

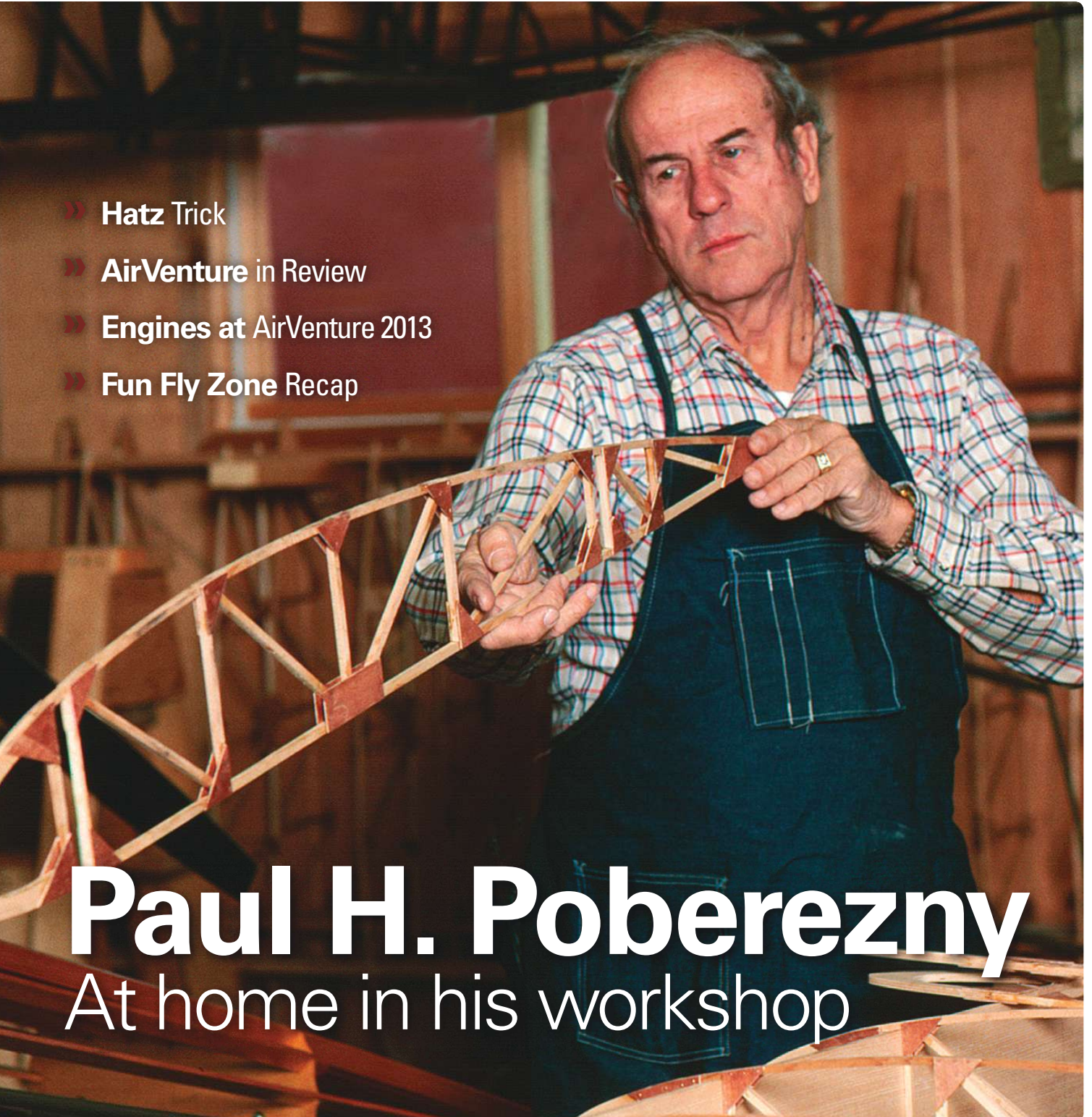


# EXPERIMENTER

The Spirit of Homebuilt Aviation | [www.eaa.org](http://www.eaa.org)

Vol.2 No.9 | September 2013

- » **Hatz Trick**
- » **AirVenture in Review**
- » **Engines at AirVenture 2013**
- » **Fun Fly Zone Recap**



**Paul H. Poberezny**  
At home in his workshop

# Oshkosh

## Many challenges, much success

By Jack Pelton

As the weeks counted down to AirVenture Oshkosh your board identified many challenges facing EAA. When we tightened the focus it became clear there were seven specific objectives that must be accomplished for Oshkosh and EAA to be successful.

**First**, we had to deal with the FAA's surprise charge of nearly half a million dollars to provide air traffic controller service for the week. Without the controllers there could be no waivers, and without the waivers the special traffic procedures that allow 10,000 airplanes to come and go would not be possible.

We did our best to negotiate the fee with the FAA, we filed a petition in federal court asking for the fees to be overturned, and we asked you, our members, to contact your congressmen and senators asking them to help. The outcome of those efforts remains uncertain, but I have hope the situation can be resolved and, more importantly, avoided entirely next year.

**Second**, we needed to have a safe event. We could not allow the distractions to compromise safety, and we didn't.

**Third**, we needed more variety in our air show because federal budget cuts prevented active military airplanes from participating as usual. With the first U.S. public appearance of Jetman, the first public flight of the Terrafugia roadable aircraft, two night air shows and fireworks displays, and an expanded mix of air show performers, we succeeded.

**Fourth**, we needed to up our game and provide a superior overall experience for every visitor. We delivered there with totally overhauled food service. EAA's team identified a number of local caterers and restaurant owners who brought a wonderful new variety and higher quality of menu items to Oshkosh. We also added a couple of national brands and held food prices in check. And as you asked for, we reduced bottled water prices to \$2 everywhere on the field.

*On the cover: Remembering Paul Poberezny, 1921-2013. (Photography courtesy of EAA)*

The debut of Disney's Planes was another Oshkosh first and was wildly successful with an estimated 15,000 people filling every available spot to see the animated feature. We expanded our restroom facilities, had entertainment groups performing on stage throughout the week, not just on Monday evening, and expanded the tram service to make getting around easier.

**Fifth**, we needed expanded transparency in EAA governance. We moved the annual meeting of the membership to Wednesday morning from Saturday so more members could attend. We presented a detailed financial report. We listened to requests by members and eliminated flightline chalets. And your board listened and responded to comments and questions from members at the meeting.

This year the compliments overwhelmed the complaints, and EAA members showed their true colors by returning to the microphone at the meeting to thank the directors for listening to them when they complained last year.

At the annual meeting your board was strengthened by the election of three new directors who bring diversity and vitality—along with very solid aviation experience and involvement—to the board.

**Sixth**, we needed to establish better communication with the thousands of volunteers who make Oshkosh possible. We held monthly phone conferences with volunteer chairs throughout the winter and leading up to Oshkosh. We listened. We made certain volunteers are recognized and thanked. I believe we made huge strides in rebuilding the confidence among volunteers that your board understands them, values them, thanks them, and knows Oshkosh could not happen without each and every volunteer.

**Seventh**, we needed to stabilize the EAA staff. Some key members who left last year have returned to Oshkosh, and I am doing my best to make sure EAA employees know they are valued and that we have the best possible people in each position.

The crucial step in resolving problems is to identify them and not make excuses or simply wish they would go away. Your board understood EAA's course control was wandering and took the steps necessary to correct. We're not done, not perfect, but the hugely successful AirVenture Oshkosh shows our course corrections are working. And your directors thank you for your support. *EAA*





## EAA PUBLICATIONS

**Founder:** Paul H. Poberezny

**Publisher:** Jack J. Pelton, EAA

Chairman of the Board

**Vice President of Marketing:**

Rick Larsen

**Editor-in-Chief:** J. Mac McClellan

**Homebuilding Community Manager:**

Charlie Becker

**Editor:** Mary Jones/EditEtc. LLC

**Graphic Designer:** Chris Livieri

**News Editor:** Ric Reynolds

**Copy Editor:** Colleen Walsh

**Multimedia Journalist:** Brady Lane

**Visual Properties Administrator:**

Jason Toney

**Contributing Writers:** Charlie Becker,

Marino Boric, Budd Davisson, Cy Galley,

Dan Grunloh, Tim Kern, Ed Kolano, Jack Pelton

**European Correspondent:** Marino Boric

## ADVERTISING

### Display

Sue Anderson

Jeff Kaufman

### Mailing Address:

P.O. Box 3086, Oshkosh, WI 54903-3086

**Phone:** 920-426-4800

**Fax:** 920-426-4828

**E-mail:** [experimenter@eaa.org](mailto:experimenter@eaa.org)

**Website:** [www.EAA.org](http://www.EAA.org)

**Need to change your address or have other membership questions?**

**Call 800-564-6322**

**(800-JOIN EAA).**

EAA® and SPORT AVIATION®, the EAA Logo® and AERONAUTICA™ are registered trademarks, trademarks, and service marks of the Experimental Aircraft Association, Inc. The use of these trademarks and service marks without the permission of the Experimental Aircraft Association, Inc. is strictly prohibited.

## Features



» **14 Hatz Trick**  
A professional builds his ideal personal machine  
By Budd Davisson



» **20 EAA AirVenture Oshkosh 2013**  
Good results... interesting aircraft  
By Marino Boric

## Departments

» **2 Tower Frequency**  
By Jack Pelton

» **9 News from HQ**  
News from EAA

» **4 Homebuilder's Corner**  
By Charlie Becker

» **28 Hints for Homebuilders**  
Mirror, Mirror on the Wall, Who is the Fairest of Them All?  
By Cy Galley

## Columns



» **30 Under the Cowl**  
The Power of Oshkosh 2013  
By Tim Kern



» **36 Light Plane World**  
AirVenture Fun Fly Zone Roundup  
By Dan Grunloh

|      |    |
|------|----|
| 1000 | 51 |
| 667  | 51 |
| 1034 | 52 |
| 811  | 52 |

» **40 Flight Test Tech**  
Sawtooth Climbs V<sub>x</sub> Determination  
By Ed Kolano



# Paul's Aeroplane Factory

By Charlie Becker, EAA Homebuilding Community Manager

When I heard that Paul had passed away, I was saddened by the news. You hate to let go of someone you love, even when it is time.

After slogging through the rest of the workday, I decided the best way to pay tribute to him was to head over to his Aeroplane Factory and weld on my project. Paul was letting me use that space to weld the fuselage for my Pirate Cub. I put on my welding helmet—one that Paul had signed for me—and started to weld. I think he would have appreciated it.

You see, the Aeroplane Factory is a special place; it was Paul's workshop. It is located adjacent to Camp Scholler—not exactly a secret place, but one that was a bit hidden and out of the way. It's the place where Paul always had a homebuilt project or two in process; usually more steel-tube fuselages than wings, because Paul liked to weld.

The current project is a replica of the *Mechanix Illustrated* Baby Ace ([www.facebook.com/MIBabyAce](http://www.facebook.com/MIBabyAce)). In 1954, Paul wrote a three-part article for *Mechanix Illustrated* on how to build your own aircraft, complete with plans for the Baby Ace. Those articles caught the attention of thousands. Letters started pouring in from people wanting to join the fledgling EAA. A couple of years ago, as a student of history, Paul decided to construct a flying replica of the Baby Ace we have in the museum in order to show our membership the airplane that really started EAA.

I volunteered to help Paul with construction of the fuselage of that aircraft. Each Saturday we would show up, start cutting tubing, and do some welding. Having Paul show me the ropes on how to build a steel-tube fuselage is something that I'll always treasure. It occurred at a time right after my own dad passed away, so having Paul in my life helped fill that void.

Whenever any group of EAA members was in town, I always made a point of offering to show them the Aeroplane Factory. For me, Paul's workshop was sacred ground. It was a thrill for me to take people over and show them the project and the memorabilia on the walls. With any luck, Paul might be there, too.

Paul was inspiring. He preached the gospel of aviation as a way to make us all better human beings. He showed us that by using "hand and mind," we could create something and better ourselves at the same time. Paul inspired people to achieve. He knew we were capable of more. Paul offered anyone with the desire the opportunity to build an airplane and fly it.

Thumbs-up, Paul! You made this world a much better place.

Gonk! *EAA*





*Paul designed a number of aircraft, including the popular Acro Sport I and II.*



*Paul getting ready to bend the lower longeron of his latest Baby Ace project.*



*Paul and Audrey Poberezny in the basement office of their home where EAA began in 1953.*



*Paul loved people; he's shown here with key volunteers at Homebuilders Headquarters in 2011. Left to right: Dennis Hasha, Jack Gress, Bill McKee, Mike Dooley, Paul, and Ann McKee.*



*Paul working on one of his first homebuilts, also in the basement of their home.*



*Paul and his red, cut-down Volkswagen were everywhere at EAA's annual conventions as he traveled the grounds solving problems and greeting members.*



*Paul in the Waco Primary Glider that his history teacher, Mr. Homer Tangney, gave him, with the caveat that he had to restore and fly it. That challenge set Paul on the path to aviation as his career and lifelong avocation.*



2013 EAA

# Sweepstakes



## Win a Stearman.

Enter for a chance to own a piece of history, a 1943 Stearman, fully-restored by Air Repair, Inc.

As an EAA member, you are automatically entered. New, Renewing and Rejoining members get 50 entries, AutoPilot members get 100 entries and Lifetime Members get 250 entries.\* Not a member yet? Visit [EAA.org/join](http://EAA.org/join).

Plus, when you choose to donate with your 2013 Sweepstakes entry, you are helping support EAA programs that grow participation in aviation. No purchase is necessary and membership action or donation will not increase your odds to win.



### Second Prize: 2012 Can-Am Spyder and Trailer

Hit the road in style on the Can-Am Spyder RT-S. This sleek roadster offers the excitement and fun of a motorcycle along with greater safety and stability.

Special thanks to **Rotax** for the generous donation of the Can-Am Spyder and Trailer.



For complete Official Rules, prize descriptions, or to enter the 2013 EAA Sweepstakes, visit [EAA.org/sweepstakes](http://EAA.org/sweepstakes)



A special thank you to **Air Repair, Inc.**

\*EAA Members (determined as of September 20, 2013) will be entered automatically as follows: New Members – 50 entries; Renewing Members – 50 entries; Rejoining Members – 50 entries; Automatic Renewal ("AutoPilot") Members – 100 entries; Lifetime Members – 250 entries. Trial Members do not receive automatic entries. \*\*A purchase or contribution will not improve your chances of winning. EAA encourages you to make a donation with your entry. All donations support EAA's mission to grow the next generation of aviators. For complete Official Rules by which all entrants are bound see [http://www.eaa.org/sweepstakes/official\\_rules.asp](http://www.eaa.org/sweepstakes/official_rules.asp).





