TWIN & TURBINE

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

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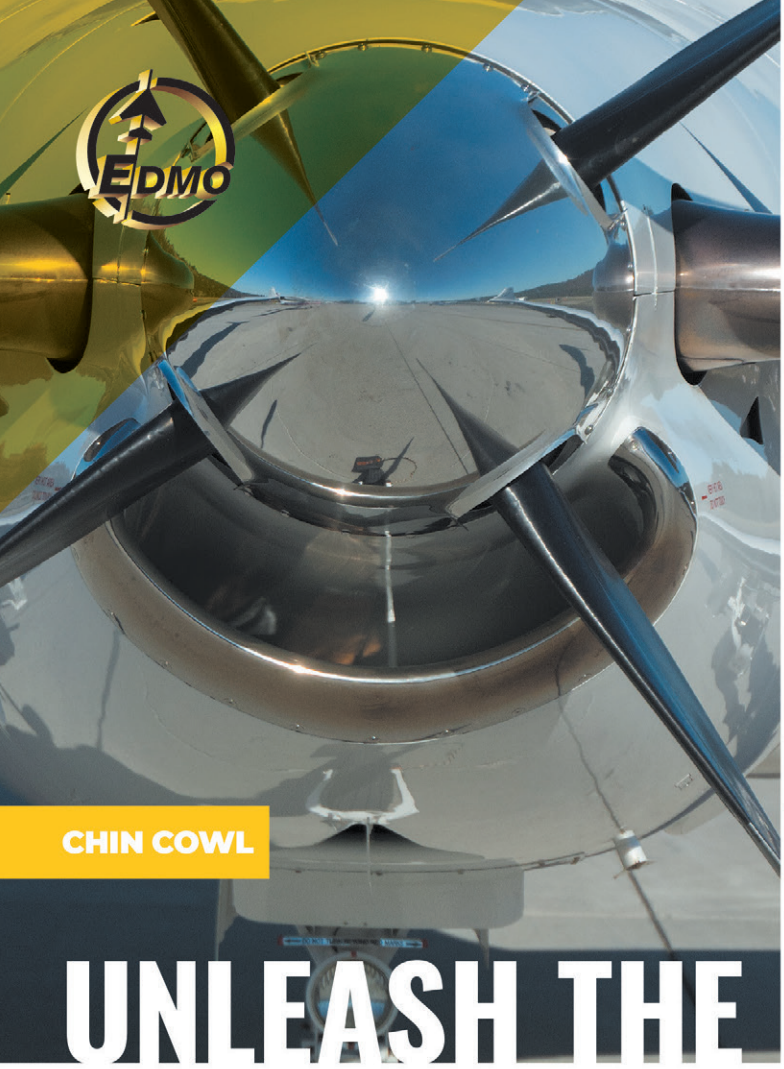
PISTON POWER

COMPARISON SERIES LAUNCHES WITH CESSNA 310 AND BEECHCRAFT BARON

GA Assembles Coronavirus Aid

An Interview with AOPA's Mark Baker

The Art of Painting Your Airplane



UNLEASH THE POWER OF YOUR PC-12

Hello. I'm Tim Gump and I was the test pilot for the Speed Cowl project. Since the introduction of Speed Cowl in August 2019, I have answered hundreds of questions from PC-12 owners and operators. The main question is "What are the benefits of Speed Cowl?" There are several—let me touch on a few.

COWL INTAKE DESIGN

The stock Pilatus cowl is referred to as a chin cowl. In general, chin cowls are not efficient due to the turbulent air they develop which reduces the airflow (ram air recovery) to the engine. The design of Speed Cowl is referred to as a pitot cowl. Like a pitot tube, the inlet is positioned lower and forward to capture uninterrupted airflow. Speed Cowl provides increased ram air recovery to the engine which equates to better engine performance. Examples of efficient pitot cowls include the King Air B200/300's, the new TBM 900 series and the upcoming Cessna Denali.

HEATED INLET LIP DESIGN

Take a look at the left side of the stainless steel inlet lip on your PC-12. You will undoubtedly see discoloration on the lip due to excessive heat. There is roughly +800° F exhaust entering the lip at that point. The heated air moves to the right side of the lip where it exits at about 350° F. Over time the carbon fiber and paint start to deteriorate, especially on the left side of the lip. As all PC-12s age, heat damage to the carbon fiber and paint is inevitable. Speed Cowl's patent-pending heated stainless steel inlet lip features internal baffling reducing the temperature of the exhaust entering the lip and maintains a more even temperature of the heated air as it moves through the lip. This design will reduce the possibility of heat damage to the carbon fiber and paint over time.

Keep a look out for more Speed Cowl benefits. In the meantime, if you have any questions email tim@edmo.com.

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info.edmo.com/speedcowl

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GA Assembles Coronavirus Aid

The general aviation industry has long served as a lifeline to people and communities in crisis. Previously, that spirit of service predominantly showed itself during natural disaster relief missions. But today, faced with the novel coronavirus crisis, aviation leaders and businesses have been quick to step up once again. Some of the biggest examples can be found in the manufacturing effort.

As it became apparent the healthcare industry faced an extreme shortage of personal protective equipment (PPE) supplies, several general aviation manufacturers joined the coalition across the country to engineer and produce custom components. I reached out to a few of the manufacturers to gather more specifics about their efforts:

Cirrus Aircraft – "We started by looking at what actions we could take to help immediately – with basic personal protection equipment (PPE) supplies. Our first round of donations, including gloves, hand sanitizer and lab gear was dropped off to local hospitals in Duluth. We also put our production and product development teams to work building real solutions for one of the most urgent problems facing the medical community – face masks and respirators. Our experimental team has since assembled 31,500 face shields for the local medical community.

Of even greater need are Powered Air Purifying Respirators (PAPR) – battery-powered blowers that provide positive airflow through a filter to a hood that protects healthcare workers from contaminated air. Our team, along with local partner Frost River Trading, quickly got to work prototyping equipment to meet this need, with 850 hood and coupler assemblies. And at the heart of creating full PAPR units, is a project to recreate the blower units available at area hospitals, which are in short supply. Our engineers have designed, prototyped and tested a replacement assembly using computer aided design (CAD) software as well as 3D printing. The design our team came up with costs a fraction of the typical unit supplied to hospitals."


APPAREO SYSTEMS


PIPER AIRCRAFT


TEXTRON AVIATION

Piper Aircraft – "At the end of March, Piper designed a prototype face shield with off-the shelf materials. With approval of the prototype, the team set out to source the necessary materials from wholesale suppliers and create a manufacturing line within the Piper factory. While the initial goal was to make a few thousand face shields for our local hospital, the demand quickly grew from 2,000 to 50,000, and today, we have orders for over 100,000 face shields with 34,000 already delivered throughout the United States.

Additionally, our local hospital requested our support in making intubation boxes for COVID patients. We were able to design, build and deliver the boxes within three days. Beyond the face shields and intubation boxes, our interior shop produced face masks for every employee to help protect them while working. We sourced fabric from the local Joanne's Fabric store, which opened their doors just for us so that we could make enough face masks for 1,000 employees."

Textron Aviation – "While goggles, masks, gowns and gloves are critical personal protective equipment (PPE) for medical providers, plastic face shields are also used in addition to these items to protect the entire face. Textron Aviation is collaborating with Wichita State University (WSU) to manufacture face shields from optically-clear PET film. First, WSU and Textron Aviation tested and adapted the open source design, then the Process Engineering team began production using the company's large Gerber cutter.

In response to the new CDC recommendation that people wear cloth or fabric face coverings when entering public spaces, the company is also

sourcing fabric and sewing thousands of cloth face masks for its employees and health professionals. Although not medical grade, these masks can be laundered and reused, and will free up the more effective N95 respirators and surgical masks for the medical professionals and first responders who need them most."

Additional aviation companies donating time and resources include Boeing, Gulfstream, Daher Aircraft, Pipistrel, AvFuel and Tamarack Aerospace (and I am surely missing others).

