TWIN & TURBINE

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

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VOLUME 24 NUMBER 1

Winter Escapes

Air Journey Takes Us to Some of Its Hottest Destinations

Latest Autopilots from Genesys

Top Turboprop: MU2 and KA100

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Photo Courtesy of Paul Bowen Photography

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Editor's Briefing

by **Rebecca Groom Jacobs**

Bahamian Gem

This issue we highlight winter escapes – something I think about a lot during a January spent in Wichita, Kansas. My parents were fond of winter escapes, and growing up we were fortunate enough to partake in many.

Looking back on my childhood, I find it incredible that I didn't realize how much of a luxury it was to grow up with an airplane. When my family of five needed to travel, we would just pile in our Bonanza and off we would go. It was as simple as that – or so I thought. But while my siblings and I enjoyed free FBO popcorn and cookies, my father was busily making travel arrangements, flight planning, pre-flighting, then packing luggage and children into the airplane. As the youngest, I was always squished into the very back of our Bonanza F33A alongside the suitcases. But I didn't mind; it was cozy!

The majority of our flights were to visit relatives in South Carolina for holidays and special occasions. But we also embarked on annual family vacations, often finding a warm beach during winter. More often than not, that entailed flying to the Bahamas by way of Fort Pierce, Florida. There we would grab a bite (at the Airport Tiki), fuel up and prepare customs paperwork. But the part that really stuck with me was my father's briefings regarding the life raft procedure should we be forced to ditch in the water. We rarely received such a serious safety briefing, which made the occasion especially important (and without fail, my mind would conjure visions of the "Jaws" aftermath we were sure to encounter if the situation did indeed occur).

For the first couple of Bahamas trips, we ventured to Paradise Island. I have little memory from Paradise except playing at the hotel and swimming with dolphins (they scared me as much as the aforementioned idea of Jaws had). But when I was around 10 years old, my father discovered a Bahamian gem – Small Hope Bay Lodge located on Andros Island. Tucked away from the more tourist-laden islands, Small Hope is an all-inclusive resort offering a relaxed, family-friendly atmosphere. Coincidentally, it's owned by a pilot who provides discounts to private pilots who fly in their personal aircraft.

For nearly 60 years, Small Hope has been introducing divers and snorkelers to the Andros Barrier Reef. The reef is the third-largest in the world, stretching 140 miles along the east coast of the island and rimming the Tongue of the Ocean. Small Hope rotates through more than 60 dive sites with three regularly scheduled dives per day, both shallow and deep options. Additionally, the island teems with Blue Holes (underwater cave systems) – some of which guests can visit for a dive or swim.

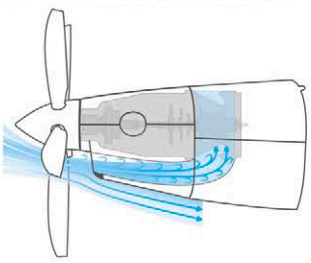
With its spectacular scuba diving, relaxing atmosphere and diverse guests, Small Hope provided my family with priceless memories. For us, it was the perfect "winter escape."

UNLEASH THE POWER OF YOUR PC-12

Internal Aerodynamic Design is a key factor in achieving optimal engine performance. The aerodynamic efficiency of a cowl inlet and ducting are measured on how well dynamic air pressure, created by the aircraft's velocity through the air, is captured at the cowl inlet and converted into static pressure around the engine's plenum. This static pressure is generally expressed as a percentage of what is known as ram air recovery. The higher the ram recovery percentage, the better the engine will perform.

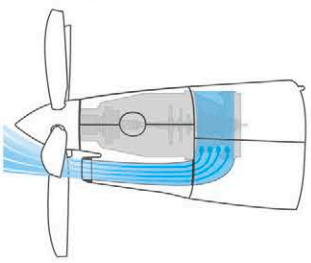
With Speed Cowl, pressure from high-velocity ram air is fully recovered at the cowl inlet and flows efficiently through the ducting to the engine plenum. This significantly increases ram air recovery to the engine plenum and boosts the climb & cruise performance.

BEFORE: Standard Factory Pilatus Cowling



Pressure from high-velocity ram air is reduced by turbulence caused by the shank of the propeller near the spinner. Also, the spinner directs much of the airflow to the lower lip of the inlet causing additional turbulence within the ducting. The result is a significant reduction in ram air recovery to the engine plenum.

AFTER: Speed Cowl Pilatus Cowling



Pressure from high-velocity ram air is fully recovered at the cowl inlet and flows efficiently through the ducting to the engine plenum. This significantly increases ram air recovery to the engine plenum.

Airmail

In Response to David Miller's "Judgment or Experience" (November)

I enjoy your column. You and Dingman are always my first reads, and if I don't get to the rest of the magazine, that's usually okay, although Ware was extraordinary this month. However, you passed on the perfect opportunity to use the old anecdote:

Neophyte to Senior Birdman: What quality makes you a good pilot?

Senior Birdman: Exercising good judgment, of course.

N: Well, how do you cultivate good judgment?

SB: Through experience.

N: How do you get experience?

SB: By exercising bad judgment.

It's funny, but we both know it's true too often. At some point you realize there are going to be lessons, despite the attempt to learn all yours from other people. One should pray that those you must learn personally will be inexpensive ones. The corollary, of course, is that there will occasionally be a recurrent training requirement for those lessons, as in experience being that which allows you to recognize a mistake when you make it again.

Don't ask me how I know this.

But since you're wondering, I'll continue my catharsis. If you (not you personally, the generic "you") follow no other rules or procedures, follow these two: 1) The bigger your hurry or that of your passengers, the slower you should be moving and 2) The last thing you MUST do before you close the door is walk all the way around the airplane. All the way around. Every time. The worse the weather, the worse the ramp condition, the further behind schedule you are, the more annoying things that have happened to disrupt/disturb your routine, the more slowly you must make this walk.

I feel better now. Keep up the good work.

Anonymous

In Response to Kevin Ware's "Only in America" (November)

I just finished your delightful article, "Only in America." In September, I completed the grand trip in my 340 with my wife of almost 50 years, my daughter and her four-year-old son.

I have dreamed about flying in the San Juan Islands for many years. After a grand trip west, including stops at relatives and friends after picking up Christina and Harry at MTV, we landed in Friday Harbor. Really fascinating place to be for two days. Then we went to Concord just as you did. Our purpose was a family wedding.

On to Sedona where my son's grandfather-in-law lived for many years. His name was Harner Selvidge. If you look him up, he made many great contributions to aviation and engineering in the first half of the 20th century. After an op stop in Oklahoma where I got avgas for $3.75/gallon – less than car gas in San Francisco – we proceeded to Nashville and supper with three grandchildren and our son and daughter-in-law. From there, we returned to our home base, SMS. A long but wonderful way to get home to our two little hounds.

I wish I could articulate our trip as well as you do because it was quite an experience. While our backgrounds are somewhat different, we both have about the same flying experience, 10,000 hours. Mine includes about 37 percent military and the rest in general aviation, including ownership of 11 different airplanes. I recently became rated as SIC in a Citation 560 and a 750X. I believe it was your article in the same magazine that spoke of the great advantages of the APU.

Thanks for sharing your delightful experience.

Phil Leventis

I just read your article entitled "Only in America" and wanted to express how much I enjoyed it. My family and I live in Hawaii but travel back to Alaska each summer where we keep and operate a 1953 Cessna 180. Alaska exemplifies the theme of your article, and we get to enjoy all the privileges you describe. Hawaii is not as friendly but our customers still get to move around basically as they wish. The airspace is fine; it's the airports that represent challenges here.

Anyway, I hope lots of people read your story. The freedom to fly the way we do is rare and precious but easily taken for granted, or in the public's case, unknown.

Shaen Tarter

I share all of your passion for the tremendous freedoms we have in the U.S. I'm on a ferry flight from Austria to the U.S. now and write this after I've dealt with the fiasco that exists in any other airspace than the U.S. I had the same thoughts as you, but you articulated it better than I ever could have. It was a well-written, meaningful and excellent article. You are a very good writer. Thanks for doing what you do!

Joe Casey

AIRMAIL

Top Turboprop Series

Mitsubishi MU2 and King Air B100

by **Joe Casey**

PHOTO COURTESY OF CLINT GOFF

Many years ago, a prospective aircraft owner came to me with the proposition that I assist her with the purchase of an airplane, then manage and fly that airplane inside my company. She wanted to move six-plus people within 800 nm, and do so with efficiency. But, she left me with one additional statement that added another level of excitement to the search. She said, "I don't want to be like everyone else. I don't want to be in the herd."

That statement can mean different things to different people, but what it did was send me on a search to find the right airplane regardless of what "everyone else" thought. So, with this unusual permission granted, I hit the market to find the right airplane.

PHOTO COURTESY OF PAUL BOWEN PHOTOGRAPHY

Looking Outside the PT6

Any turbine pilot who seeks efficiency is going to end up looking at a Garrett engine-powered airplane (TPE-331), and that is where my search took me. While I absolutely love the trusty PT6 engine that undoubtedly dominates the market, there is another engine available. Though some will sneer at an airplane with any other engine than a PT6, those pilots are usually less experienced and just echoing what others have told them. Chances are they have less than 10 hours of non-PT6 turbine time in their logbook.

I'm okay with that. But for those efficiency-minded individuals who are willing to look beyond the PT6, a whole new brave world exists. All you have to do is look at the King Air 100 series of airplanes. The A100 has the PT6 and the B100 has the Garrett. To contrast the two is an embarrassment for the A100 as the B100 will operate 30-plus KTAS faster than the A100 and have lower operating costs. The B100 has a passionate following even today, and that can be attributed to its efficiency.

If you value efficiency and want to move six-plus people within 800 nm in comfort, you'll likely end up with several airplanes on your spreadsheet that are powered by a Garrett engine. I ended up flying an MU2 Marquise, then shortly after flew the King Air B100 for another client. Strangely, I ended up with an MU2, B100 and King Air 200 in the same hangar. I had the fun opportunity to operate three very different airplanes, often on the same day. I had a bird's eye view that few ever see. Which one do I like the best? Which one should you consider buying? Well, read on for my analysis.

