

IMPRACTICAL M♠GIC

This Junior Ace revives history.

BY GREG LASLO





THE AIRPORT LINE GUYS had to know: “What year is this airplane?”

“An ’08,” owner/builder Tim Gallagher replied, having a little fun. He explains that he didn’t want to tell them it was new, “...but I didn’t want to tell them it was certificated in 2008, so I just figured I’d say ’08 and see what they thought.”

“They had airplanes like that in 1908?” came the line guys’ astonished reply.

That’s exactly the appeal Tim was going for with his Rotec R2800-powered Pober Junior Ace. By all accounts, he hit the nail on the head.

In 15 years of dreaming, building, and now flying, Tim has combined the romance of bygone barnstormers with modern conveniences. By doing so, he has created an airplane that’s popular not only with folks on the ground but also with pilots in the air.

“It just looks old,” he says.

DREAMING BY DESIGN

For a guy who flies for a living, having his own airplane somehow didn’t seem practical. Sure, he’d always dreamed about having a little taildragger he could park in his backyard, but on paper that didn’t make much sense. But this story isn’t about practical; it’s about getting the gumption to build—and finding an airplane to fall in love with.



Comparison of the Baby Ace cowl (left), and the rounded nose Tim Gallagher designed for his radial engine.

Homebuilding is practically in Tim’s genes; his dad, Marty, was a longtime volunteer at the EAA Aeroplane Factory during AirVenture, and an occasional builder of a Pietenpol of his own. “I always had the assumption that I would do it [build an airplane], but it took many years before I got my courage up,” Tim says.

Turns out, Dad gave him a push. In 1995, Tim was a low-seniority airline pilot, and he couldn’t afford a kit; if he were to build, it would have to be from plans. While solving the world’s problems one night around an Oshkosh campfire, Marty figured out exactly what kind of airplane his son needed: a Pober Junior Ace. When Tim asked, “A what?” they went to look at one, and Tim found an airplane that was exactly what he wanted. “I’d never flown in an open-cockpit airplane, so if I was going to have something as impractical as an airplane, I might as well go totally impractical and have an open cockpit,” he says. Tim liked the fact there aren’t many Junior Aces around. “I thought I would make it unique,” he adds. “I like the roominess in the cockpit and the fact that I have more control over sizing this than a Cub.”

Marty bought his son a plans set on the spot, and Tim started “paying as he played.” When he had spare funds, he’d order another \$500 worth of spruce or steel, and he’d be set for another six months. He did that for 13 years, and until he bought the engine, the radios, and the final touches that brought his total investment to about \$40,000.

Along the way, he gained seniority at the airline. He replaced his small house, where he made lots of little parts, with a big house on the Bel Air Estates airpark at Illinois’ Poplar Grove Airport (C77), where he could make big parts. With that house came a hangar right outside his kitchen door and a group of neighbors building projects of their own—new friends who would be indispensable to completing the airplane.

Still, the airplane progressed in fits and starts, and it sat idle for more than half of its building life. Along the way, the airplane suffered some mission creep: first came the decision to go with the radial engine, which required an electrical system, and then radios, a transponder, and then lights, because, well, he already had the power. In the end, he figured the plane would get done when it got done.

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Not that the time was wasted; the airplane was evolving, one stay in a strange hotel room at a time. Problem-solving epiphanies would hit him in the middle of the night: "Hey, I know how to do that now," he'd wake up saying.

REWRITING HISTORY

Eventually, Tim ran out of problems to solve. The airplane had finally come together; it was done.

Tim calls it a Gallagher Junior Ace. In building the airplane, he kept some components from the Pober plans, added others from the original Corben Ace, and came up with some of his own to make a unique aircraft that appears to step back in time while still wearing modern, comfortable shoes.

"Paul [Poberezny] kind of modernized the Junior Ace by putting a modern flat engine on it and 6.00-by-6 wheels," Tim says. "And I just reversed the trend a little

bit, but I still wanted it to be a plane you could use any day—something that, if someone has a tailwheel endorsement, they can just jump into this thing, flip a couple of switches, and go out and have some fun."

