

# SONERAI NEWSLETTER

APRIL-MAY-JUNE 2008

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## **ERIC STADJUJAR AND HIS SONERAI IIL**

*Eric sent a note along with this photo:*

*I just thought I would relate my experience of buying a Sonerai and learning to fly it. I bought my IIL from its builder, Keith Browne, in September 2004. I had 300 Cessna 172 hours in my log. I had become friends with a couple of Supercub owners at Millard Airport, and they were letting me fly with them once in a while. Once the airport group found out what I bought, a couple of other guys stepped forward to help.*

*My friend Ed with his Supercub was the best! I had 10 hours of all types of takeoffs and landings (wheel landings in a Cub are the most fun) in no time. An RV-6 owner gave me about 8 times around the pattern, and a Pacer owner gave me 20 more. I also taxied the Sonerai around for about 2 hours, but never lifted the tail.*

*So, with everybody watching on a nice day, I took off (with left rudder)! Flying and handling are a pure joy! Coming in for the first landing, she did not slow down, so I went around, got lined up, 80 over the fence, and not too bad of a landing. My knees did not stop shaking for an hour.*

*I now have more than 15 hours on it. It is still hard to get used to flaring with your butt literally inches off the concrete. I have found that that a nice medium pattern is best, so you can get all lined up perfectly. Also, as*

*you come over the fence with power off and the ball centered, touchdown is nice and straight. Otherwise, there have been a few times when I thought "uhohh" here goes a couple of runway lights.. I have landed a couple of times in a 30° 8-10 knot crosswind and no big deal. And the other day it was 10 knots right down the runway and man, was slowing down that extra 10 knots nice. Keeping your speed in check is important, otherwise you float and float.*

*Buying from Keith was the best. Knowing he built AND flew it is great peace of mind, and we talk all the time. Basic aerobatics are a blast. N968KB has an 1835 with a Ellison carb, dual ignition, a starter, and hydraulic brakes. Eric Stadjuhar, Omaha, NE*

## COMING TO SUN-N-FUN?

Sun-N-Fun is right around the corner. This year, the event starts on Tuesday, April 8, and runs thru Sunday, April 13; a day less than years past. Are you coming?

Yours truly will be there this year. It'll be the first time in the last 6 years. The last time I was there was in 2002, when I flew my Sonerai down with my hangar partner, Keith Tridle, who flew his Wagabond. This time I'm leaving the Sonerai at home and flying from Milwaukee direct to Tampa on AirTran on Tuesday and coming home on Sunday. It was pretty much of a no-brainer decision. It would have cost at least \$450 for just the gas to fly my airplane down and back, while it only cost \$232 on AirTran. True, it won't be as much fun, but I know when I'm getting home, and I can stay for the weekend and watch the Air Force Thunderbirds fly.

I did not schedule a Sonerai Forum this year, but Steve Bennett has several VW conversion-related forums and workshops throughout the week that you might want to take in. I hope to spend some time hanging around the Great Plains Aircraft Supply booth, and any Sonerai's that show up, so stop by and say "hello". Also, if you know what days you're coming, and you want to get together and B.S. about Sonerai's, drop me a line or send an email, and we make arrangements to meet.

See you in the "Sun" and "Fun".

## SONERAI NEWS

- Great Plains News: As usual Steve and Linda will be at Sun-N-Fun 2008. Their booth will be in the usual place in Building A. And Steve will be running his VW construction workshops Tuesday thru Saturday from 11 AM to 1 PM in the Engine Workshop Tent. He's also presenting a VW forum on Thursday at 10 AM in Forum Tent 8
- First Flights: There have been no new First Flight reports since last time, so when you fly your airplane for the first time, please drop me

note, or call me, or send an email. Photos are good, too.

### → 2008 Fly-In Schedule:

Here's a list of the major fly-in's for 2008. Make plans now to go to the one nearest you, and show off your Sonerai:

- Sun-N-Fun, Lakeland, FL 4/8-13
- Golden West, Marysville, CA 6/6-8
- Virginia, Suffolk, VA 6/14-15
- Rocky Mountain, Watkins, CO 6/27-29
- Northwest, Arlington, WA 7/9-13
- AirVenture, Oshkosh, WI 7/28-8/3
- MERFI, Mansfield, OH 8/25-26
- Copperstate, Casa Grande, AZ 10/23-26

- 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, sent me cash, check, money order, or PayPal (at the email address on the front page) for \$25.00. Postage is included.

- 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 2007, 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.

