust for the next 20 years.

The Green One: Serial #3023 (production #22) was also built in 1961 and is believed to have flown either for the German Police or a small airline. In 1980, it was overhauled by Dornier and then joined the Paramilitary Force of Lesotho, Africa. It was grounded there in 1982 with engine issues and didn't return to flight for a decade, by which time it resided in California. In 1993, it was wrecked and rebuilt using parts from a Do.28A that had tangled with a UH-1 Huey helicopter. It returned to flight status in 1995 and was quickly sold to Isle Royale Seaplane Services and moved to Wisconsin. They parked it as 1996 ended, with plans to eventually convert it to a floatplane and incorporate it into their existing fleet of four Do. 28's. But that didn't happen. It sat until joined by its Isle Royale sister ships just as 9/11 abruptly ended the planes' operations.

Flights of Not-so-Fancy

My impression of flying the Do.28A was not one of drama or hyperbole. Instead, I found the machine to be just what it looks like. Oversized proportions, robust construction, serious STOL capabilities, and simple, specialized systems. Climbing aboard requires some dexterity to utilize the fuselage step and handle to hoist oneself onto the stub wing without bonking your head on the bottom of the main wing. But the cockpit door/window hatches are enormous, and once you've coaxed your legs inside to straddle the floor-mounted control column, the station is roomy and comfortable. Controls fall readily to hand with the centrally mounted power quadrant. The fuel tank cutoffs and crossfeed selectors are ceiling-mounted, where they are unlikely to be moved inadvertently.

The flight controls are well harmonized in all three axes, neither heavy nor light. They require a little muscle, but not too much, and are solid enough to never be twitchy. However, they are not at all "heavy," in the way that is common among "truck-ish" piston twins. Pitch trim is controlled manually via a massive trim wheel between the pilot seats. The ship-like wood and metal wheel is easy to find and grasp and effective and precise without looking at it. Pitch trim can be fine-tuned to fly hands-off with ease. With matched engine thrust, the Do.28 can be flown with an occasional tap on a rudder pedal to keep the wings level. Slow flight, steep turns, and stalls can all be summed up in a single word – benign. Each maneuver was predictable and easy to accomplish via the well-harmonized controls and easy-to-scan instruments.

The cockpit door/windows are enormous

During my initial takeoff in Ruby, I discovered a bit of lag in rudder response. Once rudder pressure is added for directional control on the runway, it seems wholly ineffective at first (even when near liftoff speed). But, when it finally responds, the pilot is reminded the rudder is indeed large and authoritative. During the lag, though, I was fooled into overcompensating with the rudder, meaning when my action took effect, it was with far more yaw than I needed. Of course, this created an out-of-sync series of yaw corrections that left me wandering across the centerline once the tail was up. Yet even with its nuanced yaw characteristics, the learning curve is quick, and it only took one takeoff for me to develop more patience and anticipate the airplane's slow reactions to the pilot's yaw inputs before getting too aggressive with my feet.

Climb and cruise were total non-events, and the Do.28 quickly settled into a 115 KTAS economy cruise speed. Being big and draggy, pouring more fuel through the engines doesn't generate a significantly higher cruise speed, with approximately 135 KTAS being max-power cruise. Pull one engine back to a zero-thrust setting to simulate a feathered prop, and directional control requires minimal rudder in cruise. Vmc was around 60 KIAS in the clean configuration as we slowed to explore the ability of the rudder to maintain directional control at the bottom end of the flight envelope. Thus, Dan and Pepe use that as their minimum approach speed. Flap application is simple using the central Johnson-bar control with a thumb trigger release. Trigger the release and pull. The first extension is 15° and requires little effort. The second is 35° which takes a mighty pull to get the lever to click into position. This is where each owner usually leaves the flaps for landing,

rarely needing the maximum STOL capabilities of the aircraft. If the pilot needs that third notch of flaps (45˚), the pull force required is shy of herculean thanks to the heavy loads on the massive flaps and flaperons.

Landings are a relatively low-stress affair thanks to the Dornier's simplicity (it being a taildragger notwithstanding). Pre-landing checks are a breeze with fixed landing gear, no cowl flaps, and lots of time to adjust settings at the slow pattern speeds. Pepe likes to apply the first notch of flaps and carb heat on downwind and the second notch of flaps by base leg. Final approach is at 60 KIAS in that configuration, and between the flaps, flaperons, fixed slats, and servo-tab boosted ailerons and flaperons, control authority feels like it does in cruise with barely even a hint of mushiness. Three-point attitude is attained with only minimal flare, and a gentle sweep of the power to idle settles the plane in. Any tendency to bounce is easily arrested in standard tailwheel fashion by pinning the tail to the runway with a timely but firm pull on the yoke...and keeping it there.

Left to right: Matthew McDaniel (author), Ed Treml (friend of owners, machinist) Kylee Fameree (photoship pilot), Pepe Anderas (owner/pilot of N841RS), Dan Fulwiler (owner/pilot of N12828)

What of the STOL capabilities, you ask? We landed at two well-maintained turf runways, the shorter of which was 2,200'. Using only two notches of flaps, with two people aboard and nearly full fuel with no headwind, Ruby was down and stopped in half the available length without any serious braking effort. Fulwiler followed in his green machine, with the additional weight of 4 adults aboard, requiring no more runway than Ruby had. When flown to its limits by well-schooled and practiced pilots, the Do.28A could be squeezed into and coaxed out of some seriously short landing sites (as in sub-1,000').