I also spoke to Appareo Systems, the makers of Stratus aviation products. Though a smaller sized tech company, the team currently has more than 30 people dedicated to the manufacturing of emergency ventilators for its home state of North Dakota. Operating three shifts seven days a week, the company built more than 1,000 emergency ventilators in the first 10 days of production.

"We have received amazing support from our supplier network – seeing unreal turn times to deliver products," said April Steffan, a spokesperson for Appareo. "For example, one supplier drove 22 hours from North Carolina to North Dakota to deliver 3,000 clamps. We have also seen our own employees going above and beyond. One employee flew his personal aircraft to pick up some essential parts in Minnesota."

Charitable aviation organizations such as Angel Flight and NBAA's HERO program have also pivoted normal operations to accommodate the delivery of critical supplies. One of our readers, Kirk Walters, reached out to me with his own story.

"Just recently we were called into service by the Governor of Vermont under the Angel Flight Northeast umbrella to address a very pressing need in the fight against the COVID-19 crisis," said Walters. "To bridge a testing analysis gap, we organized and flew a daily shuttle from Burlington (KBTV) to the Mayo Clinic in Rochester (KRST) for 11 consecutive days. Seven of these flights were done in our Conquest 441 and the balance were flown in a Lear 60."

Kirk and fellow pilots Martti Matheson and Damien Henry ultimately flew 21,400 miles over 22 legs and transported more than 5,000 COVID-19 tests.

And let us not forget the associations that continue to vie for and protect the general aviation industry in Washington, D.C. We had the privilege of interviewing AOPA President Mark Baker for this month's Five on the Fly. He offers valuable insight into the current happenings and effects of the virus on the aviation industry.

I hope the above demonstrates how many encouraging examples of hope and compassion can be found across our communities. We all need stories of positivity, and once again, our incredible industry is up for the task.

Stay well.

Make the Most of Your Moments

I don't know about you, but it's been a long month.

When the quarantine started, I had big plans. If I couldn't fly, I would dig in and improve my knowledge on a wide range of aviation topics. Perhaps begin the bookwork on a new rating or start an article I've been meaning to tackle. If Shakespeare wrote "King Lear" and Isaac Newton managed to invent calculus both while quarantining during a 17th-century plague, surely I could muscle through some webinars and training materials.

So how's that going?

April started off strong. I joined the legions using Zoom and began substituting in-person meetings with Zoom calls. Insider hint: It's important to recognize the weird light fixture and schmaltzy aviation wall art behind you are, well, just weird and distracting. You can replace it with one of Zoom's "virtual backgrounds" such as the Golden Gate Bridge, but that's for rookies. Go pro with a virtual background of your hangar, your aircraft or the ultimate – from inside the cockpit of your aircraft…while flying. Now you've got serious Zoom cred.

Because of the pandemic, many flight training entities have been offering live online courses. Sign me up! In early April, Flight Research, Inc., hosted a two-hour live introductory course on upset prevention and recognition training taught by Dr. Scott Glaser. Loss of control is the No. 1 cause of GA fatal accidents and an area every pilot should understand in more depth. The session had 100 slots and it filled in an hour. Because of the overwhelming popularity, the company held the class at least four more times. (Thankfully, I was able to snag a spot – it was excellent.) It's whetted my appetite to complete an upset prevention and recognition training course that includes a flying component.

Don't be a video-conferencing rookie. Choose a virtual background of your aircraft or even better, of your aircraft in flight.

With the cancellation of Sun 'n Fun and other aviation events this spring, my email inbox was filled with invitations to attend a number of other webinars from Garmin, EAA, AOPA and the FAA to name a few. You could pretty much learn anything and everything in a webinar last month, from programming your FMS, to choosing the right brakes for your kit-built plane to understanding the differences between datalink weather sources. I even found a live feed of a mother eagle feeding her eaglets on explore.org, a live nature network. That occupied a good 30 minutes, although its application toward my piloting skills is somewhat questionable.

Turning to my bookshelf, I pulled out some of my favorites, "Stick and Rudder: An Explanation of the Art of Flying" by Wolfgang Langewiesche and Tony Kern's "Foundations of Airmanship." Some of the best words ever written about flying are found in these pages. Having these editions on your bookshelf not only makes you look super-smart but actually has the power to make you smarter.

Sensing that a change in environment might be healthy, I moved my social distancing practices to the airport. If you're like most airplane owners, you can always find a big or small project to do in the hangar. There's always something that needs cleaning, polishing, mending, tightening, updating, airing up or topping off. If there is a positive to embrace out of this pandemic, I can confidently say my plane has never looked cleaner nor the hangar more organized.

Another benefit of the travel lockdown is that it's given my spouse and me more quality time together. Thankfully, we share a mutual love of aviation and get along fairly well in the cockpit. Since we can't fly anywhere, we've helped each other keep our instrument skills current and our airmanship skills in shape. When flying safety pilot, we've each had fun introducing sadistic instrument failures at inopportune times. The only problem with that is we eventually switch seats. As the Wicked Witch said, "I'll get you, my pretty!" (Being from Kansas, we never, ever tire of a good Wizard of Oz joke.)

After all that "quality time" together, I can confidently report our marriage remains intact. It helps to have a sense of humor and try not to be too competitive of who nailed the

ILS or who executed a perfect power-off landing and made the touchdown point without touching the power. Not that I'm competitive or anything…

All kidding aside, the challenges many face during these unprecedented times are not lost on me. At the end of a flight, I have this habit as I watch the hangar door close and slowly obscure the view of my bird. I whisper a word of gratitude: first to my maker and second, simply in recognition of how lucky I am. That in spite of my frustrations, anxiety about the future, worry for loved ones at risk, and fear for friends on the front lines of the COVID fight, I am okay and today was a good day. In that moment, even my spouse can't annoy me.

The future is uncertain and none of us know what the "new normal" is going to look like. But in spite of uncertainties, most of us have control over the next minute, and probably the one after that. And while we may not get our "King Lear" completed this month, let's make the most of our moments.

Fly safe and stay healthy! T&T

Dianne White *is the executive director of MMOPA and editor of MMOPA Magazine. For a total of 14 years, she was editor of Twin & Turbine and has worked in the business aviation industry for nearly 30 years. She also serves on the board of directors for Angel Flight Central. An active multi-engine, instrument-rated pilot, Dianne lives in the Kansas City area and can be reached at* **editor@diannewhite.com.**


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PHOTO COURTESY OF BEN CASEY.

PHOTO COURTESY OF KATELYN WALLACE.

PISTON POWER SERIES

Cessna 310 and Beechcraft Baron

by **Joe Casey**

Two special people entered my work life about three years ago, also bringing along two special airplanes: Gerald West with his Cessna 310Q, and Deanna Wallace with a Beechcraft Baron 58. I would have enjoyed life with these two even without the airplanes, but they make the relationship all the more sweeter.

For decades, Gerald has been a pillar of leadership and strength at my home airport, Cherokee County Airport (JSO), and is the patriarch of one of the neatest families in the East Texas area. Gerald and his family operate Westcraft Manufacturing, a supplier of hydraulic cylinders to industrial markets nationwide. Gerald purchased a King Air B100 that I manage and fly and also gave me access to his other airplanes: a Piper Super Cub and a Cessna 310Q. Gerald has owned the Cessna 310Q since 1978 and it is a creampuff. At first, I was not too excited about the airplane but that was because I was unversed with this fine family of airplanes. Now that I've been educated, I fly the 310Q frequently and it has become our go-to steed for any mission that seems too small for the King Air.

Deanna hails from Lufkin, Texas, and is locally called the "Baroness" at the Angelina County Airport (LFK). There are four Beechcraft Barons based at LFK and she is trusted by the various owners, ending up in the front left seat of a Baron multiple days each week. She came to work with me and now has the keys to every airplane in our hangar ranging from the King Air 300, B100, to all of the PA46s. But she continues to operate the Barons because they are such good airplanes and, well, she's the Baroness. So, along with Deanna came the Barons, and I got an introduction to an airplane that somehow evaded my grasp in my earlier years in aviation. Now I get to fly the Baron, too and have grown to appreciate the airplane for what it is – a remarkable, overbuilt machine that is great for cross-country flying.