That retro look is most noticeable because of the Rotec R2800 round engine (a few Corbens had radials) and the big wheels (ditto), as well as the leather-wrapped coaming and oversized N numbers. The airplane was to have a Continental O-200 powerplant, but when Tim saw the Rotec, he thought, "If I could afford that, I'd really love to do it."

That inspired a fuselage redesign, at least up front. The Pober plans flatten out the nose for the Continental, but that would look odd with the Rotec, so Tim rounded it. "I love the collector ring on it, so I patterned the accessory bulkhead to fit just inside of that," he says. "I ran the profile on it straight across the top and modified the

INSTALLING a ROTEC R2800

It's a lot easier to add a Rotec R2800 radial engine during initial construction than to retrofit a complete airplane, says builder Tim Gallagher, especially considering the accessories it requires. Because a radial engine mount isn't premade to fit a Junior Ace, Tim had to scratchbuild one himself. He tackled that project after the entire airframe was together but uncovered, so he could fiddle with weight and balance. "I knew what the airframe weighed, and I knew what the engine weighed," he says. "It was a simple weight, arm, and moment thing to figure out where the engine went."

That turned out to be 16 inches from the firewall. He tack-welded the mount together and added diagonal structures. When he was sure it was strong enough, he hung the engine.

Rotec specifies that the 8-quart oil tank be positioned high on the firewall. Eight 5/8-inch lines connect the tank, oil filter assembly, engine, and breather. The filter assembly is handy, Tim says. Mounted vertically on the bottom of the engine, it—plus a quick drain on the tank and a plug on the sump—makes an oil change a five-minute job.

Next, he installed the fuel lines and electrical wiring. Fuel lines run straight into the Bing carb, which is basically what's on a BMW motorcycle. "The only problem I had was getting the ignition to work," Tim says. "I finally traced it down to a bad ground wire."





firewall to kind of start rounding it out a little, so that it's eventually totally round as it got to the front of the engine cowling."

The big wheels started as a gift to his father. Years ago, he took drawings of the Pietenpol to a friend who owns a machine shop, and then he presented those custom-turned hubs to his dad, who returned them to Tim 15 years later. Tim paired them with 18-inch motorcycle rims, found the fattest stainless steel spokes he could and the oldest-looking motorcycle tires, and added Tracy O'Brien aircraft brakes.

Other changes to the design are less visible. Tim added a trim tab on the advice of a builder who took him for a demo flight. He stretched the cockpit and dropped the seat a couple of inches, "so I could get my frame into its airframe," he says.

He also moved the fuel tanks outboard a couple of bays. That would move the drain away from right over his head and also allow him to run the fuel lines out the side of the tanks, instead of out the bottom. Those lines run between the wings and along the left sides of the cabane struts; similarly, empty fuel lines descend from the other side to serve as electrical conduit. But don't look for either. He wrapped the lines and cabanes with 2-inch finish tape; not only does that keep things tidy, but also it adds to the vintage look.

On the inside, Tim hid control cables, bell cranks, floor stringers, and other miscellany under wood floorboards—not only for appearance but also for safety. That setup keeps him from tangling his size 14 feet in the controls. He also bent new control sticks, installed screw-off aluminum floor panels so

BUILDING an E-LSA JUNIOR ACE

For pilots looking for an experimental light-sport aircraft (E-LSA) project, a Junior Ace like Tim's is a possibility—well, not exactly like Tim's, but an open-cockpit adventure machine, all the same. "The Junior Ace is right on the border of meeting LSA requirements," says Joe Norris, EAA's homebuilders' community manager. "If you limit it to 1,320 pounds on the gross weight [the maximum for an LSA], you've got to have an empty weight around 800 pounds at the most. With a Junior Ace being about the same size of a J-3 Cub, you ought to be able to get one down to around 800 pounds when it's empty—if you're careful about not adding weight when building."