Caretakers

As with most antique aircraft owners, Fulwiler and Anderas quickly point out that they consider themselves caretakers. Their joint mission is to save aircraft from obscurity (they've each rescued multiple abandoned aircraft and returned them to flight). The Dorniers are not coddled, but they are well-maintained. They are flown to local grass strips, small weekend fly-ins, antique aircraft displays, and the world's largest airshows. Thanks to Dan and Pepe, these classics are shared with aviation lovers everywhere. Now we all can learn about these rare twins' origins and histories. And until such time as their caretaker roles are complete, they will continue to fly and share their treasures. I am confident they will seek out similarly motivated buyers when that time comes. And with any luck, the Do.28A will continue to be active in our American skies. T&T

Matthew McDaniel *is a Master & Gold Seal CFII, ATP, MEI, AGI, & IGI and Platinum CSIP. In 32 years of flying, he has logged over 20,500 hours total and over 5,700 hours of instruction given. As owner of Progressive Aviation Services, LLC (www.progaviation.com), he specializes in Technically Advanced Aircraft and Glass Cockpit instruction since 2001. He's a Boeing 737-series Captain, holds 8 type ratings, and has flown over 120 aircraft types. Matt has earned the Master CFI designation for 10 consecutive two-year terms. He can be reached at:* **matt@progaviation.com** *or* **414-339-4990.**

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Navigating the FAA's Medical Processes

Joseph LoRusso is often found flying his 1943 Stearman around Broomfield, Colorado.

Joseph LoRusso's job as director of aviation at Ramos Law in Denver, Colorado, has changed over the past several years. The privilege of fiercely advocating for airmen remains the same, but the timing of his involvement in his aviation clients' journeys has changed. Not only that, but the state of the current medical landscape is also very different.

"It's important to explain from the start that I've been doing airman certificate defense for nearly a decade. Before that, I was a professional pilot. At this point, I have been flying for twenty years and have never seen the FAA as challenged as it is right now. The FAA aircraft registry is about eight months behind, which hasn't happened before."

LoRusso contends that the backlog affects not only issues about Part 47 matters but Part 67 matters as well.

"On the medical side, CAMI [Civil Aerospace Medical Institute], the office in Oklahoma City, is behind by about eight or nine months. The Federal Air Surgeon's Washington D.C. office [FAS] has a backlog for twelve to fifteen months. So, what does that mean for the owner-operator or the typical pilot?" he asked.

"Let's say you have a kidney stone and have been directed to produce some reports, undergo ultrasounds and provide a letter from your doctor. If you wait until your medical appointment to disclose that you have kidney stones before providing all the documentation to your AME, and they defer to Oklahoma City for review, you could be sitting without a medical certificate for eight to nine months. And you can't fly during that time."

As a result of the abnormally long delay, LoRusso emphasizes the necessity of pilots getting ahead of the curve. It is presently more vital for them to be proactive in addressing their medical concerns than it has ever been in the past.

"I used to say to pilots, 'If you get in trouble with the FAA, call me.' Nowadays, it's much better to be proactive than reactive. The FAA has gotten so used to saying 'no,' that once they do say no, they tend to draw a line in the sand and dig their heels in. They can deny, deny, deny. It's better to be proactive with them and give them everything they need for their review right from the start. That way, it's easier to get them to say 'yes."

At this point in the process, LoRusso acknowledges that the FAA operates nearly identically in all cases. As a result, he can anticipate which requests the agency will ask of airmen, the consulting AME, or other parties.

"First and foremost, it is important to know that with an attorney, an airman has an advocate in the FAA medical process. Many pilots make the mistake of thinking their AME is an advocate; however, by agreement and contract, an AME is an agent and representative of the FAA tasked with performing evaluations on behalf of the government. An attorney, however, is an advocate. As an advocate, counsel can produce records and proffer arguments per regulation, policy, and agency guidance, which helps avoid the seemingly never-ending stream of FAA request letters. Moreover, an attorney can evaluate an airman's case and develop a game plan before seeking medical certification."

He is commonly asked whether having an attorney involved will speed up the certification process.

"The answer is more complex than a simple yes or no. First, I will answer 'no,' there is no 'fast track' for those airmen who are represented. Rather, the timeline is shortened due to the completeness of the initial submission. As many pilots can attest, the pain and suffering of the FAA's medical review process is in the cat-and-mouse game of request letter after request letter. Eventually, the FAA either runs out of requests or the airman tires of the resulting delayed process and abandons the pursuit."

LoRusso is an ATP-rated Citation and Learjet contract pilot who understands the desire to fly as long as possible. He is on standby if an airman faces a challenge to their medical certificate. There are several issues he frequently helps airmen work through. These range from TBIs [traumatic brain injuries], sleep apnea, substance abuse, and dozens of other conditions. Naturally, there are a few conditions that pilots seek counsel more frequently than others.

"The best option is to talk to an attorney ahead of time so that we can develop a care plan, to get the best experts to help you pass your medical evaluation," he prefaced. "Cardiac issues are common. Interestingly, the FAA does not employ a cardiologist. They have six psychiatrists on staff but not a single cardiologist. They are trying to send airmen to cardiac panels, but the panels do not convene often. So, as a result, cardiac cases are getting backlogged. Another thing that we see a lot of, which is pretty generational, is ADHD. ADHD cases are immediate denials by the AME and must go through the Federal Air Surgeon's office for further review."

In recent years, he has seen some other conditions become increasingly concerning.

"There is an almost daily frustration that I am having with my pilots. Through COVID, we saw the highest number of mental health issues in the United States that we have ever seen. Pilots are no different than anyone else and are members of the same society, so we had an influx of pilots that reported seeing a therapist on their 8500-8's [Application for Airman Medical Certificate]. You must report if you have seen a doctor, a therapist, or a counselor, within the last three years. So, these pilots reported seeing those individuals for acute depression, situational depression or anxiety, treatable mental health conditions, and were denied a medical certificate," he advised.

"What is frustrating is that the mental health world is dynamic, and the FAA regulations are not. FAA regulations on mental health were crafted based on DSM-3 [The Diagnostic and Statistical Manual of Mental Disorders, third generation], which expired in 1987. We're talking about greater than three decades ago. With the DSM-5 soon to drop, the FAA will be four generations behind on clinical mental health."