## EAA Founder Paul Poberezny Passes

“You can’t be a success if you don’t love people”

EAA Founder Paul Poberezny passed away on August 22 at Evergreen Retirement Village in Oshkosh, Wisconsin, after a battle with cancer. He was 91. His career spanned more than 70 years of flight at the controls of more than 500 different types of aircraft.

Paul came from humble beginnings, yet he became one of the 20th century’s greatest aviation leaders, creating a worldwide aviation organization and the world’s largest annual fly-in event, EAA AirVenture in Oshkosh, Wisconsin.

Paul is survived by his wife, Audrey; one son, Tom (and wife Sharon) Poberezny of Brookfield, Wisconsin; one daughter, Bonnie (and husband Chuck) Parnall of Oshkosh; two granddaughters, Audra (and husband Michael) Hoy of Oshkosh and Lesley Poberezny of Brookfield, Wisconsin; and one great-granddaughter born in 2012, Charlotte “Charley” Hoy.

Paul often said that there was not a day that went by that he didn’t say the word “airplane.” His flight experiences began as a high school student and continued through service in World War II and the Korean conflict. Between the wars, he began his hands-on approach to aircraft design and building that would direct his future and his legacy.

In January 1953, he organized about three dozen aircraft builders and restorers in a local Milwaukee, Wisconsin, club that was named the Experimental Aircraft Association. Later that year, the first EAA fly-in

gathering formed the foundation of what has become EAA AirVenture Oshkosh.

Paul Poberezny’s life and career were a shining example of vision, self-reliance, and leadership. He is regarded as one of the individual giants of aviation’s first century, with an influence that reaches beyond a single flying accomplishment to affecting tens of thousands of people who have dreamed of flying.

The Poberezny family has expressed the following: “We deeply appreciate all the support shown to Paul and Audrey over the past five months. As Paul often said, he considers himself a millionaire because through aviation he made a million friends. He leaves an unmatched legacy in aviation and can be best remembered by all the people who discovered aviation through his inspiration to create EAA. We also thank you for respecting our family’s privacy during this time.”

Only private family services are scheduled at this time. Memorials in honor of Paul’s life and legacy can be made to any of the following:

EAA Aviation Foundation: P.O. Box 3086, Oshkosh, WI 54903  
Evergreen Foundation Inc.: 1130 North Westfield St.,  
Oshkosh, WI 54902

American Cancer Society, Northeast Wisconsin: 790 Mar-  
velle Lane, Green Bay, WI 54304

See a tribute to Paul beginning on page 6 of this issue.  
View the online tribute at [www.EAA.org/paul/](http://www.EAA.org/paul/)

## Clark, Klapmeier, and Welch Join EAA Board

Three aviators with extensive experience in EAA programs and activities have joined the top leadership of EAA members as the newest members of the EAA Board of Directors. James Clark, Alan Klapmeier, and Cody Welch were elected during the annual EAA membership meeting on July 31, held at EAA AirVenture Oshkosh 2013. As Class I directors, they will each serve a three-year term on the EAA board.

Clark, of Columbia, South Carolina, is co-founder of BANG! Technologies and was previously vice president of AT&T, executive director of Bell Labs, and chief technology officer of NCR Corporation. He also served as chairman for the 60th anniversary reunion of the Tuskegee Airmen.

Clark is a former president of EAA Chapter 242, has co-built an RV-6, and is building an RV-6A. He is an active Young Eagles pilot and a member of Team AeroDynamix, a precision formation aerobatic air show team featuring RV-series aircraft.

Klapmeier, of Superior, Wisconsin, is chairman and CEO of Kestrel Aircraft. He was also co-founder of Cirrus

Aircraft in the 1980s, when it developed its first VK-30 kit aircraft, and in the 1990s, when the company certified the SR20 production airplane.

Klapmeier was the 1992 recipient of EAA's August Raspet Memorial Award and received EAA's highest honor, the Freedom of Flight Award, in 2007. He is an IFR-rated pilot with more than 10,000 hours of flying time in a variety of aircraft.

Welch, of Linden, Michigan, is a retired B-757 pilot for a major airline and was a 2003 EAA President's Award recipient. He helped develop EAA's Tri-Motor tour program and is currently its chairman, having flown as captain on the Tri-Motor since 1993. He is also vice president and a board member of the Tri-Motor Heritage Foundation, founder/president of the Wings of Mercy East Michigan organization, and active in the Air Care Alliance.

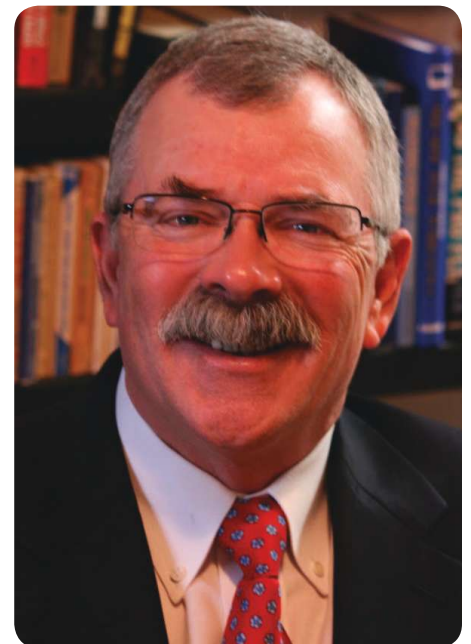
Welch is a co-developer of Horizon Lakes residential airpark, has been manager of Price Airport in Linden, Michigan, since 2001, and has owned/operated three FBOs and an aircraft sales business.



James Clark



Alan Klapmeier



Cody Welch



## Proposed AD Demands Removal of Thousands of ECI Titan Cylinders

The FAA has issued a proposed AD requiring the early retirement of thousands of ECI Titan cylinders used on Continental big bore engines. The FAA estimates the total bill for airplane owners would top \$82 million if the AD becomes final.

The FAA says the AD would address problems of cylinder head cracking or cylinder head-to-barrel separation in the ECI cylinders that are manufactured under parts manufacturing authority (PMA). Depending on cylinder serial number group the AD, if it becomes final, would require ECI cylinders to be replaced within 25 flight hours if the cylinder has fewer than 500 hours or more than 1,000 hours. Cylinders in another serial number range must be replaced within 25 flight

hours if they have more than 1,000 hours' time in service.

The ECI cylinders covered by the proposed AD are installed on Continental 520 and 550 engines, and in a rare situation, on 470 engines. The FAA does not know how many engines would be affected by the AD because ECI cylinders could be installed on an engine along with cylinders from other manufacturers. The FAA estimate is that about 6,000 Continental engines have one or more ECI cylinders installed. The big bore Continental six-cylinder engines power a long list of popular airplanes.

The proposed AD does not cite specific failure rates, or even cite a total number of ECI cylinder failures. The AD uses terms such as

“multiple failure reports” and does not point to a single accident or injury caused by the failure of any ECI cylinder.

The FAA is accepting comments on the proposed AD until October 11, 2013, only a 60-day window. You can [read the proposed AD](#), which contains information on how to comment.

EAA, along with other aviation groups, is at work formulating a response to the proposed AD and will issue a call for action soon. An important first step will be to insist on a comment period extension given the very high cost of the proposed AD, and the almost impossibility of finding enough cylinders to replace the ECI units if the AD were to become law.

---

## Loss of Control Working Group Concludes Meetings

The General Aviation Joint Steering Committee (GAJSC) second Loss of Control Working Group met for the final time last week in Brisbane, California. The group is composed of subject-matter experts from the aviation industry, academia, and the FAA, and is charged with taking a data-driven approach to mitigating the cause of fatal accidents.

Loss of control (LOC) is by far the most common factor in fatal accidents, and this group specifically focused on those fatal LOC accidents occurring during departure and en route flight. A previous

iteration of the group studied approach and landing accidents.

As a result of its analysis of a random sample of accidents over the past decade, the group has recommended several safety enhancements be adopted by the GAJSC for implementation. All are non-regulatory in nature and require the FAA and industry to jointly buy in. EAA has proposed a safety enhancement that promotes the optional use of test pilots in flight testing amateur-built aircraft, in response to examination of two accidents that

occurred during the early stages of Phase I testing.

“Our work over the past year has been a very worthwhile process,” said Tom Charpentier, EAA government advocacy specialist and EAA’s representative on the group. “The action items we developed are achievable and will have a measurable impact on flight safety while avoiding any additional regulatory burden on pilots. This process is a great example of how government and industry can work in partnership to increase safety.”

## Small Airplane Revitalization Act Passes House, Heads to Senate

The Small Airplane Revitalization Act, introduced in May by Rep. Mike Pompeo (R-KS), passed the House 411-0 in mid-July and will now head to the Senate.

The Senate bill is sponsored by Sen. Amy Klobuchar (D-MN). The legislation would compel the FAA to adopt the recommendations presented by the Part 23 Reorganization Advisory and Rulemaking Committee (ARC), of which EAA was a member.

The Part 23 ARC, composed of association and industry representatives, recommended sweeping changes to the certification and maintenance of light aircraft as well as the parts and avionics approved for installation. A major concern for the ARC was that outdated certification standards were preventing manufacturers from creating and successfully marketing new safety equipment for light aircraft.

“It is not helping aviation when mature safety technology like airbags, inflatable shoulder harnesses, and wing levelers cannot be retrofitted in small aircraft because

no manufacturer can spend the huge amount of money necessary to certify the devices for individual legacy airframes,” said Sean Elliott, vice president of EAA advocacy and safety. “The certification rules, originally designed to enhance safety, are actually a hindrance and are acting against the best interests of advancing pilot situational awareness and increasing accident survivability with technology.”

If the bill passes the Senate and is signed into law, the FAA would most likely create a new noncommercial category for aircraft equipped with parts and avionics that did not undergo the traditional certification process.

Rep. Pompeo, a steadfast advocate for GA in the House, urged senators to “pass this common-sense regulation.”

“By focusing on common-sense regulatory reform, we can strengthen general aviation while not taking a dime from the American taxpayer. That’s a win-win.” Pompeo said. “These new streamlined regulations will decrease costs, increase safety, and improve global competitiveness.”

---

## FAA Releases New Residential Through the Fence Policy, Toolkit

The FAA released a new [residential through the fence \(RTTF\) tool kit](#) in late July, which provides a convenient method for complying with the new policy recently released in the *Federal Register*.

The policy comes on the heels of [Public Law 112-95](#), sections of which prohibit the FAA from finding a GA airport sponsor in violation of federal grant assurances because the sponsor enters into an RTTF agreement.

The recently released policy is the implementation of the relevant sections of that law and a significant departure from previous FAA policy, which considered even noncommer-

cial RTTF agreements to be violations of grant assurances. EAA and other associations worked closely and successfully with Congress and the FAA to revise the interpretation of the law.

The updated policy permits the creation of new GA RTTF agreements, provided they are compliant with the law. The toolkit, which contains access agreement review sheets, recommendations for sponsors, official interpretations of the law, and sample agreements, is designed to help sponsors and applicants create successful, legal agreements with minimal agency interference.

Under the new policy, existing com-

mercial through the fence agreements are grandfathered into the law, while new commercial agreements are prohibited.

“EAA is pleased that the FAA established a clear interpretation of the law and a policy that permits new GA RTTF agreements,” said Jonathan Harger, EAA government advocacy specialist. “We believe that noncommercial access to airports, apart from being a property rights issue, is a vital element of recreational flying that promotes a healthy airport community. We are happy that the FAA provided this toolkit to help people exercise their right to have airport access.”





# Better coverage. Better rates.

Our rates are lower. Same coverage. Same great service. Plus, EAA members still get all the extra benefits like zero deductibles. But most importantly, when you purchase your aircraft insurance through EAA, you help support EAA programs that grow participation in aviation.

Visit **EALowerRates.com** or call us toll-free at 866-647-4322 for a quote.



Aircraft  
Insurance

Standard Category | Vintage | Aerobatics | LSA | Homebuilts | Warbirds | Sea Planes | Powered Parachutes & Trikes | Gliders | Helicopters

Administered by Falcon Insurance, Inc.

© 2012 Experimental Aircraft Assoc., Inc.





# Hatz Trick

**A professional builds his ideal personal machine**

By Budd Davisson





So, what kind of airplane does a professional antique aircraft restorer and replica builder build for himself?

That's a good question. But you know such a bird would have to be unique because no one gets into that kind of business unless he has a serious personal interest in it. Actually, most of the pros in that field are more than interested; they are passionate. When it comes to building for themselves, are they going to build a Cessna clone? Of course not! How about a homebuilt airplane that looks a little like

everything old but replicates none of them and directly addresses someone's taste for things ancient and funky?

Yeah, that's the ticket! And that's exactly what Mark Lightsey of AeroCraftsman in Riverside, California, did. After a long string of aircraft restorations and replicas completed for customers, he built a Hatz that looks and feels older than it really is.

Mark summed up the principle that guided this project as "I wanted everything, and I mean everything, about



this airplane to look like a production airplane circa 1933. I didn't want any aspect of it to have a modern vibe to it."

Actually, it's impossible for a Hatz *not* to look old. Next to something like a Pitts, a Hatz looks like the Wrights or maybe Glenn Curtiss had a hand in designing it. Next to a Hatz, a Staggerwing looks like the Space Shuttle. Still, quite often the Hatz's overall antique feel is compromised through the use of new or modern details such as wheelpants, the engine, the instruments, or the paint. Mark Lightsey's life revolves around getting details right: He recognizes clearly that the details are what make any project.

As it happens, the Hatz project predates Mark's antique restoration/replication business. In fact, this particular project predates just about everything aeronautical in his life except for his first airplane project in his late 20s: scratchbuilding a Corben Super Ace powered by a modified Model A Ford engine. It's a 1935 design and appeared old even when designed, so early on Mark's predilection for the ancient was showing through.

Mark said, "I stuck as close to the plans as I could, including drilling the engine for a pressure oil system as part of the conversion. I was using plans from a 1935 *Popular Aviation* [magazine] including the Corben engine conversion stuff. That meant having to make a nose case to mount a thrust bearing. I went to night school to learn machining and hogged the case out of solid billet aluminum. Hardly old-school technology, but I like machining stuff and learning new skills. That's why I make it a rule to hang out with guys who know more than I do, so when I get stuck, I always know whom to call.

"I learned to weld in night school and at EAA workshops and found it to be something I really like to do. I seem to have an affinity for rag-and-tube construction. Much more so than sheet metal.

"I finished the Ace and got all of three flights on it before the Santa Ana winds kicked up and ate the airplane. But, the airplane bug had bit me pretty hard by then."



Mark Lightsey used a super rare 0-290-3 Lycoming with a rear-mounted starter on his Hatz to achieve the look of a J-3 Cub on the nose.

At the time, Mark was working as a field technician for the gas company, but the thoughts of working on things that fly wouldn't leave his head.

