

# SONERAI NEWSLETTER

OCT-NOV-DEC 2001

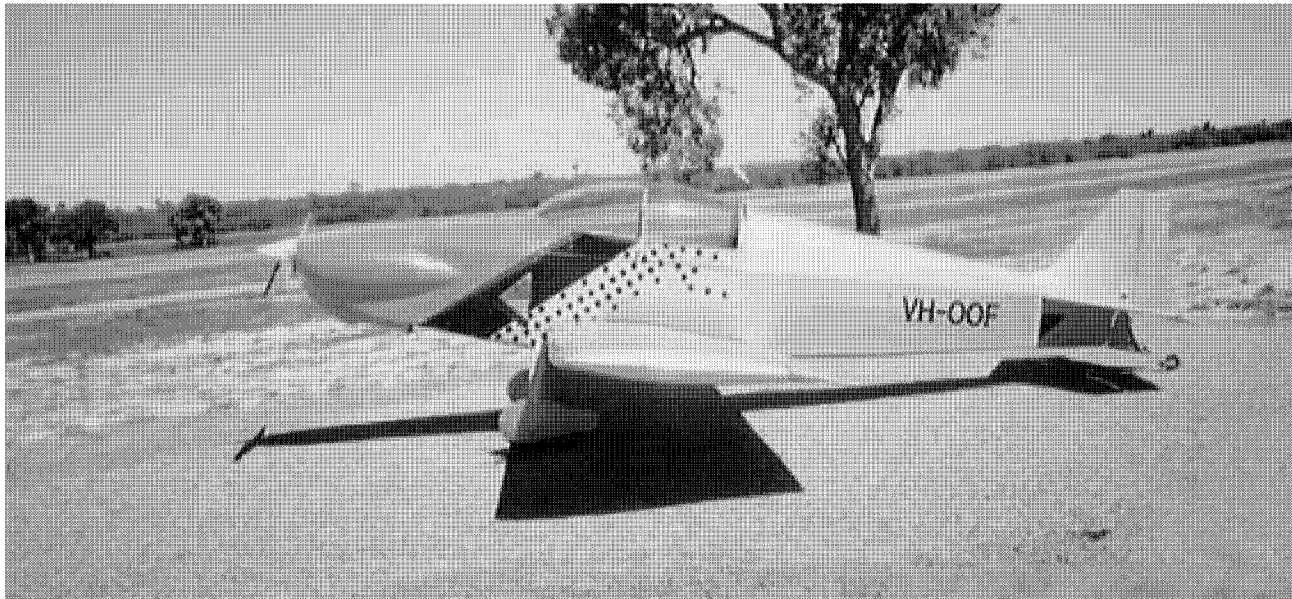
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## **KEVIN WINTERGREEN'S JABIRU-POWERED SONERAI IIL**

*As I noted in the "First Flights" section of the last issue, Kevin flew his airplane for the first time in early April. I believe it is one of the first, if not the first, Jabiru 2200-powered Sonerai's. Note the slight difference in the shape of the cowling, and the propeller that turns the "wrong" way. A photo of the engine installation is elsewhere in this issue.*

## **OSHKOSH 2001 REVIEW**

Let it be said that Oshkosh AirVenture 2001 will go down as the first convention since probably 1972 or 1973 that there was only one Sonerai on the flightline during whole convention. That's right. I had my Sonerai IIL, N99FK, there from Saturday, July 21 until Sunday, July 29. And Jim Philips got his Sonerai II, N63JP, there on Monday, the last day, to collect his mug. Where were the rest of you guys? I'm not really complaining, though. I had my usual good time.

I started off OSH 2001, as I usually do, by flying up Saturday morning, July 21, to beat the traffic rush. In years past I would have come up on Sunday,

but the EAA folks decided to start the convention a day earlier this year so I came up a day earlier. I had already driven up the weekend before to set up my campsite in Paul's Woods, so I was good to go for a week or so. The flight was uneventful up to Ripon. And even the Fisk approach was no big deal, as there were only two or three other airplanes spread out along the route. It wasn't until I was cleared to land on 36L that things got a little more interesting.

I was just setting up to turn final when I got cut off by a Kitfox driver who apparently didn't understand how the system worked, and flew in straight from the south. And to top it off, I don't believe the tower guys even saw him. I just slowed up a little,

and nestled in behind him. 36L is 8000 ft long and 150 ft wide so there was plenty of room for both of us to land. Once on the ground, the EAA Chapter 18 (my home chapter) Custom Aircraft Parking crew parked me in the auto engine row about three rows north of the Blue Arch in front of the control tower. Almost the same place they put me last year.