## BUILDING THE FIREWALL

A couple of years ago, someone asked the question: "What is the correct way to build the Sonerai firewall?" Given that the question was sent to me via email, and I didn't want to elaborate

too much, the short and sweet answer went something like this:

- 1) Mount the engine to the fuselage.
- 2) Fit and mount the cowling to the fuselage.
- 3) Remove the cowling and engine, and reattach the cowling.
- 4) Fabricate a cardboard template of the firewall to match your cowling.
- 5) Use the completed template to fabricate a plywood form block. Make the form block 1/8" smaller than the template all around.
- 6) Use the form block to layout the firewall on the galvanized or stainless sheet.
- 7) Add the 3/4" wide flange all around.
- 8) Cut out the firewall.
- 9) Notch the flange in the appropriate places.
- 10) Form the firewall over the form block.
- 11) Drill the motor mount holes.
- 12) Provide the opening for the magneto and starter (if equipped)
- 13) Install the firewall-to-cowling seal.
- 14) Install the firewall.
- 15) Drill holes for control cables, fuel lines, and electrical wiring.

So, let's elaborate some:

#### **Steps 1, 2, and 3 - Getting Ready**

Steps 1), 2), and 3) are a necessity. There is no other way to accurately fit the cowling without first installing the engine, and the cowling must be securely installed to create the shape of the firewall. For an in-depth article on the cowling installation, go to the Jan-Feb-March 2002 issue of the **Sonerai Newsletter**.

#### **Step 4 - The Template**

Making the template for your firewall can be something of a pain in the butt. The main difficulty is the reach distance from the front opening of the cowling to the front of the fuselage, or from the instrument panel station forward to the front of the fuselage. Start out by taping a piece of cardboard or stiff poster board to the front of the fuselage large enough to cover the entire front including the engine lugs, and wide enough to protrude into the cheeks of the cowling. The fit doesn't need to be very exact. If you can get to within an inch, or so, of the cowling, that'll be good.

Next, cut a bunch of strips of stiff paper (old manila file folders work well) about 1/2" wide and 2" long. A few 2" wide and 12" long strips will be good, too. Starting at the sides of the lower cowling where the cowling is straight, place the 2" wide strips on the front of the cardboard base with the edge the strip touching the cowling, and tape them down. On the curved portions, place the 1/2" wide strips so that the 1/2" edge is touching the cowling, and tape each

one down. Trim the ends of the strips to match the curvature, and overlap them as necessary to fill the gap between the base and the cowling all the way around. This is a little tedious, but it will go pretty quickly.

Once you've filled the gap all the way around the inside of the cowling, remove the top of the cowling, and remove your "rough" template. Lay the "rough template on a new piece of cardboard large enough to make a one-piece template, and trace the outline, making nice smooth curves. Cut out this "final" template, and fit it back into your cowling, and make sure that it fits the cowling accurately. Tweak it as necessary to get a good fit. Finally, use a pencil thru the engine mount bushings to mark their locations on the template. Remove the template, and use an awl or center punch to mark the engine mount hole centers. Also, write "front" on the forward side of the template. Chances are the firewall will not be perfectly symmetrical, so you want to make sure it goes on the right way.



The Template and Form Block

#### **Step 5 - The Form Block**

Now, take your "final" template, place it on a piece of 3/4" plywood or particle board with the forward side showing, and carefully trace template outline. Mark the engine mount bolt hole centers, too. With the template removed, redraw the template outline 1/8" inside the original outline all the way around. This will provide the needed clearance for the cowling seal. Mark this side of the block as "front".

Cut out the form block using a saber saw. Sand the edges smooth and radius the edges slightly. Drill the four engine mount holes. They'll be used later to drill the firewall.

#### **Steps 6 and 7 - The Firewall Layout**

Next, lay the form block on the firewall material (a 3 foot square piece of 26 gauge galvanized steel, or 0.016" or 0.018" thick stainless steel, is plenty) with the "front" side in contact with the material, and clamp in place with a couple small c-clamps,



or spring clamps. Use Sharpie pen to trace the outline of the form block on the steel.



Drawing the Flange Outline

Next, draw a  $\frac{3}{4}$ " wide flange all the way around this outline. A really easy way to do this is to cut a 1- $\frac{1}{2}$ " diameter circle out of a piece of  $\frac{1}{8}$ " plywood (or other stiff material), and drill a  $\frac{1}{8}$ " hole in the center, take your Sharpie and stick the tip thru the hole, and then roll the circle around the outside edge of the form block. Voila, a flange outline.

#### Step 8 and 9 – Cut Out the Firewall

What more needs to be said. Remove the form block from the sheet, and use your snips to cut along the flange outline, and file the edges smooth.