Mitsubishi MU2

The MU2 is a clean-sheet airplane with short wings, crafty aerodynamics and a worst-to-first past that either attracts or repels. It attracted me. I understand the aerodynamic efficiency of having high-wing loading and spoilers, but this airplane is unlike any other in general aviation. The MU2 is an airplane that flies wonderfully, but only in the hands of a pilot that respects the airplane and operates it with a professional's touch. In the 1990s, the fatal crash rate of the MU2 increased alarmingly, and both the MU2 community and the FAA responded. The FAA issued an SFAR and the training for the MU2 became much like a type rating. The fatal crashes diminished greatly, and the MU2 training is now looked upon as one of the great success stories in aviation training.

All of this history is well documented and known by many prospective owners, but what is not as well-known is the ensuing support and cohesiveness amongst the MU2 community. Mitsubishi repeatedly, year after year, gets the highest marks for support from the manufacturer when contrasted against

the other turbine manufacturers. This is absolutely critical. Show me an airplane without factory support, and I'll show you an airplane headed for the boneyard. The MU2's tremendous support is one of the reasons why it continues to have some of the most passionate followers ever.

King Air B100

The King Air B100 has a similar following amongst its owners. While there's no "B100 owners Group," make no mistake that the B100 has a passionate group of owners and pilots who love the efficiency of this wonderful airplane. I've flown the B100 for nearly six years, and I still have one in my hangar that I fly around 100 hours per year. The B100 is the "hidden gem" of the King Air world, in my opinion.

The Comparison

So, should you efficiently opt for an MU2 or a B100?

Think about the noise. Bar none, pound for pound, the MU2 is the loudest airplane on the planet when on the ground! The exhaust pipes on the MU2 are mere inches in length, and when it is operating on the ramp, it will blow your brains out with noise. It is always interesting to see people mill around the airplane as I start but quickly head for shelter after I start up. It is far too loud to hang around while operating on the ground. In flight, it is a different story.

The B100 has the same engines, but the exhaust is about 3 feet in length, and it ports that noise outside the engine nacelle. The B100 is still loud on the ground, but nothing like the MU2. However, in the air, passengers in either airplane enjoy a quiet ride that is nothing like the experience of those standing around the outside of the airplane on the ground.

Where the MU2 is audibly loud, it is also aesthetically interesting. I get more remarks from people about the MU2 than just about any other airplane I fly. While the King Air can be found on any ramp on any airport, the MU2 is a topic of discussion anywhere I go. I personally think it looks cool, but I also like redheads, '68 Chevy Trucks and Wilgas. So, even if you think the MU2 is ugly, you'll still stir up a lot of comments and discussions from folks at the airport. At least before you start the engines – then everyone will head for the hills!

Performance

When discussing cruise speeds, you've got to consider the engine size. There are two available, the TPE331-6 and the TPE331-10. Most pilots call it the "dash six" or the "dash ten." I keep meticulously accurate records on the performance of the airplanes I fly, and the average TAS for the -10 powered MU2 Marquise in cruise is 285 KTAS. In the winter, I can get 300 KTAS, and in the summer, I see about 270 KTAS. The MU2's speed is closely hinged to gross weight. Just like the faster jets, the cruise of the MU2 is faster later in a long flight as the weight of the fuel is burned off.

In the B100, I repeatedly see 260 to 265 KTAS, and it seems to vary in speed only slightly with varying gross weights. So, between the two, the MU2 is definitely faster.

While the B100 is slower, it does have far more pleasant flight characteristics. Bottom line, it is easier to fly. The flying characteristics of the MU2 must be weighed heavily by a potential buyer. The MU2 can be learned to fly safely, but it is completely different from any other corporate airplane. Do not think the transition will be as smooth as other turboprops. The MU2 training will be like a type rating, whereas the King Air B100 will be far easier.

I've got lots of flight time in more than 60 different types of airplanes, including some really strange machines that are tough to fly like UH-60s, Pitts S2Bs and many tailwheel airplanes. But the MU2 tops the list of airplanes that took a long time for me to become comfortable. At the end of MU2 flight training, I still felt uncomfortable in some regimes of flight, and I self-induced high personal limitations until my

experience grew. When I passed the 100-hour mark in MU2s, I began to feel comfortable in almost every situation. When I passed 250 hours, I'd take it anywhere in the world in some of the most demanding of situations.

So, do not romantically think you will get out of MU2 training and be "good to go" in any situation. Full-span flaps, spoilers, sloppy control feel, quirky aileron trim, narrow gear, fast speeds, high wing loading, low-to-the-ground sitting height, stiff gear, and incredibly responsive Garrett engines all make this airplane a handful for the uninitiated. This airplane takes time to make friends, but once the friendship is made, it is a great one. It provides impressive performance for the pilot that knows how to handle it.

The B100? Well, it is a King Air, and that means that it has less performance, but it has benign flight characteristics. It flies differently than the 200 or 300 series of King Airs, but it is still easy to fly.

Other Considerations

To me, the biggest difference between these two airplanes aside from flight characteristics is the air conditioning. The B100 has large gaspers and a good environmental system that heats and cools nicely. And, the B100 has the benefit of having the air conditioner compressor powered by an electric motor in the nose of the airplane. So, a GPU can be hooked up and the cabin can be cooled down prior to the passengers showing up.

The MU2? Well, there's no air conditioning at all. So, the MU2 can be really hot on those summer days. I can remember sweating bullets on afternoon flights until the airplane climbed up through the teens. There was no air conditioning and not enough air movement. As a tried-and-true Texan, I especially appreciate air conditioning.

The Decision

Which one is right for you? To be forthright, I really like the B100 and I still fly it regularly, while I do not fly the MU2 anymore. When the MU2 sold, I still had a hangar full of other airplanes that kept me engaged in flying, so the loss of the MU2 from my management didn't faze me at all. Could it be the right airplane for you? If you value efficiency, love performance, don't mind sweating, and are willing to dedicate yourself to flying more than 100 hours per year, then the MU2 can be a great selection of airplane. You must train rigorously to ensure you keep your skills equal to the capabilities of the airplane.

If you are thinking about buying an older King Air 90, the B100 is a really solid option. It'll have equitable operating costs to the 90 model, and the cabin is the size of a 200. I think the B100 is a special airplane worthy of pursuing.

If you fly either an MU2 or a B100, you'll be a part of a flock, but it's a small and passionate flock. At the last King Air Gathering, out of the 35-plus airplanes on the ramp, there were two B100s in attendance with three qualified B100 pilots. All three of us B100 pilots found each other, had lunch and reveled in the love we have for the wonderful machines we fly. It is a close-knit community and the MU2 pilots are the same way. Birds of a feather flock together, and that is a good thing. Want to join the flock? The MU2 and the B100 flocks are super. Plus, no one will confuse you as part of the herd. T&T

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

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Latest Autopilots
from Genesys Aerosystems

by **Rich Pickett**

S-TEC 3100 DIGITAL FLIGHT CONTROL SYSTEM

Genesys Aerosystems may be a recent name in the aviation industry, however, their roots go back a number of years. The company formed in 2014 after obtaining the autopilot and panel display lines of business from Cobham. These two lines represented the very popular S-TEC autopilots and the former Chelton Flight Systems displays.

S-TEC Autopilots

Since the acquisition, Genesys Aerosystems has significantly advanced the autopilot line. They have released new digital autopilot products, including the S-TEC 3100 and S-TEC 5000 Digital Flight Control Systems (DFCS). The S-TEC 3100 autopilot is focused on Part 23 aircraft, while the S-TEC 5000 is designed for Part 25 aircraft. The previous S-TEC digital autopilots were the 1500 and 2100, which were standard equipment for the Piper Meridian turboprop and others.

I've flown the S-TEC digital autopilots and found them to work well, with higher accuracy than others in the product line. The S-TEC 3100 takes this to a new level, offering envelope protection in both Flight Director (FD) and Autopilot (AP) modes. In the FD mode, aural annunciations are generated when the pilot enters a steep bank, exceeds the maximum certified speed or approaches a stall. While in AP mode, if the speeds exceed these limits, then the autopilot will adjust the pitch of the aircraft to place it in a safe attitude.

The S-TEC 3100 is almost a direct replacement for the S-TEC 1500 and 2100 autopilots. It utilizes the existing servos, however, requires a new rack and connectors. The ability to utilize the majority of the components from the previous versions (as well as the inclusion of an adaptor harness), dramatically reduces the installation time, requiring less than 20 hours for most upgrades. An additional feature is the incorporation of an internal ADAHRS, which eliminates the dependency on an external attitude source that was required with the S-TEC 1500 and 2100 systems. With a hardware cost of $9,995 for the new S-TEC 3100, it offers a nice option for owners wanting to have the latest technology in an autopilot.

Customer Comments

I've talked with Piper PA46 owners (Malibu, Mirage, Meridian, M350, M500) who have installed the S-TEC 3100. Patrick de Noonevile, based in England, owns a 2000 Mirage and upgraded his S-TEC 55 to the new autopilot during an impressive panel installation. Patrick had some issues with the existing servos during the installation, which was resolved by replacing them. Since that issue was resolved, he mentioned it offers superior tracking (especially on precision approaches), and the new envelope protection is particularly useful. He has installed the software upgrade, offered at no cost to current owners. The upgrade provides improved envelope protection, bank limit adjustments for smoother turns and other features.

Brian Cameron, a Piper Meridian owner, also recently upgraded his S-TEC 1500 to the S-TEC 3100. Brian's autopilot has the latest software version, which he mentioned flies the approaches perfectly. Avionics are becoming increasingly capable, and Brian told me in his experience, it is very important to read all of the new operating procedures and manuals to maximize performance and safety. Brian also said that "the additional features, such as built-in ADARS, LVL button, and envelope protection made it worth his investment."

S-TEC 5000 DIGITAL AUTOPILOT

Broad Applicability

Genesys Aerosystems has also broadened the applicability of the S-TEC 3100. While

current operators of S-TEC-equipped aircraft have the potential to upgrade, owners of aircraft without autopilots can also take advantage of this new digital offering. Genesys has built an approval list of more than 100 aircraft, and they are extending the approvals on an ongoing basis with the King Air 90, 100 and 200 models expected to be approved in the coming months.

