

SkyFolio  
MyGoFlight

De-escalation

PRIMED  
for Pilots

# TWIN & TURBINE

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

JANUARY 2026 \$3.95 US

VOLUME 30 NUMBER 1



**Defiant to the Finish**  
THE RUTAN DEFIANT

# CARVE YOUR OWN PATH



Up here, every advantage matters. McCauley® propellers give the edge that sets you apart and puts you ahead. Experience daring design that delivers smoother performance and quieter flights along with the industry's best TBO, reliability and warranty — all engineered to keep you soaring higher, longer. Because when you fly with McCauley, you don't just keep up — you lead the way.



[MCCAULEY.TXTAV.COM](https://mccauley.txtav.com)



**MCCAULEY®**

**EDITOR**

Lance Phillips  
lance@twinandturbine.com

**EDITORIAL OFFICE**

2779 Aero Park Drive  
Traverse City, MI 49686  
Phone: (231) 946-7770

**PUBLISHER**

Dave Moore

**PRESIDENT**

Matt Kenny

**DIRECTOR OF OPERATIONS**

Kurt Bainbridge

**PUBLICATIONS DIRECTOR**

Jake Smith

**GRAPHIC DESIGNER**

Marci Moon

**TWIN & TURBINE WEBSITE**

www.twinandturbine.com

**ADVERTISING**

Jenna Reid  
816-699-8634  
Jenna.Reid@VPDCS.com

**ADVERTISING COORDINATOR**

Betsy Beaudoin  
1-800-773-7798  
betsybeaudoin@villagepress.com

**GENERAL AVIATION  
ADVERTISING INFORMATION**

Aviation.Publications@VPDCS.com

**SUBSCRIBER SERVICES**

Rhonda Kelly  
Jessica Meek  
Leah Backus  
P.O. Box 968  
Traverse City, MI 49685  
1-800-447-7367

To change mailing address,  
email rhonda.kelly@vpdcs.com

*Twin & Turbine* (ISSN 1092-6402), USPS 24432 is published monthly by Village Press, Inc. with advertising offices located at 2779 Aero Park Drive, Traverse City, Michigan 49686. Telephone (231) 946-3712. Printed in the United States of America. All rights reserved. Copyright 2016, Village Press, Inc. Periodical Postage Paid at Traverse City, MI.

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

**ADVERTISING:** Advertising in *Twin & Turbine* does not necessarily imply endorsement. Queries, questions, and requests for media kits should be directed to the Advertising Director, *Twin & Turbine*, P.O. Box 968, Traverse City, Michigan 49685, Telephone 1-800-773-7798. Website: www.twinandturbine.com.

**MANUSCRIPTS:** *Twin & Turbine* assumes no responsibility for unsolicited manuscripts, photographs, or artwork. While unsolicited submissions are welcome, it is best to query first and ask for our Writer's Guidelines. All unassigned submissions must be accompanied by return postage. Address queries and requests for Writer's guidelines to the editor.

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

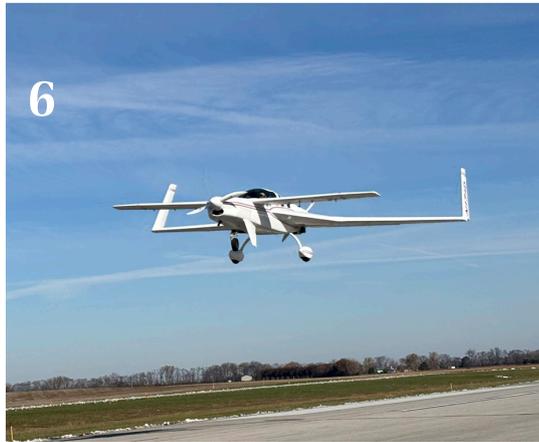
# Contents

JANUARY 2026 • VOL. 30, NO. 1

**Editor's Briefing**

**2 Having Fun in 2026**  
by Lance Phillips

**4 Get Organized with MyGoFlight**  
by Rich Pickett



**22 De-escalation**  
by Thomas P. Turner

**Owner's Corner**  
**26 Ted Margarit**  
by Grant Boyd



**6 Defiant to the Finish**  
by Matthew McDaniel

**18 PRIMED For Pilots**  
A pilot's first look at Garmin Aviation's G3000 PRIME  
Mindy Lindheim

**On Final**  
**32 Two Hours on the Treadmill**  
by David Miller

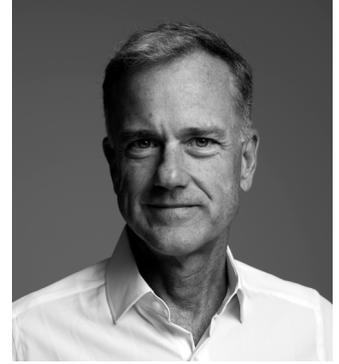
**COVER PHOTO:**

*The Rutan Defiant, courtesy of author Matthew McDaniel*

Issues of *Twin & Turbine* are available for free [www.twinandturbine.com](http://www.twinandturbine.com)

# Editor's Briefing

by Lance Phillips



## Having Fun in 2026

In addition to my aviation endeavors, I also have interests in classic Porsches and the arts. Last year, my new partners and I opened an art gallery and photo studio in Dallas. To promote the gallery and studio space, we had an opening exhibition in November, and just after Christmas, I organized a gathering of my local classic Porsche club at the gallery's historic building downtown.

The morning of the gathering, I got to the gallery a little early to set up some coffee for the Porsche club members. Meetups like this are more about connecting with like-minded humans than drooling over the cars, although lots of drooling does occur.



Not everyone encountered is a car nerd like most of us. While I was setting up the coffee table, before the group was scheduled to arrive at 8:00 AM, a couple of young people happened to pass by the small parking lot and struck up a conversation. They stopped to ask what I was doing and were intrigued by the Porsche group. They listened in wonder as I explained that I worked in aviation, had an interest in cars, and also managed the gallery upstairs in the adjacent building.

The passersby walked on after a while, and the Porsches moved in. I already knew a few of the attendees, but most were new to me. A few years ago, I sold my air-cooled 911 in exchange for an also-classic water-cooled 911. This club favors the air-cooled variety, but I still maintain friendships in the group and thought the gathering at the gallery would be appreciated for its historic location in Dallas's Deep Ellum neighborhood. The location provides a unique setting for car photography.

While talking cars with the owner of a particularly fine classic 911, we both realized that we share an interest in aviation. I mentioned this magazine, and he exclaimed with excitement that he was not only a pilot but also a monthly reader of *Twin & Turbine*. We enjoyed discussing our shared twin-Cessna backgrounds and our fondness for Cessna's 300- and 400-series platforms.

The current owner of my former air-cooled 911 was also in attendance. I learned that he also has an interest in photography and art. We intend to collaborate on projects in the future.

Having fun and working are not mutually exclusive. They can go together, and when we can make it to the point in life where our interests, both in-office and out-of-office, collide, well, that's when things get fun. Have a wonderful 2026.

A handwritten signature in black ink that reads "Lance Phillips".

[lance@twinandturbine.com](mailto:lance@twinandturbine.com)

# **TURBINES** INC.

## **AN EDUCATED DECISION**

- ✓ **Privately owned**
- ✓ **Optional use of PMA parts**
- ✓ **Selective incorporation of service bulletins**

## **PT6A ENGINE OVERHAUL/REPAIR**



**SINCE 1981, THE EXPERIENCED INDEPENDENT  
PT6A PART 145 OVERHAUL SHOP**

Get started at [turbinesinc.com](http://turbinesinc.com) | 812-877-8587  
[peg@turbinesinc.com](mailto:peg@turbinesinc.com) | [jay@turbinesinc.com](mailto:jay@turbinesinc.com)

# Get Organized with MyGoFlight

by Rich Pickett



MyGoFlight, one of aviation's premier providers of exceptional equipment for both inside and outside our aircraft, has developed a new kneeboard with some unique features. I've been flying with their products since they started, and their new offering, the SkyFolio, is a great addition to pilots' flight bags. I've used their kneeboard folios before, including the Cool Case, which has a built-in fan to keep the iPad operating in hot environments. The SkyFolio, which comes in two models to accommodate the full and mini-sized Apple iPads, includes several features that are useful not only in flight, but also outside of the aircraft.

The folio secures closed with a magnetic flap, and for those who want to securely strap the kneeboard to their leg in flight, a Velcro strap is included that threads through the back of the device. The MyGoFlight SkyFolio uses elastic clips, which enable it to adjust to several different iPad sizes. The clips are designed not to block any of the ports, which is useful when you also want to charge the tablet while in the folio.

When you want to use paper to take down notes or an ATC clearance, there is an innovative clipboard integrated into the product, complete with an IFR





cheat sheet printed on it. The clipboard uses a very slim magnetic catch to hold the paper, and a very cool feature is itself magnetic and removable. I've used this feature to remove it from inside my SkyFolio and attach it to the outside --- magnetically, or it can be used totally separate from the folio itself.

If you want to change the orientation of the iPad, the mount can be rotated within the folio. I use the SkyFolio fully open when flying the Citation Mustang and the Cessna T206. In the Citations, with the control column, I fold the folio in flight and use the clipboard separately.

Another feature that I find useful is the ability to tilt your iPad - which is very handy when you want to use

the SkyFolio outside of the aircraft, for example, in the FBO for your briefing. If you use an Apple Pencil, there is sufficient room for attaching it alongside the iPad.

The size of the folio precludes automatic sleep mode activation when the cover is closed, so you will need to ensure your tablet is in standby before closing the cover for maximum power conservation. The slim magnetic clip on the clipboard prevents any screen damage when you close the folio. I also use the MyGoFlight screen protector on my iPad, which, one time, came in handy when it was outside of the folio and slid across the ramp.

