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Vol.72 No.8 | August 2023

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The return of *Rosie the Rocketer*

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The Countdown Begins

Only 11 months to go!

BY JACK J. PELTON

AS I WRITE THIS, EAA AirVenture Oshkosh is still a few weeks away. As you read it, it's either in full swing or has just wrapped for the year. Regardless, we're already heads-down working on the next one. The making of AirVenture starts 11 months in advance. When AirVenture ends, of course there is a lot of teardown and cleanup to do. There are also smiles, hugs, thank-yous, and the exhausted afterglow of the staff and volunteers who have made it all possible. But there's no time for a parade or a victory lap — we do our debriefs through August and September, and that's when the planning for next year takes center stage.

That planning process is always interesting, and it all starts with themes. The group gets together and discusses, in a very collaborative and fun way, all the possible ideas that we can use to specify a theme for each day of the event. This really gives us the framework we need to help decide what we want to see and have happen at the show to support those themes. We always work hard and plan carefully to ensure some variety, and we do our best to make sure there will be something on the grounds for everybody. I believe what makes AirVenture unique is that you can come with your family, your friends, or just about anybody else, and they'll all find something to enjoy, even if their interests vary significantly.

We work to ensure this variety across all of our special-interest communities, like homebuilts, ultralights, aerobatics, vintage, and warbirds. The philosophy also extends to the airplanes on Boeing Plaza, our forums and hands-on workshops, the movies we show, the activities in KidVenture, the fun of the Fun Fly Zone, and the speakers who tell historical stories or share personal experiences at the Theater in the Woods. Even our exhibitors embrace the idea of variety, making AirVenture the one time you can see the whole spectrum of aviation, from nuts and bolts to brand new aircraft, in one place.

One of the first things we look at when considering themes is the list of anniversaries that will occur during the year. It might be the first flight or introduction of an antique or classic civil aircraft or warbird or a pivotal moment in aerospace history, like Lindbergh's flight from New York to Paris, the end of World War II, or the moon landing. And speaking of moon landings, with NASA planning a crewed return to the lunar surface soon, you can bet we'll be celebrating at AirVenture next year or the year after.

I believe what makes AirVenture unique is that you can come with your family, your friends, or just about anybody else, and they'll all find something to enjoy, even if their interests vary significantly.

We also focus our discussions on the search for what might be new in the next 10 months. We keep close tabs on various build and restoration projects alongside brand new designs, looking for interesting and exciting aircraft or products that might make their public debut at AirVenture. All of these things go "into the jar" to be considered for emphasis at Oshkosh. The process is ongoing over the weeks and months as we sift through the possibilities, make contacts, and determine what's possible and what isn't.

Another key part of the planning is focusing on everything we uncover during our debriefs so that we can continually find ways to improve and deliver the best experience possible to our members and guests. Business planning is a big piece of it as well. In this world of runaway inflation, we have to look very carefully at costs and try to predict what the financial landscape will look like 11 months in the future.

All in all, it's a vigorous, exciting, and rewarding process. We all enjoy the "thrill of the hunt" as we try to ensure that we come up with something special each year. We hope we've succeeded this year, and as we move into the afterglow of AirVenture 2023, it's exciting to see the first light from the glow of 2024. As always, we're thrilled to do our best to bring you the things that can be experienced only in Oshkosh. EAA

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Photo of LuLu from the JPI website gallery

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SportAviation

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FEATURES

ON THE COVER:
A pair of classic de Havilland Canada DHC-2 Beavers formed up in and over their natural habitat.
Photo by Scott Slocum

ON THIS PAGE:
On the Wednesday and Saturday of AirVenture, the Oshkosh sky comes to life with a spectacular night air show, followed by an awe-inspiring world-class fireworks display.
Photo by Dave Witty

For more coverage of the topics in this issue, visit EAA.org/SportAviation.
To view and submit aviation events, visit EAA.org/Calendar.

DEPARTMENTS

EXTRAS EAA.ORG/EXTRAS

SPORT AVIATION EAA.org/SportAviation

NIFA HOSTS SAFECON IN OSHKOSH

The National Intercollegiate Flying Association (NIFA) recently held its 2023 Safety and Flight Evaluation Conference (SAFECON) at Wittman Regional Airport in Oshkosh.

TIMELESS VOICES

HAROLD "BUD" ROUSE

Harold "Bud" Rouse was a fighter pilot during World War II, flying the P-38 Lightning and P-47 Thunderbolt in the China-Burma-India theater.

WEBINARS EAA.org/Webinars

THE THORP T-18

At a time when many felt that the range of an experimental amateur-built airplane was fairly small, one man decided to take his around the world. Join us as we take to the sky with Don Taylor and his T-18.

HINTS FOR HOMEBUILDERS EAA.org/Hints

TASK-BASED PHASE I FLIGHT TESTING

Tom Charpentier, EAA's government relations director, reviews the task-based Phase I flight testing program outlined in Advisory Circular 90-89C.

THE GREEN DOT

OLD RHINEBECK AERODROME

This time on *The Green Dot*, hosts Hal and Tom are joined by Clay and Nathan Hammond to discuss Old Rhinebeck Aerodrome. The Hammond brothers grew up on the aerodrome, surrounded by vintage airplanes. Their childhood influenced their future careers as air show pilots, and the two talk about the impressive collection of antique aircraft still flying at Old Rhinebeck.

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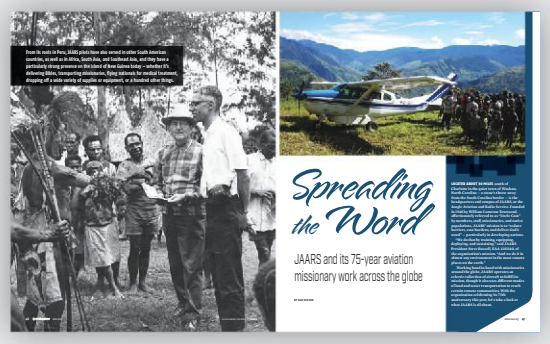
A Pair of Fine Features

I JUST READ THE ARTICLE in this month's *EAA Sport Aviation* about the *Rosie the Riveter* RV-14A of Roger and Juliette Cosh, and my late grandma Chastney of Detroit was one of those Rosies during WWII. She was 4 feet, 10 inches tall and very slender and worked at Willow Run, going in small spaces on the B-24 because of her size. I appreciated the builders' paint scheme honoring the women like my grandma. Wish I could thank them for their kind thoughtfulness.

Richard Baker, EAA 1107222
Front Royal, VIrginia



THANK YOU SO MUCH for bringing JAARS to the attention of your readers in the June issue of *EAA Sport Aviation* magazine. My late husband, Al, and I felt very blessed to discover JAARS and take a guided tour of the campus back in 2021 when we had a no-soaring day while at Bermuda High Gliderport, about 30 miles away. Also in Waxhaw, North Carolina, is the wonderful — and highly recommended — Museum of the Alphabet, which is associated with JAARS. The people at JAARS are doing a great service in translating the Bible to people in very remote places worldwide. They even work with lots of groups of people who have no written language to help them develop a written language. Without aviation, reaching these people would be very difficult, if not impossible. Kudos to JAARS and their dedicated pilots. N52 is the airport in Waxhaw with a 3,200-foot runway for those who will be lucky enough to visit Waxhaw.

Susan M. Simmons, EAA 1154115
Marathon, Florida

Columnist Kudos

I AM ALWAYS IMPRESSED with the writings of Budd Davisson and Steve Krog. They both discuss my everyday shop and flying challenges. I think this summer I will look in the *EAA Sport Aviation* archives for more of their articles.

Ralph Strahm, EAA 418280
Holtville, California

Of Ercoupes and Aircoupes

THE ERCOUPE ARTICLE BY Kris Caldwell in the June issue of *EAA Sport Aviation* ("Ercoupe 415-D," Plane Impressions) sure brought back wonderful memories for this old pilot. After soloing in a Cub in 1960 at a small suburban Chicago airfield and getting in a few hours before finishing my dental degree, then serving Uncle Sam, marriage, starting a family, and opening my dental practice, it was 1968 before I could resume working on my private license. I did that with a Mooney FBO at Chicago's Midway airport during a lull in Midway's operations. The major airlines had abandoned Midway around 1960 for O'Hare with its longer runways, and the field was an ideal and underused general aviation airport until the 1970s when the regionals with their smaller jets again made it a busy place.

As Kris mentioned in the article, in the years from its first design in 1937, the Ercoupe went through several manufacturers and iterations. In 1968 that Mooney FBO had the Alon/Mooney version of the airplane with rudder pedals but which still retained the slide-down cockpit side windows and forked tail. In fact, around Midway, the airplane was known as "the poor man's P-38!" It really was a fun airplane to fly, and it got me my private license before joining a Midway flying club that had Piper airplanes. That was done to save some cash, and among the Pipers the club had was the "complex" Piper Arrow, an airplane necessary to master for me to gain my commercial ticket in 1970 before the move to bigger and better things.

I can still recall flights in that Alon/Mooney Aircoupe with the windows down and my elbow on that sill, as if driving my car. Truly relaxed, fun flying at its best.

Lou Antonacci, EAA 73154
Hampshire, Illinois

SUBMISSIONS

Letters intended for publication should be emailed to editorial@eaa.org or addressed to EAA/Letter to the Editor, P.O. Box 3086, Oshkosh, WI 54903. Please include your EAA number, city, and state. All letters are subject to editing. Unpublished letters will not be returned.

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FLYING THE AIRVENTURE ARRIVAL WITH SMOKE AND HAZE

BY SEAN ELLIOTT, EAA VICE PRESIDENT OF ADVOCACY AND SAFETY

RECENTLY I WAS FLYING passenger flights in EAA's 1929 Travel Air biplane out of Pioneer Airport. It was a gorgeous Saturday morning to fly, the only issue being the Canadian fire smoke which reduced visibility to 3-4 miles. As I launched out at 500 feet to the southwest (part of our normal Pioneer Airport departure procedure), it was apparent how murky the day truly was, especially when looking in the sun's direction. By the time I was 6-7 seven miles out from Oshkosh, I estimated that I could see less than half that distance when looking back to the east/northeast.

Sitting in an open-cockpit vintage biplane in flight, you really rely on pilotage more than any other form of navigation. Fortunately, I know the area well, and it was not that difficult for me to "breadcrumb" my way back with known landmarks every couple of miles. It was at that time that I could not help but think of how this would affect our attendees at AirVenture who do not have the same familiarity and are trying to follow other aircraft according to the guidance of the FAA Notice (commonly called the NOTAM).

We have since discussed this with the air operations team and are planning on disseminating any significant visibility reductions not only on the Oshkosh ATIS, but also be available at many towered airports within 100 miles. We will also send out an OSHARRIVAL alert via text message for those who are signed up for that alerting system. Our goal is to ensure you have the best possible situational awareness with regard to the local environment and its effects when it comes to flying the FAA Notice.

If you are alerted that visibility is reduced, you might consider a few things. Fly to an airport that is an hour or so away and put yourself in "striking range" for when the visibility does improve with the heat of the day. You may consider an afternoon or early evening arrival when the sun is in the western portion of the horizon and not exacerbating the problem. Above all else, have a bailout plan that allows you an easy decision to abort the arrival and proceed to an alternate airport if you do not like what you are experiencing while flying according to the FAA Notice.

Good planning, along with solid situational awareness, always makes for a better arrival experience when flying into Oshkosh. Besides, when flown with this level of preparedness and planning, it is truly a fun experience!

Be safe, and see you at AirVenture 2023!

THE STATUS OF FAA REAUTHORIZATION

THE 2023 FAA REAUTHORIZATION bills are in markup in both House and Senate committees as of the time of this writing. Both versions of the bills are unique, but as drafted they would authorize the FAA for five years and include many general aviation provisions.

Current FAA authorization was passed in 2018 and is set to expire at the end of September.

These bills, the House version in particular, which for the first time incorporates a general aviation title, include language critical to our community. Important areas include MOSAIC rulemaking (modernization of special

airworthiness certificates), designated pilot examiner shortages, medical certification, aircraft registration delays, and the integration of uncrewed aerial systems.

EAA provided priorities important to general aviation in statements to both committees in February. In March, EAA's CEO/Chairman Jack J. Pelton testified before the Aviation Subcommittee of the House Transportation and Infrastructure Committee. The statements and testimony highlighted the need for reauthorization to address issues critical to general aviation, many of which are included in either one or both of the bills.

EAA, along with the Aircraft Owners and Pilots Association, Corporate Aircraft Association, Helicopter Association International, International Council of Air Shows, National Agricultural Aviation Association, and National Association of State Aviation Officials, in a letter to Chairman Sam Graves and Ranking Member Rick Larsen of the House Transportation and Infrastructure Committee, highlighted the significance of the House language:

"As representatives of various sectors of the GA community, we're thrilled that your bipartisan Securing Growth and Robust Leadership in American Aviation Act (H.R. 3935) recognizes that the U.S. aviation sector is dependent upon a strong GA community and includes the first-ever GA title to secure the long-term success of American aviation."

Chairman Graves has indicated that he wants to pass the bill on the House floor during the third week of July. It is expected that the Senate will also push to be on an aggressive schedule as well. Once passed by both the House and Senate, the bills will be conferenced to work out differences.

EAA COMMENTS ON BVLOS

EAA SUBMITTED COMMENTS IN early June to an FAA request for comment on unmanned aircraft systems (UAS) beyond visual line of sight (BVLOS) operations. This request, which is largely in response to an aviation rulemaking committee report that was published last year, included a series of questions that addressed a few potential pathways to integrating these types of operations into the national airspace system (NAS).

EAA continues to hold to our position that while we support the integration of UAS into the NAS, any effort to do so must not add additional equipage requirements for crewed aircraft or restrict the airspace where crewed aircraft are currently able to fly. Most importantly, we do not support any movement toward integration that puts the safety of any type of crewed aircraft operation at risk.

VISIT US AT AIRVENTURE!

THIS YEAR AT OSHKOSH, be sure to stop by the Advocacy and Safety booth at the EAA AirVenture Welcome Center from 10 a.m. to 12 p.m. and from 1 p.m. to 3 p.m., Monday through Friday. Additional times may be added as well, so be sure to search "Advocacy" in the AirVenture schedule at AirVenture.org or in the AirVenture app for a full and accurate listing of times.

At the booth, members of our Aeromedical Advisory Council and Legal Advisory Council will be providing advice in their respective fields. Experts on airport policy will be available to talk about topics like hangar use policy and setting up your own private airport, and you can also meet with flight testing experts to discuss task-based flight testing. We will also have general sessions to discuss anything else that is on your mind.

Our current schedule is as follows:

Day/Time	Monday	Tuesday	Wednesday	Thursday	Friday
10 a.m.-12 p.m.	Medical	General Advocacy	Medical	Task-Based Flight Testing	Airports
1 p.m.-3 p.m.	General Advocacy	Legal	Legal	Medical	General Advocacy

At the time of this writing, we are still finalizing our schedule and obligations for the event, so please check the online or app-based schedule or the notice board at our booth for a complete listing of experts and topics during the week. See you at Oshkosh! EAA






TOP STORY

HISTORIC HOMEBUILT AIRCRAFT ANNIVERSARIES PART OF EAA AIRVENTURE OSHKOSH 2023 ACTIVITIES

A NUMBER OF ICONIC homebuilt aircraft designs are celebrating notable anniversaries this year at EAA AirVenture Oshkosh, which annually brings together the world's largest gathering of amateur-built aircraft.

"Homebuilding has been at the core of EAA since the first meeting in Milwaukee in 1953 with homebuilt aircraft continuing to represent a substantial percentage of the 10,000-plus aircraft that fly into AirVenture every year," said Charlie Becker, EAA's director of chapters and homebuilding. "As we celebrate our organization's 70 years, several popular designs are celebrating their own anniversaries, and we invite all owners of those aircraft to come to Oshkosh to help commemorate the occasion."

Among the aircraft designs reaching important anniversaries in 2023 are:

- Midget Mustang 75th anniversary — Single-seat aerobatic sport airplane designed by David Long.
- Wittman Tailwind 70th anniversary — A two-seat, high-wing monoplane designed by legendary designer and racer Steve Wittman.
- Thorp T-18 60th anniversary — All-metal fully bubble canopied aircraft, well known for being the first homebuilt aircraft to successfully circumnavigate the world.
- Hiperbipe 50th anniversary — A two-seat aerobatic biplane designed by Sorrell Aviation.
- Sonex 25th anniversary — A kit manufacturer based in Oshkosh, Wisconsin, and founded by EAA Homebuilders Hall of Fame member John Monnett, EAA Lifetime 15941.
- Van's Aircraft RV-10 20th anniversary — A four-seat, low-wing airplane designed by Dick VanGrunsven, EAA Lifetime 3204, part of the world's most popular series of homebuilt aircraft.

AIR FORCE AIR EDUCATION AND TRAINING COMMAND TO HIGHLIGHT AIRCRAFT, PERSONNEL AT AIRVENTURE 2023

THE PEOPLE AND AIRCRAFT that develop all U.S. Air Force personnel are taking center stage at EAA AirVenture Oshkosh 2023, as the USAF Air Education and Training Command (AETC) is among the highlighted units at this year's event.

"The Air Force's Air Education and Training Command has a much wider reach than even most aviation enthusiasts would imagine, which makes AirVenture an outstanding location to highlight all of the command's capabilities," said Rick Larsen, EAA's vice president of communities and member programs, who coordinates AirVenture features and attractions. "Those capabilities will be showcased in the air and during ground presentations throughout the week at Oshkosh."

Final announcements on participating aircraft and activities were still being finalized at press time, but will include aircraft from throughout the Air Force. Along with aircraft displays and aerial demonstrations, AETC

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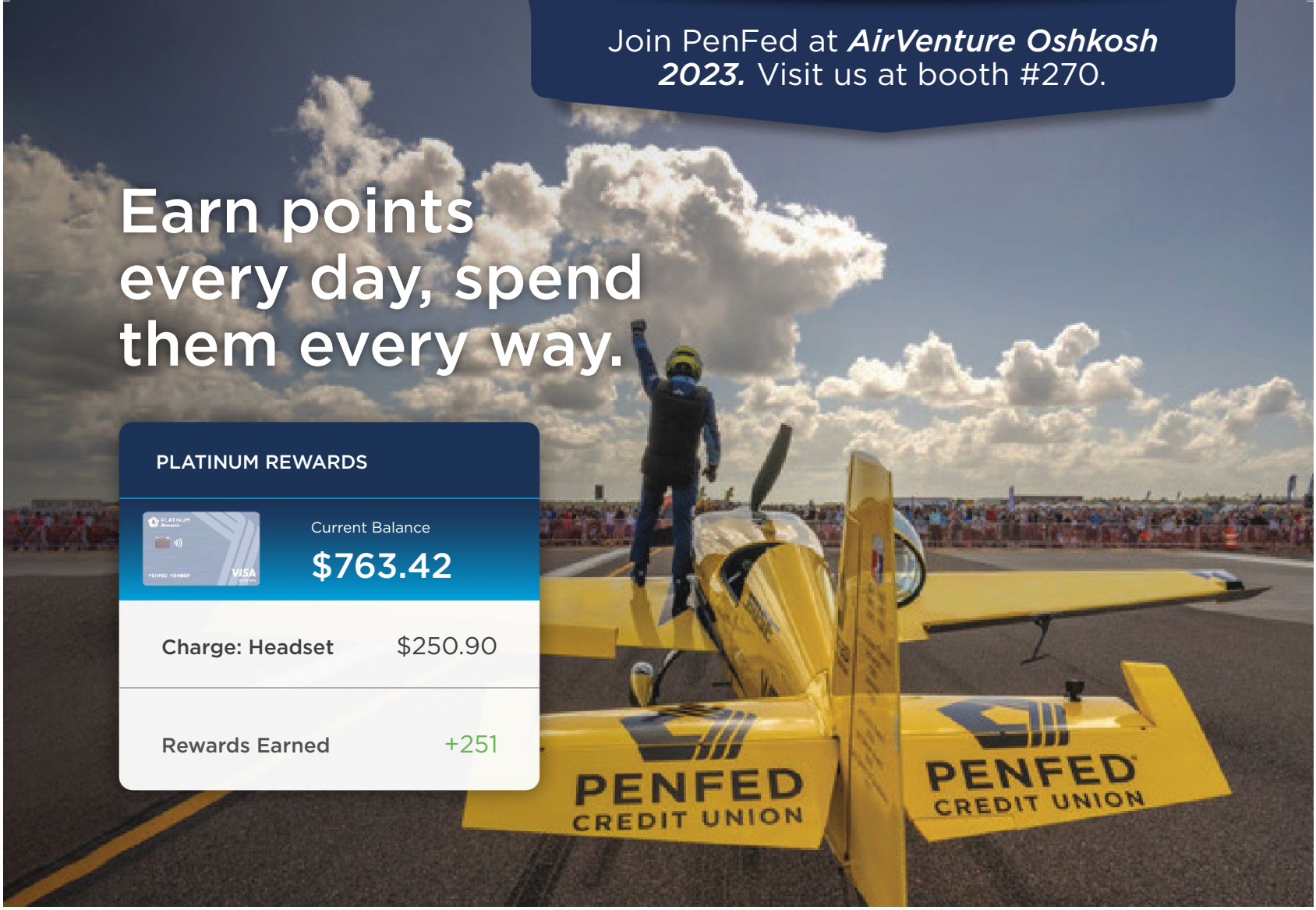

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will feature diverse elements such as critical care air transport with a C-17, military working dogs, and explosive ordnance disposal. The Air Force's Band of the West will also perform during the week.

"AETC is referred to as the First Command because nearly every airman starts at AETC, and we're proud to be responsible for establishing the foundation for so many Air Force careers," said U.S. Air Force Lt. Gen. Brian Robinson, AETC commander. "Across basic military training, technical training, and pilot training, our force generators are developing empowered airmen who are advancing the U.S. Air Force's strategic advantage to defeat our competitors. Oshkosh is an excellent opportunity for us to showcase AETC's members and how we recruit, train, and educate the airmen our nation needs."

Air Education and Training Command, with headquarters at Joint Base San Antonio-Randolph, Texas, was established and activated in January 1942, making it the oldest major command in the Air Force. AETC's training mission makes it the first command to touch the lives of nearly every Air Force member. Over the years, more than 25 million students have graduated from AETC training and education programs.

AIRVENTURE COMMEMORATES 30 YEARS OF WOMEN FLYING COMBAT AIRCRAFT DURING EAA WOMENVENTURE ON JULY 26

CELEBRATING WOMEN ADVANCING IN aviation, including 30 years of flying active-duty combat aircraft, will be part of EAA WomenVenture on July 26 during EAA AirVenture Oshkosh.

EAA WomenVenture has become an annual gathering point for women involved in aviation, from the Women Airforce Service Pilots (WASP) of World War II to teenagers involved in EAA's GirlVenture day camp that week. The programs are designed to encourage and inspire women who want to pursue their dreams of flight.

"What we've seen over the 15-plus years of EAA WomenVenture is that it has become an unforgettable annual reunion of all women engaged in aviation," said Margaret Viola, an EAA-member pilot who is the volunteer chair of the event. "We are inspired by those who came before us and, in turn, are enthused to share the world of flight with others who want to become part of it. It's a celebration that happens in a unique way at Oshkosh."

Events will be held all week, with an emphasis on July 26 activities, including the commemoration of 30 years of women flying combat missions in the U.S. military. Programs during the week include:

- **All week:** EAA WomenVenture Center, located in Aviation Gateway Park, features exhibitors and events that support women in aviation.
- **Monday, July 24:** Ice Cream Social, sponsored by Endeavor Air (SOLD OUT).
- **Wednesday, July 26:**
  - Annual WomenVenture group photo, 11 a.m., Boeing Plaza.
  - Power Lunch, Theater in the Woods (SOLD OUT), with keynote speaker Michelle "Mace" Curran, author and former U.S. Air Force Thunderbirds pilot, presenting *Upside Down Dreams*.
  - Evening program, Theater in the Woods, 6:30 p.m., with pioneering female military pilots Jeannie Leavitt, Sharon Preszler, and Martha McSally, plus more female pilots who have served in the U.S. armed forces.
- **Thursday, July 27:** Female aviation authors featured all day at EAA WomenVenture Center.
- **July 26-29:** Evening activities hosted by exhibitors on WomenVenture Center patio.

EAA WomenVenture is presented by The Boeing Company, with additional support from Endeavor Air, General Aviation Manufacturers Association, The Ninety-Nines, Piedmont Airlines, United Airlines, University of North Dakota Aerospace, U.S. Air Force, and Women in Aviation International. EAA

BRIEFLY NOTED

Popular Museum Celebrates 50 Years

The Beechcraft Heritage Museum in Tullahoma, Tennessee, is celebrating its 50-year anniversary this year. Founded in 1973 by John Parish Sr., the museum is home to a wide variety of Beech and related aircraft, from Travel Airs and Staggerwings to Bonanzas and Starships. The focal point of the anniversary will take place at this year's annual "Beech Party" fly-in on October 12-14.

New GA Engine Certificated

DeltaHawk Engines has announced that it has received FAA type certification for its 180-hp DHK180 inverted-V engine that is designed to run on Jet A fuel. The company expects to start delivering engines in 2024.

Historic Racer Flies Again

Thunderbird, a classic P-51C Mustang that won the 1949 Bendix race and was once owned by both Jimmy Stewart and Jacqueline Cochran, recently made its first flight after an 11-year restoration by AirCorps Aviation in Bemidji, Minnesota.

Nate Hammond Honored

Hammond, EAA Lifetime 1193485, a popular air show performer known for both skywriting and his exciting day and night aerobatic display routines, has been named this year's recipient of the prestigious Bill Barber Award for Showmanship. The award spotlights an air show performer who has demonstrated superb showmanship ability and is presented annually by World Airshow News and friends and family of the late Bill Barber, air show performer extraordinaire. The award will be presented during EAA AirVenture Oshkosh 2023.

Ultralight Stories Wanted

Are you passionate about the lighter side of flying?! We're looking for a variety of stories, insights, advice, and/or tips to share in the monthly Ultralight World column in *EAA Sport Aviation*. Submissions should be sent as 1,200-1,500-word documents, Microsoft Word or equivalent (no PDFs, please), with two to three accompanying high-res photos as standalone files (not embedded in the document). Send your questions or submissions to editorial@eaa.org.

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Pilot proficiency group learning

BY JOHN EGAN, EAA CHAPTERS SENIOR MANAGER

OUR EAA ORGANIZATION PROVIDES multiple opportunities to learn about aviation and to improve pilot proficiency. Within many of our nearly 900 EAA chapters in the United States and internationally, IMC and/or VMC Clubs meet as part of their chapter activity on a regular frequency to discuss and wring out actual flights that occurred where a decision by the pilot was required. It is conversations like these that help us be better pilots and better decision-makers. These group IMC and VMC Club discussions are based on prerecorded video presentations of scenarios that EAA provides to IMC and VMC Clubs each month. The group discussions truly help prepare the participants in the group with valuable insight into a flying situation that may happen to them. This organized hangar flying program is all about engaging and discussing actual flights, all designed for club participants to consider the question, "What would you do, if you were the pilot?"

First, let's be clear on what we mean by IMC and VMC Clubs. EAA IMC and VMC Clubs supplement local EAA chapters that offer monthly meetings where pilots can network and share knowledge and experience. The meetings use real-world scenarios to engage members and allow a free exchange of information that improves awareness and skills. The intent is to create a community of pilots willing to share information, provide recognition, foster communications, promote safety, and build proficiency, all in a social

The group discussions truly help prepare the participants in the group with valuable insight into a flying situation that may happen to them. This organized hangar flying program is all about engaging and discussing actual flights.

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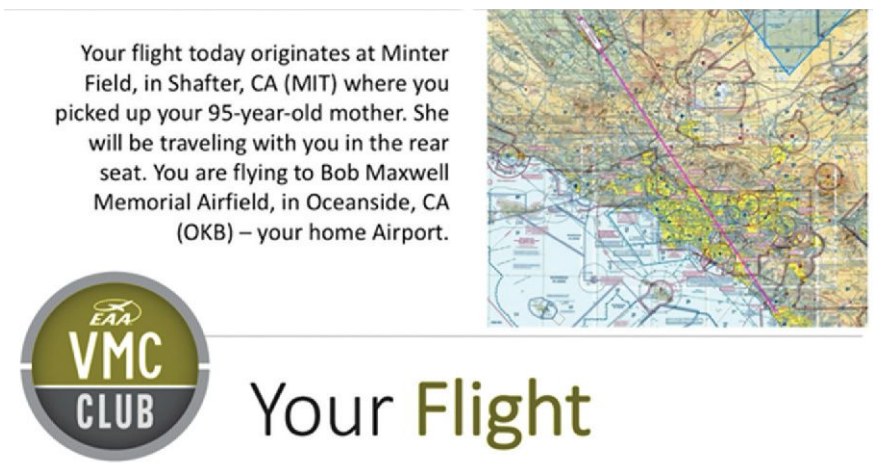
setting. Through the EAA IMC and VMC Club programs in chapters, pilots have improved their proficiency; they love it, and they appreciate it.

The EAA IMC Clubs are designed to promote instrument flying, proficiency, and safety when flying in conditions that require pilots to fly primarily with reference to instruments and under instrument flight rules (IFR). Typically, IFR flying involves flying in cloudy or foul weather.

Our EAA VMC Clubs are designed to promote flying, proficiency, and safety when flying in visual flight rules (VFR) conditions where pilots operate airplanes in weather typically clear enough to allow the pilot to see where the aircraft is going with visual reference to the ground. Regardless if you are a VFR or IFR pilot, each program may resonate with you and provide the opportunity for growth.

Using these programs, EAA chapters can offer monthly IMC or VMC Club meetings or both to local EAA members. Regardless of club type, EAA provides monthly content that virtually places the club participants in the pilot's seat. The scenarios are designed to encourage a pathway to open discussion for all participants to answer the question, "What would you do if this happened to you?" Providing the opportunity for each IMC and VMC member participant to hypothetically place themselves into an actual situation and be involved in open discussion is the key to building proficiency and increasing safety as a pilot. This is educational hangar flying at its best.

In addition to monthly open-ended video scenarios provided by EAA, club coordinators also receive a monthly IMC or VMC "Question of the Month" to share with their members. The Question of the Month is intended to be used simply as a quick icebreaker at the start of each meeting to get discussion going. The Questions of the Month are typically relatively fundamental in complexity; however, they can be informative for those who are not necessarily high-time pilots or those who are a little rusty with their rules or regulations. They can be especially helpful if the participant is not yet a pilot and typically a right-seater.



