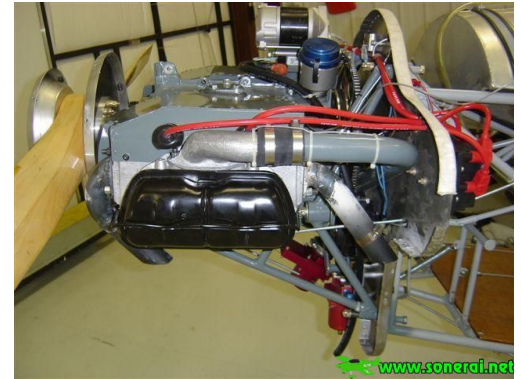


## Aerocarb Installation Tips

**Aerocarb Installation Tips**[Chad Stenson](#)

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First off, here's a little history on my installation. I owned a Sonerai ILS with a custom rear drive VW engine. Anyone familiar with the Sonerai II design is aware of the lack of space available inside the cowling for anything. The installation instructions for the Aerocarb state that the carb can be mounted in an updraft, sidedraft, or downdraft orientation. In a Sonerai, the carb needs to be mounted as an updraft or possibly a sidedraft setup. The intake manifold on a Sonerai comes down the firewall in either a 'Y' type or 'U' type manner. The Aerocarb measures about 10" in its long axis with the throttle closed and gets a little longer when it's open. This long axis is also the axis that the slide moves in. At one end is the fuel inlet. The other end is the end that moves in and out for throttle. This type of carb, whether an Aerocarb, Revflow, Posa, Super Posa, etc. has to be mounted in a way that the needle is in the same axis of the center of the engine. In other words, the needle needs to either move parallel to the crank, perpendicular to the crank or somewhere in between. The needle cannot be perpendicular to the centerline of the engine with the needle opening across the center of the engine. Does that make sense? Stay with me – this is going somewhere.



**DISCLAIMER:** Sonex, Aeroconversions, Aerovee or anyone else does not endorse this guide. This guide simply expresses my opinion and some of the techniques I used to get my Aerocarb to perform in what I consider to be a satisfactory manner. Follow this guide at your own risk. Be advised that this is a long and detailed read. This information won't apply to all installations. I am in no way saying the Aerocarb needs any of these mods or procedures to work properly. When properly installed per the installation instructions supplied with the carb, you should achieve acceptable results within the guidelines outlined.

If you have the carb layed over on its side, the fuel inlet will be on either the right or left side of the engine. The side with the fuel inlet will be favored with more fuel than the other side. This is because a slide type carburetor doesn't do a very good job of atomizing fuel, and essentially you get a "stream" of fuel running down one side of the manifold. If that fuel stream is in the center of the manifold, it won't favor one side over the other, and you get a more consistent fuel mixture from one side of the engine to the other.

Now back to the Sonerai. For reasons of convenience, I had the carb mounted across the firewall. This yielded a hard starting, poor running engine. The problem was really apparent in my recent flight to Oshkosh for Airventure. With the low throttle, slow flight that the Ripon/Fisk approach requires, the engine fought me to stay running the whole way in. Since the carb needed to be mounted with the long axis of the carb in the long axis of the fuselage (front to back), I needed to come up with some way to move the outlet of the carb forward or it physically wouldn't fit. I could have mounted the carb at about a 45-degree angle, but I had no way of getting the throttle cable to the carb since it would have needed to come from under the firewall. This is not possible without making holes in the cowling and making some goofy brackets to hold the cable. My solution was to make an 'S' piece for the intake manifold to move the carb forward while keeping the carb basically parallel to the bottom of the engine. I say basically because the carb is in fact tilted towards the front ever so slightly. So that took care of the mounting problems and cabling issues.

My Aerocarb has about 15 hours of runtime on it. Some of that time was on a Type 4 engine that used to be in my plane. The carb was mounted across the bottom of the engine and performed ok but not right. I had trouble with midrange tuning. I could get it to idle and run at WOT, but I'd have to really mess with the mixture control to get it to run ok at part throttle. This was due to mounting the carb across the engine instead of inline with the engine.

Fast-forward to the birth of the Type 1 rear drive engine setup that I'm running now. The carb has had sticking throttle moments, which are not all that uncommon from what I've read on the internet and even in Aeroconversions' Service Bulletin section on its website. Aeroconversions has addressed the issue and seems to have a good solution, but some guys still have some trouble every now and then.

My other issue was that the carb leaked fuel all over the place. It would leak from the seam between the air inlet bell and the carb body as well as from the throat of the carb. I spoke to a Sonex representative at Airventure this year, and he told me that they have not had any documented leaks like I described, but he was willing to help if I could supply pictures of my installation. I decided to take a serious look at my installation and make improvements on my own. So...