Both versions, for the mini and full-size Apple iPad, are priced at \$199, and as with other MyGoFlight products, are available directly from them or through their numerous dealers. **T&T**



With 14,000+ hours of piloting more than 100 aircraft models, **Rich Pickett** is still passionate about flying. Rich holds an ATP, CFII SME, SES, glider license, and type ratings in the following aircraft: L29, L39, Citation 500/510/525, Eclipse 500S, Beechcraft Premier and Dassault Falcon 10. He runs his company, Personal Wings, with his son Tigre. Personal Wings provides training, mentoring and aircraft services. You may contact Rich at [rich@personalwings.com](mailto:rich@personalwings.com).

**NEW**  
**for 441**  
**Conquest II**

# Plug & Play All the Way!

## LED Caution Warning Panel Suite with Integrated Fire Suppression Switches & Gear Status Display

### Cessna 441 Conquest II



- LED Reliability & Lighting Performance
- Drop-in Plug & Play Replacement
- Includes New Solid-state Logic/Dimming Control Unit
- Available This Fall

▪ **Five Year Warranty**



LED Gear Status Display  
(Single modular unit)



**Luma Technologies LLC**  
13226 SE 30th Street (B3), Bellevue, WA 98005  
(425) 643-4000, x305 Sales@lumatech.com

January 2026 / TWIN & TURBINE • 5



Departure



# Defiant to the Finish

---

by **Matthew McDaniel**

---

Oshkosh AirVenture has been the premier showcase for experimental aircraft for decades. Twin and/or turbine engine designs are rare in that world of “homebuilt” aircraft. Even more rare are such designs that make it past the prototype stage. While hundreds of homebuilt designs have come and gone through the years, one name consistently stood alone among them: Burt Rutan. The prolific designer of all manner of bizarre, fanciful, efficient, cutting-edge flying machines pushed the boundaries for 40+ years. His legacy is rewritten every summer in the trampled grass around examples of his composite, canard designs. At each AirVenture, you’ll still find rows of them displayed. It was there that I stumbled upon a small lineup of his Defiant twins and learned of one man’s 35-year quest to complete a plane that should have revolutionized the light twin market (but didn’t).

## Great Expectations Meet Harsh Realities

Rutan first flew his Model 40 design in 1978, naming it "Defiant." It publicly debuted at the National Business Aircraft Association (NBAA) convention, versus Oshkosh. Rutan envisioned a fully certified version, marketed primarily to business aviation. Small businesses loved light and small cabin-class twins at the time, but his Defiant could offer safety and simplicity that no production twin could. Sadly, in spite of his best efforts, sufficient funding to pursue certification never materialized. Burt's sole Model 40 simply became his personal transportation.

However, there was plenty of interest in his selling plans or kits for an Experimental Category version. He demurred, insisting #40 was just a proof-of-concept aircraft and not a prototype. Fred Keller was an Oshkosh award-winning builder of a Rutan VariEze, who lived in Anchorage, Alaska. Rutan later authorized Keller to build an improved version of the Defiant, but only if Keller documented every step of the build and, in doing so, helped develop a complete set of construction plans that might eventually be marketed. Keller did just that (in an astonishingly quick 18 months), while incorporating a



Canard testing



Garage modifications



First start



Fixed-pitch prop and Mooney nose gear

multitude of improvements (all developed with and/or blessed by Rutan). The most obvious change being a modest increase in wing and canard spans. The result was the Model 74 Defiant, completed in 1983. The Rutan Aircraft Factory (RAF; the precursor to Scaled Composites) sold nearly 200 sets of plans in 1984-85, before halting sales.

Many would-be builders were soon overwhelmed by the scope of such a project, especially one based primarily on plans. The tasks of building the structure, scrounging parts for modification, designing systems, and scratch-building all manner of components were daunting to say the least. No one could match Keller's super-human pace. While several did get completed within just a few more years, the majority of Defiants required 15+ years to reach airworthy status. Today, 40+ years after the last set of plans was sold, only about 30 Defiant airframes are believed to have been completed, and roughly 20 remain active.

Early writings about the Models 40 & 74 are filled with superlatives and visions of a future awash in simpler, safer, certified twins. Those were, after all, Rutan's primary design goals. The simple part was using low-horsepower, normally-aspirated, carbureted

engines, turning fixed-pitch props, and basic, lightweight, user-friendly systems. The safer part was multifaceted. Centerline thrust made the threat of control loss after an engine failure practically nonexistent. Fixed-pitch props meant easy engine management (normal and otherwise). The canard design lowered the fear and danger of stalls, as both the main wing and the canard are lifting surfaces. However, the canard reaches its critical angle of attack (AoA) first and, when it does, causes the nose to fall

(lowering the AoA on both the canard and the main wing). Thus, the main wing isn't typically able to achieve a stalling AoA. Other systems (gear, fuel, electrical, etc.) are elementary in function and non-catastrophic in failure events.

What if the Defiant had achieved certification and production (in some further refined form) and then been scaled up into larger twins with similarly safe handling and operational characteristics? There is little doubt their accident rate would have been



Author and owner



Rear engine cooling scoop



Don Mrowzinski



Custom folding canard tip



Detail of the folding canard tip

lower than that of more traditional twins. However, that simply didn't happen. As is often the case when innovative designs are forced to battle for limited development dollars within small markets, the winner is usually the more traditional choice.

### The M Isn't Silent

Don Mrowzinski grew up the son of an electrician, helping his dad wire houses. His mechanical mind was further stimulated by a blue-collar

family working in the plumbing, HVAC, and well-drilling trades. As a teen, Popular Mechanics provided his first exposure to homebuilt aircraft articles. His degree in Business and Accounting led to learning early computer programming and software development. Eventually, he started his own consulting business, designing systems for large companies and managing large-scale projects.

In the early 1980s, Don's career moved him from his native upstate

New York to Ohio. There, he learned to fly, earning his Private Pilot Certificate in 1982. While attending the Dayton Airshow with his then-girlfriend, he was looking at the Glasair Aircraft display and expressed a desire to build something similar. She asked where the two kids would sit (this, prior to them having seriously discussed marriage, much less children). Seeing this was the woman for him, they soon married, and Don shifted his aircraft search to 4-seaters.

A couple of years later, he met Burt Rutan at Oshkosh and saw the Defiant. The hook was set instantly. He purchased the plans in 1985 and started construction. Little did he know that the never-ending need for more tools and bigger shops would consume time and money of their own. Then, the kids came along, his flying stopped altogether, and the build slowed to a few hundred hours per year.

### Three and One-Half Decades in the Making

It is unlikely that anyone enters into a project anticipating it will take them 35 years to complete. Don is no exception. Nonetheless, he always believed he was fully capable of building and flying the aircraft. Initially, he logged his build time religiously. At 2,500 hours, his logging became less specific. At 4,000, it became sporadic, at best. In the end, he estimates he invested 7,500-8,000 hours building. By 1989, it was time for a new house for his family, and airplane building stopped for 2+ years. In 1992, he headed back into the shop, but soon took a detour.

One challenge of Defiant ownership is hangaring. They don't fit into standard T-hangars, because the span of the canard is much wider than both the tail span of similarly sized twins and the back of most T-hangars. Checking all the airports in his Columbus, OH home area, none offered affordable hangaring that fit the Defiant's dimensions. So, he devised an unconventional solution. He would build his canard with folding tips. The reduced/folded span (about six feet less) would be sufficient to utilize standard T-hangars. He pitched his idea to Rutan directly, who was unenthusiastic. Don was convinced it could work and pressed. Burt's response was, "Okay, but if you're going to do it, you must do it right! Which means subjecting the whole assembly to static load testing." Don agreed, and Rutan provided all the necessary testing criteria.

Don's folding tip mechanism incorporates custom-milled locking hardware to carry the spar load, plus fore and aft locks that prevent twisting.

His Rutan-approved static load tests required locking the tips in their extended position, then loading each tip with 750 lbs. (challenging in itself, just to stack so much weight onto such a small surface). That equated to 7.6 Gs, outside of the fold mechanism alone, or double the maximum G-load of a Normal Category aircraft. To date, no other Defiant builder has tackled such a modification, and it was Don's only significant departure from the RAF plans. That single modification, however, added over a year to the build. He completed the canard in 1995.

Rutan's Model 40 and the prototype Model 74 both utilized Lycoming O-320 engines of 150-160hp. The only larger engine the plans approved was the Lycoming O-360 (180-200hp). Don chose the latter, buying two, overhauled/pickled, 180hp versions in the late 90s. As the plans also recommended, he stuck with fixed-pitch props. Initially, choosing 3-bladed wooden units, carved to climb pitch.

Nearly all of the construction was conducted in a pole barn adjacent to his house. He was at the 50% done with 90% to go stage when progress stalled (around the year 2000). Career and fatherhood took priority, and the project languished for nearly 15 years. Yet, unlike so many builders, Don never gave up, never contemplated selling it, never quit dreaming. He always felt that if he lived long enough, he would complete it. After his two sons were grown, he resumed construction around 2014. After retirement (in 2016), he dove back in with a defiant push to the finish line. Finally, the day came in 2019 to extract the Defiant from the pole barn and move it to the airport. He removed a wall and cut a slot in a support post between the two single-car garage doors to allow the wing-strake to pass through. After all those years of labor, needing to repair the hole in his garage was the least of his concerns.

Don's Model 74 arrived at its T-hangar as a complete, but disassembled, aircraft. The engines and props were the only components of N171D that Don did not build or modify himself (with only the occasional aid of his wife or sons to lend extra hands when



**ACCURACY BEFORE EMPTY**

Fuel quantity isn't something you guess.

Learn more at: [ciescorp.com](http://ciescorp.com) or scan code.



**Coastal Aircraft Services**  
Gulf Shores, AL  
251-978-0163

**Why choose between aircraft maintenance and a vacation?**

Located at Jack Edwards Field (JKA), Coastal Aircraft Services is just minutes from the beautiful beaches of Gulf Shores, AL.