As mentioned, the flight scenarios are presented as videos; however, let's take a look at one of EAA's VMC program scenarios written out for reading purposes. Imagine you are one of a group of pilots sitting inside a hangar or FBO at your local airport. Your EAA VMC program coordinator presents the following dialogue to the group by way of a prerecorded video presentation. The video scenario is followed by open discussion by the group. By the way, all of the scenarios are inspired by actual flights and provided to EAA by EAA members.

VMC Club – Almost Powerless

- *You are in a 1979 VariEze equipped with a Continental O-200, with 1,000 hours SMOH, a legacy six-pack panel, and no autopilot.*
- *Your flight today originates at Minter Field (KMIT) in California, and you are traveling southeast to Bob Maxwell Memorial Field (KOKB), your home airport, also in California.*
- *Time en route is approximately 1.5 hours, and you have 24 gallons of fuel on board, or about four hours.*
- *The weather forecast for most of the region and at your destination calls for clear skies and greater than 10 miles' visibility. Winds are forecast to be 110 degrees at 8 knots.*
- *You depart at 1500 local time and climb on course. Everything is going smoothly. You turn on heading for KOKB and continue to climb.*
- *After about 10 minutes, the engine begins to run a little rough. You reduce power to 1500 rpm, and the engine sounds okay. As you increase power, the engine roughness increases.*
- *You glance at your altimeter and are at about 3,800 feet.*
- *What would you do?*

The above scenario was an actual situation offered for content for an EAA VMC Club meeting. Club members would then discuss what they might do, given they were in the pilot's seat. The responsibility of the club coordinator is to continually encourage open discussion from the group. As you can imagine, discussions such as these are informative, educational, and simply provide another social opportunity for members.

As an EAA chapter, it's easy to form an IMC or VMC Club. Simply complete the online club formation form located in the appropriate program website listed to get the process started: EAA.org/IMCclub and EAA.org/VMCclub.

To contact us here at EAA to discuss the opportunity to form a club, simply email us at imcvmc@eaa.org. EAA

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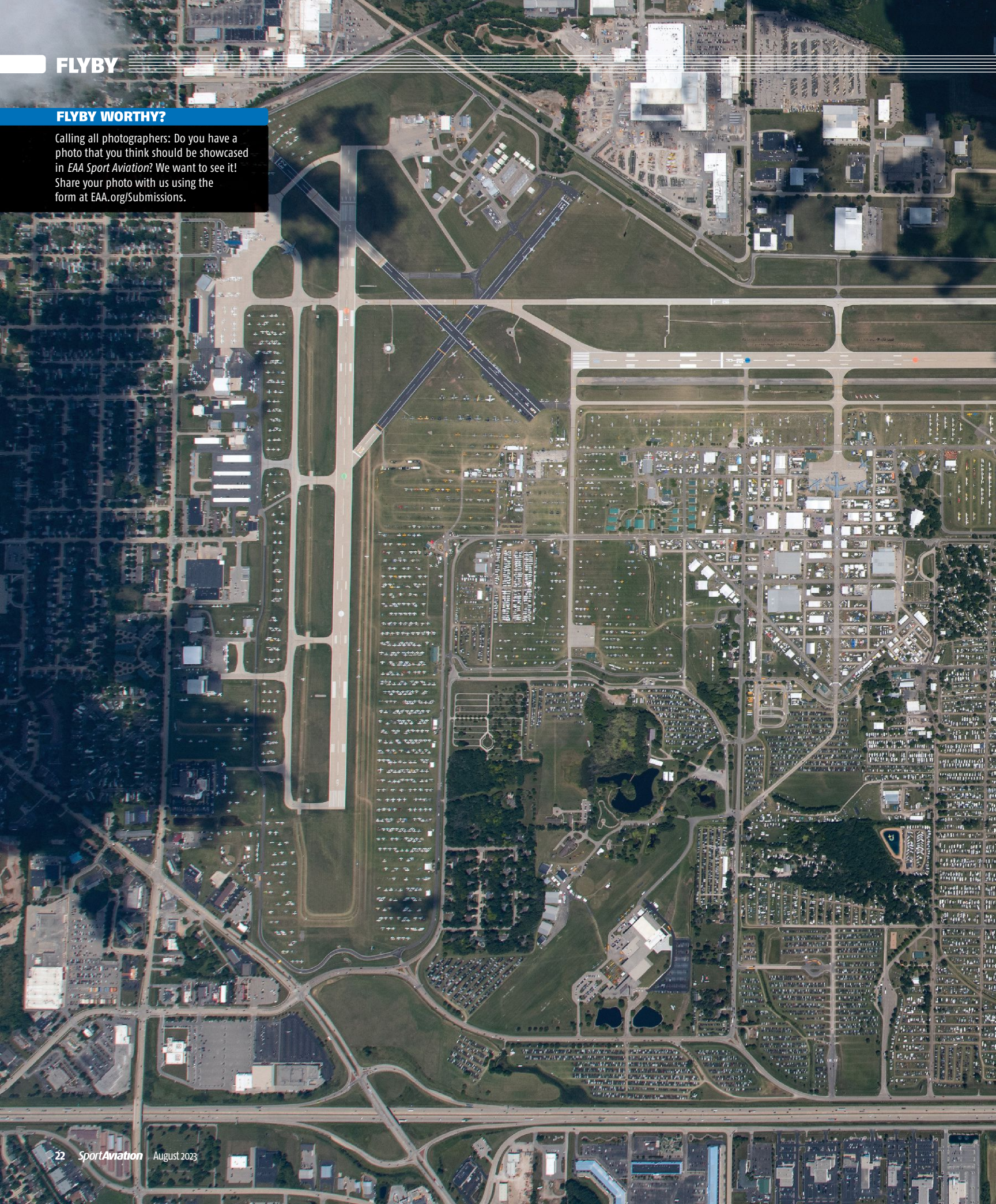


WHAT
EAA AirVenture Oshkosh 2022

WHERE
Oshkosh, Wisconsin

PHOTOGRAPHER
Connor Madison

STEVE KROG
COMMENTARY / THE CLASSIC INSTRUCTOR

Tailwheel Training

Be certain of what you are getting

BY STEVE KROG

IN THE PAST FEW weeks, I've had a number of individuals come to Cub Air for tailwheel training. Three had a tailwheel endorsement, but two had never soloed a tailwheel aircraft. Each individual had a different story to share, but after hearing them, I can only say I truly respect these individuals for coming forward and wanting more training.

According to the FARs, a tailwheel endorsement can only be issued when the individual can satisfactorily demonstrate three-point (sometimes called full-stall) landings and wheel landings under normal and crosswind conditions. All three lacked confidence in their tailwheel flying ability and thankfully sought out more training.

One student had purchased a tailwheel airplane and was given eight to 10 hours of dual instruction by the owner before flying it to Hartford (KHXF). All the flight hours were accomplished on turf under light wind conditions. We have both turf and hard surface runways at KHXF, and the individual would fly when the wind was light and variable favoring the turf runway. More than once he managed to demonstrate a slow-motion ground loop. No damage was ever encountered other than wounded pride.

After not flying for several months over winter, this individual decided this spring day was much too nice not to fly. The turf runway was still closed, so it was time to test his abilities on the hard surface. For most this would be an excellent choice as the wind was near dead calm and the temperature around 50 degrees Fahrenheit.

The most difficult part of learning to fly a tailwheel airplane is to first forget everything you ever heard from the hangar coffee klatsch crowd. Most have little or no tailwheel time and are just repeating the stories heard from other older coffee klatschers.

The takeoff and subsequent flight were both pleasant and uneventful. When it came time to land, nerves were on edge, the calf muscles tight, and the grip on the control stick became a death grip. The approach looked good, speed was right on, and the flare was as desired. But then the wheels touched, and suddenly the airplane was heading to the right side of the runway aimed at the piled snow. A second or so later, the aircraft was firmly embedded in the snowbank.

With a little help we removed the airplane from the snowbank and moved it back to the hangar. As the nerves settled and muscles relaxed, we began analyzing what had just happened. After touching down the airplane drifted to the right. Rather than applying the left rudder, the pilot took his feet off the rudder pedals and began trying to correct by applying brakes. In essence, the tail was in a freewheeling mode and had a mind of its own.

In all fairness to the pilot, part of the problem can be attributed to the tail wheel leaf spring. The U-bolt holding the three leaf springs in place had broken, allowing the leaf springs to move and preventing the tail wheel from full and correct travel.

It may have broken due to wear, or it might have been when the tail wheel was flapping side to side putting an undue load on the leaf spring. However, removing the feet from the rudder pedals and trying to take corrective action via the brakes only contributed to the ego-bruising event.

The second individual had a somewhat similar story. He received about 10 hours of dual instruction, resulting in a tailwheel signoff. Not feeling comfortable or confident, he decided he needed some

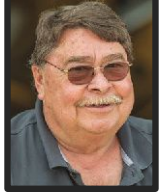
additional training as he had never done a crosswind or wheel landing and had never taken off or landed on a hard surface.

It's hard to believe that an instructor would sign off on an individual like this without meeting the needed requirements. Thankfully, this person wanted and needed more training before ever attempting a solo flight in a tailwheel airplane.

After flying twice each day for five or six days, the confidence and proficiency returned. He was now ready to safely fly tailwheel airplanes upon his return home.

As a flight instructor, I really must question how in all good conscience an instructor could sign off on a tailwheel endorsement for both individuals. In my humble estimation, both were destined for failure, and the first example mentioned did just that. I don't think I could sleep at night under these circumstances.

A third individual came to us with a tailwheel endorsement as well. But upon reviewing the logbook there were only three hours logged in a tailwheel airplane. We discussed the previous training, and I learned that little was done in the way of accomplishing the necessary requirements. This person, a young CFI, wanted to be able to provide dual tailwheel instruction but was more than apprehensive about doing so. Questioning their own proficiency and safety, the CFI turned down providing tailwheel instruction to



others until receiving further training. This individual went through our training program and is now performing tailwheel instruction.

Another young man from Florida came to Cub Air at the suggestion of his grandfather, a corporate pilot. The surface winds during his time with us were less than ideal, so he received a lot of good crosswind experience on turf and hard surface runways.

Toward the end of his training he asked about ground loops, so one of our young CFIs demonstrated a crosswind ground loop on the 200-foot wide turf runway. After seeing and experiencing how it developed and what to do with the controls, he vowed to never forget using the rudder pedals ever again.

The most difficult part of learning to fly a tailwheel airplane is to first forget everything you ever heard from the hangar coffee klatsch crowd. Most have little or no tailwheel time and are just repeating the stories heard from other older coffee klatschers. Tales like, "You better be careful because that tail will come around so fast you'll never see it coming!" Forget all this nonsense and "free but untrue" advice.

The next most difficult step in learning to safely fly a tailwheel aircraft is to use your feet. This is an art that is often neglected when flying the usual tricycle gear training airplanes.

After a thorough preflight inspection of the Piper J-3, we start by just learning to taxi the airplane. Traffic permitting, we use the 200-foot wide turf runway and practice making S-turns the full length of the runway. This teaches the required lead and lag time required to make turns safely. Then if time and conditions permit, the instructor handles the power and the control stick while the student has the rudder pedals only. Some power is applied while holding the stick back. The groundspeed is well below liftoff. The student then must apply rudder pressure as needed to keep the airplane on a straight-line track.

Takeoffs and landings are initially done on turf. This is where we begin developing the sight picture for what one needs to see and do. In the three-point attitude, forward visibility is blocked. It is necessary to look about 30 degrees left or right of straight ahead. Your peripheral vision catches the side of the engine cowling, which tells you if you are drifting left or right. Your forward visibility maintains your depth perception. Looking 30 degrees left or right of center, track that line of sight to where it intersects the edge of the runway.

On a normal 75-foot wide hard surface runway, this is equal to about two runway lights ahead of the airplane. When flying off our 200-foot wide turf, the line of sight is about 150 yards ahead of the airplane. Maintain this visual during the takeoff roll.

The most common mistake made at this point is trying to look over the nose. Until the tail lifts off the runway, forward visibility is obscured. Even then, depending on the airplane being flown, visibility remains obscured throughout the takeoff roll. The second most common mistake is the lack of rudder usage. Without proper rudder inputs the takeoff roll will have a decidedly leftward track. This often leads to too much rudder input, launching the airplane into a series of S-turns that become more severe the longer the aircraft remains on the ground.

What I like to do with tailwheel students is to begin pattern work on turf. When the student can keep the aircraft reasonably straight, I transition to using the hard surface for takeoffs but remain on turf for the landings. This method really helps the student develop smooth, rapid rudder inputs with minimal risk.

Tailwheel landings can be quite interesting during the first one or two hours. Three common mistakes are usually committed during this phase. The first is losing sight of the runway as the aircraft levels off and before the flare even begins. A student will usually try to continue looking over the nose, resulting in loss of depth perception. This results in a good bounce type of touchdown. Without depth perception, the student pilot does not know if they are 5 feet or 1 foot above the runway.

The second mistake is freezing on the rudder pedals. Both feet are firmly planted on the pedals, exerting massive foot-pounds of pressure. Leg and calf muscle relaxation are mandatory if a good safe landing is to be made. Never push and hold on one or the other pedal during the landing and rollout. Rather, it is a matter of tapping and releasing rudder pressure. Pushing and holding creates S-turns and ultimately a spectacular ground loop.

The third mistake is the lack of continuing with the control stick back-pressure and then keeping it full back until coming to a stop. Most all tricycle pilots will relax or even let go of the control stick once the main gear touches the runway surface. This results in some outstandingly high bounces between each of four or five touchdowns. The observing peanut gallery will get some great laughs at your expense as you try to corral that beast of a Cub.

Tailwheel training is not to be feared. Rather, it will make one a much better and more proficient pilot. But be certain of the training you are getting, unlike the tailwheel students mentioned earlier in this article, and know that you are a safe pilot.

Be safe, stay proficient, and have fun! EAA

The next most difficult step in learning to safely fly a tailwheel aircraft is to use your feet. This is an art that is often neglected when flying the usual tricycle gear training airplanes.

Steve Krog, EAA 173799, has been flying for more than four decades and giving tailwheel instruction for nearly as long. In 2006 he launched Cub Air Flight, a flight training school using tailwheel aircraft for all primary training.

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Thursday
10:00 am – What an Oil Change Can Reveal About Engine Health

Friday
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LISA TURNER
COMMENTARY / AIRWORTHY

Secondhand Projects

Terrific or terrible?

BY LISA TURNER

AS A TECHNICAL COUNSELOR, I get all manner of calls from builders who realize they should have called earlier.

"Lisa, this is Roger. I just bought an aircraft kit. Can you come over and get me oriented?"

"Sure. It just showed up from the factory?"

"No, the previous owner dropped it off. It's thirdhand."

"Okay." I took a deep breath.

I know that secondhand (or third or fourth) kits could be missing enough items to cause major problems for the builder.

A few days later, I visited the project.

"It was a great deal," Roger said as we entered the hangar. Boxes sat on the floor and panels were on benches. The fuselage sat in a set of slings.

"Did you get someone to evaluate this before you got it?" I asked.

"No, I acted quickly," he said. "I found it in the classifieds, and it's the airplane I have always wanted but couldn't afford."

"Why did the builder sell it?" I asked.

"He said he was in over his head."

"But it's thirdhand?"

"Yes, he bought it in an estate sale."

Sadly, after an inspection of the kit, I found that most of the work that had already been performed was not good and about a fourth of the parts for the kit were missing. No builder's log existed. And Roger didn't have the bill of sale from the kit manufacturer, only the cleared check he had paid to the last owner.

Finding and purchasing a used kit could be an excellent path to fulfill your dream of building and flying your own airplane.

Don't get caught in this trap. We ended up figuring out what needed to be done. Between rework, new kit components, and many long discussions with the local flight standards district office, Roger eventually got into the air in his dream airplane. However, it ended up being far more time-consuming and expensive than if he had started fresh with a kit from the manufacturer.

It doesn't need to be this grim. Finding and purchasing a used kit could be an excellent path to fulfill your dream of building and flying your own airplane.

WHY IT COULD BE A GREAT CHOICE

Money. The massive excitement around building and flying your own airplane cannot be underestimated. If you've experienced it yourself, you know exactly what I'm talking about.

There's just nothing else like it. If the bug has not bitten you, just go to an air show or fly-in. The opportunity to get a project for a lot less money is very attractive.

Less work. Secondhand and thirdhand projects often have a portion of the kit completed. This means less work for you.

Extras. Many kits include extras you might not have invested in. They can range from glass panel upgrades to better brakes to accessories.

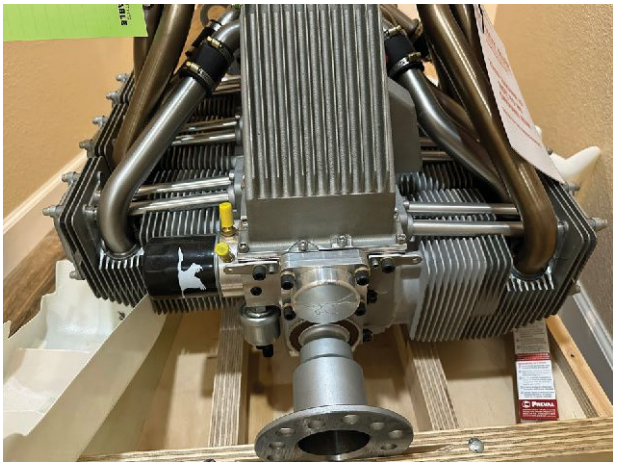
A new start. Assembled components that don't meet your workmanship standards can be abandoned and reordered from the factory for a fresh start. (So much for the less work part.)

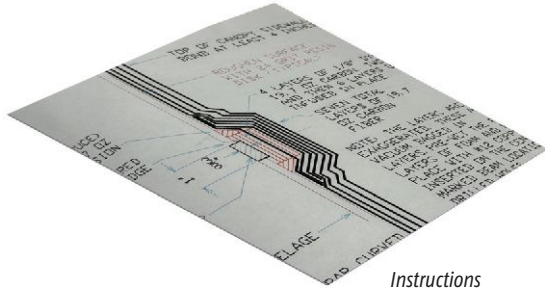
WHY IT COULD BE A POOR CHOICE

Workmanship. If a lot of the kit has been completed, it may be difficult to see interior areas. If one builder did the work, then the quality levels that you do see will most likely reflect the quality levels you cannot see.

Most of us made our mistakes at the beginning of our first aircraft build, and the anxiety of making a mistake drove us to get advice and double-check everything. But we were still newbies. If you're buying a builder's first project, there could be mistakes that are hidden.

If poor workmanship is obvious from the out-in-the-open items, like riveting on cowling panels or wiring, then it is a bad sign for the rest of the project.





Instructions

If more than one person took part in the build, then it's even more important to get an expert opinion.

Chain of ownership not maintained through the transfers. Who owns the airplane? Some kits have changed hands many times, with the formal bill of sale from the manufacturer going missing along the way. The part we don't like to deal with — paperwork — will be important when you need to register the airplane and when the designated airworthiness representative arrives to award an airworthiness certificate.

Missing or outdated parts. Next to missing paperwork, this is the biggest problem I see in secondhand kits. The owner swears, "I have 100 percent of the kit," but an inventory falls short. "Oh, gee, I wonder what happened to that part. It was here last week."

Time-limited parts. If the kit has been sitting for years, time-sensitive parts might need to be replaced, like hoses.

The aircraft manufacturer has gone out of business. This may not be a problem if you have all the parts for the kit and if you have the bill of sale from the manufacturer to the first buyer and any in-between transfers. But it may be a problem if you have any missing paperwork or parts, from directions and manuals to items that can't be sourced anywhere else.

HOW TO FINISH AND FLY YOUR SECONDHAND PROJECT

Get informed. Take the time upfront to research the kit you are looking for. Contact the manufacturer for parts lists and kit contents. By the time you head out to look at a possible purchase, you want to know as much about the airplane as the seller does.

Determining fair value. Use the research to approximate a fair price. This isn't easy since there are so many factors that influence it. Check with a builders group, classifieds, and the manufacturer. If the kit is not a common one with plenty of airplanes flying, your work will be tougher, but persevere.

The good news is that most sellers are highly motivated to make the sale. They will often come down on price if you ask. Offer to pack and transport the kit out of the location. With estate sales, this tactic can net you a huge price reduction.

Complete inventory. If you're serious about the kit, you and your prebuy expert should visit the kit and take an inventory. Take more pictures than you think you will need. It's easy and may be helpful later.

CHECKLIST

- ✔ Builder's log with photographs
- ✔ Bill of sale from the kit manufacturer — FAA Form 8050-2
- ✔ Bill of sale from the first owner to the following owner
- ✔ Bill of sale to you
- ✔ All of the documentation that came with the kit — plans, parts lists, manuals, and instructions
- ✔ Inventory of all parts and components
- ✔ Does the kit show acceptable workmanship on parts that have been completed?
- ✔ Engine condition?
- ✔ Avionics current?
- ✔ Expiration of time-limited parts?
- ✔ Determine what's missing
- ✔ Inspected by an expert?
- ✔ Be prepared to walk away

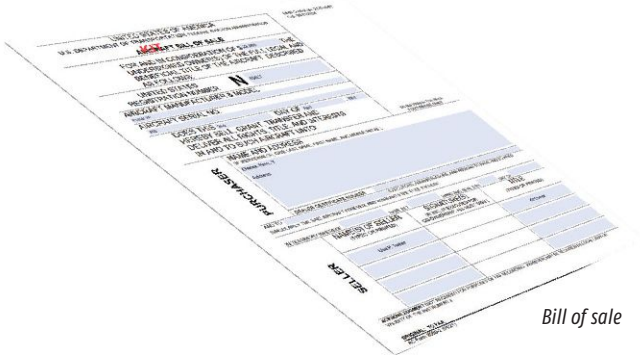
PHOTOGRAPHY COURTESY OF **LISA TURNER**

LISA TURNER
COMMENTARY / AIRWORTHY

SELLING

If you've encountered circumstances that cause you to stop work on a kit, heed the buyer advice. Make sure you've got the bill of sale from the kit manufacturer, receipts for what you've purchased, and a builder's log filled with detail on what you've accomplished to date. Take lots of pictures of progress and be as organized as you can.

When pricing your project, remember that your labor on the kit is not going to factor into the price you ask for unless the kit is in high demand. In that case, the market for that kit will drive the price up.



Bill of sale

Engine. How long since it left the factory? Where is it being stored? If it's overhauled or otherwise used, try to assess condition and status. In some respects, it's better to find a kit without an engine. Then you can source one where its condition is clear and when you are ready for it.

Avionics. Depending on what the kit comes with, avionics can be minimal and not a factor, or they can be a big factor if they're way out of date. The advice of the prebuy expert and the builders group will come in handy.

Documentation. One of the first questions you should ask is about paperwork. Does the current owner have a bill of sale from the manufacturer and a bill of sale from any previous owners?

The kit manufacturer will only give an official bill of sale (FAA Form 8050-2) to the person it sold the kit to. It will not give another one to you since it didn't sell the kit to you. This situation could leave you unable to register the aircraft.

One of the first questions you should ask is about paperwork. Does the current owner have a bill of sale from the manufacturer and a bill of sale from any previous owners?

Tell the seller that you must have the bill of sale from the manufacturer. They may be able to get the bill of sale from the previous owner.

Don't allow yourself to fall into this paperwork trap. If you do find yourself in this situation, or you haven't bought the kit yet, my advice is to talk to the FAA folks about anything you can do to provide the ownership chain necessary to complete the build and get in the air. In my experience, the FAA has been very helpful in these situations with builders.

A builder's log can be a big help in getting the airplane inspected and registered, as well as helpful to you in your build. If little has been done in the build, and you do have the chain of ownership documentation, then you'll want to begin a log right away.

Don't buy an unfinished kit on the spot. If you know it's the one you want, the seller will give you 24 hours of thinking and further research time with a deposit. I've seen too many builders make snap decisions and then realize excitement got the best of them.

Unknowns. Be flexible as you do your research. You may owe sales tax in your state on a kit, and there may be parts you need to purchase. Building your own airplane will almost always take more money and time that you thought it would.

A prebuy inspection. I left this for last because it is the most important. Never purchase a secondhand kit aircraft project without a prebuy from someone qualified. Who is qualified? It may be a highly experienced person from the builders group or someone in your EAA chapter. You can also call the manufacturer for recommendations. If the kit is not well known, and not many are flying, an experienced A&P mechanic can help you.

PLANSBUILT?

If you have your sights set on an in-progress plansbuilt aircraft, then the documentation becomes even more important. Rather than producing a formal bill of sale from a kit manufacturer, you will need the receipts for major components and parts.

Collectively and along with a detailed builder's log, these records provide the source for showing the FAA that you started from scratch and kept good records.

If you like a plansbuilt kit that is partially assembled but the builder has little documentation, it can be a problem. In this case, do your research and consult with your local FAA officials about whether it's doable or not. Be ready to tamp down your excitement and walk away from anything you think will not work out.

FINAL THOUGHTS

When I reflect on all the in-progress projects I've seen, more than 80 percent of them exhibited thoughtful and attentive assembly and workmanship. This bodes well for those deciding to purchase an in-process previously-owned project. But if you don't do your homework, it could be a disaster.

The three most important components to a successful secondhand kit aircraft build are documentation, a prebuy performed by an expert, and perseverance. Without all three of these, the runway is going to be rocky, if not impassable.

With all three, the chances are high that you will be able to address the other deficiencies you find in the kit and be able to fulfill your dream of building and flying. EAA

Lisa Turner, EAA Lifetime 509911, is a manufacturing engineer, A&P mechanic, EAA technical counselor and flight advisor, and former designated airworthiness representative. She built and flew a Pulsar XP and Kolb Mark III and is researching her next homebuilt project. Lisa's third book, *Dream Take Flight*, details her Pulsar flying adventures and life lessons. Write Lisa at Lisa@DreamTakeFlight.com and learn more at DreamTakeFlight.com.

PHOTOGRAPHY COURTESY OF **LISA TURNER**

Custom Aircraft Painting

by

Fulltron

Hey Marlin,
Made it home ....uneventful. The paint work is amazing! I'm still finding extra things you did to make it a better overall product. You exceeded my expectations, and that's hard to receive these days. Many thanks to you, Kelly and everyone that had a hand in completing my project. I'll be spreading the word. Good luck in your new business.
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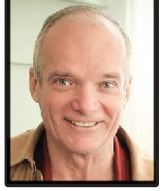


CHARLIE PRECOURT
COMMENTARY / FLIGHT TEST

Task-Based Phase I Is Here

FAA issues some welcome changes to flight testing your experimental aircraft

BY CHARLIE PRECOURT, SAFETY COMMITTEE CHAIRMAN, EAA BOARD OF DIRECTORS

TAKE A MOMENT AND Google "FAA Advisory Circular 90-89C." It is the newly released FAA handbook for Phase I flight testing of amateur-built and ultralight aircraft. It implements changes we've advocated for several years.

In Phase I testing, the builder and/or pilot must show "the aircraft is controllable throughout its normal range of speeds and throughout all the maneuvers to be executed; and the aircraft has no hazardous operating characteristics or design features." This quote is directly from the aircraft's operating limitations (FAR 91.319) and has traditionally required a 40-hour test period before carrying passengers (25 hours if a type-certificated engine/propeller combination is installed).

Now, with the guidance in AC 90-89C, these minimum time requirements can be replaced by completing flight test "tasks" (gathering flight data) that produce an aircraft operating handbook (AOH). Once the test maneuvers are complete and documented, the aircraft can exit Phase I.

The great advantage of this new approach is we eliminate boring holes in the sky to fly off the hours, a common practice that did nothing to advance knowledge of how the aircraft performs or behaves. There is great guidance available in the *EAA Flight Test Manual (FTM)* published in 2018, titled "A Task-Based Approach to Phase I," but at that time it didn't relieve pilots of the 40-hour requirement.

The *FTM* has 18 test cards and guidance on how to perform them to create an operating handbook for an amateur-built aircraft. Even for type-certified aircraft, you can fly these test cards to cross-check a specific aircraft's performance against the manufacturer's data. For amateur-built aircraft, whether these test cards take 15 hours or 50 hours is irrelevant. The key is to use the time required to complete the tasks to fully understand the aircraft's capabilities and limitations.

As described in 90-89C, "this AC creates the ability for builders to utilize a comprehensive, individualized task-based flight test plan to meet the objectives of the flight test, but according to certain completion criteria and possibly less than the typical 25 or 40 hours, depending on the complexity of the aircraft."

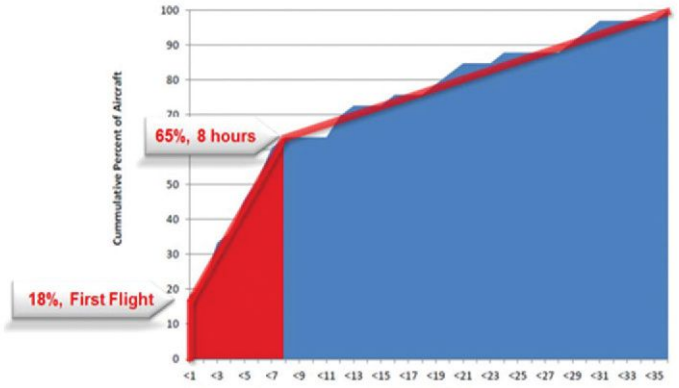
By way of history, in 2011, amateur-built aircraft were placed on the NTSB's "Most Wanted List" of safety issues for high rates of loss-of-control accidents. Since then, EAA has taken on a number of initiatives to bring the accident rate down, with a great deal of success.

The first was to add the Additional Pilot Program (AC 90-116) that went into effect in 2014. This allowed the testing in Phase I to include a second qualified pilot on board who had experience in a similar amateur-built aircraft. Since this AC was implemented, there have been no known accidents in Phase I among those who have chosen to use the Additional Pilot Program (APP) option. This stands in stark contrast to the accident history in amateur-built aircraft, particularly in the first eight hours. See the chart below taken directly from AC 90-116.