LoRusso states that there are repercussions from this highlighted mismatch.

"Because FAA regulations are so antiquated, owner-operators have a warranted and justifiable fear of reporting mental health treatment. We have a justifiable fear that reporting will turn into a denial. As a result, there are two issues: Pilots either refuse to seek mental health assistance and are flying with conditions that need to be treated, or they are seeing mental health professionals and lying on their 8500's."

These purported issues, combined with others he has observed during his last ten years of medical defense work, make LoRusso firmly believe that something needs to change. He outlines what he feels would improve the current medical process.

"Without question, the FAA's 2023 reauthorization bid should include a promise of medical reform. But what does that look like? I believe it begins with a new

medical application. The box of death, Box 18, on the 8500 is horribly drafted – an airman must be an attorney or a doctor to answer question 18. To demonstrate how absurd it is, question 18 asks an airman if he or she has ever, in his or her entire life, suffered from 'stomach trouble' or 'mental disorders of any sort.' Box 18 also asks if an airman has ever been diagnosed with 'alcohol dependence or abuse,' and those terms aren't even clinically recognized anymore!"

LoRusso added, "Once the application is revamped, the FAA needs to shift toward a system that recognizes and rewards direct clinical treatment. At present, the FAS office frequently disregards the opinions of a treating professional and defers to the opinions of its own doctors who have never personally seen or treated the airman."

> "Because FAA regulations are so antiquated, owner-operators have a warranted and justifiable fear of reporting mental health treatment..."

Outside of being proactive towards addressing their mental and physical issues as soon as they arise, LoRusso has a request for fellow pilots.

"The big thing is to make pilots aware of what is happening in the medical world. Because it's never an issue until it's an issue. And it's never a concern until you are going through it, at which time it becomes a very real concern. So, all pilots need to be aware of the medical landscape and demand better from the FAA. And the only way we can get change coming into a reauthorization year is for pilots to knock on the door of their representatives and say that they feel what is going on is unacceptable." Furthermore, proactive representation and advocacy by an aviation law professional who understands the needs of regular pilots is vital in keeping your medical certificate valid. T&T

Turboprop Autothrottle and Emergency Autoland Systems

by **Matthew McDaniel**

PHOTOS COURTESY OF INNOVATIVE SOLUTIONS & SUPPORT

While I have loved flying in sunny skies for 45 years, sometimes (as all pilots know), the sun can be a bit too bright and hot. This includes operations on the ground since even air-conditioned aircraft have challenges in hot and humid environments.

Autothrottle systems are not new. They've been around almost as long as commercial jetliners have transported passengers from A to B at previously unheard-of speeds. Granted, the early analog versions were rudimentary compared to the precision today's digital technology offers. They were also bulky, requiring heavy mechanical motors, clutches, and hardware. Yet, old or new, analog or digital, autothrottle technology remained available only within the large turbojet market for decades. The more complex operating mechanics of turboprop engines, with their multiple lever engine controls and mechanical fuel control units, proved incompatible with autothrottle technology. Thus, the turboprop pilot was left to be the sole source of throttle settings and speed control. While this kept such pilots more practiced in those particular airmanship skills, it also kept their workloads higher than their contemporaries flying turbojet aircraft. That was especially true in the takeoff, approach, and landing phases.

A New Millennium

As the 21st century dawned, digital avionics technology achieved new lows, as in low-weight, low-bulk, and low-cost. With the advent of ever-increasing capabilities combined with ever-decreasing size, digital avionics soon began to make inroads into general aviation. Electronic Flight Instrument Systems (EFIS), including Electronic Attitude Indicators (EAI) and/or Electronic Horizontal Situation Indicators (EHSI), had only begun to appear in business jets and turboprops in the early 1990s. While these increased instrument versatility and capability, they weren't exactly revolutionary developments. However, throughout the first decade of the 2000s, companies like Avidyne and Garmin began to capitalize on rapidly advancing computer software and hardware capabilities to create full-featured Primary Flight Displays (PFD), Multi-Function Displays (MFD), and even Flight Management Systems (FMS) for use in light jets, turboprops, and even piston-engine aircraft. It didn't take long for this new technology to find acceptance among those who craved the latest and greatest for their aircraft's flight deck. As a result, many older, cabin-class aircraft now fly with retrofitted, thoroughly modern instrumentation, navigation, and engine management equipment. In many cases, the value of that new digital avionics package can exceed that of the aircraft itself.

The future had arrived, and technology on the flight decks of cabin class aircraft began advancing faster than most owner/pilots could keep up with. Radio stacks of navigation and communication equipment (even those with LCD displays and early digital technology) that were all the rage in the '70s and '80s began to get replaced with units that combined GPS and ground-based navigation, and communication needs, into a single unit. Moving maps quickly evolved from monochrome to full color

and grew in size and presentation detail. Autopilots were upgraded from rate-based analog units to attitude-based digital units. Then, in the mid-2000s, WAAS-capable GPS units were made available to the masses, and digital glide paths into runways big and small, moved from fantasy to reality. Nevertheless, while autothrottle technology improved dramatically across this same timeline, it only did so in large turbojet aircraft, leaving cabin class pilots clutching and tweaking their throttles in the same way they'd been doing for the previous 50 years or more.

Dreaming in Digital

Through the 2010s, digital avionics and autopilots got smaller, better, faster, and more feature-rich. Their use soon became the norm in production aircraft and was sweeping through the retrofit market. Retrofit companies began offering the latest technologies in comprehensive upgrade packages, which included improved engines, techy cabin enhancements, and complete flight deck makeovers. None of those packages had a turboprop autothrottle system, but it was being developed behind the scenes. As digital hardware became smaller and smaller, the feasibility of squeezing autothrottle components into the crowded spaces of cabin-class cockpits began to seem realistic. Meanwhile, software advances made the complex task of automating turboprop power manipulation possible. The time had finally arrived for turboprop pilots to join their jet counterparts and enjoy the enhancements autothrottles could bring to flight safety and efficiency.