**"Lonely" N99FK at OSH 2001**

As usual, the weather was typical Wisconsin summer, hot and humid with thunderstorms the first couple of days, nice and comfortable the middle few days, and hot and humid and rainy the last couple of days. About 2 o'clock Sunday morning, we had a fairly strong thunderstorm roll through that included a lightning stroke that hit a tree about a hundred feet from my tent. Needless to say, it was almost necessary to peel me off the top of the tent afterward. Fortunately, no one was hurt, but we were certainly all wide awake.

As I normally do, I spent the mornings with the airplane showing it off, talking to many of you. The afternoons were spent wandering the site, looking at airplanes and finding places to spend money. One of the most intriguing homebuilts was the Vickers Vimy replica. That has to be the largest tube-and-fabric airplane in the world.

The forum on Wednesday was, I thought, well attended, with about 50 people there. I had some new transparencies showing some wing construction details. I hope it was of value to all who attended.

On Thursday, I got to fly in the Homebuilt Review again. It's always fun to fly during the Convention, but you only get to fly for 5 or 6 minutes (two circuits around the pattern). But, it almost didn't happen as the airplane decided to get cantankerous, and didn't want to start at the appointed time. (She's been a little ornery this year for some reason.) But at the last second she fired up, and I managed to get into my place in line

(there were 16 other airplanes) just before it was time for me to launch.

Thursday evening, EAA sponsored the annual Homebuilder's Dinner. If you get to OSH you should go to this event. The food and company are always good and plentiful, and this year, John Monnett was the featured speaker.

John, Betty, and Jeremy threw their Sonex Builders Party on Friday night at their hangar complex across the field from the Convention site. Of course, we Sonerai builders were invited, and we all had a mighty fine time. Steve and Linda Bennett invited me to have dinner before the party, so we had a fish fry and a couple of beers in town. It was a great evening.

I departed on Sunday morning, July 29. I had to wait until around 10:30 for the IFR weather to burn off. I finally launched at around 11:15 toward some dark clouds that looked worse than they really were. The visibility was 4 to 5 miles until I got a little south of Fond du Lac, then the skies opened up to better than 20 miles and I had a nice 45 minute ride home.

But that wasn't the end of my day. Once the airplane was put away, I had to get in my truck and drive back up to OSH to recover my camping gear and Englishman, Malcolm Bennett, who was camping with us. Malcolm needed a ride to Milwaukee so he could catch his plane home to England. I was glad to oblige.

As you can see it was a week of vacation well spent. I just hope I have some Sonerai company at OSH 2002.

## **SONERAI NEWS**

- Yahoo Sonerai Group: Callum Simcoe from Coquitlam, BC sent in the URL for the Sonerai group on Yahoo.com. This is user's group similar to the now-defunct lists.kz that allows you to communicate via email with other Sonerai builders in the group. Signing up is easy and free. Just go to <http://groups.yahoo.com/group/sonerai> and follow the instructions.
- Subscription Rate Increase Coming: As much as I don't want to do it, I've come to the conclusion that starting with the 2002 subscription year, I'm going to have to increase the yearly subscription price to \$14.00 per year. (Those of you who have already paid for 2002, consider yourselves

lucky.) The reasons are basically increases in postage and printing that I've absorbed over the last couple of years. I'd like to thank all of you for your continued support, and I hope to continue the quality that you've come to expect.

- **Sonerai Wing Construction Manual:** It is now available. There are 18 pages of text, 85 photographs, and 12 drawings, as well as a complete materials and a tools list. If you would like your own personal copy, sent me cash, check, or money order for \$25.00. Postage is included.
- **Back Issues: Sonerai Newsletter** back issues are available in two forms. A 3-1/2" diskette which contains most of the significant newsletter articles published by Ed Sterba from 1987 through 1995 is available for a mere \$10.00. There are also hardcopy back issues for \$3.00 each. I have the last two issues from 1994, and all of the issues from 1995, 1996, 1997, 1998, 1999, and 2000. If you want any of the above, send me a note requesting the ones you want and a check for the correct amount. The postage is included.