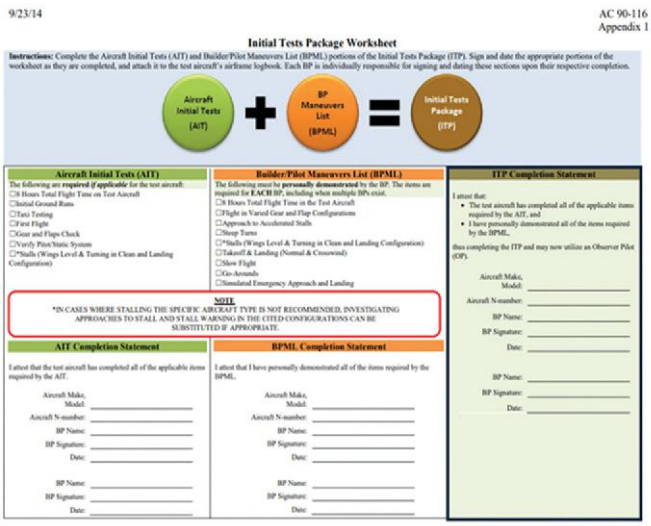
Once the APP was in place, we published the EAA *FTM* in 2018 and began our advocacy for the task-based approach, which is now available to those beginning Phase I using the new AC 90-89C. Paul Dye, EAA Lifetime 751070, and editor at large of *Kitplanes* magazine, is the first to use this approach in Phase I testing of his new eXenos electric motorglider. He reports that it is working out well and only required a one-sentence change to his operating limitations when issued by his local flight standards district office. We'll publish more on Paul's experience in a future article.

9/23/14 AC 90-116

FIGURE 3. CUMULATIVE PORTION OF PHASE I E-AB ACCIDENTS WITH LESS THAN 35 AIRFRAME HOURS (2011)



During the development of the Additional Pilot Program, provisions were put in place to eventually move to task-based Phase I testing. The figure below features a flow chart from the APP advisory circular appendix that shows the aircraft initial tests and the builder-pilot's maneuvers list that were to be completed during Phase I. These have all been incorporated into the EAA *FTM*. Additionally, Section 3 of the *FTM* provides an outline for creating the AOH, where the pilot can literally fill in the blanks using data collected on the test cards during flight.



9/23/14 AC 90-116 Appendix 1

Initial Tests Package Worksheet

Instructions: Complete the Aircraft Initial Tests (AIT) and Builder/Pilot Maneuvers List (BPML) portions of the Initial Tests Package (ITP). Sign and date the appropriate portions of the worksheet as they are completed, and attach it to the test aircraft's airframe logbook. Each BP is individually responsible for signing and dating these sections upon their respective completion.

Aircraft Initial Tests (AIT) + BP Maneuvers List (BPML) = Initial Tests Package (ITP)

Aircraft Initial Tests (AIT)

The following are **required if applicable** for the test aircraft:
- ☐X Hours Total Flight Time on Test Aircraft
- ☐Initial Ground Runs
- ☐Taxi Testing
- ☐First Flight
- ☐Gear and Flaps Check
- ☐Verify Pitot/Static System
- ☐*Stalls (Wings Level & Turning in Clean and Landing Configuration)

Builder/Pilot Maneuvers List (BPML)

The following must be **personally demonstrated** by the BP. The items are required for **EACH** BP, including when multiple BPs exist.
- ☐X Hours Total Flight Time in the Test Aircraft
- ☐Flight in Varied Gear and Flap Configurations
- ☐Approach to Accelerated Stalls
- ☐Steep Turns
- ☐*Stalls (Wings Level & Turning in Clean and Landing Configuration)
- ☐Takeoff & Landing (Normal & Crosswind)
- ☐Slow Flight
- ☐Go-Arounds
- ☐Simulated Emergency Approach and Landing

ITP Completion Statement

I attest that:
- The test aircraft has completed all of the applicable items required by the AIT, and
- I have personally demonstrated all of the items required by the BPML,

thus completing the ITP and may now utilize an Observer Pilot (OP).

Aircraft Make, Model: _____
Aircraft N-number: _____
BP Name: _____
BP Signature: _____
Date: _____

BP Name: _____
BP Signature: _____
Date: _____

NOTE

*IN CASES WHERE STALLING THE SPECIFIC AIRCRAFT TYPE IS NOT RECOMMENDED, INVESTIGATING APPROACHES TO STALL AND STALL WARNING IN THE CITED CONFIGURATIONS CAN BE SUBSTITUTED IF APPROPRIATE.

AIT Completion Statement

I attest that the test aircraft has completed all of the applicable items required by the AIT.

Aircraft Make, Model: _____
Aircraft N-number: _____
BP Name: _____
BP Signature: _____
Date: _____

BP Name: _____
BP Signature: _____
Date: _____

BPML Completion Statement

I attest that I have personally demonstrated all of the items required by the BPML.

Aircraft Make, Model: _____
Aircraft N-number: _____
BP Name: _____
BP Signature: _____
Date: _____

BP Name: _____
BP Signature: _____
Date: _____

As an example of how task-based testing would work for Phase I, we can look at a test card from EAA's *FTM*. One that makes the point well about using early flight testing to fully understand the aircraft's performance and behavior is the stall test on Card 6 (see figure below). The cards have an explanation of the test maneuver, how to perform it, and a card with data blanks to complete.

EAA FTM Test Card 6
Wings-Level Stall

Risk Designation: High

Date	Time	Fuel	Weight/CG

Procedures

CG: As indicated in the EAA FTM flight test matrix, start with forward CG locations. If your airplane has retractable gear, fly the tests with the gear up and with it down.
Fuel: One hour minimum, to full fuel as required by the EAA FTM flight test matrix.

Possible Emergencies: Loss of control, spin. If you are not spin-qualified and comfortable, hire a professional test pilot for these tests.

1. Normal takeoff and climb to safe altitude, at least 3,000 feet AGL in smooth air; 8,000 feet AGL is preferred.
2. Level off, trim to desired speed, and configure the airplane (flaps).
3. Power to idle.
4. Decelerate at 1 knot/mph per second.
5. Note IAS at stall buffet or stall warning.
6. Positive control force? Slower speeds need more stick/yoke pull.
7. Any control reversal? Slower speeds need stick/yoke push.
8. Note IAS at stall break.
9. Note roll direction and amount at stall break.
10. Recover from stall.
11. Return to safe altitude and make subsequent runs.
12. Normal landing and shutdown.

EAA Flight Test Manual | Version 1.0 | October 2018

Configuration: Idle power, takeoff flaps. Trim Speed:

Run	Stall Warning IAS	Positive Stick Force?	Control Reversal?	Roll At Stall (Deg, L/R)	Stall IAS
1					
2					
3					

Configuration: Idle power, full flaps. Trim Speed:

Run	Stall Warning IAS	Positive Stick Force?	Control Reversal?	Roll At Stall (Deg, L/R)	Stall IAS
1					
2					
3					

In stall testing, understanding the unique cues of the aircraft (how it "talks" to you) is critical to ensuring an appropriate reaction should we unintentionally get near stall. Principally, we seek to verify that our aircraft conforms to the expected responses for this particular design in this flight regime. The following provides some added detail on how to fly this test card.

Begin by stabilizing in level flight at 15-20 knots above the predicted stall speed, at a safe altitude. When stable, make a control input in each axis, roll, pitch, and yaw. The inputs should be just enough to generate about 3-5 degrees of aircraft response; then move the controls right back to neutral (usually a 1-2 second input pulse). Then watch for the aircraft response. In roll, is there any accompanying adverse yaw? Does the aircraft stop rolling when the input is neutralized? In pitch, does the aircraft return to the previous attitude? Is there any tendency for the pitch to continue to rise after releasing the stick? Does the pitch attitude continue to oscillate? Add some power and observe any pitch response. Do you see a pitch up or down? A pitch up when advancing power could cause secondary stalls when attempting to recover with power.

If all is as expected, slow 3-5 knots and repeat the process. Make note of any changes in response as the aircraft gets slower. At the first sign of any uncommanded motion (nose rise or nose slice, wing rock, or nose drop), recover the aircraft by lowering the nose to break the stall, adding power, and increasing speed. Your detailed description of how the aircraft behaves is the best documentation you can place in your AOH.

In this column in 2013, while we were creating EAA's *FTM*, I wrote about stall testing and noted how little information was provided even for an aircraft like the Cessna 172 in its POH. It simply states: "Characteristics are conventional and aural warning is provided by a horn 5-10 knots above the stall in all configurations." That's it!

Alternatively, performing the flight test card as described above, we would learn that "the C-172 elevator control gets heavier as we slow down, the airframe begins to buffet slightly, the horn comes on, and then we get a mild nose drop ("*g*" break) followed by immediate recovery when we relax the back-pressure and add power. Total altitude loss is just a couple of hundred feet." That's a far better way to describe stalls in your AOH.

Needless to say, we welcome the changes enabled by AC 90-89C. Using the task-based approach and completing the *FTM*'s 18 cards, or those tailored to your specific needs, we end up with an aircraft less likely to surprise us, and piloting skills specific to the aircraft that will keep us out of trouble into Phase II and beyond.

Fly safe! EAA

Charlie Precourt, EAA 150237, is a former NASA chief astronaut, space shuttle commander, and Air Force test pilot. He built a VariEze, owns a Piper JetPROP, and is a member of the EAA board of directors.

KRIS CALDWELL
COMMENTARY / PLANE IMPRESSIONS

Bel-Aire 4000

A beautiful Frankenstein

BY KRIS CALDWELL

The Bel-Aire 4000 is fabricated with parts from four different aircraft, a car, and two women's handbags. It contains no wood!

FIRST IMPRESSIONS

THE BEL-AIRE 4000 IS not a restoration or a kit-built airplane but a one-of-a-kind creation. Modeled after a Travel Air 4000, the Bel-Aire 4000 is the creation of Bill Bardin, EAA 562007, along with Gerry Belcher and Nick Fratangelo, and it has some truly innovative design features. This graceful and well-engineered biplane is a delight to fly over the countryside and makes all the troubles of the world below disappear.

BACKGROUND

If you think the Bel-Aire 4000 bears a remarkable resemblance to the Stearman Kaydet series (PT-13/17/N2S), there's a reason. Lloyd Stearman was the designer of the Travel Air Model A. The Travel Air 2000/3000/4000 were all developed from Stearman's initial design, and it's clear that the iconic World War II trainer was a direct descendant of his Travel Air Model A.

In fact, the Travel Air Manufacturing Co. was founded by a "dream team" of early aircraft visionaries. In 1925, Clyde Cessna, Walter Beech, and Lloyd Stearman founded the company in Wichita, Kansas. Three years later, Wichita became known as the air capital of the world, with Travel Air producing more aircraft than any other aircraft manufacturer in North America.

The Travel Air 4000B was an immensely successful aircraft for passengers (room for two in the front cockpit), pilot training, airmail, and as a sport plane. Charles Lindbergh actually flew a Travel Air 4000 on airmail routes between Chicago and St. Louis. In 1929, seven of the 20 contestants in the first Women's Air Derby race from Santa Monica, California, to Cleveland, Ohio, flew Travel Airs, including the winner, Louise Thaden.

The Bel-Aire 4000 is fabricated with parts from four different aircraft, a car, and two women's handbags. It contains no wood! The 4000 is the second aircraft built by Bill Bardin. His first was modeled after a 1925 Travel Air 2000.

The Travel Air 2000 originally came with a 90-hp water-cooled Curtiss OX-5 V-8 engine. Bardin's Bel-Aire 2000 was powered by a Chevrolet 383 V-8 engine with a hand-carved wood prop.

The wooden wings were exactly duplicated from Travel Air 2000 wings. Bill's entire career has been spent working with metal, first as a master welder and later as a mechanical construction engineer. It was only natural that he wanted his second Bel-Aire to be all metal.

DESIGN CHARACTERISTICS

With only basic Travel Air drawings as a template, Bill began a project that essentially made him both an aircraft engineer and a test pilot. It seems unfair to compare this beautiful airplane to Frankenstein's hideous monster from Mary Shelley's classic, but parallels do exist.

The upper wings are from a Piper PA-12 Super Cruiser, and the shorter, lower wings are from a PA-22-108 Colt. The wings are arranged with a positive stagger; the top wing is located forward of the lower one. Aluminum N-strut bracing transfers thrust loads and adds rigidity while stainless steel wires with javelin struts prevent torsion and vibration. The bottom wing ailerons drive the upper ailerons with a bellcrank and slave linkage rod. While the airfoils are different from the original, the wing square footage is the same as a Travel Air 2000.

Using homebuilder innovation, Bill built a hinged door into the unused right lower wing fuel tank to create a small baggage compartment. There is an additional storage compartment in the fuselage just forward of the front seat. The angular windscreens are from a Stearman and give it slightly more wind protection than the original curved Travel Air windscreens.

The fuselage is constructed of fabric-covered (Ceconite) 4130 chromoly steel, far stronger than the original steel. The tail feathers are all welded aluminum tubing, and elevator trim is accomplished with cables connecting the trim wheel to a jackscrew in the tail.

PHOTOGRAPHY BY **DAN HAMILTON**

The main landing gear uses a scissor-type linkage with eight external bungee cords per leg. Hanging just below the bungee cords on the landing gear is a 10-amp Champion wind-driven generator. I knew the wheels looked different and was surprised to learn they are lightweight spun aluminum wheels from a Ford Mustang GT spare tire. Ground steering is accomplished with a Maule tailwheel assembly and Grove brakes.

POWERPLANT

A 1929 Travel Air 4000E came with a 165-hp Wright J-6-5 Whirlwind five-cylinder radial. For the Bel-Aire 4000, Bill chose the tried and true seven-cylinder Continental W670-6A as his powerplant.

The W670 delivers 220 hp at 2075 rpm to a 102-inch McCauley fixed-pitch propeller. Three 18-gallon fuel tanks are all in the top wing and provide 54 gallons of gravity-fed fuel to the Bendix-Stromberg carburetor.

The exhaust manifold is from a Stearman PT-17, and the dishpan shielding is from a Vultee BT-13. There is a clever step welded at the top of the exhaust manifold, which helps when refueling the tanks on the top wing.

And no, it doesn't conduct much heat, so there is no danger of melting your sneakers during a "turn and burn" fuel stop.

PREFLIGHT/STARTUP

Access the cockpits via the left wing, but take caution to not trip over one of the bracing wires on the nonskid walkway. You can grab the upper wing handholds and lower yourself into the extra-wide front cockpit. The forward cockpit has basic flight instruments, stick and rudder, but no brakes.

The pilot sits in the slightly narrower rear cockpit, and an indented step in the fuselage makes stepping in easy. The aft cockpit contains all instrumentation required for VFR flying and navigation. The pilot sits in a bomber style seat with attractive deep leather pockets on either side. Bill made and modified these pockets from matching women's handbags, and they are handy for just about anything the pilot may need in flight.

TAKEOFF

Takeoff happens sooner than one might expect, especially if anticipating Stearman-like performance as I was. Four Piper Cub series wings on the same aircraft mean a lot of lift is being generated.

By the time there is enough speed to raise the tail, the high camber wings are ready to climb, whether you apply back-stick pressure or not. Takeoff will occur in 600 feet or less. Climb-out at about 65 mph will yield a 600-700 fpm climb rate.

FLIGHT CHARACTERISTICS

The Bel-Aire is a stable airplane. The build team kept the dihedral angles for both the PA-12 wing and the PA-22 Colt wing. With these significant dihedrals, even with four ailerons, you won't be doing any snappy aileron rolls.

The rectangular elevators are large and translate to a large amount of pitch authority. The Piper US35B airfoil is known for soft-stall and low-speed characteristics. Combine that with two incidences on two wings, and you always have a flying wing with a mild demeanor.

Surprise, surprise — the slow speed and stall characteristics are remarkably similar to the Piper Cub series. The control characteristics are indeed perfect for an afternoon sightseeing tour. Cruise speed tops out at about 90 mph with 1850 rpm and will burn about 13.5 gph and 0.5 quart of oil per hour.

If you're trying to deliver the mail somewhere in the dead of night, you can fly for more than 3.5 hours.

KRIS CALDWELL
COMMENTARY / PLANE IMPRESSIONS

LANDING

Make your approach at 70 mph. Since there are no flaps to configure, selecting carburetor heat is all that is required. You can choose from a turning approach starting abeam the numbers or execute a steep approach with sideslip; both allow the pilot to maintain sight of the runway.

While bungee shocks can absorb a lot of sink on touchdown, it also turns that downward kinetic energy straight back into upward kinetic energy. I learned that if you make a three-point landing, ensure it truly is a full-stall landing and not a quasi-wheel landing. Being in the no-man's land between a three-point and wheel landing is not recommended for any taildragger, but especially the Bel-Aire due to its bungee gear and relatively small rudder.

Any sink will launch you skyward, or at least make you light on the wheels. Without the tail wheel firmly planted on the deck, tail-wheel steering is nonexistent. With this lesson learned, my next full-stall, three-point landing was much less exciting.

WRAP-UP

The Bel-Aire 4000 pays admirable homage to the successful and iconic Travel Air 4000, while making significant modern upgrades. This gorgeous machine should be an inspiration to homebuilders everywhere. It demonstrates that ideas, innovation, and old-fashioned hard work can turn concepts into reality — and a beautiful one at that. EAA

Kris Caldwell, EAA 1239655, has loved airplanes since he was 5 years old and gets to fly and instruct weekly in everything from Cubs to supersonic jets. He is passionate about everything aviation but especially warbirds, vintage aircraft, and backcountry flying. On the weekends he loves to fly around the Sierra Nevada with his family in their Maule.

Takeoff happens sooner than one might expect, especially if anticipating Stearman-like performance as I was. Four Piper Cub series wings on the same aircraft mean a lot of lift is being generated.

PHOTOGRAPHY BY **DAN HAMILTON**

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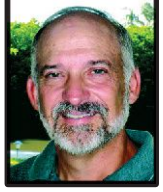

ROBERT N. ROSSIER
COMMENTARY / STICK AND RUDDER

Avoiding the Unseen

Balloons, drones, and other aerial chaos

BY ROBERT N. ROSSIER

I'M CONSTANTLY AMAZED AT the capabilities brought to us as pilots by modern avionics. The advent of GPS forever changed our perspectives and capabilities for navigation, allowing us to instantaneously reroute our flight, visualize temporary flight restrictions, and make instrument approaches to airports never before served by instrument procedures.

We can now download weather radar to our cockpit displays and see depictions of the terrain surrounding us. More recently, ADS-B has added another layer to our visualization, providing us with the means to "see" other aircraft in our vicinity, giving us a powerful tool for avoiding collisions in the air.

Yet, with all the technology we have at our disposal, we still find that it's important to keep our heads on a swivel. Despite what we do know about what is in the sky around us, other phenomena can easily elude our sophisticated electronic senses.

In recent months, we've been made aware of unidentified aerial phenomena — massive balloons — floating across our skies, posing a potential threat to national security and air travel. Typically described as the size of a couple of school buses, colliding with one of these balloons would clearly end poorly for all involved. But even smaller floating objects can pose a risk.

BEWARE OF BALLOONS

Something floating around in the sky doesn't have to be the size of a school bus to create chaos for pilots. One summer's day a few years back, while on final approach to Runway 6 at Montauk Point, New York (KMTP), at less than 300 feet, I caught a glimpse of some sort of string or tether.

Above and just off to my right, what appeared to be a party balloon — perhaps the size of a couple toasters — floated almost dead center in the final approach path. Instinctively, I rolled abruptly left to avoid the line and continued to a safe landing. After suffering that short burst of adrenaline, I stopped to ponder what else might have happened.

Had I struck the line, it might have simply broken — no big deal. Depending on the material and its strength, it might have acted as a high-speed saw, slicing through the relatively thin aluminum sheathing of a wing or horizontal stabilizer, causing serious damage.

Perhaps it could have somehow wrapped around the elevator and impaired control. I reported the encounter to the FBO, and that was the end of it.

Yet, with all the technology we have at our disposal, we still find that it's important to keep our heads on a swivel. Despite what we do know about what is in the sky around us, other phenomena can easily elude our sophisticated electronic senses.

DODGING DRONES

These days, the potential for colliding with an object in the air appears to be heightened. While party balloons are not the issue, other phenomena represent a growing threat: unmanned aerial vehicles (UAVs), or drones.

Relying on modern technology, these relatively inexpensive unmanned aircraft serve a growing need for everything from aerial photography to cell tower inspections, police surveillance, scientific research, and military missions. These aircraft can fly seemingly at any altitude, hover in place, and make radical maneuvers, popping out of nowhere at any time. All too often, they mix it up with us folks in manned aircraft.

A quick review of NASA's Aviation Safety Reporting System database reveals scores of incidents where pilots have experienced close calls with drones.

In one such report, a private pilot flying a single-engine, retractable-gear airplane near Stockton, California, wrote, "While cruising at 5,500 [feet] direct to O22 [Columbia, California] and on VFR flight following, I spotted an aircraft that I believed to be much further away. However, as I passed it, I realized it was a drone hovering at exactly 5,500 feet (my cruising altitude). It was orange and had I believe four rotors. ATC did not call it, and I did not report it to ATC when I spotted it. Upon further reflection, I probably should have made ATC aware. Since it was stationary, I did not need to take evasive action. However, I did come very close to it. I believe within 500 feet. The drone did not show on my ADS-B In and did not take evasive action."

In a similar report, the private pilot of a single-engine, fixed-gear aircraft flying in VFR conditions wrote, "Approaching RNT [Renton Municipal in Renton, Washington] from the north on the 'Factoria Arrival' at 1,625 feet MSL (data from ADS-B track log), crossing the 520 freeway I noticed a drone at a high closing rate pass directly above me. I estimate the vertical separation was less than 100 feet, but this is the value I am using in the report. I was in a descent at the time, and had this drone impacted the aircraft, I am not sure it would have ended well for myself and my passenger. After the conflict, I

notified RNT Tower, and they instructed other aircraft to avoid the area."

Numerous other reports both by GA and airline pilots suggest that spotting and avoiding a drone in midair can be a tricky proposition, if not impossible. Unlike other aircraft, drones are not required to have transponders (this may change in September 2023), and they are typically invisible to both radar and ADS-B.

Due to their size, they are naturally hard to spot. And especially when we're close to the ground, preoccupied with other matters, skimming in and out of the clouds, or with our senses otherwise fully occupied, they easily escape our detection.

One of the few defenses we have are drone-related NOTAMs, or "Drotams" as they are known in some circles. NOTAMs for unmanned aircraft systems (UAS) are issued to warn us of locations, altitudes, and times where drones are expected to be operating. By checking for "NOTAMs UAS," we can at least get a heads-up on when danger might be lurking.

Another good practice is to use ATC flight following services — or at least listen in on the frequency — to hear any pilot reports of UAVs and other such phenomena that could pose a hazard.

FAST AND FURIOUS UNIDENTIFIED PHENOMENA

While balloons and drones are clearly phenomena to keep a wary eye out for, occasional reports arise that might make us shudder. In one recent report, a glider pilot in California video recorded a "UFO" zipping across his windscreen at tremendous speed.

But such reports are no more disconcerting than the encounters pilots might have when entering military operations areas, or mixing it up with military training routes (MTRs).

Depicted as brown lines on our sectional charts, MTRs are used by military aircraft engaging in training exercises. Along these routes, military aircraft may routinely operate at speeds in excess of 250 knots. Routes are identified as instrument routes (IR) and visual routes (VR) followed by a four- or three-digit numeral.

The four-digit numerals are assigned to routes where aircraft fly at 1,500 AGL or below. The three-digit numerals indicate routes or route segments where aircraft may operate above 1,500 AGL. If our planned flight crosses or follows near an MTR, we might want to check with Flight Service or ask ATC if the route is or will be active.

Balloons, drones, high-speed military aircraft, and other unexpected aerial phenomena are becoming more a part of the environment in which we fly. By doing appropriate preflight planning, keeping our heads on a swivel, and engaging with ATC, we can at least reduce the risk of encountering aerial chaos. And keep an eye out for those party balloons! EAA

Robert N. Rossier, EAA 472091, has been flying for more than 40 years and has worked as a flight instructor, commercial pilot, chief pilot, and FAA flight check airman.

RES

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ILIENCE

Rosie the Rocketer:
The resurrection of a legend

BY JIM BUSHA

Hidden Treasures

WHEN IT COMES TO finding hidden treasures, sometimes the best place to look is right under your nose. Case in point was the discovery of a true combat legend, a modern David that once faced down a series of enemy Goliaths, if you will — and it promises to be one of the most interesting warbirds at this year's EAA AirVenture Oshkosh.

After reading a story about the exploits of Maj. Charles "Bazooka Charlie" Carpenter and his unusually armed Piper L-4H Cub named *Rosie the Rocketer* in a 2016 *EAA Warbirds* magazine article written by Maj. Carpenter's daughter, Carol (Carpenter) Apacki, Joe Scheil, EAA 1109238, who is an airline pilot by day and serial number sleuth by night, discovered that this killer Cub, bearing serial No. 11717, was hanging from a ceiling in an Austrian aviation museum.

Joe contacted his good friend Rob Collings of the Collings Foundation, who had been looking for a documented European theater combat aircraft. That set the wheels in motion as Rob traveled to Austria to verify for himself that the Cub had survived. Rob and Joe found out that after the war, the Cub had been surplused in a German yard in September 1946.

From there, L-4H 11717 became HB-OBK with Heinz Wullschleger of Olten, Switzerland, and then moved to Austria in 1955. By April 1956, sporting yellow Piper Cub colors, the registration changed to OE-AAB when it became part of the Österreichischer Aero Club in Vienna, where it towed gliders.

The airplane flew as a civilian airplane for a number of years before it disappeared into the Österreichisches Luftfahrtmuseum at Graz Airport in Austria in 1976.

In late 2018 Rob was able to convince the museum to sell the Cub to him. Loaded in a shipping container, it made its journey back home and eventually found its way into the caring arms of Colin Powers, EAA 65696, of Oregon who had a string of award-winning L-4 restorations under his belt.

Colin got the airplane on January 8, 2019.

"It was a mess as far as I was concerned," he said. "The museum in Austria had acquired the airplane as a static representation. It had been used as a glider tug after the war. The fuselage was covered with a variety of stickers and decals all over it. They went ahead and stripped all the fabric off of it and slapped fabric back on it, and painted it yellow. It didn't look very pretty."

Colin wanted to strip it down to bare wood and tubes as soon as he could. The reason? He wanted to verify the rumors and check it over to see if there were any bullet holes or other combat damage.

"I did find a very obvious bullet hole in the right wing," Colin said. "It had come up at a 20-degree angle, passed through the leading edge of the aileron, into the wing, and continued through the steel plate hinge, tearing a big hole in that. It continued on through another rib and then came

PHOTOGRAPHY BY **JIM BUSHA**

Rosie's *restorer, Colin Powers.* PHOTOGRAPHY BY **RYAN BRENNECKE**

Probably the biggest challenge to the entire restoration was the manufacturing and mounting of the six bazookas. That was the one item that was not well documented as to placement and firing mechanism inside the cockpit.

out the top of the wing. That all matches with a copy of a letter I received from Carol [Carpenter] Apacki, Maj. Carpenter's daughter."

"Lately I have been taking quite a few chances but my luck has been marvelous. Yesterday I got a bullet hole through the wing and hit a church steeple with one wheel. It was very little for what might have happened under the circumstances."— Letter from Maj. Charles Carpenter, August 12, 1944.

Besides combat damage, Colin also found some signatures and dates from Piper employees on some interior wood surfaces and wing spars. All the combat damage and personal notes have been preserved during the restoration.

Colin's restoration marching orders from Rob were simple — bring it back to look exactly like it did in 1944. Colin knew there were plenty of replica parts available for Cubs, but he focused on finding original Piper parts.

"The airplane had been modified," Colin said. "The boot cowl and a lot of the instrument panel were all different and needed to be replaced. The entire landing gear was another major issue. Somewhere along the journey, they had replaced the original and installed Super Cub landing gear legs on that. We put the stock 1944 gear back on along with removing the Continental C90 engine and replaced it with an original A65 that would have powered it back in 1944."

The engine was sent out to Premier Aircraft Engines in Troutdale, Oregon, to be overhauled. The instruments were another issue.

"They'd replaced three of the instruments with German instruments," Colin said. "We had the bill list from Piper as to what original instruments were in it at the time. These include compass, tachometer, altimeter, and airspeed indicator."

Keystone Instruments in Pennsylvania came up with all new original ones to give the Cub its factory-fresh look. As much as he wanted to keep it 100 percent original,

Colin also knew that he would have to use some new parts for safety's sake. Other new items include a Sensenich wood 72C-42 prop and Scott 3-21 tail wheel along with modern fabric covering.

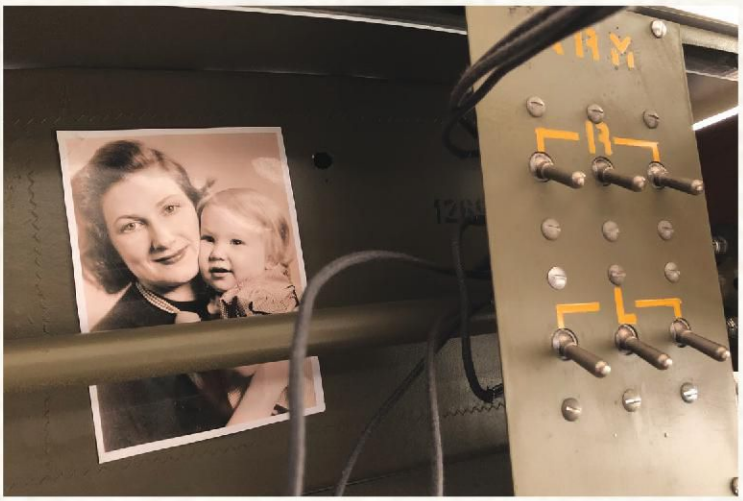
"There's a number of things that we're going to have to use new, like the flying wires on the tail," Colin said. "It came with two of them, and one of them was bent. That's a huge safety factor that I don't want to sacrifice on. Same thing with all the AN hardware. I bought the entire material list from AN hardware originally and had it all recalibrated to the Class 2 cad, which is a silver color. That's how it was in '44. All the AN hardware you buy nowadays is gold so I've been replacing a lot of the hardware."

According to Colin, probably the biggest challenge to the entire restoration was the manufacturing and mounting of the six bazookas. That was the one item that was not well documented as to placement and firing mechanism inside the cockpit.

"From my research of old photos and wartime newspaper clippings, I found that they apparently were mounted on a piece of plywood on the wing strut," Colin said. "We didn't have very good documentation on how that was built and what they used, so we had to fly by the seat of our pants on that one. I think the results speak for themselves, and they turned out like the photographs show."

The replica M1A1 bazooka tubes are mounted up at an angle between 20 and 25 degrees. The firing panel with six toggle switches — three for each wing — is located on the upper left side of the wing channel, just above the pilot's shoulder.

"It gives me a lot of pride that I was asked to perform this restoration," Colin said. "But I can't take all the credit. The reproduction of the nose art of *Rosie the Rocketer* was hand painted by Carol's daughter, Erin Pata, in the exact



Wartime photo of Charles Carpenter's wife, Elda, and daughter, Carol.

