

# SONERAI NEWSLETTER

JAN-FEB-MARCH 2009

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## **JUERGEN THIESEN'S SONERAI I**

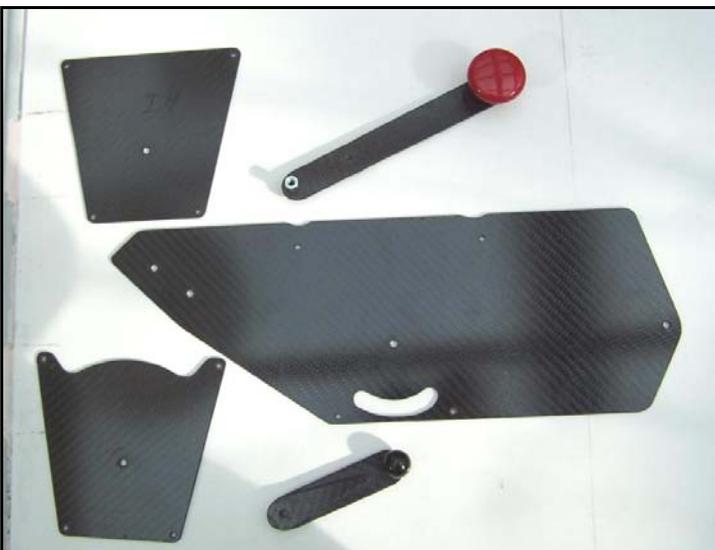
*Juergen's Sonerai I was originally built by Jim Hardy in the Dallas, TX area. Juergen purchased it, and had it shipped to his home in Germany. He's been flying it over the German countryside for a few years now. The airplane has been in a constant state of improvement with an eye toward going faster while still being quiet. Juergen has installed several carbon fiber parts, including the seat, throttle quadrant, radio mount, and instrument panel. He has also replaced the original 1600 with a 2180 incorporating an in-the-cowling exhaust system and muffler of his own design to help deal with the strict European noise abatement laws.*

## Some of Juergen's Carbon-fiber Parts



The basic VFR instrument panel

The throttle/mixture quadrant and the handheld radio mount. The radio mount is fastened to two Adel clamps.



Throttle/mixture quadrant detail pieces. They're all flat carbon fiber and epoxy lay-ups.

## HAPPY 2009

It's New Years Day 2009 as I write this. Of course, it's winter here in Wisconsin, and it's been a tough one so far. There's been a lot of snow, and when it hasn't been snowing, it's been colder than hell, and windy. It hasn't been very conducive to flying the Sonerai. So, I suffer withdrawal symptoms because I can't fly every week (you know, I get kinda grumpy, and look longingly at the blue sky when I'm at work and can't get to the airport).

The past year was OK. It was my 12<sup>th</sup> year as the Sonerai Newsletter editor and publisher. That means I've produced 48 issues so far. I hope they've been useful. Since I've covered so much information this far, it's getting harder and harder to come up with new things to write about. I'm hoping that you guys will give me some ideas about what you'd like to see in future issues. I am going to spend some time talking about fuselage construction in the next several issues. I hope to hit all of the important points, but since it's been 20+ years since I built mine, feedback on the articles will be greatly appreciated.

So, what else happened in 2008? First, I got to slog thru the mud at Sun-N-Fun. It was my first trip there since I took the Sonerai down in 2004. Unfortunately, the Sonerai got left in the hangar, and I took the airlines down this time. Second, I took my Sonerai to Oshkosh where I got to be part of the Affordable Flight Center operation. That was a lot of fun because the airplane was inside, out of the weather, and I got to spread the gospel of the affordability of the Sonerai to a bunch of new people. And third, I put 41.9 hours on the Hobbs. It was mostly local flying; just bombing around, enjoying the ability to fly. The "new" 2180 continues to perform well, although I had to pull the heads to lap in three of the four exhaust valves this fall. Ah, the "joys" of flying behind a VW. Mind you, I'm not complaining. It's a price I'm willing to pay to keep my cost of flying as low as it is. And finally, I did not get to the U.S. Air Force Museum in Dayton that I promised myself last year at this time, but it is definitely on the agenda for this year, come "hell or high water".