Genesys Aerosystems has also committed to continually improving the S-TEC 3100 and 5000. The company has embarked on a software and hardware upgrade to specifically accommodate flying in icing conditions. This is an important consideration since the safe operating envelope of an aircraft changes when flying in icing. As pilots are aware, when operating in icing, you typically will fly at a higher minimum speed both in level flight and on approach. In addition, flying an approach in icing conditions requires reduced flap extension, or none at all, which also increases the approach and landing speeds. This optional FIKI enhancement will utilize the state of the propeller de-ice switch position to adjust the low-speed envelope protection limit for flight segments when it is activated.

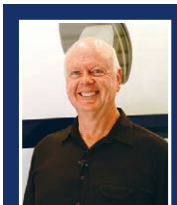
The Genesys Aerosystems S-TEC 5000 autopilot offers a similar design for Part 25 aircraft. Currently, it is offered on the Casa 212, Casa CN235 and Dornier 228 airplanes. Genesys Aerosystems is also evaluating potential expansion to other Part 25 aircraft.

Options for Rotorcraft

Helicopter operators can install one of Genesys Aerosystems' VFR or IFR stability augmentation systems – the HeliSAS Autopilot Stability and Augmentation System. The list of approved rotorcraft for VFR use is substantially large, while the current IFR approvals are limited to the Airbus EC-145e and the Sikorsky UH-60 Blackhawk.

Additional Products

In addition to the autopilot product line, Genesys Aerosystems continues to support and enhance the Chelton Flight Systems EFIS offerings. With an expansive approval list, both airplane and rotorcraft, they provide high-resolution WAAS-enabled displays complete with synthetic vision for the special mission market. Additional information on Genesys Aerosystems products can be found at *www.genesys-aerosystems.com*. T&T



With 11,000+ hours of piloting more than 100 aircraft models **Rich Pickett** *still has a passion for flying. Rich holds an ATP, CFII SME, SES, glider licenses, and type ratings in the L29, L39, Citation 500/510s/525s, Eclipse 500S and DA10. His company, Personal Wings, provides training, mentoring and aircraft services. You can contact Rich at* **rich@personalwings.com**.

PHOTOS COURTESY OF THIERRY POUILLE

Winter Escapes

Escape the cold with a flight to the tropics.

by **Thierry Pouille**

Frigid temperatures, wind gusts, ice, snow – winter is now in full force around the country. How does a flight to the tropics sound? Perhaps you can still squeeze in a trip this year, or read on for helpful tips as you prepare future plans.

Tropical Paradise

The tropics is a magical world of sandy beaches, turquoise waters and comfortable temperatures. The Tropic of Cancer passes through Long Island, located in the Bahamas (a mere 300 nautical miles southeast of Miami). After reaching the Tropic of Cancer, the average temperature reaches around 80 degrees Fahrenheit.

But what destination(s) in the tropics should you choose? This is where maps and perceived distances can play tricks on you. From Palm Beach, Florida, the closest tropical destinations are as follows:

- Providenciales in the Turks and Caicos; 520 nm
- Ocho Rios in Jamaica; 525 nm
- Grand Cayman; 450 nm
- Roatan in Honduras; 715 nm

Are you surprised Providenciales in the Turks and Caicos and Ocho Rios in Jamaica are about the same distance? And looking at the "far away" destinations, the distance between West Palm Beach and Aruba, Cartagena (Colombia), Panama, and Tortola is only 1,000 nautical miles.

Stranger yet, Aruba (at a distance of 1,021 nautical miles) is only 28 nautical miles further than Tortola. And Cartagena is only 5 nautical miles further than Liberia, Costa Rica. What is wrong with these numbers? Nothing, they are all true. Charts and maps can sometimes play tricks on us in their rendering.

Now that you have a better understanding of the distances (and the occasional trickery), let's look at some of the other factors that come into play when selecting and flying to these tropical destinations (excellent weather and temperatures are nearly always guaranteed at each).

Languages

Most of the islands are English and Spanish-speaking, with some French and Dutch spoken in the Caribbean. In the British sense, there are the Bahamas, Turks and Caicos, the Virgin Islands, the Leeward Islands, St. Kitts, Nevis, Antigua, St. Lucia, the Grenadines, Canouan, Barbados, the Caymans, Belize and Jamaica.

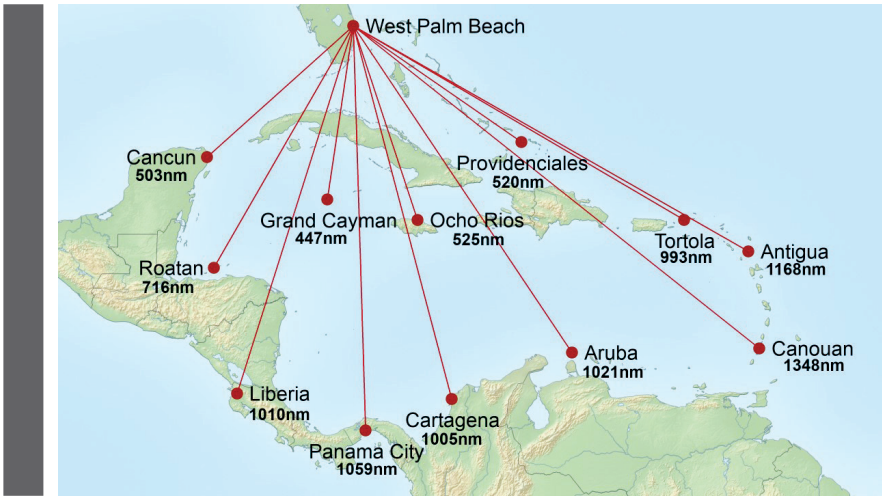
Spanish is spoken in the Dominican Republic, most of Central America, Cuba (no longer available for travel), Panama, Honduras and Colombia. There is a little Dutch spoken in the islands of Aruba, Bonaire and Curacao. In the Caribbean, we also have the French islands of Saint Martin, Guadeloupe, Martinique and Saint-Barthelemy (also known as St. Barth). English is widely spoken everywhere, so the comprehension and terminology are not an issue.

Currency

The dollar is "king" at most every destination.

But some countries do have their own currency.

AN AERIAL VIEW OF SAINT KITTS.



Fuel

Avgas and jet fuel are plentiful in the tropics but double-check availability because deliveries might be late.

For jet fuel burning airplanes, a fuel release with a well-known provider is your best bet.

Regulations

Take caution since the United States implemented the Electronic Advance Passenger Information System or eAPIS. It can be a real pain for U.S. pilots, and even worse for foreign pilots and their foreign registration. So, they have created a comparable system called CARICOM. Mexico and Central America countries also require pre-approval.

Single Pilot Waiver

While the single pilot waiver is accepted in the United States (and only in the United States) for jets that require two crew members in the rest of the world, that also applies to the

Caribbean. If you intend to fly down there in a single-pilot airplane like a Citation, you need a SIC (second in command) or specific approval from aviation authorities.

FBOs

In the Caribbean, the notion of an FBO (Fixed Based Operator) is not widely used, but they are beginning to pop up. Obviously, Puerto Rico and the U.S. Virgin Islands have had some over the years and are slowly becoming more common. Beef Island (Tortola, BVI) offers an FBO. There is also a brand new FBO in Grand Case in Saint Martin. But double-check fees before you visit there as their rates seem to be on the plus side. The Dominican Republic is also starting to open FBOs in airports such as Puerto Plata as well as La Romana. But, islands like St. Lucia and the southern islands of Dominica and Canouan do not offer any FBOs, so arrangements need to be made ahead of your trip.

Also, when an FBO is around, watch out for the fees. You must understand that the fuel is not typically disbursed by the FBO but by a fuel contractor. So, it is your responsibility to make sure that fuel is available number one. And number two, like in Canouan, there is no fuel truck. There is a pit. That means you need to move your airplane to get fuel, and when the fueling is complete, reposition the airplane on the ramp since no tractors are available to move the airplane around. All of the above can make for inconvenience or expensive costs.

Insurance

Make sure your insurance covers the Caribbean and the places you intend to fly.

Paperwork

It is highly recommended to carry a stack of general declaration forms known as the C7. This form was created by the British years ago and is still widely used in the Caribbean. Basically, the C7 form lists most information regarding the occupants of the airplane, such as crew and non-crew, passport information, etc.

I would strongly suggest preparing this paperwork ahead of time and

GRAND TURK ISLAND OF TURKS AND CAICOS

leave out the arrival and the departure airport on each (which you will fill out when you arrive). Some places like Trinidad have been known to request up to 12 copies of the form, so when I say carry a stack of copies, I mean what I say.

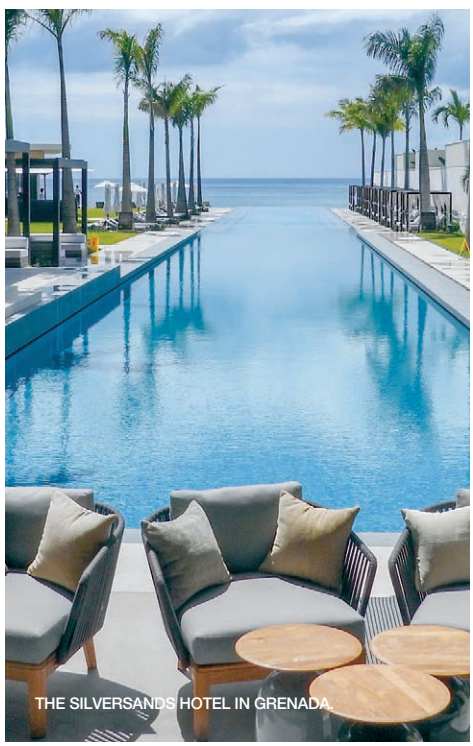
Fuel Card

A fuel card is a must in the Caribbean, especially for jet fuel since the avgas ones are a lot less available. The beauty of the jet fuel card is that you first have the price confirmed to you ahead of time. Number two, there is no money exchanged on site. Everything is done and covered by companies such as UVair, World Fuel, Colt, etc. It is certainly a must to carry one of these down instead of cash or credit cards.

That brings up the notion of cash. Some areas will require cash, i.e., the Dominican Republic for avgas. We've seen cases where the request for cash has often been made with no option for a credit card. Of course, all of these factors change over the years but be prepared in case.