"The reproduction of the nose art of *Rosie the Rocketer* was hand painted by Carol's daughter, Erin Pata, in the exact location her grandfather had it painted 75 years earlier. To be able to do this and see it take to the skies again — not only for the Collings Foundation but for the Carpenter family — is one of my greatest honors." — Colin Powers

Carpenter's original WWII-era uniform.

PHOTOGRAPHY BY **JIM BUSHA**

location her grandfather had it painted 75 years earlier. To be able to do this and see it take to the skies again — not only for the Collings Foundation but for the Carpenter family — is one of my greatest honors."

Bazooka Charlie and His Grasshopper

Before America's entry into World War II, Charles Carpenter was a U.S. history teacher at a high school in Moline, Illinois. That all changed on December 7, 1941. By early 1942, Charles Carpenter joined the U.S. Army and eventually earned his liaison wings in the likes of Aeronca L-3 Defenders, Piper L-4 Cubs, and Stinson L-5 Sentinels.

January 6, 1943

I'm writing to you from the Waco Army Flying School. It appears we shall be here only one or two days before being sent to the Field Artillery at Fort Sill, Oklahoma. What will be done with us at Fort Sill is still very much an unanswered question.

In order to stay in this Liaison business, I have to be under 170 pounds. At present, I weigh about 178. I'll be living on a little leaner diet from now on or else be eliminated.

From all that I hear, there will be a pretty rough training course ahead of us at Fort Sill. My only hope is that I can qualify for it and eventually, perhaps, be of some service to some part of the Army in this war. — Excerpt of a letter from Charles Carpenter

By mid-1943, Carpenter was assigned to the 4th Armored Division, where he became Gen. John S. Wood's personal pilot.

March 17, 1943

I'm really out with a rough and tough outfit now and I believe I'm going to like it. The 4th Armored have been on maneuvers so much that they wouldn't know what it's like to sleep on sheets or eat food without sand in it.

There is a spirit of comradeship existing that I have been told to expect but had never found before in my student officer days. I actually feel that I belong to somebody's gang now. Today was lots of fun. There was a big problem under way about 40 miles from our camp. Hundreds of our tanks and guns and trucks had assembled there for a big push through a valley between two mountains. First dive bombers blasted ahead of the armored forces. Then the tanks and artillery laid down a curtain of fire ahead of the advance. Tanks raced across the desert in fan-shaped formation trailed by long streams of dust that rose several hundred feet in the air.

I got to see more of the maneuver than nearly anyone. I was overhead about 500 feet with the General, who was looking the whole situation over. The General seems to be a very fine fellow, but a mighty big one too. He shook hands with me and called me "Carpenter" thenceforth. We took off from a small rocky strip in the desert and circled our tanks and guns. He tapped me on the shoulder when he wanted to give me instructions or a new direction.

PHOTOGRAPHY BY **RYAN BRENNECKE**

As soon as I get to know him a little better, I'm going to drop a few hints and suggestions about a bigger and more powerful plane. He weighs over 200, I weigh about 180, and our radio weighs about 60 lbs. The crew weight of our Cub is supposed to be not over 340 lbs. You can do a little addition and see why the bottom may drop out from under Carpenter and the General some day on a short take-off over a mountain.

Headquarters sent for an Air Corps pilot and a larger plane to haul the General around today. The pilot made four passes at our landing strip and refused to land. The General got disgusted and finally took off with me in the Cub. — Excerpt of a letter from Charles Carpenter

Arriving in England in early 1944, Carpenter was eventually assigned a Piper L-4H Cub, serial No. 11717 and registration number 43-30426. Built on April 5, 1944, the L-4 and Carpenter took similar paths before the war began. Both were unassuming and fun loving. The early Piper Cubs wore a yellow coat of paint with a thin black lightning bolt running down the side of the fuselage. With a gross weight of 1,220 pounds and a cruising speed around 80 mph, the Cub became the trainer of choice for aspiring pilots. But when the clouds of war enveloped the entire world, both man and machine became instruments of destruction.

The L-4 could not only see from above but also speed the advance. As tank columns roared down European roads at 20 miles an hour, a 60 mph Cub was perfect. It could get low and close, and it could see around the next corner easily.

Fangs of an L-4

As Maj. Carpenter and his pilots prepared for their channel crossing after D-Day in July 1944, several modifications were made to their L-4s. The first was to install an auxiliary fuel tank or a ferry tank. Using an oxygen bottle from a B-17 Flying Fortress, it was determined that this new fuel tank could hold approximately 8 gallons of fuel.

Positioned above the observer's seat and fashioned with a Y-clamp and copper tubing, the L-4s were ready to tackle the more than 100 miles of the English Channel and any potential headwinds or diversions they may have encountered along the way.

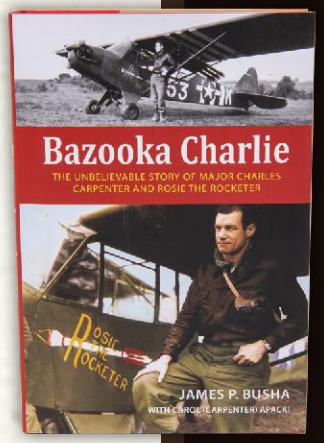
Another modification consisted of installing Plexiglass wing root fairings and a new, rounded bulbous rear upper "turtledeck" that provided the pilot with better visibility from possible rearward attacks by German fighters. Charles also obtained a rearview mirror, from a twin-engine Lockheed P-38 Lightning, and had that attached directly above the front windscreen, above the cockpit so he could glance up while flying and spot any incoming threats from his six o'clock.

The final modification was to paint the black and white "zebra stripes" on the upper and lower wings and on the fuselage sides to identify the L-4s as friends and

not a foe by trigger-happy Allied fighter pilots. But Charles also gathered his pilots to determine if it were feasible to mount a bazooka to an L-4 Cub without blowing oneself out of the sky.

One of Charles' pilots, Robert Pearson, recalled that earlier experiment and stated:

"When we were in England, all the pilots gathered and were discussing, could we mount bazookas on our L-4s? And if we did, would firing a bazooka ignite the tail of our airplane. So, we went out on the level ground, away from the camp, landed our Cubs, lifted the tail up, installed a bazooka, used black electrical tape to secure it to the struts, and fired it. Lo and behold, the rocket flew away, and we didn't see any fire from the tail end of it. So, several of us mounted at least one bazooka. And when we went to the Air Corps field, awaiting orders to go to Normandy, several of us mounted extras. I mounted a second one, and Charlie Carpenter installed a total of six. To fire them we ran a wire from the bazooka to a battery igniter located in the cabin. A shoulder-fired bazooka on the ground produced a fair amount of recoil and blowback. But up in the open air, there was nothing. Charles Carpenter and I used to kid one another that we were going to win the war by ourselves — me with two bazookas and him with six."



Convinced they could help shorten the war and defend themselves against the unknown German armor and infantry that waited for them to arrive somewhere in France, Charles sought some last-minute permission from Maj. Charles LeFever, artillery air officer, 1st Army Group.

Not simply taking Charles' word for it, Maj. LeFever took off in the bazooka-equipped L-4 and found that although the rockets would not "blow the tail off" the L-4 after he fired them, and that they did have some accuracy, he could neither approve nor disapprove their installation. That role fell on Charles and his resilient bazooka-toting pilots.

Fly, Fire, Rearm, and Return

On September 19, 1944, the Germans found themselves with an advantage; the heavy fog had rolled in, and they were using it as a shield. They quickly organized and began a counterattack against the 4th Armored Division near Arracourt. The fighting below was ferocious as Shermans and Panthers dueled and slugged it out with one another with early victories going to the heavily armored Panthers. Charles, aloft over the battle scene in *Rosie*, was helpless as he listened on his radio to the raging battle below like he was a sideline spectator at a football game. With fog preventing him from locating the enemy, all he could do was wait for it to lift.

Bazooka Charlie:
The Unbelievable Story of Major Charles Carpenter and Rosie the Rocketer

BY HAL BRYAN

JIM BUSHA, THE MAN WHO WROTE not only this feature story but also a brand-new book about Bazooka Charlie and *Rosie the Rocketer*, is my boss. You're right to assume some inevitable bias on my part. However, that bias might not be what you think.

Jim is a great storyteller, but he's a lousy self-promoter. The phrase "it's not about me" might as well be on the Busha coat of arms. In fact, Jim specifically told me not to mention his book in this magazine, but here I go anyway. If my name is missing from the masthead of the September issue, you'll know that I gambled and lost.

In spite of his protestations, I'm calling out his book here for two reasons — one minor and one major. The minor one first: EAA sells the book. Proceeds from the sales go directly to support our programs.

The second, and far more valid reason, is that Carpenter's story is, simply put, important. Jim's new book, *Bazooka Charlie: The Unbelievable Story of Major Charles Carpenter and Rosie the Rocketer*, does an admirable job of bringing that story to life.

Written with the support of Carpenter's daughter, Carol (Carpenter) Apacki, the book weaves countless scattered threads into a remarkable narrative that is so incredible that it simply must be true. Many of us armchair historians thought we knew the story of Bazooka Charlie, summed up in simple one-to-two-sentence blurbs over the years.

We didn't.

Carpenter was a gentle philosopher with a poetic bent, a man of inestimable courage and deep introspection who was drawn to teaching and dedicated to improving the lot of those around him. He faced challenges that might easily defeat the best of us — and he did so not as the square-jawed cigar-chomping hero of the propaganda posters but as a real human being with a deeply human mix of virtue and vice.

One of the best things about this book is that Jim knows when to step out of the way and let Carpenter speak for himself thanks to snippets of the hundreds of personal letters he had access to while writing.

Carpenter never wrote a memoir, and likely would have blanched at the idea of anyone turning a spotlight on him. (The shared humility of author and subject is a good match.) But this book fills that gap, with Carpenter's story supplemented by exhaustive research and backed up by riveting firsthand accounts from other veterans who were there.

The story of Carpenter the hero strapping bazookas on his Cub and blasting Nazi tanks to kingdom come is compelling enough. But the real story, the one about Carpenter the man, the story that begins before and ends well after the war, that's the story that makes this book a must-read for anyone interested in military and aviation history — and, frankly, anyone who isn't.

Bazooka Charlie: The Unbelievable Story of Major Charles Carpenter and Rosie the Rocketer is available for purchase directly from EAA, as well as other major book retailers. Jim will also be signing copies at the Authors Corner during EAA AirVenture Oshkosh. Check the online schedules at EAA.org or in the EAA AirVenture app for dates and times.

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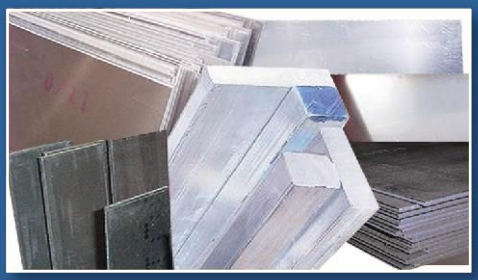

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SPECIFICATIONS

AIRCRAFT MAKE & MODEL: Piper J-3C-65D (L-4H) Cub
MANUFACTURING AND ROLLOUT DATE: April 5, 1944
SERIAL NUMBER: 11717
REGISTRATION: 43-30426
ORDER NUMBER: AF-36506
FUSELAGE SERIAL NUMBER: 11543

LENGTH: 22 feet, 5 inches
WINGSPAN: 35 feet, 3 inches
HEIGHT: 6 feet, 8 inches

MAXIMUM GROSS WEIGHT: 1,220 pounds
EMPTY WEIGHT: 722 pounds
FUEL CAPACITY: 12 gallons
SEATS: 2

POWERPLANT MAKE & MODEL: Continental Motors A65-8
HORSEPOWER: 65
PROPELLER: Sensenich wood 72C-42
CRUISE SPEED/FUEL CONSUMPTION: 75 mph/3.5 gph
POWER LOADING: 18.8 pounds/hp
WING LOADING: 6.8 pounds/hp

EQUIPMENT:
SCOTT 3-21 TAILWHEEL
ARMY FURNISHED INSTRUMENT PANEL, INCLUDING:
- **B-16 COMPASS**
- **C-11 TACHOMETER**
- **B-12 ALTIMETER**
- **B-8 AIRSPEED**

By noon, his patience paid off as he spotted a company of Panzers on the move heading toward Arracourt. But Charles also noticed something else below. A half-dozen GIs of a water point crew were now jumping into the neck-deep water to hide from the advancing German armor. As he radioed the situation back to his headquarters, Charles realized the German tanks would quickly overrun the stranded GIs.

As he jammed his left boot down on his rudder pedal and muscled his control stick forward and to the left, *Rosie* began to dive on the tanks below. From less than 100 yards, Charles launched two rockets that impacted near the tanks but missed them completely. Clawing his way back skyward, he held *Rosie* in a steep climb with the throttle pushed full forward. Leveling off, he repeated his maneuver, but this time he steepened his dive. Launching two more of his bazooka rounds, he watched them streak toward the German tanks before jinking his stick back and forth to avoid the intense ground fire that was arching its way for the Germans on the ground. He didn't know it at the time, but one of his rounds impacted its intended target as a German tank began to burn.

As he pushed *Rosie's* throttle forward once again, Charles brought the stick back to his gut as he clawed his way back for another pass. With the GIs still hiding in their watery sanctuary, they watched as *Rosie's* nose was pushed over and began to dive once again. With only two bazooka rounds left, Charles chose his target and virtually ignored the incoming rounds thrown at him and *Rosie*. With the final toggle of his switches, the two rounds ignited and launched from their tubes as they screamed earthward toward their target. A fire soon engulfed another vehicle as Charles found his mark yet again. Charles would land and rearm twice more that day as he fired 16 bazooka rounds at advancing German armor.

He later told a *Stars and Stripes* reporter, "I did not claim any because everyone seemed to be shooting at me, and I had to get the hell out of there!" But once back on the ground, Charles was congratulated for not only knocking out German armor but also halting the German advance.

September 24, 1944

Another busy and exciting day has just ended.

This is the latest I have been up for a long time. The weather has been miserable lately, but I have managed to keep my generally good disposition in spite of it.

We have had some exciting tank battles lately. The Germans have turned on us and taken the initiative. They must be some of Hitler's own schoolboys because they fight to the end often against great odds. On two occasions, the fog lifted just in time for us to beat them off.

The other day we "knocked out" 44 German tanks. The doughboys from their slit trenches gave "Rosie the Rocketer" and me credit for two. — Excerpt of a letter from Charles Carpenter

When the hostilities ceased in Europe in May 1945, many liaison aircraft remained and were scrapped or sold as surplus because it wasn't cost-effective to send them back to the United States. All that was believed to have remained of the olive drab Piper L-4H *Rosie the Rocketer* were faded black and white photos and old newspaper clippings. Thankfully, that wasn't the case, and the resilience of one valiant Piper L-4 and its pilot's heroic exploits will forever live on. EAA

Jim Busha, EAA Lifetime 119684, is an avid pilot and longtime contributor to EAA publications. He is EAA vice president of publications, marketing, membership, and retail. He is also the editor of *Warbirds* and *Vintage Airplane* magazines, and the owner of a 1943 Stinson L-5.

PHOTOGRAPHY BY **JIM BUSHA**

Bazooka Charlie:

The Unbelievable Story of Major Charles Carpenter and Rosie the Rocketer

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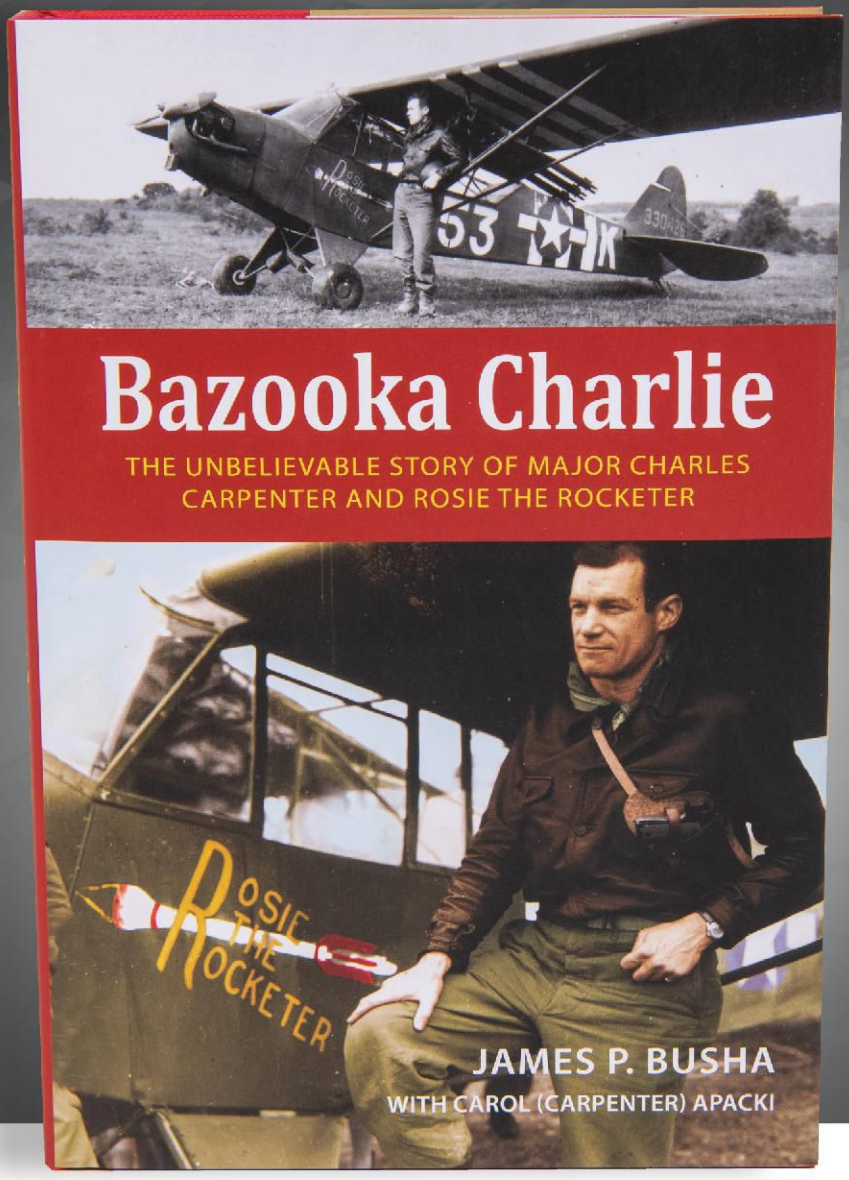

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PHOTOGRAPHY BY **JIM RAEDER**

Find

Gary Peters and the Hangar 180 web-foot Beaver

BY BUDD DAVISSON

"**EVEN THOUGH THE *TRADE-A-PLANE*** ad was over 2 years old and the photo of the Beaver on floats was faded, I called the guy anyway, not expecting anything," said Gary Peters, EAA 1481162, of Clarkston, Washington. "The voice on the phone wasn't especially happy to get my call. In fact, his first words were, 'Where'd you see that?'"

The man explained he had stopped running the ad because he got tired of folks offering him next to nothing for it.

"Basically, he just ignored the airplane and let it collect dust," Gary said. "Lots of dust! When we came to excavate it from the back of a hangar full of wildly eclectic stuff on a fly-in community, it had been sitting for 18 years. The tires were rotted flat, so just trying to pull it out entailed a lot of work. When we dragged it from its hiding spot, there were quite a number of neighbors in that community that didn't know it was there or had ever seen it."

Gary describes himself as a small-town Washington farm kid who got his introduction to flying earlier than many.

"I was 12 years old and was at a farm dinner at a family friend's house," he said. "One of those there was a World War II pilot who owned a 172 and gave me a ride. Right then, I decided I was going to learn to fly — although it would be some time before I did."

After high school, he started driving trucks for a construction company. At around 19 years old, he started a steam cleaning service for trucks. One of the clients owned a 172 that was used for flight instruction. He started flying as soon as he could.

"A lot of the construction equipment I was cleaning had been sitting around for some time because the owners really didn't use it that much," Gary said. "So, I thought I'd start a business renting heavy equipment to those who needed it, when they needed it. The first thing I got was a 'dozer blade, and it grew rapidly from there."

While the equipment business was growing, Gary was doing more and more flying.

"Almost from the beginning, I was fascinated by 1930s aircraft," he said. "Then, I went to a family grassroots fly-in. There were a number of WWII vets there, and I was struck by the camaraderie they shared and their retelling of what they had experienced. In fact, our close friend Jay Cawley's dad, Glen, was shot down while flying a TBM and was in a Japanese prison camp with Pappy Boyington."

Gary Peters had a dual purpose in mind when totally remanufacturing his Beaver. He wanted it to continue the Hangar 180 theme of bringing military aircraft back to life but also serve as backcountry transport for his family. The panel is a original as practical with the glass being iPads, etc.

Jay took Gary for a ride in his PT-22, and Gary absolutely fell in love with it.

"That part of the country, Washington and Oregon, is almost overrun with antique aircraft and those who know about them, and we were constantly traveling to fly-ins," Gary said. "At the 2016 Planes of Fame show in Chino, I got a ride in a P-40 and the hook was very definitely set."

At a show in San Diego, Jay introduced Gary to Bill and Claudia Allan.

"They have a wonderful museum and Bill is a Ryan expert, so he furthered my interests in Ryans," Gary said. "Addison Pemberton, one of the Washington/Oregon leading antiquers, was

PHOTOGRAPHY BY **CONNOR MADISON**

Every square inch of the airplane was disassembled and brought back to new condition as part of the final goal of total reliability.

helping advise me, and I wound up buying Bill Allan's PT-22 and it was delivered to me at a Planes of Fame show in Chino, California. Eventually, I also bought a Ryan STM from Bill."

Gary came away from the show with more than just an airplane.

"It was clear to me that the airplanes of the golden era of the 1930s had led to the aircraft that won WWII," he said. "The Planes of Fame show attracts a huge number of veterans and historically important people. So, I came away from that show with a PT-22 and a goal of continuing to tell their story."

Gary said the PT-22 was just the beginning of what would become something of "an obsession" for him and some of his friends.

"In what seemed to be nothing flat, we established Hangar 180, which is a museum/restoration operation that focuses on restoring and presenting historic aircraft of the 1930s," he said. "Our goal is to bring aviation education

> When we came to excavate it from the back of a hangar full of wildly eclectic stuff on a fly-in community, it had been sitting for 18 years. The tires were rotted flat, so just trying to pull it out entailed a lot of work.
> — Gary Peters

to the public, especially the youngsters. We want to tell the story of the golden age of aviation, the '30s, and how it spawned the technologies — including aerodynamics, airframe materials, and designs — that blended together to yield the famous aircraft that brought victory to the Allies in WWII."

See the accompanying sidebar for the aircraft that followed the PT-22 into what was to become the Hangar 180 flying collection.

Hangar 180 is largely operated by Gary with Bill Strange as director of maintenance. Gary's daughter, Tyler, does the daily management and handles the media and marketing.

Bill's mechanical crew is staffed with longtime crop duster types to whom serious repairs done at a rapid pace are second nature. They have years of experience responding to agricultural pilots' needs to get a damaged sprayer/duster aircraft back to work as quickly as possible. In the field of agricultural aviation, time is money. The result is that the Hangar 180 folks are capable of doing virtually any kind of airframe repair in-house, regardless of complexity, and are unafraid of any kind of challenge. Gary's latest addition to the collection — a 1952 de Havilland Beaver, N530BJ — proved that. It was definitely not a clean-it-and-fly-it project.

"I was drawn to the Beaver on a personal level partially because of an experience my wife, Jillyn, and I had flying with Addison Pemberton in his Grumman Goose. We were just exploring Washington and Idaho, landing on lakes and rivers and generally having a terrific time. It was a real family airplane, and my family, which includes five daughters, enjoys exploring together. So, I started thinking in that vein, and the Beaver struck the right chord. It

The Wipaire floats were nearly new and required little restoration. Gary found a Pratt & Whitney R-985 that was a first-run engine, a hyper-rarity today.

can be configured to hold seven people and, when equipped with amphibious floats, can be a true multipurpose airplane. Sort of the ultimate aerial family touring van."

Gary said he hadn't planned on totally rebuilding an airplane, but he also wasn't expecting to find one close to home, on Wipaire floats, and available for a decent price.

"When we made the owner an offer, the owner smiled and said that I was the first to make a reasonable offer for the airplane," Gary said. "So, he said yes. Everyone else had offered junk prices. However, he said I had to get it out almost immediately before he had to make another hangar rent payment. We only had about a month to get it out and flying."

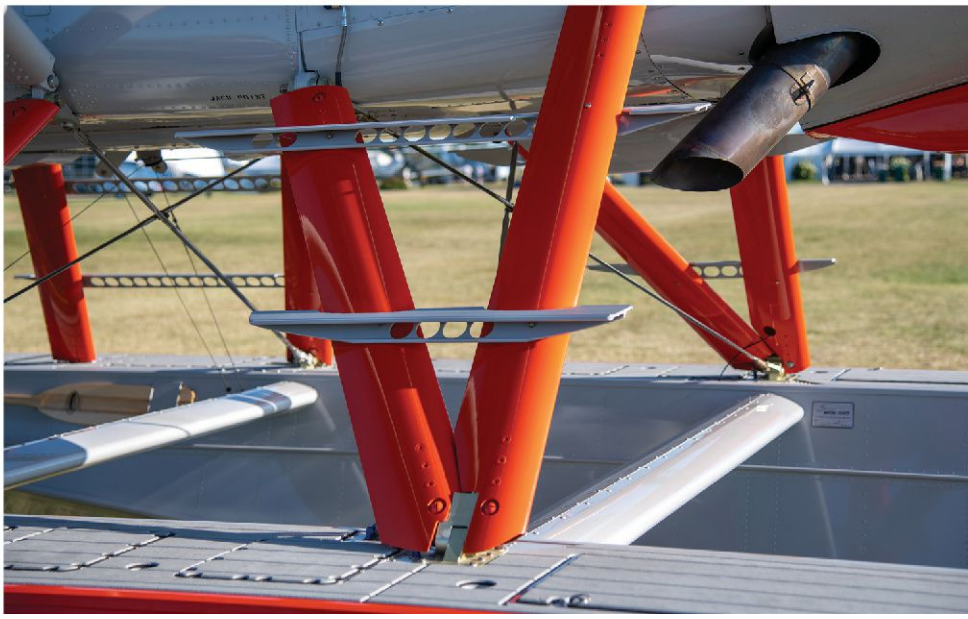
So, Gary had an airplane that hadn't flown, run, or even moved in 18 years. And he wanted to fly it the 250 miles home.

"Fortunately, where it was sitting all that time, it was totally protected from the elements," Gary said. "Even better, Bill Strange, because of his ag aviation background, was an old R-985 guy. So, he came up to the Beaver's resting place with a truck full of tools and spares, not knowing exactly what he would find or what he'd need."

Just getting to the airplane so they could work on it took a lot of effort, Gary noted.

"It was trapped behind a wall of all kinds of Western memorabilia — including an ancient stagecoach," he said. "It was a dirty, dusty job, and we felt as if we were opening a tomb, not a hangar. However, once we got at it, Bill worked on it for two days and actually got it fired up. The governor and fuel pump both leaked but were easily fixed. Mounting the new tires took some time, but once outside, we hosed the old girl off, which caused a lot of the paint to fall off in big flakes. Then we pointed her south. We got a Beaver pilot we knew to do the ferry flight because Bill and I had never even sat in a Beaver, much less flown one. To say we were Beaver newbies in every possible way would be an understatement. However, we left the gear down and made it home with no problems at all. However, almost nothing in the panel worked, the headliner was falling down around us, and we had upholstery dust in our eyes. It was actually pretty gross, but the engine didn't miss a single beat. Old Pratt & Whitneys just have a way of surviving."

PHOTOGRAPHY BY **CONNOR MADISON**



Once back in Lewiston, Gary towed the airplane to a semi-abandoned truck repair shop next to the river and then the "real fun" began.

"The shop building actually belonged to an old, old friend of mine," he said. "And, when I was 18 and 19 years old, [the shop] was where I worked replacing transmissions, clutches, and such. Even during the casual examination back in the old hangar, it was obvious the airplane hadn't been badly treated, but it had worked for much of its life, and its skins looked it. Plus, a bunch of military stuff had been removed so there were some really crude patches on it. Right at the beginning we knew that if we replaced one piece of skin, it would emphasize all of the little dings and marks in the skins around that one. So, when we were hosing off 18 years of dirt, we knew there were lots of skins we were going to have to replace. The project was obviously one of those 'in for a penny, in for a pound' endeavors."

One of the main goals Gary wanted to accomplish was to make the airplane as safe as possible to carry his family.

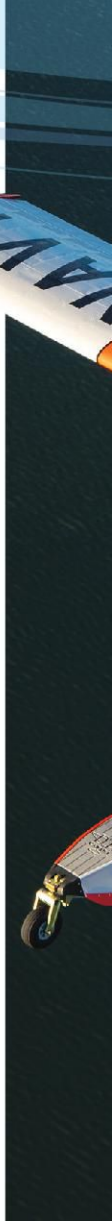
"I didn't want to put them in anything that wasn't as perfect as we could make it," he said. "So, that was our goal. We didn't say it out loud, but our mantra was going to be something like 'safety through perfection.' And that paid off."

The airplane had lived what was a fairly typical life for a Beaver. Originally, de Havilland reportedly had hoped to sell 250, but about 1,650 of them were eventually built. However, their initial low estimate was the result of them planning to use DH Gipsy six-cylinder inline engines. Fortunately, Pratt & Whitney Canada approached de Havilland with the tantalizing offer of surplus, new 450-hp Pratt & Whitney R-985

Float equipped aircraft have features their land based brethren don't need.

Gary says the fresh 985 runs turbine-smooth.

The wing-mounted mirror is the final "gear-up" check before water touchdowns.



> It took almost no time for us to forget about just getting it flying and head for our goal of perfection. An entirely new birdcage was installed along with virtually all new skins. In doing that, we gained access to every nook and cranny in the fuselage, so we were able to find her deepest, darkest secrets and make her essentially a new airplane.
> — Gary Peters

engines. Even at that time, the 985 was seen as one of, if not *the* most reliable, powerful, and easy to support engines of its size.

When designing the Beaver, de Havilland Canada had conducted a nationwide survey of bush pilots seeking their guidance as to what they wanted in a utility airplane. The 985 seemed the perfect match. Power, utility, ease of flight, lots of cargo room, and powered by the 985, its appeal reached across Canada's southern border where the U.S. armed forces were looking for just such a utility airplane. The net result was that approximately 900 aircraft were bought by the Army/Navy/Air Force. Later, when they were surplused, they greatly expanded the available Beaver supply.

