

SONERAI NEWSLETTER

JAN-FEB-MARCH 2010

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HARRY TEAL AND HIS SONERAI ILS

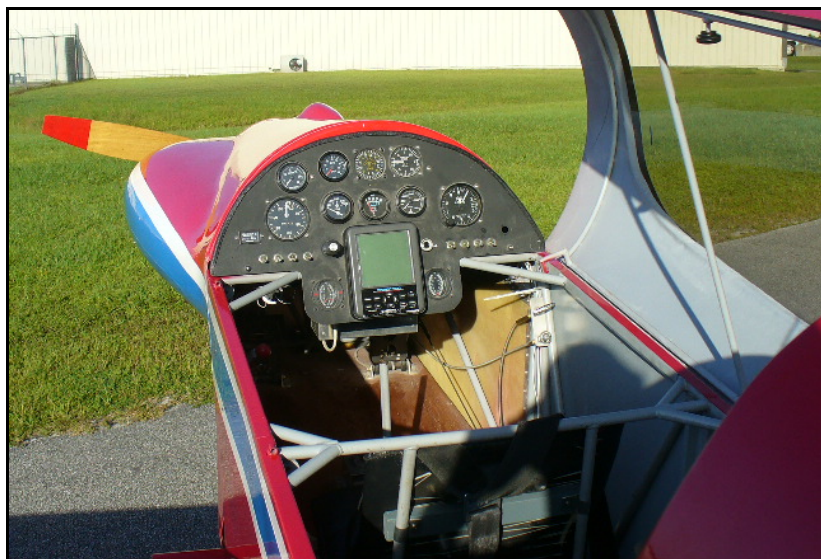
One of the truths about experimental amateur-built airplanes is that they are all different, with each one taking on the wants, needs, and aspirations of its builder. This is certainly true of scratch-built airplanes like the Sonerai, and is particularly true of the Sonerai ILS that you see here. The most obvious difference with Harry's airplane is the P-51-style scoop mounted on the bottom of the fuselage. Harry has installed a 2180 VW with liquid-cooled heads from Great Plains Aircraft Supply, requiring the installation of a cooling radiator, thus the scoop.

Other, less obvious (at first glance) differences are the metallized fuselage, and the all-aluminum tail surfaces. The fuselage structure is a Greg Klemp-welded ILS fuselage to which Harry added light-weight formers, and the skin. The tail surfaces use RV-6 type construction and are fully balanced. The wings have Hoerner tips.

As this is written, the airplane has not yet flown, but has been taxi tested to 40 mph, and has shown no cooling problems so far.

MORE PHOTOS OF HARRY'S AIRPLANE:

Here's a view of the RH side:
The empty weight came in at 680 lbs, but the engine is rated at 100 hp.



A view of the instrument panel. Harry has mounted the fuel tank behind the rear seat, which allows him to solo from the front seat

A right rear quartering view:
showing the balanced RV-style tail surfaces.





The engine installation:
Note the liquid-cooled heads, the oil pump mounted secondary ignition module, and the cooling lines and hoses.

A rear view of the engine installation:
An exercise in fitting 10 lbs of stuff in a 5 lb bag. Note the water pump under the starter.



The cooling package installation:
The inlet duct diverges to slow the air flow down to enhance cooling, and then the outlet duct converges to speed the air back up to join the outside airflow. All of this is finished off with a fiberglass cover.

WELCOME TO 2010

As I write this, it's the middle of January here in southeastern Wisconsin, and it is definitely the middle of winter. Just like last year, the weather hasn't been very cooperative from the flying point of view, so the Sonerai has been sitting in the hangar, waiting for better weather. And I've been exhibiting the symptoms of Sonerai flying withdrawal. You know, a general grumpiness, a lot of time spent looking at the gray, cold sky hoping that it turns sunny and blue on the weekend. That sort of thing.

I did go to the airport today to install a new tachometer. The weather that was promised to be partly cloudy and warm, was actually cloudy, cold, windy and damp. So, the simple procedure to install the tach was prolonged by cold fingers and a slightly misaligned screw hole.

