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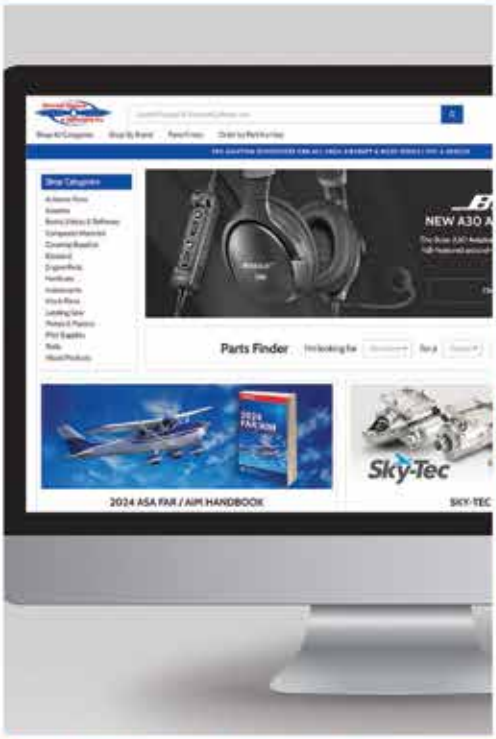

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What's inside / VOLUME 20 / ISSUE 11

CONTENTS

26

38

48

54

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The View from Here
Jennifer Dellenbusch

An Ever-changing View

IN THE 20 YEARS I've been at the top of this magazine's masthead, I've witnessed many changes in our industry, and in business and society as a whole. For instance, Facebook launched the same year that the Piper Flyer Association did—2004—but it was not available to the general public until 2006. Can you remember that time before the pervasiveness of social media? This and other changes in media consumption habits have pushed us to keep up.

As the association grows and becomes more complex, we need to put in place a structure that can sustain it and help it continue to grow. As part of that process, I'm happy to announce that after years of dedication, hard work, and commitment, we are promoting Scott Kinney from the role of Associate Editor to Managing Editor.

Scott has been an integral part of our editorial team for six years, consistently demonstrating outstanding editorial skills, leadership qualities, and a deep understanding of our publication's vision and goals.

The focus of *Piper Flyer* magazine and the type of articles will not change. Scott has already been involved in editing, proofreading, fact-checking, making suggestions for content, and writing. As a pilot and CFI, he also brings a lot of aviation knowledge to the table.

In his new role as Managing Editor, Scott will play a pivotal role in shaping our publication's future, overseeing editorial projects, fostering collaboration, and leading our talented team to new heights. We are confident that his expertise, dedication, and innovative thinking will bring the Piper Flyer Association even greater success.

I will still be here and involved in all aspects of the association, albeit a little more behind the scenes, and Kent will still be here doing what he does best, but it's time to get some help, and I'm confident Scott is the right person.

Blue skies,

Introducing Scott Kinney

THANKS FOR THE KIND WORDS, JENNIFER.

A few nights ago, I completed a move into a new home office. Part of that task was to sort through and organize several shelves full of books and back issues of *Piper Flyer* magazine. As I leafed through the first few *Piper Flyer* issues I worked on (circa mid-2017), I was pleasantly surprised to see how far our team has brought the magazine in the past several years.

We've made great strides with the look and feel of the magazine, thanks to our talented Creative Director, Pierre Kotze. Associate Editor Troy Whistman's keen eye has enhanced the content we deliver, ensuring accuracy and readability, and Jennifer and Kent Dellenbusch have pushed for improvement in all aspects of the Piper Flyer Association (not limited to just the magazine). Our supporters have become more diverse, and their product offerings are more targeted toward Piper flyers. Our contributors, both professional and amateur, who serve up the "meat and potatoes" of *Piper Flyer*, are now providing a higher grade of articles, columns, and photos than ever before. Thanks to everyone who has helped make this improvement possible.

30-plus years ago, Managing Editor Scott Kinney's aviation journey began with model airplanes.

The biggest thanks, however, goes to

Continued on Page 73

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Motoring, What's Your Price for Flight?*

A light-hearted look at aircraft engines.

You may call it your powerplant. You might call it your four-banger, opposed, magneto-fired money burner. Whatever you call it, that heavy metal thing on the front of your airplane attached to your propeller is likely the most expensive part of your aeronautical money pit.

It is the most expensive thing unless you have fallen into the trap of buying and equipping your ride with mostly not-needed (yet costly) TV screens driven by GPSes, AHARS, heated cup holders, or other magical electronic mumbo-jumbo.

If you are a fully crazed and committed avionics bunny, I sympathize. It may take years of work to get you to give up looking at a moving map and take a gander outside through your airplane's windows. Today, let's limit our discussion to your airplane's engine.

If your airplane happens to be what we call a "twin" and has two engines, just multiply any costs we discuss by a factor of three. You might think my math is wrong, but you have forgotten the age-old aviation mathematical constant that says engine costs will never make any sense.

Early engines

The first aircraft engine we all started with as children is what I would call the "vroom-vroom." If our parents loved us, they bought us airplane toys for various holidays and as a reward for successful trips to and from the potty. We pretended to fly these toys by making a loud and throaty "vroom-vroom" as we ran down the hall on missions to bomb our sister's room or strafe our dog.

Most airplane toys were of the vroom-vroom variety with toy propellers, but occasionally, we would get toy jets, meaning that we would spray the inside of our parent's homes with cold germs, cooties, and eager childhood spittle as we tried to make jet engine noises. I never got the hang of making the "whop-whop" sounds necessary to fly a toy helicopter, so I was doomed to fly fixed-wing aircraft from early in my childhood.

Balsa, baby!

Rubber-band motors were next. These engines were stretched between the prop and the tail of the balsa wood airplane kits we would usually find in our Christmas stockings next to a set of pencils we would never use and a candy cane we would never eat.

The first aircraft engine we all started with as children is what I would call the "vroom-vroom."

The key to operating a rubber band motor was to not wind it up so tight that little rubber knots would form along its length. The TBS, or "time before snapping," was roughly six flight minutes, meaning you needed to ask your dad or mom for the rubber bands wrapped around the daily newspaper.

At some point in our late childhood or early pre-teen years, we were introduced to the Cox .049 model airplane engine. This engine used Cox "glow" fuel, and instead of a rubber band or a spark plug, it was fired off by a "glow plug" that we had to hook up to a brick-sized battery. *(See a photo of a balsa wood radio-controlled airplane powered by a Cox .049 engine on Page 12. —Ed.)*

After hooking up the battery clip to its top, we would squirt a little glow fuel into the cylinder port. The fuel made a sinister sizzling sound as the glow plug warmed it. It was almost like the engine was a hissing snake just waiting to bite your finger when you tried to start it via propping.

The models powered by these .049 terror engines were frightening to me when I was young and are scary to me now that I am old. My fingers were always slippery and cold from getting them soaked in glow fuel, and the shrill noise the engine made turned me into a puddle of twitching, pre-pubescent aviation goo.

Thank goodness I finally moved up to the engine we all know and love today: the four-cylinder, horizontally opposed, fired-by-magnetos, roughly 100 hp contraption that you and I first learned to operate when we took our primary flight training.

We had our Lycomings and our Continentals. No Rotaxes or other exotic non-magneto prop-turners were available unless you were rich enough to train in a plane with a Pratt & Whitney radial or were a devoted hippy who only flew gliders powered by beautiful multicolored wispy winds provided by Mother Nature.

As students, we learned the importance of screaming, "Clear prop!" even when the ramp was utterly deserted. We studied all about magnetos. We absorbed information about carburetor ice and learned about leaning the mixture.

Starting to look a lot like the holidays

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Airplane powerplants seem complicated and obtuse, but if you memorize a few easy-to-learn terms and acronyms, you can avoid looking stupid when you discuss the subject at the next airport ice cream social or fun run.

Sometimes, we studied cowl flaps and fuel injection, but mostly, we were taught to expect the daggum engine to quit at any second—usually at the worst possible time.

Engine failure is nothing to be ashamed of

Planning for engine-out landings was drilled into our heads. "Always keep a landing field in mind for when your engine goes 'ker-clunk'," our instructors said. Occasionally, our instructor would simulate an engine out for our enjoyment and anxiety, and their enjoyment.

I took flying lessons before I took car-driving lessons, so I found it odd that my car-driving instructor never told me to look for places to pull over if my car's engine quit. He also never turned off the car's ignition key and waited for me to do an emergency automobile glide to a parking spot.

Jets!

You have probably most often flown using a variation of the magneto-fired Avgas engine. You may also have flown with engines powered by Jet-A fuel driving a propeller or an array of fan blades.

Most of my flying career has been spent operating jet fuel-burning engines, mostly airliner powerplants. They were usually called jet engines, but they were not true jets—they were turbofan engines that employed a jet turbine driving the N1 fan blades.

Engine terminology

Airplane powerplants seem complicated and obtuse, but if you memorize a few easy-to-learn terms and acronyms, you can avoid looking stupid when you discuss the subject at the next airport ice cream social or fun run.

Here are a few:

- TBO – time before overpaying for an overhaul.
- Babbit – an engine term coined by Issac Babbit in 1839. You may remember him from his catchphrase: "You rascally Babbit!" used in Warner Brothers cartoons.

Continued on Page 68

Oil Analysis Tips, Battery Replacement Suggestions

Q I recently bought a Piper PA-28R-200 Arrow 200 and so far, I'm happy with my decision. It took a while to find a good one and I had to pay top dollar for it, but I read once where you wrote that a buyer should always buy the best airplane he or she can afford.

So, I crunched my budget and estimated what I could afford. Fortunately, this great Arrow came up for sale at a local airport before it was advertised and I grabbed it.

I have read many of the maintenance and support articles on the Piper Flyer forum, and still, I have a question.

Can you please give me some guidance on how to read an oil analysis report? I understand that the report provides metals detected in parts per million (ppm), but how much is too much?

Larry

A The engine in your Piper PA-28R-200 Arrow 200 is a Lycoming IO-360-C1C, rated at 200 hp.

Lycoming has published service information that provides a general understanding of what they call spectrometric oil analysis. Specifically, this is in Service Letter No. 171 (Nov. 26, 1971) titled "General Aspects of Spectrometric Oil Analysis" and Service Bulletin No. SB 480 F (May 25, 2017) titled "Oil Servicing, Metallic Solids Identification After Oil Servicing, and Associated Corrective Action." (See Resources for links to both of these documents.)

SB 480 F is the longest (16 pages) and most recent Lycoming bulletin. Its focus is on the identification of metallic particles found in oil filters or an oil pressure screen.

The second half of 480 F lists where these metals are located, and what the presence of a particular metal means.

The following sentence from SL 171 describes the most important benefit of an oil analysis program and the steps to benefit from using oil analysis on your engine:

"The most important aspect of monitoring engine wear by oil analysis is safety. As long as the wear rates of the various elements do not show a sharp rise, the operator can be assured that his engine is in good health at the time of the analysis."

It's the overall trend that matters. A single oil analysis is of little value. Some will say that a single analysis is a useful tool for buyers who are seeking a determination of the internal condition of an engine on an airplane they're considering for purchase.

My opinion is that critical wear and engine internal condition information will be best realized by a detailed inspection of the folds of the filtering media in the airplane's spin-on oil filter, as the contents of that media will be an accumulation of contaminants since the last oil change.

An oil analysis sample is a snapshot of the wear metals; it's like taking a look at a photo of a dirt road—it doesn't mean much unless there's also a look at the condition of the same road a year ago, then six months ago, then three months ago. In oil analysis, it's the trend that tells the story.

Being new at this oil analysis game, you'll ask, "How will I know if the wear metals in my analysis report are too high?"

Blackstone Labs, the oil analysis company I use, includes a "Unit/Location Averages" column in every report they send me. According to its website, "This is the average wear for this particular type of engine for you or your business."

The four oil analysis labs I know of are AvLabs (a Piper Flyer supporter), Aviation Oil Analysis, ALS Global, and Blackstone Labs.

The key to the oil analysis process is to use the same lab and take samples regularly to establish the wear metal trend for your engine.

I get a six-pack of samples every year when I stop by the Blackstone booth at AirVenture. I keep a sample kit in my airplane in case I need a sample for any reason when I'm on the road.

One important point, as highlighted in Blackstone's "Oil Sampling Procedure" instructions: try to pull your oil sample from the middle of the drained oil stream; don't stick the sample cup into the stream as soon as you open the drain. "The first oil out might have some dirt from around the drain plug. If you wait till the end, you might not have enough oil left to fill the bottle."

Once you have a collection of samples, you can chart them to establish a metals baseline for your engine. Blackstone also includes the numbers that were found in the last four samples.

If you're really a number-cruncher, divide each category number by the hours on that sample. That will provide a number per flight hour.

Happy flying,
Steve

Q The battery in my Piper PA-32-260 Cherokee Six 260 is tired. I didn't fly many hours at all last year due to family issues. It's all been resolved now and I have started flying again. But now I find that the battery works pretty well when the weather is mild, but with the cooler weather this fall, I think it's time to make a change so I can start the big Lycoming in my airplane.

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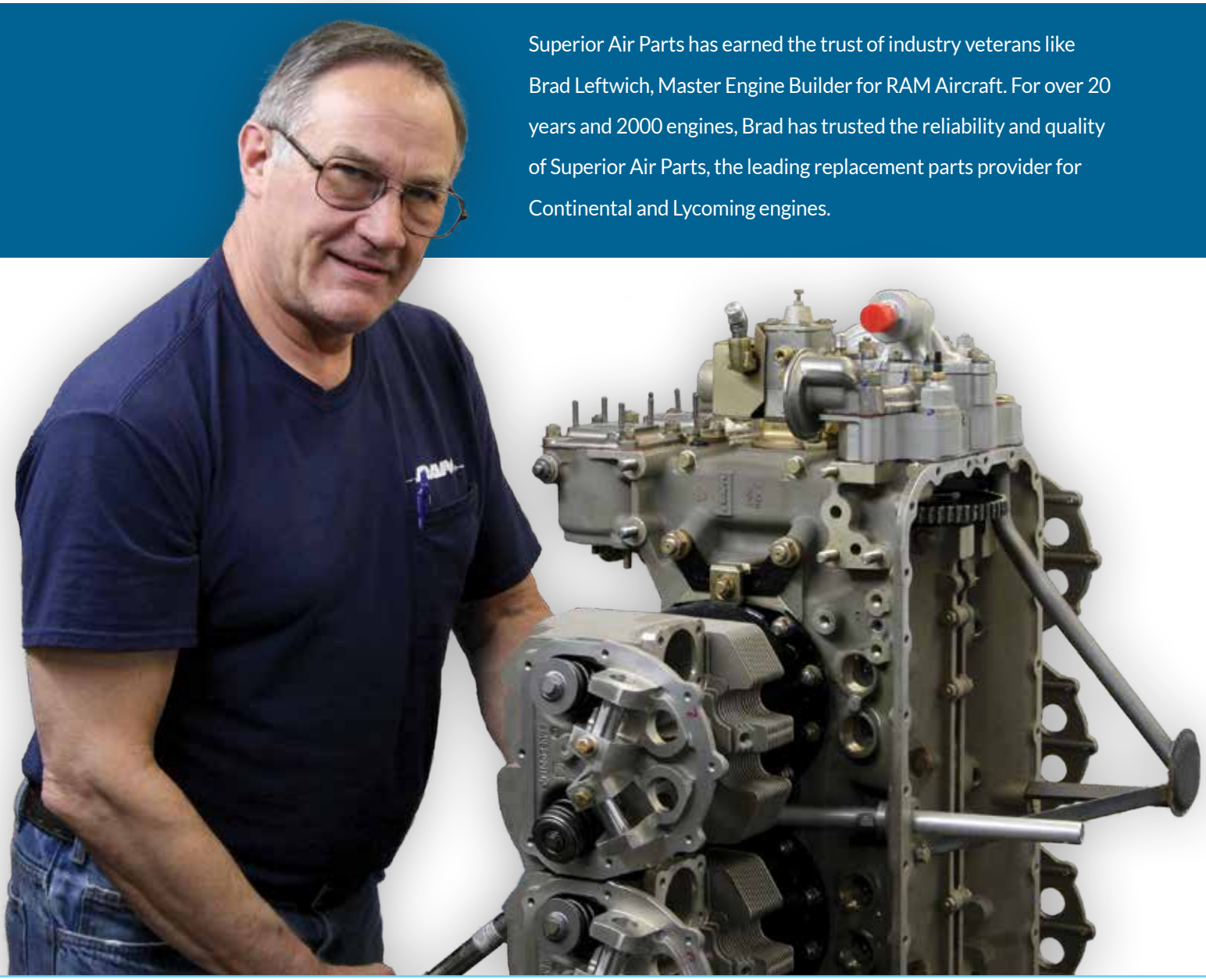

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"The most important aspect of monitoring engine wear by oil analysis is safety. As long as the wear rates of the various elements do not show a sharp rise, the operator can be assured that his engine is in good health at the time of the analysis."

What's the best battery to install these days, and how do I best maintain it during times when I can't fly often?