Gary's airplane originally went to the Royal Air Force in England before being returned to the United States where it sat in Davis-Monthan Air Force Base in Arizona. It was sold by the United States Air Force in 1966, and it coasted north, as most Beavers did, and was mounted on floats in Kodiak, Alaska, in 1994. The Wipaire 6000 floats were built around 1986 or 1987. Gary said they were in amazing condition needing almost no repair. They had only 90 hours on them, and their original anodizing was still intact.

However, the rest of the airplane was a good news, bad news type of package.

"The really good news on the airplane was that there was very little corrosion, which isn't always the case with Beavers," Gary said. "In fact, the wings were in such good shape, we knew all we'd have to do is clean, strip, and paint them. So, at the beginning we thought we'd just get it flying and usable. However, the Beaver has a few components — the so-called 'birdcage' being the most notable — that require yearly X-raying 15 years after it is replaced. The birdcage is a fairly

PHOTOGRAPHY BY **CONNOR MADISON**

The Beaver saw service with all of the US armed services so the paint scheme tries to pay homage to each of them.

complex steel tubing structure that ties the firewall, engine, and main structure of the wing strut system together and is known to corrode. So, yearly X-rays are required. It also requires major disassembly of the fuselage to install, which we were going to do anyway. It took almost no time for us to forget about just getting it flying and head for our goal of perfection. An entirely new birdcage was installed along with virtually all new skins. In doing that, we gained access to every nook and cranny in the fuselage, so we were able to find her deepest, darkest secrets and make her essentially a new airplane."

Gary noted another good part about rebuilding a Beaver is that several companies — notably Kenmore Air Harbor and Viking Air — manufacture practically every Beaver part you're likely to need.

"Plus, Kenmore is just up the road from us so they gave us a lot of help and information," he said. "However, it has to be pointed out that Bill hand made every single piece of new skin, forming many of them over welding tanks and tubes. Also, Acorn Welding in Edmonton, Alberta, Canada, built up a new birdcage for us and were super helpful on so many aspects of the build."

Gary said there was a lot to learn along the way, but experience helped.

"Initially, we knew next to nothing about Beavers," he said. "Bill and his guys, however, were old hands at handling all kinds of crunched ag-planes, so it was just a matter of redirecting their experience and utilizing the intense sources of information available to us."

They had a "stroke of luck" when it came to the engine, Gary said.

"As a family of engines goes, the 985 is probably the hardest-worked family of engines," he said. "Most have been built and rebuilt so many times that some rebuildable parts are becoming hard to

Hangar 180: Its Flying Collection

Hangar 180 starts everything it does with its moto: "Our promise, as Hangar 180, is to honor our veterans and the men and women who continue to serve our country. We promise to continue to share aviation history and remind everyone why we are able to fly these amazing aircraft. We promise to never forget." Its flying collection and public service activities very much support that statement.

The collection started off with the PT-22 Recruit, which is one of three Ryans in its stable. Those include what are essentially two of the most classic airplanes of the 1930s in the Ryan STA, which at one time belonged to race pilot superstars Roscoe Turner in the 1930s and Mira Slovak in the 1960s. It also has an ex-Indian Air Force Ryan STM, which somehow survived World War II.

Its P-40N, *Suzy*, is an actual combat veteran, having seen action in the 49th Fighter Group in Papua New Guinea, where it was abandoned and then rescued in the late '60s. Its P-51D *Patty Ann II* continued fighting after the war as part of the Israel Defense Forces in 1948. It raced at Reno under the name *Cloud Dancer* and is now painted as *Patty Ann II*, the mount of fighter ace John "Jack" Thornell, the third-highest ace with 17-1/2 victories, of the 352nd Fighter Group.

Hangar 180's P-64 replica started life as a Harvard, but its 1929 Stearman Speedmail was an official ship of the American Legion aeronautical division in the 1930s. Richfield Oil Corp. owned the airplane and campaigned it around the country promoting the legion and aviation in general.

Its PT-13 Stearman is restored in the colors and equipment of the "standardized Stearman" that eventually populated most, if not all, Navy and Army training units. Most WWII pilot veterans come to Hangar 180 to tell tales of their times in the Stearman during flight training.

Offering the extreme in comparisons, Hangar 180 has a Piper L-4 in the same area as its Mustang and P-40, showing that veterans made history from the treetops to the near stratosphere.

PHOTOGRAPHY BY **SCOTT SLOCUM**

find. However, one of our friends, Rex Vauhn, in Tulsa, Oklahoma, let us know that he had just stumbled across a number of first-run 985s. Everything on them was first run, which these days is almost unheard of. So, we jumped on one of those, which, when overhauled, essentially gave us a nearly new motor. We matched that with a 108-inch, AG200, square-tip prop. We wanted thrust with as little noise as possible, and this one from Northwest Propeller did the job. The engine proved itself on the trip to and from Oshkosh, which was 27 hours. In the first 40 hours of flying the airplane, we've only burned 6 quarts, and the engine is turbine-smooth. We couldn't ask for anything better."

When it came to the panel, Gary did his best to keep it simple.

"There's always a temptation, when doing an instrument panel for what is going to be a traveling machine, to put in as much glass as is available," he said. "However, I wanted the panel to have as much originality as made sense, and we'd make up for the lack of glass with mounts for iPads and such. So, essentially, we're flying mostly steam gauges. I did come across a new old stock dual control yoke setup, which is really handy. The general theme of the cabin area is military, but not so much so that passenger comfort is compromised."

Gary noted that Hangar 180 is a blend of historic civilian and purely military airplanes, and they paint each as accurately as possible. The Beaver was a little different.

"We knew we had an airplane type that had been used not only by every United States service but dozens of others around the world," he said. "So, picking just one was more than a little difficult. What we decided to do was pay homage to all of the U.S. forces, so the scheme includes bits from Army, Navy, [and] Air Force schemes, with an orange nose ring à la Forest Service."

When it came time to fly the airplane, they transported the best Beaver instructors they could find to Lewiston.

"That included Long Nguyen, longtime Beaver instructor, and Ray Fowler, who is familiar to EAA folks as one of the most experienced warbird pilots around," Gary said. "All three of us got checked out, which included working the airplane on the water. It took about six hours to get each of us up to speed, and every one of us absolutely loves the airplane. Now that we've expanded our use of the airplane, we can clearly see why the airplane is a legend and is idolized in many circles. It is literally a one-of-a-kind airplane, and we're so glad we've done what we've done and we're proud of the final product."

Apparently, others felt the same way about the restoration results because Hangar 180 earned the Warbirds of America division's Keep 'em Flying Award at EAA AirVenture Oshkosh 2022 and Bill Strange took home the Golden Wrench award.

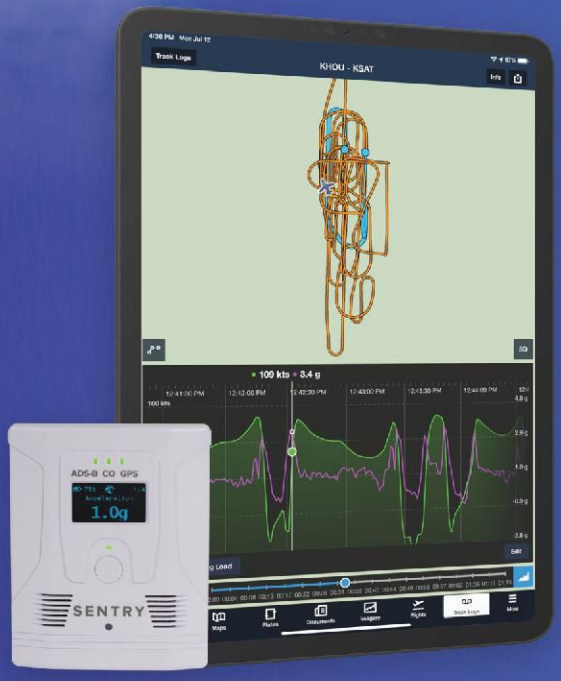
So now N530BJ stands tall among the other aircraft at Hangar 180 and periodically ventures forth to carry the museum's message around the country. Its days of gathering dust are definitely over. EAA

Budd Davisson, EAA 22483, is an aeronautical engineer, has flown more than 300 different types, and has published four books and more than 4,000 articles. He is also a flight instructor primarily in Pitts/tailwheel aircraft. Visit him on AirBum.com.

A fitting final scene for a perfect day!

PHOTOGRAPHY BY JIM RAEDER

Safety with Attitude



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The Search for IFR Safety and Navigational Ease

One man's pursuit of digital innovation

BY BUDD DAVISSON

TO ANYONE WHO HAS been flying for more than 20 years, the glass panels now commonly seen in light aircraft, both certified and amateur-built, seem like science fiction. Where airliners were once held out as paragons of avionics superiority, they are now lagging behind the likes of newly equipped RVs, Bonanzas, Staggerwings, and much-pampered 172s. However, to quote Bachman-Turner Overdrive, "You ain't seen nothin' yet."

When it comes to industry leaders, we're no longer surprised by the inventions and revelations of those who look at the world as a blank sheet of paper on which they can create their own form of artwork. The Steve Jobses, Bill Gateses, Elon Musks, and Burt Rutans of the world think differently than we do. They see the world from totally different perspectives.

However, over and above being geniuses in their own mediums, their brains also include something we only see occasionally. Besides being capable of creating otherworldly technological gadgets and concepts, they possess an innate ability to both market their creations to humanity while creating the corporate environment required to produce and further develop their products. They are definitely not one-trick ponies. The world is full of people who have great ideas and come up with great inventions. However, only a few can design, build, and successfully sell their products.

The current aircraft glass panel brigade was a product of the explosion in digital everything, from computers to smartphones to iPads, etc. The 1980s and '90s brand of what we'd call computer geeks who were also pilots saw lots of opportunities for improvement in the airplanes they were flying. One of those was Dan Schwinn, EAA 360170, an EAA board member, founder of Avidyne, a leading manufacturer of state-of-the-art avionics.

"I can't honestly say why I wanted to learn to fly," Dan said. "In fact, at some level it's always been there in the background, even though growing up I knew no one who flew and my parents had nothing to do with it. However, when I went to MIT to get an electrical engineering degree and was deciding whether to continue with AFROTC for the last few years, because of my less-than-perfect eyesight, they made the decision for me. They told me point blank, 'You'll never fly for us,' and that was that."

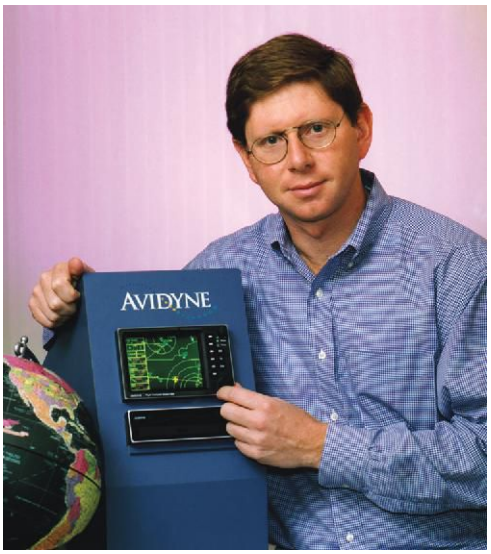
That experience unintentionally pushed Dan to become a pilot.

"In my first job, I had an office mate who had a PPL and was continually talking about it," Dan said. "At the time, I didn't even know the EAA existed and wouldn't for some years. I was definitely not an enthusiast in any way. However, something about the way he talked about flying aroused an odd sentiment in me. Some part of me thought, if he could do it, I could surely could do it, too. So, I started taking flying lessons and went from there."

Flying became part of Dan's life as he started his first company.

Avidyne's new Vantage PFD/MFD upgrade for the Cirrus includes 12-inch touchscreen displays with synthetic vision.

Avidyne's AI-based PilotEye Vision System provides an extra set of eyes in the cockpit which is especially important for seeing non-cooperative traffic like drones.



> Since I had already started one company and survived, I figured I'd start another one that used technology to address the steep IFR learning curve. At the same time, it would improve the safety and ease of basic cross-country navigation.
>
> – Dan Schwinn

> We put a lot of our IFD series GPS systems with its synthetic vision in homebuilts. It reduces the navigation load on the pilot almost to zero. If he just loads his flight plan into the unit, the synthetic vision will take him where he is going.
> — Dan Schwinn

"My first company was focused on integrating computers into corporations which, in the early '90s, was a trend that was just taking hold," Dan said. "In some business sectors growth was explosive, and I rode that wave."

As the company grew, Dan was doing more corporate travel via his own airplane.

"I went through the 172, 182 phase fairly quickly and into Mooneys, including a turbocharged 252," he said. "So, I was continually exposed to the IFR environment via traditional steam gauge layouts."

At one point, Dan realized the panel he was using was out of step with technology and a long way from being as safe as it could be or easy to use.

"I had come out of the computer world and was facing IFR travel and basic navigation with technology that hadn't improved significantly since the 1950s," he said. "As pilots, we had to develop the skills to visually and mentally derive information from the artificial horizon, combine it with info from VORs, and the DG, and other gauges. Most of the gauges we were depending on were actually quite crude, when measured against the computer world. And we were trusting our lives to them."

Then, Dan had an idea.

"Something clicked in my head," he said. "Since I had already started one company and survived, I figured I'd start another one that used technology to address the steep IFR learning curve. At the same time, it would improve the safety and ease of basic cross-country navigation. My goal was to combine it all into a single, panel-mounted unit and utilize every digital tool I could find. I wanted to make it so the average, low-time pilot could safely fly A to B without having superhuman skills or training. Plus, whatever I came up with had to be retrofittable into almost any airplane and be affordable.

"Avidyne's first product in 1994 was my way of combining VOR, RNAV, LORAN in what was basically a fairly large, panel-mounted moving map," he added. "The pilot could trace his progress over the ground against a course line he knew was right. Also, we did it in color, which helped to a very real degree.

"Using that basic concept, as a new technology came along or we were able to develop new capabilities, we started integrating datalink weather, satellite terrain imagery, traffic system alerts into the units," Dan said. "It took about 10 years, but we eventually made our panel presentations into 'synthetic vision.' In other words, the unit's face is presenting everything the pilot could see out the windshield in CAVU conditions along with all of the IFR/navigational information overlaid on it. As fast as new technology comes along, we work it into our systems. This has been true of the entire industry for long enough that the airlines and USAF are now rushing to catch up with us."

While Dan and his team have been pursuing their technologies, a totally separate field of technology that isn't certified for use in aircraft has been developing.

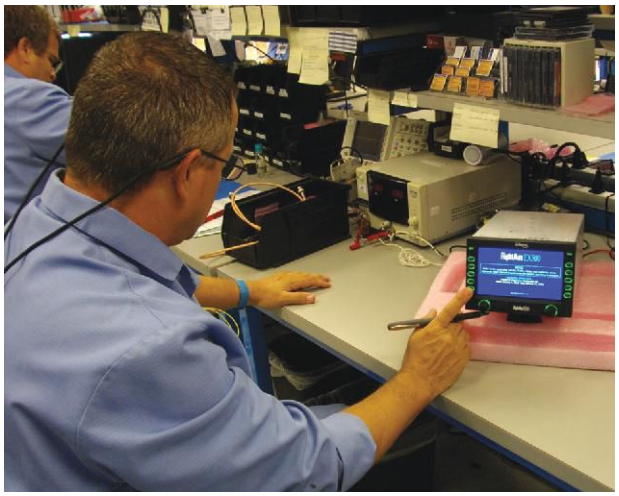
"With technology like that used by ForeFlight and presentations ranging from smartphones to iPads, we had an interesting form of competition that also opened new areas of innovation on our side," he said. "Rather than competing with iPads, etc., we decided to include them as building blocks for our system. We developed software that could present our certified information on iPads and merge with some of the ForeFlight type of information."

The connection from the equipment to the iPad is wireless, so it just has to be in the cockpit to act as a larger display.

"Our little IFD440 unit is designed to use minimal panel mount space as well as wireless connections to a number of different computer applications," Dan said. "In fact, we strongly encourage and seek out app developers that we can work with. This includes developers from overseas. The rest of the world has its own apps, and we want to link with them. This includes functioning with all forms of ADS-B In and weather information."

Dan said one of the more interesting and newest developments is making the next generation autopilot product line 360-degree capable.

"Most autopilots can't tolerate angular displacements beyond about 60 degrees of bank or 30 degrees of pitch, which are also the FAA definitions of aerobatics," he said. "However, today's corporate jet market is seeing an increasing requirement from jet operators and insurance companies that their pilots get unusual attitude recovery training. With increasing upset occurrences in which pilots don't know how to recover, we decided to build that into our DFC series autopilots. So, when an airplane is in any unknown attitude, including inverted, push a button and the autopilot will fly it back to level attitude while controlling speed buildup and attitude. An interesting aspect to this feature is that it can't be TSO certified because the FAA has no TSO standards to be used for this kind



Technician checking out an Avidyne MFD on the bench.

Product workers at the Melbourne, Florida, factory inspect PC boards.

of certification. I mention this not to encourage its use but to point out what new directions technology is going."

Even though Avidyne is quite often seen as strictly a certified airplane supplier, Dan said that is definitely not true.

"We first exhibited our product at Oshkosh in 1995, and our first sale was to a homebuilder," he said. "Today, a rapidly growing and very solid market is the result of the boom of kitbuilts. Today we're seeing lots of experimental amateur-built aircraft that are seriously equipped for IFR work. And you can't legally go into the clouds unless your equipment is TSO'd. Inasmuch as so many of the kit aircraft are faster than their certified brethren with longer legs, they are no longer looked at as being strictly used for getting Sunday morning hamburgers. Regardless of what certified aircraft you're looking at, most of which don't actually use the back seat very often, there's a homebuilt airplane that can do the same job at higher speeds. For that reason, even if the experimental pilot isn't planning on IFR flying, they are definitely going to spend most of their time on long cross-countries. And most of today's pilots know there is a whole new world of navigation units out there. We put a lot of our IFD series GPS systems with its synthetic vision in homebuilts. It reduces the navigation load on the pilot almost to zero. If he just loads his flight plan into the unit, the synthetic vision will take him where he is going."

No technology stands still. This is especially true of anything involving digits, which are now the foundation of modern avionics. Plus, there is so much research being done in so many industries to expand artificial intelligence (AI) applications that the horizons for innovative guys like Dan Schwinn just keep getting wider.

"The concept of synthetic vision is expanding wildly, partially because of AI," he said. "Combining images from a number of cameras, the current units can process all of the information it sees, compare it to the other cameras in the system, and build an image of what is out there for the pilot even though it might be invisible to radar or other technologies. It can select any runway in any conditions. It can see and warn the pilot of non-cooperating traffic [aircraft that don't have ADS-B] down to and including J-3 Cubs, which normal radar can't see."

Dan noted that one of the immediate applications for this is providing helicopter pilots with warnings and indications of everything around them in any direction.

"It'll be using IR and LIDAR cameras and sensors that talk to the AI box and creates a live image of the pilot's surroundings," he said.

Dan said he expects to see even more innovation in the future.

"The next 20 years is going to see a complete innovation cycle that's as big as what we're seeing today," he said. "For one thing, our current concept of electrical vehicles is going to be totally different. It might involve onboard hydrogen-generated electricity. We may have hybrid airplanes that are both electric and gas. All of this can be made to work with AI helping each system think and talk to one another. There is absolutely no way anyone can make a totally accurate prediction of all the advances that are going to be made because AI discoveries are being made almost daily. Here at Avidyne, we're making an intense effort to stay on the forefront of all of this. It's going to be both challenging and exciting."

Wow! It's really going to be interesting to see the effect all of this has on sport aircraft. It's obvious that at some time in the near future, if we feel like it, we're going to see glass cockpit J-3s and RVs that can go where airliners won't venture. EAA

Budd Davisson, EAA 22483, is an aeronautical engineer, has flown more than 300 different types, and has published four books and more than 4,000 articles. He is also a flight instructor primarily in Pitts/tailwheel aircraft. Visit him on AirBum.com.

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PIPISTREL'S VELIS ELECTRO

BY KRIS CALDWELL

PHOTOGRAPHY COURTESY OF **PIPISTREL**

FIRST IMPRESSIONS

I'M HAPPY TO PAY for fuel in this airplane. It may look similar to many new light-sport aircraft (LSA), but trust me, things are different under the hood of the new Velis Electro. If you haven't figured out already by the name, it's electric. While there have been many companies with electric aircraft concepts, Pipistrel has been leading the way in actual electric aircraft production since 2007. The Pipistrel Velis Electro offers the latest in performance and battery health.

In exciting news, Textron eAviation, based in Wichita, Kansas, has generously donated a brand-new Velis Electro to EAA. It will be auctioned at The Gathering during EAA AirVenture Oshkosh 2023, with all proceeds going to support EAA programs.

"EAA ... exclusively focuses on the type of aircraft of which Pipistrel is known," said Rob Scholl, EAA 1180884, president and CEO of Textron eAviation. "[EAA] reaches and supports groups intimately involved in light aviation and is leading the way in advocating on behalf of experimental and light-sport aircraft, both in the United States and globally. We are committed to supporting them in their efforts."

Rob said aircraft like the Pipistrel Velis Electro are one of the ways to attract the next generation to our industry and generate excitement through new types of technology.

EAA CEO and Chairman of the Board Jack J. Pelton expressed EAA's gratitude on behalf of the organization.

"Textron has always been a wonderful and dedicated supporter of EAA," Jack said. "In this case, though, we're overwhelmed by the company's generosity with this donation. The Velis Electro is a highly innovative aircraft that promises to be a game changer in the world of flight training. It's certain to be a hit at The Gathering, and the proceeds will have a huge impact on all of the EAA programs that support our mission."

Textron started its eAviation branch to encompass all of its cutting-edge alternative propulsion projects and acquired Pipistrel in 2022. Textron eAviation and Pipistrel are working on many exciting projects, including the Nexus Air Taxi and Nuuva V300 unmanned air cargo aircraft.

Pipistrel has the most electric propulsion production experience in the industry, and it was natural that Textron eAviation would want to gain as much of its expertise as possible. Pipistrel is based in Ajdovščina, Slovenia, and its manufacturing plant is just across the border in Gorizia, Italy.

The company's partnership with Textron eAviation means that we should be seeing a lot more of Pipistrel's products and technology in the United States. Part of the good news is that much of the certification work will have already been completed for the European Union Aviation Safety Agency (EASA).

DESIGN FEATURES

The airframe is mostly composite, and due to the relatively light weight of the powerplant and batteries (156 pounds each), the useful load is quite high. The airframe is streamlined, and every detail is designed with efficiency in mind.

This is a two-place, side-by-side, fixed tricycle gear aircraft with dual-stick controls. The mechanically operated toe brakes are dual disc-style Beringers. The flight controls are pushrod activated with the exception of the rudder pedals, which use cables.

The Velis has full-span flaperons, providing excellent roll authority throughout the flight envelope.

ABOUT THE VELIS

The name Velis comes from the Latin word meaning "moving with the sails." The Velis Electro is Pipistrel's latest electric aircraft. It builds on its previous light-sport electric airplane, the Alpha Electro.

While the two aircraft look similar, there are significant upgrades, primarily the liquid-cooled powertrain that not only contributes to the longevity and health of the batteries but also permits operations in very cold environments and rain. In fact, Pipistrel claims the new battery system lifespan is double that of the previous generation.

Other upgrades from the Alpha Electro include an increase in useful load (110 pounds), more substantial landing gear, and more overall energy onboard (a 15 percent increase). There are some slight dimensional changes to the airframe and wings also. The max gross weight of the Velis Electro is 1,320 pounds, and typically it will have an empty weight (with batteries installed) of 941 pounds, leaving 378 pounds of useful load.

Both the Velis Electro and the Alpha Electro are purpose-designed as zero-emission and cost-effective primary flight trainers to teach students basic flying skills and traffic pattern work. For private pilot training, the Velis Electro is intended to be supplemented by a gas-powered aircraft to complete cross-country and night requirements.

Both the Velis Club and Alpha Trainer are powered by a Rotax 912 and are ideally suited to supplement the Velis Electro in the pursuit of a private pilot certificate. The airframes and engine power are virtually identical. All a student would need to learn is the reciprocating engine specifics.

The lack of fuel burn and low hourly maintenance costs also make the Velis Electro an affordable aircraft for a student pilot to train in, making a pilot certificate a more achievable goal for those with less disposable income.

The Velis Electro is the first electric aircraft to be certified under EASA for use in commercial operations (flight training). Ideally, when the FAA releases the new Modernization

PHOTOGRAPHY COURTESY OF **PIPISTREL**

of Special Airworthiness Certificates (MOSAIC) rule, the Velis Electro will have a clear and quick path to certification as a special light-sport aircraft (S-LSA). For now, it remains as an experimental light-sport aircraft (E-LSA) in the United States due to regulatory language that does not include "alternative propulsion" powerplants. However, the FAA will allow an exemption for the aircraft's airworthiness while MOSAIC is being finalized.

ERGONOMICS

Dual upward-hinged doors provide easy access to the cockpit, but you will be required to swing one leg over the control stick once you sit down.

The seats are comfortable and have four-point harnesses. The seats also come with a lumbar support hand pump with a relief valve so you can adjust to your own comfort.

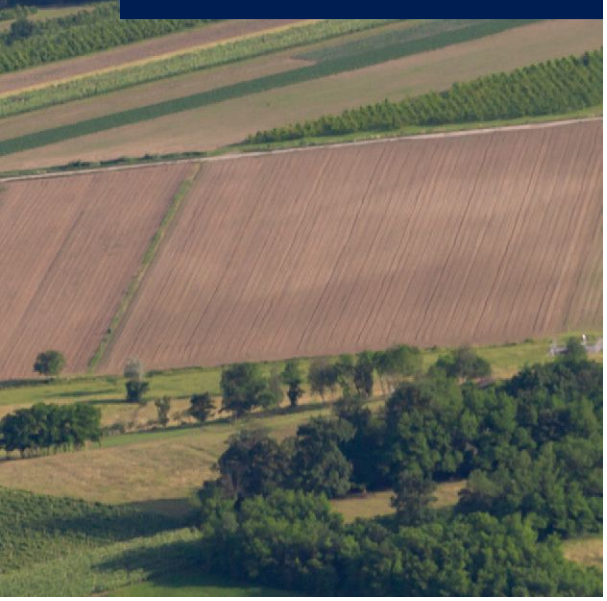
The rudder pedals are easily adjusted to your leg length during flight. If you're around 6 feet tall or greater, after sitting down, you will notice that the spar runs just in front of your forehead and is wrapped in soft indoor/outdoor carpet. It's not in the way, and I'm told that pilots as tall as 6 feet, 5 inches have comfortably flown the Velis Electro.

POWERPLANT

This is where things get interesting. Pipistrel refers to the whole power system as the "powertrain," which consists of batteries, inverter, and motor. Two 355-volt lithium-ion batteries operate in parallel (for redundancy) to power the motor via the inverter. Pipistrel's batteries are crash tested and are thermal runaway inhibiting. They have also been HIRF (high-intensity radiated fields) and EMI (electromagnetic interference) tested. Should one battery drop offline, the other battery is fully capable of climb and cruise power, albeit for a shorter period of time.

The battery power is converted from DC to AC via the inverter before heading to the motor. A separate 12-volt battery powers

One of the strangest things about the Velis Electro is how quiet it is. In flight, the loudest sound is that of the wind. At only 60 decibels, the volume of the motor and propeller is equivalent to a normal human conversation.



cockpit displays, instruments, and trim. It's kept charged by the propulsion battery when in operation. The powerplant is Pipistrel's E-811 electric motor, and it's attached to the back of the propeller.

The entire motor spins with the propeller, so technically, the Velis Electro can be considered a rotary-powered aircraft! Thrust is generated by a Pipistrel-certified, fixed-pitch, three-bladed composite propeller. Power is not measured by horsepower but by kilowatts (kW). A full-throttle takeoff will yield 57.6 kW and equates to approximately 77 hp.

Something else to get used to is the "fuel gauge." The EPSI 570C engine monitoring system shows a color-coded visual depiction of both batteries with a state of charge (SOC) percentage remaining, as well as flight time remaining in minutes. This unit is also used to push software updates and record battery performance and health.

PREFLIGHT

Before flying, you must ensure the batteries are charged and ready to go. The wheeled charging stations require at least a single-phase 240-volt AC hookup, but a three-phase 340-volt AC one is preferred. You also need two charging options available depending on whether you'd like to fly again soon or begin a battery "rest charge," which leaves the battery at about 80 percent charged; this is where you want it if it won't be flown again soon. A quick charge takes about one hour and 20 minutes and requires a 340-volt AC power supply. Even without access to a 340-volt AC power supply, a full charge will only take about three hours.

Similar to a glider, the wings are easily removable for transporting via trailer. Needless to say, it's important to check the three main spar bolt connections.

Ensure all battery and throttle enable switches in the cockpit are off, and then walk out front and spin the three-bladed prop in either direction to check for any signs of binding. The prop spins smooth and free, as there are no crankshaft, pistons, or alternator belts.

Next, make sure the charging cord is unplugged from the port in the right side of the cowling. Open the front battery door and note the state of charge, battery health, and temperature. You'll make the same checks on the aft battery located inside a door behind the pilot's seat.

In the aft battery compartment, there is an electric pump that circulates glycol around both batteries and the inverter. The glycol is pink and therefore easy to check in the clear tubing. On the previous generation of electric aircraft, an outside air temperature of 35 degrees Celsius (95 degrees Fahrenheit) would preclude flight due to the operating limitations of the inverter. The new liquid-cooled powertrain system has no such limitations.

The rest of the preflight is just like most other aircraft — except you won't have to dip the tanks or drain fuel samples. Also, note how clean the belly of the Electro is.

START/TAXI/TAKEOFF

After yelling "Clear prop," the Velis Electro is started by turning four console switches from off to on. From left to right on the console, the master, avionics, power engaged, and throttle engaged switches are turned on, making the aircraft ready to taxi.

The only sound you'll hear is the soft "whirring" of the coolant pump behind the pilot's seat. Carefully bump the throttle forward and the prop immediately spins up, and the airplane begins taxiing forward.

Steering is easy with direct linkage nose wheel steering. If you need to slow down or stop, pull the throttle to idle and the prop slows to a stop. Needless to say, it is strange to have your propeller completely stopped and hear nothing but the sound of the wheels rolling down the taxiway.

There is also no run-up required, and pretakeoff checks consist of checking the main batteries' state of charge and ensuring the auxiliary battery is at 13 volts or greater. One notch of flaps is used for takeoff. With checks complete, take the runway and add full throttle!

TAKEOFF

One advantage to an electric-powered aircraft is there is virtually no delay between throttle movement and thrust. This instantaneous thrust coupled with a lightweight, low-drag aircraft means the acceleration is surprisingly fast.