The reason for the tach replacement was that I determined that old one was off by 150 to 200 RPM over its entire range. Ever since I installed the 2180 a couple of years ago, and installed the Sterba 52x46 prop, the tach has shown 3400 RPM at my normal cruise setting of 24" of manifold pressure. At first, I thought that it was normal for this engine/prop combination, but it bothered me that it was reading that high, and I wasn't seeing the performance that I expected. So, I borrowed a "PropTach" from my EAA Chapter's tool library, and took it flying with me. (For those of you who are unfamiliar with the "PropTach", it is a small handheld optical tachometer. You simply turn it on, point the sensor end at the propeller, and read the speed. It's supposed to be accurate to 1 RPM, and is a great way to calibrate your tach.) Sure enough, it showed that the tach was reading high, and I was, in fact, cruising at about 3200 RPM. And the idle speed was showing 1000 RPM while the engine was turning around 800 RPM.

A trip to the Aircraft Spruce web site got a new Westach 2AT5-2 tachometer on its way, and a few days later it was in my mailbox. That following weekend I installed it, and rolled the airplane out of the hangar to check it out. And low and behold, the new tach was worse than the old one. It would only read a maximum of 1850 rpm, even though the PropTach was showing the usual 3200. This was not good, so out it came, and the old tach went back in.

A call to Westach resulted in my returning it to them for recalibration. The tach was gone about two weeks, and now it works correctly, at least during a ground run-up. Hopefully, tomorrow it will

be warm enough to see if it performs as well flying. One thing that I did learn while talking to the Westach rep was that I probably could have simply had the old tach recalibrated for about \$25.00. I wish I had known that before I spent \$95.00 on the new tach. Oh well, now I'll have a spare (assuming I send it back for recal) or an item for the sonerai.net ads.

Looking toward the new year, I'm hoping that it will be good one. As I mentioned in the last issue, I have been chosen to be one of the four members of the EAA Homebuilt Aircraft Council. Our task is to represent you, the homebuilder, in all things related to homebuilding within the EAA. Our first task is to make the homebuilder's experience at EAA AirVenture a more exciting, interesting, and enjoyable one. I'm just getting started in my involvement, and I'm looking for any and all ideas that could help meet the task. So, if you've got any ideas or comments, email me.

As far as going to the big fly-ins is concerned, I will definitely be at OSH, but not at SNF. With only two weeks of vacation left between now and the end of summer, I can only do one big one. Otherwise, I'm going to try to get the Sonerai to several of the local fly-in breakfasts, and continue just flying for the pure enjoyment of flying.

I hope you can do the same.

RENEWAL TIME, ONE LAST TIME

It's time to renew your subscription to the **Sonerai Newsletter**, for the LAST time. 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 "PD09", this will be the last newsletter you'll get unless you send me some money. If it says "PD10" 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. First, If you wish to continue to receive the paper copy via the US mail, the cost is still **\$15.00**. Or, if you are receiving the email version, or would like to receive the newsletter only in the electronic format, the cost is only **\$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, as always, thanks again for your continued support.

One last thing to note: Roger Godfrey, Ed Schrom, Ivan Martinez, Bob Barton, Dave Wilcox, and Scott Rupp have their subscriptions renewed for 2010 for their contributions to the 2009 newsletter. Thanks guys. Your input was truly appreciated.

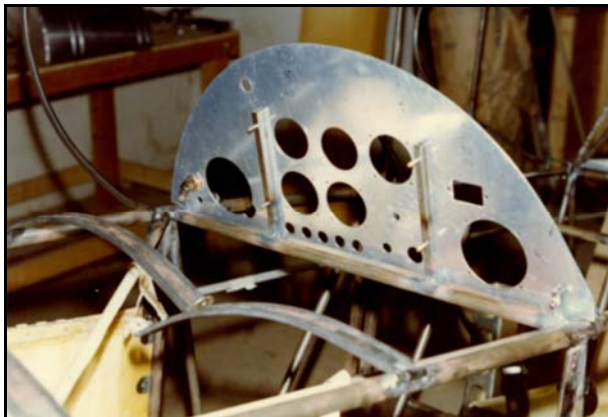
FUSELAGE CONSTRUCTION – PART 4 MORE DETAILS

As we continue our journey from one end of the fuselage to the other:

The Fuel Tank Hold-down Straps:

On the Sonerai II, there are two different set-ups for installing the fuel tank hold-down straps. On the original II and IIL, there are four straps that weld to the longerons, and bolt together at the top of the tank with AN3 bolts to clamp the tank down. On the IILS and IILTS, two straps are used, and they bolt to four pieces of 3/16" I.D. bushing stock welded to the underside of the top longerons.