Drop off your Turboprop or piston twin and let our PT6 experts and FlightSafety-trained mechanics get to work while you relax. We have experience with King Air, Caravan, PC-12, Twin Cessnas, Pipers, and Barons, ensuring your aircraft is serviced to the highest standard.





A thoroughly modern panel

necessary). That included designing and building the redundant electrical systems, the modern panel layout, all the finish and paint work, and sewing every stitch of the interior on a 1920s industrial Singer. By Autumn of 2020, final assembly and engine test runs were complete.

### Defying Gravity

As the reality that he might actually finish his Herculean task set in, Don resumed flying. First earning an Instrument Rating and then flew multiple types to sharpen his skills. Next, adding a Multi-Engine Rating (in a standard twin, to avoid centerline-thrust limitations). With the help of the tight-knit Defiant community, he also flew other Defiants into his home airport in preparation for his own maiden flight. After a few weeks of low and high-speed taxi tests and a few “crow hops” over the runway, it was time.

That first flight in May 2021 was successful, but far from trouble-free. The speed of the Defiant challenged Don, and the rear engine was both over-revving and overheating. Don pulled the rear engine to idle, abbreviated his flight agenda, and finished the flight essentially single-engine. The rear engine’s P-51 style belly

scoop was replaced with two “arm-pit” scoops, which rammed air into each bank of cylinders from the lower wing/fuselage intersection. That resolved the CHT issues, while the installation of new 2-bladed composite props, designed to optimize the Defiant’s wide speed envelope, resolved the high RPM issues.

### A Tranquil Twin

Flying the Defiant was not my first experience behind the controls of a Rutan-esque canard design. I’d previously flown Cozy Mk.III & Mk.IV

models and the Quickie 2. So, the oddities of canard flying were not totally foreign to me. A second engine just added to the intrigue. Like all canard designs, the Defiant initially scrambles a pilot’s sense of airplane form and function. Everything seems backwards. The elevator is at the front (on the canard). So, when the stick is pulled, the elevators move down (not up) to increase lift on the canard and raise the nose. The rudder is mounted below the forward fuselage, so when a pedal is pushed, it’s controlling yaw from the nose, rather than tail (it’s nicknamed a “rhino rudder”). Both engines incorporate updraft cooling, versus the far more common down-draft. The ailerons are on the main wings, but inboard, versus outboard (mainly to shorten and lighten their control rods). There are no flaps. Finally, the Defiant is taxied into the rear of a standard parking-T.

Like Cessna’s Skymaster line, the Defiant is a centerline thrust twin. Because the rear engine is out of sight, it is started first (when it can be heard). After the rear engine is running and stable, the front engine is started normally. Taxiing out is standard, using the steerable nosewheel and differential braking. Run-up is equally standard, with the only unusual aspect being verification that the canard-tips are extended (visually) and locked (via the absence of two red flashing warning lights).



The Defiant requires a capable tug

On takeoff, throttle #2 (rear engine) is opened first. Once it is obvious through both pilot-senses and engine indications that it is developing full power, throttle #1 (forward engine) is brought up to match (at which point all turning tendencies cancel each other out). Rotation occurs around 75 KIAS and requires just a slight pull on the side-stick. Typical takeoff rolls are 1,600' under standard weights/conditions and slightly longer at higher weights and/or density altitudes. N171D's custom props increased takeoff roll over 100', but also increased cruise speed 15 knots (a trade-off any pilot would welcome). The pitch sensitivity common to canard designs is apparent almost immediately after liftoff. However, once pilot control inputs are dialed in accordingly, pitch control is quite manageable. The recycled Mooney nosewheel is retracted via a simple, manually operated, over-center mechanism, while the mains are fixed.

Climb rates are generally 1,500 feet

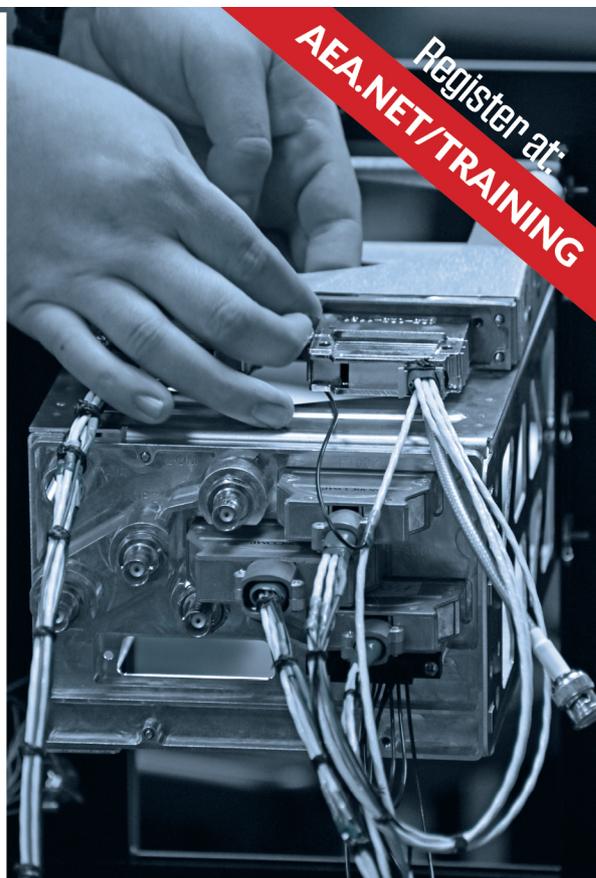
per minute (FPM) at 120 KIAS. Airflow over the rhino rudder is slightly modified by the adjacent nose gear, making a rudder trim adjustment necessary after retraction. Otherwise, there is little to fiddle with in climb, without cowl flap or prop controls. Mixtures can be leaned on-schedule, of course. The Defiant is equally happy in low or mid-altitude cruise, and N171D averages 150-155 KTAS down low on 18-20 GPH (total) and 160-165 KTAS in the teens, burning 15-17 GPH. Numbers no conventional twin of its generation, with similar horsepower, 4 seats, and a generous baggage area could achieve (especially while carrying 108 gallons of fuel, for a 5-hour range with reserves).

Maneuvers are sedate, but control forces are not harmonious. Pitch forces remain very light, while roll forces are heavier (in comparison) with virtually no adverse yaw apparent. Yaw forces are somewhere in between. Stalls are benign, as the canard is effectively "self-recovering." It stalls,

the nose drops, and it's flying again, without the main wing ever having stalled. The aircraft could stall and recover like this, in repetition, if the stick were simply held aft. Of course, a steady altitude loss would result in that situation if no other control or power changes were made.

One Engine Inoperative (OEI) flight is where the Defiant's simplicity shines. There is no published minimum safe single-engine (Vsse) speed, as there is no minimum control (Vmc) speed. The airplane is totally controllable throughout the entire flight envelope, whether flying on one engine or two. With the loss of either engine, the Defiant simply flies along as before, in terms of control. To maintain altitude, pitch will increase, and IAS will slow (with Vy and Vyse both being around 105 KIAS in N171D). There is no need to rapid-fire through memory items to identify, verify, and secure the troubled engine. No uncommanded yawing or rolling happens. No drama at all, really. Set

# Upcoming Avionics Training



[aea.net/training](http://aea.net/training) • [aea.net/training](http://aea.net/training) • [aea.net/training](http://aea.net/training) • [aea.net/training](http://aea.net/training) • [aea.net/training](http://aea.net/training) • [aea.net/training](http://aea.net/training)

the power on the good engine to correspond to the required performance, then sort out the problematic engine and secure it, if necessary.

Single-engine performance is far from stellar, but it is absolutely on par or better than similar category, conventional twins. At about 400 lbs. under gross, on a near-standard day, I began by pulling the rear engine to idle.

Once trimmed, we were still climbing at 150-250 FPM, passing through 4,500' MSL, at 110 KIAS (slightly above Vyse). Repeating the exercise with the front engine at idle, the climb rate improved to 350-400 FPM. This disparity in OEI performance is mainly attributed to different prop efficiencies. While both props are pitched the same, the front prop's wash (thrust) is less efficient,

as it is broken up passing across the canard, fuselage, and wing strake. Conversely, the rear prop's thrust is allowed to escape cleanly behind the aircraft. Additionally, when the front engine is silent (or idled), the air reaching the rear prop arrives less disturbed, further improving the rear prop's efficiency. Obviously, OEI climb numbers would likely improve

### Defiant N171D Data [Table 1]

Main Wing Span/Area	30.75 feet / 90.5 feet <sup>2</sup>
Canard Span/Area	24.16 feet / 48.9 feet <sup>2</sup> (18.1 feet with tips folded)
Total Wing Area	139.4 feet <sup>2</sup>
Length	22.8 feet
Height	9.33 feet
Cabin Dimensions	Width: 43.0" tapering to 41.5" Length: 66.0" (front), 56.0" (rear) Height: 42.0" tapering to 38.0"
Baggage Area	16.5 feet <sup>3</sup> (rear seats upright) 41.0 feet <sup>3</sup> (rear seats folded)
Empty Weight	1,900 lbs.
Max. Gross Weight	3,100 lbs.
Useful Load	1,200 lbs.
Fuel Capacity	108 Gallons (648 lbs.)
Fuel System	50 Gal. Per Wing Strake 4 Gal. Per Sump Tank Right Tanks Feeds Rear Engine Left Tanks Feeds Front Engine Crossfeed Available for Emergencies
Electrical System	12 Volts 2 x Batteries 2 x Alternators 2 x Main Busses (1=Front, 2=Rear) Normally Isolated Main Bus Tie Available for Emergencies
Avionics System	Dynon PFD & MFD Dual Engine Monitors (within Dynons) PS Engineering Audio Panel Avidyne IFD-440 IFR & WAAS Nav/Comm Dynon #2 Comm Dynon Autopilot & Flight Director

## Defiant N171D V-Speeds [Table 2] All Speed In Knots Indicated Airspeed (KIAS)

Rotation (Vr)	75-80
Best Angle of Climb (Vx)	95
Best Rate of Climb (Vy)	105
Best Rate of Climb, Single-Engine (Vyse)	105
Min. Control, Single-Engine (Vmc)	N/A
Maneuvering (Va) @MGW	130
Normal Cruise (Vnc)	150-165
Never Exceed (Vne)	195
Max. Landing Gear Operation (Vlo)	130
Max. Landing Gear Extended (Vle)	150
Max. Flap Extension (Vfe)	N/A
Landing Reference (Vref – Final)	80
Clean Stall (Vs)	67

slightly if the failed engine's prop could be stopped to reduce windmilling drag. With fixed-pitched props, full stoppage is not assured. Regardless, OEI situations in the Defiant are low pilot workload with sufficient performance margins to allow safe outcomes.