## FIRST FLIGHTS

I received three more reports of Sonerai first flights since the July-Aug-Sept issue. Congratulations to everyone, and here are the reports:

→ On July 3<sup>rd</sup>, I got this email from Vince Nicely: "After about 4-1/3 years of building, I flew my Rotax 582-powered Sonerai II low wing, stretch, and tricycle geared airplane today. Shortly, after I gain a little more experience, I plan to give you some information on how it flies and a picture or two. Today, I had it to 5000 MSL (airport about 1600 MSL), flew for 1.2 hours and learned enough to land it successfully on about 4000 feet of a 6000 x 100 foot runway where I was testing. Basically it flew OK. There are a few items to fix before the next flight, however.

"The question I want advice about is trimming the wings to fly without a roll tendency. Here are my observations. In the flight speed range of approximately 60 – 100 mph (uncalibrated at this time), I need to hold the stick to the right at all times for straight and level flight. The top of the stick is about 2 – 2 inches right of center. The aileron on the right wing has its rear edge raised approximately 1/2" and the left aileron is down a little. There is still adequate aileron travel that it banked in both directions OK. The ball is centered during these measurements. Does this suggest I need to shim the trailing edge of one wing up or

down? If so, how much would you suggest? I am considering adding one washer to position the left rear spar down 0.065" as a first adjustment. I would like some improvement before the next flight."

[Vince, you are definitely on the right track. You will probably need more than one washer, but keep adding them one at a time until it trims out. Fred]

→ On August 11<sup>th</sup>, I got this email from Ron Romans, a fellow EAA Chapter 18 member, who flies out of the Dodge County Airport near Juneau, WI about Dennis Winkel's first flight: "Dennis Winkel made his first flight of his Sonerai, Friday, August 10, 2001. After the first flight, Dennis was heard to say, 'It must have been OK, I don't need any bandages.' "

Dennis called me that evening with a report. His airplane is now a Sonerai IILT with an 1850 cc Monnett EV VW. When he bought it, it was a mid-wing II taildragger. The only problem he had with the airplane was a tendency for the engine to sputter a little on takeoff. Dennis was using a POSA carb and had filled the tank right to the top. We figured that the sputtering was due to the fuel sloshing into the back of the tank and filling the vent tube, temporarily restricting the fuel flow to the carb. A little less fuel in the tank and the vent tube installed per the plans was suggested.

I flew up to see Dennis the first weekend we were allowed to fly after the WTC attack, and he had a little over 11 hours on the airplane. He had removed the POSA and installed a Zenith float-bowl carb and rerouted his vent line per the plans, and the sputtering had gone away.

→ And on September 25<sup>th</sup>, I got this email from Gary Elliott: "I would like to know if you have carb heat on your plane. If so how did you build it and do you also have an air cleaner that works with it. I sure is a tight fit inside the cowling. I have carb heat for my engine but I don't like it. I have a Zenith carb. Oh yes, I flew my Sonerai IIL for the first time Sunday, September 23. What a ride. It really flew nice. I was a little nervous, but all went well. I will try to write a letter explaining the whole building process. Thanks, Gary.

[Gary, I do have a carb heat of sorts. The "stove" is mounted on the LH rear exhaust pipe and consists of a half box clamped to the exhaust pipe with hose clamps. A stretched extension spring is wrapped around the pipe to help conduct the heat. The warm air is ducted to side of a triangular cross-section air box mounted to the oil pan duct under the engine. The box is thinnest at the front

*and thickest at the rear where it connects to the carb. I use a Briggs & Stratton pleated-paper air filter from a lawn mower engine mounted in the top of the box. The fresh air for the carb then comes thru the "smiley" hole under the spinner. I know this doesn't help a lot, but I'm planning to write an article on it for an upcoming newsletter. Fred]*

## **IGNITION SYSTEM THOUGHTS**

by Bob Barton

*Hey Fred: In corresponding with a new acquaintance about Sonerai's, I put down some of my personal philosophy on VW ignition systems. I thought you might be interested in running it up the flag pole for everyone to shoot at. Bob*

The only reason aircraft engines have dual ignition systems is that they use magnetos, which produce a spark of about 16,000 volts. This compares with an automotive electronic ignition system which produces about 40,000 volts. So, the lower voltage dictates a much narrower plug gap (0.016 in) which is easily fouled. The 40,000 volt system allows a plug gap of 0.035 to 0.040 in. which is not as easily fouled. Thus, the 1930s technology magnetos are all-in-all much less reliable. Ergo, a dual system is required for reliability considerations.