So, considering the 310Q or the Baron, which one do I like best? Which would I buy if I were to pony up the coin for a multi-engine cross-country steed? Well, that depends upon a few considerations.

Cessna 310

The Cessna 310 is probably in the "Top Ten" list of coolest looking airplanes on the planet (at least on my list). Everything on the airplane is sleek and pointy, giving it the impression that it repels parasite drag like oil does to water. The non-turbo Q model is the one that I fly, and I have grown to love it. With a huge and comfortable cockpit, lots of luggage space, engine nacelle storage, and a panel that is spacious enough or all the latest avionics gadgets, the Cessna 310Q is a fantastic airplane for many varied missions. Gerald's Q-model has been upgraded with the Continental 520 engines that develop a lot of power for their size/profile, and the performance is very good. We regularly climb at 1,100 FPM at max-gross, and cruise at 185 KTAS while burning 22 GPH. I've flown from Texas to Montana, New Mexico, Minnesota, Florida, and a whole host of other faraway states in the 310Q – each time with four-plus people and bags. It has the useful load, range and space to be a true cross-country machine. I've grown to love it for its efficiency and utility.

But, all is not perfect in the Cessna 310. While the seats are comfortable and space cavernous, the 310 is a hard airplane to climb in. If you or your passengers have mobility issues, then the climb up on the wing and the down into the seats (especially the back seats) can be troublesome. There's a spar to contend with and only one door for everyone. I think it'd be a poor choice of an airplane for the owner who is a non-pilot and plans to hire a pro, for he or she will be sharing the same space as the pilot and will often be climbing into the awkward back seat.

On the ground, the airplane is easy to taxi and maneuver, and while in flight, it is a good performer. But in the air, the Cessna 310 can be nauseating for the newbie flyer due to the yawing. The large main tanks on the tips of the wings translate into a lot of weight on the wingtips. So, there's a definite yawing moment in turbulence. The 310Q model we fly does not have a yaw damper and it could really use one. For the pilot (who is sitting very near the CG of the airplane), it is probably not a big deal, but anyone in the aft seats will be thrown side to side when the bumps are prevalent.

The oscillations on the yaw axis are most prevalent on landing in a gusty wind. It takes a well-trained pilot who knows what the feet are for when flying to manage the longitudinal axis during the landing sequence. Don't expect to just hop in the 310 and go when you purchase one. Plan to spend some time with a CFI who knows the 310 well.

I find that I operate the 310 at a lower power setting normally. We pull back the power to 60 to 65 percent power, and we still see cruise speeds in the 170 KTAS range while only burning 18 to 19 GPH. It can be a very efficient airplane.

Beechcraft Baron

The Baron is like most other Beechcraft products – rugged, reliable and a pleasure to fly. The version we fly is a 1994 Beechcraft Baron 58 Model that flat out performs. The pilots have about the same access as a Cessna 310 (climb in the right side and slide over), but the passengers are afforded a huge door in the back that provides access to a club-seating cabin that is plenty big enough for comfort.


PHOTO COURTESY OF CLINT GOFF


PHOTO COURTESY OF KATELYN WALLACE

The spacious cabin is allied with the super large nose baggage. We've carried three sets of golf clubs, five people and even some other baggage items, and the Baron performs well. Many of the Barons have a useful load of over 1,300 lbs – that is a gob for a six-place airplane.

In cruise, we flight plan for 195 KTAS on 32 GPH and are rarely disappointed. We've loaded the Baron right up to max gross weight and it still performs well. We are repeatedly amazed at how much stuff the Baron will legally carry.

Performance-wise, the Baron is similar to other Beechcraft products in that it is not the best in any one category, but it is solid in nearly every category. It is not the fastest piston twin, but it is reasonably fast. It doesn't carry the most, but it carries a lot. It won't go the farthest, but it goes really far. There's not a hole in the Baron's game. I even asked Deanna, "What does the Baron not do well?" Her answer was, "Not do well? I don't know; it does so much so well." That was that.

And she is right. The Baron is a great airplane that doesn't really have an area of consideration where it scores poorly – except for maybe one – cost.

The Baron can be expensive to purchase. It is such a good airplane that people actively seek them on the market, ensuring that it holds its value well. While some multi-engine piston airplanes have plummeted in value over the years thanks to the plethora of more efficient single-engine offerings, the Baron remains a desirable purchase consideration. Deanna operates is a 1994 model and a similar airplane would retail on the market for about $350,000. That's a lot of coin for an airplane that is 25 years old. But, again, this is an airplane that performs well, has no holes in the game and is still being made new from the factory.

And, that last fact is important. Any airplane that is still being built generally enjoys better support than one that has been orphaned by the manufacturer. So, the support for the Baron is arguably better than the support of the Cessna 310, which last rolled off the line in 1981, and they didn't roll many that year. Most of the 310s were built in the 1970s and that is a long time ago for an airplane to still be relevant. But, the Cessna 310 is still relevant because it is a great airplane. A nice example of a Cessna 310Q with average times will sell at retail for about $100,000. A slightly newer R-model will be harder to find and will fetch a bit more.

The Decision

So, if you are working with a budget of $250,000 or more, then you can find a very nice Baron where youthfulness (newer year model) will get more and more expensive. If you want to find a nice Cessna 310 and spend $250,000, then you can buy the best possible 310 out there and add all sorts of the best modifications and upgrades. That is if that seller will sell. Most Cessna 310 owners are longer-term, owner-flown pilots and will only let their estate sell their beloved airplane once they've flown west for the last time.

In my opinion, you really can't go wrong with either steed from a functionality or investment standpoint. Both have stood the test of time, both are great cross country airplanes, and both have a following of faithful supporters. I think the cabin-class seating and the newer-year models make the Baron better for the buyer with more coin in the pocket, and the Cessna 310 is an ideal airplane for the owner-flown pilot who is value-driven that wants multi-engine reliability.

To me, when I get a mission that calls for the Baron or the 310, I'm thrilled at the prospect of flying either. Both are solid airplanes that we trust to haul around our loved ones and friends. T&T

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

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Five on the Fly

by **MeLinda Schnyder**

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President and CEO

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RATINGS:
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HOURS:
15,000

1. What are the top issues AOPA is working on in 2020?

Our advocacy arm is truly the heartbeat of AOPA – giving more than 300,000 pilots, aircraft owners and aviation enthusiasts a voice. Every day our government affairs staff and regional managers are working on the Hill and at the state and local levels advocating for GA pilots and protecting our nation's airports across the country, as well as working at the FAA to prevent onerous over-regulation. Especially during the recent COVID-19 crisis, our government affairs team has been in overdrive to make sure that GA airports receive funding to thrive even when traffic is down. And that pilots get relief from some of the aviation deadlines that are hard to meet when so much of the country is shutdown.

This year, one of our priorities is building up the House and Senate GA Caucuses, which currently have more than 280 members. Maintaining relationships with bipartisan leaders is imperative to educating and fostering champions of GA at the highest levels of Congress.

AOPA has also made it a priority to support the National Center for the Advancement of Aviation (NCAA), which would bring together all stakeholders in support of a national industry forum to address workforce challenges facing the industry and ensure that the United States remains competitive. It would help advance Science, Technology, Engineering and Math (STEM)-based aviation curriculum to reach the 25,000-plus high schools across the country, assist in apprenticeships and help military veterans and others transition to good-paying technical jobs in the aviation industry. We have been working closely with industry groups and Sen. Inhofe (R-Okla.) to make this a priority in 2020.

2. In 2019, the National Aeronautic Association recognized AOPA's You Can Fly initiative with one of its highest honors. Tell us about the organization's efforts to make GA flying more accessible and affordable to all.