### **Disassembly and inspection**

I spent 3 hours massaging my Aerocarb earlier this week. I found lots of problems, many of which could have very well been my fault. I took the carb completely apart. Before I took it apart, I noted that the slide moved in and out OK, but it seemed like there were some sticky spots. Upon removing the 6 screws that hold the carb together, I was surprised to see that that black plastic (Delron) spacer that goes between the carb body and the cover plate was severely scratched. It looked as though someone had rubbed it on a brick. This clearly was from debris getting stuck between the slide and the Delron spacer. I don't think this damage was done from normal "dirt" in the air, but possibly from larger pieces of debris (possibly fiberglass dust or aluminum shavings?). I do not run an air filter on my engine, but that may change after my recent findings.

Jet needle and fuel orifice

After cleaning everything thoroughly, I decided to smooth all moving parts and surfaces up with 1000-grit wet/dry sandpaper. The slide itself had some marks on both sides as well as the edges that run inside the carb body. The slide was polished with my 1000-grit sandpaper and cleaned up.

So with that aside, I shifted focus to the jet needle. This is simply a 1/8" piece of brass bar with a taper machined into it and a setscrew relief at one end. Stupid simple, but effective in theory and application. I tried to move the needle in and out of the fuel orifice and noted that it didn't slide in and out very smoothly. The edges of the needle had very small "nicks" in them. I compared this needle to the other 2 needles that came with my carb and they all had these marks. Possibly from handling? I don't know. I took my 1000-grit sandpaper and polished the needle. It doesn't take much force or very much time to get good results. My needle appeared almost shiny when I was done and I removed virtually no material from the needle.

The needle still didn't move freely in and out of the orifice. I measured the orifice and it measured about 1/8" (makes sense, doesn't it?) I took a .126" ream to the orifice a few times and that made a huge improvement on the movement of the needle. I fitted the needle into the needle holder (blue aluminum piece with the adjustment screw at one end) and then reinstalled the assembly into the slide. With the needle in the slide, the slide still didn't move in and out freely. I took the needle out of the holder and rotated it 180 degrees, and used the setscrew location on the other side of the holder. Everything was reassembled again, and now the slide moves in and out very freely without any sticky spots. Maybe the holder is not 100% symmetrical? I don't know; I just know that turning the needle around in the holder made it work smoothly. NOTE: The flat surface of the needle MUST face the intake manifold side of the carb when installed, or it will not work properly and your engine will not run very well (ask me how I know). The fuel orifice in my carb stuck out very slightly, so I sanded the orifice flush to the carb body. I doubt this made any difference in anything, but I don't think it hurt anything, either. It just made me feel better about it..

### **Carb body and bells**

Next up was the plastic (Delron) piece that goes between the slide and the aluminum cover plate. Mine was very scored and rough from debris getting lodged inside. Using 1000-grit sandpaper again made an improvement. I'm going to look for some Teflon sheet and make my own spacer. The Delron material seems to get damaged very easily and I think Teflon may be a more slippery and scratch-resistant material. I put a piece of 1000-grit sandpaper on a piece of glass and sanded the cover plate to ensure that it was

flat. For final reassembly, I used a very light layer of RTV between the carb body and the plastic spacer. Next, I put the spacer on, then the outlet throat of the carb. The outlet has a sealing o-ring groove machined into it and the corresponding o-ring to make the seal.

The inlet side of the carb has the intake bell. The intake bell has no seal whatsoever to the carb body. I determined that this was where most, if not all, of my fuel leakage was coming from. Since there is no seal, it's simply metal on metal between the bell and the carb body. Any fuel dripping from the fuel orifice would simply leak past this metal on metal seal and give the appearance of a carb that was leaking where it shouldn't be leaking. I took 1000-grit to the sealing surface of the bell and put a light coat of RTV on it and reassembled to the carb. If I were a machinist, I'd simply machine an o-ring groove into the inlet bell and add an o-ring. But I'm not, so a little bit of RTV works for me. At this point, the carb was completely reassembled, and the throttle moved in and out effortlessly. The acid test for the new intake and updated carb would be in running the engine.

### **The results**

The throttle slide movement is like it's on ball bearings now, whether the engine is running or shut down. It wasn't this smooth brand new out of the box. I set the mixture up slightly rich and then readjusted the idle. I was able to get my idle as low as 650rpm without any worry about the engine dying. It's never idled that low before. The throttle response is great even with this low idle. Upon shutting the engine down, the only fuel leak I had was right out of the throat of the carb from the orifice, which is to be expected. This was a very small drip that ceased within a few minutes of stopping the engine. I found no other fuel leaks anywhere else. In the air, the engine has never run so well. My EGTs used to be split 100 degrees or more one side of the engine to the other, and my CHTs were about 15 degrees off one side to the other and in the 290-300 degree range in cruise. My CHTs are now cooler than before by about 10 degrees. Both sides of the engine are within a few degrees of each other now in both CHTs and EGTs and I can lean the engine more effectively now.

### **Conclusion**

At this point, I'm pretty satisfied with my new and improved Aerocarb. I didn't do anything outside of what Aeroconversions recommends as far as the installation is concerned this time around. I do feel, however, that the simple improvements that I made to the carb itself have made it smoother and more efficient.

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