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FLIGHT REVIEW

EPIC E1000 GX

TWIN & TURBINE

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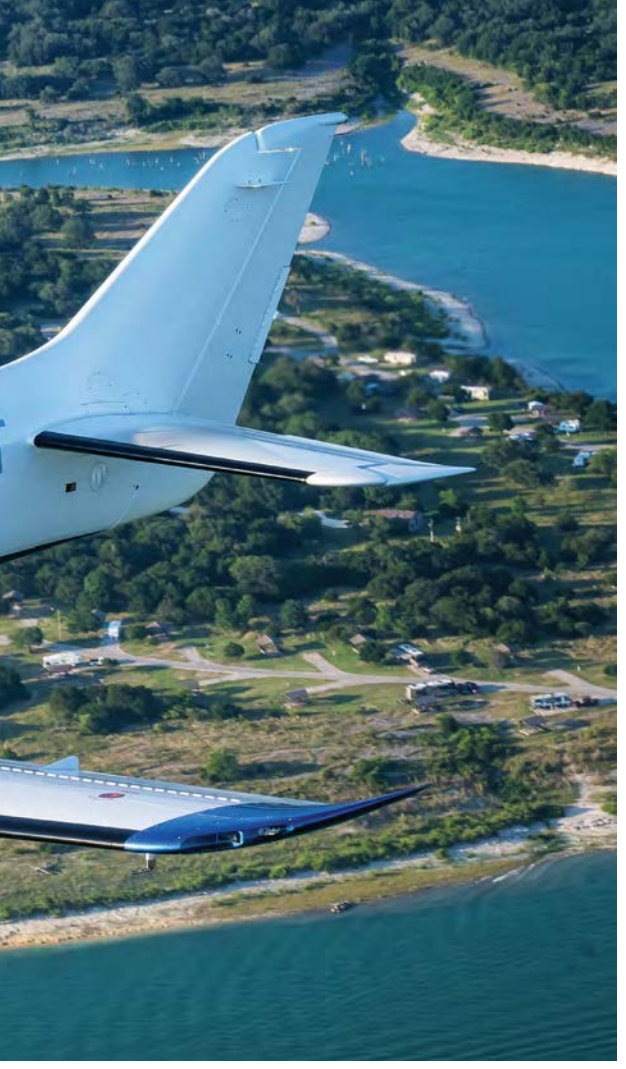


FLIGHT REVIEW

EPIC E1000 GX

by **Matthew McDaniel**

Comparing airplanes to horses has been a mainstay in both aviation journalism and aircraft naming. Evoking the image of fast or free-spirited horses seems to help sell airplanes. No one ever compares an aircraft to a draft horse. Yet, to me, Epic's E1000 GX is a hybrid galloping racehorse and heavy hauling draft horse. No other aircraft in this class can heft such loads to such altitudes then run at home-stretch speeds for the entire remainder of the race.

Like a racehorse, the Epic's lines are sleek and graceful. The E1000 GX's steeply raked windshields, aggressive five-bladed prop, and smooth glass composite surfaces hold your gaze longer than is probably considered polite. But, it is no diminutive pony. Its semi-elliptical wing spans 43 feet, and the average pilot can easily walk under the fuselage-mounted horizontal tail. The tip of the rudder towers 12.5 feet high. The aircraft could easily accommodate eight but is configured for only six. The cabin's four passengers enjoy a club seating arrangement that does not require them to interlace legs with the person facing them. In fact, the floor length between the club seats is almost double that of the two most comparable in-class competitors. Behind the last row of seats, an ample baggage area inside the pressure vessel allows access to baggage in flight.

PHOTOS BY AUTHOR

Epic's E1000 GX demonstrator inside their Bend, Oregon, delivery center hangar.

Massive double-slotted fowler flaps are elegant in form and powerful in function.

