

I Love My Sonex

I have been flying my tailwheel Sonex now for nearly 11 years, and have 650 hours on the airframe. Less on the engine (more on that later). I rented aircraft for 10+ years, and realized I could not afford to keep flying at \$150/hr (of course it's even more now!). Plus, I could never get an airplane on short notice, and when I wanted it, for how long I wanted it. A homebuilt seemed the only way to go. I spent a year researching aircraft, and the Sonex seemed the most affordable, especially since it could be scratch built from plans. It was also capable of aerobatics. It wasn't the sexiest airframe out there, but it grew on me over time. Now I think it's pretty sleek, with a lot of personality. Kids think it's pretty cool!



I scratch built because I didn't have the money to buy a kit at the time. I spent a total of \$28,000 (in 2014 dollars), including everything from airframe, to engine (AeroVee 2.1), to avionics, to paint. Well, there's not much paint; it's mostly polished (a fully painted Sonex can be as much as 25 pounds heavier). I built everything except the welded parts, fiberglass, fuel tank and canopy, which I got from Sonex. I spent 2,360 hours building, over 5 years and 3 months, with my first flight in June of 2014. I made sure my family (wife and young daughter) were the most important part of my life, so I only worked on the airplane weekday evenings from about 9pm to midnight or 1am. It helped that I was a night owl. You can't do a project like this without your family's support.

I have flown from Boston to Airventure and back 3 times. I spend more time doing aerobatics than flying for 100 dollar hamburgers. I fly EAA Young Eagles every month from April through October. I fly when I want, on my terms (well, OK, often on Mother Nature's terms).

I am also elbow deep into building an RV-7. My wife wanted faster, more room, and more baggage area (including room for our dog). But doing so has made me reflect more and more on my Sonex, to the point I really felt I wanted to write down what this airplane has meant to me, and what an unmatched dollar-for-dollar value it is. No, Sonex did not ask me to write this, or have any input, so these are my unvarnished thoughts.

The RV-7 is going to be a fantastic airplane. It will have more panel space, have a modern autopilot, go a lot faster, carry a lot more, and be capable of inverted flight. It won't be weight-challenged like my Sonex, so my wife will get to fly with me more often. But I would not be

where I am now, if it hadn't been for the Sonex. There is nothing I regret about my Sonex, and I would not trade the last 16 years with it for anything!

Tailwheel:

For a tailwheel, it's very forgiving, due to the direct-link pushrod between the rudder horn and the tailwheel. But it's still a tailwheel, and the back wheel has very little surface area, so you still have to treat it with respect. Incidentally, never, ever use the original 4" Sonex tailwheel; it's too small. I have the same 6" Vans tailwheel on my Sonex, that I will have on the RV-7. I had no previous tailwheel experience, so I had to get trained and signed off before I could even fly mine. I flew a Citabria and a Cub for that. I have to admit, for 10 hours I really felt like I was never going to figure out how to land. I was not a natural for a tailwheel. I felt like giving up. But at around 11 hours it finally began to click, and by 12 hours I was signed off! Now I have more time in tailwheel aircraft than tricycle gear. The direct-link tailwheel on the Sonex almost makes it like a nose-dragger with the tailwheel on the pavement. Almost; it's still a tail dragger.

Aerobatics:

Note: ALWAYS get aerobatic training before trying them on your own. The Sonex is only rated for aerobatics at 950 lbs, so you're by yourself without the benefit of an experienced person in the right seat. I regularly do loops, rolls (including 4-point hesitation rolls), spins (I've done as many as 7 revolutions), reverse Cuban eights and hammerheads. The hammerheads are the only one of those where there is enough zero g's turning at the top, where the engine will hiccup. 3.5 G's are average for maneuvers requiring a hard pull, like loops, and 4.5 G's is usually my max. I think 5 G's is the most I've pulled in the Sonex, but that's not normal. The roll rate is nothing to write home about (I do not have the acro ailerons), but who cares? It's fun anyway! For me, this has turned out to be my favorite part of flying the Sonex. If you like getting upside down, there aren't many other aircraft out there that can check that box, for so little cost.

Maintenance & Repairs:

THIS is probably the best part of building your own EAB aircraft. Having built the Sonex, I have the Repairman's Certificate, so I can do the annual condition inspections. Anyone can make parts and fully maintain an EAB, but only the original builder or an A&P can sign off the annual condition inspection. My inspection this year took 5 days to get through the checklists, and fix the discrepancies, which were:

- Replace worn rod end bearing at tailwheel.
- Repair trim cable housing where it exits the tail. The fairing was starting to wear through the outer vinyl housing. I un-riveted the fairing, repaired the housing, added a protective aluminum "shroud" between the fairing and the housing, and riveted the fairing back in place.
- Earlier this year I replaced the master switch and the wire feeding it. The new wire was not fully secured, so I re-routed it and bundled it with other wires.
- The right wing has always been a little "heavy," so I took the opportunity to adjust the rod end bearing to the right aileron.
- One of the Camloc female studs in the front of the cowl went missing. I installed a new one and epoxied it in place.
- Replaced all the spark plugs.
- The right tire was worn, so I replaced it with a new tube and tire.