Hotels

There have been several new openings of resorts and high-end hotels in the Bahamas. Bahia Mar is an especially big project on the island of Nassau, offering a number of unique properties. One of them is the Rosewood Hotel. In the Out Islands, there are a couple of new resorts. There is the Chub Cay Resort off of Nassau, which is worth a visit. There is also a new place on the south end of Andros Island called Caerula Mar Club.



THE SILVERSANDS HOTEL IN GRENADA.

Of course, keep in mind that properties in the Abacos area were heavily damaged or erased by the last hurricane, Dorian. So, no stop should be planned there before checking for an update on the status of any hotel. But the islands of Eleuthera and Exuma are still thriving with tourism and offer beautiful activities.

Further south in the Turks and Caicos, there are some newer, updated places to stay. To name a few, there is the Wymara Resort and Villas (which has been around for about 10 years, but they have a new name and newly completed construction). Other enjoyable and interesting options: The Shore Club and the Seven Stars Resort and Spa.

Even further south, Anguilla is certainly a beautiful place – flat with a lot of beautiful beaches. Malliouhana is a resort I have visited in the past and recommend. It has been refurbished, reopened, and is now under the care of Auberge Resort Collection.

On the same island, Belmond took over Cap Jaluca. With its Moorish style and view of the island of Saint Martin, it is an exciting place to stay with the Belmond aura. On the island of Saint Martin, La Samana on the French side, has received a substantial

number of upgrades and a new manager. It is a wonderful place to visit. Speaking of Saint Martin, it was pretty heavily damaged by a hurricane a couple of years ago. The FBO at Grand Case is mandatory and it is expensive.

On Dominica, there is a new Kempinski recently opened. It is a pretty exciting place because Dominica hasn't previously been on the map of travel in the Caribbean. Not to be confused with the Dominica Republic, Dominica is located between south of Guadeloupe and north of the Grenadines. On the island, there are hot springs, a river and a large hotel with 151 rooms.

In the Grenadines, I personally love the Mandarin Oriental on the island of Canouan. It is undoubtedly one of the more unique small resorts of the islands of the Caribbean. Some people also talk about the hotel in Bequia, which is called the Friendship Bay Estate.

North in Antigua, we have Jumby Bay, Curtain Bluff and Carlisle Bay. On Virgin Gorda, which is finally starting to reopen following hurricane damage, we have the Little Dix Bay now in full operation and worth staying again. It's a very unique lifestyle. Another place called Valley Trunk is reopening and it is fantastic.

There is also another hotel going in Saint Barth. But, keep in mind that you cannot bring a jet or any airplane in Saint Barth if you have not received an endorsement from a local pilot. It's a place you can land only after receiving an endorsement as it is closed to jets mostly because the runway is very short – about 2,200 feet. But there are a number of beautiful places there to go to like La Sereno or Manapany.

Now crossing over to the other side of the Caribbean towards the Pacific and Central America, Panama is striving with tourism. There is a charming resort off the airport of David called Isla Secas Resort, which is on the Gulf of Chiriqui. Not easy to access but worthwhile.

In Costa Rica, there is the Andaz on the Peninsula Papagayo not far away from the Four Seasons in Papagayo. There is also a place called Nayara Resort, where they take full advantage of the unique beauty of Costa Rica with lodging and amenities among the pristine rainforest.

In the Dominican Republic, there is a brand new, high-end Club Med that has opened and worth taking a look. There is also the Nickelodeon Hotel and Resort in Punta Cana.

Fees

Stay tuned for my next article in an upcoming issue regarding destination-specific do and don'ts. T&T

Thierry Pouille *is the founder of Air Journey – a leader in escorted flying experiences around the world. Learn more at* **www.airjourney.com**.

Five on the Fly

by **Rebecca Groom Jacobs**

WHO:
Kandi Spangler

COMPANY:
jetAVIVA

POSITION:
Sales Director

HOME BASE:
Denver, Rocky Mountain Metropolitan Airport (KBJC)

RATINGS:
PPL, Instrument

HOURS:
850

1. Can you describe your aviation background?

I first fell in love with aviation in 1992 after experiencing a nighttime training flight in a C172 with a high school friend of mine. So, I borrowed money from an older sibling and started flight training at the age of 16 in eastern Ohio. Thereafter, I attended Embry-Riddle and graduated with a management degree.

Over the past 20 years, I have worked in various operational and management roles starting at NetJets (where I met my husband). Then I moved on to Part 135 and eventually aircraft maintenance marketing and sales. All of these roles gave me an excellent platform to make the jump into aircraft sales in 2013, and I haven't looked back since. I love this job and find it incredibly rewarding.

2. As someone who monitors the marketplace closely, how has the turbine aircraft market trended in recent years? How do you predict the presidential election will affect the market in 2020?

Predicting the aircraft marketplace is like predicting the weather; the further out you look, the harder it is to determine what the climate will be like. However, my internal market barometer tells me that we can expect activity to level off some after the first of the year, but it will still be somewhat robust for certain market segments.

Interestingly, we've seen a real dichotomy of the marketplace the past 18 months that I expect to continue into for the foreseeable future. I don't believe we can identify trends based on market segments anymore, but rather, we need to look at specific makes/models of aircraft to see if they are healthy

or not. The airplanes that continue to do well in the market are the airplanes that are versatile, efficient, have a decent range, are roomy with a lot of seats, and have good short-field performance.

As for the presidential election, history has shown us that as we get closer to the election, businesses will take a conservative approach to spending until they know what they're dealing with on a political front. It's not that business stops during an election year; they simply don't know how to structure their purchases and hold assets. So, I predict a slower than normal summer for aircraft sales due to the pending election. Still, I think there might also be a mad rush at the end of the fourth quarter to take advantage of accelerated depreciation again, and once businesses know how to plan going forward.

3. Can you share some of the surfacing aviation trends and technologies that excite you the most?

The Urban Air Mobility (UAM) movement excites me the most. Some people think flying cars is still a pipe dream, but the reality is we are not that far off from seeing them emerge into the marketplace – much like electric cars in the past 10 years. The technology is there; now it's a matter of making them more efficient, gaining government certifications and building the infrastructure for it. It's really an exciting time to be involved in aviation!

4. What areas of the aircraft buying process do you find are most commonly overlooked?

Engine and airframe programs seem to be the most commonly overlooked items, even amongst some brokers out there. This can have a huge effect on aircraft value and appropriate purchase price if the program is not understood and transferred properly at the time of closing. This is an area where you really want to dot your i's and cross your t's prior to closing if you don't want to rely on luck in the matter.

5. This issue, we introduce your buyer's guide to the Citation 560XL series. What prompted you to create this guide, and what can readers expect to learn?

Whether you're buying or selling, there are a lot of nuances associated with the Citation XL series, including the levels of coverage mentioned above like engine and airframe maintenance programs. The XL is a fantastic airplane and will be for some time. But at the end of the day, it's about making sound investment decisions, and this guide is helping owners and buyers alike do just that. T&T

The Worldwide General Aviatio

owner/operators and chief pilots of these air

100%

TOTAL MARKET COVERAGE

Jets – 15,414

Chief Pilots & Owners

Count	Aircraft
55	AIRBUS ACJ319
26	ASTRA 1125
30	ASTRA 1125SP
49	ASTRA 1125SPX
33	BEECHJET 400
226	BEECHJET 400A
117	BOEING BBJ
371	CHALLENGER 300
53	CHALLENGER 600
31	CHALLENGER 601-1A
108	CHALLENGER 601-3A
49	CHALLENGER 601-3R
286	CHALLENGER 604
9	CHALLENGER 800
163	CITATION 500
279	CITATION 525
261	CITATION BRAVO
150	CITATION CJ1
82	CITATION CJ1+
188	CITATION CJ2
170	CITATION CJ2+
364	CITATION CJ3
123	CITATION CJ3+
273	CITATION CJ4
151	CITATION ENCORE
55	CITATION ENCORE+
305	CITATION EXCEL
18	CITATION I
248	CITATION I/SP
437	CITATION II
57	CITATION II/SP
154	CITATION III
86	CITATION LATITUDE
191	CITATION M2
377	CITATION MUSTANG
123	CITATION S/II
256	CITATION SOVEREIGN
76	CITATION SOVEREIGN+
234	CITATION ULTRA
232	CITATION V
27	CITATION VI
97	CITATION VII
249	CITATION X
29	CITATION X+
208	CITATION XLS
229	CITATION XLS+
1	DIAMOND I
38	DIAMOND IA
5	DORNIER ENVOY 3
227	ECLIPSE EA500
59	EMBRAER LEGACY 500
141	EMBRAER LEGACY 600
67	EMBRAER LEGACY 650
221	EMBRAER PHENOM 100
264	EMBRAER PHENOM 300
73	FALCON 10
20	FALCON 100
19	FALCON 200
196	FALCON 2000
22	FALCON 2000EX
56	FALCON 20C
14	FALCON 20C-5
21	FALCON 20D
2	FALCON 20D-5
31	FALCON 20E
9	FALCON 20E-5
65	FALCON 20F
58	FALCON 20F-5
178	FALCON 50
7	FALCON 50-40
93	FALCON 50EX
152	FALCON 900
24	FALCON 900C
104	FALCON 900EX
176	GLOBAL 5000
128	GLOBAL EXPRESS
19	GULFSTREAM G-100
202	GULFSTREAM G-200
9	GULFSTREAM G-300
22	GULFSTREAM G-400
288	GULFSTREAM G-450
8	GULFSTREAM G-500
500	GULFSTREAM G-550
54	GULFSTREAM G-II
21	GULFSTREAM G-IIB
120	GULFSTREAM G-III
165	GULFSTREAM G-IV
283	GULFSTREAM G-IVSP
170	GULFSTREAM G-V
33	HAWKER 1000A
5	HAWKER 125-1A
6	HAWKER 125-1AS
4	HAWKER 125-3A/RA
11	HAWKER 125-400A
13	HAWKER 125-400AS
12	HAWKER 125-400B
9	HAWKER 125-600A
3	HAWKER 125-600AS
95	HAWKER 125-700A
59	HAWKER 4000
184	HAWKER 400XP
34	HAWKER 750
170	HAWKER 800A
33	HAWKER 800B
336	HAWKER 800XP
39	HAWKER 800XPI
83	HAWKER 850XP
158	HAWKER 900XP
6	JET COMMANDER 1121
3	JET COMMANDER 1121B
8	LEARJET 23
15	LEARJET 24
1	LEARJET 24A
11	LEARJET 24B
28	LEARJET 24D
11	LEARJET 24E
7	LEARJET 24F
10	LEARJET 25
35	LEARJET 25B
8	LEARJET 25C
85	LEARJET 25D
4	LEARJET 28
26	LEARJET 31
161	LEARJET 31A
30	LEARJET 35
350	LEARJET 35A
13	LEARJET 36
32	LEARJET 36A
29	LEARJET 40
186	LEARJET 45
166	LEARJET 45XR
92	LEARJET 55
4	LEARJET 55B
12	LEARJET 55C
253	LEARJET 60
462	PILATUS PC-12/45
108	PREMIER I
6	SABRELINER 40
17	SABRELINER 40A
3	SABRELINER 40EL
1	SABRELINER 40R
21	SABRELINER 60
17	SABRELINER 60ELXM
2	SABRELINER 60EX
58	SABRELINER 65
13	SABRELINER 80
6	SABRELINER 80SC
66	WESTWIND 1
4	WESTWIND 1123
27	WESTWIND 1124
63	WESTWIND 2