Some people fly VW's on a single magneto. Not me!

Electronic ignition systems are usually sold as the second ignition system with a magneto firing the other plugs. These units do not have an auto-advance feature. They are timed to fire at 28 deg BTDC. This means it has to be turned off when cranking the engine or it will kick back. The magneto is used for cranking because it has an impulse coupler which allows it to fire at 4 deg BTDC initially, and then advance to 28 deg for running.

Steve Bennett helped me get around this problem by selling me a regular distributor, which is driven off the distributor drive, and an electronic ignition unit that is mounted on it where the distributor cap was. Viola! The distributor gives me the retarded setting for cranking, and advance for running.

The VW cylinder head was designed for a single plug. A second hole makes it weaker. Not being an engine designer, I am not positive, but I doubt that a second ignition source really improves the efficiency of this engine.

Now as to reliability: The electronic ignition does require a battery to power it, and an alternator to charge the battery. But, if the alternator fails, its failure is shown on your voltmeter, and you will have plenty of juice in the battery to get you to a safe landing.

The only other feature that you may consider a drawback is that the unit sticks up through the cowl, so you will have to make a fiberglass "beauty bump" to fair it in.

But there is a very real benefit: Eliminating the magneto will save you several pounds, and that is important on the Sonerai.

Now, all of the above assumes that you are not a mechanical engineer specializing in engine design.

*Freditorial Comment: One the neat things about the VW engines we use on our little airplanes is the number of different types of ignition systems we have to choose from. I, for one, have the magneto/electronic secondary combination on my 1850, and it has worked quite well to date. I was one of those crazy people who flew with just the mag prior to installing the Great Plains secondary. It's amazing how one's increasing age makes one more aware of his mortality, and the need for redundancy in one's ignition systems. I did find after installing it that the secondary did increase my engines performance. With everything else being constant, turning on the secondary increased my engine speed by 200 rpm.*

## **MOTOR MOUNT Q & A**

Q: Good afternoon Fred, I am building a Sonerai I with a 2180cc eng. using the Great Plains X casting. The details of this "critical assy" is not clear to me. Please help me by answering these few questions:

- What should be the exact dimensions of the steel tubes going thru the "Lycoming bushings" and what material should I use?
- What size (OD and thickness) of "large washers" should be used in this assy?
- What torque should be applied on the 4 mounting bolts and nuts?

Thanking you in advance, Michel Roby.

A: *Michel, Good questions about the motor mounting process:*

- 1) *The steel tubes that fit inside the Lycoming motor mount bushings are made from 1/2" O.D. x .058" wall 4130 tube, or 3/8" I.D.*

- mild steel bushing stock. It's not critical. These tubes should be 1-1/2" long.*
- 2) *The 8 washers that mount on both sides of the rubber bushings can be AN970-6 large diameter washers, or Lycoming #STD619 engine mount washers (in the latest Aircraft Spruce Catalog, page 246). I used the Lycoming washers because they are about three times thicker than the AN washers, so they won't bow when you torque up the motor mount bolts.*
  - 3) *Use 175 in-lbs of torque on the motor mount bolts. You want to draw the rubbers down until the washers contact the 1-1/2" long steel tubes inside the rubbers. Fred*

### **ALTERNATE SUPPLY** by Bill Craft

An alternate source for Sonerai building supplies: I found that some items are just plain difficult to find while building my IILT. I came across a non-aviation source for some items:

McMaster Carr  
P.O. Box 4355  
Chicago, IL 60680-4355

Plant Location:

600 County Line Rd.  
Elmhurst, IL 60126-2081

Sales Desk and Customer Service:  
(630) 833-0300  
[chi.sales@mcmaster.com](mailto:chi.sales@mcmaster.com)

That snap plug for the gas tank: 2598K34 Quick Snap Test Plug, 2" Pipe Size, 1-3/16" Body Length; \$15.32.