Descents are one of the few instances where pilot workload in a Defiant is slightly higher than that of a typical twin with constant-speed props. Like any high-performance aircraft capable of flying in the oxygen levels, the pilot can choose to trade altitude for airspeed during descent. However, since Defiants typically utilize fixed-pitch props, engine RPM will rise as airspeed increases unless the pilot adjusts power accordingly.

In the pattern, the Defiant remains simple, but different. The nosewheel's maximum operation speed (Vlo) of 130 KIAS (150 once locked – Vle) allows it to be extended early if using it as a speed brake is desired. When proper descent planning makes that unnecessary, it is typically lowered on downwind. The verification of "Gear Down, One Green" is peculiar, but

appropriate ("Two Green" could be used, if incorporating the adjacent canopy lock annunciation). Application of carb heat isn't typically necessary. Instead, glance at the right Dynon display to verify safe readings on the carb temp gauges. Don typically targets a minimum speed of 100 on downwind and 90 on base into final. With no flaps and no belly speedbrake (as some canard designs have), the Defiant is challenging to slow on final. A common technique is to pull the rear engine to idle and allow its windmilling prop to act as a speed brake. The front engine is then used alone to control speed and sink rate. Eighty knots works well on final, with a threshold crossing speed of 75. While a small flare is acceptable and safe, the Defiant is best flown onto the runway in a stabilized pitch attitude and descent rate. Since it lacks flaps, it will already be in a slightly nose-up attitude if stabilized on-speed. Since the rudder pedals control both the rhino rudder and nosewheel steering, the pilot should anticipate the nosewheel to be slightly askew upon initial contact, if any significant crosswind requires

sustained rudder input throughout the touchdown and rollout.

None of Rutan's canard designs that made it into the homebuilt market could be accused of being STOL-machines. The Defiant is better than most in that it has a sturdy nose wheel and a reasonable main-gear width. Nonetheless, Don prefers to avoid runways under 3,000' long to preserve appropriate safety margins.

Taxi-in can be accomplished on either or both engines. Otherwise, there is almost nothing for the pilot to do. Don likes to insert a small blocking device behind his gear release trigger, as an extra layer of protection against inadvertent nosegear unlocking (though, even with the trigger depressed, one would still have to give a mighty lift over-center on the manual gear handle to actually retract it).

Oddly pointed directly at the hangar door, the twin is shut down and secured. Egress is a delicate affair using a slightly blind step below the fuselage. However, there is ample structure to grasp throughout the process. Then the one-of-a-kind Mrowzinski folding canard tips can be unlocked and lowered into their dangling (folded) positions. Being a twin, the Defiant is a bit much to muscle around with just a hand-towbar. So, the sturdy electric tug is maneuvered into position, the motorized cams lock onto the nosegear tow-lugs, and the short tow into the hangar begins. Yes, Don designed and built the custom tug, too! 

**Matthew McDaniel** is a Master & Gold Seal CFII, ATP, MEI, AGI, & IGI and Platinum CSIP. In 34 years of flying, he has logged nearly 22,000 hours total and over 5,900 hours of instruction given. As owner of Progressive Aviation Services, LLC ([www.progaviation.com](http://www.progaviation.com)), he has specialized in Technically Advanced Aircraft and Glass Cockpit instruction since 2001. McDaniel is also a Boeing 737-series Captain for an international airline, holds eight turbine aircraft type ratings, and has flown over 135 aircraft types. Matt is one of less than 15 instructors worldwide to have earned the Master CFI designation for 11 consecutive two-year terms. He can be reached at [matt@progaviation.com](mailto:matt@progaviation.com) or 414-339-4990.

# TWIN & TURBINE

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



17,000+ Jet Owners

12,000+ Turboprop Owners

6,000+ Twin Piston Owners

5,000+ High Performance  
Move-Up Single Owners



**The Worldwide General Aviation  
& Business Aviation Markets  
Receive Twin & Turbine every month!**

FOR ADVERTISING INFORMATION, CONTACT:

Jenna Reid, Advertising  
816-699-8634 • [Jenna.Reid@vpdcs.com](mailto:Jenna.Reid@vpdcs.com)  
[www.twinandturbine.com](http://www.twinandturbine.com)

TWIN & TURBINE

Contact us for more  
information and the  
full mailing list.

## JETS - 22,379

### CHIEF PILOTS & OWNERS

COUNT	AIRCRAFT
8	ASTRA 1125
41	ASTRA 1125SP
59	ASTRA 1125SPX
21	BEECHJET 400
266	BEECHJET 400A
250	BOEING BBJ
513	CHALLENGER 300
317	CHALLENGER 350
29	CHALLENGER 3500
29	CHALLENGER 600
25	CHALLENGER 601-1A
108	CHALLENGER 601-3A
52	CHALLENGER 601-3R
351	CHALLENGER 604
283	CHALLENGER 605
78	CHALLENGER 650
3	CHALLENGER 800
53	CHALLENGER 850
5	CHALLENGER 870
504	CIRRUS VISION SF50
130	CITATION 500
375	CITATION 525
345	CITATION BRAVO
207	CITATION CJ1
107	CITATION CJ1+
255	CITATION CJ2
245	CITATION CJ2+
489	CITATION CJ3
267	CITATION CJ3+
464	CITATION CJ4
192	CITATION ENCORE
85	CITATION ENCORE+
405	CITATION EXCEL
13	CITATION I
277	CITATION I/SP
436	CITATION II
50	CITATION II/SP
164	CITATION III
173	CITATION LATITUDE
58	CITATION LONGITUDE
376	CITATION M2
510	CITATION MUSTANG
142	CITATION S/II
366	CITATION SOVEREIGN
118	CITATION SOVEREIGN+
315	CITATION ULTRA
289	CITATION V
27	CITATION VI
135	CITATION VII
324	CITATION X
39	CITATION X+
314	CITATION XLS
358	CITATION XLS+
17	DORNIER ENVOY 3
33	ECLIPSE 550
317	ECLIPSE EA500
20	EMBRAER LEGACY 450
83	EMBRAER LEGACY 500
113	EMBRAER LEGACY 600
72	EMBRAER LEGACY 650
16	EMBRAER LINEAGE
379	EMBRAER PHENOM 100
580	EMBRAER PHENOM 300
113	EMBRAER PRAETOR
57	FALCON 10
21	FALCON 100
15	FALCON 200
272	FALCON 2000
5	FALCON 2000DX
23	FALCON 2000EX
162	FALCON 2000LX
148	FALCON 2000LXS
25	FALCON 20C
15	FALCON 20C-5
17	FALCON 20D
1	FALCON 20D-5
1	FALCON 20E
48	FALCON 20F

75	FALCON 20F-5
182	FALCON 50
5	FALCON 50-4
8	FALCON 50-40
115	FALCON 50EX
282	FALCON 7X
70	FALCON 8X
173	FALCON 900
28	FALCON 900C
21	FALCON 900DX
351	FALCON 900EX
99	FALCON 900LX
22	GULFSTREAM G100
130	GULFSTREAM G150
238	GULFSTREAM G200
305	GULFSTREAM G280
13	GULFSTREAM G300
11	GULFSTREAM G350
324	GULFSTREAM G450
131	GULFSTREAM G500
641	GULFSTREAM G550
465	GULFSTREAM G650
16	GULFSTREAM G-I
15	GULFSTREAM G-II
12	GULFSTREAM G-IIB
87	GULFSTREAM G-III
175	GULFSTREAM G-IV
319	GULFSTREAM G-IVSP
202	GULFSTREAM G-V
113	GULFSTREAMG 600
32	HAWKER 1000A
5	HAWKER 1000B
7	HAWKER 125-1A
2	HAWKER 125-1AS
1	HAWKER 125-600A
55	HAWKER 125-700B
66	HAWKER 4000
216	HAWKER 400XP
53	HAWKER 750
142	HAWKER 800A
16	HAWKER 800B
408	HAWKER 800XP
44	HAWKER 800XPI
100	HAWKER 850XP
176	HAWKER 900XP
213	HONDA JET
4	LEARJET 23
44	LEARJET 24
64	LEARJET 25
3	LEARJET 28
614	LEARJET 31
22	LEARJET 35
56	LEARJET 36
140	LEARJET 40
470	LEARJET 45
102	LEARJET 55
418	LEARJET 60
17	LEARJET 70
158	LEARJET 75
294	PREMIER I
6	SABRELINER 40A
2	SABRELINER 40EL
2	SABRELINER 40R
5	SABRELINER 60
9	SABRELINER 60ELXM
48	SABRELINER 65
11	SABRELINER 80
1	SABRELINER 80SC
1	SUKHOI SBJ
3	SYBER JET SJ30
52	WESTWIND 1
14	WESTWIND 1124
47	WESTWIND 2