"I ran into a guy who had a Porterfield and was building a Hatz. His name was Mark Story. I knew the Hatz fairly well and liked the way it looked, although I had never even sat in one. And it was rag and tube, so it was well within my comfort zone. Mark had decided he was going to move to Mexico with his Porterfield and wanted to sell his Hatz project, which consisted of wing ribs and most of the center section. So, I bought it."

As luck would have it a good friend of Lightsey, Jack Pickering, had just finished an RV-6 and was looking for a follow-on project.

"Jack and I were good friends, and we became partners in the Hatz, even though Jack had zero rag-and-tube experience," Mark said. "However, like most builders, he was eager to learn something new. And it turned out that I enjoyed teaching new skills to him.

"When we started, Jack not only didn't know anything about tube and fabric, but he had no tail wheel time at all. So, when we finished the airplane ten years later, he logged some Cub time and got a no-drama checkout in the Hatz. He flew it really well, but he's a classic serial builder. He'd rather build than fly, so he sold me his interest in the Hatz and started building an RV-12."

It took them ten years to build the Hatz, not because it was such a complex, big project but rather because Mark decided to follow his passion. He quit the gas company and started AeroCraftsman, first in Hemet, then moved it to the legendary Flabob Airport in Riverside. There his penchant for old airplanes built of everything except sheet metal led him to a client base that had him restoring all sorts of antiques, including Travel Airs and WACO cabins, and replicating airplanes, the best known of which was a tiny little speedster, the C.460 Caudron racer of 1936. However, when he'd have a free hour or two, he and his partner would be banging on the Hatz.

Mark said, "The Hatz is about as simple as an airplane can get. You might even say rudimentary. It wasn't hard for me to envision this as a 1930s factory-built airplane because almost everything in it could have been from around 1933.

"The biggest part of the project was building the wings. Even though we had a set of wing ribs, there were still the ten wing and center section spars. And

the drag/anti-drag wires. We bought clevis for the wires but fabricated the wires themselves by threading 3/16-inch stainless rod. Gotta save a buck or two when you can. That's one of the nice things about the Hatz: With few exceptions, the metal components can be built with just a grinder and a welding torch."

One of the discouraging aspects of building a biplane, besides there being more parts involved than with a monoplane, is that you have four leading edges that have to be kept looking good. Often they are easily dented, but Mark and his partner, Jack, handled that by forming plywood leading edges that resist denting and can be finished as straight as glass.

"The fuselage is your typical square box fuselage," Mark said. "You lay out the sides on a jig table, then stand them up and add the crosspieces. This is the way airplanes have been built for nearly 75 years, and the Hatz is faithful to traditional building technique in every way, shape, and form."

Mark didn't pay any attention to the various offshoots of the basic design or the faster, sleeker versions many Hatz builders were crafting. He had antiques on the brain, and since his shop was filling up with the bigger versions he was restoring, he was constantly keeping his eyes open for items that would give his airplane that new-in-1933 look. This included just about everything on the instrument panel.

When asked where he got a particular thing, such as the globe compass, he always said the same thing: "I don't know. I've been collecting stuff for a long time and it just showed up."

The same thing applies to the unusual altimeter, the bigger-than-average mag switch, and the tach that appears only to go up to 2000 rpm but has a second inner scale that supplies the extra 1000 rpm to get him off the ground. Oddly enough, the tiny Microair radio is barely noticeable and doesn't detract from the overall effect.

"One of the neatest things I found was some sort of an old, wooden military data case. I didn't sand it or refinish it or anything. I liked the patina it had, so I just fixed some cracks and fastened it to the back of the front seat. It's the perfect place to put an iPad."

Wait! Did he just say iPad? Is it an antique iPad from the '30s?

Mark just laughed. "I fly this airplane everywhere I'd fly a regular airplane, even though I'm only doing 95

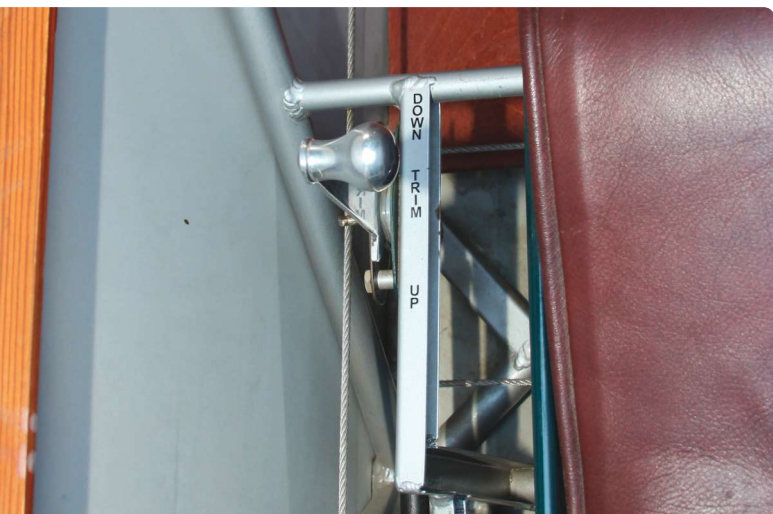




*Lightsey had been collecting antique instruments just for this project for years.*



*Everything on the airplane is hand made including the throttle.*



*Mark machined the trim handle out of aluminum bar stock.*

mph. And I'm not even using a 'mini pad.' My eyes aren't 27 years old anymore, and the bigger one makes reading it in the open cockpit that much easier."

Whoever thought we'd be seeing open cockpits and super-sophisticated electronics? But then, when you're building an airplane your way, that means exactly what it says: Everything about it can be done "your way." And it's not as if Mark is the first guy to sneak an iPad onboard a biplane.

When it came time to choose an engine, there was no choice to be made. From the beginning, Mark had a specific, and fairly rare, engine in mind: a 135-hp Lycoming O-290-3. What's so special about a Lycoming O-290? Usually nothing, but the -3 says that it has no ring gear up front. So, do you have to prop it? No, you don't, and that's why Mark wanted that specific engine.

"I wanted a J-3 Cub look to the nose, but I didn't want to have to prop it," he said. "It's hard to do that kind of a nose with a starter-equipped Lycoming, because the starter ring gear is attached to the prop flange. The ring gear is so big that it dictates the shape of the nose, which isn't what I wanted. The -3 engines, however, have an E80 starter mounted directly to the accessory case out back. I've been told that they built around 300 of the engines for the Piper YL-14, a specialized military liaison airplane that was similar to the later Super Cub. It apparently had slots and introduced flaps to Piper aircraft and had a tilt-up glass rear deck for a litter. However, the project was canceled after only 14 prototypes were built, which orphaned all of the -3 engines. So, you see them from time to time, and I just kept waiting until I found one. Another nice thing about them is that they used the old cast aluminum rocker arm covers with the Lycoming "L" on them. Those have a nice antique feel to them."

Mark said that as soon as he made the first flight, he knew he'd made the right decision in building the Hatz and doing it the way that he did it. Although he'd flown everything from exotic WACOs to fire breathers such as the little Caudron racer, the Hatz provided the "something" he'd been looking for.

"It couldn't be a more pleasant airplane to fly, if you tried," he said. "First, it takes off like a maple seed. No matter what you do with the controls, it's going to float off the ground and start climbing at 800 fpm, which for this slow of an airplane gives a pretty steep climb angle. "I put bearings and bushings everywhere I could in the control system, so the ailerons, which we converted to piano hinges for their gap sealing effect,



would be smooth, and they are. The airplane will actually do a pretty decent aileron roll and loops just fine, but it's the low-altitude cruising, at 1,000 feet or so, that's the most fun. Lots of the cars are moving faster than we are, but you know what? You don't care. You don't fly an airplane like this to get somewhere. You fly it to enjoy the journey."

As a guy who spends most of his time with his hands inside airplanes, he knows whereof he speaks, when he said, "The same thing can be said of the building. The actual building is the journey, and when it's over and the airplane is done, it's as if there's something missing from your life.

"Airplane building is a form of creation that you find in almost no other area. Maybe in wooden boats, I don't know. But when you're building something that you know has life in it, it's just different than working on a car or anything else that's simply a machine.

"And building isn't about speed. It's not about when it's going to be finished. It's about creating the component that's laying on your bench at that moment. And it doesn't make any difference what it is. Maybe a rib. Maybe a landing gear. Whatever it is, that's the project. The airplane isn't the project. Each individual part is.

"When you have it done and sitting on the ramp, or you're cresting a ridge in the late afternoon sun, and you look around at the airplane, you don't even see the airplane. Your mind sees inside of it, and you remember how it felt to be sanding this part or welding that one. You are forever connected to each of those little parts, and you're being carried along by a living entity that has more than just a little of your own DNA in it.

"We're not 'building' airplanes, we're 'creating' something that flies, which means it actually lives. And the feeling that overwhelms you on the first takeoff is a feeling only a few people in the world have had. That's what makes the entire journey worth it."

I don't think we can add anything to that, do you? *EAA*

Budd Davisson is an aeronautical engineer, has flown more than 300 different aircraft types, and published four books and more than 4,000 articles. He is editor-in-chief of *Flight Journal* magazine and a flight instructor primarily in Pitts/tailwheel aircraft. Visit him at [www.Airbum.com](http://www.Airbum.com).

## The Family Hatz

Part of the reason the Hatz is such a simple design is because it was designed by a homebuilder, not an engineer. John Hatz was the fixed-base operator in Merrill, Wisconsin, and decided, as so many have, that he wanted an airplane that didn't exist. He wanted something that would be happy on the local grass runways and would let him pretend he was flying one of the much bigger biplanes—the WACOs, Travel Airliners, and their ilk. In fact, the airplane was to be a replacement for his WACO and was to be a biplane with the soul of a Cub. Not a bad goal! And he achieved it.

Soon, just about everyone in the area had gotten a ride in it including Dudley Kelly, an engineer from Versailles, Kentucky. Kelly talked John into letting him draw up plans so others could enjoy the delights to be had in watching an autumn sunset through a maze of flying wires interwoven with nostalgia. The first Hatz flew in 1967, and an estimated 150-plus followed; but not all were the same airplane as there have been a variety of evolutions of the design that have resulted in four distinctly different Hatz models.

The Hatz CB-1 is the original John Hatz design. He envisioned the aircraft being powered primarily by O-200s and O-235s (100 and 115 hp), as they were readily available from dead or dying C-150s/152s.

In the Kelly D, which is referred to as the Simple Hatz, the center section and curved lines were eliminated to make the airplane faster to build.

In the Hatz Classic, the sophistication of the Classic is increased by the fuselage being visibly rounded and streamlined by stringers leading into a fully enclosed cowling. The engine of choice is the 150-hp Lycoming O-320.

The Hatz Bantam, as the name implies, is a Hatz light. It's designed around a 120-hp Jabiru, and through reducing the span and length and generally working to get weight out of it, the design becomes a nice little two-place, light-sport aircraft compliant airplane. For full information, go to [www.HatzBiplane.com](http://www.HatzBiplane.com) which is the digital home of the Hatz Biplane Association and the source of all things Hatz...including hats.



# EAA AirVenture Oshkosh 2013

**Good results...interesting aircraft** By Marino Boric





EAA AirVenture Oshkosh 2013 is still very vital. The World's Greatest Aviation Celebration has progressed with the times; the level of activity this year was higher than most expected.

What started out as a cold "Frostkosh," with uncommonly low nighttime temperatures, warmed up to be one of the most pleasurable AirVentures weatherwise in many years—and the mood of visitors rose accordingly.

AirVenture is a litany of events packed into one long aviation week: It is a daily air show, two night shows, workshops and forums, product and service introductions,

and as much camaraderie as the aviation community can offer. And as usual, AirVenture hosted several firsts. For example, the public flying debut of the Terrafugia Transition, the Swiss Jetman, and the SubSonex jet were crowd stoppers during the air show.

This year, in contrast to last, was upbeat, with hundreds of volunteers and EAA's core constituency of homebuilders and warbird and antique/classics restorers now feeling appreciated and happy to call AirVenture fun again. Compared to last year, the AirVenture grounds have changed, too—now much more modern with new roads, sanitary facilities, and a wider choice of food.





### Terrafugia

This year the Terrafugia Transition flew for the first time and drove on the taxiway. Monday's AirVenture crowd was the first to see it fly in public, followed by a second appearance later in the week.

Terrafugia is hoping to market its drivable aircraft to pilots who hate being grounded by bad weather or have difficulty traveling after they land. Pilots flying into small airports usually are stuck there unless they can catch a cab or rent a car.

Flying cars have a long tradition. Terrafugia engineers wanted things much easier for Transition owners, so they designed wings that fold up next to the car. That makes it small enough to travel down the highway and park in a one-car garage.

The projected price tag is \$279,000, with more than 100 persons having paid the \$10,000 refundable deposit. The company expects to build a third-generation prototype—the second generation is the one that flew at AirVenture—and then to begin production for sale in 2015 or 2016.

According to Terrafugia's information, the Transition is designed to cruise at 100 mph in the air with a range of 400 miles, with half an hour of reserve fuel. On the road, Transition can travel up to 65 mph with the fuel efficiency of a small car. Transition flew for 10 minutes, slow and low over the crowd, and then landed, folded up its wings, and drove down the taxiway. It needs a 1,700-foot runway to clear a 50-foot obstacle. [www.Terrafugia.com](http://www.Terrafugia.com)



### Sonex

Oshkosh-based kit-plane manufacturer Sonex Aircraft announced production, pricing, and performance details of its SubSonex JSX-2 Personal Jet and began accepting refundable \$10,000 deposits for the one-place aircraft. Power comes from a 247-pound-thrust TJ-100 turbojet engine from PBS Velka Bites of the Czech Republic.

Preliminary performance specs for the SubSonex estimate a 1,200-foot takeoff distance, a never-exceed speed of 298 mph indicated airspeed, a 300-mile range with reserves, and a 59-mph stall speed in the landing configuration. Certificated in the experimental exhibition category, buyers will not have to build 51 percent of the aircraft as experimental amateur-built aircraft rules require. It will be offered in an ultra-quick build kit with a guaranteed price of \$125,000 for the first 10 kit deposit holders. By the end of AirVenture, eight deposits had been received.

"The purpose of the whole project is to be able to have a jet for the price of a light-sport aircraft," said John Monnett, adding, "Which would you rather have?"

SubSonex kits will ship with a preassembled fuselage (with canopy and windshield installed), wings, tail, and control surfaces. The "plug and play" TJ-100 engine features an integral electronic control unit and includes instrumentation, throttle control, pre-wired harnesses, and installation components. Avionics and paint are the only items not included.

Sonex is currently constructing JSX-2 prototypes that feature a larger cabin, fully retractable landing gear, and a BRS ballistic parachute system. Deliveries of the first JSX-2 kits are expected by mid-2014, Monnett said.