Stan

A Years ago, the only batteries that were made for small airplanes were what are known as "flooded cell" batteries.

These were characterized by removable caps (six caps for a 12-volt battery and 12 caps for a 24-volt battery) on top of the battery case. As this type of battery charges, explosive gases laden with sulfuric acid are expelled out of the top of the battery. From time to time, owners had to pour distilled water into these batteries to keep the level above the plates.

The battery box installed in my 1960 Piper PA-24-180 Comanche 180, and other light airplanes of that vintage, has three tubes connected to the battery box. They all exit the bottom skin of the aft fuselage. One is tapered forward to catch ram air which is then routed to the forward upper section of the battery box. The second is connected to the aft end of the battery box. The airflow through the battery box is designed to carry off the explosive acid-laden gasses. The third tube is a drain out of the bottom of the battery box. It's very common to see bare metal on the fuselage aft of these tubes due to paint erosion from the acid.

Examples of flooded cell batteries are the Gill G-25 and G-35 (12-volt).

In my opinion, the best battery today is what's known as a Recombinant Gas (RG) battery. These don't off-gas so they don't require a vented battery box, and can be mounted in any orientation, so they are ideal for aerobatic airplanes. The self-discharge rate is very slow compared to a flooded cell battery.

Gill also makes RG-type batteries.

I have been using a Concorde RG-35AXC sealed battery in my Comanche for the last 10 years. I replaced the first one last year. It is an expensive battery (nearly $500), but my experience and user reviews of this battery posted on PFA Supporter Aircraft Spruce & Specialty's website indicate that these batteries last a long time.

Since neither Gill nor Concorde batteries were original equipment as listed in the Type Certificate Data Sheet (TCDS) of my

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The improvement in today's batteries has bumped up the cost, but given the longer effective life, and the increased "electrification" of modern airplanes, RG batteries and Battery Minders are the way to go, in my opinion.

Comanche, there must be an approval basis for installation. The Gill website indicates its batteries are approved to replace the original battery by being built in accordance with what's called a Technical Standard Order (TSO).

Concorde batteries are approved for installation under the Supplemental Type Certificate (STC) program and Parts Manufacturer Approval (PMA). The Concorde battery website is chock full of helpful information. I called their customer support, told them my N-number and they sent the STC paperwork approving the installation.

Like you, I wasn't able to get much stick time last year due to a pesky health issue. Limited activity is not good for batteries, although the low internal impedance of RG batteries greatly slows the time-related discharge during non-use periods.

I keep my Concorde battery in tip-top shape by connecting it to a Battery Minder when I'm not flying. Please do not get a non-aviation Battery Minder; it's not designed for aviation batteries. Yes, the aviation version is expensive ($270), but it has kept my last Concorde battery in good shape for over eight years.

As I recall, the rule of thumb for battery life for the older flooded-cell batteries was three to four years.

The improvement in today's batteries has bumped up the cost, but given the longer effective life, and the increased "electrification" of modern airplanes, RG batteries and Battery Minders are the way to go, in my opinion.

Happy Flying,
Steve

(PFA Supporter EarthX recently received STC approval for installation of their lithium iron phosphate batteries in many Piper models, including the PA-28 series. These batteries are lightweight, don't off-gas, and are expected to last longer than conventional lead-acid batteries. See Page 62 for more information. —Ed.)

IMPORTANT: This article describes work that may need to be performed/supervised by a certificated aviation maintenance technician. Know your FAR/AIM and check with your mechanic before starting any work.

Continued on Page 69

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For you kind readers who happened to attend the Gathering at Waupaca and the seminars on the Sunday before EAA AirVenture Oshkosh, this may be a bit of a rerun for you, but nevertheless a worthwhile undertaking.

In a moment of weakness, our fearless leader, Jennifer Dellenbusch, agreed it would be a great idea for me to be one of the presenters on Sunday. If you missed it, the topic was "Threat Error Management for General Aviation."

I only noted a few people napping during the presentation, and there were even a few snickers from the audience at the appropriate times. The applause was polite at the end, perhaps because it was the end, and I would now sit down.

OK, enough self-deprecation and on to the point. One of the topics I covered during the presentation was the concept of "strategic versus tactical." This is an important topic for all flight operations and is worthy of frequent review. Buckle up! On our flight home from AirVenture, I got to practice what I preached.

Strategic versus tactical

Despite my complete lack of skill in sports, I think there's a great parallel with football. Spotters watch the game and then report their observations to the coach, who then relays this to the quarterback and other players, and they hatch a plan. Then, in the huddle, the quarterback comes up with a specific play that will be employed to advance the ball down the field. All of that is strategy.

Once the ball is snapped and the quarterback scans the field for a receiver to, well, receive, even the best-laid plans can fall apart, and thinking on the fly (see what I did there?) becomes essential if a first down—or better still, a touchdown—is to be achieved. That, of course, is tactical.

The sky was angry. A front was coming. With it were forecast low ceilings, rain, and embedded thunderstorms.

We had to employ both techniques this year to get in and out of Waupaca Municipal Airport (KPCZ, Waupaca, Wisconsin).

First, I needed a ride. If you're a long-time reader of this column, you may recall that my partner "Paul Classic" and I sold our Piper PA-28-236 Dakota. My options to Oshkosh were the airlines, my pal David and his Piper PA-34-220 Seneca III Turbo, my other pal "St. Paul" and his Cirrus, or some combination of these. In the end, it was a combo.

I took the airlines from Moncton to Toronto, where I met up with St. Paul, and we Ubered to Kitchener-Waterloo Airport (CYKF, Woolwich, Ontario, Canada), then hopped in his Cirrus to clear U.S. Customs in St. Clair County International Airport (KPHN, Port Huron, Michigan), then onward to Waupaca. Easy peasy, right?!

Strategic weather planning

Well, the reason for this plan was that the weather in the Maritimes was less than ideal. Hopping a ride in the Seneca meant that David would potentially need to launch into IMC from his home base in Charlottetown (CYYG, Charlottetown, Prince Edward Island, Canada) and then shoot an approach into Greater Moncton Roméo LeBlanc International Airport (CYQM, Moncton, New Brunswick, Canada) before continuing the trek west.

I opted for the Southern Ontario plan, as it would allow David to press on to fairer skies for his first stop, bypassing Moncton altogether.

I hope you agree that all of the above was strategic planning.

Our flight to Port Huron was relatively uneventful. Once on the ground, we started planning our flight to Waupaca. I had been OCD'ing over the forecast for about a week. It mentioned that afternoon pop-up thundershowers were possible on the west side of Lake Michigan. Mother Nature did not disappoint.

We used our various apps and scanned the trends of the weather. There was a line of thunderstorms extending from the Door Peninsula/Green Bay area all the way down to Chicago. Behind it were other pop-ups, but they appeared to be everywhere except Waupaca.

We spotted a trend where there was a gap in the line and felt that we could navigate using our eyeballs while avoiding any penetration of clouds. We also agreed that if we weren't happy with what we saw, we could land at one of Michigan's many airports on the lake's east side. Again, more strategy.

We filed IFR, choosing a fix that took us north of the direct track, toward where the gap was trending.

Time for tactical flying

Off we went! We were in good VFR without deviating for the first half of the flight. As it turned out, we needed to go a little farther north and ended up just south of Green Bay Austin Straubel International Airport (KGRB, Green Bay, Wisconsin). We arranged this routing well east of Lake Michigan, utilizing what we saw on the map display and the view out the window.

As we approached the lake's west shore, we were deviating and descended to stay in the clear. At no point were we in the clouds, and quite frankly, it was a pleasant flight despite the weather. Chatter with ATC was intense due to traffic trying to get into Oshkosh; lots of diversions were taking place.

See the screen shot above from FlightAware of our route around the weather. Compare that to the fancy G1000 depiction as we approached the weather. We were headed to NENSE intersection, as there was a large gap there as viewed with the eyeball. I regret that I didn't take a photo of the weather.

Also, note that the picture has been edited with a red circle to highlight the time delay of the data from the satellite weather. As shown in the cyan page header, "MAP – WEATHER DATA LINK (XM)," we were receiving SiriusXM data, not FIS-B weather. More on this later.

Regardless, the previous paragraphs illustrate tactical flying.

The return trip

The next three days were spent immersed in the fun that is AirVenture. Little thought was given to our return flight until the bus ride back to Waupaca on Tuesday evening.

The sky was angry. A front was coming. With it were forecast low ceilings, rain, and embedded thunderstorms.

Over dinner that evening, we discussed our plan. David and his ride-along pal, Scott, were also planning a Wednesday morning departure in the same direction, so we four put our heads together. A 7 a.m. taxi pickup was agreed upon.

Morning came too early and the weather review started in earnest. It was still good VFR in Waupaca, but the storm was advancing faster than expected. Breakfast was shrouded in rain at the hotel, with the occasional visit of the Rice Krispy brothers, Snap, Crackle, and Pop.

The taxi ride to the airport was quiet, and I spent a fair bit of time scanning the sky. It was gray, but there were hints of sunlight to the south and north. This was confirmed by the radar apps on my phone. At the time, the heaviest weather was east of the airport, with a decent gap to the west.

A gentle rain was falling when we got to the airport, and I noted from the movement of the scattered low-level clouds that there was a rather brisk wind from the west at a couple of hundred feet while the wind on the surface was a menacing 1 knot, gusting to 2.

Paul and David went to prep the two birds while Scott and I stayed inside to collaborate on our plan. Initially, we considered an escape to the southwest and an end run around the mess until we could ease toward the east and our intended

destination of Ogdensburg International Airport (KOGS, Ogdensburg, New York).

Paul suggested that may not be wise as we'd probably need to go south toward Milwaukee, maybe even Chicago, and that meant more congested airspace to contend with. Scott and I quickly agreed. North it would be.

We compared the radar shots and the movement trend and noted a rather large gap to the northwest that curved to the northeast, where we could pass through the front southwest of the Sault Ste. Marie area in Ontario, Canada. We filed our routes and picked up our IFR clearances via telephone before we launched.

Once airborne and in radar contact, we negotiated turns to the east sooner than our filed route, and we continued climbing to stay in the clear.

In the G1000 photo to the left, you can see we had asked for direct CRAZE but deviated to the left of that. We had negotiated a turn to the east before our filed fix of the Rhineland VOR, RHI, seen at the far left of the MFD's moving map.

Note the NEXRAD times of 2 and 12 minutes for the weather updates. Again, I'll get back to this shortly.

The climb continued to 13,000 feet, and we put on oxygen. This altitude kept us in the clear as seen from the picture out the window, taken around the same time as the G1000 screen shot. We aimed for the area hidden behind the propeller in the photo and stayed in the clear as we flew past the puffy cumulus clouds below us and the stratus layer above.

We logged a few minutes of light instrument time shortly after that, as we passed through the front, just as we crossed the lake's western shore. Forward visibility was a mile or two in light rain, and we

could see straight down, sometimes to the ground directly below us.

This would prove to be the bumpiest part of the flight, which I would characterize with the non-standard term "heavy-light" turbulence.

As we cleared the weather, ATC advised us that a military area over Michigan was hot, and we'd need to avoid it. We were offered direct to a fix named PINES before continuing the straight shot onward to Ogdensburg.

That long leg contained lots of towering cumulus along the way, most of which were avoided by ATC-approved zigs and zags. All in all, it went well. We collaboratively strategized and then modified the plan as we went to ensure we were staying safe.

Datalink time delays

Now, back to discussing the time delay with the data-linked weather displays. A February 2023 FAA circular titled "ADS-B In Pilot Applications" notes that "in extreme scenarios, NEXRAD CONUS and Regional data on the display can be up to 15 minutes older than the display's age indication for that weather radar data." This circular is linked below in Resources.

The time delay noted on the G1000 screen is how long it has been since the data was received, but the information could be much older. Remember, the weather depicted is a stitch-together, a mosaic of the multitude of radars around the country, and must be rendered into a composite image.

It takes considerable computing power and time for this to be completed, then sent to the network—either XM or ADS-B, before being transmitted to you.

We collaboratively strategized and then modified the plan as we went to ensure we were staying safe.

This is why it is unwise to make tactical maneuvers around convective weather solely based on NEXRAD information. In our case, we were using the G1000 data to back up what we were seeing out the window.

This is a critical point to increase one's longevity and cannot be stressed enough. Fifteen minutes—even five minutes—can be an eternity in the life and development of a thunderstorm! Realtime onboard radar remains the gold standard. Stormscopes are also valuable, but onboard live radar remains the only acceptable method to avoid weather in a tactical manner.

And there it is. Well-equipped GA airplanes with pilots making good choices can operate in some weather. We analyzed the situation from the ground, devised a plan that included lots of outs, and launched. The plan was modified by what we saw, and we avoided any heavy IFR. Convection and little airplanes—even big airplanes—don't mix.

See you next month for more adventures. Fly safe!

Tom Machum *is a Boeing 787-9 Captain with just over 20,500 hours. He and his wife, Jennifer, live in Moncton, New Brunswick, Canada. His stories are inspired by his flying adventures in both big and small airplanes. Tom also flies a Piper PA-28-236 Dakota for fun, and his articles are inspired by his flying adventures. Drop him a note and he'd be happy to reply. Send questions or comments to editor@piperflyer.com.*

RESOURCES

"ADS-B IN PILOT APPLICATIONS"
faa.gov/air_traffic/technology/adsb/pilot

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BUSTING

Violations of Special Use Airspace can lead to an unpleasant phone call or even an interception by fighter jets. A recent seminar at the Gathering at Waupaca detailed common pilot airspace errors, and what to do if you're ever intercepted. **By Steve Ells**

"My job is to educate General Aviation pilots so we don't have to do our job," said Major Cameron "Divot" Lowdon in front of a packed room at the Gathering at Waupaca prior to EAA AirVenture Oshkosh 2023. Lowdon is a member of the Royal Canadian Air Force attached to the North American Aerospace Defense Command (NORAD) headquarters in Colorado Springs, Colorado.

During his presentation, Major Lowdon told us that 99.2% of TFR violations of the Special Flight Rules Area (SFRA) around Washington D.C. are by General Aviation (GA) pilots.

Violations of the D.C. airspace and Presidential TFRs cause NORAD to scramble its jets approximately three to four times a week. Yes, that's just for the Washington D.C. Special Flight Rules Area (SFRA) and the TFR that accompanies the President of the United States when he is traveling.

The GA pilot will probably have the bejesus scared out of them when a sleek gray fighter jet nestles along the left side of their airplane. That fighter hasn't nestled in because the pilot wants a look at your Piper; it's there because you unwittingly flew into restricted airspace without clearance or communications with ATC.

According to Major Lowdon, who is presently assigned to increase awareness of these TFRs that NORAD is assigned to defend, knowing—and complying with—three basic rules (Plan, Talk, Squawk—more on this later) should be enough to prevent an interception during all GA flights, but if an interception happens, knowing how to respond to the standardized set of signals sent by the interceptor pilot will guarantee a safe outcome.

This all falls under NORAD's Civilian Air Education & Training (CAE&T) program, designed to provide this education to the General Aviation community.