I hope that your 2008 was productive, and that your 2009 allows you to continue flying your Sonerai, or to finish it and start enjoying the great fun that is flying a Sonerai. Happy New Year!

## RENEWAL TIME

OK, heads up everyone. It's time to renew your subscription to the **Sonerai Newsletter**, again. Take a look at the mailing label on the envelope that this fine document came in, and check the "PD" date next to your name. If it says "PD08", this will be the last newsletter you'll get unless you send some money. If it says "PD09" or higher, you're in good shape, and you can go on and finish reading the rest of this issue.

As far as determining how much money to send, you have a couple of options this year. First, if you wish to continue to receive the paper copy via the US mail, the cost is still **\$15.00**. But, if you would like to receive the newsletter only in the electronic format, the cost will only be **\$12.00**. As usual, I accept cash, check, money order, or PayPal. Please make the check or money order out to "Fred Keip", and mail it to the address on the front cover. If you prefer PayPal, use the email address on the front cover. And thanks again for your continued support.

## WANT A FREE SUBSCRIPTION?

As in years past, I will continue to offer a FREE one year subscription to the **Sonerai Newsletter**, to anyone who contributes an article that gets published. I know most of you don't consider yourself writers, but you know what, I don't consider myself to be one either. Just put together an article on your airplane, your travels with it, some innovation that you've made, or anything related to building, flying, or maintaining our great little airplanes. Send it to me via email or snail mail, along with any photos that you might have (photos are great because you can provide a lot of information without writing a whole lot of words). Don't worry about spelling, sentence structure, and all of that. I'll clean it up before it goes in the newsletter.

For last year's contributions, I'd like to thank Bill Evans, Ivan Martinez, Roger Godfrey, Bob Barton, Dave Wilcox, and Bob Schwarz. You guys will note that your subscriptions are "PD09".

## FUSELAGE CONSTRUCTION, PART 1 GETTING READY

Back in 1998, I wrote an article on wing rib construction which started a series of articles that described the process of building a set of Sonerai

wings. Over the period of the next year and a half, five articles were published that walked you thru the entire process of assembling a set of wings. Those articles, along with the opportunity to build a set of IILTS wings that provided the photos, eventually led to the **Sonerai Wing Construction Manual** that many of you are using today.

Since that book was published I have received several requests to come up with a similar book outlining the process of building the fuselage and tail feathers. I've put it off for a long time because I have published several articles written by others that have described the process pretty well, and I thought that that was enough, but not any more. Starting with this issue, I plan to walk thru the entire process of building the fuselage, tail surfaces, controls, and canopy frame. Basically, we'll talk about everything that gets welded.

To start out, let's talk about the preparation that's needed before getting started with the actual construction:

#### Workshop Requirements:

Obviously, you need a place to build your airplane. It can be a garage, your basement, a barn, a separate shop, or a hangar. It really doesn't matter, but it needs a few basic things to be usable:

1. It needs to be big enough to hold the components that you are working on, plus have some room to move around the project as it grows. In the case of the fuselage it must be long enough to accommodate the jig table that the fuselage will be built on (we'll talk about building that in a bit).
2. It needs to be well lit. There is no need to work in the dark. If you don't want to add permanent lighting to your work space, you can buy a few two-tube, four foot fluorescent fixtures and hang them from the ceiling with hooks and chains.
3. Along with light, it should have enough electrical power to power the tools that are needed.
4. Heat and/or air conditioning is nice, otherwise your work time may be limited to the seasons of reasonable temperatures in your area.
5. Shop ventilation is a requirement because welding does make smoke and hot steel smells. Remember that it is very important to keep your spouse and family happy if you want a chance to finish your project, so if your shop is in the basement (like mine is) or an attached garage, think ceiling vent fan. Don't set up fans that will

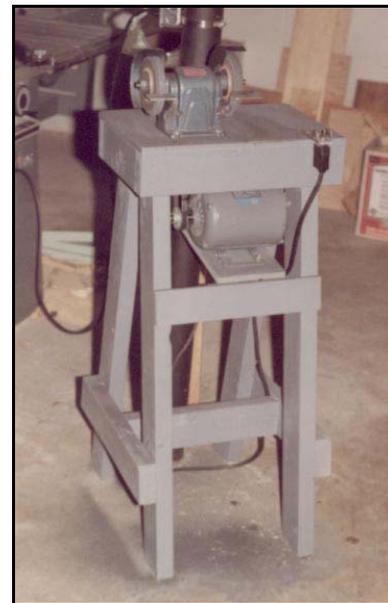
move a lot air thru your welding area, as this will cause quenching of the welds, but we'll talk about that later.