Operating the SubSonex in the United States requires a private pilot certificate, and for those without a turbine rating, a letter of authorization from the FAA. Sonex has developed a transition training program to provide the necessary instruction to qualify for the letter of authorization (LOA). The JSX-1 was featured in flight demonstrations during AirVenture, flown by primary test pilot Bob Carlton. [www.SonexAircraft.com/SubSones](http://www.SonexAircraft.com/SubSones)



### Rud Aero

Rud Aero of Sebastian, Florida, introduced the prototype of its RA-3 all-carbon aerobatic aircraft. Rud's RA-3 is similar to the RA-2 the company presented last year, with the difference that the RA-3 is a two-seater with side-by-side seating instead of the RA-2's tandem seating.

The RA-3's design is optimized for primary flight training and comfortable economical cross-country travel despite that it is also a fully aerobatic aircraft. The RA-3, like the RA-2, also offers interchangeable wing options—one for beginner/intermediate aerobatics and the other for advanced aerobatics. Aerobatic pilots can first train on a cambered wing, then convert to a constant-chord symmetrical wing for advanced aerobatics.

The RA-3 also offers a rugged and lightweight carbon-fiber airframe designed to  $\pm 8g$  with a 2x safety factor. The RA-3 is intended to be certificated in the Primary category under FAR Part 21.24. A similar but lighter airplane, the RA-3 LSA, will be offered as a light-sport airplane and will have a useful load of more than 500 pounds.

Rud Aero's mission, according to Company President Rud Taras, is to build the strongest and best aerobatic planes in the world. The RA-2, an unlimited-class aerobatic,

was specifically designed for world-class aerobatic pilot Sergei Boriak. Rud Aero says the RA-2 exceeds the capabilities of all existing aerobatic aircraft. Its lightweight, carbon-fiber airframe is the strongest in its class, able to sustain  $\pm 13g$  with a 2x safety factor.

The aircraft can be built with a four-cylinder engine or a six-cylinder powerplant for even greater performance. [www.Rud.Aero](http://www.Rud.Aero)



### MakerPlane Launches Indiegogo Campaign

MakerPlane, the open-source aviation community, has launched an Indiegogo crowd-funding campaign to raise funds for the completion of its two-seat experimental light-sport aircraft (E-LSA). The goal of the MakerPlane 60-day campaign is to generate \$75,000 to complete the design, perform test flights, and release open-source plans that will allow anyone to download and build the aircraft.

Indiegogo's crowd-sourcing platform allows organizations to raise funds for specific projects through donations. In return, rewards or perks are given. The funds are being used for tooling and materials, and time is being donated by MakerPlane team members to complete the project.

MakerPlane is planning to have the prototype of the two-seat light-sport aircraft (LSA) built by Oshkosh 2014 and to fly it in 2015. The aircraft has been designed and optimized to be built on home-based or "maker space" CNC equipment. According to John Nicol, MakerPlane founder and president, he built the CNC mill for about \$800, and anyone else can build it, too. All other materials for building the aircraft will be within everybody's reach, with most of them coming from local home improvement



stores. The goal of the project is to give the opportunity to potential builders to build a complete aircraft (engine included) well below \$20,000; \$15,000 is the target. The company is working on technology that will allow novice builders to point a smartphone camera at an aircraft part and have it display build and assembly information for the part on the screen. Supporters can see the Indiegogo campaign at <http://igg.me/at/MakerPlane>.



Icon President Kirk Hawkins announced that FAA approved its weight increase request.

### Icon Aircraft

Icon Aircraft, developer of the amphibious A5 LSA, announced that the FAA granted its exemption request for a gross weight increase to accommodate safety features, including a spin-resistant airframe (SRA). The exemption allows the A5's takeoff weight to rise as high as 1,680 pounds, 250 pounds (114 kg) above the 1,430-pound limit for amphibious LSA.

The FAA determined "a grant of exemption is in the public interest" for the increase of the A5 maximum takeoff weight. "The FAA believes it achieved an acceptable balance between enabling innovation and regulating safety in the regulations covering the certification and operation of light-sport aircraft." The FAA also noted that it hadn't considered the weight of SRA technology compliant with 14 CFR Part 23 spin-resistance standards in establishing the MTOW for LSA.

The A5, introduced at EAA AirVenture 2008, initially was designed to meet mandated weight limits for LSA. During development the company decided to make the airframe spin-resistant to maximize safety. That objective required increasing the wing size and consequently the empennage, changes that put the aircraft's weight over the LSA amphib limit. The initial production A5 will weigh 1,510 pounds, according to Icon. [www.IconAircraft.com](http://www.IconAircraft.com)



### GreenWing International Taking Orders for eSpyder

GreenWing International (GWI) started taking orders for the eSpyder electric, single-seat aircraft at Oshkosh. The eSpyder initially will be sold as an experimental amateur-built kit in the United States and as a completed aircraft in Europe, where it has achieved German DULV certification. The eSpyder offers pilots the opportunity to experience clean, quiet, affordable electric flying.

Pricing will be 34,990 euros for the completed single-seater in Europe, and \$39,990 for the experimental kit in the United States. Initial deliveries are planned for the fourth quarter of 2013, and GWI is currently limiting the number of sales positions to 25 aircraft in the European Union and 25 kits in the United States. GreenWing feels it is important to focus first on delivering outstanding customer service to the early customers of the electric aircraft and wants to focus on those customers before taking a larger number of orders.

GWI pilots have been routinely achieving flights of more than an hour in the two planes that were flown several times at AirVenture. The typical cost per hour for electrical power in the United States is \$1.60 and around 3 euro in Europe due to higher energy prices. The eSpyder noise level is around 51 decibels, far below any gas-powered airplane.

Yuneec's eSpyder E280 single-seat ultralight debuted at AERO 2012 last year, and it's now back in 2013 in a modernized version with better aerodynamic protection for the pilot and engine parts. GWI claims it is the world's first certificated electric airplane, with German DULV certification awarded in February 2013. The eSpyder provides practical, affordable recreational flying with clean, quiet electric power. It combines a proven airframe design (the former Flightstar Spyder) with the Yuneec 24-kilowatt electric power system that can lift a 220-pound payload at an initial climb rate of 600 fpm. Maximum speed is 56 mph, with an economical cruise

speed of 37 mph. Flights as long as an hour are possible, with a 30-minute reserve still available upon landing. Batteries can be exchanged or charged in about two hours.

[www.GreenWing.aero](http://www.GreenWing.aero)



### Nando Groppo Debuts Trail

The Trail, a two-seat, fixed-wing LSA made in Italy by Nando Groppo S.r.l., debuted at EAA AirVenture Oshkosh 2013. It is certified as a UL (Ultra Light) airplane in Germany and Great Britain, and it just obtained LSA approval.

The Trail on display at AirVenture was a ready-to-fly version, equipped with a 100-hp Rotax 912S engine, AvMap 5 instrumentation, fixed-pitch wooden propeller, and 40-gallon (120-liter) fuel tank that allows more than six hours of flying time and about 600-nautical-mile range, and was offered for sale at a promotional price of \$79,900.

The Trail features two seats in tandem and a chromoly welded steel fuselage and is covered with 2024 T3 aluminum. It is available in the nose gear and taildragger configuration. One of the most unusual features is its quick wing-fold capability. The wing-fold process is exceptionally fast and easy, doesn't require any tools, and can be performed in five minutes, thanks to strutted wings.

The Trail is a STOL aircraft, offering a cruise speed of 110 mph, and has been specifically designed to operate from unprepared runways. Ninety-two Trails already have been manufactured and delivered. The aircraft can be powered with a Rotax 912S, Sauer 2400, or Jabiru 2200 engines.

Trail will be sold in the United States as a ready-to-fly aircraft for \$85,000 or as a kit at \$25,000 (no engine), with an average build time of 600 hours. Kits are delivered with the wing spars already riveted and steel parts welded and powder-coated. All aluminum skins are supplied CNC pre-drilled. [www.Groppo.it](http://www.Groppo.it) or [www.Fly-BuyLSA.com](http://www.Fly-BuyLSA.com)



### SkyCraft Introduces Ready-to-Fly SD-1 Minisport

SkyCraft Airplanes launched its ready-to-fly SD-1 Minisport at AirVenture. The plane has a 118-mph cruise speed, 1,400-fpm climb, 1.8-gph fuel burn, and \$54,850 price tag. Included standard with the aircraft is a Hirth F-23 engine, removable wings, Dynon glass avionics, a comm radio, iPod jack, and nav and strobe lights for night VFR flight.

The airframe was designed in the Czech Republic by Igor Spacek of SD Planes and is well known to the European public. The single-seater weighs 275 pounds and has a 300-pound useful load. It can accommodate a 230-pound pilot and 60 pounds of fuel—enough for a 575-mile range. An aft baggage compartment provides up to 30 pounds of storage. The Hirth powerplant is a two-stroke, flat, two-cylinder, 50-hp engine with dual ignition, fuel injection, and a 1,000-hour TBO. As an added benefit, SkyCraft has offered to pay for the top-end engine overhaul and propeller replacement for all SD-1 owners in the United States. [www.SkyCraftAirplanes.com](http://www.SkyCraftAirplanes.com)



### RANS Offers All-New S-20 Raven

RANS introduced its newest product, the S-20 Raven, in bare-bones form at AirVenture. The airplane is designed to be the successor to the famous Coyote II



S-6S, which will remain in production. The S-20 has a lot to offer high-wing enthusiasts. According to Randy Schlitter, RANS president, the side-by-side S-20 Raven can equal or exceed the performance of the S-6S.

The S-20 Raven uses the S-7 wing and tail but has a new, all-welded steel fuselage. The new aluminum 7075 landing gear is CNC machined, heat treated, and shot peened for long life. The S-20 also can be switched from a tailwheel to a tricycle gear. Sliding, adjustable, and quickly removable seats together with large, wide-opening doors allow easy ingress and egress. The seat backrests recline for easy baggage compartment access, and the removable seats offer the uncommon possibility to sleep in the aircraft, if needed.

The Raven wings are the same as on the S-7S, featuring one-piece, fully CNC-machined stamped ribs, CNC-machined spars, aero servo ailerons, and 26-gallon fuel tanks. RANS said the aircraft is still in development, but it is accepting pre-orders; four aircraft were sold during AirVenture. [www.RANS.com](http://www.RANS.com)



### AvMap Announces the Ultra EFIS

AvMap, the Italian manufacturer of GPS equipment since 1994, presented the Ultra EFIS, a standalone unit providing air data, attitude, heading, and altitude reference (ADAHR) during AirVenture 2013.

The AvMap Ultra EFIS is a standalone device with a 3.5-inch, ultrabright, sunlight-readable LCD display. The unit is compact, 49.5 millimeters deep, and ultralight—only 145 grams. The AvMap Ultra EFIS can be easily installed in a panel fitting a standard 84-millimeter (3.3-inch) panel hole and connected to the GPS receiver and the aircraft's pitot-static system to provide reliable ADAHRS data.

The AvMap Ultra EFIS is designed for light-sport, ultralight, and experimental aircraft. It contains solid-state gyros, accelerometers, magnetic field sensors, air data sensors, and a UAV navigation motion processor.

The Ultra EFIS 3.5-inch PFD screen displays attitude (roll, pitch, and heading), airspeed and altitude (pitot-static system based), wind sideslip, and vertical speed. AvMap now gives the pilot the possibility to choose the EFIS solution: standalone or integrated with EKP V. Depending on space availability, either two displays or one unique device can be chosen. The Ultra EFIS is the standalone solution for panel mounting; owners of EKP V may consider buying the A2 ADAHRS module to be used together with the cockpit docking station to complete the AvMap EFIS set.

The Ultra EFIS will be on sale starting this fall at \$1,200, while the complete AvMap EFIS set (EKP V plus Cockpit Docking Station and A2 ADAHRS) retails in the United States at \$2,750. [www.AvMap.us/avionics/instruments/UltraEFIS](http://www.AvMap.us/avionics/instruments/UltraEFIS)



### Beringer Introduces 'No Ground Loop' Tail Wheel

The well-known French wheel and brake manufacturer Beringer introduced a new, patented, tail wheel assembly featuring a double pivot that does not allow a tail wheel aircraft to ground loop.

Beringer technicians noted that taildragger aircraft instability increases with the square of speed. Thus, at certain speeds, even a skilled pilot is not able to master the conventional tail wheel. Fast airplanes (such as the P-51 Mustang) have a locking system that maintains the tail wheel in line with the aircraft longitudinal axis. This solves the instability problem but does not allow almost any path correction required in crosswind conditions or to counter the engine torque.

According to Beringer, it has found the solution, developing a tail wheel with a double pivot mechanism. Pivot 1 (the "rear" one, in line with the wheel axis) allows precise guidance of

the aircraft on takeoff and landing; Pivot 2 (the “forward” one) allows sharp turns when unlocked. In spite of having the tail wheel locked, the Beringer assembly allows taxi operation and steering; when sharp turns are required the tail wheel can be unlocked from the cockpit. [www.Beringer-Aero.com](http://www.Beringer-Aero.com)



### A New Composite Kit-Built Helicopter

Innovator Technologies, manufacturer of the Mosquito helicopter and Composite FX, have partnered to build a new two-place, side-by-side helicopter called the Swift that was on display in the Ultralight area.

The Swift will have an empty weight of 900 pounds, a payload of 700 pounds, a 100-mph cruise speed, and a 120-mph maximum speed. Range of the 185-hp helicopter is 3.5 hours or 350 miles. The tail rotor is an enclosed Fenestron; the main rotor diameter is 26 feet. It will have a full-suspension rotor system, two composite rotor blades, an all-composite fuselage (74 inches wide), and 35-gallon fuel tanks.

The engine is expected to be a Lycoming-based, fuel-injected IO-360. Test flying is expected to begin by the end of 2013. [www.Composite-FX.com](http://www.Composite-FX.com)



EAA Homebuilding Community Manager Charlie Becker (right) presents the Raspet Award to Rotax's Christian Mundigler.

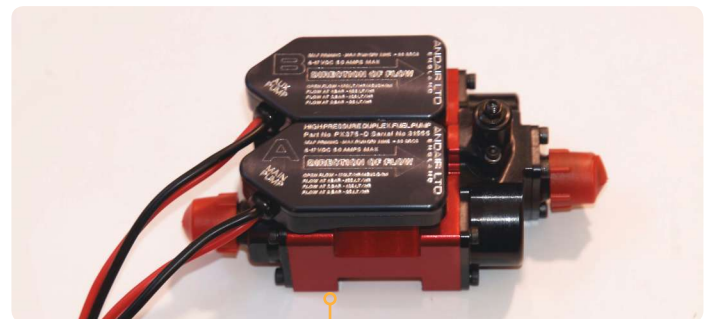
### Rotax Earns Dr. August Raspet Award

Christian Mundigler, manager of BRP Rotax Aircraft Engines Sales, accepted the Dr. August Raspet Memorial Award from Charlie Becker, EAA's Homebuilders Com-

munity manager, during an AirVenture press conference. The award recognizes Rotax for its outstanding contributions to the advancement of light aircraft design.