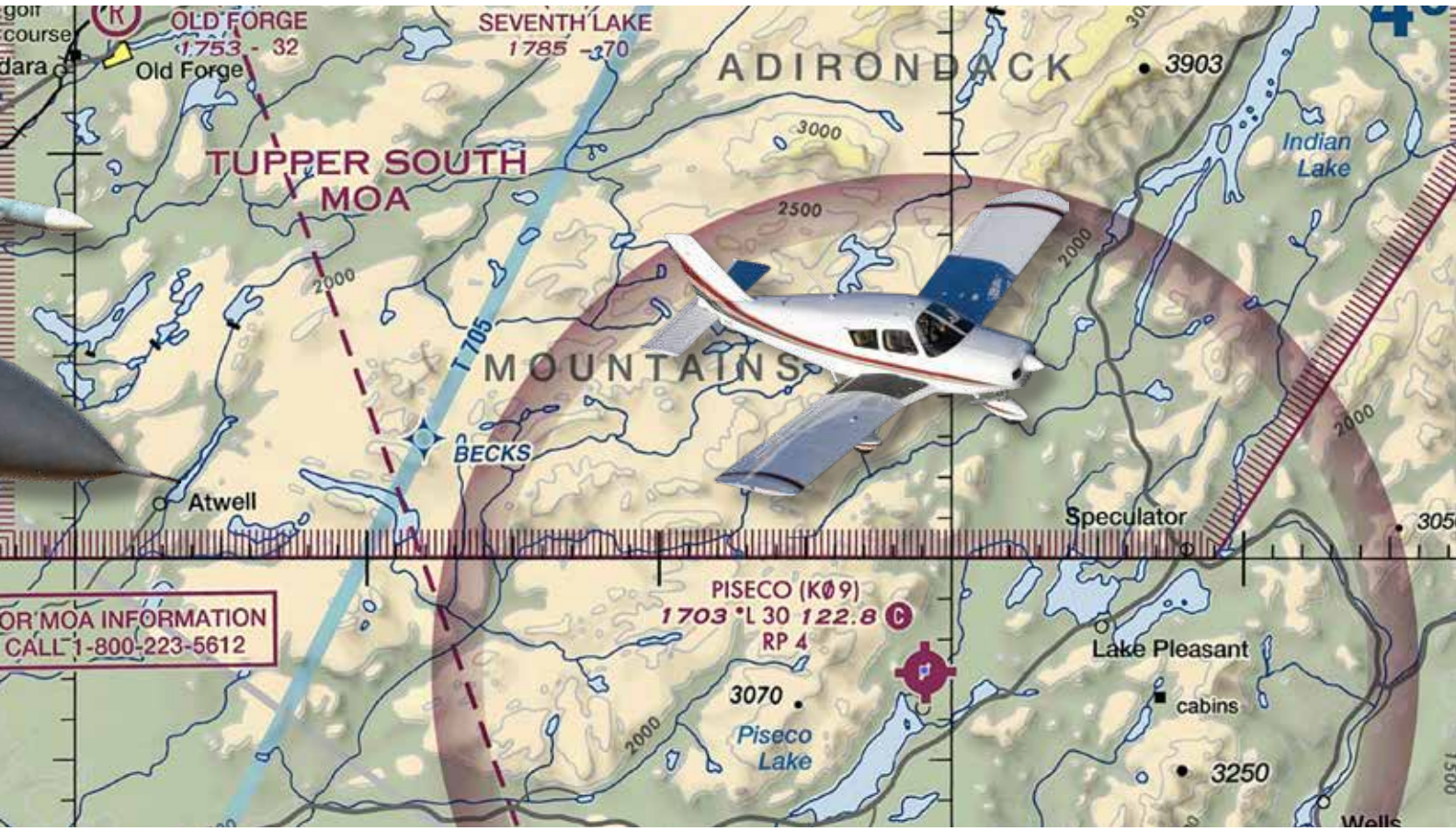
Special Use Airspace (SUA)

The FAA website addressing SUA says, "SUA areas are depicted on aeronautical charts, except for controlled firing areas (CFA), temporary military operations areas, and temporary restricted areas."

Note the word "temporary" in front of military operating areas above. All of us are (or should be) familiar with military operating areas (MOAs), which are shown on sectional charts; special temporary MOAs are not charted.

Types of SUAs include Prohibited Areas, Restricted Areas, Warning Areas, Military Operating Areas (MOAs), Alert Areas, Controlled Firing Areas (CFA), and National Security Areas. As mentioned above, all except Controlled Firing Areas,

AIRSPACE



Temporary Military Operating Areas, and Temporary Restricted Areas, also known as Temporary Flight Restrictions (TFRs), are charted.

A map of SUAs is available on the FAA's SUA website, sua.faa.gov. The website also contains FAA Order JO 7400.10, which provides "a listing of all regulatory and non-regulatory special use airspace areas, as well as issued but not yet implemented amendments to those areas established by the Federal Aviation Administration (FAA)."

Let's now talk about a few of the most important types of Special Use Airspace.

Restricted Areas and MOAs

The limits of Restricted Areas and MOAs are charted. Some pilots think that Restricted Areas must always be avoided; that's not true. There are altitude ceilings, so sometimes it's possible to fly over the top of the airspace. The active usage days and times are available on the back of sectional charts in blue text in the Special Use Airspace listings and also via electronic flight bag (EFB) products running on portable tablets.

Restricted Areas and MOAs that are not active are termed "cold." The status of both types of airspace is easy to obtain by calling the controlling agency. Airplanes on flight plans and those on Flight Following can simply ask their current controller if the airspace is "hot" or "cold." *(Remember that VFR advisory services are not always available. Pilots can ask ATC about the status of SUAs, including Restricted Areas and MOAs, but this should not be a substitute for appropriate preflight planning. —Ed.)*

Temporary Flight Restrictions (TFRs)

A TFR defines an area restricted to air travel due to a hazardous condition, a special event, or a general warning for the entire FAA airspace. The text of the actual TFR contains the fine points of the restriction.

The most common types of TFRs in the Western States are space operations, VIP flights, firefighting aircraft, aerial exhibitions such as airshows, and outdoor sporting events. A few large amusement parks, such as Disneyland Park in California and Walt Disney World Resort in Florida, have their own "temporary" flight restrictions (which have been around since shortly after 9/11).

Most TFRs are planned and published many days (and sometimes weeks) in advance. Look on the FAA's TFR website (listed in Resources) for this list.

According to Lowdon, VIP TFRs will be published by the FAA 48 hours before the start time and date. However, when the POTUS (President of the United States) is traveling, these TFRs can change quickly

owing to itinerary changes. It is incumbent upon GA flyers to keep up to date on these last-minute changes that could impact your flying plans.

Presidential VIP TFRs normally extend from the surface to 17,999 feet msl with a 30 nm radius of POTUS' ground location.

VIP TFRs and Security Airspace

Security Airspace typically is a protected circle surrounding a high-security airport or destination. These TFRs usually have two rings; one with a 30 nm radius, and the other with a 10 nm radius.

Here are the typical rules *(always read the text of a TFR's NOTAM carefully to ensure compliance with specific TFR requirements. —Ed.)*:

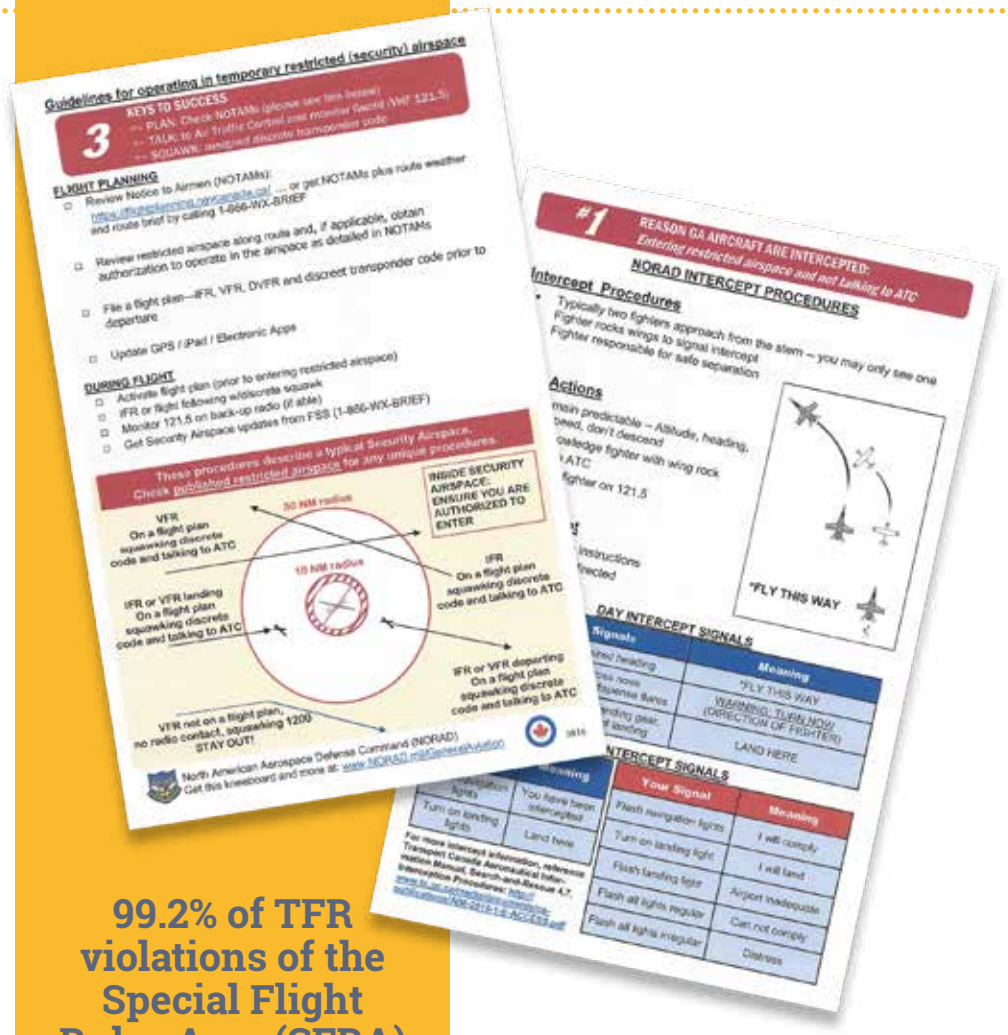
- If you're a VFR flight squawking 1200, stay out of all of the airspace within the 30 nm radius.
- Aircraft are free to transit the 30 nm radius airspace or land and take off at an airport within the 30nm radius (but outside the 10nm ring) if they are on an IFR or VFR flight plan, squawking a discrete code, and talking to ATC.
- Finally, no operations are permitted inside the 10 nm inner ring.

Seems pretty simple. And it is. NORAD provides a kneeboard "cheat sheet" that pilots can download (see Resources). An additional note: you can always verify that you are authorized to enter the security airspace by asking ATC.

The key takeaway for pilots is that you can fly through parts of this type of TFR, but you just have to do a little extra mission planning to ensure compliance with the TFR's requirements. NORAD needs to know who is in the TFR; if they don't know who you are (i.e., they see a 1200 squawk code), then they will send in fighter aircraft to determine what the aircraft is and their intentions.

Washington D.C. SFRA

The Washington DC area has its own Special Flight Rules Area (SFRA). Prior to operating VFR within 60 nm of the DCA VOR, pilots must complete a regulatory awareness course. There are increasing sets of operating requirements based on the distance of the operation from the DCA VOR. The SFRA begins at 30 nm from DCA VOR, and VFR flights within this circle require several steps, with the specifics dependent on the type of operation, origin, and destination. An innermost Flight Restricted Zone (FRZ) around the core of Washington D.C. prohibits most VFR flights. See the online course linked in Resources for more information.



99.2% of TFR violations of the Special Flight Rules Area (SFRA) around Washington D.C. are by General Aviation (GA) pilots.

EFBs

One of the best ways to keep abreast of TFRs along your route of flight is through the use of a software program known as an Electronic Flight Bag (EFB) displayed on a portable tablet or a multifunction display (MFD) installed in the panel.

FlyQ, the EFB I use, displays all active TFRs as red circles and sporting events in orange circles. When I touch the circle, the information displayed enables me to take steps to avoid it. The type of TFR, date and time of the TFR, and its dimensions (i.e., surface to 3,000 feet agl) are provided.

Rerouted due to a TFR

On July 22, 2022, I launched in the World Cruiser (my 1960 Piper PA-24-180 Comanche 180) on what I planned as a GPS direct flight from my home airport in Paso Robles, California (KPRB), to Evanston, Wyoming (KEVW). According to the info at Windy.com and AviationWeather.gov, the winds at 12,000 feet were calm, so I felt comfortable with my plan to fly over the southern Sierras in California and continue directly to my landing after I had passed the Rockies during the 561 nm leg.

As soon as I checked in with ATC for flight following, I was given a reroute due to a TFR on my planned flight path. It didn't take much to comply, just a slight heading change. Because I had made good

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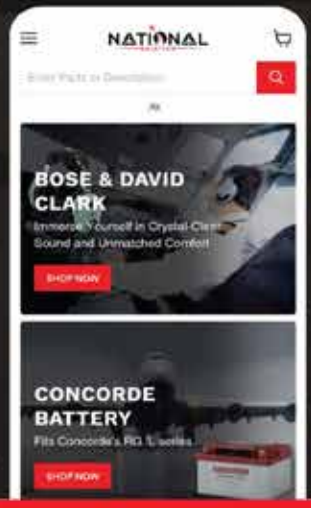

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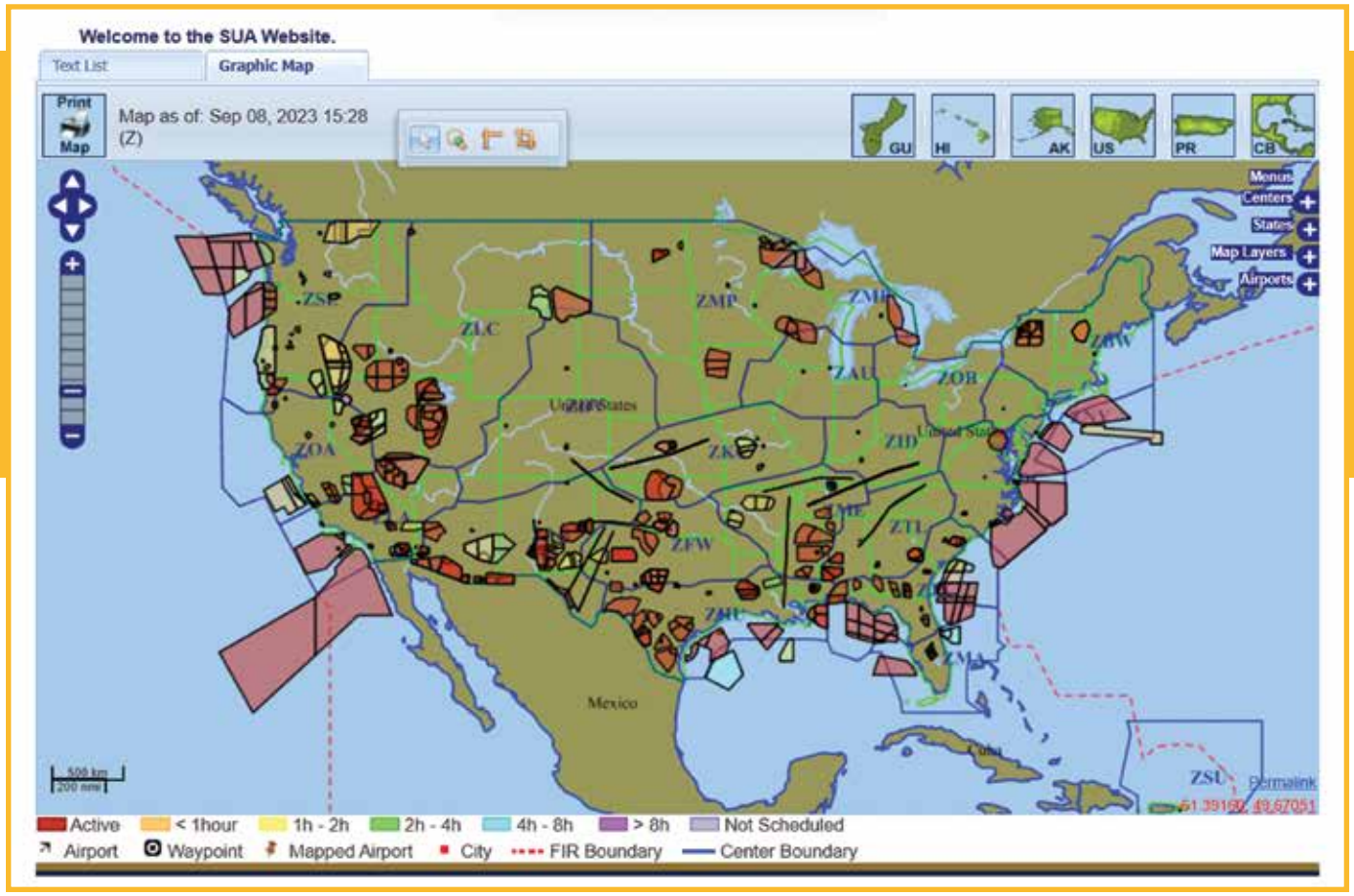


time and was still fat on fuel, I later used my EFB to obtain a NOTAM for the Fort Bridger, Wyoming airport (KBFR). It said that there was no fuel at the airport, so I landed at Evanston.

That day, because I had updated my EFB with current information before the flight, it was able to deliver timely information during the flight. Because I got flight following services from ATC, they helped me avoid a TFR and provided vital airport information that enabled me to make an informed inflight decision.

Three basic rules: "Plan, Talk, and Squawk"

Major Lowdon told us that the best way to avoid an airspace violation is to "Plan, Talk, and Squawk."

Plan means to check the Notices to Air Missions (NOTAMs) along the planned route prior to takeoff, and update this information during flight.

Talk means talk to ATC, and monitor the frequency 121.5 Mhz, also known as "Guard," on a second channel or radio.

Squawk means to obtain a discrete transponder code from ATC. Each discrete code allows ATC to be aware of the aircraft type, registration number, equipment, and aircraft speed/route of flight.

Intercepted! What do I do?

Since Piper Flyer members abide by all flying regulations, and pre-plan and preflight to the nth degree, in theory, none of us will ever have an intercept story to tell. But if we did, it would go something like this:

"I looked out the left side of my airplane one day, only to see an F-16. The pilot of the F-16 rocked his wings." That wing rock means "you've been intercepted"—and the fighter pilot needs you to acknowledge that fact.

Since you've read this article and have downloaded the kneeboard-sized two-page document "Tips for Temporary Flight Restrictions and Special Use Airspace" linked in Resources, you know you should rock your wings in acknowledgment, talk to ATC if you're in contact, or tune a com radio to 121.5 MHz for verbal communication.