If you are using the original II four strap set-up, I would strongly recommend that you not weld the straps to the top longerons. The reason is that there is a high probability that a strap will break off while installing or removing the tank. Instead, as an alternative, I created hinges at the strap to longeron joint using 3/16" I.D. bushing stock and clevis pins.



Hinged Tank Straps and Panel Supports

In any case, you will need the fuel tank to determine the proper length of the straps. The tank should have padding where it sits on the tank supports. Cowling chafe seal or a closed-cell foam tape works well. And, use rubber anti-chafe molding (Aircraft Spruce p/n 05-01800) on the straps.

The Fuel Tank Stops:

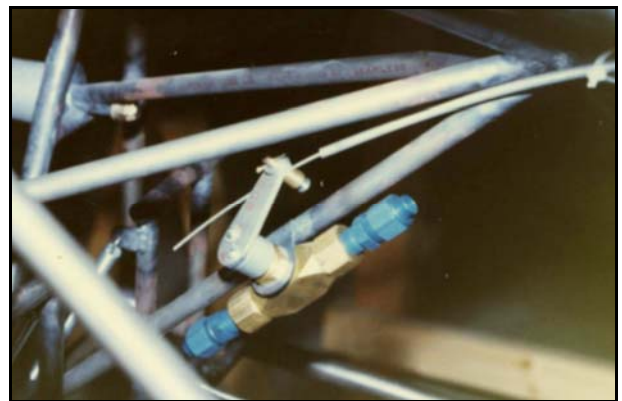
One item not shown on the original II and IIL plans, but shown on the stretch plans, is a pair of "rear fuel tank locators". They are a pair of AN970-4 large diameter washers that are cut out and welded perpendicular to the inside of the top longerons to keep the tank from sliding aft during acceleration. Be sure to do something like this because, believe me, the tank will try to slide backwards if it can.

The Nose Gear Supports:

Not having ever built the nose gear assembly and support structure, I can't provide a lot of additional insight into the installation process. Just follow the information on the drawings, as it appears that all of the necessary information is there. (If any of you "T" builders would like to provide input, email me.) Also, Sonex Ltd. now offers a compression spring to replace the two rubber sleeves in the strut assembly. Contact them (www.sonexaircraft.com) for more information.

The Fuel Valve Mount:

The fuel valve mounting plate, or bracket, welds to the backside of the firewall station. The shape and final configuration will depend on the type of valve used, so it'll be necessary to have the valve in hand to finalize it. If you use the brass Imperial Eastman or Weatherhead two- or three-position valve, you'll need to also fabricate and mount the fuel shutoff rod. This will require the use of one or more small universal joints. McMaster-Carr (www.mcmaster.com) carries a large selection of these steel universal joints at reasonable prices.



Ball-type Fuel Valve Mounting

As an alternative to standard plug-type valve, you might want to consider using a quarter-turn ball valve, and control it with a push-pull cable. I mounted 3/8" Imperial Eastman ball valve, that I got from Wag-Aero, to the diagonal down tube under the fuel tank, and control it with a locking, T-handle push-pull cable in the rear cockpit. The ball

valves have a very low operating torque, and work well with push-pull cables.

The Instrument Panel Mount:

The instrument panel is attached to two pieces of 3/8" x .035" square tubing and two washers welded to the top cross-member at station 29-1/2. These tubes are welded at an angle to match the rear face of the top cowling, so it will help to have the cowling on hand for alignment purposes. I found that it worked best for me to weld the tubes to the back side of the cross tube, and use short pieces of the 3/8" x .035" square tubing in place of the washers to move the panel back enough to be able to easily remove the top cowl.