Like so much in aviation, change can be slow, even during times of rapidly advancing technology. This is a good thing too. New technologies need vetting, testing, and detailed scrutiny. When applied to certified aircraft, they must be proven to be safe and reliable. That process takes time measured in years, not days, and mountains of capital investment. Thus, while turboprop autothrottles were spoken of often throughout the 2010s, it was in the late 20-teens that news of certifications began to break. Initially, those certifications were retrofit systems only. However, several companies are now offering new production turboprops with autothrottle systems, too.

Pseudo FADEC

Another technology that has been around for decades now is Full Authority Digital Engine Control (FADEC). It allows pilots to move power levers as the situation demands without fear of exceeding engine limitations (torques, temperatures, pressures, etc.). The computer "reads" the pilot's throttle "command" and provides the closest engine output to that command without exceeding any operational limits. Like autothrottle, though, FADEC has primarily been limited to turbojet engines. One of the principal challenges of developing and certifying a turboprop autothrottle system is getting that system to work without the input of FADEC data. The Pratt & Whitney PT6A turboprop engine is far and away the most common in cabin-class turboprop aircraft today. What it is not, however, is digital. It operates via decades-old analog/hydromechanical technology. Highly reliable and versatile as it may be, strapping an autothrottle to a PT6A was a complex matter of tapping into the FADEC to utilize its data and software capabilities since no such FADEC existed.

The not-so-secret sauce is provided by linking electromechanical components that control power output to hardware and software that constantly monitor engine parameters and trends. Along with this comes the equally safety-enhancing abilities to select and hold a desired indicated airspeed (IAS) and envelope and stability protection features that will kick in if a distracted pilot allows IAS to reach low or high-speed limits that could potentially cause a stall or structural damage. Additional safety features allow for speed protection in turbulent air or the automatic setting of maximum range or maximum endurance power. Of course, all this must also communicate with the autopilot systems to couple autothrottle adjustments to achieve the IAS, Altitude, Vertical Speed, and Navigation commands input by the pilot. In multi-engine aircraft (such as King Air variants), the autothrottle system must be capable of helping to manage an engine failure situation by adjusting power on the operating engine to achieve safe performance parameters and to assist in avoiding (or recovering from) a Vmca situation, for instance.

Retrofittable

In 2018, Innovative Solutions & Support (IS&S) achieved certification and began delivery of an autothrottle system for the Pilatus PC-12 (image page 22). Dubbed "ThrustSense," the system is retrofittable in two ways, depending on the cost the buyer can justify and other enhancements they might desire. Simply adding autothrottle capabilities requires the addition of IS&S's Integrated Standby Unit (ISU), which can replace any existing standby instruments. The ISU provides the software and control panel necessary to control the PT6A engine. Or, the owner could bundle the addition of autothrottle and ISU with a complete panel upgrade via IS&S's NextGen 3015 system. The 3015 includes dual PFDs, a large central MFD/Engine Display, WAAS, ADS-B In/Out, VNAV, RNP & LPV, electronic charts, TAWS, SynVis, radar, satellite weather capabilities, etc. Similar upgrade paths to ThrustSense are available from IS&S for the King Air 200 and 300 series. ThrustSense retrofit options for other cabin-class turboprops are in development, as well.

Factory Installed

First to market with an autothrottle system for a cabin-class turboprop was Daher, which introduced autothrottle capabilities to its TBM lineup with the TBM-940 model in 2019. All autothrottle control and programming are handled via the Garmin 3000 avionics suite and its requisite assortment of sensors and software. As of this writing, the TBM-960 is the Daher flagship, still sporting the G3000 and autothrottle. Piper followed soon after

IS&S retrofit for PC-12

with its flagship M600 model. The M600 is essentially the Meridian fuselage but with a newly designed wing and the G3000 avionics suite. At Swiss plane-maker Pilatus, the PC-12 NGX is the current model with an autothrottle option available. Their Honeywell avionics suite is dubbed ACE (Advanced Cockpit Environment) and includes SmartRunway and SmartLanding systems and advisories, along with all the other technology typical to current generation glass avionics suites. Finally, in the twin-engine ranks, the King Air 260 and 360 models feature IS&S ThrustSense as standard equipment.

Emergency Autoland Capabilities

The latest in wow-factor avionics technology innovations are the emergency autoland systems. These systems could not be possible without autothrottle capabilities, as they allow for fully automated control from cruise flight through touchdown, rollout, and shutdown. These are not certified autoland systems, like airline ILS Category

III operations. Instead, they are last-ditch emergency systems that can take control of the aircraft in the event of pilot incapacitation or total loss of situational awareness. This emergency mode is activated with the push of a single button (for manual activation) or via automatic activation (should the pilot fail to interact with the avionics systems in a timely or appropriate manner). Upon doing so, control is removed from the pilot, and the aircraft will climb/descend as necessary and divert to the nearest suitable airport via a terrain-aware navigation route. ATC and the passengers will also be advised of what is happening automatically. The aircraft will fly the most appropriate instrument approach procedure, extending landing gear and flaps when appropriate, then land, roll to a complete stop, and shut down.

Piper led the pack to market by introducing their "HALO" emergency autoland system on the M600/SLS in 2020. This milestone represented the first FAA-certified emergency autoland system within general aviation. Cirrus followed quickly with the "SafeReturn" system on their second-generation SF-50 VisionJet. That marked the first turbojet-powered aircraft certified with such a system. Daher dubs their system "HomeSafe," on the TBM-960, built upon the foundation of the autothrottle system they introduced on the prior TBM-940 model. Regardless of the specifically branded name for the system, all are based on the Garmin G3000 avionics suite hardware, software, data inputs, and autopilot/autothrottle control.