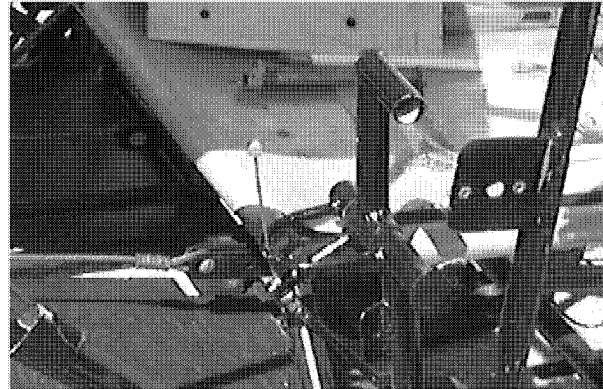
IILT items: 6338k483 Bronze flanged bearings for 1 1/4" shaft; \$3.50, and 5909k65 Needle roller thrust bearing 1 1/2" diameter; \$2.60.

I modified the plans and did away with the rubber bumper for the front nose wheel tube. Although I found a good source for the rubber (86335k36, 1/2" thick skirtboard rubber sheeting - a 1 foot piece would make many bumpers), I decided to use a spring like the Sonex. McMaster has a spring used for mounting dies that comes in various sizes and weights. I picked one that was 1 1/4" inside diameter and about 4" long, takes about 400lbs to compress 2" (96485k384 Hard-Drawn Steel Jumbo Compression Spring 4" Length, 1.937" OD, .312" Wire \$9.00). You can find everything in their catalog on the web, complete with pictures.

I also made toe brakes on the rudder pedals. See the attached picture.

I have reached an impasse right now. I'm trying to figure out how to get intake and exhaust in the same area behind the engine. I wished I had taken closer pictures of your plane's engine compartment at S-N-F. I know that it can be done since I had seen your plane. If it weren't for that, I would be sure it was impossible.

Bill Craft  
Fallsington, PA  
[Billc851@home.com](mailto:Billc851@home.com)



**Bill Craft's Brake Pedal Set-up**

### **WEIGHT & BALANCE HELP**

by Dave Wilcox

I've had numerous conversations with builders that need some help with weight and balance. I've created the attached instructions to help. The instructions include procedures for both nose and tail wheel aircraft. That may have added extra confusion. What do you think? Should I write two separate procedures? Any other suggestions?

*Dave, I think your procedure is great, and easy to understand, particularly with the graphics. The procedure makes up the last two pages of the newsletter so that it can be separated and copied easily. Fred.*

*Happy  
Holidays,  
Everyone*

# 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.*

TAPER PIN REAMERS FOR FREE LOAN. Brown & Sharp #3 and #5 for AN386-3 and AN386-5 taper pins. \$150 deposit, shipping one way ~ \$5. Free loan for 14 days, \$2 per day after that. David E. Wilcox, 517 E. Saratoga St., Gilbert AZ 85296.

**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)

For Sale: Used Bogie tailwheel and Monnett tailwheel caster with 2-5 1/2" springs (needs the chains) \$25.00, New unmachined Monnett "Electro X" casting \$100.00, Used Monnett Sonerai I fuel tank (needs cleaning) \$55.00, Used pair of axles, 3/4" shaft, 5 3/4" long \$4.00, Used fuel shutoff valve \$5.00, Used set of rudder pedals asm. with toe brakes (see Sonerai I drawing page 11 and 15c) \$20.00, Used Sonerai I torque tube asm, (see drawing page 5) \$40.00, New (4) 87.5 cylinders and pistons \$75.00. You pay the shipping. Bob Schank (734)697-7057 (2/00)

For Sale: Sonerai IILTS w/ Great Plains 2180 cc, 95% complete, excellent workmanship, \$13,000. Chris Mullaney (301)872-9308 (2/00)

For Sale: Revmaster 2100 w/ dual Bendix mag, starter, Revflow carb, oil cooler, prop (56x45), approx 400 hrs,

came off KR-2, \$2000, Doug Evenson, dwevenson@cs.com, (706)327-4601(H), (706)888-4602(cell) (4/01)

Wanted: 20 amp Syncro magnet ring for HAPI 1834 VW engine and 20 amp Syncro stator for same. Must be in perfect condition. Ken Christian (660)263-7937 (1/01)

For Sale: Sonerai I Project - Std. Wing done; welded fuselage, tail surfaces, controls, on gear; 1600 VW w/ SuperVee mount; canopy; cowl; wheel pants; aluminum tank; \$5000 OBO, John Ricchio, (708)447-0448 (4/00)

For Sale: Complete landing gear from Sonerai II, including Condor tires, Goodyear inner tubes, Azusa brake system, 3/4" tapered bearings. Off flying Sonerai, in excellent condition, \$400 Call Ron (301) 390-7705 (1/01)