Joe says there are little things you can do. For example, consider foregoing an electrical system; a battery, starter, radios, and other components add weight quickly. You'll also want just one fuel tank, basic visual flight rules instruments required by 91.205(b), and a light engine, perhaps a small Continental. Leave off the wheelpants and go light on the paint, and you'll get an airplane that will still carry two people and full fuel.

Your airplane may not perform exactly like Tim's Junior Ace, but in this case, the E-LSA certification is about compromises that ensure you're able to fly as a sport pilot. If you're willing to live with that, this kind of wind-in-your-hair flying might just be right for you.

CARE & FEEDING of a ROTEC

A radial adds a step to Tim's preflight: He pulls the propeller backward through three rotations to free the engine from hydraulic lock. (*Hydrolock is common on the lower cylinders when a radial engine sits for a long time. The typical cause is oil that drains down through the push rod shroud tubes, fills the rocker covers, and then seeps up through the valve guides into the intake and exhaust ports. If enough oil enters the combustion chamber, the cylinder can fill to the point where hydrolock occurs. To prevent engine damage, it is universal practice to check for hydrolock during pre-flight inspection, typically by hand-cranking the propeller for several turns to make sure the crankshaft cycles normally through all cylinders.*)

The Rotec has a magneto on the right side and electronic ignition on the left. On preflight, clicking between them is smooth, without an rpm drop. Likewise, a tick on the voltmeter is the only sign the carburetor heat works; by design, the two 30-watt elements could run continuously without affecting performance, but Tim turns them on only for arrival.

He changes the oil every 25 hours using motorcycle oil, which contains an additive to lubricate the accessory gears and gear-reduction mechanisms, and a car oil filter. The Rotec uses 14 motorcycle spark plugs, and, should he need a new starter or alternator, he can get those at an auto parts store, too. He burns 100LL avgas but could use mogas if he had a 98-octane supply.

Rotec recommends checking the gap on the mechanical lifters every 25 hours, which requires Tim to pull all 14 valve covers (though that may eventually become every 100 hours). Meanwhile, he'll check compression every 100 hours until the engine reaches its 1,000-hour time between overhauls.



he can get to anything he needs to, added an elevator-trim wheel, and hid antennas, antenna wires, and fuel lines behind a finished, fabric-covered, interior. "It's just a little overkill in the building process that makes the day-to-day operations a little bit easier," he says. "And taking the extra time and doing those little tweaks to it makes you feel a little more part of the finished product when you're done."

'PERFECT FLIER'

Tim is well aware that the airplane isn't perfect; there's some grizzled fabric and a few runs of Randolph polyurethane paint on one of the doors that he had to sand out and repaint, which marred the finish. His neighbor countered his frustration by asking if he was building a museum piece or a flying airplane. That advice was just as valuable as the tools, expertise, and other assistance he received from his fellow EAA Chapter 1414 members.

It was time to fly. He finished it on June 21, 2008, and its first two flights are posted

for 21st century posterity on YouTube.

And, boy, did it ever fly; "like a Cub on steroids," Tim says, adding that the visceral experience is about the same as flying a Cub with the doors and windows open, and they both land at about the same rate. The only difference is when he gooses the 110-hp Rotec to turn the 76-by-50 prop. "You push the power up on this engine, and it's like having two 65s [horsepower engines]," he says. "Being seven cylinders, and with the torque profile, and the three-to-two gear reduction, the thing is just up and going now. It has no problems spinning [the prop]. It's a neat design."

It's doubly exciting because he gets to share that experience with the builders who helped him out along the way, both by giving them rides and letting them fly the airplane. He's thankful for the neighbor who made the seats and taught him to wrap the coaming, for the guy who had the miscellaneous bolts and fittings he needed, the neighbor with the paint booth, the

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The BEST and WORST of TIMES

Tim had just learned that his Junior Ace had won the Bronze Lindy for plans-built aircraft at AirVenture Oshkosh 2009, and he was ready to head for home. The winds were a little gusty for takeoff on Runway 18, but he had flown the airplane enough to feel confident in direct crosswinds approaching 15 knots.