The fighter will then make a slow turn to the heading you're expected to fly. Follow the turn and then follow the fighter. This "dance" is preparatory to landing. The fighter will circle the landing airport, lower its landing gear, and overfly the runway in the direction you're to land.

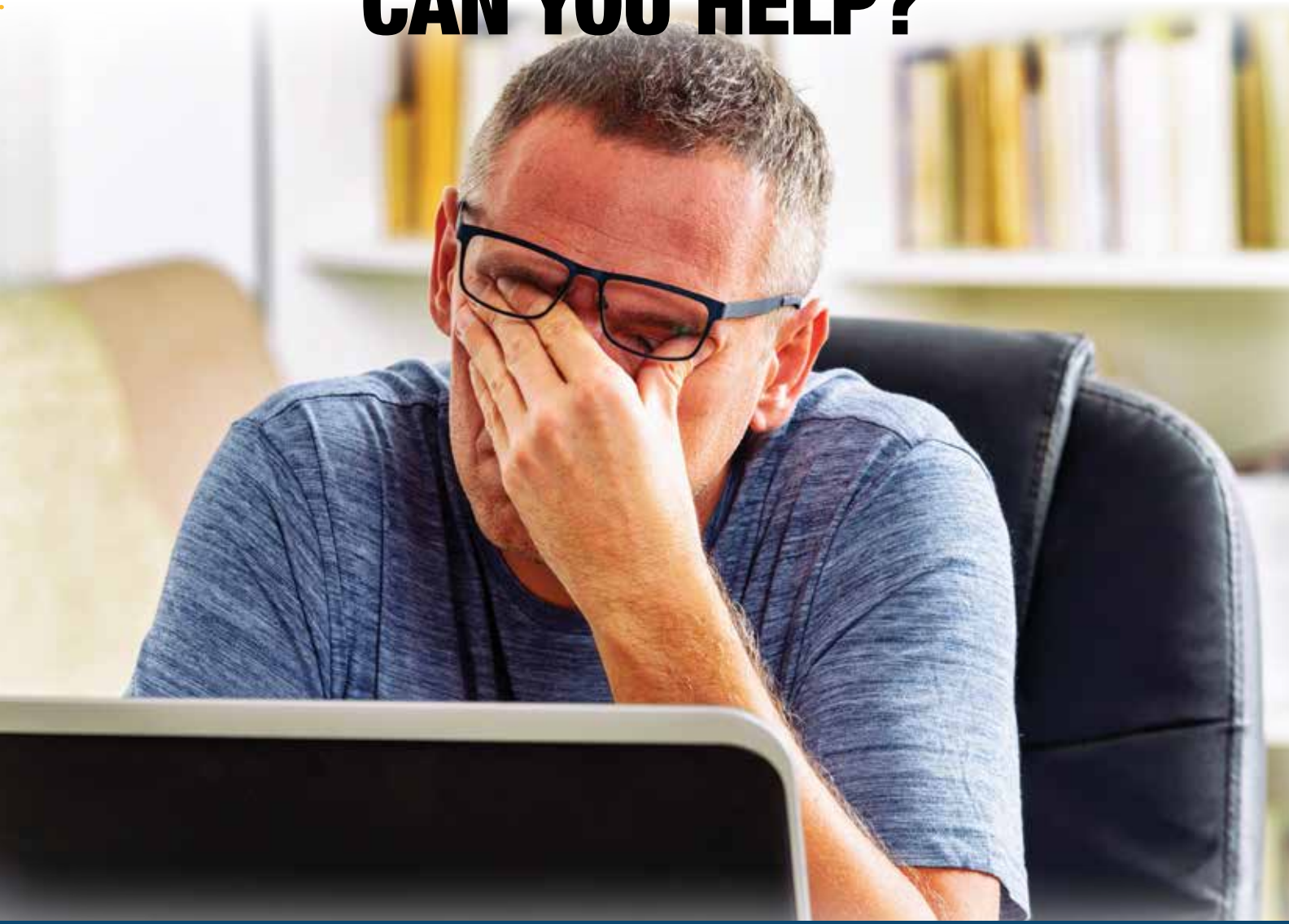
You land and get your hand slapped. You learn your lesson.

What if you don't acknowledge the fighter after repeated attempts to get your attention?

The next maneuver by the fighter will be called a "Head Butt," in which it will cut across your flight path and, in some cases, release flares in a more vigorous attempt to get your attention. This maneuver should be construed as meaning "Turn *now*, or else."

Again, rock your wings to acknowledge that the message has been understood, and if able, contact ATC or tune a com radio to 121.5 MHz for voice communications.

CAN YOU HELP?



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TFR List | TFR Map | Map Airports | TFR Help | NOTAM SEARCH | SUA

NOTAM

Number :	FDC 3/4286 Download shapefiles
Issue Date :	August 31, 2023 at 1749 UTC
Location :	10NM W SUTHERLIN, Oregon
Beginning Date and Time :	August 31, 2023 at 1800 UTC
Ending Date and Time :	September 30, 2023 at 0400 UTC
Reason for NOTAM :	TO PROVIDE A SAFE ENVIRONMENT FOR FIRE FIGHTING ACFT OPS
Type :	Hazards
Replaced NOTAM(s) :	N/A

Jump To: Affected Areas
Operating Restrictions and Requirements
Other Information

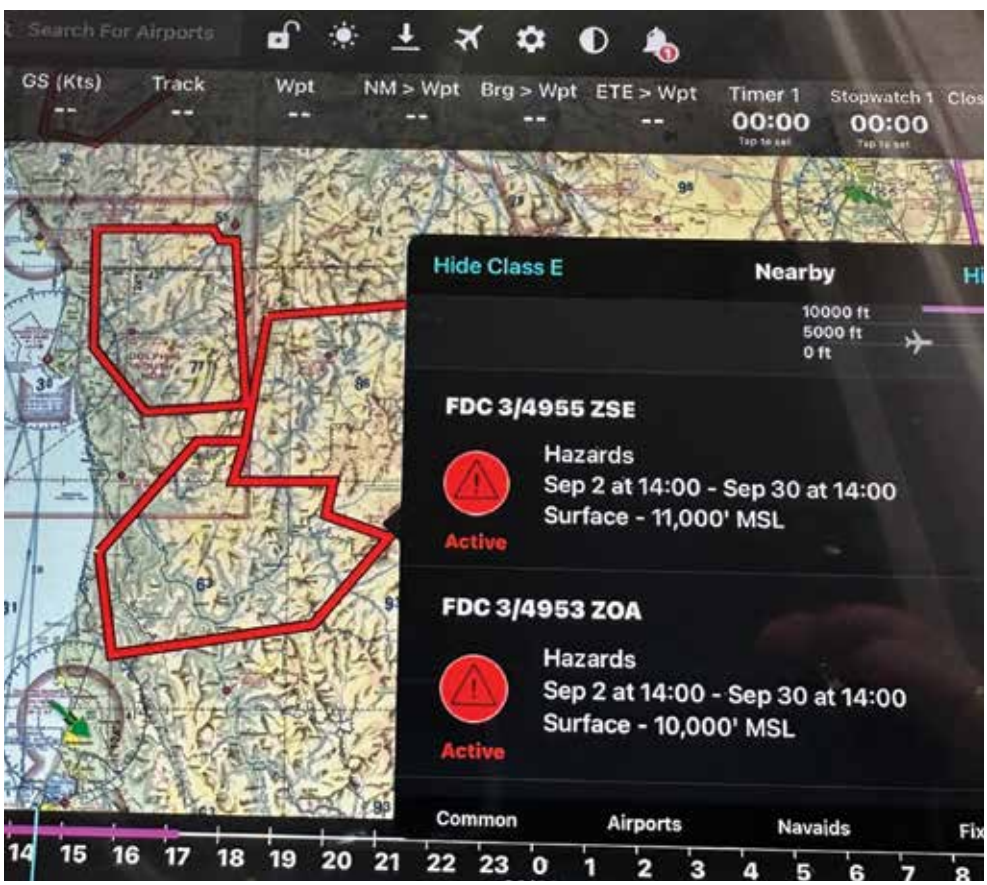
Click for Sectional
NOTAM Text

Affected Area(s) Top

Airspace Definition:
Region bounded by:

	Latitude:	Longitude:	FRD:
From:	43°26'00"N	123°41'00"W	RBG296020.9
To:	43°27'30"N	123°27'00"W	RBG325017.1
To:	43°17'15"N	123°27'00"W	RBG306007.6
To:	43°17'15"N	123°41'00"W	RBG273015.8

Altitude: From the surface up to and including 7000 feet MSL
Effective Date(s):
From August 31, 2023 at 1800 UTC
To September 30, 2023 at 0400 UTC



Then, follow the fighter until it signals (in the method outlined above) where you're expected to land.

Night interception procedures use navigation lights and landing lights as communication signals. If the fighter flashes its nav lights, it means "You've been intercepted." Flashing your nav lights signals that "I'll comply." When the fighter turns on its landing lights, it means "land here." When you turn on your landing lights, it means "I will land."

If the airport is inadequate, flash your landing lights. If you can't comply, flash all lights in a regular cadence. If you're in distress, flash all lights in an irregular cadence.

Thorough preflight planning and inflight communication with ATC will help you avoid ever having to put these intercept procedures into practice. However, if you ever have to use them, a knowledge of proper intercept procedures will keep a bad day from becoming much worse.

Knowing and complying with three basic rules should be enough to prevent an interception during all GA flights... Plan, Talk, and Squawk.

Steve Ells *is contributing editor and tech rep for Piper Flyer Association. He has been an A&P/IA for 45-plus years. He is a commercial pilot with instrument and multi-engine ratings and loves utility and bush-style airplanes and operations. He's a former associate editor for* AOPA Pilot. *He owns Ells Aviation and lives in Templeton, California. Send questions and comments to editor@piperflyer.com.*

RESOURCES

DC SFRA COURSE
faasafety.gov/gslac/ALC/courseLanding.aspx?cID=405

FAA SUA WEBSITE
sua.faa.gov

FAA TFR WEBSITE
tfr.faa.gov/tfr2/list.html

NORAD RESOURCES FOR GENERAL AVIATION
https://www.norad.mil/General-Aviation/

"TIPS FOR TEMPORARY FLIGHT RESTRICTIONS (TFR) AND SPECIAL USE AIRSPACE"
tinyurl.com/SUAKneeboard

CARL STEINHOFF

RECIPIENT OF THE **WRIGHT BROTHERS MASTER PILOT** AWARD

Piper Flyer Association member Carl Steinhoff is 87 years old. He took his first airplane ride in April 1967 at the Long Island MacArthur Airport (KISP, Ronkonkoma/Islip, New York) in a Cessna 150. Today, 56 years after his first takeoff, he has over 2,000 hours aloft.

Steinhoff is a recent recipient of the Wright Brothers Master Pilot Award given to U.S. pilots who have been flying for more than 50 years (and have had no certificate revocations). I interviewed Steinhoff, a healthy-looking soul with bright eyes and good color that belies his age, at The Gathering at Waupaca.

BY STEVE ELLS

Steve: You just received the Wright Brothers Master Pilot award. What does that mean?

Carl: It's for 50 years of safe flying.

S: Do you feel like a Master Pilot?

C: Well, you know Napoleon, when choosing generals, had two questions of his staff. The first was, "I know the guy is good, but is he lucky?" I don't know how much goodness had to do with my award, but I was awfully lucky over the past 50 years.

S: Tell me why you feel that way.

C: Every time you fly, you have to be aware that we don't live in a perfect world with perfect machinery, and there have been times when I was up there wishing I was down here!

S: Can you tell me about one example?

C: I was pretty active with the Civil Air Patrol when I moved to Las Vegas, and one night we were flying to an airfield that was going to be the base for an exercise. We wanted to get there early, so we were somewhere over the Sierra [mountains] at about 6 o'clock. It was dark, and someone said "I smell smoke." So, we shut everything off; the person next to me had a flashlight. We turned the master switch back on, started turning things on, and found it was a rheostat for the post lights. It certainly got our attention!

S: You never want to smell smoke in an airplane! Anything else come to mind?

C: There was another time I took the family to Florida, and on the return trip around Atlantic City [New Jersey]—our destination was Islip MacArthur—it started to get dark in the airplane. We lost all electrical power. The magnetos kept the engine going, my son had a flashlight on the panel, and we made it back to Islip.

S: Was that an alternator problem?

C: The bracket on the alternator failed, and the belt slipped. The airframe had the old Narco Mark 12 radios, and they sucked up all the juice.

S: When did you start flying?

C: I started flying late in my career. I soloed in April… it must have been 1967. I had always talked about learning to fly, but you get married, you go to graduate school, kids come along. Finally, my wife saw me reading my *Flying* magazines, and said "I'm sick and tired of hearing about you not flying, so why don't you?!" By the time she finished that sentence, I was out the door and down at the airport.

S: Do you remember the kind of airplane you started in?

C: I started in a Cessna 150, and it was at Islip MacArthur on Long Island. Generally, my flying was just for fun, but I went through all the ratings. I got my commercial in a Piper PA-28R Arrow and later my CFI. I was a professor at NYU at the time, so I got to do consulting; I used the plane to get to various places in the New York Metro area.

S: What were you teaching at NYU?

C: I was a professor of Educational Administration. Our program prepared school administrators. I taught courses in organizational theory, which involves leadership, decision-making, and morale. I also taught courses in educational research.

S: What's the farthest you've flown an airplane?

C: New York to Nevada. After 20 years at NYU, I got tired of commuting. In 1988, I took a job at the University of Nevada, Las Vegas, so I flew the plane from New York to Las Vegas. That's the longest trip I've taken, but I've taken two trips to Oshkosh (EAA AirVenture) and have actually landed on the blue dot.

When they used private aircraft, I spent quite a bit of time flying for the Civil Air Patrol.

S: Was that rewarding?

C: It was very rewarding. You had the chance to fly real missions involving transportation of blood, and emergency services, and looking for missing airplanes.

S: Do you have any advice you would like to pass on to new pilots, or pilots in general?

C: It's the same old advice—it's a license to learn. When you think you have mastered the topic something new pops up. Stay informed—I'm 87, but I still keep my CFI renewal up to date, and while I'm not instructing regularly, I do some flight reviews to keep my hand in it.

S: During these flight reviews, is there anything you see that pilots are weak in?

C: People who have some experience tend to try to taxi to the runup area while they're doing all sort of things on the panel when they should be paying attention to the taxiing and taking their time.

People with advanced aircraft with very expensive panels should spend more time looking at the original moving map, which is called the window, rather than keeping their eyes on their panel. And they should spend more time learning how to use this very expensive equipment on the ground instead of trying to figure it out while they're flying.

S: Your comments remind me of a story I read not long ago, "Children of the Magenta Line." The term referenced kids flying these days that rely on automation so much that they can't fly the airplane...

"Stay informed—I'm 87, but I still keep my CFI renewal up to date, and while I'm not instructing regularly, I do some flight reviews to keep my hand in it."

C: Basic skills are still necessary. There have been times when I've been flying with people when the Air Force, for reasons known only to itself, has shut down the GPS system. There's a pilot sitting there cussing that it's not working. You have to look outside and keep track of where you were and where you're going.

S: That's a skill I had to learn during my early days of flight training.

C: When I flew to Oshkosh and when I came out here [to Las Vegas], I didn't have any fancy equipment. When I hit the Missouri River, I lost my radios. I didn't have an audio panel then. The plane was bare-bones then—it had a switching panel. I looked at the chart so I knew where I was. I looked down, and there was an airport. I landed. It was a Mom and Pop organization where Mom ran the airport, and Pop was the mechanic and the avionics technician.

He said, "Can I look at that for you, son?" He took it apart and said I had some dirty contacts in the switching panel. Then he asked if $50 was too much. I said "No, go ahead." Then his wife said, "There are three motels in town, and you're not staying in two of them."

S: I have a very similar experience in the airport at Dalhart, Texas (KDHT) on a cross-country. What airplane do you own now?

C: It's a Piper PA-28-180 Cherokee 180, a 1967.

S: Are you flying on BasicMed?

C: I'm flying on BasicMed. It's kind of silly but it's the way the government operates. A BasicMed exam is a more comprehensive exam than an FAA third class [medical]. Your doctor will generally sign the BasicMed during your annual physical. My physical is an EKG, a full blood panel, and a much more extensive workup. You don't get any of that with a third class medical.

S: Do you like to just go up and fly around the Las Vegas area?

C: That's it. I enjoy flying, I enjoy the airplane, and flights up through the hills and mountains. We have a group of people at the North Las Vegas airport (KVGT), and we fly out to a local airport. It used to be the $100 hamburger; now it's the $200-$300 breakfast. That same group meets every Thursday at the North Las Vegas airport for lunch. Lunch starts at about 11:15. If anyone is in the area, join us for lunch at the Tailwinds Café.

S: Do you have a name for this group?

C: Not really, but if we did it wouldn't be publishable.

S: Have you found a good mechanic for your airplane?