With the power set to 57.6 kW on takeoff, you will see your "time remaining" go significantly down, but once power is reduced after takeoff, your "time-remaining" will increase. Even with a "fuel-conserving" 40 kW climb power set, the Velis still climbs between 350-400 fpm with two large adults on board.

Regardless of temperature and elevation, the engine will always deliver the same power.

PHOTOGRAPHY COURTESY OF **PIPISTREL**

CRUISE

The visibility is fantastic. The doors are basically just big windows and allow you to see almost straight down. The large windscreen gives great forward visibility. The instrument panel is unobtrusive and almost helicopter-like. A skylight behind the main spar adds to the "open" feel of the cockpit. Not much risk of getting claustrophobic in this airplane.

The flight controls are extremely light, and all inputs can be made with only two fingers on the stick — no death grips required. Once level, typical cruise power is set at about 20 kW to maximize time airborne. A local-area flight in the Velis will be about 50 minutes, landing with the state of charge at about 20 percent.

When the SOC falls below 30 percent, the master caution warning will illuminate and the SOC depiction will turn amber. Not an emergency, but the airplane is trying to tell you that it's a good time to start looking for an airport. The SOC depiction turns red at 19 percent remaining but will still provide full power if required. At 10 percent SOC, the available power will be metered back to conserve time aloft.

Trim is electric (12-volt battery) and accomplished with a rocker switch on the center console, but it's rarely needed. One of the strangest things about the Velis Electro is how quiet it is. In flight, the loudest sound is that of the wind. At only 60 decibels, the volume of the motor and propeller is equivalent to a normal human conversation.

The lack of noise also means that the Velis Electro can fly pattern work at noise-sensitive airports, where reciprocating and jet-powered aircraft are severely restricted.

Pipistrel has its roots in the world of motorgliders, so it's not surprising that the Velis Electro has glider-like design characteristics and performance. At idle, with the propeller windmilling, the motor acts as a generator and actually charges the batteries. During this "recuperation" mode, the power gauge will actually read a negative kilowatt number, meaning the windmilling prop and motor is creating electricity.

For an experienced glider pilot on a good soaring day, it's possible to extend your flight beyond the advertised 50 minutes and still land with VFR reserves.

SPECIFICATIONS

AIRCRAFT MAKE & MODEL: Pipistrel Velis Electro
CERTIFICATION: E-LSA

LENGTH: 21 feet, 4 inches
WINGSPAN: 35 feet, 1 inch
HEIGHT: 6 feet, 3 inches

MAXIMUM GROSS WEIGHT: 1,320 pounds
EMPTY WEIGHT: 941 pounds
MAX ENDURANCE: 50 minutes (plus VFR reserve)
SEATS: 2

POWERPLANT MAKE & MODEL: Pipistrel E-811
MAXIMUM TAKEOFF POWER: 57.6 kW (approximately 77 hp)
PROPELLER: Pipistrel P-812-164-F3A, certified, fixed pitch, composite, three blades, 65-inch diameter
CRUISE SPEED: 90 knots
POWER LOADING: 22.9 pounds per kilowatt
WING LOADING: 12.9 pounds per square foot

V_{NE}: 108 knots
V_{SO}: 45 knots

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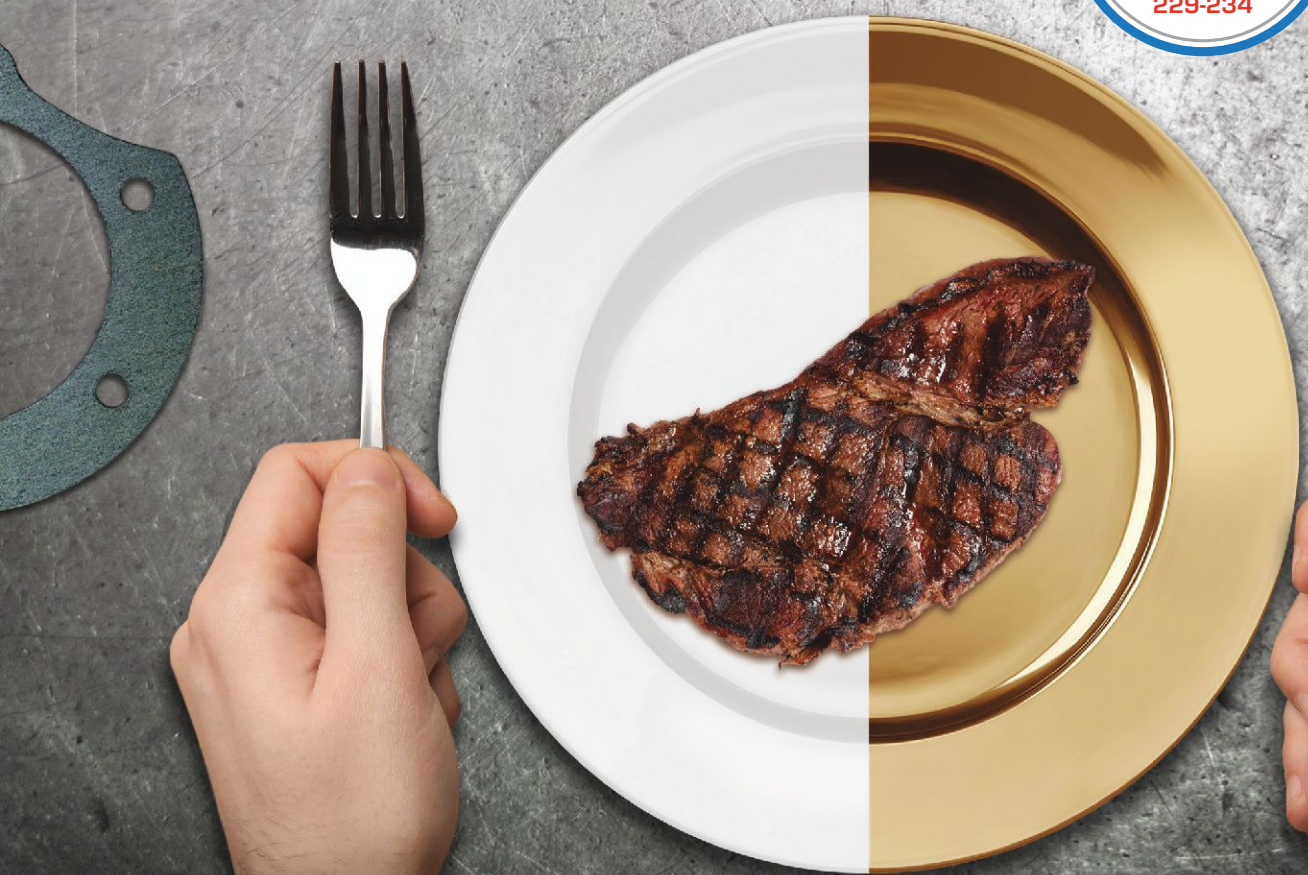

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APPROACH AND LANDING

As previously stated, the Velis is extremely slick and doesn't like to slow down. To maximize efficiency, a power-off approach and landing is standard.

Retard the throttle to idle at midfield and allow the aircraft to decelerate until slower than 81 knots. Pull the Johnson bar-style flap handle to the first detent, bringing the flaps to 9.5 degrees down.

When established on final and below 65 knots, pull the handle to the second and final detent, which deploys 20 degrees of flaps. Final approach speed is 60-65 knots. Attitude is everything on final. You must resist the temptation to nose over and dive for the runway if you find yourself high. You will rapidly blow through the max flap speed almost immediately.

Hold a constant attitude that gives 60-65 knots. While you could slip to land in the Velis Electro, there's not much surface area on the fuselage to make a difference. The best approach is a stabilized approach with power back almost to idle.

The flight controls are sensitive, and the flare and touchdown are relatively easy as long as you don't overcontrol; use the rudder to keep the longitudinal axis tracking straight down the runway.

After landing, there's no need to stop at the fuel pumps. Taxi back to parking and turn the four switches off in reverse order. Plug the Electro back into the charger and grab lunch while your steed charges for your next flight.

The lack of fuel burn and low hourly maintenance costs also make the Velis Electro an affordable aircraft for a student pilot to train in, making a pilot certificate a more achievable goal for those with less disposable income.

WRAP-UP

Since the days of Orville and Wilbur, aircraft engines have operated by burning dead dinosaurs. While there are certainly new aviation technologies being developed every day, it's not often that you get to fly an aircraft with a completely new type of powerplant.

Aviation from the beginning has been about out-of-the-box thinking, and all of us in EAA are, by definition, dreamers and doers! Without dreams of flying, we'd all have our feet planted firmly on the ground.

The young boys and girls who are introduced to aviation through EAA's Young Eagles program are tomorrow's industry leaders, engineers, builders, pilots, and space explorers. The donation of the Velis Electro by Textron eAviation will certainly be put to good use in supporting all of EAA's programs that facilitate the mission of growing participation in aviation. EAA

Kris Caldwell, EAA 1239655, Kris Caldwell has loved airplanes since he was 5 years old and has flown everything from gliders to fighters. He is passionate about everything aviation but especially warbirds, vintage aircraft and backcountry flying. He and his family are always on a search for a new flying or camping adventure. He can be found at PlaneImpressions.com.

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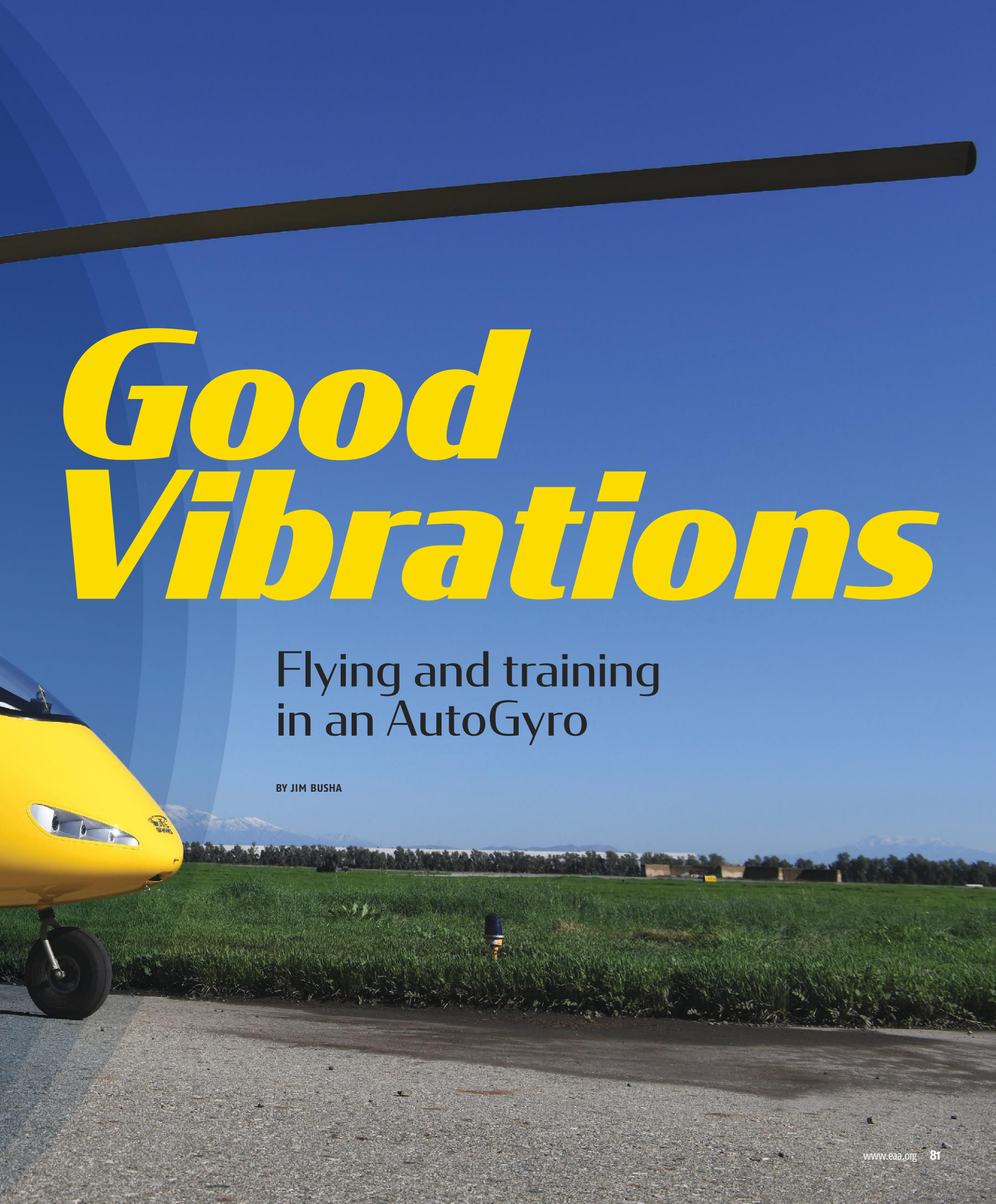


Good Vibrations

Flying and training in an AutoGyro

BY JIM BUSHA

AutoGyro:
Life in the Fun Lane

ACCORDING TO AUTOGYRO OF HILDESHEIM, GERMANY, a gyroplane, also known as a gyrocopter or autogyro, is a relatively simple aircraft concept and easy to fly — but often historically misunderstood.

A helicopter flies because an engine spins the main rotor blades (the ones above the aircraft), each of which is a wing and generates lift, sucking the helicopter body upward and into the flight direction required depending on which way the disk is tilted. The little rotor at the back is there to stop the body from turning under the main rotor due to the engine torque reaction. Helicopters are fuel-thirsty, are a little noisy and complex, and require expensive maintenance. But they can take off, hover, and land vertically.

A fixed-wing airplane uses an engine and propeller to pull or push the wing through the air. As the air passes over the wing, lift is generated and the aircraft flies. Gyroplanes bridge the gap between these two technologies, simply and effectively — exactly as Juan de la Cierva intended in the 1920s when he invented the Autogiro.

The rotating wing above the gyroplane is not powered in flight. Like a fixed-wing aircraft, the engine and propeller pushes — or pulls — the aircraft body through the air, driving air through the rotating wing (or rotor). This airflow forces the wing to rotate. As it rotates, the airfoil section generates lift.

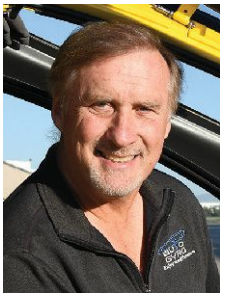
Flying a gyroplane is relatively easy. There is no helicopter collective control needed, and the rotating wing speed is self-regulating. There are no fixed-wing airplane flaps or ailerons to manage. They are simply not required.

A gyroplane cannot hover, or take off or land vertically. But because the rotating wing speed is not engine driven and powered only by oncoming airflow, it will always keep spinning whether the engine is running or not. Even if descending vertically, air still flows through the wing, making it spin.

It also means gyroplanes have the capability to operate at low airspeed because the wing speed is independent of the engine or gyroplane body. A normal minimum level flight speed can be as low as 25 knots/30 mph/40 kph. And a gyroplane can generally be safely operated at 0 indicated airspeed.

Similarly, gyroplanes can also fly to fairly high speeds. Most recreational gyroplanes have a maximum speed of around 105 knots/120 mph/190 kph. Drag and fuel burn increases significantly above this, requiring clever wing construction to achieve the 1950s achievements of 175 mph.

Because of the inherent safety and appeal of the "fun factor," Henry Boger of Chino, California, decided to dip his toe in the gyro world and see if all the hype was real. He was not disappointed.



Fascination
Henry Boger, EAA 1116602

Henry is the CEO of Adventure Air located at the Chino, California, airport. Adventure Air specializes in flight training, sales, and service, concentrating on AutoGyro products.

"I'm a representative for both AutoGyro of Germany and ELA of Spain," Henry said. "I've always loved flying and opened Adventure Air about 10 years ago. Originally, my focus was with weight-shift aircraft. I've been a pilot for 33 years now, single-engine instrument-rated with 2,500 hours of single-engine land time when I jumped over into the weight-shift control trike world. From there, I became a CFI for weight-shift control and have 2,000 hours in weight-shift control. One day I was waiting at Hawthorne, and the winds picked up to 20, 25 miles an hour so I couldn't fly the weight-shift control that day. I started researching what I can fly that's not really affected by wind that much, and I found the gyroplanes."

Unlike fixed-wing aircraft, a gyroplane's unpowered rotor "chops up" the wind, meaning that turbulence has much less impact on the smoothness of the ride.

"Most of the models that we sell, like the Cavalon, are shaped like an egg, so wind blows around them pretty evenly and you just don't get bumped around like you do in a fixed-wing aircraft," Henry said. "Out here at Chino, the winds pick up quite heavy, sometimes up to 50 miles an hour. When the winds pick up, we go flying while everybody else will sit on the ground. They actually fly a little better, in my opinion, in high winds because the rotor will spin up quicker and will lift off more in a vertical type takeoff."

As you taxi a gyroplane, the relative wind blows through the rotor like a pinwheel, slowly picking up speed. Most modern gyros also have what's called a

PHOTOGRAPHY COURTESY OF **HENRY BOGER OF ADVENTURE AIR**

PHOTOGRAPHY BY **JIM BUSHA**

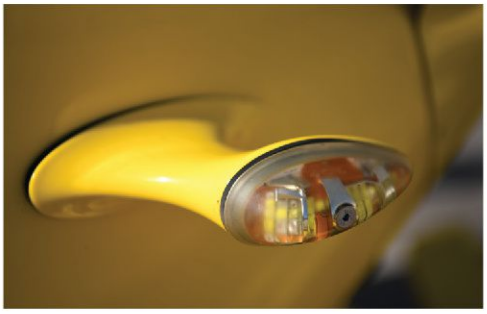
pre-rotator, which uses a mechanism called a bendix. The bendix helps get the rotor spinning but is disengaged before takeoff.

"You're being pushed by an engine either from the back or the front," Henry said. "The new modern gyroplanes are pusher-props. The nice thing about that is if something happened to the engine and the engine stops running for whatever reason, or your propeller has a problem, it has no effect on the rotor up there. It's a free-spinning rotor, and like a leaf off a tree, you're just going to float down, and then you can have a nice soft landing in an area the size of a tennis court."

As a full-service flight school, Henry and his staff at Adventure Air teach a variety of new pilots or those making the transition from fixed-wing aircraft.

"Most of my students are people that are fixed-wing licensed pilots," Henry said. "They are looking to get the gyro add-on. The wild thing about the gyroplanes is that they are classified as a rotorcraft. So, you can count a lot of that time towards helicopter rating time if you want. But if you're a private pilot and you want to get the gyro rating, it's just an add-on rating to your fixed-wing license. There's no hourly requirement for it. It's just proficiency. I would say a regular person coming in to fly — anywhere from five to 15 hours you can get proficient."

> **When the winds pick up, we go flying while everybody else will sit on the ground. They actually fly a little better in my opinion in high winds because the rotor will spin up quicker and will lift off more in a vertical type takeoff.**
>
> **— Henry Boger**



According to Henry, the flight characteristics of a gyroplane in the air are similar to an airplane. It is a combination airplane-helicopter, but it's more closely related to an airplane.

"It's more like an airplane that can't stall because you can pull the stick back and go to zero airspeed in the air," he said. "You don't stall. They cannot stall. What they do is they'll slowly start descending. So, wind is continuously blowing through the rotors. You're in what's called auto-rotation.

"With gyros, all rotors have sag, so the rotor blades kind of dip down at the ends," he added. "During takeoff, if you were to take the stick and pull it all the way back to your chest with the rotor not spinning, the rotor would come down and the amount of sag would cause it to hit the tail or the prop that's spinning. So, you have to spin the rotor up to a certain rpm. We say 200 rpm before it's rigid, and when you tilt it back, it won't hit the tail or prop. So that's probably one of the most important things is you keep the stick forward."

Henry pointed out that there's a small button on the stick used to engage the pre-rotator.

"Once the bendix is engaged, it starts the rotor spinning," he said. "Once it gets up to 200 rpm, that's all you need. You can take your finger off the pre-rotor button, which drops the bendix out. Then you can pull the stick back, add power, and go down the runway.

"As you're going down the runway at 200 rpm, the rotor is now tilted back," he said. "When it gets to about 300 rpm, the nose is going to come up off the ground, kind of like you're popping a wheelie. Once the nose is off the ground, you continue to add power up to full power, then you have to keep the nose close to the ground. Then eventually the machine will just come up off the ground. And then once you get about 60 miles an hour, you climb out about 60."

The AutoGyros that Henry trains in are certified up to 12,000 feet. All the gyros Henry uses are powered by a Rotax engine as well. Specifically, the 100-hp 912, the 114-hp 914, or the 141-hp 915. Pilots will see cruise speeds between 80 to 110 mph, while V_{NE} is 120 mph. It's not jet speed or anything, but it's reasonable and a heck of a lot of fun. And with 26 gallons of fuel on board, you're good for about five hours in the air, burning about 5 to 6 gph.

When you're done cruising around and ready to head back to the airport to land, the capabilities of the gyroplane are eye-opening.

"In the gyro, I fly the pattern, but I do a little steeper approach than I do in a [fixed-wing] aircraft," Henry said. "So, if I have the VASI lights, I'll be above the VASI

PHOTOGRAPHY BY **JIM BUSHA**

lights usually. Once you get to the end of the runway, then I'm going to sink it down. You approach at about 60 miles an hour, which is good speed for the gyro. I flare it out at about a foot off the ground, let the airspeed bleed off, and slowly bring the stick back to lower your airspeed, and just touch the back wheels onto the ground. Once the back wheels touch, the nose comes down and sets down. And depending on the wind conditions, it can be a zero rollout or 5 feet. It's a very, very short-field landing aircraft."

Henry said landings are so easy that he often asks guests if they want to try it.

"It's actually very easy," he said. "It's funny, I'll have either low-time, or for people that are coming out here for an intro flight, a demo ride, and I'll ask them, 'Do you want to do the landing?' And then, of course, everyone's like, 'No, no, I can't do the landing.' But I follow along with them. I explain how to do it, and they find that the landings are really, really easy."

According to Henry, AutoGyro is the only company that makes full U.S.-certified aircraft. The other companies out there come as a kit and are experimental.

"AutoGyro has primary category certification, so they can come fully built, and you can do limited commercial operations with flight training, aerial photography, pipeline inspection, things like that," he said. "The certified machines come with a very basic panel, which is altitude, airspeed, the typical things that you would see in a very basic aircraft, all the way up to full Garmin G3X touchscreen panels. We now have certified the Garmin G3X's autopilot, ... which is awesome. Price point for the Cavalon model, a brand-new factory-built with the 915 Rotax engine, which is fuel injected and turbocharged, starts at about $130,000. Depending on the avionics you get, they can go up to about $190,000. The other models we have, again, AutoGyro, you can get these in either a kit form or the certified. You can get a kit 'Gyro, which is the MTO starting at about $60,000. I say it's a build, but it's more of an assembly. You're actually putting the thing together. I've built several of them. I've built the MTO, and I built a Cavalon in about 10 days. You're not welding metal and things like that. Everything fits according to the experimental rule of the 51 percent build requirement."

The real obvious thing with owning a gyroplane is that hangar space is a minimal requirement.

"Hangar space is awesome," Henry said. "I had a standard T-hangar at the Hawthorne Airport, and I fit seven AutoGyros in there because they just slot in. You just Tetris them in."

Annual time with a gyroplane is another eye-opening experience that doesn't put a huge dent in your wallet.

"Because our aircraft are new, there's not a whole lot that goes wrong with it," Henry said. "With any annual, you're going to do an oil and filter change. You're going to do inspection. Some of the engines have 2,000-hour TBOs [time between overhauls]. Some of them have a little bit less. The rotor blade on the top is a 2,000-hour TBO, but let's talk about the rotor system for a second. AutoGyro builds their own extruded aluminum blades, which create a very smooth flight. The rotor system doesn't have a transmission as the blades don't articulate, and [it's] a very simple system. The rest of the body is an aircraft. Most annuals cost between $500 and $1,500. But don't take it from me. Listen to the people who jumped off the fence into the AutoGyro world."

Let the Good Times Roll

Genevieve Amina Gideonse

Originally hailing from Portland, Oregon, 28-year-old Genevieve now calls Los Angeles home. Her journey into flight training took a nontraditional path.

"It was really dumb luck," Genevieve said. "I was working at a bar in LA and became friends with one of the cooks, named Walter. And since I was fairly new to the city, I didn't have a mechanic yet, and I asked his opinion, as I knew that he did some mechanic work as well. Walter was happy to just take a look at my car and told me to meet him where he was working in Chino. I didn't realize he was working at Adventure Air in Chino. As soon as I saw the gyroplanes, I was fascinated. When you look at them, they look fun."

Genevieve knew immediately that she would be interested in going up and flying one for herself. She also knew aviation was not a cheap hobby for someone working two jobs and living in California.

"I met Henry Boger, and I asked if I could volunteer my time to work here and clean or do whatever around the hangar in exchange for lessons," Genevieve said.

Henry kindly agreed.

"And pretty soon after my second or third lesson, I got really lucky because Jimmy McEwen, another gyro pilot, was coming through, offered to take me up," she said. "I went on a little lesson with him, and he happened to be flying to SUN 'n FUN [Aerospace Expo] the following week and asked if I would be interested in going just to

PHOTOGRAPHY BY **JIM BUSHA**

> But I especially love the flying part. I love the perspective that you're at because you're not flying that high. You can see a lot. And it is very low turbulence. It feels very smooth.
>
> — Genevieve Amina Gideonse

> **It filled that bill of what I was looking for, for low and slow. I can go up in the mountains and go find a stream and fly along it and get down over the beach and fly at 500 feet above the water and look at all the billionaire homes at Laguna.**
>
> **— Hal Woodruff**

get some hours and see what a cross-country trip was like. And I totally jumped at it. That experience really lit the fuse for me."

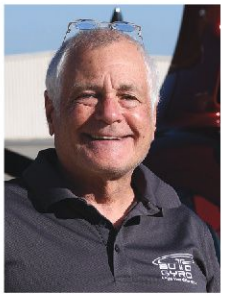
Genevieve has big plans for the future.

"I have a long way to go — 35 hours and climbing," she said. "I would love ultimately to become an instructor. I would love to be an instructor first and foremost. I'm interested in tourism. I love travel. And so big world dream down the line is to open a tourism business or something where gyro lessons are a part of that, in this country or another. I'm specifically interested in low-carbon ways of aviation. So, I'm attracted to the low fuel use of gyros."

Through her gyroplane training, Genevieve also found that she became interested in mechanic work. She started shadowing Walter, who works on the AutoGyros, and found a whole new perspective and understanding of the mechanics of a gyroplane.

"It's always a thrill when I come out to the airport and learn how a gyro works," she said. "But I especially love the flying part. I love the perspective that you're at because you're not flying that high. You can see a lot. And it is very low turbulence. It feels very smooth. It's a beautiful perspective. There's something about flying where I feel very excited and calm at the same time. To be somewhat in control and really engaged in that way while still seeing a high sort of perspective makes me feel very clear about things when I'm on land. Everyone has exceedingly been very welcoming. ... I think any amount of enthusiasm I had was really respected and met, especially because it is a niche. I don't have an understanding of what other areas in aviation are.

"I am accustomed to learning from other women, which is part of the reason why I would love to become an instructor and bring more women or people from different backgrounds — nonmilitary backgrounds, nonaviation backgrounds — into this world because I think anyone who loves flying will bring a great new perspective and will just enjoy it. The amount of joy I get from it is surprising to me every time."



Turn the Page
Hal Woodruff

At 73 years old, Hal Woodruff still vividly remembers when he used to fly U-control airplanes as a kid growing up in Indiana.

"I would go crazy if I broke a prop on a Sunday," Hal said. "I made a prop out of a Pepsi can, so I could continue flying that day."

Hal eventually obtained his private pilot certificate in 1975. Since then, he has owned a Cherokee 140 and is in a partnership with a M20C Mooney.

"After that, I got transferred out to California to be branch manager in the business I was in," Hal said. "I had nothing to fly, until I got into flying hang gliders for a short while. I quickly decided jumping off of mountaintops over here at Crestline, and also at Elsinore, was not a long-term solution to flying."

Then, something caught his eye.

"One day I was driving, going through the Banning Pass, and I saw a glider go overhead, and I says, 'Oh my God, I got to check this out.' And I actually followed the glider all the way over to Hemet, where it landed, and from that moment on, I was hooked on gliders and flying sailplanes."

In 1993, Hal bought a kit and proceeded to build and fly a Lancair 360. He upgraded to a Lancair IV-P in 2000 and spent the next three years building the airplane and

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has been flying the IV-P ever since. But Hal still had a yearning for seat-of-your-pants flying.

"I was flying at 18,000 feet, autopilot's on, and we're just smoking away," Hal said. "And, I started thinking, 'You know, I used to have a lot more fun flying.' I was thinking all along, I really needed something where I could go low and slow. So, I was on a mission to find something low and slow, and I was looking at Cubs and Super Cubs. That was until I met Henry, who moved into Chino about two years ago. I couldn't help but wonder what was going on when I saw gyroplanes taxiing back and forth all day long. ... I walked over there, and I introduced myself to Henry. He described what the gyroplanes are all about and how safe they were. When we got back from that ride, I said, 'Okay, sign me up. I want to do the sport pilot thing.'"

Hal admitted he was apprehensive about gyroplanes because he just wasn't sure how safe they were and was really concerned about the safety aspects. But it was Henry's assurance and first flight that convinced him otherwise.

"I learned right away that it's really critical that you get the rotor up to 200 rpm plus before you begin your takeoff roll," Hal said. "The more air you got going through, the faster the rotor will rotate. But if you get distracted and if you're not pulled back and putting some resistance on the rotor, it'll slow down. And if it slows down, it can get to the point to what is called blade flap. There is the possibility for the gyro to just roll right over."

Hal said he had so many different thoughts racing through his mind on that first 20-minute demo flight with Henry. But there was one that took over his entire thought process.

"Do I have enough money in my bank account to get one?" Hal said. "My low and slow itch was definitely scratched. You can cruise at a hundred miles an hour. It's faster than my friend's 140. And it carries significant amount of fuel, so you can go pretty long distances. It filled that bill of what I was looking for, for low and slow. I can go up in the mountains and go find a stream and fly along it and get down over the beach and fly at 500 feet above the water and look at all the billionaire homes at Laguna."

Hal said that he started feeling comfortable after about five or six hours of training. His past experience in gliders and fixed-wings only added to his comfort level.