Since AOPA's founding in 1939, lowering costs and reducing barriers has always been the focus of the organization. AOPA's You Can Fly Program has developed initiatives to support flying clubs, encourage best practices in flight training, get lapsed pilots back in the air, bring AOPA's resources and expertise to pilot groups across the country and invite high school

students to learn more about careers in aviation and aerospace

I am very proud of all that our You CanFly Program has achieved in just a few short years, and being recognized by the NAA for all our work is an honor. Our high school aviation STEM program has introduced 5,000 students in more than 160 schools to opportunities in aviation so far. We've also made waves by welcoming underrepresented groups with 37 percent being minority groups and 22 percent being women. Thanks to generous donations and a match by the Ray Foundation, we were able to secure $1 million in flight training scholarship funds last year. And we're just getting started. Our four-year high school curriculum will be in many more hundreds of schools in the next few years.

3. *Is there something that you didn't realize as a member (since 1984) that you've come to understand since taking the left seat at AOPA?*

For the past six years, I've been fortunate enough to lead this tremendous organization. I learned early on that AOPA goes way beyond our merchandise and the magazines you might see in pilot lounges across the country. AOPA is a fast-moving machine of nearly 300 dedicated employees working every day to further GA.

When I first joined as a member, I didn't realize just how much AOPA offers and how vital the advocacy arm of our organization is. GA pilots are such a small percentage of the overall population so it's vital to advocate for the support we need in Congress while energizing our network of pilots and enthusiasts. I've made dozens of trips to the Hill since becoming AOPA's president and it has really given me a better perspective of how much we need a united voice.

4. *You've owned quite a number of airplanes over the years – tell us about them.*

I knew early on that I had to work hard to keep up with my flying habit. Becoming president of AOPA was lifechanging for me and a career in this industry has opened many doors allowing me to keep up with my passion. Over the years, I've had my fair share of aircraft – including my 1953 Super Cub, which I've owned for nearly 30 years, and I'm not sure I will ever part with it. Flying low and slow in the cub and taking it through the backcountry and grass airstrips really reminds me of what being a GA pilot is all about. I have also owned a few Beechcraft Barons and my current is a 1967 Baron 55D that I keep in our Twin Cities hangar for jumping around. On the business side, my 1980 Beechcraft King Air F90 is great for traveling to headquarters in Frederick, Maryland.

5. *How has COVID-19 already affected GA, and what do you predict might be the effects once we get through the current pandemic?*

COVID-19 has temporarily uprooted the aviation industry from the bottom up. The airlines are dealing with the brunt of this crisis, but GA is also feeling the impact. From ATC zero events, airport closures, constantly changing airspace restrictions, impacts on flight schools and issues with airman certifications – this is an unprecedented time in our history. But through the hardships, we've seen just how vital GA is to the nation's infrastructure. Our industry has played a huge role in recovery efforts by conducting humanitarian flights and delivering urgent supplies like masks, ventilators and other resources of need.

AOPA and several partner organizations have been working with the FAA and Congress to highlight the value of GA, and fight for regulatory exemptions and policy deviations on behalf of our members. We were pleased to learn that the FAA is working to issue a Special Federal Aviation Regulation to help alleviate uncertainty about compliance and find solutions for those affected by this pandemic. Our main goal is to keep GA flying, and though we have certainly hit a rough patch, I have no doubt GA will come out on top again. It's just a matter of time. T&T

Citation Training at LOFT Aero

by **Rich Pickett**

PHOTO BY AUTHOR

I recently added an FAA Part 135 Citation 525-series Captain position with Jet Methods (based at Palomar, California) to my aviation experiences. The process required an interesting combination of ground, online and flight training. Each charter certificate holder has a set of FAA-approved operating specifications known as "OpSpecs." They detail everything from dispatching the airplane, maintenance, takeoff and approach minimums, to how much dry ice you can carry! Even after 40 years as a CFI, there were regulations and procedures that I had never seen.

Under Part 135 operations, the Part 91 61.58 annual recurrent training isn't sufficient to meet the charter requirement; hence you have to complete a program that is approved within the OpSpecs. While the content is similar, it involves expanded ground and simulator content, including Part 135 regulations, flight procedures, and, of course, more paperwork. In my case, it provided a chance to train at LOFT Aero in Carlsbad, California – a stone's throw from Palomar Airport (KCRQ) just north of San Diego.

LOFT Aero

Noel Yantos is the founder and president of LOFT. A number of years ago, I trained for my first Cessna-series type rating under his Flight Crew System's FAR Part 61 Citation 500 training program in a Cessna Citation 501. Except for an instrument proficiency check in an FTD, all training was in the airplane.

Noel realized that while his Part 61 training program was very successful, it was time to move up to another level. He started the development of LOFT's current Part 142 training program in 2010. Assembling a team of experienced aviators with Part 121 and Part 135 experience, LOFT created its first syllabus in six months. For those in the aviation training industry, you know this is no trivial exercise. The fact that they created the syllabus in six months is impressive of itself.

The company's first venture targeted the Cessna Citation 525 type rating, which applies to one of the broadest arrays of aircraft models from the Citation CJ to the CJ4. The creation of a Part 142 simulator training program is an extensive project involving the development of the syllabus, curriculum, instructor training, facility, Class C or D flight simulators – and the FAA must approve every step. For the development of its Class D simulator, LOFT engaged Aeronautical Systems Engineering (ASE) in Florida. Within the Citation 525 series, the CJ1 is the most prolific model, so it made sense to start with that particular aircraft simulator.

Each area of a Part 142 training program is governed by a different group within the FAA. The

curriculum is reviewed and approved by an FAA Training Course Program Manager (TCPM). In the case of LOFT, that is an inspector within the FAA San Diego FSDO office. This process involves a considerable amount of time by both LOFT and the TCPM.

ASE has built a number of simulators, and while quite familiar with the manufacturing of these devices, each new model requires an extensive amount of aircraft data, both systems and inflight aerodynamic. In order to build the CJ1 models for LOFT, it entailed fully instrumenting the actual airplane and flying a variety of flights over a period of six weeks. The result is an experience that mimics the aircraft in minute detail, even the quirks.

Arriving for Training

When you enter LOFT, you notice a difference from other training centers right off the bat. The LOFT concierge, Corrie Reese, sits at a desk created from a jet engine cowl. And on the right, you see a Link trainer complete with the instructor desk. All around, the walls are lined with aviation memorabilia – so much so that you might think you have entered a museum instead of a training facility!

This was my first training experience focused on the Cessna Citation CJ1 (CE-525). There are many similarities between all of the Citation 525-series aircraft, but enough specific differences for each model to keep it interesting. Richard Sears, LOFT's vice president, was gracious to accommodate my training requirements on short notice and created a class slot for me that fit my schedule. With only a one-week notice, it was the proverbial "drinking from a fire hose" process in absorbing LOFT's 500 pages of material in their training manual. The materials are well written, concise and dovetail perfectly with the ground and flight training program.

Bob Rombach was my ground instructor on the first day, and as expected, an expert in the CJ1. I was joined by an experienced Citation CJ1 owner who had already trained several times at LOFT. Bob took an integrative approach to learning aircraft systems and limitations. His style, which typically started with the annunciator panel and each system's associated CAS message, proved very effective in learning the normal and abnormal operation of the systems. As Noel told me during our interview, one of the company's training goals is to "reduce the complexity to ensure simplicity."

PHOTO BY AUTHOR

On to the Sim

LOFT's CJ1 sim is equipped with the standard avionics for that model, namely a Universal FMS and Garmin GNS 530. Cessna offered various avionics systems in the Citation 525 series with earlier models equipped in this manner and later models with Rockwell Collins Pro Line 21 in the CJ1+, CJ2+, CJ3 and CJ4. Newer models in the series, notably the M2 (CE525) and the CJ3+ (CE525B), feature Garmin 3000 avionics.

Time passed quickly in the simulator. My flight training session with Eugene Tucker went by fast from pre-flight to shut-down. LOFT's flight simulator was just like the airplane, except at Eugene's direction, systems and engines failed frequently for my session. As pilots who have done type rating training know, the emergencies are only interspersed with short periods of normal operation. From engine fires to failures both before V1 and after, it was a great workout.