The Tabs for Mounting the Floor Boards and Cowling:

There's no real magic here. Make the tabs out of .035" 4130 sheet stock, and weld them to the tubes in all the right places. One secret I've found to successfully weld the tab so that one edge doesn't burn away, is to tack both corners of the tab before completing the weld. If you tack just one corner, and proceed to weld across the tab, there is a high likelihood that the edge of the tab closest to the end of the weld will get too hot and melt away. It'll be ugly.

The Control Stick Torque Tube Bearing Supports:

Again, there's no real magic here. The trick is to keep all three supports in line. A four foot long piece of straight steel angle, or square steel tube, will work well. Clamp the angle/ tube to the lower cross-members, and then clamp the supports to the angle/tube. Weld as much of the support as you can, then remove the angle/tube and finish the welding. Like the tabs above, it would be wise to tack the ends of the supports before finish welding to prevent the edges from burning away. Also, do not pre-drill the mounting holes for the bearing blocks yet. That'll be done when the blocks are positioned with the control stick torque tube.

The Seats:

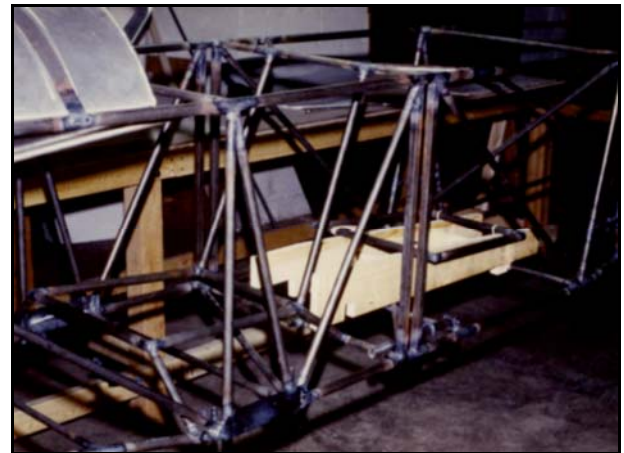
At this stage of the process, it is probably a good idea to make and install the seat frames. There are a couple of good reasons for this. The first, and most important, is that once they are in, you can put some plywood across the bottoms and sit in the fuselage, and make AIRPLANE NOISES. Believe me, that is a major accomplishment. Second, it'll be necessary to sit in the seat to determine the correct turtledeck height when we get to that point.

The challenging part about the seat installation, is that you have to locate the seat in space above the bottom of the fuselage and between the sides

without any convenient places to support the assemblies. We'll have to do a bit of fixturing to make life easier.

First though, start out by laying out and welding up the two seat bottoms. The front seat bottom will be four tubes making a rectangle (on the IILS or IILTS) or trapezoid (on the II or IIL). The rear seat bottom will be either a four tube trapezoid (on the II or IIL standard seat) or a three tube trapezoid with the rear tube missing (on the II or IIL long-leg seat, and the IILS and IILTS).

To properly position each of the seat bottoms, make a wood fixture that you can clamp to the fuselage bottom cross-members and clamp the seat bottom to so that you can then fit and tack all of the support and back tubes. Cut two boards long enough to span the cross-members, and mark the locations of the cross-members on the boards. Next, determine the fore/aft location of the seat and mark those locations on the boards. Then, measure up 4" from the bottom of the board at the front of the seat and 3" up for the back of the seat, draw a straight line between these points, and cut the board along that line. Now, clamp the boards to the fuselage, and clamp the seat bottom to the boards.



Seat Fixture

With the seat bottom properly positioned, all you need to do is cut, fit, and tack all of the support and back tubes in place. Note that if you are building a mid-wing airplane, the front seat back tubes are bolted in, requiring a pair of .090" tabs to be welded to the seat bottom. After all of the tubes are in place, remove the fixture boards, and weld everything complete.

The IILS and IILTS plans show a steel strap webbing arrangement for the seat bottoms and backs. The straps are .035" x 1" 4130 strips, and can be welded at this time. As an alternative, the

bottoms and backs can be covered with .025" 2024-T3 aluminum. The aluminum is cut to the shape of the seat bottom, with the sides, front, and back extended about 6". These extensions are then wrapped around the seat tubes and riveted to the bottom.

Now, go sit and make AIRPLANE NOISES.