The Blank

To prep the flange for bending, it will be necessary to cut notches along all the curved surfaces to allow the flange to be bent in these areas. Start out putting a mark every  $\frac{1}{2}$ " along the form block outline in the curved areas only. Center punch each mark, and drill with a  $\frac{1}{8}$ " drill. Then use your aviation snips to make two cuts perpendicular to the edge of the flange, tangent to each drilled hole. This will leave a nice  $\frac{1}{8}$ " wide slot at each hole.



Forming the Flange  
(Note the Slots in the Flange)

#### Step 10 – Forming the Firewall

Position the form block back on the blank, again with the "forward" surface in contact with the sheet. Align the form block with its outline, and securely clamp the blank to the form block with several c-clamps. Flip the whole assembly over so that the blank is on the top, and use a plastic-faced hammer to carefully hammer the entire flange down so that it is in contact with the form block all the way around.

#### Step 11 – Drill the engine mount holes.

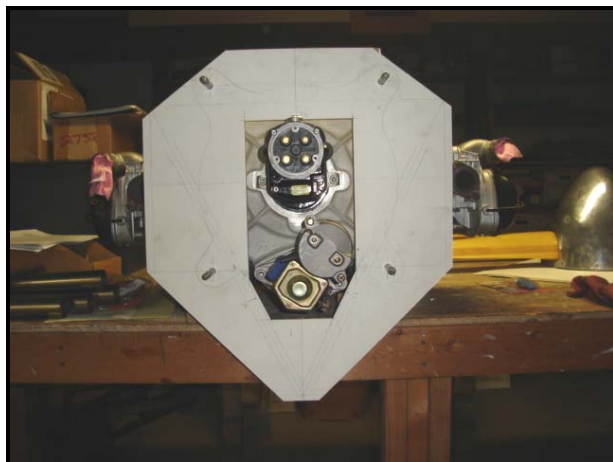
Before removing the form block, flip the assembly over again, and use the engine mount holes drilled in the form block as guides to drill the holes in the firewall. At this point, remove the new firewall from the form block and fit it to the fuselage, and check its fit to the cowling. Hopefully, if you did your homework correctly, there should be a uniform  $\frac{1}{8}$ ", or slightly smaller, gap all around.

#### Step 12 – Cutting the Opening for the Magneto and/or Starter

On those engines with a magneto and/or a starter, the mag or starter will protrude thru the firewall some amount (on the Sonerai II's only, the Sonerai I engine uses a separate engine mount, so "I" builders can skip this step), so it will be necessary to cut an opening in your new firewall to make that possible. Of course, it will also be necessary to build a box out of galvanized or stainless to enclose them, and to make the firewall continuous. Do not use aluminum for the box because in a cowling fire situation, the aluminum will melt very quickly, and your firewall will no longer be a "wall".

To determine the size and shape of the opening, it helps to make another cardboard template (or modify your firewall template) with all of the firewall station tubes drawn on it, and the engine mount holes punched. You can then install the engine

mount bolts, rubber bushings, and the aluminum mount bushings on the engine, and slip the template on the engine. Now, you can figure out where the opening will go. Keep in mind that the shape and size of the box will be limited by the diagonal tubes behind the firewall station.



The Hole Template



Modified Form Block

Once you determined the opening size and location on your template, transfer that shape to your form block, and use your saber saw to cut out the hole. Sand and radius the edges. Now, slip the firewall back on to the form block and use the Sharpie to mark the location. Remove the form block, and lay out the mounting flanges for the box on all edges of the opening.

Next, cut the opening in the firewall, and file all of the edges. Re-fit the firewall on the template, and clamp it in place. Use the plastic-faced hammer to form the flanges into the form block.

### Step 13 – Install the Cowling Seal

There are several ways to seal the firewall to the cowling. The one that I've always used is the Ace Hardware #5387822 vinyl and sponge rubber bulb-

type door weather strip. It is basically a foam-filled 3/8" bead with a 5/8" mounting flange. It comes in a single 17 foot length, which is more than enough to seal a firewall. It costs less than \$20.00. The seal is riveted to the firewall flange with CCP-42 stainless, flush pop rivets about every 3" around the periphery of the firewall. The bead of the seal sits at the corner of the firewall and its flange, while the seal flange sits on the firewall flange.



Installing the Seal

### Step 14 – Install the Firewall

There's not much additional to be said here either. Install the firewall along with the engine.