Since I was completing a FAR 135 training under our OpSpecs, I was required to do some additional procedures, such as a takeoff with 600 RVR and approaches to 1800 RVR. Otherwise, the maneuvers were essentially the same as a Part 91 61.58.

In addition to the CJ1, LOFT has a Lockheed L1011 and a new Cessna Citation V (CE560) simulator. The L1011 simulator is used for training crews for orbital sciences, which utilize an L1011 to launch rockets while airborne. The Citation V simulator is also unique as it is the only Level D training device outside of FlightSafety. With this simulator, LOFT can offer pilots not only initial and recurrent training for two pilot operations, but also the FAA-required annual training for the Single Pilot Exemption for the various 500-series jets. For pilots requesting the single-pilot exemption training, the programs require two additional days.

Proficiency Check

For the recurrent training, your final session is technically a proficiency check rather than the type rating check ride. While different by regulations, the process is very similar. My proficiency check was with Noel starting with the Part 135 paperwork. Noel quizzed me on the new-to-me Part 135 regulations and procedures, as well as the usual aircraft systems and emergencies. His engaging manner quickly puts you at ease. After struggling with some of the charter requirements and answering his other questions, it was off to the simulator for the check ride. Noel put me through the paces for almost two hours, and before I knew it, we were done.

Pilot Training Challenges

I asked Noel what challenges he and his instructors see when training their clients. His main comment: "pilots get in their own way." When pilots have issues, it can often be traced back to them responding too fast without confirming their current situation. In some cases, it is not confirming that the PFD scoreboard (the display of autopilot modes) matches what they thought they had selected on the mode controller.

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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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57	JETSTREAM 32
60	JETSTREAM 41
25	KING AIR 100
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

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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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In other situations, it is not properly utilizing all of their cockpit resources, including an understanding of situational awareness. I also find myself that if I slow down, especially on a check ride, it provides more time to resolve issues and confirm that the aircraft is correctly doing what I planned.

LOFT also offers an active podcast, the LOFT Aviation Podcast. Noel believes this is a good way to expose pilots to a wide variety of aviation topics and keep aviators engaged. As we all know, learning doesn't stop when you complete a check ride or proficiency check.

Upset Training

LOFT is enhancing its previous upset recovery training (UPRT) program. They are completing a full restoration and upgrade of an Aerovochody L-39. Their goal is to have a significantly upgraded aircraft to be closely aligned with business aviation jets. The L39 will also feature a Garrett 731 turbofan. The new engine enhances the performance with less turbo lag, high reliability, more power and reduces the aircraft weight significantly. In addition to the new engine, the plane also offers a Garmin-based panel.

I have an Experimental Authorization to fly the L-39 (an experimental version of type rating), and their upgraded aircraft will be a great platform. They will be offering one-day and two-day training programs that can closely mimic business aircraft in a safe environment later this year. You can learn more or contact LOFT at *www.LOFT.aero*. T&T

With 11,000+ hours of piloting more than 100 aircraft model **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. He is also a proud owner of an Eclipse and Cirrus SR22. You can contact Rich at* **rich@personalwings.com**.

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A Guide to the Citation 560XL Series: Part 3

The art of painting your airplane. When is it time, and how much will it cost?

by **Kandi Spangler**

PHOTOS COURTESY OF JETAVIVA

If you're anything like me, you're probably shocked by the price of an aircraft paint job these days. Just 10 years ago, I remember getting paint quotes from a reputable shop on a mid-size jet for around $60,000 to $70,000. Those days are long gone, unfortunately. This got me wondering, "Why is painting an aircraft so expensive?"

Like the car industry, the chemicals in aircraft paint used to be much better in terms of preventing corrosion, chipping, fading and generally holding up to the elements. Nowadays, however, those chemicals have been deemed too dangerous for us to use, harmful to both our health and our planet's environment. Not to worry, the U.S. Environmental Protection Agency (EPA) is here to save us! I'll skip the political debate on this, but the use of newer-age, "safer" chemicals is only part of the reason for the increased costs. The other half of the equation is far more interesting to talk about and vastly improves the finished product.

The Painting Process

Some of the most reputable shops in the industry are now led by professionals who seem just short of having a PhD in aircraft paint and detailing. These pros geek out on aircraft paint and it shows. In fact, did you know there is an annual conference where around 30 aviation companies made up of "paint doctors" and paint manufacturers show up to discuss best practices in aircraft painting, talk about new application techniques, and help develop new products? Neither did I until I researched this article.

Reputable shops like West Star Aviation, Duncan Aviation, Elliott Aviation, Jet Aviation, as well as the aircraft manufacturers, are now hiring experienced aircraft paint professionals who went to school for this specific trade. They then put them through an additional extensive training program


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specific to their systems and processes. It's no wonder too; the process is mind-blowing, from start to finish.

Step 1: Paint Stripping and Inspecting.

The estimated time to complete this first step is about a week. To begin, a shop will start by preparing the metal surface to be painted. Some would say this prep work is likely the most critical step in the whole process to ensure the longest-lasting paint job – and an additional check that allows you to catch skin corrosion issues early before they become bigger problems. This is also where, as they say, "you get what you pay for."

Some shops will start with a scuff process, where they don't actually strip the old paint off, but rather scuff or sand the old paint so the new paint will adhere to it better. There are a couple of issues with this technique: 1) The process doesn't allow you to catch any skin or fastener corrosion as easily; 2) The process usually ends up making the aircraft heavier than if it were completely stripped and then painted.

The best form of metal preparation for a paint job includes removing of the control surfaces to better gain access to all areas of the airplane and then using a chemical stripping process (using Peroxide or similar chemical). This is where the EPA comes in. Safe handling of the wastewater associated with this process requires the shop to capture, contain and properly dispose of these chemicals. This alone can cost several thousands of dollars per aircraft. But this sure beats having to deal with a skin repair later. That's because a good shop will end this stripping process with a thorough inspection of the entire aircraft. This is an important step because this is when issues can be found early and how a more expensive repair is avoided down the road.

Pro Tip: *Whichever shop you choose to have your paint done, make sure they are equipped and approved to handle repairs for your airframe. That way, if corrosion or other issues are found that require maintenance, you can have it addressed on site and with minimal delay.*

Step 2: Surface Prep and Base Color Application.

Next is preparing the surface for the base color application, which also takes about a week. Again, this step can likely be a difference of years in the life of your paint job, so don't skimp here either. This is where the PhDs of aircraft painting come in. It used to be the process of painting cars and painting aircraft were very similar. Today, however, the process is very specialized, especially considering all the concave and convex surfaces, extreme temperature and speed variations, and the fact there are vertical, horizontal, topside and underside surfaces to consider.

Some of the best paint shops use a prepping process that includes both Alodine (to form a protective barrier on the metal) along with a two-part epoxy primer. It's not as easy as it sounds. Alodine is another extremely effective, yet nasty chemical that requires special handling and disposal, equating to more dollars in cost. After this, the epoxy primer must be applied precisely in a climate-controlled, dust-controlled and well-ventilated paint shop. This is where the rubber meets the road – or paint meets the metal – and where you'll be blown away by the painting process. And guess what? More dollars adding to the overall cost!

Paint booths are amazingly sophisticated these days. Some of the most advanced shops are using a high-tech electrostatic process that allows for the charging of the paint molecules providing a 60 to 75 percent efficiency (meaning 60 to 75 percent of the paint makes its way onto the surface of the aircraft) and minimizes paint waste. The sophistication doesn't end there. The paint booths are also equipped with special lighting and multi-stage filtration systems in the floor, ceiling and walls. That's after they spray water on the floor and walls up to four feet high prior to painting just to keep dust and other particles from flying around. Again, only stuff the "Paint PhDs" would know.

Step 3: Base Paint Rework, Application of Stripes or Other Detail Painting, and Painting of Control Surfaces.

The timing of this step varies largely based on the size of the aircraft and the complexity of paint design, but expect one to two weeks on average. "Roughly 10 percent of each paint application will not pass our standards," says George Euler, paint shop manager at West Star Aviation's Grand Junction facility.