With his son, Matthew, a student pilot, in the left seat, Tim powered up for takeoff and danced on the pedals to keep the aircraft straight.

During the last stages of construction, he considered installing finger straps—reinforcing metal collars—onto the rudder pedals, one of the first parts he'd assembled after learning to weld. In fact, he'd done it to the left-side pedals, but, itching to fly, he passed on the right. "Well, the right rudder pedal on the right set of pedals had a couple of little cold areas in it," he says. With the pressure from the takeoff roll, the pedal snapped off at its base.

The right wing smacked on the ground, and the aircraft spun around and came to rest with the left wing jutting up in the air. The ground loop was the first time he'd dinged an airplane in his career, and he'd done it in front of thousands of people waiting for the start of the air show.

In a few hundred feet, it'd become the worst of times. He trucked the damaged airplane home and locked it up in the hangar.

"I had some of the hallowed ground from Oshkosh shoved into the wing for three or four months," he says. "I finally started cutting some of the fabric away to see what kind of damage I'd done to the wing and pulled off some of the broken sticks. It was slow—and kind of therapeutic."

The examination revealed that he'd have to splice about 9 feet of spar onto the right wing and replace nine tubes in the right front fuselage area. The skid pulled 20 of the 36 spoke nipples out of the right wheel, and the impact bent part of the right-side fuselage and caught the tip of the elevator. "The integrity of the fuselage and wing really absorbed all the impact," he says, sparing both Gallaghers serious injury.

With damage assessment in hand, he's putting the airplane back together, and he figures he'll have a better airplane for the experience. He's replacing the original 1.75-inch steel wheels with 2.5-inch aluminum ones to allow for better side loads, and as he fixes the damaged elevator, he'll be able to put on a second trim tab to correct stick pressures at cruise speeds. "I didn't have troubles with the right wing," he says. "I can't understand why I broke that."

At the rate he's going, he should have it flying again by early June. "I've still got a pretty good list of people that I still need to give rides to, so there's going to be a lot of payback there," he says. "But that's good payback." Good, indeed.



GALLAGHER JUNIOR ACE: Performance Data

Certification: *Experimental*

Equipped for: *Day/night VFR*

Length: *20 feet, 4 inches*

Height: *7 feet, 4 inches*

Wingspan: *32 feet* • Wing area: *160 square feet*

Gross weight: *1,600 pounds*

Empty weight: *921 pounds*

Wing loading: *10 pounds/square foot*

Fuel capacity: *34 gallons*

Fuel consumption: *at 55% power: 5.0 gph*

Range: *at 55% power: 500 miles*

Powerplant: *Rotec R2800* • Horsepower: *110*

Propeller: *76-by-50 wood Culver*

Maximum speed: *105 mph, V_{NE} 120 mph*

aircraft-covering expert, and the one with the English wheel. And, especially, his wife, Suzie, and daughter, Stephanie, who provided years of support.

"Being able to repay all the favors that were given to me over the years is rewarding," he says. The funny thing is, he knows they did him a favor, but they seem to think he's doing them one by letting them fly the machine. They come back with a big grin on their face and ask when they can go again.

He understands. "It's a hoot to fly around in," he says. "It's very stable, and you can fly around and look outside and never really think about the airplane. It takes care of itself."

The airplane has nearly 99 hours on it now, and it still turns heads, even

at an airport dotted with Stearmans, T-28s, and other assorted award winners. His neighbors spend the summer with their hangar doors open, on the watch for something interesting. "They hear the Junior Ace going by, and it sounds like a wide-open John Deere tractor, and [they] say, 'Oh, that's Tim,'" he says. "That Rotec has such a distinctive sound."

It's a dream come true, for sure. "It just looks like it's beating the heck out of the air, beating the heck out of bugs and stuff," he says. "It just looks right out there on the grass." *EAA*

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