### Step 15 – Drill Holes for Controls, Wires, and Fuel lines

Now, you can determine the locations where the throttle, mixture, and carb heat cables will pass thru the firewall. To provide the best seal, I'd recommend using the Aircraft Spruce "Cable Safe" pass-thru's (ACS p/n 05-16250). They are configured like a bulkhead fitting, lock the control cable in place, and provide a seal without a grommet. For electrical wires, it'll be necessary to use rubber grommets. Consider using stainless firewall shields (ACS p/n 61-275 is typical) to protect the grommets in a fire. For fuel line passage, use a bulkhead fitting or gascolator mounting fitting.

To drill all of the needed holes, I'd strongly recommend spending the money on a step drill, like my Irwin Unibit 4. It can drill holes from 3/16" to 7/8" in 1/16" steps. It makes a nice, clean, round hole in the sheet stock with a minimum of effort, and much more quickly than using a chassis punch.

So, there you have it, a new firewall. Good luck.

## SOME THOUGHTS ON GETTING UP AND DOWN SAFELY (or SHOULD I BE MY OWN TEST PILOT?)

by Bob Barton (65xx21@comcast.net)

I've had a couple of "learning experiences" with my Sonerai IIL, and some time to think about flying it. I have noticed that a large percentage of builders have someone else do the first flight for them. I didn't do that. I flew it myself. Let me tell you why I decided to do that.

I was careful in the construction of the plane so that I was pretty confident that it would not experience an in-flight structural failure. I carefully "eyeballed" the finished product to be sure nothing was warped or crooked. I did a careful, detailed weight and balance analysis. And I ran the engine at full power for five minutes to be sure the temperatures and oil pressure stayed in the green. Of course I would have done all of this whether I was going to do the first flight or have someone else do it.

I did think about getting a "test pilot" to take it up, but then I thought: "Many examples of this design have been flown successfully. All a successful test flight by someone else would prove would be that it would fly ... or, horror of horrors, if it crashed, what would I say to the test pilot's family? 'Dang! I sure am glad that wasn't me!'" Again, supposing the test pilot's flight was successful, that would still leave me with the nervous task of flying it for the first time for myself.

Now what I have been talking about is the testing of a proven, docile design like the Sonerai or one of Van's RVs. I did read about a fellow who bought and finished a Knight Twister project. This is a small racing bi-plane, and is a handful to handle for an inexperienced pilot. Nevertheless, he opted to take it up on its first flight. After a squirrely takeoff and climb out, he managed to climb some and seriously considered bailing out rather than trying to land it. He said he would have too, except for the fact that he didn't have a parachute!

### That First Flight

Whether you have someone else take it up or you do it yourself, it would be wise to follow these steps:

1. Taxi back-and-forth, up-and-down the airport ... always with the stick full back, to get familiar with its low speed ground handling.
2. Now line up on the runway and sit there looking straight ahead. Memorize what you see in your peripheral vision. That is exactly what you want to

see when you touchdown ... the plane's attitude and the way the edges of the runway look. There! You have mastered a very important part of landing.

3. Next, with the stick full back apply full power and accelerate to 40 knots, then keeping the stick back, cut the power and roll/brake to a stop. Do this several times ... never lift the tail. WARNING! If you cut the power with the tail wheel up off the runway, you will become a passenger in an unpowered airplane. The rudder is too small to give you directional control with no propwash blowing over it, and you don't have differential brakes to help in steering.

### Go For It!

Now you have mastered the first phase of the takeoff and the last phase of the landing. Let's think about what comes in between. The rest of the take off consists of raising the tail, accelerating from 40 to 60 knots, applying slight back pressure to lift off, accelerating to 70 knots in ground effect, and then proceeding to climb out at 70 knots.

The next step is to establish the approach speed. Climb to 3,000 ft. AGL and, with the ball centered, do a power-off stall. Note the speed carefully and multiply by 1.3. This, then, is your approach speed. I am surprised at how many people are afraid of doing a simple power-off stall. They seem to have the same fear as the average man-on-the-street ... that if it stalls; the airplane will fall and crash. No it won't! It will give you a brief thrill ... less than a Six Flags ride, and you will find out exactly what your approach speed should be. Lots of folks think, "Faster is safer", so they come whistling down final way too fast, then float along above the runway, or worse yet, force it down, bounce, bounce, etc. Then, having made such a bad landing, they "correct" by adding more speed ... and the situation gets worse!