Turboprops – 11,605

Chief Pilots & Owners

Count	Aircraft
369	CARAVAN 208
1208	CARAVAN 208B
32	CHEYENNE 400
131	CHEYENNE I
13	CHEYENNE IA
251	CHEYENNE II
56	CHEYENNE III
37	CHEYENNE IIIA
51	CHEYENNE IIXL
23	CHEYENNE IV

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484	KING AIR 200
21	KING AIR 200C
17	KING AIR 200T
197	KING AIR 250
173	KING AIR 300
9	KING AIR 300LW
554	KING AIR 350
64	KING AIR 350C
354	KING AIR 350I
16	KING AIR 90
10	KING AIR A/B90
63	KING AIR A100
209	KING AIR A200
48	KING AIR A90
104	KING AIR A90-1
93	KING AIR B100
854	KING AIR B200
99	KING AIR B200C
8	KING AIR B200CT
91	KING AIR B200GT
4	KING AIR B200SE
21	KING AIR B200T
77	KING AIR B90
329	KING AIR C90
34	KING AIR C90-1
191	KING AIR C90A
351	KING AIR C90B
80	KING AIR C90GT
89	KING AIR C90GTI
150	KING AIR C90GTX
12	KING AIR C90SE
242	KING AIR E90
156	KING AIR F90
25	KING AIR F90-1
61	MITSUBISHI MARQUISE
1	MITSUBISHI MU-2D
22	MITSUBISHI MU-2F
16	MITSUBISHI MU-2J
33	MITSUBISHI MU-2K
10	MITSUBISHI MU-2L
18	MITSUBISHI MU-2M
17	MITSUBISHI MU-2N
24	MITSUBISHI MU-2P
36	MITSUBISHI SOLITAIRE
616	PILATUS PC-12 NG
146	PILATUS PC-12/47
215	PIPER JETPROP
68	PIPER M500
79	PIPER M600
794	PIPER MERIDIAN
201	QUEST KODIAK 100
2	ROCKWELL 680T TURBO
5	ROCKWELL 680V TURBO II
5	ROCKWELL 680W TURBO II
4	ROCKWELL 681 HAWK
96	SOCATA TBM-700A
68	SOCATA TBM-700B
283	SOCATA TBM-850
100	SOCATA TBM-900
33	SOCATA TBM910
111	SOCATA TBM930
5	STARSHIP 2000A
68	TURBO COMMANDER 1000
30	TURBO COMMANDER 690
132	TURBO COMMANDER 690A
136	TURBO COMMANDER 690B
81	TURBO COMMANDER 840
24	TURBO COMMANDER 900
52	TURBO COMMANDER 980

Twin Piston – 6,320 Owners

Count	Aircraft
34	BARON 56 TC
1412	BARON 58
2	BARON 58 PA
339	BARON 58P
108	BARON 58TC
3	BARON A56TC
332	BARON G58
186	BEECH DUKE B60
163	CESSNA 340
507	CESSNA 340A
58	CESSNA 402B BUSINESS LINER
130	CESSNA 402C
24	CESSNA 404 TITAN
244	CESSNA 414
352	CESSNA 414A CHANCELLOR
39	CESSNA 421
34	CESSNA 421A
319	CESSNA 421B
596	CESSNA 421C
50	CESSNA T303
110	DIAMOND D42
108	PIPER 601P AEROSTAR
24	PIPER 602P AEROSTAR
515	PIPER CHIEFTAIN
25	PIPER MOJAVE
308	PIPER NAVAJO
208	PIPER SENECA
12	ROCKWELL 520 COMMANDER
4	ROCKWELL 560 COMMANDER
11	ROCKWELL 560A COMMANDER
8	ROCKWELL 560E COMMANDER
7	ROCKWELL 560F COMMANDER
13	ROCKWELL 680 SUPER
3	ROCKWELL 680E
15	ROCKWELL 680F COMMANDER
12	ROCKWELL 680FL GRAND COMMANDER
5	ROCKWELL 680FLP GRAND LINER

High Performance Move-Up Singles – 5,807 Owners

Count	Aircraft
219	BEECH BONANZA
438	CESSNA 182
56	CESSNA 206
389	CESSNA P210N
21	CESSNA P210R
54	CESSNA T182
818	CIRRUS SR20
2991	CIRRUS SR22
28	MOONEY ACCLAIM ULTRA
10	MOONEY OVATION ULTRA
238	PIPER MALIBU
104	PIPER MATRIX
441	PIPER MIRAGE

39,146 TOTAL AIRCRAFT

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A Guide to the Citation 560XL Series: Part 1

by **Kandi Spangler**
PHOTOS COURTESY OF jetAVIVA

The most common question I hear when I tell people I'm the 560XL expert for jetAVIVA is, "What is the proper nomenclature when referring to this aircraft: Excel or XL?" Technically, they're both correct. The original airplane's official marketed name is the "Citation Excel." However, like every certified aircraft model, an official serial number designation is given. In the case of the Excel, that serial number designation is 560XL-XXXX (the last four digits representing the unique serial number). So, "XL" was picked up early as a quick way to write about the Excel. Incidentally, that "XL" terminology now encompasses all three models: Excel, XLS and XLS+.

Citation 560XL

The Citation XL series aircraft is the world's best-selling business jet for a reason. The airplane is versatile, has excellent range, can land on shorter runways, offers a roomy cabin and ample baggage space, and most importantly, is economical to operate – which brings me to the whole reason for writing this guide covering the XL lineup. jetAVIVA is a top dealer/broker in the industry through the vast number of transactions we handle each year, including Citation XLs.

This guide is my way of providing value to Excel/XLS/XLS+ clients past, current and future. The series will focus on several areas: 1) Providing current and prospective owners valuable information related to aircraft values; 2) What we see in pre-buy inspections and how this can help you as a buyer or seller; 3) What new technologies to look for if you plan on holding on to your airplane

for a while. We'll also touch on paint and interior upgrade options, and even explore upgrade paths when figuring out the best time to "trade up" and move into your next aircraft.

History

Introduced in 1996, the first Citation Excel delivered in 1998, and Textron continues deliveries of this popular jet as of 2019. The most recent variant, the XLS+, makes the fleet size a whopping 949 aircraft in operation today. Of those aircraft, 365 are Excel, 328 are XLS, and 256 are XLS+. (If you want to learn more about the history and differences between each model, I invite you to watch our 560XL Series Review Video review at *www.jetaviva.com* under the "Videos" section).

Another interesting fact about the XL fleet is that a staggering 28 percent of all XLS aircraft in operation today are operated under fractional ownership programs like NetJets and Wheels Up. They clearly see the value, efficiency and popularity of this aircraft model.

A Current Overview of the XL Markets

Last year proved to be another strong year for the XL markets, although we did see some dichotomy between the three models in this series. The Excel stayed fairly strong in the first part of the year and then experienced some market softening as the year went on. The XLS market remained strong throughout the year, only experiencing a short lull through the summer months, then returning as one of the strongest markets in business aviation going into Q4. The XLS+ market proved to be the most unpredictable of the three markets, however, with early serial numbers selling more quickly than later serial numbers. Overall, all three markets remained fairly strong in the fourth quarter.

Current Snapshot

A "healthy market," as defined by many industry analysts, is a market with roughly 10 percent of the fleet available for sale. Any higher, and this indicates a buyer's market. Any lower, and it's considered a seller's market, generally speaking. So, as of this writing at the end of October 2019, here are the market statistics:

- Citation Excel: 17
  For Sale = 5.0%
- Citation XLS: 13
  For Sale = 3.3%
- Citation XLS+: 12
  For Sale = 5.5%

As you can see, we are most decidedly in a seller's market with inventory numbers for all three models in the 3 to 6 percent range. Life is good, right? In theory, yes. However, there is an interesting trend when it comes to breaking down the transactions over the past year and discovering what buyers are looking for.

In general, there seems to be a higher demand for late-model Excels (2002 or newer), as well as any XLS priced at or below $4.5 million. There are also a number of variables when looking at this fleet, and buyers assign a certain value to these variables that are not necessarily linear. It's these devil-is-in-the-details variables that drive overall aircraft values.

For instance, the "Vref Aircraft Valuation Digest" says to deduct the engine buy-in cost if the aircraft is not on an engine program. "Bluebook" values the airplane differently. They have you add the buy-in amount to the overall aircraft value if the airplane is already on an engine program. Just figure out the buy-in cost then, right? Wrong. We have found that of the 12 (yes – twelve!) different engine program options and levels of coverage, simply figuring out the buy-in differential does NOT directly calculate aircraft value. Partly, this could be because some buyers do not understand the differences between these programs and coverages. Other savvy buyers, however, weigh the buy-in differently depending upon how far from the future event they are.

For example, say the airplane is on Pratt & Whitney's ESP Silver engine program, and to bring the airplane up to ESP Gold coverage, the buy-in cost is $500,000. If the airplane is just

past an overhaul, most buyers will not account this buy-in into their equation due to the fresh engines. Alternatively, with the same coverage and buy-in for an airplane approaching overhaul, a buyer would likely take into account the full $500,000 buy-in.