6. Make sure your shop is configured with doors that will allow you to get the largest components out without tearing down walls and such. This may sound obvious, but how many times have you heard stories of projects that were built in the basement, and the builder had to punch out a basement wall to get it out.

#### Tools:

I think it can be stated with some degree of confidence that the more tools that you have, the easier it is to build the airplane. If you have any kind of a shop now, you probably have most of the basic things, but a basic list might be:

1. Skill saw or table saw to help build the jig table.
2. Carpenter's square, four foot level, and long straight edge to help build the table, and perform fuselage layout work.
3. Tubing cutter for rough cutting tubing to length, and a hacksaw for cutting sheet stock (a band saw with its blade speed slowed to about 150 feet per minute, and a 24 tooth per inch blade is really handy).
4. Powered grinder, or grinding arbor with a motor, of sufficient power to allow grinding of the tube ends without bogging the motor down. I used a US General arbor and a ½ hp 3450 rpm motor from my jointer. The arbor had two ¾" wide, 6 inch diameter grinding wheels. The entire unit was mounted on stand that allowed me to keep at next to the jig table.



Grinder and Stand

5. Aircraft-type combination snips for rough trimming of the tubes.
6. C-clamps, magnets, and vise-grip pliers to hold parts in position for welding.
7. A welder. This can be an oxygen-acetylene set up, a TIG welder, or MIG welder. Whatever you are comfortable welding with. If you have no welding experience, and are operating on a limited budget, as most of us Sonerai builders are, my personal recommendation is to opt for the oxy-acetylene set up. It will require the least capital investment, and the process is easy to learn.
8. A sturdy, bench-mounted vise to hold pieces for forming, etc.
9. Finally, although not tools in the strictest sense of the word, I'd very strongly suggest that you buy the four books written by Tony Bingelis. They are **The Sportplane Builder**, **Firewall Forward**, **Sportplane Construction Techniques**, and **Tony Bingelis on Engines**. They are an absolute wealth of information that no airplane builder should be without. You can get them individually, or as a package, from the EAA.

#### Jig table:

One of the things that you learn while building an airplane is that building a proper jig or fixture is the most important part of building a good airplane. Oftentimes, once the jig is built, actually making the part becomes anticlimactic. So, the first fixture that we are going to build will be the jig table for the building the fuselage.

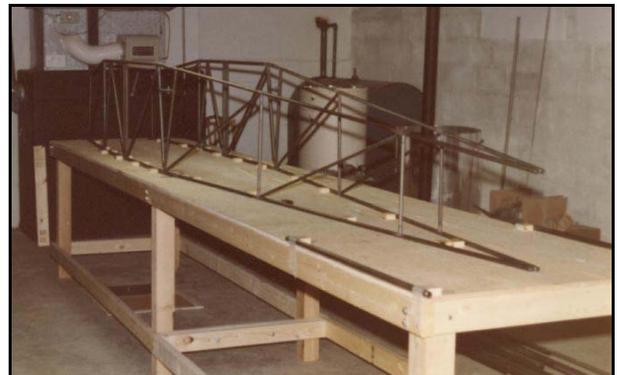
The regular Sonerai II fuselage is 15'-0-1/8" long, while the ILLTS is 16'-7-1/8" long, and the Sonerai I is 12'-3" long. This will require a long table. Sixteen feet is the suggested length, since plywood comes in eight foot long sheets. In fact, to make things easier to build, I'd suggest building two eight foot tables and bolting them together, end-to-end. Obviously, for building the ILLTS, it will be necessary to add a one foot extension to accommodate the extra 7-18" length. All of the Sonerai fuselages are 22" high, while the II's are 24" wide, and the I is 21-1/4" wide. This will require a minimum table width of 24". I built my table 36" wide to provide plenty of working space.