C: I'm very lucky; I have a very experienced mechanic who was in the military and the airlines but has extensive General Aviation experience. He has a fleet of older GA airplanes which he rehabilitates and sells. [He has] a very good team of people who help with the basics such as removing the panels.

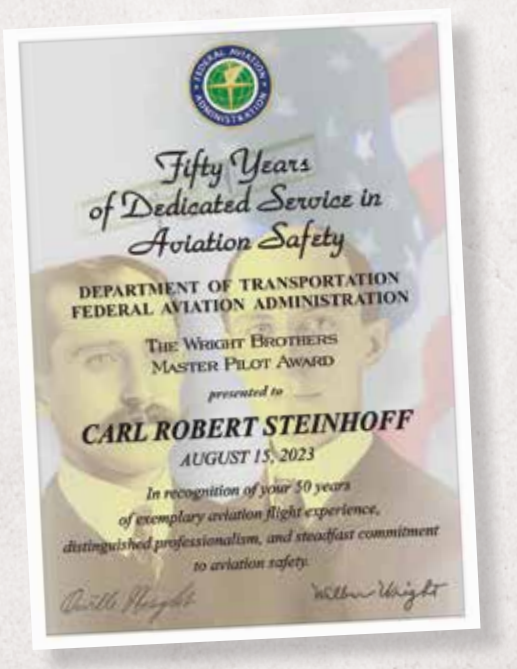
I've been very lucky with maintenance—I've had first-class people. I'm not mechanically inclined, but over the years, these mechanics would show me how to do something, then would say, "Now you tighten it!" So I developed some skills I never thought possible.

S: Any other tips for pilots?

C: You should always keep learning—it keeps you young and alive.

Later, Carl told me one more thing: "You have to be good, and you have to be lucky, but chance favors the prepared."

Steve Ells *is contributing editor and tech rep for Piper Flyer Association. He has been an A&P/IA for 45-plus years. He is a commercial pilot with instrument and multi-engine ratings and loves utility and bush-style airplanes and operations. He's a former associate editor for* AOPA Pilot. *He owns Ells Aviation and lives in Templeton, California. Send questions and comments to editor@piperflyer.com.*

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PIPER SARATOGA:

RIDING THE UPS AND DOWNS OF THE GENERAL AVIATION INDUSTRY

A look at Piper's PA-32R-301 Saratoga from its introduction in 1979 through the model's development during troubled times.

By PFA Staff • Photos by Keith Wilson

Saratoga

In today's General Aviation market climate, when manufacturers are hard-pressed to keep even a couple of models rolling off the production lines, it's hard to imagine the days when a new Piper model or variation was released nearly every year.

In the 1970s, for example, Piper released several variations of its popular PA-28 Cherokee line. Those models included the Flite Liner, Challenger, Cruiser, Warrior, Archer, Pathfinder, Lance, and Dakota—some with turbo versions and various horsepower options available, as well. Piper took the basic PA-28 model and sped it up, enlarged it, simplified it, stretched it, added retractable gear, and just about any other option the company thought might be needed to win over a market segment.

Perhaps only these optimistic times could bring forth the Piper PA-32-301 Saratoga. After all, Piper already had the PA-32R Lance and PA-32 Cherokee Six. But Piper hadn't met a niche it couldn't niche even further or designed a design that they couldn't further redesign. It was also a time when the sales volume could still support that business model—at least for a bit longer.

The history of the Saratoga is a complicated one. Piper developed it from both the Lance and Cherokee Six models. At first glance, it would seem that Piper had decided to consolidate its fleet, but that isn't what happened. Piper launched two Saratoga lines within months of each other, and continued to produce them side by side for most of their run.

Side by side: The Saratoga and Saratoga SP

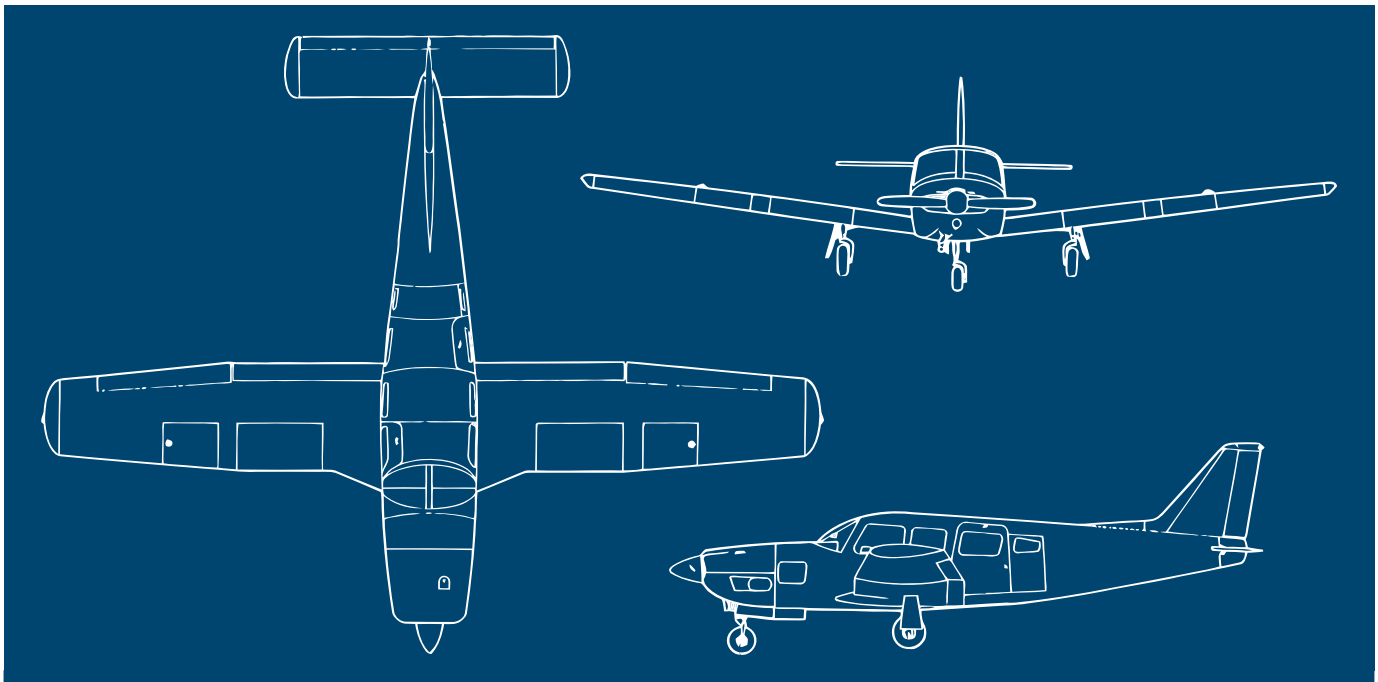
In late 1977/early 1978, Piper began working on a new model using the PA-32-300 Cherokee Six 300 as a foundation. The engineers fit it with a semi-tapered "Warrior Wing" with a four-foot increase in wingspan, and gave it a 200-pound gross weight increase. Piper flew prototypes with both a turbocharged engine (the 300 hp Lycoming TIO-540-S1AD) and a normally aspirated engine (the 300 hp Lycoming IO-540-K1G5).

The PA-32-301 Saratoga and PA-32-301T Turbo Saratoga were certified on Jan. 9, 1980, and sales began in February 1980. The base price for the Saratoga was $66,700, and the turbo version sold for $74,900. The Type Certificate Data Sheet (TCDS) mentions that this model is the "Same as Model PA-32-300 except for tapered wings, increased gross weight, and other minor changes."

In the meantime, Piper decided in 1979 to use the Saratoga name for all PA-32s. It began converting its Lance fleet from the T-tail to conventional tail aircraft, and Piper tested turbo and normally aspirated versions.

The new models were named the PA-32R-301 Saratoga SP and PA-32R-301T Turbo Saratoga SP for the turbocharged version. Certification was granted on Nov. 7, 1979, with sales following in December at prices of $80,200 for the -301 and $88,400 for the -301T. The TCDS for the PA-32R-301 states it is the "Same as Model PA-32R-300 [Cherokee Lance] except for tapered wings and other minor changes." (Note: the PA-32R-300 Cherokee Lance had a conventional tail. The PA-32RT-300 Lance II had the T-tail.)

Saratoga



Specifications

Dimensions	PA-32-301	PA-32-301T	PA-32R-301 II HP	PA-32-301T II TC
Length	27 feet, 8 inches	27 feet, 8 inches	27 feet, 10 inches	27 feet, 10 inches
Height	8 feet, 3 inches	8 feet, 3 inches	8 feet, 6 inches	8 feet, 6 inches
Wingspan	36 feet, 5 inches	36 feet, 5 inches	36 feet, 3 inches	36 feet, 3 inches
No. of Seats	6/7	6/7	6	6
Weights				
Maximum Ramp	3,615 pounds	3,617 pounds	3,615 pounds	3,615 pounds
Maximum Takeoff	3,600 pounds	3,600 pounds	3,600 pounds	3,600 pounds
Basic Empty	1,935 pounds	1,998 pounds	2,407 pounds	2,464 pounds
Baggage Capacity	200 pounds	200 pounds	200 pounds	200 pounds
Useful Load	1,680 pounds	1,619 pounds	1,208 pounds	1,151 pounds
Performance				
Maximum Cruise Speed	152 ktas	182 ktas	163 ktas	177 ktas
Takeoff Ground Roll	1,013 feet	960 feet	1,200 feet	1,200 feet
Landing Ground Roll	650 feet	732 feet	640 feet	640 feet
Service Ceiling	16,000 feet	20,000 feet	15,588 feet	20,000 feet
Stall Speed, Flaps Down	63 kcas	63 kcas	61 kcas	61 kcas
Stall Speed, Flaps Up, Rearward CG	70 kcas	70 kcas	66 kcas	66 kcas
Fuel				
Type	100LL	100LL	100LL	100LL
Total Capacity	107 gallons	107 gallons	107 gallons	107 gallons
Usable Capacity	102 gallons	102 gallons	102 gallons	102 gallons
No. of Tanks	4	4	4	4
Power				
Engine Model	Lycoming IO-540-K1G5	Lycoming TIO-540-S1AD	Lycoming IO-540-K1G5D	Lycoming TIO-540-AH1A
Horsepower	300 hp	300 hp	300 hp	300 hp
Propeller	Hartzell	Hartzell	Hartzell	Hartzell
Propeller Type	Constant-speed, two- or three-blade.	Constant-speed, two- or three-blade	Constant-speed, three-blade	Constant-speed, three-blade

To further complicate Piper's product labeling, the Saratoga SP was made available with both fixed and retractable gear.

Production of the PA-32-301T Turbo Saratoga ended in 1984, and the normally aspirated PA-32-301 was retired in 1991. The final PA-32R-301T Turbo Saratoga SP rolled off the line in April 1987, and the last PA-32R-301 Saratoga SP in 1992.

Minor changes marked the various model years of both Saratoga lines: Dyna-cushion engine mounts, new paint schemes from year to year, and new seats, to name a few. The automatic landing gear extender was removed from the SP in March 1988.

Piper's woes

The late 1980s and early 1990s were tough years for General Aviation. Cessna completely shut down its single-engine piston assembly line in 1986. Piper paused production in January 1990, but restarted limited production in March of the same year, with Cheyenne and Mirage aircraft that had been partially completed. After completing those airframes, production halted again while Piper sought a buyer, funding, or a partner.

Despite the tough times that plagued General Aviation in general and Piper specifically in 1992, Piper looked to revive the Saratoga SP with an improved version.

In July 1991, Piper filed for Chapter 11 bankruptcy. Despite a lot of interest from companies, including Pilatus, Piper could not put together a deal that the bankruptcy court would approve.

Finally, in 1995, a consortium comprised of Dimeling, Schreiber and Park, Teledyne, and Piper's creditors and shareholders purchased the assets of Piper for $95 million. On July 17, 1995, Piper emerged from bankruptcy as The New Piper Aircraft Inc.

Hope springs eternal: Saratoga II HP and Saratoga II TC

Despite the tough times that plagued General Aviation in general and Piper specifically in 1992, Piper looked to revive the Saratoga SP with an improved version.

Using an SP it leased back from a customer, Piper began testing. The model ended up with a Hartzell three-blade propeller, a 300 hp Lycoming IO-540-K1G5 engine, and a new cowl designed by Mississippi State University and NASA, which featured circular inlets. The plane, dubbed the Saratoga II HP, was certified on May 26, 1993. The price for a base model was $309,800.

In 1996, under the reorganized New Piper, the PA-32R-301 Saratoga II HP was updated with 28-volt electronics. Other changes over the years centered primarily on avionics: the Garmin GNS 430 in 1999, Garmin GNS 530 in 2001, and, in 2004,

Avidyne's FlightMax Entegra integrated flight deck, necessitating an amendment to the TCDS.

The development of a turbocharged version of the Saratoga SP had been delayed by the cash crisis within Piper but was restarted when Piper emerged from bankruptcy. Sporting a modified cowl with an extra bottom louver and a 300 hp turbocharged Lycoming TIO-540-AH1A engine, the PA-32R-301T Saratoga II TC was certified on July 9, 1997. Sales began in late 1997 for the 1998 model year for $398,200 with standard equipment.

The PA-32-301 Saratoga would be reborn as the short-lived 6X, but production of all PA-32 models ended in 2009.

We may never see the days return when the market could warrant producing multiple versions of a basic airframe, but what fun it must have been to be an aerospace engineer in General Aviation's heyday when the sky was literally—and figuratively—the limit.

RESOURCES

"Piper Aircraft, Freedom of Flight" by Roger Peperell. Air-Britain, 2020

TCDS No. A3SO, Rev. No. 32, Piper Aircraft Inc. for PA-32-301, PA-32-301T, PA-32R-301 (SP), PA-32R-301T and PA-32R-301 (HP); rgl.faa.gov.

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UNDERSTANDING OIL COOLERS

STEVE ELLS explains how oil coolers work and how to maintain them.

In 1976, my boss signed a contract to fly East Coast holiday travelers from Salt Lake City, Utah, to Sun Valley, Idaho, during the Christmas holidays.

It was a cold pre-dawn morning that December at Friedman Memorial Airport (KSUN, Hailey, Idaho) that serves Sun Valley. I was wrestling the preheating hoses to ready the 1,200 hp Pratt & Whitney R-1830s in our Douglas DC-3 for an early morning launch.

The roaring Herman Nelson heater pushed a blast of hot air up into the wheel well to the 25-gallon capacity oil tank, and, under the engine cover, I aimed a third tube toward the oil cooler. If oil couldn't flow through the oil cooler, no one would make their connecting flight home that morning.

The basics of an oil system

Civil Aeronautics Manual (CAM) 13, titled "Aircraft Engine Airworthiness," addresses the certification of engine oil systems. In Heading 13.112, there are four paragraphs.

Paragraph (a) states that the engine oil system shall be designed and constructed to function properly in all flight attitudes and atmospheric conditions in which the airplane is expected to operate. Paragraph (b) says that for wet sump engines—like the ones in our Pipers—the provisions of paragraph (a) must be complied with when only one-half of the maximum lubricant supply is in the engine.

Paragraph (c) says the lubrication system shall be designed and constructed to permit the installation of a means for cooling the lubricant.

Paragraph (d) says the crankcase shall be vented to the atmosphere to preclude the leakage of oil resulting from excessive pressure within the crankcase.

The one we're concerned with in this story is paragraph (c).

The latest version of this requirement is Part 23.1013, which states: "(b) Each engine must have an independent oil system that can supply it with an appropriate quantity of oil at a temperature not above that safe for continuous operation."

What is this "safe oil temperature for continuous operation?"

An aircraft oils expert told me this about oil temperatures: "As oil goes through an engine, it normally will see instantaneous temperatures about 50 F greater than the oil temperature shown on the airplane's oil temperature gauge(s). If your engine oil spends any length of time at 245 F, the oil will break down (oxidize), so this limit should not be considered acceptable for cruise conditions. For best results, I like to see cruise oil temperatures between 180 to 200 F."

The idea that the engine oil can get too hot is backed up by a quote from John Schwaner's book, "The Sky Ranch Engineering Manual." Schwaner writes, "At about 450 F, the oil begins runaway oxidation and turns to carbon."

Pilots should take steps to clean bugs and dirt off their coolers by blowing air or by aiming a water jet from the backside to the front side of the oil cooler.

Oil temperature limits

The maximum (red line) oil temperature for Continental engines is 245 to 250 F (120 C). For Lycoming engines, this limit is 240 F (118 C).

When are oil coolers needed?

The oil cooler on my DC-3 was brass; every oil cooler on your Piper airplane is made of aluminum. Coolers for Continental engines are bolted to the engine case. Coolers for Lycoming engines are not; they're remotely mounted, usually on a firewall bracket or attached to the engine cooling baffling. Lycoming installations require hoses to move the oil to and from the cooler. For example, the oil cooler on the Lycoming O-360 engine on my Piper PA-24-180 Comanche 180 is mounted behind the front engine baffle on the pilot's side of the airplane.