"It didn't take very long," Hal said. "When I finally took the sport pilot test, I had less than 10 hours and was feeling pretty comfortable about the whole thing. My advice to other pilots: Go and fly it and see if it feels comfortable to you. I would say don't sit on the fence and go find yourself an operation, such as what Henry has here, and go take a ride and see if it's for you. And it certainly worked for me and a lot of other people that I know. You will be astounded by how much fun it is. But one word of caution — don't be surprised if you're writing a check for one after that first flight." EAA

Jim Busha, EAA Lifetime 119684, is an avid pilot and longtime contributor to EAA publications. He is EAA vice president of publications, marketing, membership, and retail. He is also the editor of *Warbirds* and *Vintage Airplane* magazines, and the owner of a 1943 Stinson L-5.

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Performance Checklist

Pay attention to your engine

BY VIC SYRACUSE

LAST MONTH I MENTIONED I would share more of the Hummingbird flight testing with you, and I promise I will. Overall, I have completed the Phase I testing, Carol got her first ride, and I think we are on track to bring it to EAA AirVenture Oshkosh 2023.

Next month I will share some more details of the Phase I testing, but this month I've decided to preempt that with some maintenance observations, which I think are more important to share. Some of them I have shared before, but I know we continually get new members, so in the spirit of both reinforcement and awareness, here are some findings on a couple of RV-9s that came to us recently.

I try to be present when a customer brings their aircraft to Base Leg Aviation, but it's not only to meet them and discuss their airplane. I am carefully listening to the engine and airframe as they taxi up, as well as looking at the tread and ground track of the tires and other things such as spinner track.

I can quickly tell if the engine is idling properly. From the exhaust tone, I can tell if it is too rich or too lean, or perhaps is missing a beat due to leaking intake gaskets or fouled plugs.

Sometimes I can't be there as customers drop their airplane off on the weekends, so the first thing I do is run it up prior to doing any work. It not only gets the engine oil warmed up for draining, but also allows me to see how the other systems in the aircraft are working, such as the engine instruments and electrical system. We even have a checklist that we use to document all the readings both prior to and after the condition inspection.

The first RV-9 has been maintained by us for many years and comes to us all the way from Maryland. I always check the ignitions right after startup, and this one almost quit completely when one or the other ignition was checked. That was quite surprising since it had one electronic ignition.

It was so bad I was surprised the owner had not called and said he wasn't coming. It got somewhat better and smoother once it warmed up, but it was still not to my liking. All other systems were good.

It piqued my interest. I removed the cowling and didn't find anything amiss with the intake tubes or ignition wires.

The engine was approaching 1,200 hours so I was curious as to the condition of the spark plugs and cylinders. Upon removing the spark plugs I immediately discovered the problem — all of the lower plugs were full of lead deposits.

The plugs were Tempest HE REM37BY with the larger gap as used in the Electroair ignition system and are not usually prone to fouling. You can see in the photo how much lead was in them.

A couple of them did not pass the resistance test, and the center electrodes were beginning to "football," so it was time to replace the plugs, which had almost 500 hours on them.

I know the pilot well, and I know he understands good leaning technique, so this warranted more scrutiny than just replacing the spark plugs. All the intake gaskets and hoses looked good, with no signs of brittleness, cracking, or blue stains.

When my flashlight settled on the airbox, I found what I was looking for. There were blue fuel stains all around the seam in the carburetor. That is usually evidence of a leaking or heavy float. This will initially cause an overly rich fuel mixture, which can lead to the excessive lead deposits I had discovered on the spark plugs.

I've seen this quite a few times over the years, and it's usually around 1,000 hours and 10 years, which fits this scenario perfectly. We replaced the spark plugs, along with a new carburetor overnighted by Aircraft Spruce & Specialty Co., and the results were amazing.

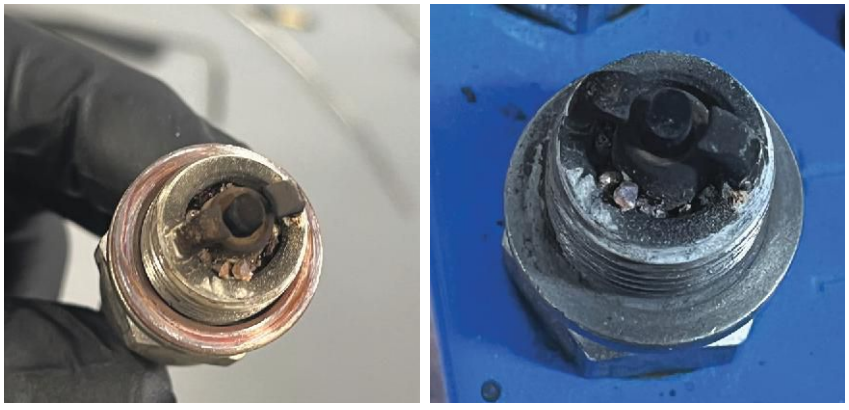
The customer showed up as I was finishing, so I had him start the airplane. I like to be outside the aircraft, or at least have someone outside the aircraft, during the post-maintenance run-up to check for leaks, especially on the fuel system.

His immediate reaction was, "Wow! Night and day difference." It started immediately and ran nice and smoothly, as it should. He later texted and said it ran wonderfully all the way home.

So, what's the lesson here? The reality is that sometimes the performance of an engine can degrade so slowly that you may not notice it.

It's kind of like that picture you hang so perfectly on the wall and notice it for a few days after you hang it up. Sometime later, a visitor comes by and comments about the picture being crooked, and you never noticed it. Yet you know it was perfect the day you hung it.

A good idea is to have a "performance" checklist for your aircraft where you can make a note of all the engine parameters on day one, or when it comes out of maintenance. Then throughout the year, perform the checklist again and make



The spark plugs shown here are full of lead, which is abnormal for an engine with electronic ignition. Further scrutiny is certainly warranted as to the cause.

note of the findings. I bet over time you will find things that you didn't even notice were slowly degrading.

The second RV-9A had been purchased about a year ago and was coming for the first condition inspection with Base Leg Aviation. It ran quite nicely during the run-up, but I noticed the alternator was only charging at 13.4 volts. That's not good. We typically look for 14 volts or higher.

A quick review of the logbooks revealed that some of the common items I often highlight were quite noticeably neglected, such as the 500-hour Slick magneto service bulletins (SB). Many owners in the amateur-built aircraft arena think that service bulletins don't apply, but I've always begged to differ.

In the case of the Slick magnetos, I have seen them completely fail in flight as a result of not performing the 500-hour SB or the 1-15A SB pertaining to the rotor gear.

Just when I think we have stopped the plague of the loose jam nuts, we are reminded it is not totally eradicated. On this aircraft, all three jam nuts on the rudder were quite loose.

The K&N air filter was hard as a brick, quite shrunken in size, and had already damaged the airbox. Once a filter shrinks and hardens, besides not filtering the air, it vibrates in the airbox and begins to rub a hole through the bottom.

Repairing the airbox with some epoxy and/or aluminum sheet will fix the problem, along with installing a new air filter. I've mentioned this before — the K&N air filters are not "lifetime" when used in our aircraft. They shrink and harden over time due to exposure to fuel and excessive heat.

You can clearly see the difference in size between the old filter and the new filter. The old filter was also hard and had caused damage to the bottom of the airbox from vibrating around loose.

After removing the impulse magneto to perform the SB, I noticed quite a bit of rust on the impulse coupler housing. It was nothing major, and I was able to clean it up prior to reinstallation. It was, however, a reminder of what happens to the interior of these engines when they aren't flown regularly or, even worse, when they are only run on the ground.

This aircraft had only 596 hours on it in 17 years. That's not nearly enough — and we don't know if it sat for any length of time during those years.

I often hear from owners that during periods of flying inactivity they will go out to the airport and run the engine on the ground periodically. That is one of the absolute worst

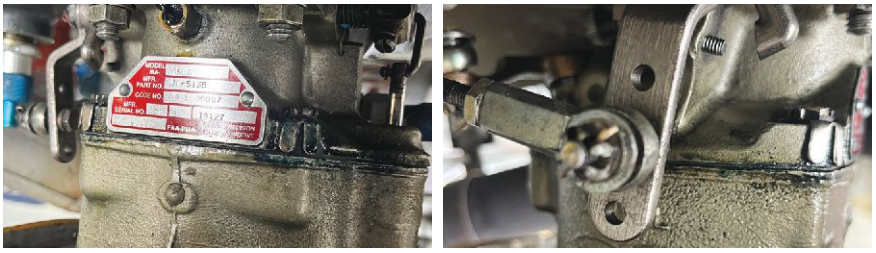
things you can do to an aircraft engine. Unless you run the engine long enough to get it up to an oil operating temperature of 180 degrees and keep it there for at least 20-30 minutes, you are introducing a lot of moisture into the crankcase that does not evaporate.

Moisture is a byproduct of combustion, and some of the combustion gases blow past the piston rings into the crankcase. Besides being of high water content, it is also corrosive. When you shut the engine down, the moisture-laden vapor condenses back onto the engine components.

The camshaft and the components in the accessory case suffer the most. The cylinder walls will also experience extra wear and tear, especially during startup, as evidenced by the scoring on the cylinder walls I found during the borescope check.

Replacing the automotive alternator with an aircraft alternator showed a charging voltage of 14.3 volts during the post-maintenance run.

This aircraft has an Odyssey battery, which is probably the most common battery on RVs. That battery likes a higher charging voltage, such as 14.3-14.5. When charged at the lower voltages of 13.4-13.6, the life of the battery will shorten. Perhaps this one charged initially at the higher voltage but slowly decreased over time.



Here you can clearly see blue fuel stains all around the carb bowl seam. This is usually evidence of a heavy float, which is causing a high fuel level in the bowl. This can lead to an overly rich fuel mixture and excessive lead fouling.

This RV-9A is another possible example of using a performance checklist throughout the year on your aircraft to prevent possible degradation from sneaking up on you.

No sense in having that battery fail to start your engine after you've landed for fuel on the first stop of your vacation trip. It could really put a damper on the fun factor! EAA

Vic Syracuse, EAA Lifetime 180848, is a commercial pilot, A&P/IA mechanic, designated airworthiness representative, and EAA flight advisor and technical counselor. He has built 11 aircraft and has logged more than 10,000 hours in 74 different types. Vic founded Base Leg Aviation, has written books on maintenance and prebuy inspections, and posts videos weekly on his YouTube channel. He also volunteers as a Young Eagles pilot.

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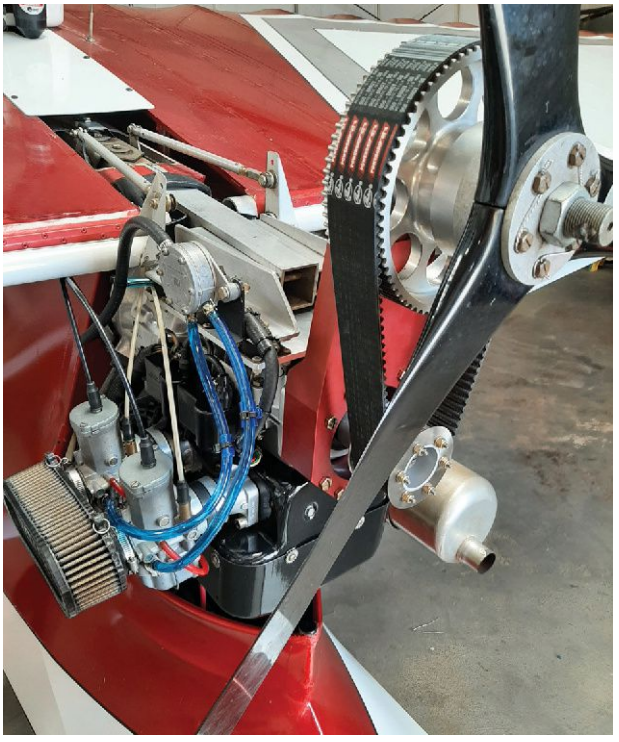
BY MARK MURRAY



I DON'T MIND AN engine that fails on rare occasions. Before you send a psychiatrist my way, please let me explain.

Like so many others, my entry into aviation was through a typical general aviation trainer — a Cessna 150, in my case. And, like we've come to expect, the little Continental O-200 pounded away just fine for those hours. After a session of practicing engine failure simulations, I asked my instructor — an experienced, high-time pilot — if he'd ever experienced a real failure. He'd once experienced a flameout in a private jet at altitude but was able to restart the engine without trouble.

In contrast, now 30 years and almost 2,000 hours later, I've had more than my share.

I don't exactly welcome engine failures, but why my opening statement? First, let me explain my experiences and what I've learned.

EXPERIENCE IS A HARD TEACHER

It's easy to say, "Hey, you're flying glorified snowmobile engines around. What do you expect?" But, in prepping this article, I reviewed my failures. The results are interesting. The majority are fuel delivery related (no, not a lack of fuel onboard, but problems with either fuel hoses or filters). Most were early on when I was first learning how to operate and maintain my airplane. Or, in other cases, they were friends' airplanes, and maintenance was insufficient or lacking altogether.

When people disparage two-strokes as far as reliability, it's usually because of the engine's early history of sudden failures without much warning. They will commonly refer to the engine "seizing," which describes when the piston almost instantly stops in the cylinder, usually trading metal in the process.

I can honestly say that in more than 1,500 hours of two-stroke experience, I've never had that type of seizure. I came close once, when I failed to completely warm up a Rotax 582. On this particularly cold winter day, the cylinder couldn't handle the rapidly expanding piston as I climbed out on full power. There was a slight stumble, but the engine kept right on running. A teardown showed evidence of "shock" type damage to the piston. Completely avoidable if I'd warmed up sufficiently, and if anything, an indicator of reliability; it continued to run even after improper operation.

Sometimes the failures resulted in a complete power loss, sometimes in a partial power loss, and sometimes in simply a precautionary landing with no sustained power loss. I once had this type of problem in a special light-sport aircraft. As a factory-built airplane, as opposed to a kitbuilt

The old adage "An ounce of prevention is worth a pound of cure" is appropriate here. My experience is that simple, well-maintained systems using quality components are the way to go.

airplane, you'd think that you're operating something with a little more "built-in" reliability. Not necessarily.

A heavy band clamp went through the prop shortly after takeoff, taking out a considerable chunk of it. The vibration was significant. Fortunately, everything stayed intact, and we were able to land without incident. And it was four-stroke powered, by the way.

Let's face it, sometimes, no matter what you do, mistakes will happen. No one is perfect. I once had the crankshaft completely lock up without warning on an engine with about 40 hours. It was a bad crank bearing. In another instance a clean fuel filter stopped up. It looked perfect to the naked eye. Only when it was disassembled and inspected closely under a bright light could you see the contamination.

WHAT DID I LEARN?

Maintenance and operation: You can't learn too much. Early on, I figured that I could keep an airplane engine running. After all, I kept plenty of other types of engines maintained. Even as deceptively simple as most airplane systems are, there are hidden dangers. I learned by experience and by reading. The research was great, but I should have sought out more advice from experienced flyers.

By the way, make sure the advice you're receiving is from someone actively flying with lots of time behind whatever engine you're running. A lot of aviation-oriented folks are friendly and ready to help out, but their experience may be based on just a handful of hours. Almost anyone can keep an engine running for a few hours.

Fuel systems: Keep it simple, and use quality parts. Resist the temptation to reinvent the wheel in an effort to make the system failure proof. Many times, so-called improvements have unintended failures built in that won't be readily apparent. There's a good chance that the kit manufacturer designed a reliable system; failures typically don't sell well. If the system has been updated or modified by builders over the years, take the time to understand the reasons behind it. There may be a good reason for the update. Sometimes it was for increased capacity, and maintaining reliability will require more effort on your part.

Also, I'm reminded of the "series" fuel system versus "parallel" fuel system debate. The idea is that running two completely separate fuel delivery systems in parallel is safer. Possibly, but is the additional complexity worth the additional maintenance to keep it safe? Is the parallel system fully tested?

The old adage "An ounce of prevention is worth a pound of cure" is appropriate here. My experience is that simple, well-maintained systems using quality components are the way to go. By the way, I've also learned that thinking of your fuel system filter as a "secondary" filter helps, too. By that, I mean you've already prescreened the fuel before it entered your tank (portable fuel cans are notorious for collecting water and garbage). Funnels with built-in screens and sumps are commercially available for this purpose. And don't forget to drain and clean your airplane fuel tank often. I clean mine every 100 hours or once per year, whichever comes first. Even with prescreening the fuel, contamination still occurs.

Train and then practice: In your primary training, you no doubt practiced engine failure simulations. That shouldn't have been the last time you did so. Continue practicing. Spot landings are great for this. Pick a well-defined spot on a lonely runway, cut to idle on downwind once the spot is off your wing, and see how close you can get. I typically pick the third centerline dash from the numbers, but any spot will do if you can easily see it from altitude. And make sure to give yourself an out in case your practice dead-stick turns into the real deal. Typically, this means that the runway is at least partially surrounded by open fields.

Never use the numbers as your "spot." The last thing you want is to apply power just after realizing you won't make the numbers, only to learn that power is no longer available. Obviously, some airports will be better suited than others for this practice.

The idea is to get to the point where you know what you and your airplane are capable of. There's no way of knowing exactly what the conditions will be for your next failure. Altitude, winds, full or partial failure; who knows? But getting to the point where you can nail that spot every time will be a huge advantage. But only if you stay proficient at it.

Be wary of strange airplanes: Your buddy might be the best guy in the world, but he may not maintain his airplane as much as he should. When I was younger and dumber, I jumped at the chance to gain new skills in different designs. In a way, it was good experience, but sometimes it was more experience than I bargained for.

Never become complacent: I teach my students to always keep on the lookout for potential landing zones. Once, I was asked, "How do you find enjoyment in flight if you're always concerned with engine failures?" I use the example of driving on an interstate

highway. You have to be alert to traffic all around you and to the potential of merging traffic. However, you can also enjoy listening to the radio or having a conversation with a passenger. Once you get over the fear of engine failures, you'll find that you can plan for them and enjoy flight at the same time.

What constitutes an acceptable emergency landing zone depends entirely on where you are, how high you are, the conditions, and what you're flying. I once experienced a complete failure on takeoff in a friend's T-bird ultralight. There was water in the fuel. From full throttle to almost instant failure in less than 10 seconds. It was a 700-foot strip with short pine trees off the departure end. Fortunately, I heard my instructor's voice in my memory, telling me to force the nose down. All the more important in a high thrust-line pusher. The young, rubbery pines kind of acted like the plastic bristles of a hair brush. From initial touchdown to stopping was only 90 feet. Amazingly, there was practically no damage to the airplane. There's a lot to be said for the low kinetic energy of our little machines.

On another occasion, a broken fuel hose in a friend's Challenger caused a partial failure on takeoff. The engine would surge and then falter as it was starved for fuel. I was maybe 300 to 400 feet up, with a passenger. With nothing but tall trees ahead, I both dove and banked hard to the left, toward an open field. The Challenger demands almost constant rudder work to remain coordinated, and this turn was no different. It quickly became apparent that I still had plenty of altitude to make the runway, so the turn was continued. Now, just to the right of the runway numbers, I was high and fast. A hard slip had us touching down at about the midpoint of a 3,000-foot runway.

ALL AIRPLANES ARE GLIDERS FIRST

An experienced pilot once told me that he was no longer afraid of engine failures. I thought he was nuts. But now, I get it. Being acutely aware it's possible, yet usually recoverable, gives you that. I've learned the wisdom of the saying "Never fly over something you're not willing to land on." Strangely, it's given me a lot of appreciation for the "spare" motor we always carry around with us: gravity. If that seems like a strange comment, take some glider lessons. It's amazing to see what's possible when both aerodynamics and energy management are used together.

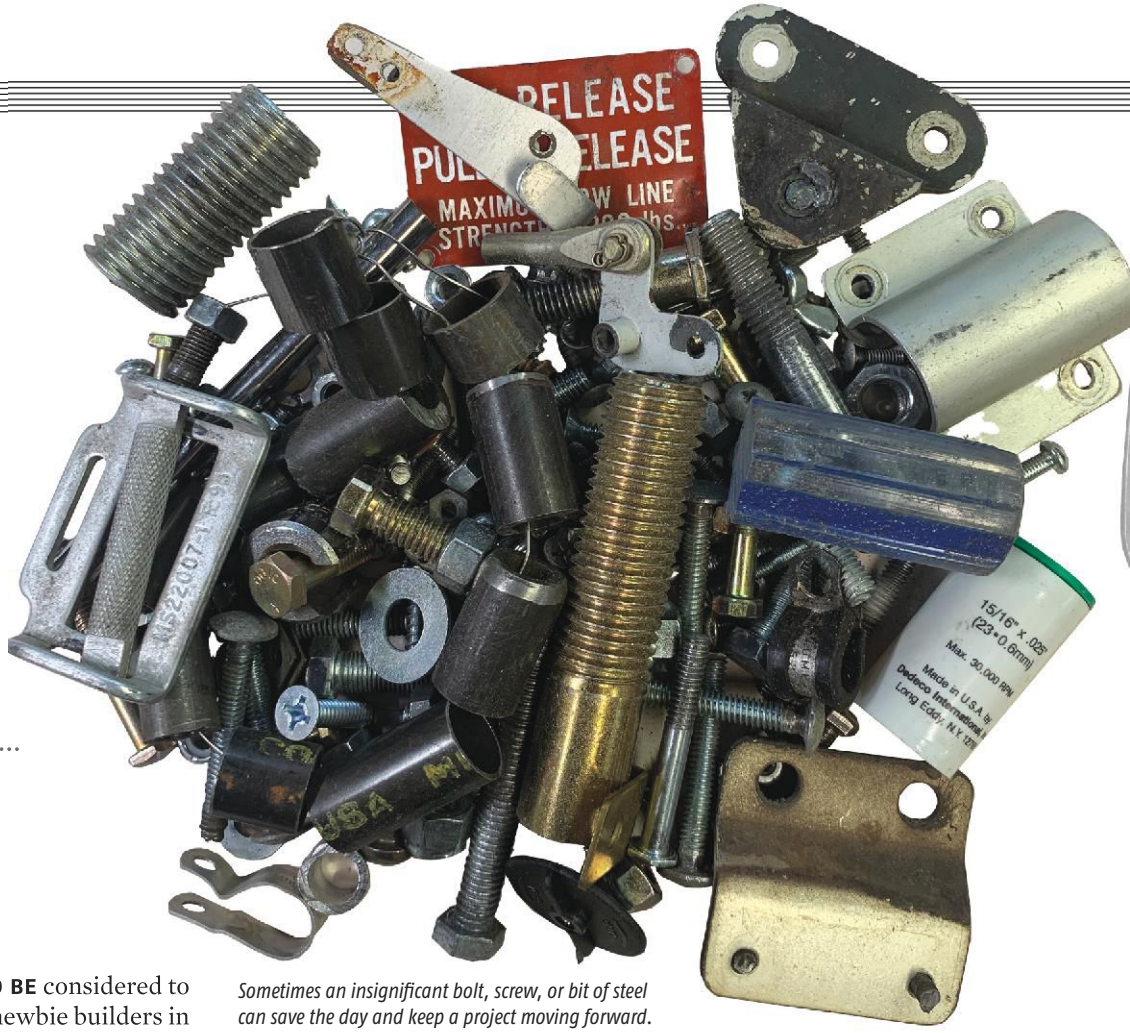
So, hopefully you understand my initial comment a little better now. If you still want to send a doctor my way, no worries. I'm sure he'll find something to do. EAA

Mark Murray, EAA 394554, of Georgetown, Georgia, was always fascinated by airplanes. He discovered ultralights thanks to an article published in *National Geographic* in 1983. In 2008, he earned his light-sport repairman maintenance rating and turned his hobby into a business, eventually becoming a CFI and an A&P mechanic.

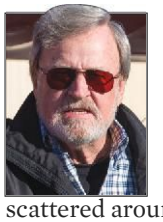
Scrap Isn't Junk

One man's junk is another man's ...

BY BUDD DAVISSON



Sometimes an insignificant bolt, screw, or bit of steel can save the day and keep a project moving forward.



THE FOLLOWING COULD BE considered to be aimed at training newbie builders in the fine art of scrap collecting. I say newbies because all of us gray dogs already have old paint cans, cardboard boxes, and other nondescript containers scattered around the shop that are full of what most normal people (those who don't have a workshop — they do exist, I'm told) would call junk and would throw away. But not us. That "stuff" — collected scraps — is our treasure trove of bits and pieces we'll periodically dig through to find something that's absolutely necessary to keep a project going.

Few of us — if any — do nothing but build airplanes in our shops. Flying machines may be the main objects of our mechanically creative obsession, but we'll find ourselves doing lots of other projects in there as well. It may have to do with specialty cars, a stand for our barbecue, or a bracket in a closet. You know, the handyman stuff life calls upon us to do along with our other obsessions. So, the scraps, which are the byproducts of building anything, slowly accumulate around our feet without us even realizing it.

That "stuff" — collected scraps — is our treasure trove of bits and pieces we'll periodically dig through to find something that's absolutely necessary to keep a project going.

Incidentally, in an effort to clarify the subjects we're discussing here, I asked Mr. Google for definitions. Google's dictionary, provided by OxfordLanguages, defines scrap as "a small piece or amount of something, especially one that is left over after the greater part has been used." I'm certain we all agree on that.

It defines junk as "old or discarded articles that are considered useless or of little value." This is where some arguments might be found.

The truth is that junk is in the eye of the beholder. The definition of junk is based on it being judged to be of no value — and that's where the longtime builders diverge from the herd in terms of material definitions. Junk or scrap? What's the old cliché? "One man's trash is another man's treasure." I didn't come up with that but wish I had. When you're deep in the process of building something, airplane or otherwise, you're always coming up with a situation where all you need to keep the project alive and moving is a single 5/8-inch long AN3 bolt. Or maybe a 2-inch square piece of 0.090-inch 4130 plate. Or maybe 2 inches of 3/4 by 0.049 tubing. Or a scrap of walnut big enough to turn into a 2-inch knob. The needs are innumerable and matched by the inevitable search into shop nooks and crannies looking for the tiny, seemingly unimportant treasure that will keep the project going.

What follows is a highly theoretical approach to identifying, evaluating, archiving, and storing scrap. Bear in mind this is theoretical

There is no right or wrong way to store scrap — especially small pieces. From deli meat containers to cat food cans, whatever works and is available does the trick

because I don't know how other folks do it, but I just toss bits and pieces I might have a future use for into whatever container I can find and am relatively sure I won't lose.

For that reason, a side effect of the *scrap is treasure* concept is that you are likely to find yourself ferreting away odd little boxes, pet food cans, peanut butter jars, the big, plastic Folgers instant coffee jars, deli ham containers, and anything that might be useful for holding the aforementioned treasures.

Again, the concept is theoretical. Each to his own. I'm positive I don't set a good example in this area so chart your own life course when it comes to scrap collecting.

EVALUATE AVAILABLE SPACE

If you've just created, or moved into, a new shop space, chances are you already think you know the available storage space. And to a certain extent, you do. However, the longer you're in a given shop space, the more crowded it becomes (tools tend to multiply if left together alone overnight) and the more "relaxed" and creative you will become when it comes to storing stuff.

I say relaxed meaning, you probably started out with the image of your workshop looking like an operating room. However, reality tarnishes that image in nothing flat as the scrap treasures you're squirreling away multiply. Shortly your operating room image begins to look suspiciously like a blacksmith shop.

Even if you have a workshop that dwarfs the ever-present double garage, you'll quickly discover what wonderful, out-of-the-way spaces exist under many of your tools and benches. And, if you're a scrounger, you find yourself keeping your eyes open for castoffs that neat freaks termed as "junk" but you see as highly usable scrap that applies to your shop situation.

For instance, my main workbench is a modern, fairly new, heavy metal unit in which the top cantilevers out over massive legs, creating a huge under-bench storage area. I wrestled it out of the dumpster at the airport (with lots of grunting and sweating) where a hangar tenant had tossed it when moving out of his hangar. Under it I have multiple plastic containers that hold bits and pieces for individual projects and cardboard boxes full of the aforementioned peanut butter jars, boxes, etc.

It also hovers over an extremely heavy, low cardboard box that acts as the receptacle for odd pieces of steel whacked off this or that. A different but identical

dumpster yielded an unusual, narrow, multi-shelf, over-my-head-high metal cabinet. The solid walnut multi-drawer low cabinet in my office with the typewriter on top (yes, I said typewriter) was fished out of another dumpster and is the file cabinet for my AN nuts and bolts. Most offices don't store AN hardware, but that's a solid 2-foot square piece of floor space the workshop gained and the office didn't even know it lost. (The office is an attached double garage that was converted long ago.)

DON'T IGNORE WALL SPACE

My workshop area is a little more than half of a smallish four-car garage, and I monitor my floor space as if I was a brain surgeon. Every square inch counts. And scrap takes up floor space. For that reason, walls become usable storage space. And scrap almost never lends itself to being put on shelves or hung from walls. It's generally too small. There's a tendency to think of walls as places to put free-standing shelf units against, but those take up floor space.

Can what we're putting on those shelves be put on temporary, dedicated shelves that are hung high on the walls to leave the floor under them available for either tools, scrap storage, or actual workspace? Can we take components of our projects and either hang them on the walls or stuff them into spaces between studs?

Scrap tubing from various suppliers comes in 18- to 24-inch pieces, and each 10-pound box has tubes ranging from 3/8 inch to 1-1/2 inches for $15. If only one piece solves a future problem, it's well worth the money and takes up little space.

Drywall makes for bright, clean workspaces, but it blocks off lots of storage space. Of course, I'm in Arizona so I don't worry about insulation. Others may not have that luxury. Been there, done that.

DON'T FORGET RAFTER SPACE

The ceiling is just a horizontal wall with gravity working 90 degrees to it rather than parallel to it, so storage becomes a little more problematic. Especially if it's drywalled. If the rafters are open, it's storage heaven. Enter 1-inch lumber, particleboard, and 2-inch particleboard screws.

The good news about building airplanes is that nothing is very heavy, so 1-inch by 2-inch stringers or 3-inch lumber screwed to the rafters can hold scrap, parts, or material safely. For some applications I'll screw 2-by-8-foot particleboard across the rafters to form shelves.

If your ceiling is drywalled, think about some sort of hanger system (blocks screwed to the

When building anything in tubing, we always wind up with bits and pieces that "might" be used in the future.

rafters?) that will let you create shallow shelves. Shop storage, if at a premium, is a never-ending application for imaginative building.

Of course, the ideal type of storage for stuff like scrap or other things you don't need often is to move it outside. However, sheds eat up construction time and money. Garbage cans don't. I have a line of big, high-quality plastic garbage cans across the back of my shop, each of which holds either different types of scrap (wood, steel, etc.) or project parts. The cans are impervious to the weather and are watertight. It's like free shop space for stuff I don't need immediately but don't want to throw away either.