Other variables like ADS-B and WAAS vs. ADS-B and WAAS/LPV can mean a difference in value of up to $175,000. That's on top of the "normal" variables like seating configurations, WiFi and other attributes specific to the model (e.g., an APU on an Excel was optional).

Historic Comparison

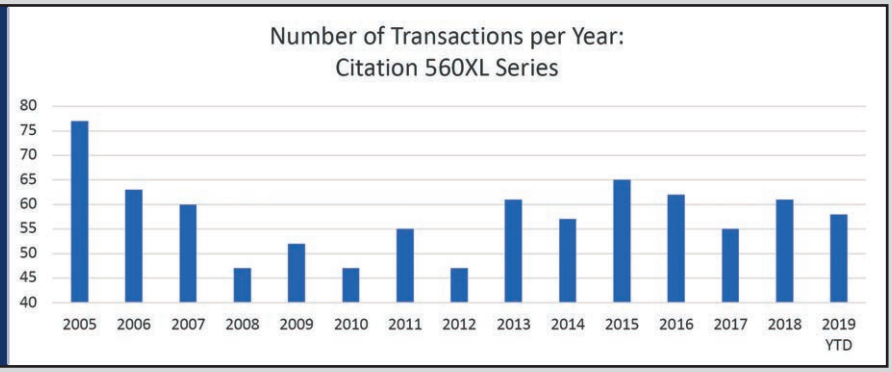
I'm also a fan of looking at the historical numbers. As you can see below, the sheer volume of trades has generally been trending up, though they are still not back to mid-2000-era numbers.

And as I mentioned earlier, while transactions were up in 2018, we were happy to see values staying relatively stable throughout the year on both the Excel and XLS as well.

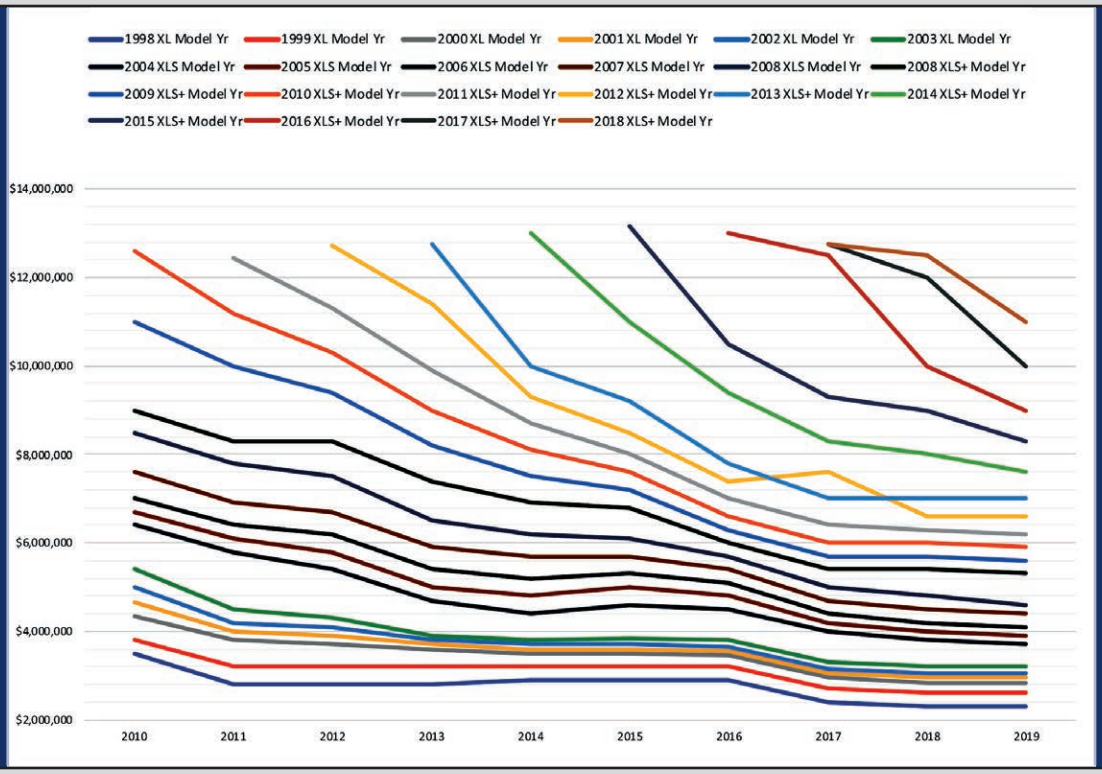
So, what does this all mean? It means that on a macro-level, values seem to be holding steady, but I sense change is in the air. Specifically, for the Excel fleet due to the vast number of former NetJets aircraft currently held in inventory by Textron. This will no doubt start affecting the values of aircraft across the board at some point, much like the Citation X fleet experienced back in 2015-2016. However, the value of your specific airplane is going to be dependent upon many factors, including aircraft age, total time, engine program level, avionics upgrades, ADS-B compliance, WiFi, paint and interior condition, among other things.

With the help and research continuously conducted by jetAVIVA's sales advisors, I meticulously track on- and off-market aircraft as well as obtain sold prices for recent transactions. I've spent years refining and perfecting my super-secret-squirrel spreadsheet on the XL markets. Even my colleagues tend to glaze over or go cross-eyed at the level of detail that goes into my calculations. But at the end of the day, I am confident in the data I provide an owner with a valuation of their aircraft, or when I'm buying an aircraft for my acquisition clients. The market is the market; I just report the weather.

Stay tuned for "A Guide to the Citation 560XL Series: Part 2" in an upcoming Jet Journal. T&T



Kandi Spangler is a sales director at jetAVIVA. She has more than 20 years of aviation experience. You can contact Kandi at **kandi.spangler@jetaviva.com**.



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The Hangar Problem

by **Kevin Ware**

There was a truly rare, freak-out weather event this past year at our airport. Strong gusty winds just blew the roof and doors off around 40 hangars built 30 years ago out of wood frames, wood truss roofs and metal siding. Oddly, aircraft tied outside on the flight line 100 yards from these hangars escaped unscathed – as were airplanes stored in newer, all-steel hangars nearby. The sudden loss of this group of hangars with winter fast-approaching made our already-chronic hangar shortage suddenly immediate.

But, this isn't just a local problem. I regularly fly to different airports across the country, and at almost every one, local owners of general aviation aircraft say there is a long waiting list for aircraft hangars if there are any available at all. It appears to be a national phenomenon and something you would think a free market economy would have long ago fixed. Unfortunately, that has not happened. Our own hangar disaster made me start to wonder why this problem persists.

Ironically, part of the problem is caused by the presence and availability of the old hangars themselves. You can see these structures at different airports all over the country. They have long passed their design life, with some even left over from World War II. Others were built very cheaply by private sector investors who leased the land from the airport. With time, as the leases ran out, the ownership reverted to the airport itself, which then rented them to local aircraft owners. The rent in our area for this type of hangar has been about $250 per month (often less than a commercial self-storage facility of similar square footage). Local aircraft owners became accustomed to these relatively low rents and opposed any change that might make them higher. Hence, the old structures continued to exist long past their design life, and in the process made it difficult from an investment point of view for anyone to replace them.

Another reason for the hangar problem is the relative shortage of suitable airport land for new construction, and that is due to several reasons. One

being this country long ago stopped building new airports. Luckily, we built a lot of them to start compared to other countries, but increasing demand for land use has placed the existence of those remaining under threat. In addition, most of the existing airports were laid out long before any wetland or other such environmental issues were of concern. But now they are, and the regulations applicable to them have real teeth. At our airport, this has made vast areas of otherwise suitable land not useable by law. Even when some of the land is not environmentally constrained, other rules regarding soil type and drainage can make building on those sites prohibitively expensive.

A third reason is the cost of construction itself. The time has long passed where cheap, farm-style pole buildings suitable for keeping a C182 out of the weather, were readily permitted by local government authorities. Now, most new construction must meet building and fire codes that simply did not exist 30 years ago – and that has greatly increased the cost. Also, there are prevailing wage rules as to what the construction workers are to be paid that did not exist in times past. This is particularly true if the construction is on publically owned land (as are most airports), or if the public entity has any business or ownership type involvement with the project. In our area, all these regulatory requirements are estimated to increase construction costs by at least 50 percent. Now, a case can be made that better-paid workers and buildings designed to a higher standard are all good things, and they are, but they also upsurge the cost.

Another interesting reason for the hangar shortage problem is called the "bump down phenomena" – something that has actually been caused by the success of business aviation. When I was a flight instructor based out of Boeing Field (KBFI) on the southern edge of urban Seattle (now more than four decades ago), there was ample tie-down space for general aviation. And if a given business bought say a Learjet, there was plenty of room for that airplane to be housed at a cost

Fierce,strong winds blew the roof and doors off around 40 hangars at my local airport.

the company felt it could afford. But then a strange thing started to happen. Really large, multi-billion dollar businesses became established in the area and gradually moved up to the likes of Boeing 757s. In the process, through simple purchasing power, they acquired most of the available hangar space for their very large aircraft, displacing the smaller Learjet or Cessna Citation owners. Like falling dominoes, they in turn began to bump owners of smaller, less expensive aircraft. In the process, the shortage caused the cost of any space to go up dramatically. On KBFI today, monthly hangar rent for a modest-sized business jet can easily be in the area of $20,000, if you can find it. This has caused those owners to seek space at outlying airports, which in turn has further constrained the space available to smaller aircraft.

Another thing that has increased demand for local airport use (and aircraft storage) is that since 9/11, there has been a mass migration by aircraft operated under FAR Part 91 away from airports operated under FAR Part 121 for airlines. This has mostly been due to the extra cost and hassle required to comply with TSA rules. In our area, two airports previously considered primarily devoted to Part 91 or general aviation use (KPAE and KBLI) now have airline operations. Part 91 pilots now need to have ID cards, which require several time-consuming tests to obtain, to even access their aircraft. Passengers cannot access the aircraft at all unless accompanied by a crew member carrying an ID card. Drive-through gates are all locked and require all sorts of security codes in order to get through them. Land previously available for Part 91 aircraft storage is now devoted to airline passenger use. Local car parking suddenly has become expensive and hard to find. All of these factors have indirectly increased the demand for land on airports not so affected, and in a larger sense, this is probably a good thing, but it has its cost.