Oil coolers are reliable for maintaining "ideal" oil temperatures on many of today's piston-powered airplanes. Yet, some popular planes have flown for decades without oil coolers. These include the Piper Cubs and a few early Super Cubs.

Piper installed Continental's small C-series engines, the A-65, C-85, and C-90, on its early two-place tube and fabric-covered airplanes such as the J-3 Piper Cub, the J-4 series, and the J-5 Cub Cruiser. The PA-11 Cub Special and PA-18-95 Super Cub were also powered by the Continental C-90.

There were no oil coolers on those engines. There are adapter kits from Continental to bolt on a remote cooler, but those kits are hard to find these days. Fortunately, Steve's Aircraft has developed an STC-approved remote-mounted oil cooler kit for many small Continental engines, including the C-90.

In late 1945, Piper developed the three-place PA-12 Super Cruiser. It was powered by a Lycoming O-235-C1 engine. It was followed soon after by the four-place PA-14 Family Cruiser. As far as I know, the -12 and every PA tube-and-fabric single built after the -12 (with the rare exception of the PA-18-95 Super Cub) was powered by a Lycoming engine and equipped with an oil cooler.

The oil coolers on the PA-12, -14, -16, -18, -20, and -22 were supported by a welded tube brackets and were located in the cowling center line below the propeller.

The Vernatherm oil temperature control valve is located in a housing that's mounted on the accessory section of the engine. More on the Vernatherm in a moment.

Gnarly goop is a cold oil signal

Ideal cruise oil temperatures are between 180 and 200 F. It's OK for oil temps to reach 210 to 220 F during a climb on hot days. One telltale sign that the oil is not getting hot enough to "boil out" the moisture that accumulates in the oil (due to condensation and as a byproduct of combustion) is the presence of a whitish, milky appearing "goop" on the oil filler cap after a flight.

If the flight was short, the "goop" may be present simply because the oil wasn't hot enough for a long enough period, but if you see it after flying for an hour, the oil isn't getting hot enough. Most small airplane manufacturers provide what are called "winter fronts" (also called winterization kits) to reduce the airflow through coolers during cold weather operations.

These "winter fronts" are getting hard to find, so it's not uncommon for owners working with their mechanic to create a method of blanking off a portion of their oil coolers, especially during colder flying weather.

Modern engine monitors typically display numerical values, making it simple to determine how hot the oil is. Original equipment oil temperature gauges typically show the temperature indication against a green arc with no numbers—with those gauges, there's no way to know how hot the oil actually is.

Gauge calibration can be established by submerging the probe and a known-good thermometer in water while the water is being heated. Mark the face of the temperature gauge at significant temperatures (160 F, too cool; 180-190 F, just right; 210-220 F, OK during a hot weather climb, but too hot for cruise flight).

What is an oil cooler, and how do I take care of mine?

Aircraft oil coolers are heat exchangers—hot engine oil is pumped through a series of small passages in a sandwich-like cooler assembly. Parts inside the coolers slow the oil and provide a convoluted oil path through the cooler body. Modern coolers have proven effective as the interior oil passages are exposed to cooling ram air. The coolers for our airplanes are built to withstand 150 psi of fluid pressure.

Pilots should take steps to clean bugs and dirt off their coolers by blowing air or aiming a water jet from the rear to the front of the oil cooler. Soapy water is also a good cleaner. The small fins should stick straight out from the cooler, oriented parallel to the path of ram air through the cooler. If any of the fins are bent, it is possible to move the fins back into alignment using a small pair of needle-nosed pliers.

Coolers should be thoroughly cleaned when the engine is overhauled or rebuilt. Some maintenance manuals suggest running Stoddard solvent or other cleaning fluids through the cooler for a few hours. Still, the best method is to send the cooler to Pacific Cooler Service, one of the best-known and most experienced cooler service centers, or one of the other cooler service centers in the country for inspection, testing, and cleaning.

A representative of Pacific Oil Cooler Service told me its ultrasound-based cleaning process typically removes enough debris from oil coolers to fill "about the size of half of a Chapstick tube."

If your engine is being rebuilt by a field overhauler, make sure to ask how the cooler will be cleaned.

Types of oil coolers

There are two types of oil coolers. The first, and the one that is standard equipment on most small airplanes, is most often simply called "the oil cooler." Technically, it's a congealing oil cooler.

The second type, nowhere near as common, is a non-congealing cooler. It's most often installed in cold climates. Following engine start, a non-congealing cooler routes cold oil through a bypass passage built into the cooler, returning the cold oil to the engine to warm it. Even when the not-yet-to-temperature oil goes through the bypass passage, it provides some warmth to the oil already in the cooler (preventing it from congealing), hence the non-congealing name. See the McFarlane link in Resources for photos of both types on Lycoming-powered airplanes.

As the oil temperature increases to 150 F, the thermostatic oil cooler control valve (also known as the Vernatherm) begins to lengthen, rerouting the oil to the already warmed oil cooler passages.

Non-congealing oil coolers can be identified by a ¾-inch thick base plate with a Vernatherm screwed into the baseplate.

Since the congealing style coolers do not have the preheating bypass feature of the non-congealing coolers, preheating them before starting the engine is critical whenever engines and coolers are cold-soaked.

Lycoming engine manuals recommend preheating when the engine/cooler combo is cold-soaked at temperatures lower than 10 F—except for the -76 series engines, such as the O-320 H series and O/IO-360-E series, which need preheat at 20 F. Continental's low-temperature preheat recommendation is 20 F.

Most pilots with preheating equipment available start preheating their

planes whenever outside air temperatures are around 30 to 40 F, erring on the side of caution.

No one has to run out to buy a huge trailer-mounted Herman Nelson preheater for their Piper; today there are many small and convenient engine preheaters available for Piper flyers. You can buy cellphone-operated on-off switches that can turn preheaters on from afar before you arrive at the hangar for a cold-day launch.

Vernatherm valves

There's scant information on how a Vernatherm oil temperature controller works in any of the Piper Owner's Handbooks or Pilot's Operating Handbooks. But there are a few rules of thumb that need to be recognized.

Lycoming and Continental engines control oil temperature with an "automatic thermostatic temperature control valve." Nobody calls it that; it's called a Vernatherm, named after the company that makes them.

Vernatherms change length with a difference in oil temperature. Below around 150 F, the sealing cone is retracted from its seat. When installed in a "normal" congealing oil cooler, the Vernatherm isn't against the seat, so oil bypasses the cooler and continues circulating as the engine warms up.

As the oil warms, the overall length of the Vernatherm increases, eventually closing off the bypass path, which sends the warm oil through the oil cooler. At around 185 F, the cone of the Vernatherm is fully seated, and all of the oil routes through the cooler.

The Vernatherm in the non-congealing cooler extends to shut off the internal bypass passage in the cooler, which reroutes the oil through the cooling section of the cooler. The difference here is that the oil passes through part of the cooler even when the Vernatherm is closed rather than bypassing the cooler entirely.

Another feature of the Vernatherm valve is a spring that assists the temperature bulb in seating the valve end.

Vernatherm projecting forward from the base of the oil cooler. If you look closely, you'll see 77 C (the opening temperature) etched on the base.

Some wear is evident on this Vernatherm.

A standard Vernatherm with cone and spring visible.

This spring has one other essential job. In the event of an oil-pressure spike—a high-pressure surge—this spring will be compressed, unseating the cone so the high-pressure oil can bypass the cooler.

The most common cause of oil pressure spikes is the rapid application of power during the initial stage of the take-off roll. Please do not "goose" your throttle.

Preheating the oil cooler

If the cooler hasn't been sufficiently preheated, the Vernatherm valve and seat may be damaged by the following chain of events:

After a few minutes of operation, the Vernatherm valve senses warm oil temperatures and extends to contact the seat. This routes the warm engine oil through the cooler. If the cooler hasn't been preheated, this warm oil will run into very thick cold oil in the cooler. If it's really cold, the oil in the cooler may even be congealed (solid).

When the warm oil bumps up against the congealed oil, a pressure spike occurs, and the spring pressure that seats the valve of the Vernatherm will be overcome, opening the bypass path. This rapid opening immediately lowers the oil pressure, and the valve then slams shut against the seat. This rapid varying of the oil pressure at the cooler will cause the valve to hammer against the seat, and can also cause damage to the oil cooler. In some extreme cases, the cooler will burst.

Lesson: Always preheat both your engine and your oil cooler.

Take care of your oil cooler

Oil coolers don't require much attention during normal flight operations if they are properly preheated during cold temperatures. Pilots can have them cleaned and bent fins straightened, but that's about it. One trick for finding leaks is thoroughly cleaning the cooler before applying a spray coating of dye penetrant developer—a spray-on white powder-looking coating. You can purchase a can of developer at your local hardware store or welding shop. Some seem to have success using Dr. Scholls athlete's foot spray (I haven't tried it, but I will if need be).

Once it dries, fly a circuit around the airport and look for the leak after landing—it will be obvious against the white coating.

A second leak detection method involves a black light—modern engine oils look fluorescent green under that light.

Oil coolers rarely fail to the point that the engine's airworthiness is compromised; more often, a cooler failure is due to a crack. Sometimes, this crack is from an improper installation that causes bent or distorted mounting flanges, especially on coolers installed on Lycoming engines.

Oil coolers don't require much attention, but they provide a vital service related to the airworthiness of your engine.

IMPORTANT: This article describes work that may need to be performed/supervised by a certificated aviation maintenance technician. Know your FAR/AIM and check with your mechanic before starting any work.

Steve Ells *is contributing editor and tech rep for Piper Flyer Association. He has been an A&P/IA for 45-plus years. He is a commercial pilot with instrument and multi-engine ratings and loves utility and bush-style airplanes and operations. He's a former associate editor for* AOPA Pilot. *He owns Ells Aviation and lives in Templeton, California. Send questions and comments to editor@piperflyer.com.*

RESOURCES

PFA SUPPORTERS

MCFARLANE AVIATION
"How to Identify Continental Oil Coolers"
mcfarlaneaviation.com/articles/how-to-identify-continental-engine-oil-coolers

PACIFIC OIL COOLER SERVICE INC.
oilcoolers.com

OTHER

STEVE'S AIRCRAFT (STC'D CONTINENTAL OIL COOLERS)
stevesaircraft.com

DESTINATI

EAA Photo/Andrew Zaback

THE GATHERING AT WAUPACA

EAA AIRVENTURE OSHKOSH 2023

WISCONSIN WRAP-UP

STEVE ELLS provides an update from The Gathering at Waupaca and EAA AirVenture Oshkosh 2023.

I have always looked forward to mid-July and the 26 flight hours to AirVenture and back from my home airport in Paso Robles (KPRB), California, to Waupaca (KPCZ), Wisconsin, in my Piper PA-24-180 Comanche "World Cruiser."

In 2023, I rode in the back of a couple of airliners due to a minor health issue. Next year, I plan to fly my airplane to Waupaca again.

The Gathering at Waupaca

Here's how The Gathering worked this year. Fly to Waupaca Municipal Airport. Land, take on affordable fuel, tie down, and secure the plane. Ground transportation was available for the 10-minute trip to the Par 4 resort and golf course in town. Saturday evening, we start getting together at our annual meet-and-greet.

Each year, we gather around with old friends and welcome new friends to share stories about flying, airplane buys or sells, and some personal and family news since we've been together every year for a while now. It's good (airplane) family time.

Michael Leighton, a longtime contributor to *Piper Flyer* magazine and owner of flymkleighton.com, and his son Hudson showed up again this year. Hudson was a few weeks away from starting college, and I—and probably everyone else who had seen him at last year's Gathering—was surprised at how much taller he had grown since last year. I wasn't alone in wishing Hudson a great time in the big college world.

Sunday was our big day at The Gathering. Breakfast, lunch, and a nice dinner bookended presentations by industry experts throughout the day.

Bill Ross of Superior Air Parts returned, this time for a talk on "How to Save Money on Engine Maintenance." Major Cameron "Divot" Lowdon, RCAF, from the National Oceanic and Atmospheric Administration (NOAA), gave an informative talk on what happens when a GA pilot busts a TFR, and made suggestions on how to stay out of TFRs. *Piper Flyer* contributor Tom Machum provided information on "Threat/Error Management For General Aviation," and Mike Jesch, whom I flew with to AirVenture and back six years ago, delivered what he called a "ForeFlight Free-For-All" on the ForeFlight Mobile Electronic Flight Bag (EFB).

Following Sunday's dinner, Jen and Kent Dellenbusch handed out door prizes.

The bus to AirVenture

One of the best benefits of signing up for The Gathering is the bus. Each Monday and Tuesday, two buses depart the Par 4 Resort at 7:30 a.m. to take Gathering members to the EAA AirVenture Oshkosh grounds. Since some members leave early in the week, only one bus runs on Wednesday. In the evening, the bus(es) turns around and returns to the Resort.

This eliminates the need to rent a car, drive it back and forth the 35 miles to AirVenture, pay for parking, and struggle to find where you parked your car in the vast parking lots at the end of the day. You also get parked right next to the main gate.

The buses typically stay on the grounds during the day so you can drop off your purchases instead of carrying them around all day, and the air conditioning is left running, so there's always a cool-down/sit-down spot available. The Gathering is like getting a real toy in your Cracker Jack box.

A huge crowd

As I walked the grounds of AirVenture 2023 seeking improvements and new

Gathering attendees Debbie Collins, Sal Staiano, and Tonya McDonald with the bus at AirVenture.

Left to right; Hudson Shytles, Michael Leighton, Steve Ells, Kevin Garrison, Jennifer Dellenbusch, Sal Staiano, and Troy Whistman.

products that could spark interest and add safety and value for Piper Flyers, it seemed that there were more people than I'd ever seen there before.

The after-show wrap-up confirmed my observations; over 677,000 individuals walked through the front gate at AirVenture during its 70th anniversary year.

One of the most significant changes I've noticed over the last two years has been the rapidly increasing number of women at AirVenture. The secret is out—aviation is fun and has enough width and breadth to fulfill a lifetime of interest for any person who is bitten by the aero bug. And it can lead to a rewarding career.

One of the drawbacks for me this year was the high temperatures and humidity. I'm very used to high temperatures, but the high humidity pulled power out of my internal powerhouse daily. I walked slowly, carried little, and hydrated often. I hoped to lessen the miles I walked by catching one of the trams transporting attendees to distant corners of the grounds all day, but there weren't enough trams to handle the crowds. The end result was laying down 16,000 steps (about 8 miles) on both of my busy days.

AirVenture presents a vast range of activities. These range from all-day-long ultralight airplane flights from the ultralight airstrip on the grounds, afternoon airshows, and warbirds of most every era in size and shape in their special parking area. Forums and workshops cover everything from "Flying Around the World" to "Fabric Covering 101," to "Side-by-Side Aerobatics," to "The Fly Girls Revolt."

The list goes on and on. On Thursday alone, there were over 225 presentations. I'll lay down greenback dollars that nowhere else on this planet provides as much aviation-related information, participatory

EAA Photo/Chris Miller

Hundreds of women aviators gather on July 26, 2023, in front of the Boeing Dreamlifter for the annual WomenVenture group photo.

hands-on workshops, and good old airplane talk as AirVenture during the third week of July at KOSH.

During "The Big Airshow," EAA provides many housing options for visitors. There's the option to pitch a tent and camp next to your airplane, the opportunity to reserve a parking spot with water and electrical service for visitors with trailers or motor homes, and yet another option is to hire a local company to set up and equip a travel trailer on the grounds for you (and they take it all down at the end of the show). Many Oshkosh residents also rent their homes during the week.

I stayed in one of the University of Wisconsin-Oshkosh dorm rooms a couple of years ago. It worked out very well since the cafeteria provided great food, and for $5, I stepped aboard a shuttle bus for a one-way ride to and from the main gate.

If you discover your airplane has contracted a case of hiccups while on the grounds, EAA provides a service it calls "Emergency Aircraft Repair," as well as activities such as different religious services for various denominations and A.A. meetings each day.

I spent some money this year on "airplane stuff I couldn't do without." One impulse buy created a problem since I couldn't cram another item into my suitcase. No problem, I took it to the UPS facility set up on the grounds between Buildings A and C and had it shipped from AirVenture to my home.

Unleaded Avgas

In years past, while writing for the Aircraft Owners and Pilots Association's (AOPA) Pilot magazine, I and others on staff wrote about the industry's need for an unleaded 100-octane Avgas. Today, 20 years later, FAA-approved unleaded 100-octane Avgas is available from General Aviation Modifications Inc. (GAMI). GAMI is based in Ada, Oklahoma.

The fuel, G100UL, is approved for use in the fixed-wing fleet under the Supplemental Type Certificate (STC) approval process. This fuel, an approved no-lead solution, has not yet been actively produced or distributed due to what I perceive to be pushback from the other players in what is a lucrative market—and some regulatory obstacles. There's a bill pending in Congress to amend current regulations.

The Dellenbusches—Joe, Jennifer, and Kent staff the booth at AirVenture.

For more insight on the unleaded 100-octane Avgas situation, I recommend a look at a recent interview by Paul Bertorelli of AvWeb: "Rep. Jay Obernolte on Fielding Unleaded Fuels."