RETAIL SCRAP

Most aircraft supply houses (Spruce, Wicks, etc.) periodically have sales of their own scrap, usually steel tubing. They're always having to cut pieces for customers, which means they always have pieces too short to sell for construction, but it's definitely not junk.

Often these tubing bundles (usually about $15 for 10 pounds) have some tubes that are heavier than we're likely to use in an airplane. We don't have a choice. We get what we get. However, that definitely doesn't mean they're useless.

Periodically, as recently as last week, when I see them having sales like that, I'll buy one or two bundles just to have it around. I can't begin to guess how often I'm digging through the tubing pile looking for something I can modify to serve a shop purpose. You just never know.

The concept of "you just never know" applies to all scrap material. You just never know when you'll need it, and it's frustrating when you don't have it. So, to protect our mental health, don't think something is junk when it's actually scrap. You never know. EAA

Budd Davisson, EAA 22483, is an aeronautical engineer, has flown more than 300 different types, and has published four books and more than 4,000 articles. He is also a flight instructor primarily in Pitts/tailwheel aircraft. Visit him on AirBum.com.

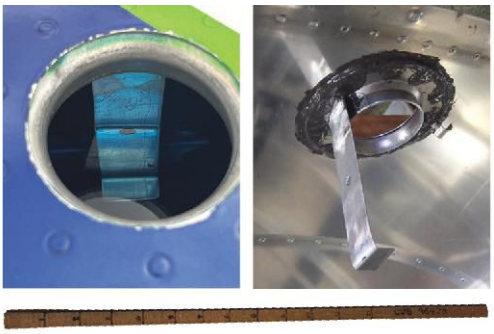
VISUAL FUEL TAB FOR DETERMINING FUEL QUANTITY

BY GARY BAKER, EAA LIFETIME 251742

HOW MANY AIRCRAFT HAVE you flown, and have you trusted their fuel gauges? We always know our fuel quantity after the tanks have been topped off, but what about after a one- or two-hour flight? Can you continue on your journey without adding any fuel? How well do you trust your fuel gauges? Here are a few suggestions to determine the fuel quantity on your aircraft more accurately.

I have flown many Piper aircraft and have appreciated having the fuel tabs installed in the tanks for determining the quantity visually in each tank. When building the tanks for my RV-6, I incorporated those tabs with an extra hole.

I used a scrap piece of aluminum strip and measured two lengths of 4 inches each, 3/4-inch wide — one for each tank. I placed a 1/4-inch 90-degree bend on each strip and drilled a 1/4-inch hole halfway up from the bend. Each strip was riveted in place under the tank filler ring. The tank rings were then Pro-Sealed and riveted to the tank skins.



My RV-6 holds 19 gallons in each tank. The bent tab at the bottom indicates a quantity of 12 gallons in each tank. I also drilled a 1/8-inch hole in each tab, and the bottom of the hole indicates 17 gallons. I now have excellent visual references as to each tank's fuel quantity. Your measuring strip will need to be calibrated, which can be done while calibrating your fuel quantity gauges.

An alternative method of measuring the quantity of fuel in a tank can be a calibrated stick. When I fly Cessna 172s or 182s, I use a measuring tube calibrated for determining quantities. Calibrated tubes or wooden dowels can be made for your fuel tank as well.

The Mark I eyeball is another method of measuring, but mine is losing its accuracy as I age. I'm glad I gave myself alternative options. Good luck with your project!

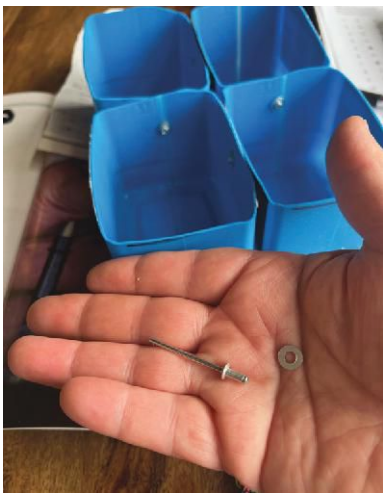
RECYCLED SCREW CONTAINER

BY BRIAN GLODOWSKI, EAA 672184

MY WIFE IS A serious recycler and is always looking at ways to repurpose things that get tossed without much thought. So she was pleased that her words of encouragement for me to recycle more had finally paid off.

Everyone has likely seen this trick, cutting the top off an empty oil container to use for holding screws and miscellaneous hardware. I use several of these during my annual inspection to keep all the screws organized, especially when I am opening inspection plates or taking out the seats. But there are several sizes and types, and I tend to mix them up, or I want to keep screws from one side separate from the other. I'm weird that way.

I was looking at a pile of oil containers in the trash and wondered if I could stick them together. Well, with a 1/8-inch drill bit, some Pop rivets, and small washers, it turns out you can make a simple four-pack to keep things organized. I cut the container to my desired height and punched a hole about 3/4 inch below the top. Just flex the container to rivet the sides, placing a small washer over the end of the rivet before squeezing the rivet tool. And I now have a handy organizer that cost me virtually nothing and made my wife proud of my recycling efforts. EAA



GOT A HINT?

Want your own *EAA Sport Aviation* contributor hat? We'll send you one if you submit a hint that we run in this column. Send your tips to editorial@eaa.org.

EAA MemberCentral

PHOTOGRAPHY BY **CHRIS MARSHALL**

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Taking advantage of the ASTC Travel Passport Program is easy. Show your EAA membership card at the admissions area of the museum you are visiting to gain access to its facilities for free. Visit EAA.org/ASTC to view a list of all participating museums and the requirements for admission. The facility must be located at least 90 miles or more from both the EAA Aviation Museum in Oshkosh, Wisconsin, and your home address.

Excited to start exploring? Visit EAA.org/ASTC for more information. EAA

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A Proud Partnership

New Hampshire Van's Aircraft RV-7

I'VE BEEN OBSESSED WITH aviation since I was about 5 years old. I started taking flying lessons during my senior year of high school and passed my private checkride a year later. But the idea of building my own airplane didn't really take root until the Air Force assigned me to Edwards Air Force Base in 1991. I joined EAA Chapter 1000 as it was just forming at Edwards, and it seemed like everyone in the chapter had a project underway. But the airplane that caught my eye was the RV, and a couple of years later, I was the proud owner of an RV-6A tail kit. But my Air Force duties, evening classes, and other pursuits kept the project on the back burner, and I eventually shelved it.

Fast-forward to 2002. I was out of the Air Force, in Boston, and had just met my wife-to-be, Ellen, when the building bug struck again with full force. I was hesitant to mention my affliction to Ellen, not knowing how she'd respond. But she was really supportive, and we soon had an RV-7 tail kit and a workshop in the basement. Ellen has always been a full partner in the project, learning to rivet like a pro. Someone who agrees to marry you after you start building an airplane is definitely a keeper!

We started building in a small basement in our rental house in suburban Boston and then moved to a large one-car garage when we bought a house just down the street. That's where we built the wings and fuselage. We were perpetually short on storage space; the wings and tail were stored in our den for a couple of years. Once the big parts came together, we moved to hangar space at the Nashua, New Hampshire, airport. Building was a slow process, around 16 years more or less. We moved several times in that period as my career progressed, often having demanding travel schedules. Family activities — soccer games, skating practice, band concerts — took priority over building. It's probably true that engineers make for slow airplane builders because we tend to overanalyze everything, and I'm absolutely guilty of that.

The RV received its airworthiness certificate from Designated Airworthiness Representative Jon Ross on May 2, 2020. Soon after the inspection, the FAA issued an airworthiness directive on the crankshaft in our engine, so it came off the airplane and went back to the shop for a new crankshaft — not what you want for a newly certificated airplane. But the engine came back quickly, and we had our successful first flight on October 18, 2020. We experienced only a few small discrepancies, and there were many RV grins around the hangar. I'm a

"Never, never, never give up!" That quote was on stickers and fridge magnets all over the shop and house.

former Air Force, FAA, and now consultant flight test engineer, and I found the *EAA Flight Test Manual* and cards to be an outstanding resource for flight-testing our airplane.

About the airplane itself, it's pretty much a stock RV-7 with minimal mods to accommodate avionics mounting. The engine is a 180-hp Superior IO-360 built and customized by Tim Hess at Unlimited Aero Engines, driving a Hartzell blended-airfoil prop. Avionics and instruments are almost all Garmin — a single-screen G3X Touch PFD/MFD and autopilot, G5 standby flight instrument, GTN 650 GPS/nav/comm, GTX 45R transponder/ADS-B, and GMA 245 audio panel. We also have an Advanced Flight Systems AOA Pro angle-of-attack system. Since we're planning on a lot of long-distance travel, we installed comfortable Classic Aero Aviator seats.

Big thanks go to Jon Ross and Bob DiMeo, my technical counselors/flight advisors, for their patient help and advice, and also to Van's for an outstanding kit and excellent technical support. Thanks also to Tim Hess at Unlimited Aero Engines for building a superb engine. Thanks as well to Mike Henning, Burt Wadas, Mark Masse, Rich Mileika, Steve Briggs, Dave Rogers, John Sannizzaro, and everyone in the New Hampshire/Massachusetts RV community for their constant help, encouragement, and advice.

Last and most importantly, thanks to my life and building partner, Ellen, and our daughter, Whitney, for always being available to rivet or hold a part, putting up with aluminum shavings in the carpet, not complaining when the air compressor kicked on in the middle of the night, and most importantly, keeping me focused on what's important. Ellen talked me off the "quitting" ledge more than once. Another inspiration was remembering a paraphrased quote by Winston Churchill — "Never, never, never give up!" That quote was on stickers and fridge magnets all over the shop and house.

As far as advice for other builders, I would say just get started, and don't be afraid to make mistakes along the way. Building and flying your own airplane is an experience like no other; it's worth every drop of blood, sweat, and tears — and never, never, never give up!

Dave and Ellen Setser, EAA Lifetime 334330 and 1232638;
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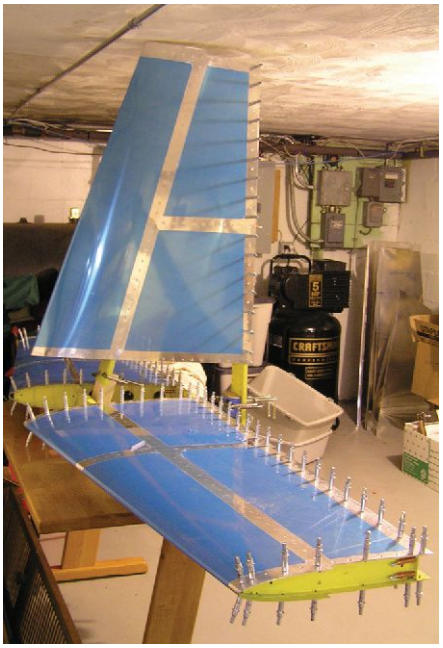

Number Three for Me

Massachusetts Van's Aircraft RV-10

MY VAN'S RV-10 BUILD took 28 months to complete. My hangar is attached to my home so it was easy to work on it every day, including some very long days. I didn't keep track of the hours, but it was pretty much a full-time endeavor for those months. This was my third RV build. Prior to the RV-10 project, I completed an RV-14A with my partner, Bob Bisbee, and an RV-8 with my partner, Pete Dooley. In addition to Bob and Pete, I was fortunate to have EAA technical counselors and an abundance of assistance from another neighbor and experienced RV builder, Mitch Garner.

The paint scheme was developed for the RV-8 that my neighbor Pete Dooley and I built a few years prior. The ever-talented Sean Geist at Lancaster Aero adapted the scheme to the RV-10 airframe. The base is Matterhorn White, and the accent colors are metallic Ming Blue, metallic Antique Gold, and metallic Charcoal Gray. I can't say enough about the extraordinary quality of work performed by the folks at Lancaster Aero — they know how to make a builder look really good!

For the powerplant, I chose the Thunderbolt version of the Lycoming IO-540 and coupled it to a Hartzell three-bladed composite propeller — it seems to pull hard and run smooth! For avionics, I installed a three-screen Garmin G3X Touch system coupled to a Garmin GTN 750 for IFR navigation. The kind and brilliant folks at SteinAir wired the panel, and all I had to do was install it and integrate it into the aircraft systems.

Prior to building my first airplane, I had zero experience with any kind of metalworking, metal fabrication, or assembly. So I attended the two-week Empennage Build Class at Synergy Air in Eugene, Oregon. What a fantastic experience! I learned how to perform almost all the operations required to build the entire airplane and, most importantly, how to do them right. The folks at Synergy Air are highly experienced, dedicated to teaching homebuilding skills and — importantly for me — patient.

Living on an airpark, I was fortunate to have lots of highly experienced technical advice and assistance readily available. My neighbor, technical counselor, and frequent helper, Mitch Garner, got me through more than a few rough spots. Other neighbors and veteran builders George Benoit, Bob Bisbee, Pete Dooley, Rich Desmond, Rich Dupee, and Sherry Grobstein also provided help and advice at many points in the build. My wife was my primary cheerleader and motivator to complete the RV-10. She also bucked her share of rivets and torqued her share of nuts and bolts. Even the grandkids,

Building an airplane is not one single huge project; it's a collection of a hundred smaller projects.

Andrew, Ryan, Kate, and Sarah, found ways to help, especially in the tight, hard-to-reach spaces.

One thing that I discovered early on was that building an airplane is not one single huge project; it's a collection of a hundred smaller projects. Sometimes when the whole project seems overwhelming, it can be helpful and satisfying to complete one small thing and be able to check that off the list. This approach also provides lots of opportunities to move on to something else when you get stuck or frustrated with a current task. It's also helpful to get comfortable with the idea that sometimes you just have to order some new parts and start over on something. I ended up building quite a few practice parts before actually working on the keeper parts. The good news is that the kit providers have lots of spare parts, and they are happy to sell them to you.

My advice to anyone considering building their own airplane is, "If you think you might be interested, just go ahead and order an empennage kit and give it a try." If you like it, keep going; if not, just sell the empennage kit. You will get most, if not all, of your money back. If you keep going, you will begin a significant and rewarding life experience, probably make a few new friends along the way, and likely get to experience the generosity and talent so abundant within the homebuilding community.

Rick Brown, EAA 372779; Falmouth, Massachusetts
Email: rkbrown819@yahoo.com

FLORIDA
SONEX AIRCRAFT SONEX

I STARTED FLYING 57 years ago in a Cessna 170A, which I owned for 47 years. However, after I retired, I decided it was time to build another homebuilt, having previously built a Fly Baby with my dad and later a Sonerai II. Because I had been following John Monnett's newest design, the Sonex, I knew that was the airplane I wanted to build.

I ordered the kit in May 2011 and started construction in my two-car garage in New Jersey. Two years later, with all the major components built, we moved to Florida. After securing a hangar at the Winter Haven Regional Airport, I completed the Sonex a year later.

The model I constructed is a tailwheel, powered by a six-cylinder Jabiru engine that is rated for 120 hp. I designed the VFR panel to include aircraft flight instruments, GRT EIS engine system, MGL V6 radio, Sandia transponder, and of course, the ADS-B Out. I installed a 54-by-60-inch Prince propeller. The fuselage is polished with royal blue wings and wheelpants (it's a real head-turner).

Flying the Sonex is a hoot! My cruise speed is 135 mph indicated. At 2750 rpm, I can lean the engine to 6 gph, which is a considerable savings in fuel compared to my 170. Since completing the Sonex, I have flown to many airports in Central Florida to join the members of the Winter Haven Pilots Association for lunch.

Sonex LLC is a good company to work with because of its excellent customer service and continuous support available to the builder.

Bob Ohlson, EAA 39673; Poinciana, Florida
Email: sonex528rj@gmail.com

NEW HAMPSHIRE
SLING 4

I RECEIVED MY PRIVATE pilot certificate more than 30 years ago before I got married and started a family. Like so many of us, flying fell off the priority list in order to provide/save for the family I started. Aviation was always on my mind, though, and I did my best to stay up on what was happening in general aviation. It was during these years that it crystalized that when the time was right, and I got back into aviation, I really wanted my own airplane. The idea of owning an older certified aircraft was not appealing, and I would not pay the price of a new one, which meant experimental was the route I was going to go. The ability to maintain it myself also held huge appeal.

After 25 years the pendulum of life began swinging back to allowing me to get serious about identifying the airplane I wanted to build. I went down to SUN 'n FUN to see the list I had identified. My mission is to travel, so I wanted a four-place; it was not a very long list. I settled on the Sling 4 out of South Africa due to its incredible efficiency and the pulled rivet construction. Oh, and I also thought it was beautiful.

I received the boxes that made up my airplane on my birthday in 2018, and almost exactly four years later I received my airworthiness certificate for N77RL. The build itself was straightforward as I built it exactly as Sling said to. When I did bump into a challenge, I would either consult the blogs of other builders or reach out to the Sling team in Torrance. How did people build airplanes before online blogs?! I did sub out the panel/harness to Steve and Adam at Midwest Panel Builders. That may have been the best thing I did in the whole build as their product is terrific. They are a great resource and are good people as well. I also subbed out the paint.

Toward the end of the build I went out to the Sling Pilot Academy in Torrance and received 15 hours of dual instruction to get current and to get Sling experience. I also went down to Lockwood Aircraft Supply to take Dean's Rotax class in order to properly maintain my 914.

I am super pleased with the end product and the choices I made along the way. I now look forward to seeing my awesome country — my way.

Rodney Lippold, EAA 1266124; Atkinson, New Hampshire
Email: rodlippold@comcast.net

FLORIDA
ZENITH CH 750 CRUZER

HAVING STARTED IN THE world of RC model airplanes, the first impression of flying in a Zenith 750 Cruzer was pivotal for me to get started into full-scale flying.

My next step was to visit the Zenith factory in Mexico, Missouri, and build my own rudder for the 750 Cruzer. Following this, I ordered the remaining component kits and built the wings, fuselage, and tail section as time permitted.

Work and life got in the way, but with fantastic support from my family we continued to chug along with the build process. While this was happening, I was fortunate to find an airpark home near Southwest Florida International Airport (RSW), which helped to complete the assembly of all the components to build my airplane.

I decided on using a Corvair-powered auto conversion engine for my build, and it went flawlessly. Then came the concept of getting my pilot certificate done so that I could fly my Phase I on the airplane that I built with my own hands. All in all, it was an amazing endeavor, and the sense of accomplishment is incomparable to any that I have experienced in my lifetime so far. I named my airplane *TUK TUK TOUCAN* for all the fun and frolic that it will bring in my life.

Ramesh Nori, EAA Lifetime 1219470; Fort Myers, Florida
Email: noriramesh@gmail.com

MASSACHUSETTS
VAN'S AIRCRAFT RV-8

MY RV-8 KIT WAS bought in 1997 by a gentleman who was working on it for 15 years before he decided to sell it. The wings and tail kit were done, so it was similar to buying a quick-build kit.

Tim Hess is an engine guru who owns Unlimited Aero Engines in Fitchburg, Massachusetts, and was the crew chief of Michael Goulian's Red Bull Air Race Team No. 99. He assembled a Superior XP-IO-360 engine for me. That engine was hung in January 2017.

I picked a Garmin VFR suite that included a GDU 460, G3X Touch, G5, GTR 200, and a GMC 305 with GSA 28 roll and pitch servos. I took a course offered by the Aircraft Electronics Association to learn how to do the wiring needed to connect all the avionics. It focused on the Garmin G3X Touch system. That was an indispensable step in my completion of the airplane.

I have come to love everyone at Steinair Inc. Stein and the crew answered my many phone call questions. The best! I painted the airplane myself. I used Stewart Systems paint. I stole the paint scheme stripes off the original Starship Enterprise.

Completing a project like this depends not only on you but also on all the people who are there when you need help, especially a wife who is there when asked to put down her project and come out to the barn "for just a minute." Thanks, Denise! Thanks to Bob DiMeo who is a technical counselor for EAA Chapter 106 and also who taught me to fly.

First flight was December 19, 2021. After Phase I testing, we have been to Oshkosh for AirVenture and to Florida and Georgia. Do I even have to say it? Keep on building. The rewards are wonderful.

Richard Snyder, EAA 1103864; Lowell, Massachusetts
Email: rsnyder53@comcast.net

FROM THE EAA BUILDERS LOG

EAA's online Builders Log is free for all EAA members to use to document their projects. It allows members to post an unlimited number of entries, which can consist of photos, text, PDF documents, Excel files, and more, to create a detailed record of the work done on build and restoration projects alike. Start documenting your project at EAA.org/BuildersLog, or follow this month's featured project via the link at EAA.org/Extras. EAA

Name: Robert Henderson, EAA 304444
Location: El Paso, Texas
Aircraft Make and Model: Kitfox Series 7
Project Start Date: May 8, 2020

Gone West

Not alone into the sunset but into the company of friends who have gone before them.

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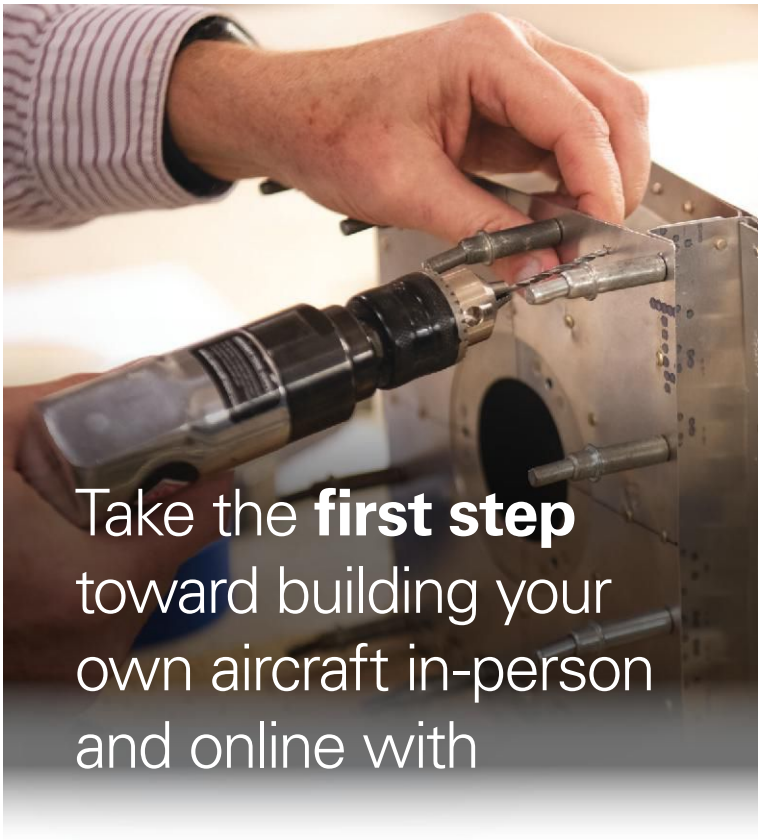

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From Blueprints to Blue Skies — Students Soar!

BY SHERRY NIEDERKORN, EAA LIFETIME 1277308

MEMBERS OF EAA CHAPTER 5 combined forces with members of AMA Club 502 for the inaugural attempt at the Build and Fly program for seven students with an interest in aviation. The seven students were chosen from a pool of alumni from the EAA Chapter 5 Summer Youth Aviation Camps held at the Geauga County Airport (7G8) in Middlefield, Ohio, during the summers of 2019, 2021, and 2022. (The 2020 camp was canceled due to COVID-19.) The adults led these seven students on a journey from blueprints to blue skies! Build and Fly students included:

2019 camp alumni:
Aiden Kilmer (Burton) 17
Joe Kuzma (Middlefield) 17
2021 camp alumni:
Abrielle Allen (Chardon) 14
Trey Cadwallader (Burton) 14
2022 camp alumni:
R.J. Miller (Middlefield) 13
Felicity Park (Kent) 15
Elizabeth Poulos (Middlefield) 13

Students actually began the process on June 28, 2022, at the Corsair Field at the Jetway Airport where they learned to fly a remote control airplane similar to the one they were scheduled to build. Once their skills were polished (and the weather grew dismal), the team moved to 7G8 to begin the build portion of the program on September 20, 2022. Students began with the blueprints from a kit and then learned woodworking skills, fabric covering, and electronics in order to complete the build (on February 28, 2023) of the LT-40 remote control airplane with a wingspan of about 6 feet.

On June 6, 2023, students, family members, and EAA and AMA chapter members gathered at Jetway Airport for a potluck picnic under the canopies at Corsair Field near Ravenna. Certificates and T-shirts were presented to the students and John Ashley (build team leader), Dick Allen (master builder), and Hugh Polack (flight instructor), and then the maiden flight began at 6 p.m.

Students Aiden Kilmer, Trey Cadwallader, and Felicity Park took turns flying the completed LT-40. Conditions were challenging, due to the steady strong winds, but several successful takeoffs and landings ensued. It was a beautiful evening for the maiden flight of the inaugural Build and Fly program.

When asked about their favorite part of the Build and Fly program, Joe Kuzma expressed his fondness for "working on the flight simulators to get experience on the controls." Felicity Park liked "covering the wings, ailerons, and rudder" during the build portion, and Trey Cadwallader enjoyed "flying the real thing ... actually flying ... the best!"

WELCOME, NEW LIFETIME MEMBERS

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Sandra Lowe (EAA 816211), Magnolia Springs

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Scott Conner (EAA 1247171), Steamboat Springs
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WELCOME, NEW EAA CHAPTERS

EAA's local chapters are about people, bringing together individuals interested in learning more about aviation as well as sharing their own knowledge. To find a local chapter and get involved in grassroots recreational aviation in your own backyard, see EAA.org/Chapters.

CHAPTER 1696
Warrenton, Oregon
Phil Rohr
philr.rohr@gmail.com

THANK YOU, VOLUNTEERS

Volunteers make EAA AirVenture Oshkosh — and just about everything else EAA does — possible. This space in *EAA Sport Aviation* is dedicated to thanking and shining the spotlight on volunteers from the community. Sadly, it cannot capture all of the thousands of volunteers who give so much to the community every year. So, next time you see a volunteer at AirVenture or elsewhere, however they are pitching in to make EAA better, be sure to thank them for it. It's the least we can do.

Do you know a volunteer you'd like to nominate for Volunteer Spotlight? **Visit EAA.org/Submissions.**

JENNIFER HANTOSH NÉE NEUNTEUFEL

NOT MANY PEOPLE CAN say that they lost their first tooth in Camper Registration at EAA AirVenture Oshkosh, but for Jennifer Hantosh née Neunteufel, EAA 1218066, that's just one of her many memories of attending AirVenture as a child. Jennifer has been not only attending AirVenture since she was young, but also volunteering. She continues to greet AirVenture attendees as a third-generation volunteer. Jennifer's grandparents started EAA Chapter 101 in 1962 in Addison, Illinois. The late summer pilgrimage to AirVenture has been a family tradition ever since.

"We would make the trip up to Oshkosh at night so that the kids would sleep on the way," Jennifer recalled, "and there would always be anticipation once we arrived and started working in Camper Registration."

If Jennifer's maiden name sounded familiar, it is because Neunteufel Lane, the road that leads to Camper Registration at Camp Scholler, is named after her grandmother, Dolores Neunteufel. Dolores helped start Chapter 101 with her husband, Al, as well as the family tradition of volunteering at AirVenture. Jill Schumacher, EAA's manager of convention administration, spoke fondly of the Neunteufel legacy here at Oshkosh. "Jennifer's family has been deeply involved with EAA for many years, not only during our annual AirVenture gathering, but also at the chapter level. Her grandmother, Dolores, who was a dedicated volunteer in various capacities for decades, groomed Jennifer for the Assistance Center chairman position. Although Jennifer was relatively young when named as chairman, she firmly and confidently grabbed the baton ... and has carried on the family tradition of being a first stop welcoming smile for our attendees."

Now a mom with three kids of her own, Jennifer works at the Assistance Center outside the Main Gate and the Information Booth Kiosk inside the Main Gate. She enjoys seeing people from the start to the finish of their AirVenture experience. "It's fun to see people in the morning and learn about what they're excited about," she said, "and then see them again at the end of the day and hear about what they saw!" She hopes to impart her family tradition of volunteering at AirVenture to her kids. In 2022, she brought her oldest son up a week early for the first time. She hopes he sees how much of an impact volunteers make on this larger-than-life event. "I hope my kids carry on the tradition of volunteering ... seeing that they can contribute to something bigger is valuable, I think," she said. Schumacher applauds how Jennifer is passing down her family legacy. "Jennifer is well respected by her volunteer team — which includes her father, Kenny — as well as EAA staff for her positive attitude, friendly demeanor, and leadership qualities," Jill said. "She is already involving the next generation of volunteers by having her young daughter in tow as she goes about her chairman tasks. It's rewarding to witness how much Jennifer cares about EAA as an organization and our AirVenture guests."

To those thinking about starting your own family tradition of volunteering at AirVenture, take some advice from Jennifer. "Just do it," she said. "Start somewhere small. There's something for everybody!" EAA

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POSTMASTER: Send address changes to EAA MEMBERSHIP SERVICES, P.O. Box 3086, Oshkosh, WI 54903-3086. CPC 40612608

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FOR THE 2005 EAA Youth Art Contest, contestants were asked to design a paint scheme for one of EAA's two Young Eagles aircraft, a GlaStar 3 (N231YE). Asked to use their creativity and provided with only an outline of the aircraft, more than 200 entries were received from across the country. The winning design, submitted by Aaron Mentowski of Bay Village, Ohio, and painted by Gulfstream of Appleton, Wisconsin, can still be seen on the GlaStar as it continues to fly Young Eagles to this day. *EAA*

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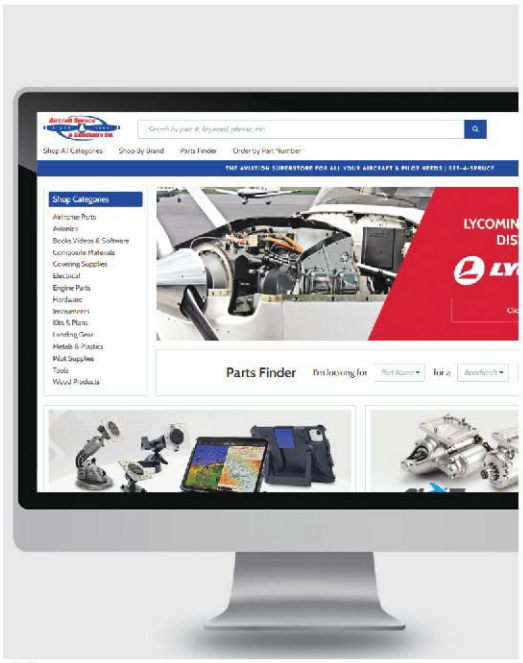

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