## TURBOPROPS - 16,319

### CHIEF PILOTS & OWNERS

COUNT	AIRCRAFT
210	AVANTI
1	AVRO RJ70
483	CARAVAN 208
2275	CARAVAN 208B

37	CHEYENNE 400
140	CHEYENNE I
21	CHEYENNE IA
218	CHEYENNE II
49	CHEYENNE III
39	CHEYENNE IIIA
58	CHEYENNE IIXL
238	CONQUEST I
292	CONQUEST II
77	DAHER TBM-700A
96	DAHER TBM-700B
113	DAHER TBM-700C
383	DAHER TBM-850
134	DAHER TBM-900
70	DAHER TBM-910
102	DAHER TBM-930
138	DAHER TBM-940
66	DAHER TBM-960
165	DE HAVILLAND DHC
49	EPIC E1000
1	FOKKER 70
37	JETSTREAM 31
70	JETSTREAM 32
64	JETSTREAM 41
32	KING AIR 100
474	KING AIR 200
21	KING AIR 200C
8	KING AIR 200T
261	KING AIR 250
46	KING AIR 260
190	KING AIR 300
10	KING AIR 300LW
695	KING AIR 350
91	KING AIR 350C
35	KING AIR 350ER
397	KING AIR 350I
6	KING AIR 350IER
73	KING AIR 360
7	KING AIR 90
7	KING AIR A/B90
65	KING AIR A100
155	KING AIR A200
32	KING AIR A90
89	KING AIR A90-1
93	KING AIR B100
1154	KING AIR B200
118	KING AIR B200C
121	KING AIR B200GT
6	KING AIR B200SE
8	KING AIR B200T
46	KING AIR B90
306	KING AIR C90
40	KING AIR C90-1
193	KING AIR C90A
402	KING AIR C90B
78	KING AIR C90GT
112	KING AIR C90GTI
165	KING AIR C90GTX
18	KING AIR C90SE
257	KING AIR E90
172	KING AIR F90
29	KING AIR F90-1
5	MERLIN 300
14	MERLIN IIB
5	MERLIN III
27	MERLIN IIIA
45	MERLIN IIIB
14	MERLIN IIIC
4	MERLIN IV
11	MERLIN IV-A
34	MERLIN IV-C
91	MITSUBISHI MARQUISE
16	MITSUBISHI MU-2F
1	MITSUBISHI MU-2G
11	MITSUBISHI MU-2J
28	MITSUBISHI MU-2K
10	MITSUBISHI MU-2L
18	MITSUBISHI MU-2M
23	MITSUBISHI MU-2N
25	MITSUBISHI MU-2P
46	MITSUBISHI SOLITAIRE
70	NEXTANT 400XT
1	NEXTANT G90XT

1081	PILATUS PC-12 NG
836	PILATUS PC-12/45
216	PILATUS PC-12/47
300	PIPER JETPROP
91	PIPER M500
263	PIPER M600
601	PIPER MERIDIAN
292	QUEST KODIAK 100
3	QUEST KODIAK 900
15	ROCKWELL COMMANDER
6	STARSHIP 2000A
54	TURBO COMMANDER 1000
21	TURBO COMMANDER 690
134	TURBO COMMANDER 690A
136	TURBO COMMANDER 690B
80	TURBO COMMANDER 840
27	TURBO COMMANDER 900
26	TURBO COMMANDER 980

## TWIN PISTON - 7,649

### OWNERS

COUNT	AIRCRAFT
37	BARON 56TC
1677	BARON 58
428	BARON 58P
119	BARON 58TC
3	BARON A56TC
355	BARON G58
108	CESSNA 310
167	CESSNA 340
552	CESSNA 340A
50	CESSNA 402B
124	CESSNA 402C
27	CESSNA 404
317	CESSNA 414
452	CESSNA 414A
42	CESSNA 421
28	CESSNA 421A
309	CESSNA 421B
707	CESSNA 421C
59	CESSNA T303
112	DIAMOND D42
20	DIAMOND IA
186	DUKE B60
80	PIPER 600 AEROSTAR
3	PIPER 600A AEROSTAR
45	PIPER 601 AEROSTAR
4	PIPER 601B AEROSTAR
201	PIPER 601P AEROSTAR
24	PIPER 602P AEROSTAR
589	PIPER CHIEFTAIN
26	PIPER MOJAVE
301	PIPER NAVAJO
255	PIPER SENECA
74	ROCKWELL COMMANDER
168	ROCKWELL SHRIKE

## HIGH PERFORMANCE MOVE-UP SINGLES - 10,002

### OWNERS

COUNT	AIRCRAFT
393	BEECH BONANZA
441	CESSNA 182
55	CESSNA 206
428	CESSNA P210N
22	CESSNA P210R
58	CESSNA T182
1220	CIRRUS SR20
3733	CIRRUS SR22
2048	CIRRUS SR22T
121	MOONEY ACCLAIM
37	MOONEY ACCLAIM ULTRA
407	MOONEY OVATION
12	MOONEY OVATION ULTRA
263	PIPER MALIBU
199	PIPER MATRIX
565	PIPER MIRAGE

# PRIMED For Pilots

## A pilot's first look at Garmin Aviation's G3000 PRIME

by **Mindy Lindheim**

PHOTOS COURTESY OF GARMIN INTERNATIONAL



Author and Pilot Mindy Lindheim sitting in Garmin Aviation's G3000 PRIME simulator

Set in a cool, dark room in Olathe, Kansas, a soft blue glow spills into the hallway on Garmin International's campus. Step inside and you'll see a room outfitted with a sleek simulator - the newest G3000 Prime avionics suite. Normally, pilots may sweat walking into a simulator session, ready for an exhausting session full of emergencies and tricky scenarios. But today, I was excited. This session would be all about discovering what this next-generation flight deck had to offer, and I couldn't wait to literally get my hands all over those screens.

### **Walking In With Expectations**

Strapping into the left seat of the jet simulator, I had expectations for the G3000 PRIME, which was first announced in October 2024. I've been flying behind Garmin screens since I learned to fly in 2012 and have logged hours on the G1000, G1000 NXi, G2000, G3000, and,

finally, G5000. As I maneuver between flight decks, the familiar Garmin logic has always given me a sense of comfort. No matter which cockpit I am in that day, my muscle memory immediately knows where to go and how to operate the panel.

But I'll admit - my expectations stopped there. I assumed the G3000 PRIME would be "good" because Garmin doesn't miss. But what I didn't expect was just how much more they were offering than I ever knew was on the menu.

The G3000 PRIME is Garmin's newest, most advanced integrated flight deck yet. Think of it as the traditional Garmin DNA, modernized and upgraded in all the right places. The panel was designed for Part 23 turbine, military, and advanced air mobility markets. It has been selected for several aircraft, including the Pilatus PC-12 PRO, the Cessna Citation CJ4 Gen3, and the Beta Technologies ALIA.

## A Shot of Espresso

I had my morning coffee before my simulator session – because honestly, what pilot doesn't? But as I sat behind the G3000 PRIME with the simulator jet engines running, I took a moment to assess the panel and realized something funny: it felt like the avionics had a cup of coffee, too! It was fast, sharp, and carried a fresh energy and appearance. It was as if the G3000 I am familiar with had just gotten its own shot of espresso.

The first thing my eyes noticed was three edge-to-edge, 14-inch touchscreen primary display units (PDUs). Any Garmin guru will instantly admire the aesthetics, as the screens were optimized for maximum use and the resolutions were crisp. The layout was standard to what any of the G "thousands" would usually offer, but it was apparent that the PRIME presented much more user interaction with the information shown. The Garmin team put real thought into keeping the interface intuitive, but was also careful not to clutter it.

Along the center console were the two secondary display units (SDUs). They are similar to the Garmin Touch Controllers (GTC) I'm used to, but they offer much more screen real estate - about a 40% increase - and several more user options. This panel is just begging for pilots to start tapping!

I switched on my pilot brain (insert coffee here) and was ready for my first task: getting my taxi clearance from the ramp. And this very first mission is where the PRIME already hit me with a hidden gem feature. The moment I tapped on the frequency box to enter new numbers, the SDU recommended preset frequencies that it thought I may need based on my location - including the exact Ground Control digits that I was about to go hunting for.

These are the little things that make pilots feel seen. Small features like this can make such a huge difference - especially when you're arriving in busy airspace and every spare moment matters.

## Touching Everything

We grow up being told to keep our hands to ourselves and stop touching everything. But here's the thing: pilots never grow up. We are all kids at heart – loving every minute of staring out windows and making lots of noise as we blast by. It's every kid's dream, and now, thanks to PRIME, we're actually encouraged to touch! Tap, tap, tap away!

And honestly, it would be hard not to. The PRIME suite is designed around touchscreen function and supports multiple fingers on the screen at once – ten, to be exact. I realized there were two key reasons behind the new advanced multi-touch functionality.



The G3000 PRIME supports up to ten touchpoints at a time, allowing for easier hand stabilization in turbulence



The G3000 PRIME has similar functionality to the Garmin Pilot flight planning app

The first is hand stabilization. As much as we try to avoid turbulence, the bumps will happen, and we must plan for that reality. You can stabilize your hand on the beveled edge of the display unit or simply rest several fingers directly on the screen and use one finger to tap. The screen automatically detects which touchpoints are for stabilization and which touchpoint is still selecting something. Great ways to interact and multiple options until you find smooth air again.

The second benefit of the multi-touchscreen interface is multi-user capability. This means both the pilot and co-pilot can touch and select options on the same screen simultaneously. While the pilot may be adjusting the cabin temperature directly from the PDU, the co-pilot can zoom out on the map and assess the weather ahead. No fighting over controls? The kid's dream lives on!

## It Thinks Like Garmin Pilot

Remember how I mentioned that all Garmin products have the same brains? Well, Garmin Pilot has officially entered the chat.