Cynical History

I admit I can sometimes be cynical about new aircraft designs and the upstart companies who introduce them. After all, how many have we seen come and go over the years? They often wow us with aesthetically pleasing artist renderings (or even a prototype) and eye-popping performance claims, only to fade away as suddenly as they appeared. Sometimes it is simply a matter of funding that dooms them. Other times it's an inability to match early performance or price claims that causes their eventual demise. Usually, it's a combination of both.

So, when I first saw a completed Epic LT kitplane in the mid-2000s, I was conflicted. It was undoubtedly a sleek machine, but it was still a kit and a daunting one at that. How many builders would persevere in putting daylight under its tires? In a story all too familiar, Epic went bankrupt in 2009. It seemed the design would soon go the way of the Dodo. Thankfully, a group of Epic owners/builders (including the current CEO, Doug King) joined forces with a Chinese company to buy the assets and soon reopened the Bend, Oregon, factory to produce kits and assist builders. Subsequently, they announced their intention to pursue certification and manufacture ready-to-fly aircraft.

In spite of those early turbulent years, the LT kits have been incredibly successful at reaching flight status. Because Epic only sold kits bundled with their builder assist program, every one of them eventually flew. Of those 50 or so LTs, all but a handful remain airworthy (and factory-supported) today, even though Epic ceased kit sales in 2012 to focus on certification of the E1000 model. What other kitplane company can you think of that had a nearly 100 percent completion rate on kits sold? None that I know of. However, producing kits and assisting builders is a far cry from producing and delivering certified aircraft. Especially, a cabin class, pressurized, turbine machine capable of 300-plus knot speeds and cruising altitudes deep into RVSM territory.

Ownership of the company changed once more as it separated its kit-owner support and certification arms (Epic Flight Support and Epic Aircraft, respectively). Type certification of the E1000 was achieved in late 2019, with first deliveries and production certification following in mid-2020. The enhanced E1000 GX was certified in July 2021. Major design changes to reach those milestones never materialized. Nearly every aspect of the design was refined, of course, but the company stayed true to its goal of keeping the performance and handling of the E1000 on par with that of the LT. Thus, Epic Aircraft now builds the fastest certified single-engine turboprop in production and delivers a new one every three weeks.

Considerate Compromises

I can hear my fellow skeptics already: "It's all too good to be true." Aircraft certification programs always add weight and subtract performance. It's just in the nature of ensuring an aircraft meets minimum certification standards for durability, maintainability, and control. The Epic is not an exception to that rule. The typical empty weight of an E1000 GX is 500 pounds or so heavier than that of an LT. Some of that weight is in structural

The primary carbon-fiber construction material makes up all major structures, all flight controls, trim tabs, cabin panels and flooring, most fairings and trim pieces, and even the firewall (shown here).

beef-ups required to meet certification standards for redundancy and crashworthiness (which allowed the E1000 to achieve certification in the tougher Utility Category). But, much of that weight is in interior improvements added because Epic wanted to, not because they had to.

Soundproofing and vibration dampening was added throughout the airframe, making it the quietest and smoothest single-engine turboprop I've flown. The airstair door was revised and, when opened, interior courtesy lights switch on to ease loading when the aircraft is otherwise unpowered. A secondary emergency exit was added, and the large windows got an electronic dimming feature. Significant flight deck enhancements were also added, resulting in an incredibly ergonomic design that lowers pilot workload and increases safety from the adjustable glare shield down to the auto-switching fuel selector. Critical to offsetting these weight-adding features and boosting performance was the enlargement and reshaping of the engine intake to better optimize air induction.

The advantage Epic had in retaining its performance pedigree throughout the 7-year certification effort was not about what it ended with but what it began with. Specifically, power. A lot of it. From day one, Epic's business end has harnessed the trusty Pratt & Whitney PT6A-67A turboprop, sporting 1,200 SHP. It is not takeoff limited as in some other single-engine turboprops in this category. All 1,200 horses are available to the pilot through takeoff and initial climb, and 1,000 of them are available continuously (thus, the E1000 designation). With so much power available, the certified model could afford to gain a little "maturity weight" and still be a thoroughbred performer.