AN ALTERNATIVE ELEVATOR PUSH-PULL

by Bob Quick

Here's Bob's solution to the side-to-side bending of the elevator push-pull tube during aileron actuation. The photos tell the story, but here are a few of Bob's comments:

Thanks for the input, as you seem to be the guru, in all things Sonerai. I'm just trying to keep all motion as linear as possible, with the fewest number of parts and pivots to maintain. Getting into that area, once the aircraft is covered, could prove to be quite a challenge, as we age (gracefully), unless of course, should one have a well trained spider monkey, in the vicinity. I'd read on the website, you'd used a hinged pivot in this area, and I just didn't care to have pivot bolts, and hinges, where close-"easy" inspection wasn't really an option. (I've worked on too many Lotus's, mid engine Maseratis, etc, where you can't get to the shift rods and such without disassembling half the bloody car !). I figured a shot or two of motorcycle o-ring chain lube, once or twice a season should keep the guide tubes free of friction, for smooth operation. And, the addition of the second guide, just behind the interconnect, really helped take the flex out of the long rear tube (an added benefit).

Bob Quick-Kirkville, NY



2010 FLY-IN SCHEDULE:

Here's a list of the major fly-in's for 2010. Make plans now to go to the one nearest you, and show off your Sonerai:

- Sun-N-Fun, Lakeland, FL 4/13-18
- Virginia, Suffolk, VA 5/22-23
- Golden West, Marysville, CA 6/11-13
- Arlington, Arlington, WA 7/7-11
- AirVenture, Oshkosh, WI 7/26-8/1
- Rocky Mountain, Denver, CO 8/28-29
- Copperstate, Casa Grande, AZ 10/21-23
- SERFI, Evergreen, AL 10/22-24

DIRECTORY 2009

ISSUE	TITLE	SUBJECT
JFM '09	Happy 2009	Misc
JFM '09	Renewal Time	Misc
JFM '09	Want a Free Subscription?	Misc
JFM '09	Fuselage Construction, Part 1	Fuselage
JFM '09	Stupid Mechanics/Godfrey	Maintenance
JFM '09	Piper Fairleads	Controls
JFM '09	PBK Welding	Fuselage
JFM '09	A Little Humor/Schrom	Humor
JFM '09	Directory 2008	Misc
AMJ '09	Sun-N-Fun is Upon Us, Again	Sun-N-Fun
AMJ '09	Fuselage Construction, Part 2	Fuselage
AMJ '09	Wade Jones and His Sonerai II/Martinez	People
AMJ '09	Is It Love or Is It Money/Barton	Misc
AMJ '09	2009 Fly-In Schedule	Misc
JAS '09	Oshkosh'09 – It's That Time	Oshkosh
JAS '09	Sun-N-Fun 2009/Evans	Sun-N-Fun
JAS '09	How Does the Wing Fold Work?/Wilcox	Wings
JAS '09	Do You Believe in the Drag Bucket?/Wilcox	Wings
OND '09	Seen at Oshkosh 2009	Oshkosh
OND '09	It's About Time To Retire	Misc
OND '09	Fuselage Construction, Part 3	Fuselage
OND '09	Upgrade From Mechanical Drum Brakes to Disk Brakes/Rupp	Landing Gear
OND '09	Wisdom (?)	Humor

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

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

WANTED: Sonerai II parts. I'm attempting a Sonerai project as a cancer treatment diversion; please let me know what you have to sell. Call 24/7 Thank you. M.Lee Wachs 707-463-0467. (2/09)

FOR SALE: 1915cc VW Conversion w/ new aluminum crankcase, balanced forged 69mm crank, SCAT C20 cam with EMPI steel bolt-on timing gear with straight cut teeth, new dual-port cylinder heads drilled for 10mm secondary plugs, Monnett shrink-fit prop hub, SCAT lifters, 26mm oil pump, top-mount oil cooler, Slick 4216 mag, GPAS secondary ignition and 20 amp alternator, and Monnett Electro-X mount modified to allow use of the 20 amp alternator. Engine was built in 2003 but has not been run. Can crate and ship to USA locations at buyers expense, or can be picked up in Houston, TX. \$2500 OBO. James Gay III, jsgiii@att.net, or at 713-922-9080. (4/09)



Ken Cottle's Sonerai III