Table construction is pretty straightforward. First, build a 2x4 ladder frame for each table. Space the "rungs" of the ladder on 24" centers, and nail or screw the frame together. Cut the tops from 5/8" plywood, and attach them to the frames. For legs, use 4x4 posts that are 36" long. This will put the

top of the table at a comfortable working height. You'll need six posts, four for the first table and two for the second.

To assemble the table, get a couple of friends or family members to help. Have them lift the table top up so that you can set a leg under each corner of the table. Use a c-clamp to hold each leg in place. The reason for this is that you now want to make sure that the table is level in all directions. Of course that means that the table will be set up in its working location. If the table top is not level, place shims between the underside of the table top and the top of the leg at the low corner. Once the table is level, attach each of the legs to the top with a pair of 1/4" lag bolts. Then, attach a 2x4 frame around the outside of the legs about 12" up from the floor to stabilize the legs.

Once the first table is done, position the second table so that it can be bolted to one end of the first table, and place the last two legs under the free end of the table. Once the tables are bolted together, level the second table to the first, and bolt the last two legs in place.



Fuselage Jig Table

Now, we're ready to start the fuselage. We'll tackle that next time.

## **STUPID MECHANICS** by Roger Godfrey

*I got his email for Roger, and he has some great insight that you might want to think about related to maintainability. Be sure to make all of the parts needing regular maintenance, like the magneto and starter, easily accessible. It's a real pain in the butt to have to remove the engine to fix a mag or starter.*

A little hanger flying caused me to think about writing to you and asking you a question. It has almost become a tradition for me to loose my electrical system coming home from Oshkosh.

This year the main battery cable shorted out inside the starter box and dragged the battery down to zip at about Iowa City. I flew home using eye ball navigation and the magneto. I made the starter box in the fire wall very snug on the starter to clear the rudder pedals, and there is therefore very little room for the battery cable. I lined the box with rubber but the wire seems to seek out places to rub off the insulation and short out. I had to pull the engine after I got home to fix it. The idiot who built it should have made the starter box removable as is the magneto box, but he didn't.

I did a lot of flying this fall and had a good time, but my oil leaks continued. They were not real serious but crudded up the bottom and bugged me. I put in new prop hub seals last year and stopped that leak, and then I fixed leaks where the secondary ignition magnet trip goes into the old distributor hole. I still had a leak at the rear and after talking to you, I decided to replace the rear main seal. I took the engine off again and pulled the rear case off. I replaced the rear seal but I think the leak was between the flywheel and the crankshaft where I had left out a gasket. This is significant as the crankshaft oil galley has an open hole to this surface. With a gasket between the crankshaft and the flywheel I had to dig out my donut shims and reset the end play.

I put it all back together and it would not start. The starter wire had managed to get wrapped around and shorted out again in the starter box. Being the tremendous diagnosticians we are, we decided that the old battery had died from its abuse on the way home from Oshkosh. I went out and bought the same battery brand and model number, and it would not go into my battery box. It was about 1/8 of an inch too long. I rebuilt the battery box and installed the new battery. Then when it still would not start, we pulled the engine off again and fixed the shorted wire.

I had installed a second solenoid at the battery so the wire was not hot except when starting. When it did start it ran well on the secondary ignition system and terrible on the magneto. It was obviously way too advanced. We pulled the insulation off of the back of the fire wall, opened up the magneto box and re-timed it using a pin to lock the magneto. After we got everything back together, it ran worse than before. Both the local A&E and I were frustrated. He brought out his buzz/light box and we tore everything apart again and timed it with that. Now it runs real sweet, and seems to have more punch. Time will tell if it leaks oil.