Conclusion

These new and emerging technologies are indeed game changers in the world of cabin-class turbine aircraft. Autothrottles significantly lower pilot workload during critical phases of flight while providing greater precision. With envelope & stability protection software, synthetic vision displays, terrain awareness, and crew alerting systems, autothrottle could be life-saving. Taken a step further into full emergency return/autoland capabilities, the technology goes beyond even what large bizjets and airliners currently offer. Especially in terms of emergency return and autoland capabilities, the cabin-class turbine world is presently leading all other segments of general aviation and paving a path for such technologies to trickle upstream and down. T&T

Matthew McDaniel *is a Master & Gold Seal CFII, ATP, MEI, AGI, & IGI and Platinum CSIP. In 32 years of flying, he has logged over 20,500 hours total and over 5,700 hours of instruction given. As owner of Progressive Aviation Services, LLC (www.progaviation.com), he specializes in Technically Advanced Aircraft and Glass Cockpit instruction since 2001. He's a Boeing 737-series Captain, holds 8 type ratings, and has flown over 120 aircraft types. Matt has earned the Master CFI designation for 10 consecutive two-year terms. He can be reached at:* **matt@progaviation.com** *or* **414-339-4990.**

by **Kevin R. Dingman**

Bad Attitude

Pilots don't get disoriented; we get transitorily perplexed

PHOTOS PROVIDED BY AUTHOR

Do you remember when doing spins during training for your private pilot license was common? There was a placard on the wall behind the bench seat of Cherokee 140s: UTILITY CATEGORY—that's what they called it, and that's what allowed you to do spins. After doing spins for the first time, I wanted more. Barrel rolls, loops, lazy eights, and more spins. Spin recovery was even part of training in the Air Force T-37. Of course, in the F-16, an unusual attitude was not unusual. Even arrogance was a normal attitude.

I eventually got to do snap-rolls in a C-150 Aerobat—never did develop a taste for any 'outside' maneuvers, though; no negative g's for me, thank you. The Cherokee's roll control with the Hershey-Bar wing was so stiff that you had to practically stand on the yolk. But then came the taper-wing Warrior. I blame the temptation on Piper: they enhanced the roll authority of the Cherokee, making it a dream to roll..... or so I've heard. NORMAL CATEGORY only, don'tcha know.

Many folks have rolled airplanes that aren't supposed to be rolled. Some have done loops as well. Some with bad results. In his Shrike Commander, the late-great Bob Hoover showed a generation of pilots that, done properly through energy management, most airplanes can perform aerobatics without 'g'-ing your lips off or spilling a cup of tea —even with both engines feathered.

> The J3 Cub is the safest airplane in the world. It can just barely kill you.
>
> -Max Stanley

A few days after I delivered a used C-150 to an FBO in Phoenix, a renter tried a loop (note: tried) and pulled the wings off. And a local pilot here in AZO crashed trying (note: trying) to do a roll right after takeoff. Aerobatics in the wrong airplane and without training can kill you. So can accidental aerobatics. How can you accidentally do aerobatics? Glad you asked.

Tail Stall

Do you know how to recognize a tail stall? What if your wing deice works, but the tail deice fails? What happens? A tail stall-- and the indication and recovery procedure are exactly the opposite from a wing stall. Ever had an autopilot malfunction and rapidly pitch up? How about asymmetric speed brake or spoiler deployment? I've been at or beyond 60 degrees of bank, unintentionally, three times in transport category airplanes. Once was due to wake turbulence at a high altitude, another at a low altitude. I had asymmetrical spoiler deployment the third time due to a failing auxiliary hydraulic pump. I've talked to colleagues who have had asymmetrical deice problems as well. Lots of ice on one wing, little on the other. And while I hope to never have it in real life, I've trained in several different jets for inflight thrust reverser deployment, and in the sim, it's dramatic.

Well, I Never!

If you have never been beyond 60 degrees of pitch or bank, you need to. As a part 135 or 121, two-pilot crew, the chances of being in a 'very' unusual attitude are slim. The odds are higher in single-pilot part 135 or part 91 operations, but it's still rare. But don't convince yourself that as long as you pay attention to your attitude, you'll be okay and that upset training is just for fun. If for no other reason, it will help you recognize your condition more quickly, and more importantly, you won't be as inclined to soil your trousers when it does happen. And with clean trousers, you can more confidently get to the task of executing a recovery.

> Status quo, you know,
> is Latin for 'the mess we're in.'
> - Ronald Reagan

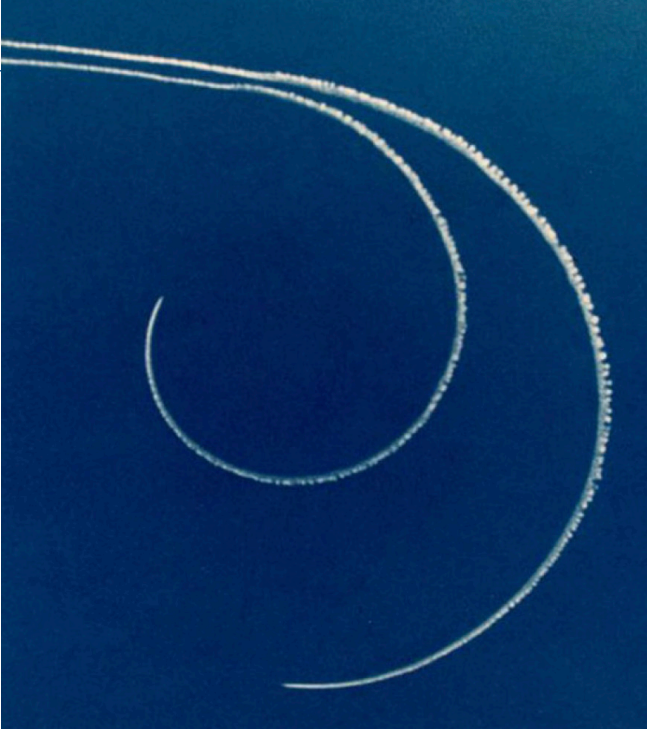
The basic thought process of unusual attitude recovery is similar to an engine failure in a multi-engine airplane: recognize the condition, verify the condition, pick a plan, execute the plan, and verify that you got the desired results.