It is a testament to the high standards they have for aircraft paint. Imperfections such as dust particles, "fish-eye" spots (small bubbles in paint), or "orange peel" (uneven or rippled surface caused by humidity) are areas

that a good shop will re-work and address before going to the final stage of the process. It's also during this stage in the painting process when the control surfaces are painted and balanced with the same painstaking attention to detail.

Step 4: Paint ReWork, Cut-and-Buff, Clear Coat, Installation of Control Surfaces and Balancing, and Final Inspections.

During the final phase of the painting process, estimated to take one to two weeks, areas will be repainted as a result of periodic inspections done to assess each paint application. Additionally, some of the top shops will use a process called a "cut-and-buff" to blend the height of the striping with the height of the base color. A trick I like to use when assessing a paint job is to take my finger and drag it across the seam of the stripes. If it's smooth, I can assume it was likely a thorough paint job. If it has an evident edge to the stripe, then I know no blending was done and it was likely a cheaper paint job. That doesn't mean it's a bad paint job; it simply means they skipped a finer detail that I like to look for. And, finally, there's the clear coat. Though not required and adds weight, it's a must for any metallic paints.

At the end of the process, the control surfaces are reinstalled and balanced to ensure smooth operation. No unnecessary input is required by the pilots or the trim to compensate for any minor changes in the control surface's weight as a result of the paint.

Finding a Good Value

It's easy to see why costs have escalated in the last 10 years. Between state-of-the-art equipment, systems, facilities, training and disposal costs, it's no wonder a good paint job from a reputable shop on a Citation Excel/XLS/XLS+ can now cost between $85,000 to $95,000 for a two-stripe paint job.

There are some good shops out there that can do it for less, and that doesn't necessarily mean you are sacrificing on quality. But you do need to understand what processes they use, ask lots of questions and ask to see some of their work. As they say, the devil is in the details, and with paint, it's all about the details.

Be on the Lookout for Subpar Work

On the other hand, there are bad paint shops out there and shops that just don't offer the level of detail I like to see. When in doubt, here are some things to be on the lookout for:

1. **High-Build Primer or Improper Use of Bondo** – Yes, Bondo body filler can be used on airplanes. But it can also be misused, as can high-build primers. Things I look for are the outlines of the rivet heads in the wings. If you can't see them, why? Is the paint too thick? Did they use a high-build primer or body filler? Filler does not flex like paint either, so you'll likely see cracking of the body filler in these areas.

2. **The "30-foot Paint Job"** – This is what I call a paint job that looks good at 30 feet away, but once you get close to the airplane, you can see orange peel on the underside of the wings, or you can tell that the control surfaces were never removed for paint. You can usually see a fresh coat of paint on top of peeling paint in the area between the control surfaces and the trailing edge of the wings/horizontal stabilizer.
3. **Overspray** – I've seen this one all too many times and I'm not sure why. I believe it occurs when a shop is doing touch up or maybe even they are spraying paint on an adjacent airplane in the same shop. You'll see specs of paint on the side windows.
4. **Bubbling or Blistering Paint** – Imagine Steve Martin yelling at John Candy in Planes, Trains, and Automobiles, "Those aren't pillows!" The same is true with bubbling or blistering paint. That is likely corrosion under there. Have a maintenance professional check it out.

Buying Like a Pro

I often tell my acquisition clients that I'd rather find an airplane that needs new paint and interior but has good bones. That's because everything else is generally cosmetic and you can usually find a better deal that way. If you find an airplane with a good history (logbooks and pedigree) and good bones (discovered using a thorough pre-buy inspection), you can feel good about investing in a high-quality paint job and a custom interior that you will enjoy for a while. More importantly, you'll likely realize a greater return on the aircraft down the road. 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** or 512-410-0295.

Paint Pro Tips

1. The more stripes, the higher the cost. Stick with one or two colors for striping.
2. Don't go crazy. Pick a crowd-pleasing color scheme for resale purposes if you want any sort of return.
3. Paint touch up. Do it often as it will extend the life of your paint job. But make sure the shop matches the colors. (Note: Not all white is white. And metallic paints actually require more touch up).
4. Using ceramic, xylan or titanium paint coatings once a year WORK REALLY WELL. Use them and it will extend the life of your paint job.
5. Clean your airplane often and keep it hangared, both at home and on the road. Foreign particles (dirt/dust), UV rays and humidity can easily cut the lifespan of your paint job in half.

The Virus

A seemingly simple Lear 31 trip turned into a journey fraught with frustration, inconveniences and unexpected risks.

by **Kevin Ware**

We were to pick up two of our regular passengers, one of them a teenager, the other his mother in her 40s. They were going to Palm Desert for three to four days to get some sun and meet with friends. Even though the coronavirus panic was in full swing in Seattle 60 miles south of us, there were no reported cases in our area. And with just four people in the little cabin all known to each other, we felt reasonably comfortable about the decision to fly.

The airplane itself is a somewhat dated Lear 31 at 30 years old with that peculiar mix of old fashioned switches and early electronic display instruments. However, with a maximum gross weight (MGW) of 15,500 pounds and 3,500 pounds of thrust put out by each TFE 731-2 turbofans in back, it is one of the better performing Lears, with the ability to climb well over 5,000 feet per minute and reach a ceiling of FL510. With the little airplane's Mach .81 cruise speed, the flight to the airport nearest our passengers' destination (Thermal, KTRM) was to take just under two hours.

We departed home base with full tanks and deadheaded the 20 minutes to the airport where the passengers were going to meet us. We then drank coffee while the line crew topped our tanks even though we had just flown for less than a half-hour. One of the problems with a Lear 31 is that it has very short legs. About 3.5 hours in the air, even in the high flight levels, is all it's good for. If you cannot enter the high flight levels, or have to flight plan to an airport in low IFR conditions requiring an alternate, all the extra fuel requirements limit the airplane to about 2 hours in the air. Given these limitations, we thought replacing the 200 gallons we burnt on the way up a good idea.

Our passenger arrives with her teenage son, both looking happy and healthy, and we escort them to the aircraft and load their baggage behind the back seat. That is another

peculiarity of an older Lear. The baggage is stowed behind the back seat, with a seatback release device seemingly stolen from a 1950s vintage Chevy. All very awkward.

We run the start checklist and get the little jet going. I call the tower for our clearance, only to be told they have nothing on file for us. This occasionally happens at this airport because it is a contract tower without direct access to the FAA's computer system. Plus, it is technically within Victoria's airspace being just 10 miles from the Canadian border. We ask them to call Victoria departure control and see if our clearance got stuck in the Canadian system. They do so and come back saying they have nothing for us either, then suggest we call flight service by cellphone. My co-pilot, Josh, dials the number only to get an eternal hold.

With the engines burning over 100 gallons per hour while just parked on the ramp, we need to get going. So, with Josh still on hold, I call flight service on their local frequency. They say there is nothing for us in the system, so I start filing a flight plan with them the old fashioned way, one item at a time over the radio. In the meantime, Josh gives up on the phone, calls the ground controller, gets a taxi clearance out to the runway, and starts the airplane rolling that direction running the taxi checklist by himself. Flight plan now filed, we call ground control and they still do not have a clearance, so we decide rather than burn more fuel sitting on the ground, we will depart VFR and deal with the problem with Victoria once airborne.

As you might have predicted, shortly after takeoff, we find the departure controller's frequency jammed up with airline traffic coming out of Vancouver and cannot get a word in edgewise. With the Lear's climb rate, we really have to power back to stay below FL180 just three minutes after leaving the runway. And traveling at 250 knots we are rapidly reaching the end of Victoria departures airspace and entering that of Whidbey, the naval air station just to the south. Finally giving up on Victoria, we call the Navy controller, who appears to have been waiting for us and immediately reads our clearance to Palm Springs, gets us to change to Seattle Center, then clears us to FL410. Ten minutes later, we are finally up there and getting some decent fuel economy out of this thirsty and short-legged little airplane.