But assuming you are still with me so far, turn on to final and establish the proper approach speed, (1.3 x Vs). Set the speed with the stick and keep your touchdown spot in the same place on the windscreen by adjusting power. If the touchdown spot moves up on the windscreen, add some power. And conversely, if it moves down, you are over shooting. Reduce power. Once you are over the numbers, (at say four feet up), gradually reduce power to idle and ease back on the stick 'till you see the touchdown attitude you memorized earlier. Hold that. Touchdown and roll to a stop, just as you practiced.

### Tail Draggers

Many people are put off by the reputation of "tail draggers". Much of this mystique is promoted by

“elite tail dragger pilots”. But I have found the Sonerai to be very easy to handle, even in crosswind conditions. Granted, some tail draggers are bears to handle ... described as “trying to turn around and look at you!” Some designs have the wheels too far forward. Some have too narrow a tread. One factor that is often overlooked is the vertical position of the C.G. The higher above the wheels the C.G. is, the greater the plane’s tendency to tip over. But in all points, the Sonerai is designed to give it very tame ground handling.

### Crosswinds

The key to successful landings in any airplane is to keep the centerline of the plane exactly aligned with the centerline of the runway. Then, if you find you are drifting off to the left or right, correct it with bank, but keep the plane pointed down the runway centerline. This works with tricycle gear planes, but it is crucial for tail draggers. The reason for this is that touching down in a crabbed attitude in a tail dragger is the sure beginning of a ground loop. So if you are landing with a crosswind, you should come down final with the wingtip lowered on the windward side. This means you will touch down on one main wheel with the tail wheel touching at the same time.

What we have been describing is a slip; where the plane is flown with crossed controls ... say left aileron and right rudder, or vice-versa. You can do this anytime (not just in a crosswind). The Sonerai is one of the easiest planes to slip that I have ever flown. The neat thing about slipping is that it allows you to lose altitude without gaining speed ... but be careful not to go any slower than the 1.3 Vs approach speed. And as a bonus, you get a much better view of the runway. Of course, it is assumed that you will come out of the slip before you level out to touchdown.

## ESCAPE TOOLS

One of the great things that I love about the design of the Sonerai is its one-piece canopy. After learning to fly in high-wing Cessna 150’s, where it’s necessary to lift a wing to see “what’s out there”, having an almost totally unimpeded view of the airspace around the airplane was, and is truly marvelous. Sure, you can’t look straight down like you can in a high-wing airplane, but the Sonerai’s wings are small enough that the view down isn’t that bad. And besides, isn’t that what ailerons are for?

One of the things that I don’t like about the one-piece canopy, though, is the problem it provides

should you flip the airplane over on its back during an emergency landing in a rough field. If you go over on your back with the canopy closed, a large portion of the entire weight of the airplane will be resting on the canopy, making it impossible to get it open from inside the airplane.

One possible solution would be to open the canopy just prior to touching down, so that should you go over, you could crawl out from under the airplane. This, of course, assumes that you don’t get smacked on the top of the head as the airplane comes to a stop. Another risk entails losing control of the airplane as you open canopy, and change the airflow over the tail (although, having had my canopy come open in the air on my first flight, the airplane flew quite well with the canopy open). So, opening the canopy is still a questionable solution.

Another possible solution is to either break the canopy or cut your way out of the fuselage. A couple years ago, I rediscovered an article that Budd Davison wrote for EAA’s **Sport Aviation** entitled “The Ins and Outs of Canopies: Giving Emergencies a Little Thought”. (You can find the article today on Budd’s website, [www.airbum.com](http://www.airbum.com).) In the article, he described his thoughts about the canopy escape problem while flying around in his Pitts S-2B, which also just happens to have a large one-piece canopy. His solution to the entrapment problem was to carry a couple of “escape tools”. The first is a canopy breaker. It needs to have a sharp edge, or point, and be heavy enough to allow you to create enough inertia to allow the sharp edge to cut and break the plexiglass.

The second tool is a hacksaw blade to allow you to cut thru the fuselage tubes in the cockpit area to make an opening to crawl thru. Sure, you’ll be cutting your beloved Sonerai apart, but it’s either that, or being trapped in an upside down position for a very long time.

The photo on the next page shows the two tools that I fabricated. The first is a 12” long cold chisel that I sharpened the edge of, painted, and wrapped the handle with black plastic tape. The second is a standard length, 32-tooth per inch hacksaw blade with half of its length wrapped in black plastic tape. I carry them in my flight bag which I always carry on the hat shelf behind the seat, so that I can always get to it.

Will they get me out of the cockpit if I end up inverted after a “bad” landing? I don’t know, and I certainly don’t want to know, but if the situation happens, at least I’ll have the tools to give it a good try.



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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)



**Canopy Escape Tools**