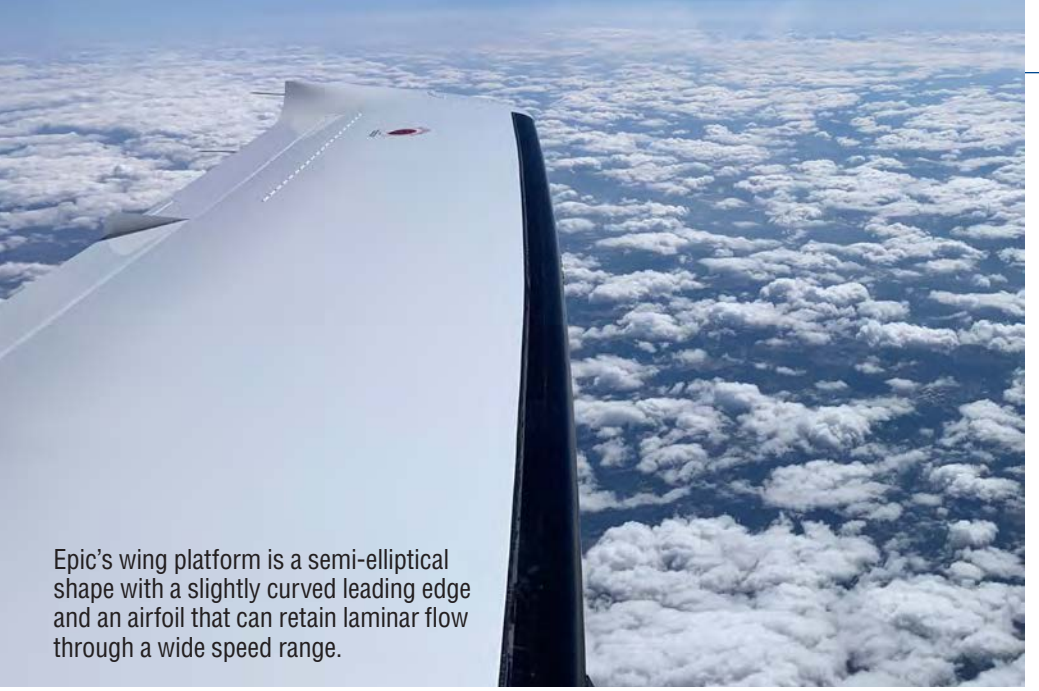
Combine that with prop and engine airflow refinements made to improve thrust output, and the E1000 GX retains the same bragging rights as its LT brethren. In some areas, it even bests them. E1000 GX pilots can fill the tanks (264 gallons usable), fill all six seats with FAA-standard size adults (with some payload left over for baggage), climb at 3,000 to 4,000 FPM to FL340, and then cruise north of 315 KTAS in the 50 gallons per hour (GPH) range.

One example of the design of the various E1000 GX's subpanels, organized into logical rows and groups with sequential button placement to create easy workflows.

Flying the E1000 GX

It took me over a year to connect with Epic's Flight Training Program Manager, Peter King (no relation to CEO Doug King). A pandemic, crazy work and flight schedules, 2,000 miles of separation, and demands on Epic's working fleet of aircraft made making all the stars align difficult. It was worth the wait!

Peter King is a highly experienced flight instructor, flight test pilot, and Garmin avionics guru. Our aviation paths have crossed many times in the past couple of decades, so there was an easy comfort between us as he walked me through a preflight. We talked about such arcane topics as Boundary Layer Energizers (BLEs), span-wise flow control devices and optical ice detectors (all of which the E1000 GX



Epic's wing platform is a semi-elliptical shape with a slightly curved leading edge and an airfoil that can retain laminar flow through a wide speed range.

has). Once we settled into the flight deck, it was immediately obvious that actual pilots had significant input into the layout. All normal workflows are logical: left to right for startup and taxi, right to left for after-landing and shutdown. None of the nonsensical patterns I've experienced in so many aircraft types over the years.