During AirVenture, Rotax revealed that real-life flight tests are showing a fuel economy improvement of up to 36 percent with the fuel-injected 912iS engine compared to the carbureted Rotax 912 ULS engine. The digital engine control unit (ECU) and the redundant electronic fuel-injection system ensure optimal fuel and air mixture at any altitude for a longer flight range, fewer CO2 emissions, and lower operating costs. The 912iS engine works with throttle settings below 97 percent in an “ECO Mode” with a Lambda 1.05 setting, which results in low fuel consumption. In a “Power Mode” above 97 percent throttle up to WOT, the Lambda is 0.88. The Rotax 912iS engine is currently available on 26 different aircraft types; 24 other OEM installations are in progress.

BRP Rotax also announced it will offer new Rotax Extended Service Terms (REST) programs for owners of a 912 engine, starting October 1, 2013. Two warranty extension programs will exist. A “One Year Plus” program includes a one-year warranty extension or 200 additional flight hours, whichever comes first. A “Full TBO” program offers three years additional warranty or up to TBO (2,000 flight hours), or whichever comes first. This program will be offered to all customers who have a four-stroke Rotax engine that is already covered by a warranty. Further details about the REST program will be released on October 1, 2013, and it will be effective starting from that date. [www.FlyRotax.com](http://www.FlyRotax.com)



### Andair Dual Fuel Pump

Andair is one of the premier manufacturers of aircraft-related fuel components such as pumps, filters, and valves. During AirVenture 2013, Andair introduced a new, duplex fuel pump for the Rotax four-stroke engine family. Two independently controlled fuel pumps are built into one aerospace aluminum body, called the PX375D-PR. It is self-priming, lightweight, and compact; it weighs just over one pound (18.2 ounces). The price is approximately \$1,200. [www.Andair.co.uk](http://www.Andair.co.uk) EAA



# Mirror, Mirror on the Wall, Who is the Fairest of Them All? My mirror replied, “Not you!”

By Cy Galley

Every person who works on airplanes has a collection of mirrors to inspect the nooks and crannies of a plane. I have big ones, little ones, round ones, square ones, magnifying mirrors, one that will go through a spark plug, a lighted mirror, a variable-angled mirror with the angle remotely controlled. Yet I am frustrated by the mirror-on-the-wall's pronouncement.

Unfortunately, mirrors have several shortcomings. They have a limited field of vision. Their view is always farther than the real distance. The reflected image is reversed left to right. They are difficult to maneuver to get a good clear view. Poor lighting makes it difficult to see the reflection. They only work where there is a direct line of sight. But the greatest limitation is... there's no way to share or consult with others about what you see. You can't compare the present view with last year's, last month's, or even a minute ago.

There are several great solutions in this electronic age. One is a small camera with a wide-angle lens

and close focus. Many of these cameras can slip into small places and will light up the area with their flash. They'll work in places where even a mirror won't work or when there is no direct line of sight. They can go through an inspection hole, for example, to look at a buried cable pulley for wear.

On many cameras, you can use the ¼ -20 tripod hole to affix a rod to extend your reach. If it is too far to reach the shutter button to take a video scan of the area, then just start videoing, insert the camera until you reach the area you want to view, and pan the area. After you stop videoing and pull the camera back out, you can pause the video on the frame that gives you the desired view.

You can see the result immediately on the camera's viewer, and the image or video are stored on a memory card (SD, CF, or whatever card your camera uses). The view on the camera in most cases can be enlarged to home in on the important portion of the photo. When the memory card file is loaded onto your computer for viewing, the photo can be really be magnified, rotated, cropped, or even printed. That image file then can be e-mailed around the world for consultation help from a fellow builder, owner, or supplier.

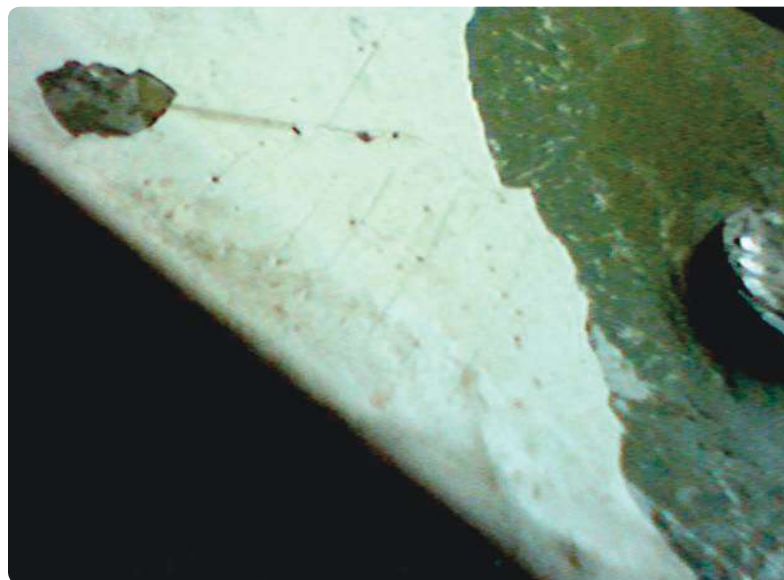
Another device that many of us have is a cellphone. In many respects the cellphone camera is handier than a regular camera as an inspection tool because we are generally carrying it with us. Cellphones have an added feature: the camera can be switched to be a forward-facing camera, which allows us to see what the camera is seeing. This makes it an electronic mirror, which aids in looking at the desired location. Most of us will take still pictures, and some of us may even do videos. In addition to what a regular camera will do, you are able to e-mail the pictures from your cellphone to your computer or tablet. Just like with a camera, you can view it "live." Cellphone cameras can even be remotely triggered as there is an "app" for that!



The last mirror eliminator is a USB camera. This is a video camera that is normally mounted on your computer for a "live" video chat. Since it has a USB cable, you can connect this camera directly to your laptop or tablet to view the images you are taking on a bigger screen. The USB camera shown here even has a built-in LED light for darker areas, like inside a wing or fuselage, and it will focus on items as close as only 3 centimeters away. You don't even have to have a direct line of vision to "see" your desired view.

The cheap camera I bought doesn't auto-focus, but it is smaller than the regular camera or cellphone so it gets into tighter places. When comparing the camera, the cellphone, and the USB device, the cellphone is the most convenient.

Mirror, mirror on the wall...I don't need you anymore!



## Watch These Online Hints for Homebuilders Videos!

Here are four new videos that were released recently.



### Engine Compartment Sealant

Dick Koehler shows some different types of sealants that could be used to seal around firewall pass through areas.



### Testing Dacron Sailcloth

Brian Carpenter of Rainbow Aviation Services demonstrates how to test the condition of Dacron sailcloth.



### Repairing Scratched Plexiglass

Dick and Bob Koehler demonstrate the steps involved in restoring scratched plexiglass to like new using commonly available products. Dick and Bob are both A&P mechanics with IA authorization and EAA SportAir workshop instructors.



### Cutting Holes in Your Instrument Panel

Dick and Bob demonstrate ways to cut round holes in your instrument panel, including the use of a Greenlee Punch.





Robert Baslee of Airdrome Aeroplanes displayed this Rotec-powered Spirit of St. Louis replica at AirVenture 2013. [www.AirdromeAeroplanes.com](http://www.AirdromeAeroplanes.com)

# The Power of Oshkosh 2013

## New and updated powerplants

By Tim Kern

Aircraft design starts with the available powerplant. That axiom has held for more than a century. Some designers/builders have become so frustrated with the engine options available that they have designed their own engines. There is little need to do that today.

At EAA AirVenture Oshkosh 2013, options abounded. Here is a sampling of new, new-ish, and alternative power

sources, dwelling on the less known and the newer. Here's what is available, or will soon be, to power your next aircraft.

We'll cover the engines starting with the highest cylinder count and then displacement order. Note that many of these engines are in various stages of development, so the caution of *Caveat Emptor* always applies.





aluminum two-seat Spitfire Mk. 26B from Supermarine Aircraft of Cisco, Texas. Weighing 523 pounds installed and making 430 hp at the crank, this fuel-injected V-8 drives a patented, dual-belt 1.82-to-1 Michael O’Sullivan–designed reduction unit from the flywheel end. It is managed by a custom-mapped Motec electronic control unit that gets signals from redundant flywheel triggers. The proprietary mechanical throttle body puts positive cable control back in the pilot’s hand, eliminating the automotive throttle-by-wire link. Cost is about \$70,000, and it’s available now. [www.SupermarineAircraft.com](http://www.SupermarineAircraft.com)

### BMW V-12 Conversion by Titan Aircraft

Seen at the Titan Aircraft exhibit at AirVenture, this BMW 7-series injected engine weighs about 40 pounds more than the current Honda engine often used by T-51 builders and provides 326 hp. Titan has fitted its own redrive. The engine’s separate induction and computer for each bank of cylinders give it a measure of redundancy. It’s effectively two straight sixes on a common crankshaft. This compact (19 inches wide), 5.4-liter V-12 with 9.5-to-1 compression is certainly *not* a Rolls-Royce product, regardless of the stickers adorning the valve covers. There is also a 5.0-liter, 8.5-to-1, 296-hp version, with the same outside dimensions, from an earlier BMW. It *might* be “boostable.”

The V-12 BMW is about twice as expensive as Titan’s Honda or Suzuki conversions—around \$50,000, which is proportional to the increase in torque. And yes, you can use this engine with Titan’s new airfoil and longer wing T-51 (that’s actually closer to scale of the original P-51). It should allow cruise in the 220- to 240-mph range, with a stall in the 50s, according to Titan Aircraft. [www.TitanAircraft.com](http://www.TitanAircraft.com)



### Engineered Propulsion Systems Flat-V Vision 350-hp A44-POC

Running for a couple years now and nearing early production, this twin-turbo diesel is a proper, clean-sheet aircraft design poised to replace legacy flat-six, air-cooled power. Interestingly, the case is designed in compacted graphite iron (the prototype has a solid 4130 steel billet case), which allows an extremely compact design that needs no cylinder liners and prevents thread failures, as well. Engineered Propulsion Systems has also designed its own aviation-dedicated turbocharger rather than adapting an automotive unit. Smooth enough through its 1.366-to-1 integrated gearbox to run a *metal* Hartzell propeller (the only diesel that can do this).

This 320- to 420-hp 677-pound (installed weight of the prototype), five-main, liquid-cooled, 4.4-liter (87 x 93 millimeter) flat eight-cylinder engine has been tested at actual density altitudes higher than 15,000 feet, where legacy diesels usually won’t start. An SR22 is being readied for imminent flight test. The videos of the Colorado tests are proof enough on the company website. [www.EPS.aero](http://www.EPS.aero)

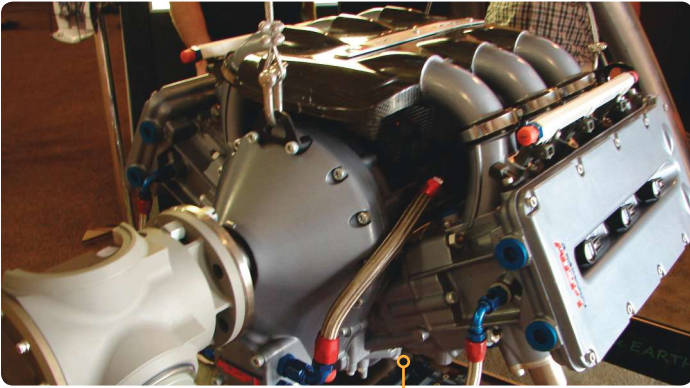


### Supermarine V-8

This 6.2-liter LS-3, Chevrolet-based crate engine conversion is flying in some 20 airplanes, notably the



## Under the Cowl



### Adept Airmotive Multi-Fuel V-6

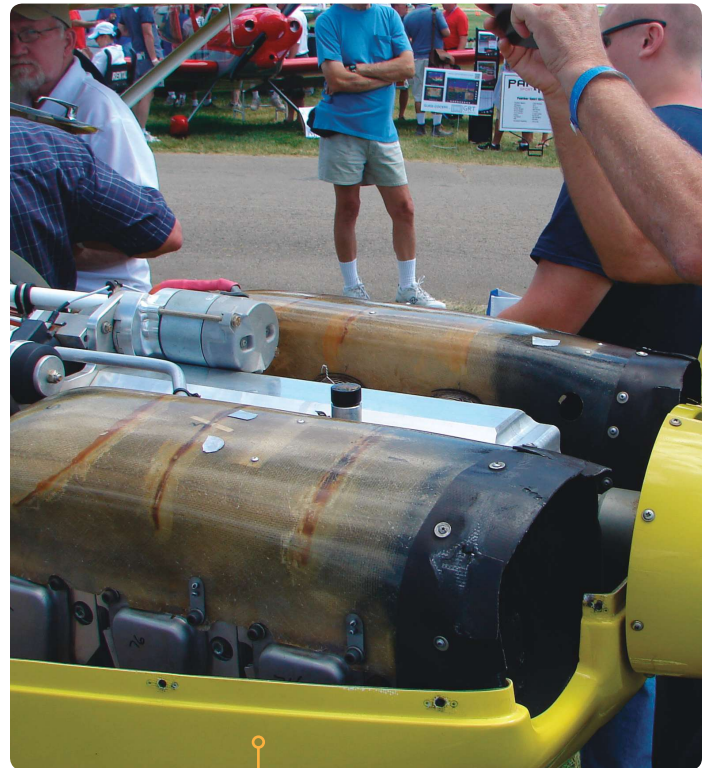
Ready-to-burn avgas, mogas, ethanol blends up to E50, and some biofuels; the unusual 120-degree V-6 by Adept Airmotive is a liquid-cooled oversquare (98 by 70 millimeter, 4.2-liter) four-valve, geared platform that produces 280 to 320 hp. An asymmetrically counterweighted crankshaft eliminates not only rotational vibration but also the rocking couple inherent in offset-cylinder designs. Maintenance is aided by design: The heads can be removed with the dual overhead cams still in place. At 340 pounds installed (with turbo) and just 28 inches from the prop flange to the engine mount, this compact engine features a dry sump. One of five preproduction engines is currently flying in a Ravnin test sled in South Africa, where flight tests at 190- to 200-knot cruise speeds show fuel consumption advantages of greater than 40 percent, compared to a TS10 540. [www.AdeptAirmotive.com](http://www.AdeptAirmotive.com)



### ULPower: Two Sixes Join the Fours

Next to the Zenith Aircraft area was a now familiar engine from ULPower, but this time it had six cylinders.