Today, General Aviation Modifications Inc. (GAMI) has the only unleaded 100-octane Avgas with FAA approval (Swift's offering is 94 octane). GAMI's approval applies to every spark-ignition engine and airframe (no helicopters yet) in the fleet as of September 2022 through the Supplemental Type Certificate (STC) process. The STC process has been used for decades to approve other fuels, such as the use of unleaded auto fuel in a wide range of GA airplanes.

GAMI did not participate in the Piston Airplane Fuels Initiative (PAFI), a testing program run by the Federal Aviation Administration (FAA) from 2014 through 2018. The PAFI program wasn't able to find an unleaded 100-octane Avgas formulation that met the parameters for safe operation. For more on this subject, please go to the Frequently Asked Questions (FAQ) tab on the G100UL website.

Today, three companies produce unleaded Avgas formulations:

Swift Industries in Lafayette, Indiana, has an FAA-approved 94-octane unleaded fuel, UL94 Avgas. I ran a tank of it through my Comanche with a Lycoming O-360 engine and couldn't detect any change in EGT or CHT temperatures as I switched back and forth between the tank with Swift UL94 and traditional blue 100LL Avgas.

Swift's fuel was available at AirVenture 2023 at the ultralight airstrip. Swift promises that its unleaded 100-octane Avgas is deep in development. The Swift unleaded UL94 fuel is being pumped at a few airports around the country today, and providers that wish to pump this fuel—which can be safely used in around 70% of the light aircraft flying today—should contact Swift.

The third company is Hjelmco Oil in Sweden. Hjelmco has been producing its unleaded 91/96 octane Avgas, called Avgas 91/96UL, since 1981, and Lycoming, Continental, and Cessna have approved its use. As far as I know, Hjelmco 91/96UL has no presence in North America.

The Eliminate Aviation Gasoline Lead Emissions (EAGLE) initiative

The EAGLE initiative website says, "The EAGLE initiative is a comprehensive public-private partnership

The EBBS backup battery and panel control head for Electroair's Electrronic Ignition System (EIS).

Superior Aircraft Components' Electro Luminescent Super Thin (ELST) EL panel.

consisting of aviation and petroleum industry and U.S. government stakeholders, working toward the transition to lead-free aviation fuels for piston-engine aircraft by the end of 2030, without compromising safety or economic health of the general aviation industry."

A statement on the EAGLE webpage says, "In February 2022, PAFI became an integral part of one of the four critical EAGLE pillars." Those pillars are: "Supply Chain Infrastructure and Deployment, Research Development and Innovation, Unleaded Fuel Evaluation and Authorization, and Regulation, Policy and Programmatic Activities."

A look at new stuff at AirVenture

DeltaHawk diesel engine

The DeltaHawk diesel aero engine has been in development and improvement since 2007. The DeltaHawk engine is a diesel fuel, two-stroke, direct drive, supercharged, and turbocharged engine rated at 180 hp. It is liquid-cooled and built to handle both pusher and tractor applications. The 180 hp version weighs 357 pounds, including exhaust, turbo, alternator, and starter.

DeltaHawk claims a 40% savings in fuel costs over the same power Avgas fuel engine, states that its engine has 40% fewer parts than an Avgas engine, is less toxic because it doesn't burn leaded fuel, and is the ideal engine for use in countries that don't have leaded Avgas.

DeltaHawk is actively seeking companies interested in the engine and is taking applications for service centers. Read more about the DeltaHawk engine on their website. *(Websites for all products mentioned in this article can be found in Resources.—Ed.)*

A new approach to panel lighting

I finally met Kranston Kincaid face-to-face at AirVenture this year. I became acquainted with him through posts on the Piper Comanche page on Facebook (FB) for his work on replacement Comanche engine airflow baffles. As I walked past his booth, I saw examples of what his company—Superior Aircraft Components—calls the Electro Luminescent Super Thin (ELST). The ELST is a flexible and thin (0.20-inch) EL panel. I'd never seen a flexible EL panel before—I had only seen the rigid EL panels used by Cessna in the 1970s and 80s.

These panels can be conformed in many ways—to illuminate and label the power control panel in a twin, to illuminate and label each circuit breaker (CB) in a CB panel, or for any other cabin lighting and illuminating tasks. In my opinion, the ELST is a game-changer that solves instrument panel illumination headaches. For more, take a look at the video on the Superior Aircraft Components website.

The latest propellers

MT-Propeller (whose products are now available through PFA supporter McFarlane Aviation) told me at AirVenture that it was moving forward with obtaining certification for the installation of its electrically-controlled constant-speed composite propellers for Cessna 172 series with the solid crank O-360.

The Lycoming four-cylinder O-360-A4M has a solid crankshaft and thus no option to install a hydraulically-controlled constant-speed prop. The complete installation kit will include a two-bladed propeller (a three-blade option will be

available), a spinner, and a cockpit control module. I asked if the 180 hp Piper PA-28 Cherokee would likewise be approved for to use this prop, and they told me it's on the certification list. Unfortunately, MT-Propeller has decided that this upgrade will not be available for 150 hp Cessnas or Pipers at this time.

Sensenich Propeller announced that its G-series composite-blade, ground-adjustable propellers were approved for installation on the 150 hp Piper PA-18-150 Super Cub. Approval for installation on the Piper PA-28 Cherokee models is in process.

Imagine adjusting your Sensenich prop to the best takeoff power position (high rpm, fine pitch), shortening the takeoff run during a weekend of flying off short mountain strips. Then, once out of the mountains, being able to (after landing) quickly and safely adjust the prop for better cruise performance (lower rpm, coarse pitch setting) for the cross-country flight home.

The best borescope

Many years ago, I wrote about the Oasis Scientific VA-400 borescope. This unit was the least expensive portable borescope available at the time. As most of you know, a borescope is required to complete a compression test on Continental aircraft engines. The VA-400 is a simple scope that enables owners and mechanics to complete a non-destructive inspection of exhaust valves and other tough-to-get-to spots on airplanes.

This year, Oasis asked me to test out its Vividia CX-6010i borescope. It's a much-improved and much more capable borescope camera with a 1280x720 CMOS sensor that provides 1 megapixel HD resolution. The VA-400 sells today on Amazon for $245-295, depending on equipment. The CX 6010i sells for $599. I believe the CX 6010i is a much more useful tool. All Oasis borescopes can be ordered directly from Oasis.

SureFly and Electroair gain approval to replace both magnetos

Piper Flyer Association supporter Electroair, the first company to offer a sophisticated and active electronic ignition system, had several products of interest. After announcing the approval of a single-drive, dual magneto system

DESTINATION

last year to replace the Bendix D-2000 and D-3000 conventional magnetos, this year Electroair announced approval to replace both traditional magnetos with its Electronic Ignition Systems (EIS) systems.

I asked Mike Kobylik of Electroair to explain the requirement for an alternate or backup power source for the dual EIS installation. He said:

"Backup power requirements can be met by the following means:

1. Dual bus-equipped aircraft.

2. Aircraft equipped with a backup alternator: one of the EISes must be wired directly to the backup alternator. The overall system must be protected with diodes; the installation manual explains more completely.

3. Backup battery. We offer a kit that combines a TCW lithium-iron battery with our backup battery monitor panel. The separate monitor panel was a requirement of the FAA and is under our own STC."

SureFly, a company based in Granbury, Texas, has been selling its four-cylinder and six-cylinder SureFly Ignition Module (SIM) electronic magneto replacements since 2019. Lycoming offers a rebranded SureFly SIM option on its factory-rebuilt and new engines.

SureFly recently received approval to replace both magnetos. Previously only one—either the non-impulse or the impulse-coupled magneto—was approved for installation.

One of the requirements when replacing both magnetos with SureFly SIMs is the addition of a backup power source to power the electronic mag and provide engine ignition in the event of an aircraft electrical power loss. SureFly recommends the TCW Technologies backup power system when two SIMs are installed.

Piper updates

Ron Gunnarson, Piper Aircraft vice president of sales and marketing, took the stage at the press HQ to announce that the market is "bullish" for Piper this year. Last year, they delivered 236 aircraft, a 14% increase over 2021 deliveries. "It's the strongest market we've ever seen," said Colcagno.

Piper then announced the certification of its diesel-powered PA-28-181 Archer DX, with the installation of a Continental CD-155 diesel cycle engine. Following that

announcement, Colcagno introduced the owners of a flight school in India that had ordered 47 Archer DX trainers.

The second Piper announcement related to its plan to increase utilization of its manufacturing capabilities and tooling at Vero Beach, by allowing other OEM manufacturers and industries to utilize the facility. Supporting this effort, Piper Industrial Manufacturing Company (PIMCO) has been established at the Piper facility in Vero Beach.

Looking for a two axis-auto pilot for the low-budget owner

Maybe because I started flying during the era of round analog instruments, ADF approaches, and the early days of LORAN-based navigation in small airplanes, I think night is a time for sleeping rather than flying. I keep a tightish rein on my spending, and I haven't felt I needed an autopilot in my Comanche "World Cruiser," but my attitude must be softening—or it may be that I'm becoming more aware of the passage of time because I'm seriously considering the installation of a Trio autopilot.

Simply put, the allure of a low-cost, easy-to-install two-axis autopilot is pretty hard to resist. I visited with The STC Group and asked questions about the Trio Pro Pilot Digital two-axis autopilot, which seems like just what I'm looking for.

The advantages are easy to understand. I will be able to reach something in the back seat, scroll around on my EFB, or take care of personal business without risking an unusual attitude. In the past, my co-pilots have been charged with, "Just keep the wings level!" We haven't augered in, so as is said these days, "it's all good," but I keep getting this gnawing feeling that it's time to get an autopilot to help me out.

The Trio autopilot has options to install the control head in a radio stack or a standard 3.125-inch instrument hole.

The roll and pitch servos are conventional, use bridle cables, and connect to the primary control cables with cable clamps, just like all other autopilots I've installed and serviced over the years.

The out-the-door-price for an FAA-approved Trio Autopilot for my Comanche is a little over $6,000. The STC holder

Continued on Page 70

PRESS RELEASES

*Compiled from press releases

November 2023

EARTHX HAS EARNED AN FAA AML STC FOR THE INSTALLATION OF ITS FAA TSO-APPROVED 12V LITHIUM BATTERIES IN A VARIETY OF 12V SINGLE-ENGINE AIRCRAFT

The AML STC approval allows single-engine Cessna, Piper, Mooney, and Aviat aircraft owners with 12-volt systems to upgrade to a lighter, more efficient, and more reliable system based on the most advanced lithium battery technology.

Windsor, CO (September 22, 2023) — EarthX, Inc., announced that it has earned FAA AML STC that will permit the installation of its FAA TSO'd 12V LiFePO4 battery on a wide variety of single-engine Cessna, Piper, Mooney aircraft, and the Aviat A-1.

"At EarthX, innovation is the core of our mission. We exemplify this commitment in the aviation industry by being the first company in the world to offer an FAA TSO-approved 12V lithium battery, " stated Kathy Nicoson, Sales Director, EarthX. "We are extremely proud of this accomplishment and are excited for a growing number of owners to benefit from all of the advanced features and capabilities the EarthX LiFePO4 replacement battery will bring to their aircraft. "

Continued on Page 64

SHERWIN-WILLIAMS LAUNCHES NEW AEROSPACE CONDUCTIVE COATING

Conductive coating (CM0485115) gives aircraft owners a high-conductivity solution for dissipating static on aluminum and composite aircraft.

ANDOVER, KANSAS – September 2023 – Sherwin-Williams Aerospace Coatings added a new aerospace conductive coating (CM0485115) to its line of undercoats, enabling aircraft owners to impart conductivity onto aluminum and composite substrates. The coating offers high conductivity to non-conductive substrates by producing an anti-static conductive film on their surfaces with a resistivity of 0.1 to 100,000 ohms per square meter to help static charges dissipate from antennas and radomes. The coating is designed with excellent adhesion and offers excellent fluid resistance.

Conductive coating (CM0485115) is designed to work with Sherwin-Williams topcoat systems. Using a 1:1 mix ratio, the product is simple to mix and apply. It is compatible with all non-electrostatic spray equipment and can be applied onto pre-primed aluminum and composite substrates to achieve high conductivity. For the best results, the conductive coating should be applied in one singular, continuous closed film or one cross coat. The application can happen in a wide range of environmental conditions, and the coating can be air cured or force dried, providing flexibility for applicators. Drying times vary based on the dry film thickness.

"As composite substrates continue to grow in popularity in the aerospace market, it's important for our customers to have ready access to a robust conductive coating that can meet their requirements for functionality, durability and ease of application," said Julie Voisin, Market Segment Manager, Aerospace, Original Equipment Manufacturer Interior and Commercial Vehicle Refinish. "Our new conductive coating is a perfect complement to our product offering and commitment to deliver high-performing products to the aerospace marketplace."

For more information on the new conductive coating (CM0485115), visit https://aerospace.sherwin.com or call Sherwin-Williams Aerospace Coatings at 1-888-888-5593 (North America), 1-316-733-7576 (international).

PACIFIC COAST AVIONICS ANNOUNCES THE RETIREMENT OF DEWEY CONROY AND THE APPOINTMENT OF RANDY WRIGHT AS ITS NEW OPERATIONS MANAGER

PCA™
Pacific Coast Avionics

Portland, OR (October 02, 2023) — Pacific Coast Avionics announced today that the company's co-founder, Vice President, and COO, Dewey Conroy, is retiring on October 01, 2023. The company has also announced the promotion of long-time team member Randy Wright to the new position of Operations Manager.

"It is with heartfelt gratitude that everyone involved with Pacific Coast Avionics wishes our dear friend Dewey the happiest of retirements," stated Rick Garcia, President and CEO of Pacific Coast

Continued on Page 64

PRESS RELEASES

EarthX Batteries
Continued from Page 62

Benefits of the new generation EarthX LiFePO4 lithium battery include:

- Saves weight: Over 23+ pounds lighter than an equivalent lead acid battery
- Increased cranking power
- Longer battery life span: 6+ years
- Fully recharges in minutes rather than hours
- Ease of Installation. Includes STC and installation kit with a battery management system that can alert you to anything outside the normal range. No more guessing how your battery is performing.

The FAA TSO'd 12V LiFePO4 12V battery and STC retail for $699.00. The Cost of the installation kit varies by aircraft model. See the EarthX website for details.

The single-engine (Textron) Cessna models included on the initial AML STC include the following:

- 120/140
- 150, 150A, B, and C
- P172D
- 175, 175A, B, and C
- 177, 177A, B, and 177RG
- 180, 180A through K
- 182, 182A through Q
- 185, 185A through F, and A185E

Pacific Coast Avionics
Continued from Page 63

Avionics. "And now it is my great pleasure to announce that Randy Wright has been promoted to our new Operations Manager."

"Randy has been with Pacific Coast Avionics for over 30 years, most recently as our Sales Manager," Garcia continued. "That wealth of knowledge about our customers and products makes him the ideal selection to take over PCA's day-to-day operations."

"I can't thank Dewey, Rick, and everyone else here at Pacific Coast Avionics enough for putting their trust in me," White said. "Dewey is a legend in the avionics industry. I will do

The single-engine Piper models included on the initial AML STC include the following:
- PA-28-140, 150, 151, 160, 161, 180, 181
- PA-28-201T
- PA-28-235, and -236
- PA-28R-180, -200, -201, and -201T
- PA-28RT-201 and -201T
- PA-28S-160, -180
- PA-12, -18, -20, -22, -24, and -32

The single-engine Mooney models included on the initial AML STC include the following:
- M20E, F, J, and K

The single-engine Aviat included on the initial AML STC:
- A-1

"EarthX, Inc. is passionate about battery improvement in the aviation market and has invested many years in an extensive R&D program followed by the in-depth FAA approval process, " Nicoson continued. "The end result is this AML STC, which will allow our lithium iron phosphate batteries to challenge the status quo and bring undeniable benefits to aircraft owners. "

everything I can to continue his and PCA's tradition of providing exceptional products and unrivaled service to our past, present, and future customers."

Randy Wright

GARMIN RECEIVES ADDITIONAL GFC 500 AUTOPILOT CERTIFICATIONS

Certified aircraft now include select Cessna Cardinal, Beechcraft Mentor and Piper Seneca models

OLATHE, Kan./Sept. 13, 2023 – Garmin (NYSE: GRMN) today announced it has received Federal Aviation Administration (FAA) Supplemental Type Certification (STC) for the GFC™ 500 digital autopilot in additional aircraft to include the Cessna 177/177A Cardinal and the Beechcraft T34A/T34B Series. The STC also covers the Piper Seneca PA-34-200T and PA-34-220T II-V models, marking the second certification of the GFC 500 in a twin-engine aircraft. The GFC 500 digital autopilot is intended for light piston aircraft while delivering superior in-flight characteristics, self-monitoring capabilities and minimal maintenance requirements when compared to older generation autopilot systems.