The first thing is to recognize the condition. It's normal to feel and hear things in your plane and react. The sound of airspeed or engine noise increasing or decreasing, a variation in cabin pressure, sudden turbulence, or the sensation of more or less g force. If you fly over mountainous terrain, the signs of mountain waves may be your warning. If it's night or you're in IMC, your reaction should be to check the panel. Hopefully, you've recognized the condition rather than getting a call from ATC. That call would be well into your deviation from level flight.

No Need To Panic!

noun - *sudden uncontrollable fear or anxiety, often causing wildly unthinking behavior.*

Some type of attitude indicator (PFD, MFD, ADI) is the first place to look—and look at more than one if you have several. If you find two that agree with each other, you can move on to the pick-a-plan phase. If they disagree, you



must find one or more indications to determine which attitude indicator is right; a third artificial horizon, the VSI, IVSI, airspeed, and altimeter, should do. There's no need to panic, really. You have some time. You don't want to get this one wrong by using 'wildly unthinking behavior,' so take a few (3-5) seconds.

Picking a plan will depend on what you see the airplane doing. You will have the urge to ask yourself why it's happening—fight that urge until after the wings are level. The easiest unusual attitude from which to recover is one in the roll axis, even if you've made it all the way around to inverted. Rolling the shortest direction upright is the accepted course of action. Depending on the plane, you may use a combination of yolk and rudder. Follow your manufacturer's recommendation regarding the rudder, though; in some airplanes, you can break things using too much rudder or with rudder reversals (rapidly transitioning direction in yaw--- e.g., AA 587 November 12, 2001).

Corner Velocity

The more dangerous unusual attitudes are extreme deviations in pitch. Usually, if you're nose high, you'll be slow, and if nose low, fast. However, it's possible to have a nose-low attitude with slow speed and a nose-high attitude with high airspeed. With this in mind, you need to understand the concept of corner velocity or corner speed.

Corner velocity is used in fighters, aerobatics, and airplane racing. It's the speed at which you can generate the highest turn rate and, therefore, the smallest turn radius. If you're faster than corner, your radius is larger. If you are slower than corner, your radius is, again, larger. Generally, this speed is the square root of your g-limit times stall speed:

Vc = VS x √Gmax (e.g., 6g limit and 60-knot stall = 146 corner, 4g and 80 kt stall=160).

This matters because we want to recover from this bad attitude with the smallest loss or gain of altitude. Especially

if the ground is within range of a larger turn radius. It's difficult to imagine adding power in a nose-low attitude or removing power when nose-high, but you may need to do just that. With this bit of confusion, the most likely nose-high recovery scenario will be to add power, roll smoothly to 90 degrees of bank, let the nose fall to the horizon (or below the horizon, depending on speed), and then roll wings level. More on nose-high recoveries in a bit.

Lift Vector

In a nose-low unusual attitude recovery, the first thing you do is level your wings. You need to get the lift vector going in the correct direction. Picture long arrows pointing out the top of your wings at a 90-degree angle. The lift vector points at the ground if you're inverted (at positive g). It points to the horizon if you're in 90 degrees of bank. The first step is to make your lift vector point above the horizon, meaning less than 90 degrees of bank.

Ideally, you want your lift vector pointing straight up, away from the rocks. The closer to straight up it is, and the closer to corner velocity you are, the quicker you will return to level flight. Learn the 'unloaded' roll (rolling at zero or near 0 g); remember, you want to be near corner velocity. You may have to reduce or add power. Next, gently add back pressure as required to your g limit or the edge of an accelerated stall if the rocks are near.

Dump Some Lift

A nose-high recovery is a little more uncomfortable, especially for your passengers. You may see something less than one g for a few seconds. Not necessarily zero-g, but you may get "light-in-the-seat." Pushing straight forward would be very uncomfortable and take a long time. In an aerobatic plane or fighter, you would simply roll inverted, pull your nose down to the horizon, then roll upright. Not a good idea in your aircraft unless you are almost vertical. However, it will work fine in any airplane as long as you maintain positive g (hopefully around one or two) throughout the maneuver. The positive g is necessary to ensure your fuel and oil systems behave as designed.

The (most controlled) best way to dump lift to lower your nose is to roll left or right. The more nose high you are, the greater the bank angle must be. Anything from 30-90 degrees would be appropriate. As you roll, the lift vector points less and less away from the ground, and the nose will fall to the horizon.

The decision when to roll back level is based on a few things: how close to corner you are when the nose approaches the horizon, how fast the nose is falling toward/through the horizon, and where the rocks are. You may be able to roll out before you get to the horizon, or you may need to let the nose fall through the horizon. Make smooth, deliberate control inputs. Once again, professional upset training will teach you the nuances of the process and help in your decision-making.

Some would say that no simulator can model the disorientation of actually being upside down. Yes, and no. A simulator is perfect for experiencing and correcting an IMC or night upset. A real airplane may be better for learning day VMC upset recoveries. I recommend you do both. After which, the most challenging part of an upset event is explaining to your passengers what happened.