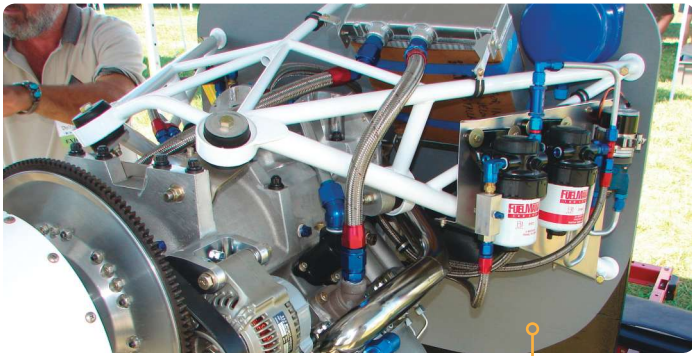
The 390 (3.9-liter) and 520 (5.2-liter) sixes are outgrowths of the 260- and 350-series fours and were displayed along with the purpose-built fours. Air-cooled, direct-drive, two-valve, wet sump, and opposed, these engines look like traditional aero engines, but they incorporate modern metallurgy, fuel injection, dual full authority digital engine control (FADEC) ignitions, and a lightweight, reasonable-size footprint. [ULPower engines](http://www.ULPower.net) are built in Belgium and are imported through their dealer in Missouri. For U.S. customers – [www.ULPower.net](http://www.ULPower.net)



### The Corvair Engine

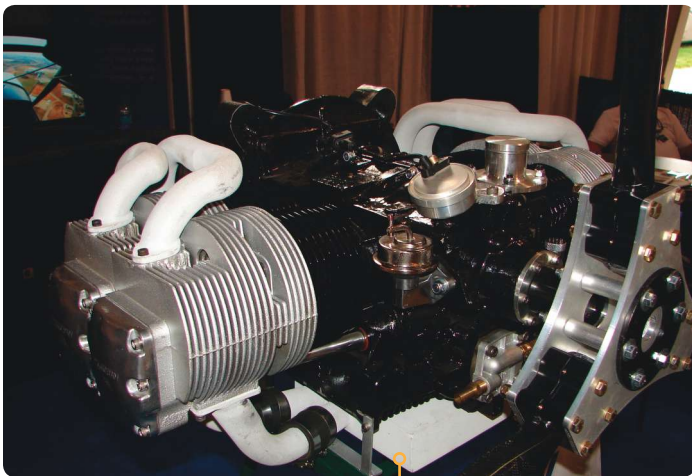
The controversial Corvair automobile recently celebrated its 50th anniversary, and Corvair aero conversions have been around nearly as long. Corvair engines offer smoothness, reliability, and reasonable power to weight (typically 100 hp, with direct drive). New parts for the opposed air-cooled sixes are still manufactured, and there is a large contingent of worthy supporters and developers who have made these engines both affordable and bullet-proof, and who continue to support them with a high level of expertise and experience. Corvair owners are part of a tight family, encouraging seminars and hands-on participation, reflective of the roots of EAA. [www.FlyCorvair.com](http://www.FlyCorvair.com)





### DeltaHawk V-4: The Diesel of the Future?

DeltaHawk's 202-cubic-inch (3.3-liter), mechanically fuel-injected, direct-drive V-4 multi-fuel compression ignition engine has been in test and development flying for more than a decade and is undergoing design revisions and further testing on its way to certification. A liquid-cooled, staged turbo-supercharged (the supercharger is used for starting and "rescue power") two-stroke, the "internal dry sump" DeltaHawk can be mounted in any orientation—V up, V down, or with the shaft vertical. Horsepower ratings of 160, 180, or 200 at 2650 rpm and a compact plan view generate a lot of interest every year. Planned follow-on engines include V-2, V-6, and V-8 configurations and are in various stages of preparation. [www.DeltaHawkEngines.com](http://www.DeltaHawkEngines.com)

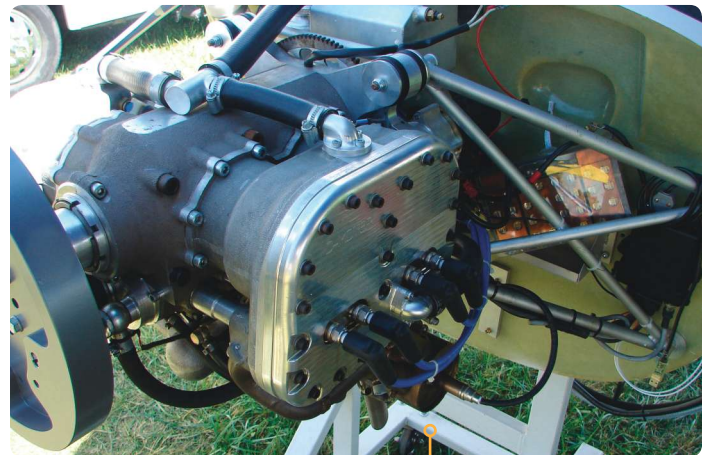


### Brazilian 2.6/2.8/3.1-Liter Fours

Motorav is the world's largest producer of VW engine cases for the automotive market. It has now made a dedicated aircraft engine from that original inspiration, based on engineering a new optimized case that incorporates improved oiling, a real nose bear-

ing, proper cylinder stud support, long-throw crank clearance, and added strength. The engine is cast in lightweight magnesium by Motorav's Brazilian sister company, RIMA.

The rest of the engine is also aero-focused: pistons of 94-, 98.4-, or 101.6-millimeter diameter motivate the engine's forged 94-millimeter throw crankshaft to deliver 95, 105, or 115 hp. There are proper steel cylinders and aluminum upflow dual-plug heads with generous fins; the sump has extended fins, too. These Brazilian engines are starting to accumulate flight test hours in anticipation of their general release. In the works: fuel injection and turbos. Stay tuned to [www.Motorav.com](http://www.Motorav.com).



### D-Motor's LF26: Modern L-Head

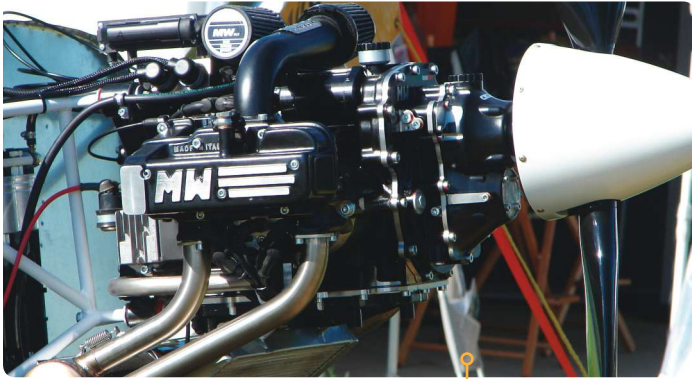
When this engine appeared at the U.S. Sport Aviation Expo in January, the booth was constantly mobbed. How could an "old" L-head design attract so much attention? This 125 pounds wet (and including radiator, oil tank, and exhaust), Belgian-made, 2.7 liter, two-valve, fuel injected, dry sump, aluminum engine has grown since Sebring, and now displaces 2.7 liters, and is a bit less oversquare, at 103.6 x 80mm.

Designed to fit on a Jabiru engine mount, the small-dimensioned flat four has an integrated 20A alternator and dual electronic ignition. Cylinders are Nikasil-lined. The LF26 runs on avgas or high-octane mogas. A Speed Cruiser has flown an early test engine for 1,500 hours so far. The company expects ASTM compliance this year, even as assembly is moved to Ft. Pierce, Florida.

D-Motor is actively looking for builders who want to fly this 93 hp, \$17,500 package. A six-cylinder "LF39" version (135 hp, 174 pounds) is in the works. [www.D-Motor.eu](http://www.D-Motor.eu)



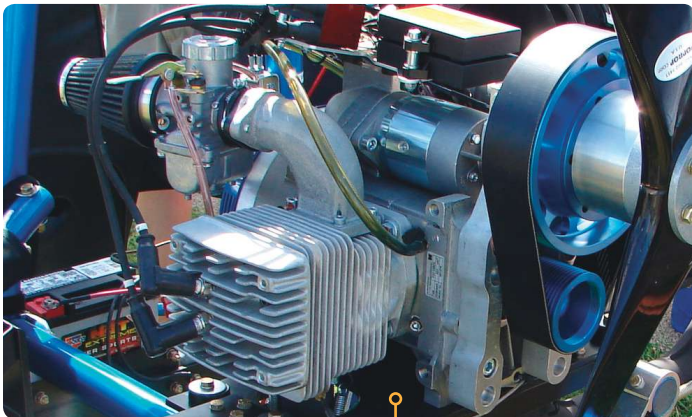
## Under the Cowl



### MWfly Aeropower: Innovative B22R

MWfly's compact mechanical-lifter OHC, opposed four-cylinder engine has fuel injection, liquid cooling, and a built-in 1.958-to-1 gear reduction that runs in its own oil, which is shared by the prop governor. It also has a multi-piece, counterbalanced, forged crankshaft that rides on four ball bearing mains; an aluminum case; and billet pistons in wet steel liners. A small starter, no flywheel, and no clutch keep the 2.2-liter engine's weight down. These work because the compression ratio of the engine is automatically reduced to just 5.5-to-1 at low rpm. (It's 10.5-to-1 at operating speeds.)

Designed for rear or bed mounting and in flight test since 2006, the Italian-built mogas/avgas 130-hp, 185-pound MWfly B22R was seen at Oshkosh mounted on a Bushcaddy, represented by the Canadian MWfly distributor. First deliveries will be available in two to three months. Price is \$18,900, FOB Italy. [www.MWfly.com](http://www.MWfly.com)



### Hirth: Two-Stroke of All Sizes

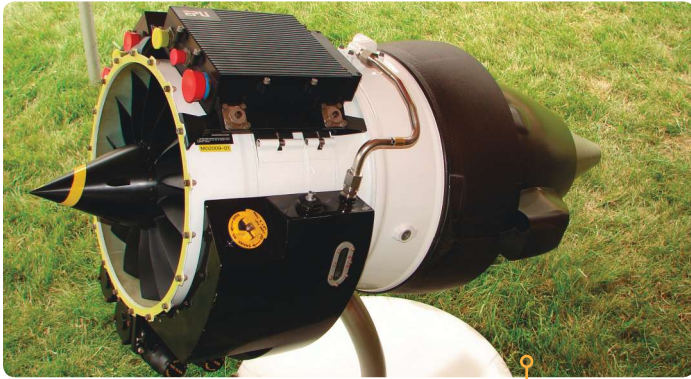
The two-stroke engine dominated ultralight and light homebuilding in the 1980s, and modern designs

are much better now. The German Hirth company has engines in a multitude of power ratings, both liquid and air-cooled, with proven redrives. They're distributed in the United States by Ohio-based Recreational Power Engineering. With Nikasil cylinder liners and 1,000-hour TBOs, Hirths are available from 15 to more than 100 hp; with one, two, three, or four cylinders; with carburetors or fuel injection; and they carry a one-year warranty against any defective part and a three-year prorated warranty on the crankshaft. We'll make it simple: No one offers as many two-stroke options to the aircraft builder as does Hirth. [www.RecPower.com](http://www.RecPower.com)



### VW Derivatives

If you want VW power in your airplane, you can buy a kit engine from [AeroConversions](http://AeroConversions.com), a complete engine in several configurations from [Great Plains](http://GreatPlains.com), a straight conversion by [Hummel](http://Hummel.com), or a completely new, large-capacity (built on proprietary cases) powerplant from [Revmaster](http://Revmaster.com). Laid out in the 1930s like an airplane engine, this Dr. Ferdinand Porsche-designed air-cooled flat four has powered more airplanes than any other automotive derivative. With power ratings from 60-ish to more than 100 hp, in sizes from Hummel's 25- to 30-hp 1/2 VW to fours of 1600 cc to Revmaster's 2.5-plus liters, the venerable VW engine remains one of the low-cost, reliable alternatives, and it's available as a kit or complete, basic or all pumped up. Your choice.



### Price Induction DGEN 380/390 Turbine

This small turbopan incorporates several patents, most notable among them a geared induction and coaxial starter-generator. This arrangement allows electric pumps to eliminate gearbox-driven pumps and allows a large intake. (The intake rotates at a slow 14,000 rpm, while the exhaust spins at 45,000 rpm.) In this design, 80 percent of the thrust comes from the cold side, reducing the expense of making large and multiple heat-resistant components. How cold is the cold side? Well, the intake fan is made of aluminum! Four feet long and weighing just 175 pounds including the FADEC unit and fuel and oil pumps, and with six years of testing, more than 2,500 ignitions, and 1,000-plus hours of dyno running at some 570 pounds of thrust, the (twin-engine) test bed for the French-made DGEN is expected to fly next year.

### And Many More...

Traditional powerhouses are constantly improving their products. Rotax's evolution continued last year, with the introduction of the fuel-injected 912iS. Lycoming's 233-inch four is available for experimentals and light-sport aircraft (LSA) with fuel injection and CDI, and its iE2 series of bigger engines features dual electronics and thermal engine control.

Japan's HKS has talked about its turbocharged HKS 700T for many years; now it's a flying reality.

Rotec Aerosport's 2800 (seven-cylinder) and 3600 (nine-cylinder) radials continue to gain fans, with the 2800 appearing in a *Spirit of St. Louis* lookalike from Airdrome Aeroplanes at Oshkosh.

ECi's 340-inch, 180-plus-hp Titan "stroker" motor has an ardent following in LSA Cub designs and RVs, as do its other fours, in 320-, 360-, 370-, and 409-inch sizes.

Jan Eggenfellner's four-cylinder, in-line 1.5-liter engine core is familiar to millions of drivers as the Honda Fit engine, but only its automotive core remains in the Viking. Running 2.33-to-1 helical-cut gears and making its peak 110 hp at 5500 rpm (2360 prop rpm), the 178-pound (dry) OHC, dual FADEC-equipped aluminum engine sports a stainless muffler (supplied) and numerous proprietary components that make it very much an aero engine. With starter, 40A alternator, and dual engine controls, the Viking is available now for \$12,995. [www.VikingAircraftEngines.com](http://www.VikingAircraftEngines.com)

Continental Motors' recent weight-saving O-200D is catching on, and Continental's Chinese owner, AVIC, announced it purchased Thielert (Centurion) the week before Oshkosh. Continental will offer the Centurion 2.0-liter in-line four (and the possibly revived 4.0-liter V-8) to experimenters, as well as to the original equipment manufacturer (OEM) market, in a departure from the Thielert Aircraft Engines GmbH policy of dealing with only OEMs. CEO Rhett Ross also announced support for the French air racers, Team Big Frog, for a future Reno bid.

Superior Air Parts, another now Chinese company, has cloned its Texas factory in China and plans to keep its Texas facility open, as well.