The GFC 500 autopilot uniquely integrates with Garmin's GI 2751 or G5 electronic flight instruments, a combination of either a standby GI 275 or G5 electronic flight instrument interfaced to a G500 TXi™ flight display, or a G3X Touch™ flight display to provide pilots with an economical and modern autopilot solution. The autopilot mode controller contains large, dedicated keys and knobs, as well as a control wheel that allows for easy adjustment to aircraft pitch, airspeed and vertical speed, and a Level Mode (LVL) that returns the aircraft to straight-and-level flight with the push of a dedicated button. In addition, GFC 500-equipped aircraft can take advantage of Garmin Smart Glide™, a safety-enhancing tool that helps pilots in an engine power loss event by automating certain tasks and helping to reduce pilot workload[1].

The full-featured GFC 500 autopilot provides a long list of existing general aviation aircraft with a simple, lightweight, cost-effective autopilot upgrade path. Incorporating solid state attitude with robust self-monitoring capabilities, the GFC 500 provides superior autopilot performance, greater reliability, and additional safety tools that are similar to those featured on the popular GFC 700 autopilot. In addition to traditional autopilot capabilities, such as altitude hold, vertical speed and heading modes, the GFC 500 also includes altitude preselect, VNAV, underspeed and overspeed protection and more. Pilots can also select, couple and fly various instrument approaches, including GPS, ILS, VOR, LOC and back course approaches when paired with a compatible Garmin GPS navigator.

As a standard feature of the GFC 500, pilots receive Garmin Electronic Stability and Protection (ESP™), which works to assist the pilot in maintaining the aircraft in a stable flight condition. ESP functions independently of the autopilot and works in the background while the pilot is hand-flying the aircraft to help avoid inadvertent flight attitudes or bank angles by nudging the pilot to return the aircraft to a safe flight attitude.

Garmin continues to add aircraft models to the growing STC list for the GFC 500 autopilot. To view the most up-to-date aircraft STC list, to view certifications that are expected to being in the next 12-months, or to express interest in a specific aircraft make/model, visit www.garmin.com/GFC500.

Garmin products and services have revolutionized flight and become essential to the lives of pilots and aircraft owners and operators around the world. A leading provider of solutions to general aviation, business aviation, rotorcraft, advanced air mobility, government and defense, and commercial air carrier customers, Garmin believes every day is an opportunity to innovate. Recipient of the prestigious Robert J. Collier Trophy for Garmin Autoland, Garmin developed the world's first certified autonomous system that activates during an emergency to control and land an aircraft without human intervention. Visit the Garmin Newsroom, email our media team, connect with @garminaviation on social, or follow our blog.

[1] GI 275 ADAHRS source required for Piper Seneca models.

THE HIGH AND THE WRITEY

Continued from Page 12

- TDC – top dead center. A negative and depressing term.
- Mag drop – what happens when you work on your engine's magnetos with hands slippery with Cox glow fuel.
- Ferrous metal – engine metal parts forged by tamed FAA-certificated ferrets.
- What was that?!? – a pre-engine-failure sound heard from your passenger before...
- The sound of silence – your $40,000 engine fails for no particular reason at the worst possible time, just like your CFI tried to warn you about.
- Camshaft – the bill you receive from your A&P mechanic, Cam.
- Scat tube – rubbery hose you use to swat away unwanted hangar critters.
- EGT – engine egg timer.
- CHT – "Cylinder's hot, Ted." A shop safety acronym.
- FADEC – Federal Aviation Department of Engines Committee.
- Torque – from the Latin, meaning "twisty."
- Warranty – yours expired two hours before your engine exploded.
- Marvel-Schebler – the newest superhero duo from the Marvel Universe.
- Airworthiness Directive – get out your checkbook.
- One thousand dollars – the minimum initial payment for dealing with any of the abovementioned terms. *(Also known as an Aviation Monetary Unit or AMU. –Ed.)*

Some of you have probably flown engines that I will never operate. Are there any rocket-powered, electric, or solar-powered pilots out there? I look forward to the first aircraft powered by the Flux Capacitor first seen in Back to the Future, Part I.

(*Night Ranger, from the song "Sister Christian.")

Kevin Garrison's *aviation career began at age 15 as a lineboy in Lakeland, Florida. He came up through General Aviation, retired as a Boeing 767 captain in 2006, and retired from instructing airline pilots in 2017. Garrison's professional writing career has spanned three decades. Send questions or comments to editor@piperflyer.com.*

Continued from Page 18

Steve Ells *is contributing editor and tech rep for Piper Flyer Association. He has been an A&P/IA for 45-plus years. He is a commercial pilot with instrument and multi-engine ratings and loves utility and bush-style airplanes and operations. He's a former associate editor for* AOPA Pilot. *He owns Ells Aviation and lives in Templeton, California. Send questions and comments to editor@piperflyer.com.*

RESOURCES

PFA SUPPORTERS

AIRCRAFT SPRUCE & SPECIALTY
aircraftspruce.com

AVIATION LABORATORIES
avlabs.com

CONCORDE BATTERY
concordebattery.com

EARTHX
earthxbatteries.com

OTHER

AIRPLANE OIL ANALYSIS
airplaneoil.com

ALS AVIATION OIL ANALYSIS
alsglobal.com

BATTERY MINDER
batteryminders.com

BLACKSTONE LABS
blackstone-labs.com

GILL BATTERY
gillbatteries.com

FURTHER READING

LYCOMING SERVICE BULLETIN NO. 480 F, "OIL SERVICING, METALLIC SOLIDS IDENTIFICATION AFTER OIL SERVICING, AND ASSOCIATED CORRECTIVE ACTION"
lycoming.com/content/service-bulletin-no-480-f

LYCOMING SERVICE LETTER NO. 171, "GENERAL ASPECTS OF SPECTROMETRIC OIL ANALYSIS)
lycoming.com/content/service-letter-no-l171

Continued from Page 61

estimates it will take another $4,000 to install and set it up.

The BendixKing AeroCruze 100 (formerly TruTrak) series of autopilots has STC approval for installation in PA-28 and PA-32 aircraft. The price point is less than the Trio autopilot, but it's not yet approved for my Comanche.

I am getting ready to commit to a big instrument panel/avionics upgrade, and right now it looks as though one of the Trio autopilots will be part of that upgrade.

If you're sitting on the fence about attending AirVenture, and you've been bitten by the aero bug, start planning now to be in Oshkosh, Wisconsin, during the week of July 22-28, 2024. The real fun will start with your fellow Piper Flyer friends at Waupaca. See you there!

Steve Ells *is contributing editor and tech rep for Piper Flyer Association. He has been an A&P/IA for 45-plus years. He is a commercial pilot with instrument and multi-engine ratings and loves utility and bush-style airplanes and operations. He's a former associate editor for* AOPA Pilot. *He owns Ells Aviation and lives in Templeton, California. Send questions and comments to editor@piperflyer.com.*

RESOURCES

EAA AIRVENTURE OSHKOSH EXHIBITORS

PFA SUPPORTERS

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continental.aero/diesel/engines/cd155.aspx

ELECTROAIR ***(Electronic Ignition)***
electroair.com

MCFARLANE AVIATION LLC
mcfarlaneaviation.com

MT-PROPELLER
mt-propeller.com

OASIS SCIENTIFIC INC. ***(Borescopes)***
oasisscientific.com/borescopes.html

OTHER

EAA AIRVENTURE OSHKOSH
eaa.org/airventure

DELTAHAWK ENGINES INC.
deltahawk.com

PIPER INDUSTRIAL MANUFACTURING COMPANY (PIMCO)
pimco-piper.com

SENSENICH PROPELLER
sensenich.com

SUPERIOR AIRCRAFT COMPONENTS
(ELST Panel Lighting)
superioraircraftcomponents.com/elst/

SUREFLY PARTNERS LTD.
(Electronic Ignition)
www.surefly.aero

THE STC GROUP LLC
www.thestcgroupllc.com

TCW TECHNOLOGIES
(Backup Battery System)
tcwtech.com

TRIO AVIONICS *(Autopilots)*
trioavionics.com

UNLEADED FUELS

FAA EAGLE INITIATIVE
www.faa.gov/unleaded

GENERAL AVIATION MODIFICATIONS INC.
(G100UL Avgas)
g100ul.com

HJELMCO OIL *(91/96UL Avgas)*
hjelmco.com/pages.asp?r_id=13963

"REP. JAY OBERNOLTE ON FIELDING UNLEADED FUELS" BY PAUL BERTORELLI, AVWEB
youtube.com/watch?v=1LYgWSCqk-o

SWIFT FUELS *(UL94 Avgas)*
swiftfuelsavgas.com


EAA Photo/Dave Swartz

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Aero Design	aerodesignaircraft.com	33
AeroLEDs	aeroleds.com	61
Aero-Mach Wilco	wilcoaircraftparts.com	71
Aero-Tow	amigoaerotow.com	71
Aerox	aerox.com	67
Air Mod	airmod.com	24
Aircraft Door Seals	aircraftdoorseals.com	61
Aircraft For Sale	flyingmag.com/afs	06
Aircraft Owners and Pilots Association	aopa.org/join	13
Aircraft Spruce & Specialty	aircraftspruce.com	03
Airmark Overhaul Inc.	airmarkoverhaul.com	16
AirWard	airward.com	70
Alpha Aviation	alphaaviation.com	69
Alpha Systems AOA	alphasystemsaoa.com	37
Aviation Creations	aviationscreations.com	68
Aviation Fabricators	avfab.com	22
B.A.S. Inc.	basinc-aeromod.com	70
Brown Aircraft Supply	brownaircraft.com	65
Chief Aircraft	chiefaircraft.com	69
CiES	ciescorp.net	67
Concorde Battery Corp.	concordebattery.com	53
Dodson International	dodson.com	70
Eagle Fuel Cells	eaglefuelcells.com	52
EarthX Inc.	earthxbatteries.com	65
Electroair	electroair.net	59
Floats & Fuel Cells	ffcfuelcells.com	18
Fly M.K. Leighton	flymkleighton.net	69
Gallagher Aviation	gallagheraviationllc.com	70
Great Lakes Aero Products	glapinc.com	59
Gulf Coast Avionics	gca.aero/piper	45
Hartzell Propeller	hartzellprop.com/topprop	37
Icom America Inc.	icomamerica.com	11
IceShield	iceshield.com	02
Insight Instrument Corp.	insightavionics.com	75, 76
J.P. Instruments Inc.	jpinstruments.com	25
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Kelly Aero	kellyaero.com	05
Knots 2U	knots2u.com	60
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National Aviation	nationalav.aero	29
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Preferred Airparts	preferredairparts.com	51
SCS Interiors	scs-interiors.com	12
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Sterling Aviation Tech. Inc.	sterlingaviationtech.com	71
Superior Air Parts	superiorairparts.com	15
Tempest Aero Group	tempestaero.com, tempestplus.com	19, 50
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Wentworth Aircraft Inc.	wentworthaircraft.com	23
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PiperFlyer.com contains an archive of our magazine articles, a listing of Service Bulletins, Airworthiness Directives, and safety alerts, a product directory called the Piper Yellow Pages, plus an events calendar, knowledge base, our library of member photographs and videos—and our forums (see next item).

Online Forums piperflyer.com/forum

Our online forum, located within the association website, is a great source for question-and-answer interaction and an excellent way to converse with other members, the PFA staff, and Piper Flyer's contributing editor, longtime A&P/IA, Steve Ells.

Piper Flyer Association member event

Email kent@aviationgroupltd.com
Register: thegatheringatwaupaca.simpletix.com

Piper Flyer and Cessna Flyer Association members fly in to beautiful Waupaca (KPCZ) for a Saturday night cocktail reception, full slate of informative seminars on Sunday and Sunday evening banquet at the Waupaca Ale House, and then enjoy the air-conditioned motor coach to AirVenture on Monday, Tuesday, and Wednesday with an optional night bus on Wednesday to accommodate viewing the night airshow. Fabulous raffle prizes at our Sunday drawing!

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We have contacts everywhere in the industry and we'll assist in finding you that part or getting an answer to your question. That's what we're here for.

Many vendors offer discounts to members. Call or email Kent for more information or ask our vendors when contacting them directly. Remember to tell them you are a Piper Flyer Association member.

VIEW

Continued from Page 8

you, Piper Flyer Association members. Without you, there would be no Piper Flyer Association or *Piper Flyer*. It's been an absolute pleasure to help provide the content you want (and need) about your Piper for the past six-plus years, and I'm excited about being able to help with this next step.

My flying background is in General Aviation. I've never bothered flying anything with a callsign that includes "heavy," nor do I plan to. I took my first GA flight in a Piper at age 5, and some 30 years later, the first airplane I owned was a Piper. This is where I want to be: surrounded by fellow Piper pilots and owners, where we can share our passion for and desire to learn about these incredible aircraft.

I plan to bring a few new voices into the pages of *Piper Flyer* over the next several months. If you like them, please speak up and tell us so. If you can't stand them, we want to hear that, too! And don't worry, the regular *Piper Flyer* contributors and their columns, articles, and photos aren't going anywhere.

My virtual office door is always open; if you have questions, comments, story ideas, or just want to talk shop about Pipers, drop me a line at scott@aviationgroupltd.com. And if your aviation adventures bring you to Oregon, stop by Hobby Field (Creswell, Oregon, 77S), and we'll grab lunch!

-Scott Kinney

P.S.

Kent recently sent out a member survey to Piper Flyer Association members to help identify what we're doing well and where we can be better. Thanks to everyone who has already responded. If you haven't yet completed the survey, please do so using the link below. It will only take a few minutes.

I'm looking forward to incorporating your suggestions about *Piper Flyer* into future issues. After all, this is your magazine!

Piper Flyer Association 2023 Member Survey
surveymonkey.com/r/PFMemberSurvey

THIS MONTH IN AVIATION HISTORY

NOVEMBER 1

1954 — The United States Air Force retires its last Boeing B-29 Superfortress from service.

1957 — The Bell GAM-63 Rascal air-to-surface guided missile officially becomes operational with the Strategic Air Command at Pinecastle AFB, Florida.

NOVEMBER 6

1945 — The first airplane with a jet engine to land on an aircraft carrier is a Ryan FR-1 Fireball piloted by U.S. Navy Ensign Jake West.

NOVEMBER 7

1910 — The first use of an airplane to carry commercial freight is the Wright Company's airplane, flying from Dayton to Columbus, Ohio, carrying 10 bolts of silk to the Morehouse-Martens Company.

1959 — Discoverer VII satellite is launched into orbit by the United States Air Force.

NOVEMBER 10

1988 — The United States Air Force reveals the existence of the Lockheed F-117A Nighthawk stealth fighter.

NOVEMBER 11

1956 — The first flight of the world's first supersonic bomber, the Convair B-58 Hustler.

NOVEMBER 12

1957 — Defense Secretary Neil H. McElroy orders the United States Army to prepare to launch an Earth satellite. A modified Jupiter-C test vehicle will be used.

NOVEMBER 15

1965 — The first flight around the world over flying both Poles is made by U.S. airline Flying Tiger Line Captain J.L. Martin.

NOVEMBER 16

1949 — Douglas DC-6A prototype sets commercial San Francisco to Los Angeles record of 58 minutes, 13 seconds with an average speed of 350 mph.

NOVEMBER 17

1949 — Civil Aeronautics Board bars all military-type aircraft from operating into Washington National Airport.

NOVEMBER 20

1963 — The USAF accepts its first two McDonnell Douglas F-4C Phantom II jet fighters.

NOVEMBER 22

1961 — The United States Navy claims a world speed record for the McDonnell F-4H Phantom II flying at 1,606.342 mph at Edwards Air Force Base, California.

1988 — Rollout of the first Northrop Grumman B-2A Spirit stealth bomber.

NOVEMBER 23

1947 — The Convair XC-99 makes its first flight, piloted by Russell R. Rogers.

1959 — The Boeing 720 medium-range jet transport (a 707 derivative) make its first flight.

Lieutenant Colonel Robert Bradford Robinson, Jr., with the McDonnell YF4H-1 Phantom II.

NOVEMBER 25

1957 — The Senate Preparedness Subcommittee launches a sweeping probe of the United States' missile and satellite programs by summoning numerous scientists for opening day's public testimony.

1957 — The United States Air Force announces that artificial meteors were launched successfully sometime in October at speeds up to 40,000 mph—about 15,000 mph above the Earth's escape velocity.

NOVEMBER 27

1912 — The Aeronautical Division of the United States Army Signal Corps receives the first "Flying Boat," a Curtiss Model F, capable of takeoff from water.

1959 — The Hiller X-18 tilt-wing research transport completes its first flight at Edwards Air Force Base, California.

NOVEMBER 29

1951 — The United States Air Force announces development of its first all-jet heavy bomber, the Boeing XB-52 Stratofortress.

NOVEMBER 30

1949 — Aeronca Aircraft Corporation announces its 1950 Champion, the 90 hp Model 7EC, with a complete 12-volt electrical system, soundproofing, full-width rear seat, no-bounce gear, and other improvements. Delivery to begin Dec. 1, 1949.

1956 — The Martin TM-61 Matador becomes the USAF's first tactical missile.

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