For Sale: 1978 Sonerai I restoration project. This is a previously flying aircraft with a valid airworthiness certificate. On gear, nearly complete. Everything sandblasted, primed and painted. Fuselage and tail feathers covered and primed for color coats. Wings, ailerons, and wing tips ready for painting. New instrument panel with new/TSOed instruments. Brakes installed and bled. All controls and fuel system are installed and working. All that remains to do is to install a new canopy, sand the cowl, paint it and put your engine in the place of mine. Price is \$2500. [jholgate@bellsouth.net](mailto:jholgate@bellsouth.net) (3/01)

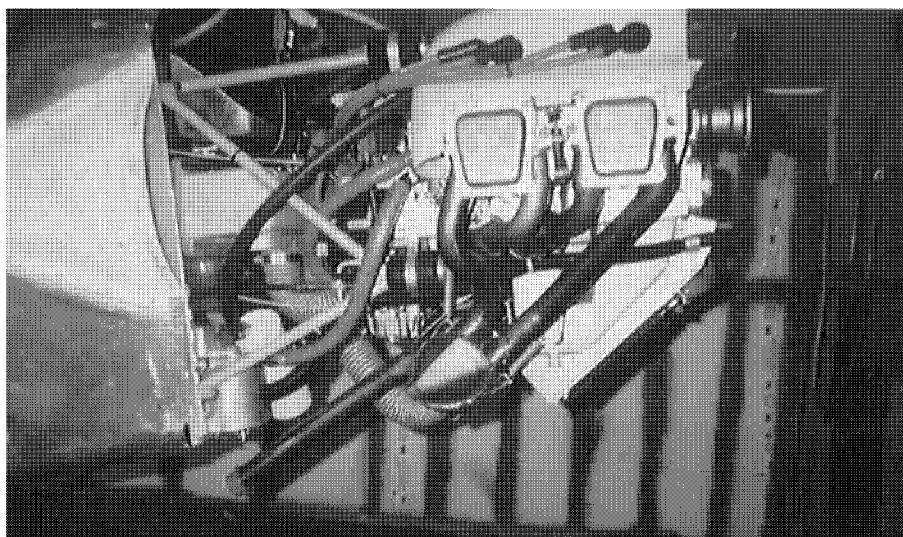
For Sale: Sonerai IILTS (low wing, tri-gear, stretch) fuselage for sale. The engine mount is for Diehl accessory case, \$5500, but includes landing gear and hydraulic brakes – which is a \$6500 value. Call Steve at (402)493-6507 for more info. (3/01)

For Sale: VW Engine/Parts. Priced to sell complete – only \$600. or individually as needed. NEW: single port cylinder heads, 92 mm pistons & cylinders, valve covers, & x-casting. USED: engine case, 1835 cam, stock 69 mm crankshaft, & other misc. parts. Call after 7:00 PM. Dan Bernard, 785-483-6812 (4/01)

For Sale: Sonerai II Stretch fuselage, prebuilt spars, ailerons, Monnett ribs, fiberglass cowl, wing tips, & wheel pants, nosewheel, tailwheel, canopy. \$5800. Call Steve Garn, 336-877-0318 (4/01)

For Sale: Sonerai IIL fuselage, professionally welded, on gear, set up as taildragger. Bolt kit and lots of parts included. \$2500 or trade for complete Continental A65 or A80. Jeff Huson, 502-857-2218, [jeffsbajos@aol.com](mailto:jeffsbajos@aol.com) (4/01)