The French diesel-maker, Safran subsidiary SMA, brought its full contingent, including the well-known four (now in its SR305-230E iteration), and multiple design improvements over its "A" version, from which the "Continental" opposed four diesel was birthed.

Turbine Solutions Group in Deland, Florida, showed applications for the little 247-pound-thrust SubSonex one-man jet and its sister, a 241-hp TP 100 turboprop; with bigger turbines, they provide dedicated firewall-forward kits for the RV-10 and Lancair IV/P, among others.

The Mazda converters, the Suzuki fans, and those who develop their own auto conversions of many types were all over the field. Engines not much larger than a cell phone power PPGs; two-strokes, four-strokes, rotaries, and converted APUs... There's so much to see at Oshkosh! *EAA*

Tim Kern is a private pilot and has written for more than 40 different aviation magazines. He was a key builder on two aircraft projects and has earned the title of certified aviation manager from the NBAA.





*This resurrected 1980 Volmer Jensen VJ-24 is likely the only example still flying.*

# Fun Fly Zone Roundup

## What caught our eye

By Dan Grunloh

One of the changes noticed in the Ultralight/Light Plane and Helicopter area on the south end of Wittman Field is the nomenclature used by the flightline announcers. We were described as “down on the Farm” for many years, but due in part to the new paved roads and expanded activities, we have been rebranded as the “Fun Fly Zone,” a well-deserved moniker. Besides ultralights and light planes, we have powered parachutes, paragliders, helicopters, trikes, hot-air balloons, and more electric-powered aircraft than can be seen anywhere on the earth. Something is flying in the Fun Fly Zone all day every day, except during the afternoon air show. While most of the fly-in attendees at EAA AirVenture Oshkosh spend the entire week on

the ground, we get to fly and have fun every day, thanks to our slower speeds and reduced runway and airspace requirements.

The number of spectators at the Ultralight runway on the very first day of flying was nothing short of astounding. Because of the economic recession, our crowds had been a little light for several years, but not this year. Perhaps the public has accepted that the economic recovery will be slow and are now looking seriously at the low-cost side of aviation. They weren't all gawkers either. It was common for spectators to follow fliers back to their tie-down spots at the end of the flying session to ask questions.

The following statistics tell the story. The Fun Fly Zone registered 142 aircraft, including 12 hot-air balloons. We recorded 1,138 takeoffs and had the same number of landings. I made 43 of those landings myself in my Air Creation trike. We pumped 626 gallons of fuel into aircraft and gave 249 demo rides plus 40 youth rides. The weather was great and there were no accidents or incidents. For a quick peek at the action, watch the EAA video “[Something Special About Ultralights.](#)” EAA’s *AirVenture Today* and daily *e-Hotline* can be your sources for all the AirVenture 2013 news, including videos and archives of the daily newspaper; these can all be found at [www.AirVenture.org/live](http://www.AirVenture.org/live).

### Rare Barn Find in Volmer Jensen VJ-24

A beautiful example of the very rare Volmer Jensen VJ-24 SunFun was displayed and flown this year at AirVenture 2013. The design originated in 1978 as a hang glider and motorglider. The aluminum tube-and-fabric design was an outgrowth of the earlier all-wood VJ-23 hang glider. Jensen, a sailplane designer, is better known for his homebuilt two-place all-wood VJ-22 Sportsman amphibian introduced in 1957. The VJ-24 was found in storage by Tim Lowrey of Brookville, Indiana, an A&P mechanic. The airframe was completed but not covered. The original owner was B. Howell of Connersville, Indiana, the youngest of three builders who began the project in 1980. The 15-hp, 100-cc Yamaha engine is original. Empty weight is 210 pounds, and the 36-foot-long wing cruises at 30 mph and lands at 15 mph. Few VJ-24s were probably built because by 1982 most ultralight enthusiasts wanted the higher cruise speed allowed under the then new FAR 103 rules. Tim also owns and flies a Corben Baby Ace, and he previously flew an UltraPup at AirVenture. He now owns a rare piece of history, likely the only flying example in existence.

The VJ-24 wasn’t the only antique in the Fun Fly Zone, and now that more and more designs are reaching 30 years of age, we probably need to establish an antique ultralight judging category. In addition to 30-year-old Quicksilvers, we saw a Klaus Hill Hummer, a Pterodactyl, and an original Lazair. All were flying just fine.

### Revo Trike Invasion

Larry Mednick, creator of the [Revo LSA trike](#), led a flock of

trikes from Tampa, Florida, to Oshkosh to attend AirVenture 2013. It’s becoming an annual trip for them. The state-of-the-art Revo trikes cruise between 90 and 100 mph, so the trip from Florida to the Chicago area took two days. They stopped awhile at Cushing Field to attend the pre-Oshkosh Trikefest sponsored by Mike Hudetz before continuing on to Oshkosh. While at Cushing, Larry gave a talk on trike piloting. There were five trikes in the group (four Revos), but Barry Maggio, who gained fame by flying his LSA trike around the Statue of Liberty, was held back by a cracked muffler. Curt Shoaf of Watseka, Illinois, was recruited to ferry a new Revo trike to Oshkosh by its owner, Eric Nakamoto, who rode along. A total of seven pilots took turns flying the four trikes including Amy Saunders, Wes and Marsha Frey, and Quinn Ahrens flying an Apollo Delta Jet. Craig Ewing of [Silver Lining Aviation](#) joined the group at Oshkosh with his Revo by trailer. Revolution, the only trike manufacturer exhibiting in the Fun Fly Zone, had as many as five trikes in front of its booth. Revo trikes are made in the United States, and the wings are custom, strut-braced topless designs manufactured by [Northwing](#). The Revo team members took newcomers for rides all week and estimates that they (and Craig Ewing) provided about 65 introductory rides during the week.

### Electric Flying Revolution

A lot has changed since Randall Fishman first flew his electric weight-shift trike at AirVenture a few years ago. More recently Dale Kramer gained notoriety for his electric Lazair flown here in 2011 and 2012. Several significant firsts came at AirVenture this year, starting with the introduction of the Yuneec eSpyder by



After her ride in a Revo trike, Lisa Shetter, who typically flies in a Piper Warrior, said, “It was fast!”





Spectators waiting for the first takeoff from the Ultralight runway on Monday evening.



Greenwing International is now accepting orders for the electric-powered eSpyder.



Quad City Challenger N10DZ, built by Don Zank, first flew from Illinois to the Sun 'n Fun International Fly-In and Expo in Florida in 1989.

**Greenwing International.** Two examples were flown at air show center during the main air show, and the company is now **accepting orders**. The airframe is based on the Flight Design's Spyder designed by Tom Peghiny, but it has been extensively reworked for electric power. It will be an amateur-built kit in the United States for now, but Greenwing will certify the aircraft as an S-LSA once they have some experience with the first 25 airplanes. The price is \$39,995, and it will require a private pilot certificate until we can get the FAA to correct a glitch in the regulations. Sport pilots are currently limited to reciprocating engines.

Another first is the announcement that the new owners of Quicksilver (the oldest manufacturer of ultralights) have teamed up with Brian Carpenter of Rainbow Aviation to develop an electric aircraft called the **Quicksilver EMG**, beginning with a primary glider-style airframe using the wings of a Quicksilver GT 400. Brian gave a talk on the project in the Ultralight Forums tent. A twin-engine-powered version will follow and also a two-place trainer. Brian's vision is for an adaptable airframe that can be developed into several different configurations. Construction is underway, and flight testing will begin soon.

The third new development is more subtle but was widely noticed by the pilots flying internal combustion engines in the Fun Fly Zone. Mark Beierle of **Earthstar Aircraft** brought his electric Thundergull, or eGull, to AirVenture again, but now with a new electric motor rated at 55 hp maximum. Each year the aircraft shows improvement. It now flies routinely in the ultralight pattern for long periods of time, doing many takeoffs on a single charge. He kept going around and around like all the rest of us until we began to forget this was an electric airplane! That will be the norm in the very near future. Look for more stories about the eSpyder, Quicksilver EMG, and Earthstar eGull in *EAA Experimenter*.

## Challenger Sweeps Judging Awards on 30th Anniversary

The **Quad City Challenger** design, arguably the most successful light plane of all time, with 4,000 aircraft completed and flown, is 30 years old this year. A record number of Challengers, more than any other brand, were flown to AirVenture 2013, including two examples on floats. The Challenger kit-built airframe gives ample opportunities for builders to display their craftsmanship skills, and as a result all three top light plane judging awards went to Challengers. See all the AirVenture 2013 judging results [here](#). Challengers are available in one- or two-seat versions and are registered as amateur-built aircraft. The original ultralight version is also still available. The latest model, XL-65, is optimized for the sport pilot category and

won the Grand Champion Gold Lindy award. Challenger enthusiasts will celebrate the 30th anniversary with a fly-in at the [Erie Airpark](#) in northern Illinois on September 20 to 22. A total of 65 Challenger aircraft attended the 25th anniversary fly-in in 2008.

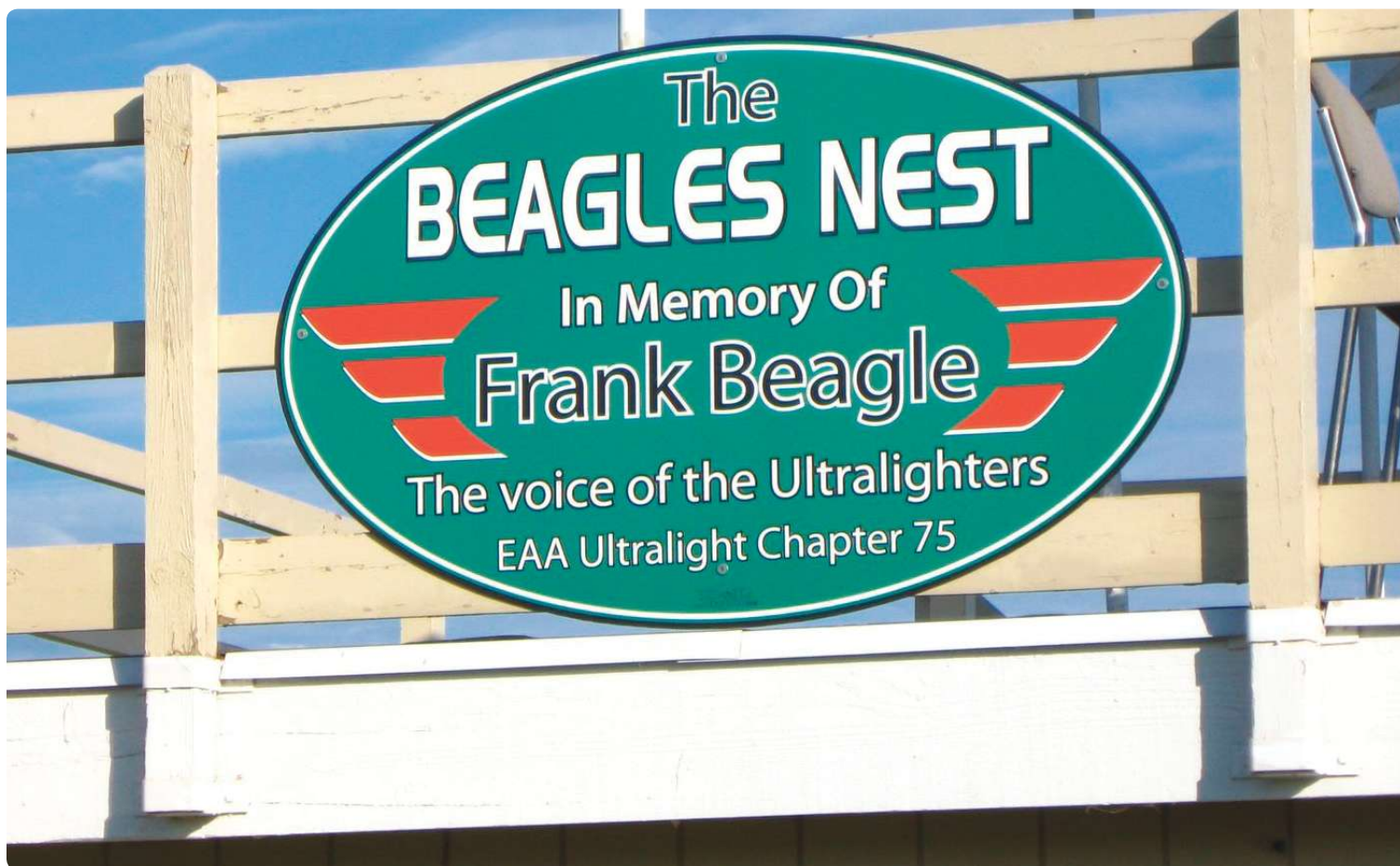
### Lest We Forget – Frank Beagle

A ceremony was conducted on the Ultralight flight-line at AirVenture 2013, dedicating the announcer's tower to the memory of Frank Beagle, who passed away earlier this year at the age of 69. Frank was an early pioneer who served as the "voice of ultralights" at Oshkosh for a quarter century. His booming voice, boundless enthusiasm, and encyclopedic knowledge of the aircraft and pilots made him a superb air show announcer and commentator. He educated a whole generation of pilots and newcomers to the light side of aviation. Steve Krueger, president of EAA Chapter UL 75, presented the sign donated by his chapter, designating the announcer's tower as the "Beagle's Nest." A recording was played of his voice from last year.

It sounded so real coming from the same PA system where we heard him for so many years that many in the assembled group were visibly moved. After the formal speeches, the microphone was made available to anyone who wanted to tell a story or share a recollection about Frank. The string of people who spoke included longtime EAA editor and writer Mary Jones and former EAA staff member Bob Warner. Learn more about Frank and see archival pictures from the early days of ultralights at [FrankBeagle.blogspot.com](#) while it is still available. Listen to an EAA Radio interview from 2012 with Frank Beagle [here](#).

Please send your comments and suggestions about this column to [dgrunloh@illicom.net](mailto:dgrunloh@illicom.net).<sup>EAA</sup>

Dan Grunloh, EAA 173888, is a retired scientist who began flying ultralights and light planes in 1982. He won the 2002 and 2004 U.S. National Microlight Championships in a trike and flew with the U.S. World Team in two FAI World Microlight Championships.



*The announcer's tower at the Fun Fly Zone is now known as the "Beagle's Nest."*



# Sawtooth Climbs $V_x$ Determination

## Determining best climb angle

By Ed Kolano

Last month we took the raw data from the sawtooth climb test flights and created a plot of best climb rate airspeeds ( $V_y$ ) versus density altitude. This handy plot can be used for flight planning as well as in-flight reference. We also spent a few words on data reduction engineering judgment to assess the quality of the data, illustrating when it's appropriate to exclude and include suspect data. This time, we'll use the same flight test data to determine the airplane's best climb angle speed ( $V_x$ ). Oh, and a little more of that judgment.