- The rest was straight forward inspection, adjusting and lubrication.

If you are at all familiar with annual inspections for certificated aircraft, you'll know that between parts and labor, and sometimes 2 months of down time, you might be into it for several (or more) thousands of dollars. Mine cost me about \$65 in parts, and around 25 hours of my time.

Several years ago I damaged my right aileron, and needed to make a new one. I pulled out the plans, ordered some aluminum and parts from Aircraft Spruce and Sonex, and had a new one built and installed in a week. I think I spent around \$120.

With 3 years on my AeroVee, I got caught in swirling, gusty winds while taxiing. The tail was lifted and the prop smashed itself on the ground before the tail settled back down. This happened on Nantucket Island (access by ferry, only)! That weekend I brought my station wagon over on the ferry, with my portable engine hoist (made of 2x lumber), and a friend. We drained the oil, removed the engine and took it back home. Once I received a new crank, bearings and prop hub from Sonex, I took the engine apart in 2 evenings. I put it back together in 2 more evenings. I then took it, and a loaner prop from another Sonex owner, back to the island in the station wagon, reinstalled it, added oil, did some ground test runs, made a few adjustments and tweaks, made a test run around the airport pattern, then flew it home. Not including the prop, I spend around \$500 in parts. The funny thing was that the insurance company paid ME for my time being the mechanic, to do the repairs!

AeroVee 2.1

This engine only comes as a kit. There is no pre-assembled option. To some this is a negative. But it really isn't at all. That makes it very inexpensive. And after building it myself, I know the engine inside and out, which makes it much easier to maintain and to troubleshoot. It's also an incredibly simple engine. There is zero complexity. What you see is what you get. The down side is it is only 80 hp. So you have to know that going in. If you build a 700-750 pound Sonex (mine is 655 pounds empty) full of every "upgrade" and "option" to make it a Lexus instead of a Chevy, and then expect it to perform like climb at 1,000 ft/minute on a hot day with 2 people inside, then you will be sorely disappointed (and unsafe). And it will be your fault, and not that of the airframe or the engine. It was not designed to do that, and so you should not expect it to do that. If you have the finances to do it, put in a Jabiru 3300, or a Rotax. But then you're going to about triple the cost of the engine. If you go with the AeroVee, it's an exceptionally good engine. But you have to know its limits, live with them, and not complain. You also can't build a 700+ pound airframe and expect to be happy. If you are going with the AeroVee, build LIGHT, and you will be much happier.

Honestly, a VW engine is a tinkerer's engine. I spend time throughout the year tweaking, fiddling and chasing down little bits of this and that. Nothing major. It's just a "loose" tolerance engine with solid lifters. It leaks oil (VW aficionados say it doesn't leak, it just marks its territory). You just can't stop that. It's usually from one or more of the pushrod tubes. But there are lots of other little areas like the prop hub and the oil sump, where oil just seems to get by. Just minimize it, embrace it, put a piece of cardboard under the cowl, and move on. If you spend all your time chasing oil drips you will drive yourself nuts.

As for longevity, let me be honest about my own experiences. After I rebuilt the engine from the prop strike, I put another 450 hours on it. I always get oil analysis done when I do my oil changes, and I started to see a trend with metals that indicated an issue with the crank and bearings. It got to a point where I had to ground the engine and open it back up. I removed it in one afternoon. I cleaned up the parts and inspected everything. The forward most bearing had worn away a good bit of the crank. The bearings were actually in pretty good condition, and all the other journals on the crank were fine. I surmised that doing a lot of aerobatics put a lot of stresses on that front bearing, and made it wear quicker. I don't know if that's true, but that's what I was thinking. So I bought a new crank and bearings. The cylinders and pistons were still in serviceable condition, but I decided to replace them anyway, figuring I'd get at least another 600 hours out of them. They aren't expensive. I spent a total of \$1,850 for all the new parts, and once assembled, I have a nearly a zero-time engine (the cam and heads were fine, so I did not replace them). So should I have expected more time on the engine before having to do all this? Maybe. I'm not sure how many others do as much aerobatics as I do in mine, so there's that. But all in all my down time was relatively short, and if you spread my cost over 7 years, I would have had to "reserve" \$264/year or \$22/month for this "rebuilt" engine. Try that with a certificated engine! Or even a Jabiru or Rotax.