Give the map display a simple touch, and Garmin Pilot users will see a recognizable radial menu appear - just as it does on the popular flight planning app. Tap an airport, and the radial menu will open a wheel of options, including airport details, airspace information, navigation tools, weather, and more.



Visual procedures graphically presented of all the arrivals available at once for ease of planning



SafeTaxi has become a great tool for providing situational awareness on the ground



The new takeoff and landing graphics give a visual briefing on the required performance calculated from the G3000 PRIME.

The similarities don't stop there. You can pinch-to-zoom on the moving map, swipe the map to see further down the route, and even edit the flight plan directly from the PDU screen. At one point, I realized I had performed three actions in a row purely on instinct, because PRIME behaved exactly like my iPad app.

## Favorite Features

As I "flew" to Boston, I kept uncovering more features that just made sense and topped my favorite list. In no particular order:

SafeTaxi. Pilots are used to flight plans that guide us through the roads of the skies, but that guidance disappears on the



Mindy Lindheim sits in the G3000 PRIME simulator at the Garmin Aviation campus in Olathe, Kansas



Mindy Lindheim and Garmin Aviation's Scott McCurley come in for landing in the G3000 PRIME simulator

ground. That's where SafeTaxi steps in. It's like a progressive taxi: the system visually shows you exactly where to go based on the instructions you've received.

I plugged my taxi route into the SDU, and arrowheads appeared along the taxi diagram on the display in front of me. My geo-referenced airplane icon on the screen progressed along the arrows to the runway – almost like a game of Pac-Man. Satisfying.

Visual Arrivals. I have never seen arrivals displayed the way the G3000 PRIME did, and it honestly blew me away. All at once, the system displayed a color-coded visual representation of every arrival at my selected airport. In an instant, I could quickly gauge which arrival to expect based on my direction of flight.

Takeoff and Landing Graphics. I'm used to the G3000/G5000 suites calculating my takeoff and landing performance for the jets I fly, but they snuck in a new wow factor on the PRIME. Instead of just showing the numbers, the system now also visualizes the performance data.

The graphic displayed included:

- the selected runway,
- intersecting taxiways,
- landing distance available,
- required field length,
- calculated margin,
- touchdown zone elevation,
- and even the current headwind/crosswind component

It transforms the data into something you can see. My landing briefing was a breeze. I even caught myself planning my expected taxiway turnoff simply by glancing at the graphic. This was a significant improvement in briefing performance data.

The Bottom Line

By the time I landed the simulator jet in Boston, I was ready to handle the G3000 PRIME in a real cockpit.

What struck me most was the feeling that Garmin clearly had the pilots' best interests in mind when designing this platform. My head stayed up far longer than usual because I didn't need the GTCs (or SDUs, in this case) as often to complete most tasks. The G3000 PRIME was intuitive, easy to understand, and it provided several ways to streamline information with fewer clicks.

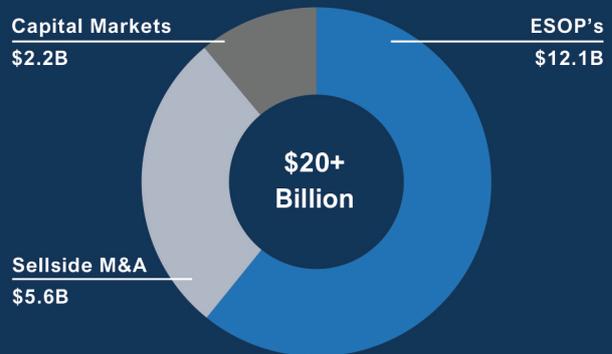
The PRIME felt like a great co-pilot, and one that I would certainly choose to fly with again. (And let's be honest... we can't say that about all co-pilots, can we?) 

**Mindy Lindheim** is an experienced pilot, aircraft broker, and aircraft owner. She has Textron Aviation factory experience as both a sales director and demonstration pilot and has since worked her way up to earning a Citation 525S type rating, Citation Longitude C700 type rating, and sells airplanes for Lone Mountain Aircraft. Mindy is very active on social media to educate, inspire, and share aviation experiences on her accounts @schmiindy. You can contact Mindy at [Mindy@ChasinTailwinds.com](mailto:Mindy@ChasinTailwinds.com).

# PARALIGN



With decades of investment banking, law, and ESOP expertise, we are the trusted partner for family and founder-owned businesses considering ownership transition.



*Paralign serves clients in Seattle, Miami, and everywhere in between with 3,000 feet of pavement and a JetA truck!*



[www.paraligncp.com](http://www.paraligncp.com)  
[ted.margarit@paraligncp.com](mailto:ted.margarit@paraligncp.com)

Securities and investment banking services are offered through BA Securities, LLC Member FINRA, SIPC. Paralign Capital Partners and BA Securities, LLC are separate and unaffiliated entities.

# De-escalation

by Thomas P. Turner



No flight is perfect. Some may become very “perfection-challenged” as a result of an omission or error. If something you do leads to an abnormal or emergency situation in flight, it’s key to avoid letting that error escalate into something worse. Take this example of a B55 Baron (NTSB Final Report CEN21LA174):

When the pilot rotated the airplane for takeoff, he felt the left rudder pedal “slam to the floor,” and he could not depress the right rudder pedal, which resulted in a sustained adverse yaw condition. The airplane climbed and drifted left of the runway, so the pilot continued the climb to pattern altitude.

During the climb, he saw the towbar attached to the nosewheel through a mirror on the left engine nacelle. The pilot circled the airport for about 30 minutes while assistance arrived. During the last circle, as he was descending, the right engine lost power. The pilot recalled that the right fuel gauge showed “low,” and the left fuel gauge was about 1/2 full. The pilot began to crossfeed fuel to the right engine, but he was unsuccessful in getting the right engine to restart. The pilot was unable to maintain airspeed and altitude and was having difficulty maintaining directional control of the airplane, so he elected to land the airplane in an open field. The airplane sustained damage to the fuselage and right wing during the landing.

Although the airplane manual states that the crossfeed is to be used in level flight only, the pilot reported that fuel was being fed to the right fuel tank, as evidenced by the fuel gauge indication increasing. The pilot reported the airplane’s altitude was “a couple hundred feet above the ground” when he turned the crossfeed on, and this

may have prevented him from having adequate time to restart the engine as he was occupied with trying to land the airplane.

The National Transportation Safety Board determines the probable cause(s) of this accident to be: The pilot’s failure to remove the towbar from the nose landing gear before takeoff, which resulted in a sustained adverse yaw condition, and his failure to adequately monitor the fuel system while circling the airport, which resulted in fuel starvation and loss of power to the right engine.”

AOPA Air Safety Institute posts a video, “Reality Check: What Are the Most Costly Insurance Claims?” It identifies aircraft towbars as a factor among the “top four” most frequent claims scenarios. The video does so in the context of propeller strikes, but if you forgot the towbar on a twin, that’s not the hazard. Watch the video at [www.aopa.org/training-and-safety/online-learning/reality-check/reality-check-costliest-claims](http://www.aopa.org/training-and-safety/online-learning/reality-check/reality-check-costliest-claims). I’m not going to dwell on this in this article except to say people whom I’ve provided transition training when they’ve become a first-time aircraft owner have heard me preach: attach the tow bar and immediately move the airplane, then immediately detach the tow bar. Don’t leave it on and walk away from the tow bar. Make it a habit that the tow bar is on only during the time you’re actively towing the airplane. This includes removing the tow bar when the airplane is inside its hangar.

## Deconstructing

Instead, let’s look at the idea of de-escalating abnormal and emergency procedures. First, a recap of our example:

- The pilot experiences a flight control issue. The rudder is stuck at full left rudder.
- The pilot circles the airport until help on the ground arrives.
- During that time, the pilot flies into a fuel-critical state.
- During descent, the right engine loses power. At climb, approach and landing speeds, this would require substantial left rudder to compensate. In this case left rudder was already applied—maybe even too much left rudder.
- The pilot attempts to use fuel crossfeed to restart the right engine, but the engine does not restart.
- The pilot “elected to land the airplane in an open field.”

The 40-year-old pilot's decision to put the Baron down in a field probably saved his life. Without rudder control, it would have been enormously difficult, if not impossible, to land. It would have required extreme measures to avoid loss of control in flight and a possible rollover into the ground. However he did it, he survived with only “minor” injuries. The NTSB final report says the Baron had “substantial” damage, but it is currently registered with a parts sales company in Colorado, so it's unlikely it will ever fly again.

### What other options might have been available to the pilot?

1. Land before the fuel state became critical. Even if waiting for “assistance” (fire trucks? An ambulance? a mechanic?), as fuel became critical, it would have become more important to get on the ground...any ground, including the field he eventually chose.
2. Switch to crossfeed before descending. The B55 Baron in this event was a later, interconnected tanks model, that is, it did not have independently selectable auxiliary tanks. Both fuel cells in each wing act as a single fuel tank with an ON position of the fuel selector valve.
3. Avoid unporting. If the fuel level is low, fuel may unport in a descent attitude. Fuel unporting using crossfeed in other than level flight is a known issue in Barons; trying to switch from ON to CROSSFEED during a descent, or trying to operate in crossfeed during a descent, are both unlikely to succeed in restoring fuel flow to the engine. It's probably better to shut down an engine on your terms in level flight and descend on one engine than to have it quit on its own terms sometime during that descent.
4. Don't add to your workload by trying to “save” the airplane. If doing something out of the ordinary (e.g., switching to crossfeed and trying to start an engine) is necessary for survival, then by all means try it. But if heroic measures are diverting your attention from the basics—aviate, navigate, and communicate—then take what you've got to work with and don't make things potentially worse.
5. Observe any takeoff fuel level limitation. In the case of this B55, there's a limitation that requires at least 13 gallons of usable fuel in each (main) tank for takeoff.