UFO Avoidance

Upset training will minimize the time you spend 'transitorily perplexed.' And so, no longer will the pax see you using 'wildly, unthinking behavior' or screaming like your Dachshund Lily getting a mani-pedi. So, any non-UFO explanation to the pax should work. You must also tell ATC what happened and file a NASA report. Telling ATC will prevent me and others from flying into the same crap that caused your upset if it was weather related. The NASA report will protect your ticket. The not-a-UFO part will keep you out of the tabloids and the psychiatrist's office. We can all recover from a bad attitude, even arrogance, with training and practice. Keep the shiny side up, my friends.

Authors note:

If you are into formulas like corner velocity above, here is another fun one; it's the speed at which tires hydroplane: 9 x √tire psi. e.g. 9 x √60 psi=70 kts. 9 x √120 psi=98 kts. 9 x √160 psi=113 kts. And your car: 9 x √35 psi=53 mph.

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**.

Not a Jet; Still Epic

PHOTOS COURTESY OF AARON VANTROJEN

"The Epic E1000 GX is a fantastic airplane. Probably one of the funniest things about it is that most air traffic controllers refer to me as 'Epic jet.' It happened just this weekend out of Riverside (KRAL), where ATC was calling another plane and was referring to me as that 'Epic jet.' It's common, but I'm not sure if it's because they are unfamiliar with the plane since it's relatively new or because of the speeds that I am going," wondered Aaron VanTrojen, who has owned the six-place single-engine turboprop for a little over a year and a half.

"This can also cause controllers a little disruption when I'm coming into terminal areas because we slow down. They see our speeds at altitude, and when we start coming down on approaches, we slow down significantly, much slower than a jet does. Most controllers do not expect us to get so slow as quickly as we do. So now, when I begin a descent into Puerto Vallarta (MMPR), for example, I tell them what my speeds are planned to be in the terminal area. It's a benefit not to have to come shooting through an approach at over 200 knots; we can come in nice and slow."

This aspect is just one of the many that VanTrojen enjoys about his Epic E1000 GX. The Epic is the third aircraft that the founder and CEO of Geneva Financial has owned. The mortgage industry executive's incremental aircraft ownership journey has consistently allowed him to fly faster, higher, and with more payload.

"It started in 2019 when I was transitioning from a Cirrus SR22T. We had a deposit on a new Vision Jet, which I had test flown and loved. It was an easy transition from what I was flying, but I didn't fully understand the

capabilities of that plane. Especially flying out of Stellar Airpark (P19), which has a short runway, in the heat of the summer, I now had important considerations, like weight restrictions. So, I was getting concerned about that. We had scheduled my transition training in Tennessee, but then Covid hit, and my training was canceled. At that time, the mortgage industry was experiencing serious uncertainties, as did the entire economy, so we canceled our purchase," VanTrojen recalled.

"Then I was like, 'I don't know what to do now.' And my next-door neighbor, who was flying a Pilatus PC-12 as a charter pilot, said I should just get a Piper Meridian. That way, I could learn how to fly a turboprop and then figure out where to go from there."

Aaron and his Epic

Aaron and Telle VanTrojen at the Epic factory

VanTrojen flew his Meridian for only a year while working up to his next plane. He quickly realized that another aircraft, the progress of which he'd been tracking for several years, would be the perfect next step.

"I had been watching the Epic go through its process of going from an experimental aircraft to a certified one. I started calling them and decided that was the right plane for me. I needed something relatively small since I didn't need to carry many passengers and wanted something fast. Speed was the selling point for me. And I couldn't find any plane that matched it in its class. Especially flying in and out of Stellar in the heat of the Arizona summer."

Not only is the PT6A-67A-powered Epic fast, but VanTrojen also reported that it has attractive payload capabilities - especially compared to the Meridian.

"I learned quickly with the Meridian that it's not always a true six-passenger airplane. It may have six seats, but you will typically not put six people in it - unless you are just hopping up to Sedona for breakfast. It has weight restrictions. The Epic's payload is 1,100 pounds, with fuel full. While it's unlikely that you will put six people in it with full fuel, you can probably get five, and certainly four, with luggage. To have that capability and not have to reduce the fuel load is a huge benefit and selling point. I love to take every trip with full fuel, even if I don't need it. I would never want to be that guy with fuel concerns and never have been."

Not only can you fill the tanks and go in the Epic, but its runway operations are also noteworthy, VanTrojen advises.

"I can take off from my home base in Chandler in the heat of the summer with zero concerns about the runway length. The Epic takes off in only half the runway's distance at Stellar, about 2,200 feet. I'm using half the runway, approximately, to get off the ground, and the Epic stops in even less than half the runway. And that's in the summer, so if you can get in and out of here without any issues during the hot months - you can get in or out of just about anywhere. So the performance is unbeatable," he stated.

"The Epic is just very, very capable and is exceptionally fast. I cruise at roughly 305 knots and have even gone faster than that with no winds. I typically cruise at 34,000 feet, where my fuel burn is about forty-eight gallons per hour. Which is not bad at all, especially when compared to a jet. And a smaller jet will go how much faster? Not a lot!"

VanTrojen first became acquainted with Epic's performance characteristics during initial transition training with the aircraft.

"I went to Bend, Oregon for transition training in the aircraft because they didn't have a simulator then. Now they do. So, the transition training was

all in aircraft, and in fact, my plane was missing a document from the FAA at first, so we went out the first day and did training in the owner's plane. But it was great training nonetheless. The insurance required me to do fifty mentor hours, so we did nine hours in Bend, and then I had a mentor pilot to knock out the other forty-one hours with me the next week. It was a lot of flying," he said.

"I did fifty hours of flying in about ten days. My mentor pilot formerly flew the F-18 and had accomplished multiple combat tours. It was really intense training. He pushed me to my limits as a pilot and made me exceptionally better. The speed of the plane at altitude is not an issue; it's irrelevant when it comes to from a safety perspective. This is because you can slow down when you are coming into terminal areas, so you don't have to come racing in like a jet. The airplane also has excellent handling characteristics at low speeds, so you can stay within your comfort envelope - even with its very efficient design."