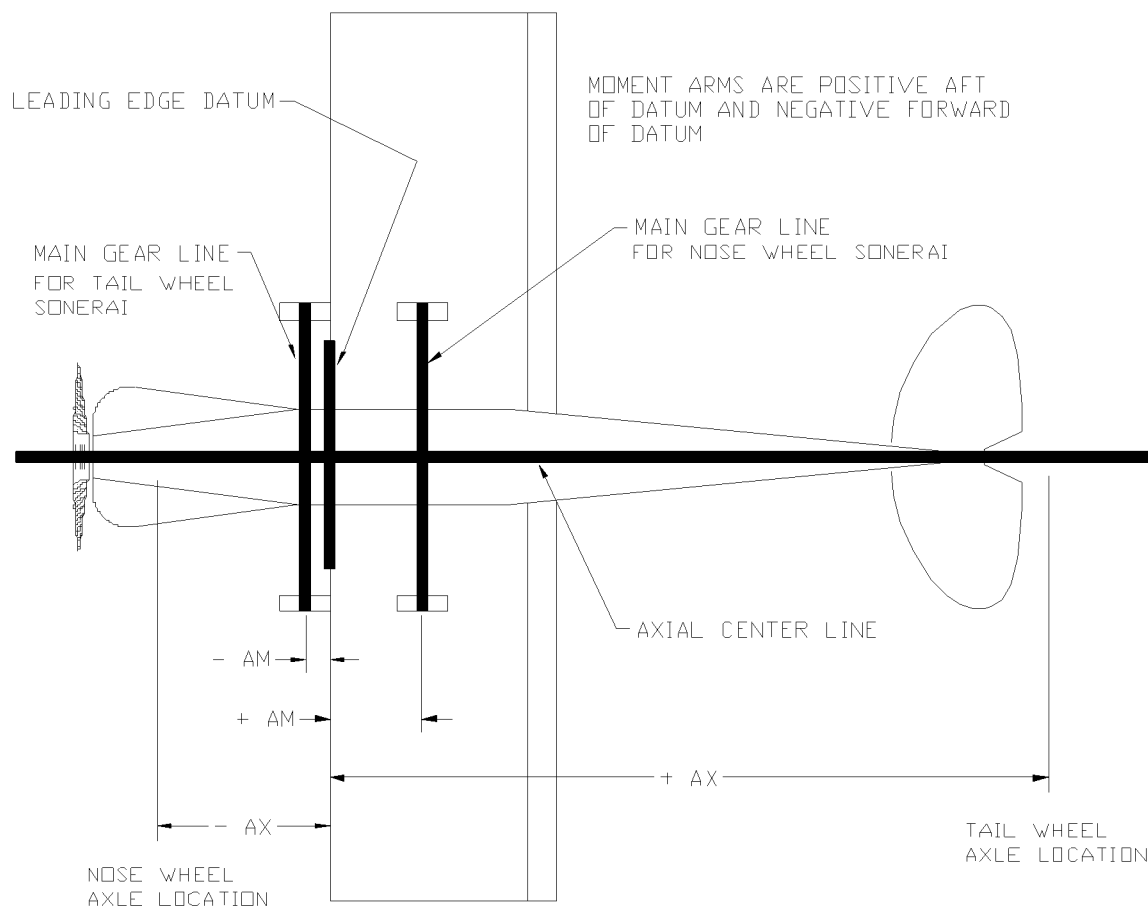
For Sale: Sonerai II Mid-Wing, minor ground loop damage, new prop, new cowlings, supercarb, 1850 EconoVee, all major parts. Pictures available email. \$2500. Jack Hall, 760-949-6999, [jhall6980@aol.com](mailto:jhall6980@aol.com), Southern California (4/01)