The sun sets as we cross the Oregon/Nevada border about 45 minutes into the trip. A half-hour later, we can see the lights of Las Vegas off to our left, with that narrow vertical shaft of white light that comes off the roof of one of the hotels. Now about a half-hour from landing, we find we have "made fuel" en route and have about 1.5 hours remaining despite our long ground delay prior to departure. The ATIS comes up 10 minutes later stating KTRM is clear with 10 miles visibility and the winds calm. We request radar vectors to a visual approach, and about four miles out, say goodbye to the radar controller and switch to Unicom. Two miles out, we think we can see a red rotating beacon, motionless and about a third of the way down the runway. After a couple calls on Unicom, we discover the beacon belongs to a Cessna 182 that is just stopped there

in between making night currency landings and takeoffs. Stopping an airplane on an active runway, at night, faced aft to the incoming traffic at a non-towered airport is a very bad idea. But after explaining what he was up to, the pilot says he will get on the roll. We are too professional to say anything critical and just reply that we are less than a minute from landing.

The 182 breaks ground just as we get the 50-foot call out and we land without any problem. We taxi to the Lear's local hangar, only to find another 182 out of its hangar with pilots pre-flighting the aircraft. As our noisy TFE 731's wind down, they start to walk over in typical pilot-friendly fashion. After asking where we had flown in from, we reply Seattle, and they promptly stop dead in their tracks and ask, "Isn't there a lot of that coronavirus up there?" At the time, a nursing home in Kirkland had the highest rate of corona deaths in the country, and it was making the headline TV news every night, so we reply, "Not that bad, except in nursing homes" and added, "But, we are OK." You can almost hear them thinking, "Yeah, sure," as they make immediate 180-degree turns and head back to their aircraft, all Learjet curiosity displaced by fear of the virus.

We hook up the Lear to the tug as fast as we can to allow our virus-avoiding 182 drivers taxi past, which they do with all their landing and taxi lights shining in our faces – maybe to sterilize the air. Finally, having put the little jet away for the night, we get in the crew car and make our way into Palm Springs proper. We check into the hotel then go out for dinner at a nearby restaurant serving Jewish food. The place is almost always full, but tonight it is nearly empty. Nevertheless, we choose an isolated booth and take care not to tell the waitress we just flew in from Seattle.

As it turns out, the owner wanted the Lear to stay in Thermal for the days he and his family were there, so arrangements are made to send the crew (us) back via airline. This happens frequently to executive jet pilots, and the reasons are primarily economical. If we stayed in Palm Desert, we would charge layover fees, which for two pilots amount to $1,500 per day plus expenses. If we flew

Decked out in personal protective gear while conducting COVID-19 testing.

the airplane back home, by ourselves, the hourly cost with fuel would be amount to $10,000 or so. But if we are sent back by airline, the tickets would cost less than $200 each on Allegiant, the local low-cost carrier. Thus, the next morning we make our way to Palm Springs Airport and check into our return flight home.

The airport is crowded with facemask wearing people, all trying to stay at least 6 feet from each other, even in the long, snaking Starbucks coffee line. Our flight boards early, and I find myself about halfway back in the cabin in a tight middle seat, which is not at all comfortable. Concerns about proper "social distancing" seem to go out the window as other passengers board and walk down the aisle, literally making body contact with the person in front of them, while they handle the back of every seat. I am hoping no other passengers will arrive to fill my row, but no such luck. Early on, a male who appears healthy sits to my right, but I am encouraged that the window seat to my left remains empty.

However, just before the cabin crew closes the door, an unwell looking elderly lady enters, obviously short of breath and with a face mask in place. She comes down the aisle coughing occasionally, looking directly at the seat numbers then back at her ticket, as slightly lost passengers often do. Then, yikes, without saying a word she stops at my row and points at the window seat right next to me. After some fussing around, she gets seated and I ask if the mask is to protect her from me or me from her. She does not find my

inquiry amusing and just stares out the window silent for the next two hours as the A320 takes us back to Washington.

The A320 lands and a half-hour later I am in my car driving home wondering if I will get coronavirus. This business of piloting executive jets clearly has its frustrations, inconveniences and risks, but I was not counting on COVID-19 virus exposure to be one of them.

But then, by contrast, two days later, I am working as a physician at the Health Department's COVID-19 testing site, all decked out in personal protective equipment (PPE) and feeling reasonably safe while doing viral testing on actively symptomatic patients. Maybe I should avoid any further Lear trips where I have to return via airline – that is unless I can board with the protective gear. T&T

Kevin Ware *is an ATP who also holds CFI, MEII and helicopter ratings, has more than 10,000 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**.

by **Kevin R. Dingman**

1.21 Gigawatts!

Airplanes and electricity: the best of friends; the worst of friends.

Who can forget Dickens' primer from "The Tale of Two Cities" (modified here for relevance), or the iconic line from the 1985 blockbuster film "Back To The Future"? Christopher Lloyd, as Dr. Emmet Brown, delivers the classic 1.21 gigawatts line and its follow-on: "How could I have been so careless? 1.21 gigawatts; Tom, how am I going to generate that kinda power!"

A gigawatt is one billion watts or 83,320,000 amps. Holy joules and mother of pearl! Who knew time travel would require so much power – or invoke such a muddled, mollusk metaphor? Since we typically fly our airplanes within just a one-time continuum, our electrical requirements are less daunting – no plutonium-fueled flux capacitor required. But even with our airplanes' relatively refrained appetite for amperage, we are "Runnin' with the Devil" (Van Halen, 1978). With a risk of fire and brimstone (OK, mostly fire), electricity can be the worst of friends if we fail to properly manage our volts, amps, ohms, watts and those oyster-joules.

Electrons + Movement = Heat

Heat + Combustibles = Fire

Fire + Airplane = Bad

Fortunately, our airplanes have no need for a time travel level of electrical power, nor is it necessary for pilots to demonstrate proficiency in using actual electrical circuit equations. But since aircraft electrical systems can be the best of friends or the worst of friends, it is necessary for us to understand how the system in our airplane operates and where the threats are – and to have enough knowledge to isolate failed circuits or busses when they become the worst of friends. Isolation methods are generally composed of a master or battery switch, generator or alternator switches and circuit breakers. All circuits should be protected with a circuit breaker or fuse. This is a device that senses the current flow, and when it reaches a predetermined level based on wire capacity (size), opens the circuit so that no current flows.

Popped CBs

If we are going to isolate busses or components, we need to know what we lose when we isolate them with the master, the battery, a generator or alternator. Along with where the circuit breakers are for major components, systems and avionics. To quickly identify circuits, a common technique is to install colored circuit breaker "collars" or to paint the most important or high draw breakers. In my Duke, for example, the landing gear motor and electric trim CBs are painted white.

While manually pulling a CB is an accepted isolation technique, resetting a popped breaker inflight can be problematic. From AC 25.137-1A: "Service experience has shown that attempts by the flight crew to restore power by resetting CBs after an automatic disconnect (popped breaker) can sometimes create a fire hazard and will often be unsuccessful because the majority of such disconnections are caused by faults that must be corrected by maintenance action." So, don't reset popped CBs unless needed for safety of flight and directed by the POH, QRH or the manufacturer's inflight procedure.

My Generator is Bigger Than Your Generator

The battery(s) and generators/alternators are the sources of our electricity. The typical piston twin's generators or alternators produce about 60-120 amp/hr, a turbine twin or small jet about the same, and a B-737 around 90 Kva (kilovolt-ampere). Each of the three fuel cells on the space shuttle generates 12 kilowatts, and your car uses about 400 amps to start and 45-50 amps while driving. A turbine engine can draw 1,000 amps to start.

Without getting into an electrical engineering discussion about joules vs. watts vs. amps vs. the amount of time in use, etc., the bottom line as far as we pilots are concerned is this: Amps (current 'flow') and wattage along with voltage (potential for electron 'movement'), wire size and material (aluminum, copper, gold, etc.) generate varying amounts of heat – enough heat and you get fire. An open circuit is cold (literally, room temperature). An in-use circuit should produce virtually no heat. A circuit that has too much current for the size of wire will get hot – possibly hot enough to start a fire. And fire + airplane = bad. Even more so than an engine failure, an electrical fire will get your attention, so we need to recognize the early signs of an overheat or fire.