Figure 1 is the same data reduction worksheet we used last time for the 3,800-foot density altitude test, but we've added two columns—"True Airspeed" and "Flight Path Angle." These values appear in blue on the worksheet, along with all the other post-flight calculated values. We'll need the true airspeed for our  $V_x$  calculations. We'll talk about why we included the climb angles a little later.

First, the airspeed conversions; we recorded the observed airspeeds during the flight tests. Using our

| Test Order | Observed Airspeed | Start Press Alt | End Press Alt | Press Alt Block | Mid Press Alt | Elapsed Time | Avg ROC | OAT (deg F) | Density Alt | True Airspeed | Flight Path Angle | Remarks   |
|------------|-------------------|-----------------|---------------|-----------------|---------------|--------------|---------|-------------|-------------|---------------|-------------------|---|
| 1          | 80                | 3250            | 3750          | 500             | 3500          | 32           | 938     | 51          | 3794        | 85            | 6.28              |   |
| 2          | 70                | 3250            | 3750          | 500             | 3500          | 37           | 811     | 51          | 3794        |               |                   | Low confidence. Wandered fast; explains faster ROC. <b>Don't use.</b> |
| 3          | 90                | 3250            | 3750          | 500             | 3500          | 30           | 1000    | 51          | 3794        | 95            | 5.95              |   |
| 4          | 65                | 3250            | 3750          | 500             | 3500          | 45           | 667     | 51          | 3794        | 69            | 5.49              | VSI 650   |
| 5          | 100               | 3250            | 3750          | 500             | 3500          | 29           | 1034    | 52          | 3859        | 106           | 5.53              |   |
| 6          | 75                | 3250            | 3750          | 500             | 3500          | 37           | 811     | 52          | 3859        | 79            | 5.78              | VSI 750   |
| 7          | 85                | 3250            | 3750          | 500             | 3500          | 31           | 968     | 52          | 3859        | 90            | 6.09              | VSI 1000  |
| 8          | 70                | 3250            | 3750          | 500             | 3500          | 40           | 750     | 51          | 3794        | 74            | 5.74              |   |
| 9          | 95                | 3250            | 3750          | 500             | 3500          | 29           | 1034    | 52          | 3859        | 101           | 5.83              | 3/5 confidence  |
| 10         | 120               | 3250            | 3750          | 500             | 3500          | 30           | 1000    | 52          | 3859        | 127           | 4.46              | VSI 1050  |
| 11         | 140               | 3250            | 3750          | 500             | 3500          | 39           | 769     | 52          | 3859        | 148           | 2.94              |   |

airspeed calibration information (from our airspeed calibration flight tests), we converted the observed airspeed to indicated airspeed and then to calibrated airspeed. Then we used one of those painfully long equations to convert calibrated airspeed to true airspeed, but you can perform this calculation using a flight computer, conversion chart, that same long equation, or any method you like—the answers will be the same. We omitted the conversion from calibrated airspeed to equivalent airspeed, because the testing was conducted at a slow enough airspeed, and our test altitudes were low enough to disregard this conversion. Generally speaking, you can assume equivalent and true airspeeds are the same when flying slower than approximately 200 knots calibrated airspeed and below approximately 10,000 feet pressure altitude.

We now have the true airspeed and climb rate for each sawtooth climb. Figure 2 shows the relationship between these two speeds and the associated climb angle,  $\gamma$ . Notice that the longer the rate of climb arrow in relation to the true airspeed arrow, the steeper the flight path angle will be. Another way to say this is the steepest flight path angle occurs when the ratio of climb rate to true airspeed is the maximum attainable.

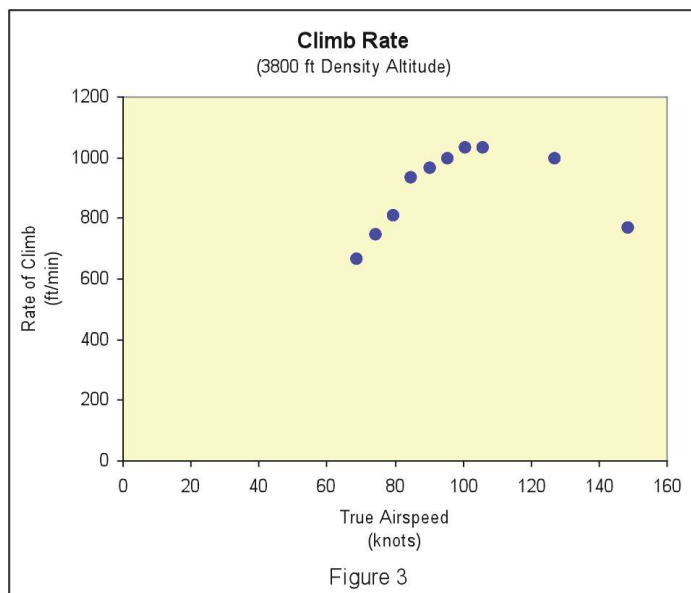
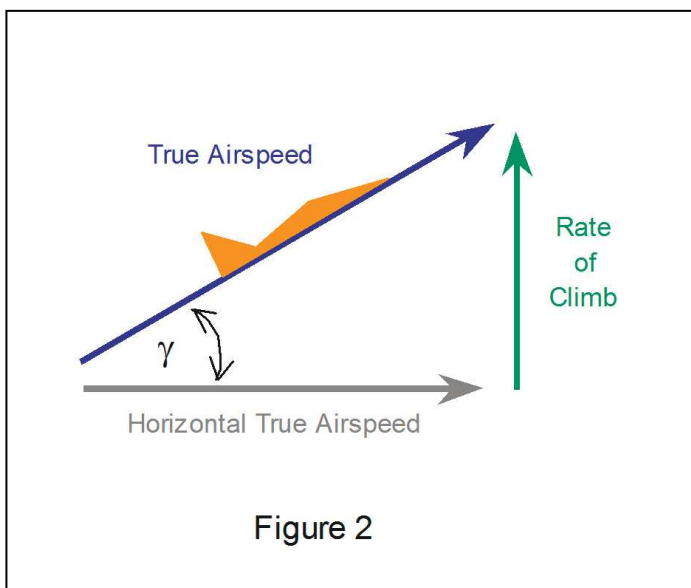
During the  $V_y$  data reduction, we created a plot of climb rate versus *observed* airspeed. This time we plotted climb rate versus *true* airspeed. Using observed or calibrated airspeed for this plot won't work; it must be true airspeed, as shown in Figure 3. Notice also that the origin of both axes in Figure 3 is zero and the scales are linear (i.e., same distance between 20 and 40 knots as between 80 and 100 knots). These are more must-haves for this method to work.

We then faired a curve through the data points in Figure 3, then removed the individual data points to come up with Figure 4. Failing a curve fills in the missing data and makes the next step easier. We drew a straight line from the origin (zero airspeed, zero climb rate) to the curve so it just touches the curve without passing through it. This tangent line from the origin to the curve touches the curve directly above the  $V_x$  (in true airspeed) and directly to the right of the  $V_x$  climb rate. This tangent-to-the-curve relationship provides the most vertical speed for the least flight path speed, maximizing the climb-rate-to-true-airspeed ratio, or  $V_x$ .

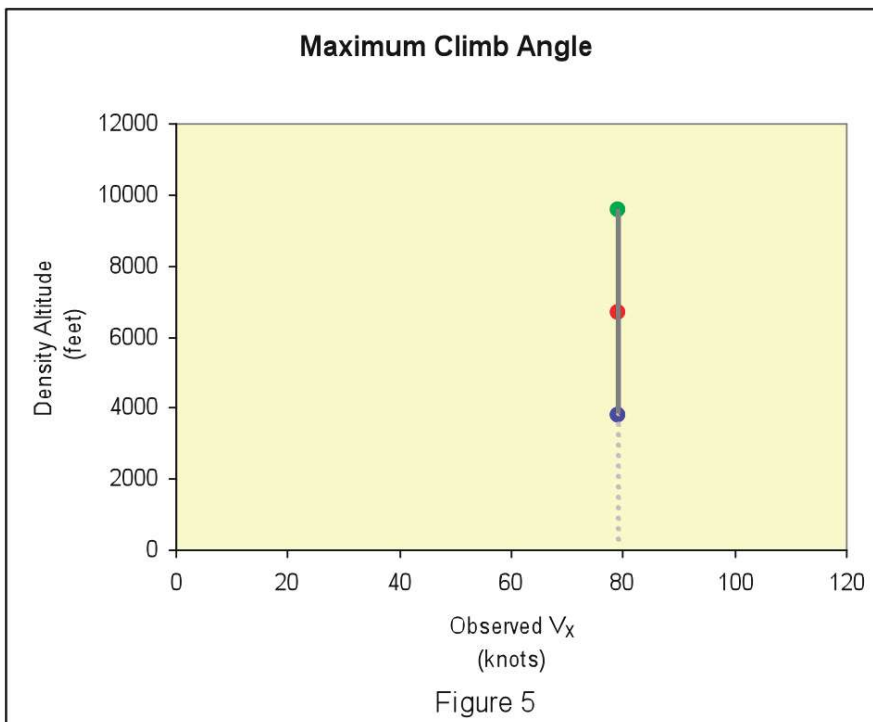
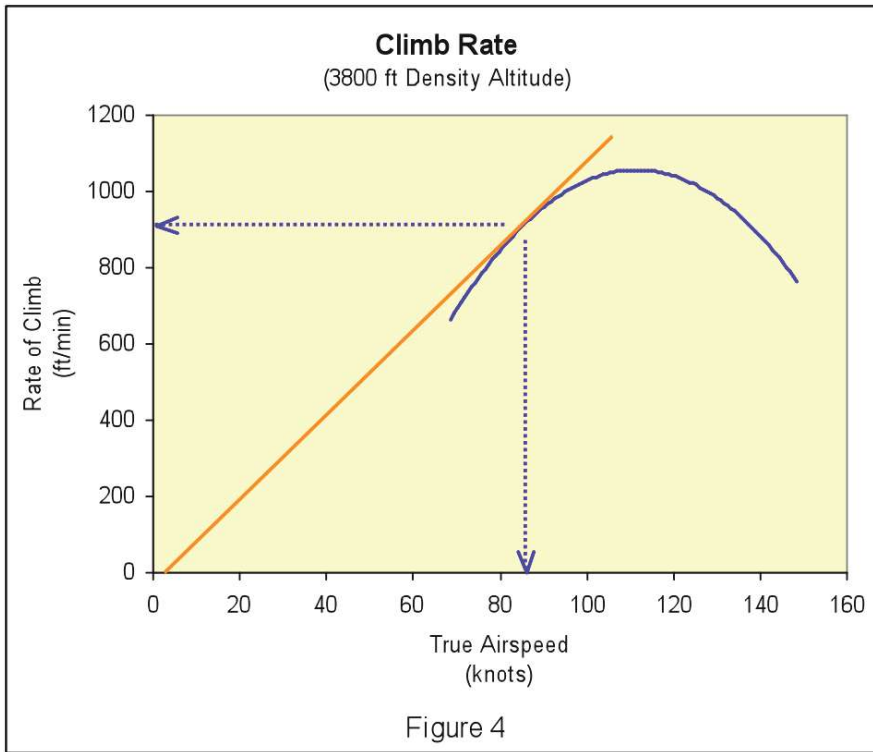
Okay, so we now have  $V_x$  for 3,800 feet density altitude. If we were to perform the same graphical solution for our climb data from 6,700 and 9,600 feet, we'd have  $V_x$  for three different altitudes. Plotting each of these  $V_x$  speeds versus density altitude, we could fair a curve through the

points and fill in the  $V_x$  for the altitudes between the tested altitudes. We did this, and the result is Figure 5.

Notice that we plotted  $V_x$  in observed airspeed instead of true airspeed in Figure 5. While true airspeed was needed for the graphical solution to work, we used observed airspeed here, because this is what we'll see on the airspeed indicator—much handier. We simply converted the  $V_x$  in true airspeed to calibrated airspeed, then used the results of our airspeed calibration flight testing to come up with the corresponding observed airspeed, then plotted the points. We've shown the line extrapolated to zero density altitude, but as we cautioned last month, this is a bit of a stretch. Another sawtooth climb test through a 1,500-foot







density altitude should supply enough confidence to extrapolate this line to zero.

Speaking of errors, our data show a single  $V_x$  observed airspeed for all three tested altitudes. In theory,  $V_x$  should increase about one-half percent for each 1,000 feet of altitude. There's 5,900 feet between our lowest and highest test altitudes, so a  $V_x$  of 79 knots at 3,800 feet would imply a theoretical  $V_x$  of  $(79 + 0.005 \times 79 \times 5800/1000 =)$  81 knots at 9,600 feet. To see whether this two-knot discrepancy matters, we took another look at the data from the 6,700- and 9,600-foot tests. Here's where that flight path angle column on the worksheet comes in. For all three tested altitudes, flying up to 5 knots slower or faster than the  $V_x$  for that altitude results in less than one-quarter of a degree climb angle penalty. At 3,800 feet density altitude, that one-quarter degree translates to 22 feet additional distance needed to clear a 50-foot obstacle. At 9,600 feet density altitude, it's 20 additional feet.

So what should you do with this information? Well, you could repeat the entire test series and data reduction. You could review your test cards to see if you included data you shouldn't have or omitted data you should have included. You could scrutinize your original data reduction, searching for errors. Or you could accept the fact that your  $V_x$  results may be off by a couple of knots between zero and 10,000 feet. Considering we're talking about a distance penalty of a little more than the length of the typical airplane and that it should only take 428 feet (638 at 9,600 feet density altitude) of no-wind horizontal distance (after take-off and accelerating to  $V_x$ ) to clear that 50-foot obstacle, you might just accept the results and enjoy the fact you won't have to memorize different  $V_x$  for different altitudes. We think that last option sounds pretty good, but we'll spot-check by repeating a few climbs, anyway.

That about does it for the climb performance. Next time we're going to take a break from the "how" stuff and talk about a few aviation "whys." Stay tuned. *EAA*

# How-to Resources, Homebuilt Results.



## *Caught the homebuilding bug?*

Let us help you get started! Design and build your own aircraft with the help of EAA's how-to manuals and DVDs!

## *Ready to fly your new homebuilt?*

Pick up your Amateur Built Certification Kit today. To order, visit **ShopEAA.com** or call toll-free, 800-564-6322.



Take advantage of EAA's regional SportAir Workshops and weekly webinars **all year round** for additional how-to expertise. Visit **SportAir.com/schedule** or **EAA.org/webinars** for more information.





# Get hands-on.

Get the skills you need from the experts you trust.  
For workshop dates, locations and costs,  
visit **SportAir.org** or call 1-800-967-5746.



SportAir  
Workshops