The fuel gauges are marked accordingly with a yellow arc range in which takeoff is not permitted. It's possible, I suppose, for one IO-470L to go through 13 gallons in half an hour if at full power and full rich mixture. It's also possible that the fuel level was below the minimum required amount before takeoff, and the engine ran out sooner. Adding the possibility of fuel unporting in descent with something more than zero fuel and less than 13 gallons on that side, however, we don't know where the fuel level may have been at takeoff.

6. Before fuel starvation, reduce power on the right engine. The pilot may have been able to balance the effects of rudder deflection somewhat by using partial power on the engine that was adding to pushing the airplane's nose to the left, then landing in this newly balanced state—carefully adjusting power on both engines as the rudder became less effective.
7. Land gear up with power to maintain directional balance, knowing directional control would be lost as soon as the nosewheel touched down, or at the very least, the nose gear would collapse. There is no way this could have been turned into a normal landing.

### De-escalation

The Crisis Prevention Institute ([www.crisisprevention.com](http://www.crisisprevention.com)) publishes a Top 10 De-Escalation Tips to use during times of high stress. Although much of this does not apply to an in-flight emergency, a few of the items might, including:

- “Keep your emotional brain in check. Remain calm, rational and professional.... Positive thoughts like ‘I know I can handle this’ and ‘I know what to do’ will help you maintain...rationality and calm....”
- “Set limits...[consider] concise...choices and consequences.... Offer the positive choice first.”
- “Choose wisely what you insist upon.... Decid[e] which rules are negotiable and which are not.”
- “Allow time for decisions.... A person's stress rises when they feel rushed. Allowing time calms things down.”

Here's the bigger picture: if faced with any abnormal or emergency situation in flight, whether from something you did, something you did not do, or through no fault of your own, ask yourself:

1. How can I maintain or regain control, and
2. What is the minimum I need to do to get this airplane on the ground with the lowest chance of injury to its occupants?

Then do those things, and only those things, to maintain command of your aircraft until it comes to a stop. 

**Thomas P. Turner** is the author of the *FLYING LESSONS* Weekly blog ([www.thomaspturner.com](http://www.thomaspturner.com)) that inspires pilots to pursue *Mastery of Flight*.™ A prolific writer, speaker and flight instructor, Tom has been inducted into the National Flight Instructor Hall of Fame.

## Ted Margarit

by Grant Boyd

PHOTOS COURTESY OF TED MARGARIT AND EPIC AIRCRAFT



Epic E1000 taxiing

In the early days of his college tenure, Ted Margarit was laser-focused on building hours with the ultimate goal of becoming an airline pilot. But being vectored back onto the ground by Grand Forks control in the fall of 2001 was the canary in the coal mine that his longstanding dream may not be actualized after all.

“I went to the University of North Dakota and started as a Commercial Aviation major,” Margarit said. “I was flying the morning of September 11th, and I’ll never forget when Grand Forks Air Force Base, which controls the airspace there, came on the radio and basically began shepherding blocks of students to the ground. We made it back to the briefing room, and there was a t.v. on, which is how we first

learned what happened. Pretty quickly after that, the older students were getting their offers to join regionals pulled.”

After 9/11 initially derailed Margarit’s aviation ambitions, he remained determined to complete the flight requirements needed to graduate. His Aviation Management degree proved a natural bridge to law school, and as his legal career took shape, his passion for aviation resurfaced – this time in an entirely new and unexpected form.

Ten years after graduating from undergrad in 2004, Margarit was making headway in his career in advising family-owned businesses on ownership transitions. The itch to begin flying again was too strong to resist, and it aligned well with the needs of his growing company.



Ted Margarit in the hangar with his E1000

“I cover the country, from Seattle to Miami. The M600 could make it to South Florida, but it was a five-and-a-half-hour adventure. It wasn’t the most comfortable experience. So, I really wanted an aircraft that had good speed but also good range. And like most do in this segment, I looked at a Citation Mustang, a Phenom 100, an Eclipse, TBM’s, and a PC-12,” he recalled.

“I also looked at the Epic and was like, ‘Wow, that’s the new thing. I don’t want to own a brand-new airplane with all the teething issues that you hear about with new models.’ But after talking to a bunch of owners and learning more, I heard that they weren’t having problems. The airplane has a PT6A-67, which is effectively the same motor as the PC-12, and there are a lot of systems that are similar on other airplanes. There really isn’t a lot that’s new, just the airframe.”

“I got back into flying very recreationally at first by joining a 172 and 182 flying club at Schaumburg Airport in Chicago,” Margarit said. “In 2018, I moved to Sioux Falls as my wife, who’s obviously the brains of the bunch and a retina surgeon to boot, wanted to practice medicine and raise a family where she grew up. To balance our careers, our deal was that we would take our South Dakota-provided tax savings and use those to buy an airplane. It would allow me to serve my customers without having to spend time waiting for connections at random airline hubs all over the country.”

The SR22 was a great way to reenter the cockpit, but Margarit quickly realized he needed something faster and could go farther. He purchased a Piper Meridian only a year later.

“A year into owning the Meridian, I had a nose gear that failed to extend [in February of 2020]. This was actually perfect timing because in March, as we all remember, there wasn’t anywhere to go. After nine months, I was able to get a new prop and engine and flew the Meridian for a few more years. Next, I flew an M600 before getting into the Epic E1000 GX I now fly,” he said.

With a national reputation for assisting companies in transitioning their ownership structure to their employees through Employee Stock Ownership Plans (ESOPs), the Epic allows him the flexibility to visit clients where they are and on their schedule, all without the inefficiencies of airlines. The result, according to Margarit, has made his aviation background just as key a part of his career and business as his law degree or ESOP experience, with airplanes representing some of the best investments he’s made in his business, Paralígn Capital Partners.



The all-composite, utility category airframe was part of the selling point for Margarit. Its sleekness was only some of its allure.

“What really pushed me to the E1000 was that it’s really the TBM of the 21st century. It flies 330 knots at 34,000 feet; I think my speed record so far in the airplane is 337 knots [true airspeed]. I have seen these numbers, so you can get more than the marketing numbers. You could, of course, go faster in a jet, but you’re going to pay double or triple for the privilege, plus spend two weeks getting a type rating. So, as I looked at those Venn diagrams, the Epic pulled ahead, and it has worked out really well for me.”

One of the many positives Margarit highlights about the aircraft is that “it is a stupid simple plane to fly that comes at a far lower cost than many other options.” It might just



E1000 in the flight levels



The whole crew fits comfortably



Ted and his daughter



be an aircraft in a perfect sweet spot, where owners find little reason to ever upgrade.

If Margarit were to ever move up, he feels that without another comparable turboprop in the market, a jet is the only step left. The Citation CJ3+, Phenom 300, or Pilatus PC-24 would be options that would match the E1000's range. But he isn't only pleased with the performance aspect of his current bird; it is economical to fly as well.

"I'm currently about 400 hours into ownership. Cash out of pocket, not including engine reserve, interest, or depreciation, has been only about six hundred and fifty bucks an hour. So, insurance, maintenance, hangar, cleaning it, fuel, training, and everything else have only been a little more than six hundred dollars an hour. That's incredible to go 330 knots and not have to worry about being in a 35-year-old airframe," he explained.

"With the Meridian and M600, I had costs pretty reliably down to about four hundred and fifty dollars an hour. I do notice that the E1000 burns quite a bit more fuel with the larger powerplant, but you're moving so much faster, so cost-wise per mile hasn't really changed significantly. On the other hand, like everything, there's always room for improvement. I know Epic has come out with upgraded insulation and sun-blocking windows to address the biggest complaint among Epic drivers sitting under the giant windscreen – the summer ground sweats!"

Another potential knock of an aircraft that's been certified in the recent decade is how it is supported by the



The ramp presence is real



Paralign Partners (left to right): Dillon Lewchuk, Nate Dykes, Ted Margarit

factory. However, Epic’s work in the homebuilt space was good practice for how they support owners of its certified models.

Margarit points to an experience where a hydraulic pump had failed, and he was AOG halfway across the country from his home base. 36 hours later, the work was signed off,

and he was back in the air thanks to parts and technicians delivered via a factory-owned Epic to the field.

“I have been really impressed with the level of product support from Epic. I recently watched their CEO, Doug King, get dirty crawling under my plane to check an oil leak. I was blown away; what CEO does that?!” Margarit asked.



**SELECT**  
airparts

Your trusted Beechcraft and Hawker parts source



More than 210,000 Part Numbers Available!

**New**   **Overhauled**   **Used**



Email: [sales@selectairparts.com](mailto:sales@selectairparts.com)  
Phone: 800-318-0010  
[www.selectairparts.com](http://www.selectairparts.com)



**TO ADVERTISE IN TWIN & TURBINE  
MAGAZINE CONTACT:**

**JENNA REID,  
ADVERTISING DIRECTOR**

**JENNA.REID@VPDCS.COM**  
**816-699-8634**

“And I think they’ve demonstrated a real commitment to the airframe, like Cirrus has. The AX is out now, and we are going to see continual improvements to the E1000. The airframe is such that it’s so underutilized today. There’s a lot of potential left in it. The aircraft has an 8,000-pound max gross takeoff weight, and you can load it with anything, and the ride quality is phenomenal. It’s just a really well-built airplane.”

More than 25 other E1000’s have rolled off the line since Margarit’s aircraft received its airworthiness in 2022. The company celebrated the delivery of its 100th certified airplane in September 2025.

“When you go to train in Bend, Oregon [at Epic’s facility], there is a wall right outside the simulator where there is a picture of every owner with their airplane. That wall is getting crowded,” he said, highlighting that other Epic pilots are a great resource for how to operate and caretake for your aircraft.