I had bought the airport manager a bottle of Scotch and he let me work on the plane in the heated main hanger. There is a lot of traffic though there, and lots of people became interested in Sonerai Aircraft. Several are thinking about building one, including the A&E who was alternately laughing at me and helping me. He thinks he will build one with a 120 hp Jabiru. I answered a lot of questions on Sonerai aircraft, and then one fella asked can you wheel land one? I never have, have you? With the spring gear and no shock system I would think it might get interesting. **But then I used to do 120 Cessnas with the same gear.**

*Freditorial Comment: I have never wheel landed my Sonerai III. I've never felt the need. First, the wings are so close to the ground that crosswinds don't seem to have a huge effect on landing (although takeoff is another matter). Second, the tail surfaces are sized such that the horizontal stab and elevator are larger than the vertical stab and rudder, so the airplane will run out of rudder authority before it runs out of elevator. You can have the tail up, and won't be able to steer it. Not good... And third, in the three-point landing, the tailwheel is immediately on the ground, so steering ability is always there. I like that.*

## PIPER FAIRLEADS

From time to time I get questions that I assume everybody should automatically know the answers to. But then I have to remind myself that not everyone has been fooling around with airplane stuff as long as I have. One of those questions concerns the purpose of the four 3/4" long pieces of the 7/8" OD x .058" wall tubing that are welded into the Sonerai II fuselage; two beneath the rear seat, and two at the last bay ahead of the rudder post. (There are two in the Sonerai I fuselage). They are used to hold the Piper fairlead bushings that guide the rudder cables on their trip from the rudder pedals back to the rudder horn.



The Piper fairlead is a two-piece nylon flanged bushing that the cable passes thru to guide the

cable's direction and to keep the cable from wearing on the surrounding steel structure. The outside of the bushing is grooved to accept a steel snap ring that holds the bushing in the 7/8" tube. The fairleads are available from Wag-Aero ( part number M-035-000) and Aircraft Spruce (part number 05-05500).

The photo shows the parts of the fairlead next to the piece of tubing that gets welded into the fuselage.

## PBK WELDING

A month or so ago, I got a call from Peter LaFreniere who owns a small welding company called PBK Welding,LLC. Peter welds aircraft components, and in particular fuselages for homebuilt airplanes. He has built several of the Wag-Aero airplanes (Sport Trainer and Wag-a-bond), along with some others, and he's looking to expand his offerings. To that end he would like to offer the various Sonerai fuselages to potential builders. He can provide precut tubing kits, tack-welded fuselages, and fully welded fuselages. If you are interested, go to his website [www.pbkwelding.com](http://www.pbkwelding.com). He's located in East Troy, WI. His phone number is 414-248-9240.

## A LITTLE HUMOR from Ed Schrom

*Here's a joke that celebrates the irrepressible problem solving nature of Sonerai builders. If it sounds familiar it's because I ripped off someone else's newsletter but I hope you'll print it anyway.*  
Ed Schrom

A Bonanza owner, an RV owner and a Sonerai builder happen to meet each other on a cruise ship (their wives made them go). When the ship made port at the Island of No Apples the three flyers decided to explore together while the ladies shopped for Chinese-made souvenirs in the local clip joints. So they rented a go-cart and off they went.

Before long the three found themselves arrested and in jail for the crime of failing to stop for a herd of goats in a cross walk. They were tried the same day, found guilty and sentenced to die by the guillotine.

The following morning (I said it was the Island of No Appeals, didn't I?) they were led to the scaffold. The Bonanza owner was taken first and strapped to the table. When the executioner released the rope there was a faint creak and then – nothing!

The blade was stuck! The resourceful convict saw his opportunity.

"God has spared me because I am a Bonanza pilot and therefore better than everyone else," he explained to the judge.

The judge had read about Bonanzas in the magazines from the U.S. and was persuaded by the man's logic, so he set him free.

Next up was the RV owner. He was strapped to the table and again the executioner released the rope. *Creak*, then nothing. The blade had stuck again.

This guy was no dummy either. He saw how the Bonanza pilot had saved his own skin and in a flash he thought of what to say:

"I am the pilot of an RV, the most popular homebuilt airplane in the world. Obviously, God looks with favor upon us RV pilots."

The judge knew little about RVs except that two of them made up the island's entire air force. Somewhat skeptical but wanting to play it safe, he let the man go.

Finally the Sonerai builder was led to the platform and strapped down. The executioner let go of the rope and – unbelievably! – the blade jammed a third time. By now the crowd was blood thirsty and the judge was visibly perturbed. Then the Sonerai man craned his neck, looked up at the blade and said, "Oh, I see what's wrong..."