Yet another cause of the hangar problem is the tendency of some aircraft owners to assume (and even expect) the local government entity that owns the airport (and in the U.S., most airports are publically owned) to provide hangar storage at a price they feel they can afford. But that assumption is based upon a false reality. Most communities are already subsidizing their local airport with taxpayer money. Unless they can clearly see some larger public benefit, those local taxpaying voters are extremely reluctant to increase those costs. In our area of the country, given the cost of new hangar construction by a public entity, a new hangar rent for say a Cessna 182 would be on the order of $800 to $1,000 per month. And even that large number would likely not produce a defensible return to the taxpaying owners…that is it would represent some form of subsidy. And that sort of subsidization for most communities is simply not politically viable.

So, what is the solution for this hangar problem that exists all over the country to a certain extent?

First, owners of airplanes both big and small need to realize that for reasons mostly related to the success of aviation, keeping their aircraft in a hangar is going to cost more (a lot more in some situations) in the future than it does now. But this is America, a country with an economic system based upon capitalism – a system which tends to fix these kinds of problems on its own. So, the result is the negative of increased costs also has a positive side to it. That is when cheap, decrepit hangars gradually become non-useable and hangar rents increase (to extent land can be made available), the private sector will kick in and again start to build new hangars just as they did 30 or 40 years ago. Those hangars will be more expensive, but they will also be built to a much higher standard than those of the past, lasting longer. Ideally, they will provide a decent return on investment for those that built them, and that will encourage others to do so.

The hopeful result: we will pay more, but also our children will have a safe place to store their airplanes. Forty hangars suddenly getting blown down by a freak gust of wind just before winter will never happen again. T&T

Kevin Ware *is an ATP who also holds CFI, MEII and helicopter ratings, has more than 11,000 hours and is typed in several different business jets. He has been flying for a living on and off since he was 20, and currently works as a contract pilot for various corporations in the Seattle area. When not working as a pilot he is employed part time as an emergency and urgent care physician. He can be reached at* **kevin.ware2@aol.com**.

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Power from the Start

Battery Talk with Mid-Continent Instruments and Avionics and True Blue Power

by **Rich Pickett**

The recently released Gen5 battery family.

PHOTOS COURTESY OF TRUE BLUE POWER

Since its founding 55 years ago as a small repair station in Wichita, Kansas, Mid-Continent Instruments and Avionics has progressively expanded its product line and industry leadership. While the company remains a strong instrument overhaul and repair facility for a broad base of avionics, they continue to innovate with their own line of avionics, instruments and True Blue Power products. The True Blue Power division includes a product line of USB charging ports, DC-to-AC inverters, voltage converters and lithium-ion batteries.

Powering Crew and Passengers

With crew and passengers now carrying more varied and powerful portable devices, the demand for aircraft-powered charging ports has increased. I have the original True Blue Power USB charging ports in my personal airplanes and found them to be very effective, delivering adequate power for my portable electronic devices.

True Blue Power recently announced the release of the TA360 series – a new line of high-speed charging ports that utilize USB Power Delivery (PD) technology to deliver up to 120 watts of power. Building upon the previous TA102 and TA202 lines, which are still available, the TA360 charging ports are available in single and dual USB-A and USB-C configurations. Unlike the previous series that can operate from 10-32V aircraft line voltage, these higher power charging ports are only available with 22-32V input

voltage. These units can provide variable output power 5-20VDC and 3 amps to accommodate a wider array of portable devices.

Expanding Lithium-Ion Batteries

True Blue Power has been manufacturing lithium-ion batteries for aircraft for many years. The TB17 (17 amp-hour) is used in lighter aircraft such as the Cirrus G2 Vision Jet, Bell 505 Jet Ranger X, Robinson Helicopter R66 Turbine, Tecnam P2012 Traveller, Airbus Helicopter H130, Robinson R44 and Bonanza A36. In larger aircraft, such as the Bombardier DHC-8, Cessna Caravan 208 and Beechcraft King Air 350, the 44 amp-hour TB44 is utilized. The TB44 is also powering Textron Aviation's newly certified Cessna Citation Longitude. Last February, I flew the Cirrus Vision Jet G2 with the True Blue Power batteries and noticed the start performance was impressive, offering a quick engine acceleration and resulting low ITT.

Building upon their existing TB17 and TB44 products, True Blue Power recently released the Gen5 battery family, starting with three offerings: TB20 (20 amp-hour), TB30 (30 amp-hour) and TB40 (40 amp-hour). The new series has a different form factor than their original line of batteries. The Gen5 is also certified to the FAA's most stringent C179B Class A-4B rating.

Todd Winter, president and CEO of Mid-Continent Instruments and Avionics and True Blue Power, met with us at NBAA-BACE in Las Vegas regarding the design of their latest batteries. Listening to Todd describe the products, using the term "battery" for these devices is an over-simplification. It is probably more accurate to refer to them as "power systems." When we think of conventional aircraft batteries, it invokes a visualization of a plastic or composite case, holding plates, separators, electrolyte and terminals. Yet, True Blue Power's lithium-ion batteries are sophisticated devices with integrated management and monitoring capability.

True Blue Power's latest TA360 series.

True Blue Power Technology

True Blue Power batteries contain a large number of small lithium-iron Nanophosphate (LiFePO4) cells, wired in a combination of series and parallel circuits, to not

The True Blue Power TB44 used in larger aircraft, including the Citation Longitude.

only provide the required voltage but also to offer redundancy which accommodates the failure of an individual cell. These same cells are used in power grid applications, such as mining, to balance power needs.

Without going into a deep dive into lithium battery chemistry and construction, this technology provides higher power, longer life and a greater level of safety over other lithium battery technologies, including lithium-metal designs. Nanophosphate technology, patented by A123 Systems, Inc., is engineered nanoscale chemistry that can tolerate a wide variety of environmental conditions and still perform. In the unlikely event that an individual cell does have an issue, they generate significantly less heat, reducing the likelihood of a thermal runaway, which can occur with lithium metal-oxide designs.

For aircraft operators, that translates into more power and a dramatic increase in safety if an individual cell fails. This is one reason that True Blue Power designs meet the latest FAA requirements, including thermal runaway, drop impact tests, containment and many others. After personally experiencing a high-temperature exothermic event with a Ni-Cd aircraft battery, it is comforting to know that the True Blue Power battery design and monitoring make this a non-issue.

True Blue Power batteries can also offer substantial weight savings (60 pounds in the Cessna Citation Longitude application), and turbine engine starts as low as -40 Celsius. The low-temperature start is the result of a system that involves an integral heater in the battery. When the battery senses either a charge or a current draw as simple as the activation of a baggage or door light, the heater starts and warms the battery up to 0 Celsius. This process takes a maximum of 45 minutes at -40 Celsius. When you start your pre-flight, simply turn on any load or attach a GPU, for example, and the battery warms itself. The batteries also include a display panel with test switches for the pilot to monitor the condition of the battery.

Maintenance Cost Reduction

The standard True Blue Power lithium batteries reduce maintenance costs with an extended battery capacity check of two years, while the Gen5 series only requires on-condition maintenance. The batteries also offer a significant increase in cycle-tolerance, designed for 10,000 cycles versus 500-800 for lead-acid or Ni-Cd, which makes

them perfect for high-cycle operations such as skydiving, crop dusters, short-haul operators and helicopters. Coupled with the high-cycle lifespan is a rapid charge capability, with the ability to fully recharge in as little as 15 minutes. And when it comes time for a replacement, the solid cases are aluminum and easily recycled.

Price-wise, lithium-based batteries are more expensive than conventional alternatives. But when factoring full life-cycle costs and performance, they can be an attractive option for operators. The TB17 and TB44 have retail prices of $6,280 and $16,575, respectively. The new Gen5 series prices are $9,035 for the TB20, $13,435 for the TB30 and $17,835 for the TB40. More information can be found at *www.truebluepowerusa.com*. T&T

With 11,000+ hours of piloting more than 100 aircraf t models **Rich Pickett** *still has a passion for flying. Rich holds an ATP, CFII SME, SES, glider licenses, and type ratings in the L29, L39, Citation 500/510s/525s, Eclipse 500S and DA10. His company, Personal Wings, provides training, mentoring and aircraft services. You can contact Rich at* **rich@personalwings.com**.

by **Kevin R. Dingman**

Statistically Speaking

Will you have an engine failure this year?

The good news for many T&T readers is the FAA says turbine engines have a failure rate of one per 375,000 flight hours compared to one every 3,200 flight hours for piston engines. This means jet engines are 117 times less likely to quit than reciprocating ones. According to the NTSB, there are somewhere between 150 and 200 accidents per year that are caused by power loss. For piston twins and experimental aircraft, the accident rate is higher.

There were over 4,000 accidents attributable to engine failure during a recent five-year period; that's about two per day. But the actual engine failure number is likely double or triple that rate when you consider the number of engine failures that resulted in a successful landing with no damage i.e., not an "accident" – like mine and my buddies mentioned below. It's a new year; will this be the year that you have your first engine failure? If you have more than 5,000 hours and have not yet had one, statistically speaking, the odds say yes.

> "Nobody who gets too damned relaxed builds up much flying time."
>
> – Ernest K. Gann

Fate is the Hunter

Fate is a fixed course of events. It may be conceived as a predetermined future, whether in general or of an individual. The word fate traces back to the Latin word fatum, and something that's your fate is a done deal, not open to modification. The quintessential fate endorsing works of Ernie Gann notwithstanding, the words random and statistical probability or odds are less philosophical when describing the likelihood of an engine failure than is fate. The word "random" generally means "with a uniform distribution." In statistics, the "odds" of an event reflect the likelihood that the event will take place. And "eventually" is defined as occurring at an undetermined time in the future. If we exclude higher risk flying such as crop dusting, aerobatics, air racing, combat, other edge-of-the-envelope maneuvering and chronically poor maintenance, one would think that "eventually" the "odds" of having an engine failure would occur "randomly" across all pilots and that over time, we should all experience at least one. If only that were so.

My friend Bob Hoffman with his first off-airport landing in 20 engine failures.