All the switches (actually backlit push buttons), as well as avionics, flight, and engine controls fall easily to hand. The seat is easily adjustable for optimum pilot eye position. The avionics screens and subpanels all have similar focal lengths allowing pilots with aging eyes little trouble adjusting focus from one viewpoint to the next. One of my favorite features was the recessed panel directly in front of each pilot, known as "the wedge." It contains an AOA gauge, gear and flaps position lights (including an amber TRANSIT light), and a takeoff configuration checklist. By simply holding down the throttle-mounted TOGA button this checklist illuminates. Any red item is not correctly configured for takeoff. Once the button can illuminate the list as all-green, all critical takeoff items have been properly set.

Of course, like any pilot, I'd hoped to experience Epic's well-publicized performance numbers. Yet, even with high temperatures and short stage lengths conspiring to foil that, I was still highly impressed. With OATs at a whopping ISA +24F at the surface, we departed Bend around a thousand pounds below the 8,000 lbs MGW. The long rudder arm and huge rudder trim tab make counteracting the massive left-turning tendencies that 1,200 SHP produces very manageable. Don't forget to release the right rudder pressure and re-trim towards center quickly after liftoff, though, or the rapidly increasing speed will quickly humble the pilot with an inclinometer ball pegged to the left. Nothing a bit of practice won't overcome, of course, but getting the yaw damper (with its automatic rudder trimming capabilities) engaged early in the climb is helpful too. By the time we'd reached midfield on our VFR downwind departure, we were 5,000 feet AGL. We could easily maintain 3,000 to 3,500 FPM at (or even slightly above) V_y IAS, making it obvious that Epic's claims of 4,000 FPM climbs are not unrealistic in ISA conditions.

Typical flight maneuvers exhibited the E1000 GX's beautiful handling qualities. Pitch and roll are well harmonized and just heavy enough to not be twitchy. That powerful rudder is more sensitive, however, and requires a lighter touch (but, in most flight conditions, the yaw damper will be managing the rudder for the pilot anyway). Steep turns up to 60-degrees bank were a pleasure. Stalls are a total non-event thanks to the robust warning and recovery systems (including a stick shaker and, for the truly inattentive pilot, a stick pusher). Of course, a simple lowering of pitch combined with having 1,200 SHP on tap makes for a quick recovery.

Epic has chosen to stick with the Garmin G1000 NXi avionics suite. In the E1000 GX model, the system is mature, feature-rich, and incorporates dual 10-inch PFDs, a central 12-inch MFD, a data-entry keypad, and multi-layered redundancies. Garmin's GFC 700 autopilot also replaces the previous S-Tec 2100 model used in the original E1000 and mounts it under the glareshield. The GFC 700 incorporates everything we expect in this modern age of integrated digital avionics: full VNAV capabilities, full WAAS approach coupling, and fully coupled missed approaches.

Our first approach was a GPS WAAS (LPV) full procedure from the Initial Approach Fix (IAF). The G1000 NXi's VNAV system made the descent from cruise altitude a breeze, including meeting multiple crossing restrictions. Initial flap and gear extension requires little adjustment by the pilot. Landing flap extension, however, is a different affair. That additional flap throw is a whopping 31 degrees (from 12 down to 43). Initially, a subtle push on the yoke is sufficient to counteract the double-slotted fowler flaps as they extend mostly aft. But, as they begin to droop, dramatically increasing drag, a more forceful push is required to maintain the glidepath. Of course, the autopilot can do all this with aplomb if left coupled. For missed approaches, simply push the TOGA button to properly sequence the G1000 NXi. Follow up by advancing the throttle to takeoff/go-around power and cleaning up during the ensuring rapid climb and acceleration (the yaw damper will take care of the right rudder needs, assuming the A/P is fully coupled throughout the missed approach).