Ozone, Hot Plastic and Smoke

Electrical smell, vapor, smoke and flames will be our indication of a serious electrical problem. And you may notice one or more of these before your carbon monoxide/smoke detector sounds an alarm. When electricity arcs through air, as it sometimes does with a DC electric motor or between a bare wire and ground, it splits oxygen and nitrogen into a form of oxygen called ozone. This creates a smell – it's the electric, model train smell. You may also encounter this smell from an electric drill or other electric motor with brushes if it doesn't have a fan to blow away the smell. In an electrical fire scenario, this "electric motor" smell is followed quickly (or sometimes preceded by) the smell of hot or burning plastic, rubber or insulation. Sometimes you may even hear electrical popping, arcing or sizzling. Do not ignore these signs or second guess yourself if that is what you smell or hear. If it's a developing electrical fire, you may only have a few minutes to find and put out the fire before much worse things happen.

Fire!

My first inflight electrical fire was aboard my trusty 1959 Cessna 150. I was stationed at MacDill Air Force Base in Tampa while going through initial F-16 training and kept the plane at Peter O. Knight Airport across the bay. One sunny day I took it out for a couple laps around the patch. Just after liftoff, the reverse current relay light came on and I smelled both electrical smell and battery acid. My voltage regulator overheated, failed to regulate and allowed 1.21 gigawatts (thereabouts) into my battery, which caused it to "boil over." I shut off the master, landed immediately and ran into the FBO for a bucket of water to rinse the battery box and belly.

I also had an incident where a partially bare wire once arced against my pressurization controller in the Duke, causing the electric smell and burning rubber. And there were a couple of incidents with a recirculating fan while on the ground in the MD-80, but nothing like my Northwest/Delta friend Bob Hoffman experienced. He was flying a B-757 en route from JFK to MCO. A recirculating fan overheated inflight causing an electrical fire that filled the cabin with smoke. Bob landed 12 minutes after the checklist began, with no damage and no injuries. Here are some other published reports of electrical incidents.

Accidents and Incidents

- North American Aviation, Command Module, Apollo 1 – an electrical short started a fire which was exaggerated by an O2 saturated environment resulting in loss of the module and crew in just 17 seconds.
- MD11 belonging to Swissair – crashed into the sea off Nova Scotia following an inflight electrical fire caused by the inflight entertainment system.
- A321 operated by British Midland – during cruise in night IMC had an electrical malfunction accompanied by intermittent loss of the display on both pilots' EFIS and an uncommanded change to a left-wing low attitude.
- A319 operated by British Airways, London Heathrow to Edinburgh – experienced an electrical malfunction during a night pushback, which blanked the EFIS displays following the second engine start and

produced some electrical smell but no smoke.

- B752 operated by American Airlines from SEA to JFK – lost significant electrical systems functionality en route. After making a visual daylight approach, the aircraft was intentionally steered off the landing runway when the captain perceived that an overrun would occur.
- DH8B while descending into BDL – had an inflight fire that originated at a windshield terminal block.
- B747 near Dubai UAE – had a main deck cargo fire 22 minutes after takeoff resulting in a rapid build-up of smoke in the cockpit. An unsuccessful attempt to land was followed by loss of control due to fire damage.
- B747 operated by TWA – exploded over the Atlantic 12 minutes after takeoff due to arcing of the fuel quantity indication system in the center fuel tank.

Aggressively Pursue

Some fires are difficult to locate and fight. The time delay can allow fires to take hold and do plenty of damage. It may also be difficult to confirm that you even have a fire, which can cause a delay in the decision to land (this delay may allow the fire to become non-survivable). Accomplish the procedures in your POH or QRH and do your best to find and extinguish the fire. FAA Advisory Circular 120-80A uses the words "aggressively pursue" in reference to finding and fighting a fire. But while aggressively pursuing the fire, also make a mad dash, beeline, emergency descent or whatever euphemism you like to use that means nearest suitable airport, and do it right now – even if you think the fire is out or that it's under control. If your avionics are still working, use the "nearest airport" function of your navigation system, then make the Mayday call, ask ATC for a vector and request ARFF.

Shopping List

Fire extinguishers (Aircraft Spruce, $200 & up).

Carbon monoxide/smoke detector (Home Depot, $36.97).

CB collars (Aircraft Spruce,$2.51 ea.).

Provita smoke hood (Aircraft Spruce, $189.00).

Crash ax.

According to 14 CFR 91.513, we need one extinguisher for seven to 30 seats – I have two in my six-seat Duke. One or two carbon monoxide/smoke detectors is a good number for four to 10 seats. Two to four CB collars should work in most GA aircraft. And in Part 121, we have smoke hoods for all crew members in order to allow us to function in a smoke environment while we fight the fire. These are also a great tool for GA. And aircraft with more than 19 seats need a crash ax to assist with egress if exits are jammed.

Remember, aircraft electrical systems can be our savior or our slayer. Learn your electrical system, where critical breakers are located, and go shopping for the above safety equipment. Because even without a Flux Capacitor, we're "runnin' with the devil," and it won't take 1.21 gigawatts to create a fire that can roast our joules. 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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First Solo–Again

> "November seven three zero Juliet Alpha, will you need a runup at the end?"

I was ready for the question from Love ground control (KDAL) but anxious about the flight. It wasn't the weather. But after 14 years of exclusively flying jets, this would be my first solo flight in a King Air. "Negative, zero Juliet Alpha," I replied.

"Monitor tower twenty-three seven and have a good flight. Southwest 2217 taxi up and hold short behind the King Air," said ground control.

Not only was I new to the airplane but the airport as well. Dallas Love is a major terminal with parallel runways, lots of construction and the home of Southwest Airlines. I didn't just jump into the C90A after my purchase. Instead, I attended five days of initial with King Air Academy in Phoenix, then about 25 hours of mentoring. Years ago, I decided that if I am going to put my loved ones in the airplane, I want to be as ready as possible for the good, the bad and the ugly. But today it was just me.

Even though my C90 is G1000-equipped, there are significant operational differences between the airplane and my previous Mustang. A fact that was emphasized as I climbed out from Love and my ears began popping.

I had neglected to turn on the bleed air controls.

Not a big deal, and easily rectified, but overlooked on the checklist.

"November seven three zero Juliet Alpha, I need to vector you off the departure for faster aircraft, turn right 20 degrees," said departure control. I glanced at the torque gauges and realized that I needed to add a little more throttle to counteract mother nature's effect on engine output. Even though I knew this, putting all the parts of the puzzle together in a seamless manner was challenging – especially having not flown for two weeks.

I was on the way to Shreveport (KSHV) for a practice ILS and then back to Love. Level at 19,000 feet, truing 265 knots, it didn't matter that I wasn't in a jet. I was in paradise.

Landing smoothly was another matter.

The C90 is very nose heavy. It takes full nose-up trim to grease one on. Or so I had been told because all of my landings were, shall we say, noticeable. No trailing link gear on the King Air and chopping the power on those big four-blade props results in an abrupt loss of lift.

Let's just say I didn't sneak up on Shreveport. I vowed to try again on the return home.

"November seven three zero Juliet Alpha is level seven thousand with Oscar," I transmitted to regional approach. "Roger, zero Juliet Alpha, reduce to 190 knots. This will be a vector to the ILS Yankee runway one three left approach." Eighteen hundred-foot broken skies were requiring an approach sandwiched between four Southwest 737's.

"Zero Juliet Alpha, maintain one sixty to the marker if possible. Turn left heading one five zero to intercept the localizer, maintain two thousand until intercept, cleared ILS one three left," said approach.

I hand-flew the airplane and prepared for another poor landing. Over the fence at 100 knots, I got lucky. It all came together.

I greased it on. I was smiling from ear to ear.

I think you know the feeling.

Fly safe. T&T

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

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