“I was really impressed with my transition training at the factory. When I transitioned, I had 2,000 hours of single-engine turboprop time, and the Epic’s ergonomics are such that you really don’t need a checklist – all the switches are aligned top to bottom, left to right. You could train a monkey to fly this airplane pretty quickly.”

An ancillary benefit of the E1000 is how it looks next to other airplanes. If ramp appeal is something you’re interested in, this aircraft may fit the bill.

“It has almost the same wingspan as the PA-46’s and TBM but is a little wider and longer. But what blows everything out of the water is its height, from tip to tail. The aircraft stands so much taller on the gear because you have a propeller that’s almost nine feet across, that’s converting 1,200 shaft horsepower to thrust,” Margarit said.

“In my hangar, I park next to King Airs, Gulfstreams, and some light jets. I don’t feel like I have a small plane anymore. In the Epic, I feel like I belong in the big boy hangar. It’s a measurement contest to be sure, but I say ramp presence matters at this segment of the market. I mean, when I ask my team to ride with me to client meetings, their confidence in the airplane is entirely related to their perception of it on the ramp. The SR22 and Pipers are good flying airplanes and great at their intended mission, but every employee who flew with me in those airframes poorly hid their apprehension about the trip due to the ‘small plane’ image. That has completely changed with the Epic.” 



**Grant Boyd** is a private pilot with eight years of experience in aviation business, including marketing, writing, customer service, and sales. Boyd holds a Bachelor’s and a Master’s of Business Administration degree, both from Wichita State University, and a Doctor of Education degree from Oklahoma State University. He was chosen as a NBAA Business Aviation “Top 40 Under 40” award recipient in 2020.



# POWER HOUSE

Okmulgee, Oklahoma may be off the beaten path, but for more than fifty years, this small town has been home to the only family-owned Pratt & Whitney Canada Designated Overhaul Facility in the world. And to the most highly skilled PT6A service technicians in the industry – as well as the parts, accessories, rental engines, and power sections needed to keep your downtime to a minimum. No one knows the PT6A better, and no one takes greater pride in their workmanship. The next time you’re over this way, come see the house we call home.



918-756-7862 | [covingtonaircraft.com](http://covingtonaircraft.com)  
Se Habla Español | FAA Repair Station No. CP2R750K



35% to 85% off!  
New Surplus Aircraft Parts

*Chosen for value and service*

**The Worlds Leading Supplier of New Surplus and Used aircraft parts for nearly anything that flies! From Single and Twin Cessnas, to Pipers and jets like Citations.**

**Check with us for parts like:**

- Airframe
- Piston Engine
- Turbine Engine
- Continental
- Lycoming
- Overhauled Rotables
- Exhaust Systems
- Wheels and Brakes
- Overhauled Propellers
- Hardware: AN, MS, NAS
- Pre-sewn Fabric Envelopes
- And More!

**Free Online Inventory Search**  
[www.preferredairparts.com](http://www.preferredairparts.com)

**Preferred Airparts, LLC**  
Div. of JILCO Industries, Inc.  
**800-433-0814**  
Toll free, U.S. & Canada  
Tel. 330-698-0280 - Fax. 330-698-3164  
sales2@preferredairparts.com  
**We Buy Worldwide!**  
Sales Hours: 8:15am to 5:30pm EST

## Ad Index

**AEA..... 13**

**BLR Aerospace ..... Back Cover**

**CIES Corporation..... 11**

**Coastal Aircraft Services ..... 11**

**Covington Aircraft Engines ..... 29**

**Luma Technologies..... 5**

**Paralign Capital Partners..... 21**

**Pilots N Paws..... 30**

**Preferred Airparts LLC ..... 30**

**Select Airparts ..... 28**

**Textron/McCauley..... Inside Front Cover**

**Turbines Inc..... 3**

**Vac Veterans Airlift Command ..... Inside Back Cover**

**TO ADVERTISE IN  
TWIN & TURBINE MAGAZINE, CONTACT:**

**ADVERTISING DIRECTOR, JENNA REID**  
816-699-8634 | Email: [Jenna.Reid@VPDCS.com](mailto:Jenna.Reid@VPDCS.com)



# Pilots N Paws®

**is an online meeting place for pilots and other volunteers** who help to transport rescue animals by air. The mission of the site is to provide a user-friendly communication venue between those that rescue, shelter, and foster animals; and pilots and plane owners willing to assist with the transportation of these animals.

A general aviation transport requires just one pilot volunteer and is far more efficient and dependable than time-consuming ground transportation for these animals who are often in danger of euthanization. Volunteer pilots retain complete authority of their planning and flights, and can give as much or as little time as they like.

**SIMPLE AS 1-2-3**  
No bothersome paperwork required! If you love to fly, and you love animals, please join us now! It's easy, it's fun, and it's extremely rewarding. Joining is easy and takes just a minute of your time.

- 1.** Go to [www.pilotsnpaws.org](http://www.pilotsnpaws.org) and register
- 2.** Post your information and read other posts
- 3.** Wait for contacts / make contact with others

**WHY JOIN THE PILOTS N PAWS NETWORK?**

- Enjoy flying while helping a worthwhile non-profit organization
- Flights are tax-deductible 501c3
- Expand your network of pilot/aviation contacts and other professionals
- Gain flight experience and log more hours
- Explore new geographical areas
- An extremely rewarding experience every time



**Pilots N Paws®**  
[www.pilotsnpaws.org](http://www.pilotsnpaws.org)

# TWIN & TURBINE

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

---

Written **By** Pilots **For** Pilots

---



[www.twinandturbine.com](http://www.twinandturbine.com)

---

Product Reviews | Turbine & Piston Operations | Safety & Training  
Market Trends | Aircraft Upgrades | Industry News | Lifestyle Features

---



## Two Hours on the Treadmill

"I'm current but not confident."

How many times in your flying career have you said that? Maybe it's been a few weeks since your last flight. Maybe the last landing you made wasn't your best. Maybe you had minor surgery and were just getting back to normal.

That was the text message from M2 owner, Larry King. He had a big trip planned from Dallas to Utah coming up, and wanted me to fly as a safety pilot before his departure day. To make sure his skills were sharp.

"I am in. What's the plan?" I replied.

"How about Mesquite (KHQZ) to Shreveport (KSHV), then to Longview (KGGG), then to Tyler (KTYR), then back to Mesquite? We can shoot an approach at each airport, and I have enough fuel, so we don't even have to get out of the plane."

Larry doesn't do anything halfway.

We met at his hangar on a marginal VFR day to brief the flights. Assembling the relevant information using ForeFlight was pretty simple. Longview's main runway was closed. They were mowing at Tyler. The usual stuff. Larry timed out the flights and filed all four at once. Our

phones lit up like a Christmas tree. My job, initially, was to handle the radios and keep us organized. From my "old school" habits, I printed paper charts for each destination. We briefed the probable instrument approaches before departure and filed to the initial approach fix (IAF) where possible. Since the flights were short (38, 17, 16, and 25 minutes), things would happen fast at M2 speeds.

Off we went to Shreveport.

Climbing to FL 250 on the first leg, we needed engine ice as we flew through some light precipitation. The Shreveport ATIS reported 10 knot winds favoring runway 24 but said they were landing 14. Larry asked for the GPS to 24, and approach control agreed. Nice decision.

As we taxied back, ground control asked if we were ready to copy the next clearance. "Tell them we need a few minutes to get sorted out," Larry said. He deleted the old flight plan and uploaded the new one into the Garmin G3000. By the time we were ready, tower had switched runways to 24.

Off we went to Longview.

We asked for direct to NEVER intersection, the IAF for the GPS runway 18 approach. Larry kept his speed down at our 3,000-foot cruising altitude in a busy training environment. On the ground in Longview, I sorted paper charts. "Are we in Longview or Tyler?" I confusedly asked.

"Longview, I'll taxi slower, so you can catch up." Larry laughed.

For the last two legs, I had Larry handle the radios as well. It was a real workout, programming the G3000 for takeoff speeds, landing data, loading approaches, listening for each ATIS, etc.

By the time we landed in Tyler, he was in the groove. I was exhausted.

As I drove home from Mesquite, Larry sent me a copy of his digital flight report card.

"96" isn't bad, he texted. Practice makes perfect.

Fly safe. 



**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, speaks nationally and writes on a variety of aviation safety topics. You can contact David at [davidmiller1@sbcglobal.net](mailto:davidmiller1@sbcglobal.net).

# COMBAT WOUNDED

THEY'VE GOT HEART, THEY NEED WINGS

Imagine a soldier returning home from combat facing devastating injuries and long-term hospitalization-- in a facility hundreds of miles away from their family.

**Now imagine yourself bringing them together.**



The VAC provides free air transportation to post 9/11 combat wounded and their families for medical and other compassionate purposes through a national network of volunteer aircraft owners and pilots.

**FIND OUT HOW YOU CAN MAKE A DIFFERENCE.**

**VETERANSAIRLIFT.ORG - 952-582-2911**



## WINGLET SYSTEM

Crafted with precision, this system features a lightweight aluminum wingtip, a sleek carbon fiber winglet, and integrated LED lighting. The system is FAA/EASA approved for installation worldwide.

✉ [info@BLRaerospace.com](mailto:info@BLRaerospace.com)

🌐 [www.BLRaerospace.com](http://www.BLRaerospace.com)

☎ **+1 (425) 405-4808**

## BENEFITS

- Reduce drag with certified take-off and climb performance.
- Improved handling/performance for a smoother flight.

- Sleek updated design to modernize your King Air's appearance.
- Asset value appreciation.
- LED lighting included. Reduce glare and never be inconvenienced from a burnt out bulb again.

@BLRaerospace



### LED Winglet Lighting

Position, Anti-collision and Recognition Light.

### LED Tail Lighting

Combined Aft Position and Anti-collision light assembly.

### Extended Length De-ice Boots

De-icing coverage extended to the winglet.