We made a quick return for a practice landing, where I under-flared a little and landed a bit flat, but found the E1000 GX easy and predictable to control. Returning for departure, taxi speed was easily controlled without brakes by manipulating prop pitch into the Beta range. During the subsequent departure, we picked up our IFR flight plan to Seattle's Boeing Field and

zoomed up to the assigned cruise altitude of FL260 in a matter of minutes. With the temps still well above ISA, the PT6 unsurprisingly reached its ITT limit slightly before we got there.

Epic advertises a top cruise speed of 333 KTAS, which would be most likely in this altitude range. Yet, in ISA +10 temperatures, we settled in at 324 KTAS max cruise. So, on an ISA day, 333 KTAS seems entirely realistic. While max speeds are more likely in the mid-to-high 20s, fuel flows will not be optimal there. The savvy E1000 GX pilot will take advantage of its amazing climb rate to get to the top floor (FL340) as quickly as possible, where peak efficiency can be achieved. At FL260, we were consuming 67 GPH at 324 KTAS (max cruise) and 64 GPH at 321 KTAS (normal cruise). In comparison, at FL340, E1000 pilots routinely report fuel flows in the 48 to 50 GPH range while cruising at 315 KTAS.

The descent into BFI was as stable and predictable as the combo of G1000 NXi avionics and GFC 700 autopilot would imply. Vectors onto the Localizer were a breeze, and I elected to hand fly most of the ILS 14R approach. With two prior practices under my belt, I found the control inputs required during gear and flaps extension to be predictable and speed was easily controlled (with a little help from Peter regarding the ideal target power settings). This time my flare was more on-point and that, combined with the trailing link landing gear, resulted in a satisfying "chirp" at touchdown.

Training and Future

Epic has developed a top-notch in-house training program that aims to help owner-pilots do much more than simply satisfy FAA and insurance requirements. Their goal is for pilots to achieve "Demonstration of Mastery" of each training program Task. While a turboprop aircraft weighing less than 12,500 lbs does not require a Type Rating, Epic's objective is to help each pilot achieve the same levels of knowledge and airmanship that a Type Rating would require. This is achieved through a program they refer to as "The Epic Challenge." The course includes online study, remote meetings with the ground instructor(s), in-aircraft training, and the use of their incredibly detailed and realistic Frasca E1000 AATD Simulator (located at the Epic Factory Training Center in Bend, OR). While the owner has to pony up for fuel used in their aircraft, all other program costs are covered by Epic.

What the future holds for the E1000 GX is ripe for speculation and, like any similar manufacturing company, Epic is tight-lipped about it. However, there are a couple of blank spaces on the GX panel that might suggest enhanced capabilities to come. With multiple other aircraft in the same category already offering autothrottle and safe-return "emergency autoland" capabilities, one can easily imagine such features being added to Epic's flagship in coming years. One also wonders what experiential knowledge is being gained as E1000 GX fleet hours rise, which could be applied to future refinements. Obviously, maintainability almost always improves as designs mature. Speed and efficiency routinely do, as well. Could a future Epic model or variant be the first in this category to achieve a 350 KTAS top speed? Having already cleared all the hurdles that take most startup aircraft manufacturers down, and with only 17 more knots to get there, I wouldn't bet against Epic. T&T

Matthew McDaniel *is a Master & Gold Seal CFII, ATP, MEI, AGI, & IGI and Platinum CSIP. In 31 years of flying, he has logged over 20,000 hours total and over 5,700 hours of instruction-given. As owner of Progressive Aviation Services, LLC (www.progaviation.com), he has specialized in Technically Advanced Aircraft and Glass Cockpit instruction since 2001. Currently, Matthew is also a Boeing 737-series Captain for an international airline, holds eight turbine aircraft type ratings, and has flown over 115 aircraft types. He can be reached at* **matt@progaviation.com** *or 414-339-4990.*