So if you set reasonable expectations for your AeroVee, it's a wonderful, resilient, simple and reliable engine. You'll get your hands dirty throughout the year. But is that such a bad thing?

AeroInjector (slide-body carb):

The AeroInjector often gets a bad rap. I spent a month or so dialing it in, initially, and I have not touched it again in 10 years. Those who have not had good experiences, I think don't understand the unit very well, and have not spent the time to do so. And those trying to force cold air into it are also needlessly complicating things. With the AeroInjector sucking air from inside the cowl, you don't need carb heat. The air in there is already warm. Trying to force cold air into it runs the risk of some level of icing, even though there is no venturi as in a traditional carburetor. There is NOTHING to service or rebuild in an AeroInjector, and it is dirt simple. There are only 5 major parts to it, unlike a traditional carburetor. I have mine set up so that in the summer I have to lean it a good 1" to 1-1/2" to take off, otherwise it's too rich and hesitates. In the winter I can push it to full rich. This means I NEVER reset the AeroInjector based on season or conditions. Some people try to, and that's too much fiddling. Just get it right the first time, and leave it alone. You will probably need to try 2 or 3 needle sizes in your initial setups.

Sonex vs. Vans RV-7

Comparing the Sonex build to the RV-7 I can make a number of observations. On the RV-7 I've finished the tail feathers, the wings, and I'm building the fuselage.

- It's a great kit, but the instructions leave a lot to be desired, and the drawings are lacking key information.
- New Sonex builders complain that there is no builder's manual or instructions. Honestly, the Sonex plans are the best in the industry, and include all the information on each sheet, to tell you how to put it together. The Sonex plans are far better than the Vans instruction pages, and the drawings are also superior. The Sonex plans essentially tell you everything you need to know, self-contained, on any given sheet. The RV plans make you search high and low on multiple sheets to find a lot of information that "should" be

on the sheet you are working on. A tremendous amount of information is left out of the instructions, so it's very easy to miss some critical piece of information if you don't stumble upon it scanning the entire set of drawings.

- The pulled rivets of the Sonex make the construction very simple, and nearly all the riveting can be done with one person. On the RV, much of the bucked riveting can be done by one person, but there are a lot of places where you must have a second person.
- Setting bucked rivets takes practice. It also takes a lot of care not to dent the metal around each rivet. It's easy to do if the rivet gun is at a slight angle, or if the bucking bar slips on the back side. Or if the bucking bar is not on the intended rivet. Ask me how I know all this! Setting pulled rivets is super easy, and can be mastered in a few minutes.
- Drilling out bucked rivets without damaging the surrounding materials is also something of an art form, where drilling out pulled rivets is much simpler. It's hard to enlarge a hole when drilling out a pulled rivet. It's really easy to do with bucked rivets.
- With pulled rivets you can put pressure on the layers of aluminum to push them together before pulling the trigger. With bucked rivets there is only so much you can do to apply pressure with the rivet gun, so its easy to end up with a rivet that looks good, but when you look at the layers of aluminum, there may still be gaps between the metal, such that they do not make full contact. If that happens you have to drill out the rivet and try again. The problem is that there are a lot of places where it's impossible to get clamps in place to hold the layers together. Having a third hand is often needed; two to do the riveting, and one to press the layers of metal together to make full contact with one another. There is no particularly good solution.
- If the RV-7 had been my first aircraft build, I'm not sure I would have finished. It's not nearly as simple as the Sonex, and the frustration factor comes more often. The Sonex is an EXCELLENT first (if not your only) first aircraft build, that will not challenge you more than it should.
- Not having to build a leak-proof fuel tank for the Sonex (you have to build TWO for the RV) is a huge plus. The rotationally molded Sonex tank is stronger than a tank (no pun intended). Its weak point are the molded fittings, which are prone to leaking after a time, for no apparent reason. So there's that.

I'm excited about flying the completed RV. But the Sonex has been a wonderful airplane, keeping me happily and affordably in the air all these years. I knew its limits and so never complained about what it couldn't do. In the end, I HIGHLY RECOMMEND building a Sonex if it meets your mission requirements. It's also perhaps the best aircraft of its type out there, when it comes to being buildable by people who have little or no construction experience. Aluminum cuts with the same tools that cut wood, so there are very few special tools needed. If you don't know if you can actually build an airplane, check out the Sonex. **I'VE LOVED EVERY MINUTE OF BUILDING AND FLYING IT.**