Not-So-Evenly-Distributed

In 45-some thousand hours of flying time, my Northwest/Delta/Duke instructor friend has experienced 20 engine failures. Some of them were in GA and some were at the airlines. Some were in single-engine airplanes and some were in twins. Some were in his own, some in that of an employer or a client. Some piston, some jet. And of all the failures, the one this past summer was the first that ended in an off-airport landing. His engine seized during day-VMC, and fortunately, the airplane had enough energy to make it to a soybean field just short of the airport. His 20 engine failures in 45,000 hours caused me to make a quick comparison of his flying time to engine failure ratio and my own.

In 25,000 hours, I've had four engine failures and all of them ended with on-airport landings with no damage. One was a recip and three were jets. The First Officers that I fly with have 10,000 to 15,000 hours, and most have had one or two engine failures, but many have had none. While I am a proponent of anthropomorphism and intuition, I'm not so much inclined to endorse unicorns, four-leaf clovers or fate. So, what the heck is going on with the engine failures? From the above piston engine vs. jet statistics, we know that recips, like the board game Mouse Trap, are a Rube Goldberg jumble of moving parts much more vulnerable to failure than a jet. So, let's take a look at some recip components from a "Mike Busch" (a well-known engine guru) perspective to learn more. The turbine folks can skip to the end of the story, but you may gain some empathy (and sympathy) for us recip schmucks by reading on.

Bottom End

The bottom end components of our piston aircraft engines – crankcase, crankshaft, camshaft, bearings, gears, oil pump, etc. – are very robust. They normally have a useful life that is many multiples of the TBO.

Top End

The top end components – pistons, cylinders, valves, etc. – are considerably less robust than the bottom end. It is not unusual for top end components to fail prior to TBO. However, most of these failures can be prevented by regular inspections and use of a digital engine monitor. Most top end failures are random (there's that word again) and do not correlate with TSMOH (time since major overhaul).

Crankshafts

Lycoming did a study that showed their crankshafts often remain in service for more than 14,000 hours (that's seven-plus TBOs) and 50 years – no problem here.

Camshafts and Lifters

Cam and lifter spalling is the number one reason that engines fail to make TBO, and it's common in the owner-operator fleet (i.e., T&T readers) where aircraft tend to fly irregularly and sometimes sit for weeks at a time. Tiny corrosion pits can lead to rapid destruction (spalling) of the surfaces, sending metal flakes, or even chunks, into the oil filter and beyond. The good news is that this problem has been mostly negated by a friend of mine (Gary Bongard) who has a patent on carbide tipped lifters. He recently completed the arduous process of getting approvals from The Man and has begun manufacturing. I have his lifters in both motors on the Duke.

Bearings

Bearing failure is responsible for a significant number of catastrophic engine failures. Bearings fail prematurely for three reasons: They become contaminated with metal from some other failure (i.e., lifters), or they become oil-starved when oil pressure is lost; or main bearings become oil-starved because they shift in their crankcase supports to the point where their oil supply holes become misaligned. Contamination failures can be prevented by using a full-flow oil filter and inspecting the filter for metal at every oil change.

Connecting Rods

Connecting rods usually have a long useful life and are not normally replaced at overhaul. Many rod failures are caused by improper tightening of the rod cap bolts during engine assembly. Failures can also be caused by the rod bearings, usually due to oil starvation.

Valves

It is quite common for exhaust valves and valve guides to develop problems well short of TBO. Failures are less common nowadays because problems can usually be detected by monitoring EGT's on digital engine monitors. Even if a valve fails completely, the result is usually only partial power loss. I will add two caveats: There is an increasing failure rate of valves in some engines and one of our readers (good job and thanks for the story Pete) recently had a valve fail, which cascaded through

Ruined cam and lifters from my Duke replaced with carbide tipped lifters and a new cam.

multiple components and eventually caused both the turbo and the engine to fail. His was yet another engine failure example that didn't create a data point because he landed on-airport with no damage.

Suck Squeeze Bang Blow

(Turbine folks should rejoin us here).

Comparatively speaking, turbine motors are moving-parts-limited and have few failure modes. As long as none of the processes in the paragraph title – intake, compression, ignition/expansion and exhaust – are interrupted, turbines will serve us well. Just use good clean fuel, good clean oil, mind the limitations, don't suck in anything but air, and it will run (almost) forever. The most frequent cause of jet engine failure is the ingestion of objects. This can cause both damage and rotor imbalance. On the ground is the most likely place this happens but birds,

My on-airport landing after an engine failure occurred in poor weather conditions.

> "Never wait for trouble."
> – Chuck yeager

chunks of ice and airframe pieces are common causes while in flight. Also, any mechanical problem that causes a rotor imbalance can cause microscopic cracks to form on the turbine blades, leading to their failure. Other than that, it takes human intervention to kill a jet.

I recommend that you not practice engine failures during takeoff in the airplane. Save it for the simulator because any realistic takeoff-failure scenario in the airplane would be dangerous. Using a zero-thrust power setting once above 3,000 or 4,000 feet, and with an instructor, however, is valuable training. Make sure the surprise factor is there. Practice failures during a turn on the SID, at some point halfway to altitude during a distraction, and one while at cruise. These maneuvers should not be considered complete until the engine is (simulated) secured, the airport of intended landing has been selected, and the route to that airport and the approach to be flown have been loaded. Practice flying the airplane at zero-thrust while talking to ATC (your instructor) and loading/programming your GPS/FMS/FMC. Then in the sim, practice the approach, landing and single-engine go-around.

Motors Don't Abide by The Statistics

An FO I flew with described the astonishing sight of a dissipating hurricane working its way up the Eastern seaboard as they overflew the system. I never gave much thought to the weather below me while traveling from A to B until my precautionary shutdown in the Duke when I had to land in crap weather on one motor. Make sure you consider an engine failure when flight planning – and not just for your departure and destination airports. Poor engineering or maintenance, metal fatigue, fuel contamination, bad luck, probabilities, four-leaf clovers or fate. Many variables are in play as we consider if and when we will have a loss of power, a precautionary shutdown or a failure. These events are supposed to occur randomly and only every 3,000 or 4,000 hours. But apparently, motors don't abide by the statistics. Ernie Gann may have been right. T&T

Kevin Dingman *has been flying for more than 40 years. He's an ATP typed in the B737 and DC9 with 24,000 hours in his logbook. A retired Air Force major, he flew the F-16 and later performed as an USAF Civil Air Patrol Liaison Officer. He flies volunteer missions for the Christian organiz tion Wings of Mercy, is employed by a major airline, and owns and operates a Beechcraft Duke.Contact Kevin at* **dinger10d@gmail.com**.

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And Then There Was One

After buying 10 or so airplanes in my career, and "almost" buying numerous others, I know I need help when I am about to fill a hangar. One previous purchase catastrophe, one close to that, and a couple of lucky ones have taught me that I don't know what I don't know about buying airplanes.

As you may remember, although I am going to remain current in a Citation, I decided that my "daily driver" is going to be a King Air. Now, all I had to do was find the perfect one.

I began to educate myself by reading *www.beechtalk.com,* the go-to place for everything King Air. In the chatroom, I noticed posts from one guy in particular – Chip McClure of Jet Acquisitions. Not an aircraft salesman but a buyer's rep. A kind of paid assassin, scouring the market for just the right airplane at just the right price. I called him.

"Basically, you pay me to say no," he told me. "As in no, that's too much money for that vintage model. Or no, the avionics upgrade cost will put you way over budget." I soon realized that King Airs are chock full of optional STCs: upgraded engines, Raisbeck aft strakes, swept props, nacelle storage lockers and all sorts of avionics possibilities. My brain was overloaded.

Chip drove to Dallas to meet me for dinner. During which, he told me some details about a previous King Air I couldn't quite pull the trigger on. I was lucky I didn't. It was apparent that Chip knew the market and, more importantly, the players. He is also somewhat of a celebrity as the father of "Baby Jessica" – the infant who fell into a Midland, Texas water well in 1987, setting off a rescue that captured the attention of the world. Two takeaways from the dinner.

1. Jessica is a grown woman and fine today.

2. Chip paid for dinner.

We were off to a good start.

And so, the search began. Could I have done what I paid Chip to do? Probably, but it would have taken me much longer and I would have paid for my mistakes. He also talked me through and out of numerous airplanes on the public market. "Most of the airplanes I find are not listed anywhere," he said.

We finally agreed on what appeared to be a really nice C90 out west. Chip jumped on a Southwest Airlines flight to take a look. He knew my 30 years in the car wax business made me very conscious of the appearance of an airplane. I waited for his phone call.

"Dave, the owner's pictures were misleading," he said. "This airplane needs a lot of work." He sent me around 100 pictures, including one showing piles of dirt in the wing nacelle storage lockers. At least I didn't have to travel to Oregon to see a dirty airplane.

Then out of nowhere, Chip's Rolodex paid off. A call about an off-market C90A. The owner was considering a trade to a jet and the King Air might be available. I spent a month just waiting to see it. But the wait was worth it. The owner had lavished attention and dollars into the airplane – upgraded engines, Garmin G1000, swept props, incredible paint and interior. It was exactly what I was looking for.

As Chip negotiated the deal, I glanced at the maintenance report. Reading through it, I was shocked. Listed were inspections for lightning strikes, operation at excessive airspeed, flight through volcanic ash and hard landings.

I called Chip in horror. "Have I just bid over a million dollars for a totaled airplane," I exclaimed.

"No, Dave, that's just the listing of all the possible inspections. They weren't done. It's just a list," Chip replied. Oh my gosh, I thought I had just made a terrible mistake.

Chip poured over the logbooks for almost two days. "Dave, based on what I know about the airplane and the owner and how I will structure the offer, I think we should take a look-see."

And based on Chip's recommendation, I signed the offer. Then it was on to Stevens Aviation in Nashville where the real work began. More logbook examination, borescopes, a visual inspection and test flight.

A week later, the final report. Good to go. The cost of Chip's services wound up being a bargain. Now, I have to learn how to fly the thing.

Fly safe.

David Miller *has owned and flown a variety of aircraft from turboprops to midsize jets for more than 50 years. With 6,000-plus hours in his logbook, David is a member of the Citation Jet Pilots Safety Committee and writes and speaks on aviation topics. You can contact David at* **davidmiller1@sbcglobal.net.**

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