## DIRECTORY 2008

ISSUE	TITLE	SUBJECT
JFM '08	Happy New Year	Misc
JFM '08	It's Renewal Time, Again	Misc
JFM '08	Free Subscription Offer Continues	Misc
JFM '08	Bill Evans' First Flight/Evans	First Flights
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AMJ '08	Coming to Sun-N-Fun?	Sun-N-Fun
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AMJ '08	Some Thoughts on Getting Up and Down Safely	Safety
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JAS '08	The Wilcox Nosewheel/Wilcox	Landing Gear
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OND '08	Parking Brake/Schwarz	Controls
OND '08	2008/2009 Fly-in Schedule	Misc
OND '08	Electronic Newsletter?	Misc

# WANT ADS

*These Ads are provided as a service to you, the subscriber, and are free of charge. I only ask to be informed when the Ad is no longer valid, and needs to be removed. Thanks.*

**SONERAI WING CONSTRUCTION MANUAL:** There are 18 pages of text, 85 photographs, and 12 drawings, as well as a complete materials and a tools list. If you have an older set of plans (The manual is now included with the plans, so you new plans holders already have it.) and would like your own personal copy, send cash, check, money order, or PayPal) for \$25.00. Postage is included. Fred Keip, (262) 835-7714, [fredkeip@aol.com](mailto:fredkeip@aol.com)

**BACK ISSUES: Sonerai Newsletter** back issues are available in three forms. The first is a CD which contains all of the complete newsletters published by Ed Sterba from 1987 through 1995 in ".pdf" format. It costs \$40.00. The second is a CD which contains complete copies of all of the newsletters published from 1996 through 2008, also in ".pdf" format. The cost is \$50.00. If you buy both CD's, the package price is \$75.00. And finally, there are also hardcopy back issues. I have the last two issues from 1994, and all of the issues from 1995 thru 2007 (That's 54 issues!). Contact me for pricing, and I'll make you a deal. As usual, I accept cash,

check, money order, or PayPal for the correct amount. Postage is included. Fred Keip, (262) 835-7714, [fredkeip@aol.com](mailto:fredkeip@aol.com)

**SPECIALTY WELDING CAN SUPPLY YOUR COMPLETELY WELDED SONERAI FUSELAGE AND OTHER WELDED COMPONENTS.** Contact Greg Klemp at *Specialty Welding*, W6461 County YY, Neshkoro, WI 54960, (920)293-8089 or (920)293-8007 (Fax)

**RACEAIR DESIGNS IS AVAILABLE FOR YOUR FABRICATION AND RESTORATION NEEDS.** Contact Ed Fisher, (330)518-8383, [raceairdesigns@hotmail.com](mailto:raceairdesigns@hotmail.com). Over 30 years experience in dope, fabric, welding, and sheet metal. Numerous awards including 1991 and 2004 Oshkosh Grand Champion Ultralight. No job is too big or small. Need a fuselage welded? Give Ed a try!!

**FOR SALE: Sonerai IILTS project.** Wings and ailerons complete except for mounting the wing tips and balance weights. \$3000 (current materials cost). Basic fuselage frame tack welded with remaining tube and sheet

materials, \$850. Will separately or as a package. Make offer. Dave Bubolz, 248-685-3114. (1/08)

**FREE:** Aluminum bar stock (mostly 2024-T351 from Sonerai landing gear), 1/2", 5/8", and 3/4" thick. Also, some nylon and high density polyurethane. Let me know what you need, and just pay the shipping. Fred Keip, [fredkeip@aol.com](mailto:fredkeip@aol.com), 262-835-7714 (1/08)

**FOR SALE:** Lycoming O-235-C1 engine, runout & disassembled, includes 2 Scintilla magnetos, carburetor, 1 set of std. Piston rings. \$2000. Ken Christian, 660-263-7937 (2/08)

**FOR SALE:** Sonerai IILS single-place. 200 hr TT, 2180 w/dual electronic ignition, 40 amp alternator, starter, hyd. lifters, and new heads, Sterba prop, extra fuel tank, 5/8" landing gear, Monnett factory-welded fuselage, S-wings, Icom A-20 radio. See the July-Aug-Sept 2007 issue for photos. Asking \$8700. Doug Johnson, Topeka, KS, 785-246-0844 (4/08)



**Jerry Gore taxi testing his Sonerai IIL**