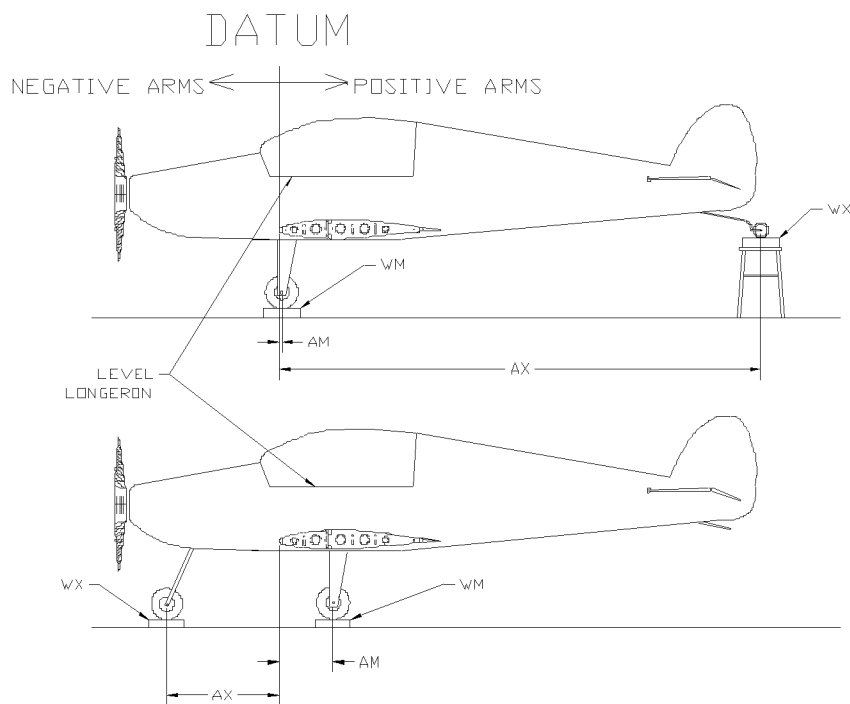


Kevin Wintergreen's Jabiru Installation

## Weight and Balance Calculation for the Sonerai Aircraft.

1. Drain all oil and fuel. Remove all items that are not part of the aircraft. Undrainable fuel and oil are normally part of empty weight, therefore a dry engine sump, oil cooler, or fuel tank should be filled and then drained using normal maintenance procedures.
2. Positioned the aircraft on three scales.
3. Level the aircraft by adding shims under the scales. Tail wheel aircraft will require a stool to raise the scale for the tail wheel. Place the level on the upper fuselage longeron.
4. Using a plumb-bob and a piece of chalk, transfer engine centerline and tail centerline locations to the floor.
5. Use a carpenter's chalk line to connect the engine and tail points creating an AXIAL CENTER LINE on the floor.
6. Transfer the right and left wing leading edges to the floor using the plumb-bob and chalk.
7. Snap a chalk line through the leading edge points on the floor and label it DATUM. Write the word POSITIVE on the axial center line between DATUM and the tail of the aircraft. Write the word NEGATIVE on the axial centerline between DATUM and the engine.
8. Transfer the main gear axle locations to the floor.
9. Snap a chalk line through the axle points and label it MAINS. If you have a tail wheel Sonerai, the MAINS line will be forward of the leading edge by about one inch. If you have a nose wheel Sonerai, the MAINS will be aft of the DATUM by about 19 inches.
10. Measure the distance between the intersections of the DATUM line and the MAINS line. This is dimension AM, (arm main).
11. If the MAINS line is aft (toward the tail) of the DATUM line, AM is positive. If the MAINS line is forward of the datum line AM is negative. Record AM on the work sheet.
12. Transfer the tail wheel or nose wheel axle point to the AXIAL CENTER LINE on the floor using a plumb-bob.
13. Measure the distance from the DATUM to the tail or nose wheel position as applicable. This is dimension AX, (arm, tail or nose X). AX will always be positive for a conventional gear aircraft and AX will always be negative for a tricycle gear aircraft.
14. Perform the calculations in the examples to assure you arrive at the same empty weight CG (rounded) before calculating your own numbers.





#### EXAMPLES

CONVENTIONAL GEAR  
 AM = ARM MAIN = -9  
 WM = WEIGHT MAIN = 530  
 AX = TAIL ARM = 168  
 WX = WEIGHT TAIL = 30  
 CGE = 8.15

TRICYCLE GEAR  
 AM = ARM MAIN = 19  
 WM = WEIGHT MAIN = 477  
 AX = ARM NOSE = -32  
 WX = WEIGHT NOSE = 137  
 CGE = 7.62

15. Record weights of the two main scales. Add together and record as WM, (weight mains).
16. Record weight on tail or nose wheel scale. Record as WX, (weight nose or tail).
17. Double check that all arms forward of the leading edge are recorded as negative and all arms aft of the leading edge are recorded as positive. Remember that when a positive number is multiplied by a negative number the resulting product is negative.
18. Multiply AM by WM and record moments as MM, (moments mains).
19. Multiply AX by WX and record moments as MX, (moments nose or tail).
20. Add WM and WX to get WE, (weight empty).
21. Add MM and MX to get ME, (moments empty). Remember to subtract if moments are negative.
22. Divide ME by WE to get CGE, (empty center of gravity).

## SONERAI W&B WORKSHEET

N# \_\_\_\_\_ DATE \_\_\_\_\_

empty center of gravity (CGE) =

total moments (MT)

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total weight (WT)

arm main (AM)

weight main (WM)

moments main (MM = AM x WM)

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arm tail or nose (AX)

weight tail or nose (WX)

moments tail or nose (MX = AX x WX)

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total weight (WT = WM + WX)

total moments (MT = MM + MX)

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empty center of gravity (CGE = MT / WT)

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