Just as the aircraft delivery and initial training events were a personal experience, VanTrojen reports that Epic's customer service network is similarly focused on the pilot.

"The process of getting my plane was fantastic. Epic has great customer service, with continuous progress updates as my plane was being built. There was a slight delay in delivery, but it was to be expected and was not too long."

"While jets are a bit quicker than the Epic, the maintenance costs are significantly higher. You can buy a used jet for less than a new Epic, but the annual costs are astronomically high comparatively. My plane's first annual [inspection] was only about $20,000. It was up there [in Bend] for a considerable amount of time, though, because in the first year of production, they realized many little things needed to be corrected. They essentially gave me a new airplane after the inspection, which was great."

Looking forward, VanTrojen only sees himself flying this plane well into the future since he feels there isn't a better one on the market today. The Epic is the perfect aircraft for his current mission. He enjoys an attractive advertised maximum range of 1,560 nautical miles, good runway performance, ample payload, and blistering speed.

"I do a ton of flying around the West Coast; California, Nevada, Utah, Colorado, and Texas is also really easy. I also fly to Puerto Vallarta once a month for pleasure. I typically don't fly the Epic to the East Coast because using the airlines is easier if I have to fly five or six hours. I've taken it as far as Seattle thus far."

Overall, VanTrojen's ownership journey thus far has been entirely positive. As with other changes the company has implemented, he patiently awaits an important all-weather addition to the aircraft's capability list.

"The only question now is when Epic will receive its FIKI (flight into known icing) certification. They are in testing with the FAA, and once approved, the whole operational fleet gets certified. I would love to see that happen sometime this year." T&T

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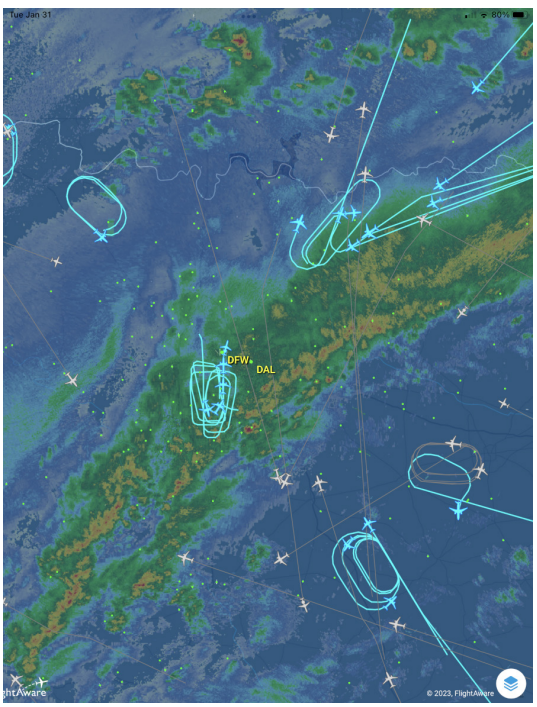
Mother Nature Takes the Cake

Delta 1234, cancel approach clearance. Fly the localizer, climb and maintain 3,000," came the hurried command from DFW approach control. "We've just been told that Runway 35L has failed the friction test, and braking action is unsuitable."

DFW's seven runways, all covered in ice, were unusable. It was that kind of day on January 31 all over North Texas. I woke up to the backyard picture below, ice covering everything. I had already canceled my trip in the Mustang to Nashville, TN (KMQY), for a Citation Jet Pilots (CJP) board meeting. Based at Addison (KADS), my airplane would be hard-pressed to taxi safely to Runway 34 this morning, much less able to abort a takeoff.



ADS RUNWAY 34 FICON 1/1/1 (Braking: Poor/Poor/Poor) 50 PCT ICE PLOWED 50FT WID AND DEICED SOLID 50 FT WID OBS AT 2301311300

But others came from all over the U.S. to attend the CJP meeting. I purchased a refundable reservation on American Airlines. At 6 a.m., however, the roads to DFW airport were virtually impassable, with a half inch of fresh ice and a temperature of 27 degrees Fahrenheit. Although my flight still showed an on-time departure, I couldn't imagine it would get off on time or even depart at all.

I set up shop on my stationary bicycle with two iPads and a cellphone to record the storm's effect on air travel. The ATC Live feed from Dallas Love field was my first stop. The airport's ground services kept one runway open overnight, but by 9 a.m., a new round of frozen precipitation was entering the metroplex.

Seven Southwest 737s were ordered to return to the gate as Love was closed for runway clearing. But the airport's resources were no match for the sheets of ice raining from the sky. "Ground, Execjet 1234 would like to reposition from Atlantic to Signature." "Negative, the entire airport is shut down pending further notice," came the response from ground control.

A quick glance at Foreflight showed only four airplanes in holding patterns headed for Love. Most had delayed their departures to wait out the storm.

But the story at DFW was much worse.

One of the busiest airports in the country, DFW runs 24/7 in virtually all kinds of weather. And even with relatively few snow and ice storms during a typical year, it has scores of plows and trucks to keep things running.

Mother Nature was having none of that.

In the picture at left you can see what happens when an entire airport shuts down. When landings and takeoffs stopped, the feeder fixes started to fill up with airplanes holding. The ice was coming down so fast the trucks couldn't keep up. As the poor braking action readings were coming in from the ground vehicles, aircraft were told to go around, even after being cleared to land. The airspace was filled with airliners, some holding directly over the airport.

Something had to give. Within minutes, flights began to divert to Oklahoma City, San Antonio, and elsewhere. Over the next three days, waves of ice hit the metroplex, and several thousand flights were canceled.

As the lady said, "It's not nice to fool with Mother Nature."

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**.

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