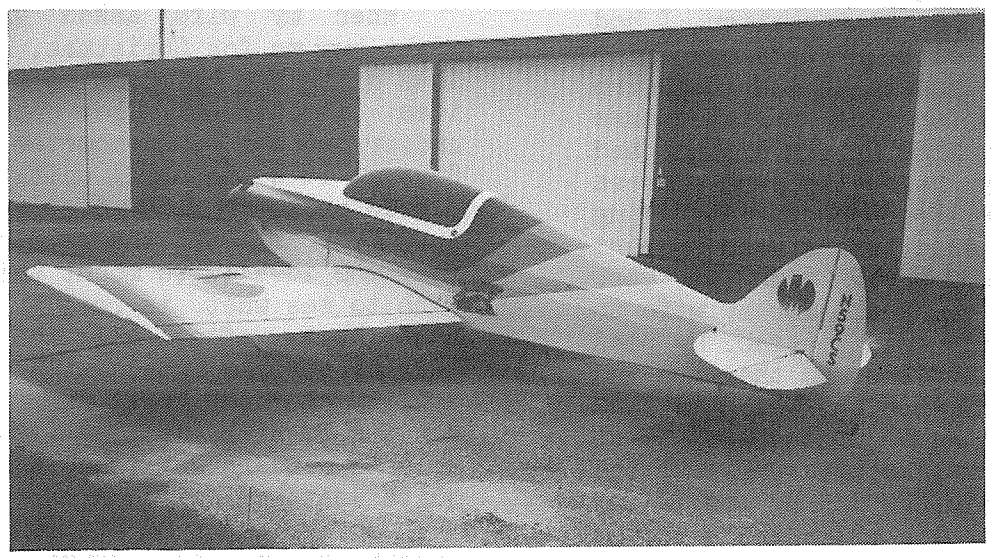
SONERAI NEWSLETTER

APR-MAY-JUN 1991



Chuck Stottlemyer's Wright Brothers Award winning Sonerai IIL "Mouser". I don't remember how long he has been flying it but it's been quite a few years. Chuck also has a Pitts painted to the same color scheme which goes from a dark blue trim through green into tan.

We love the change of Seasons !!!

Welcome to the Spring issue of the Sonerai Newsletter. I spent the better part of this past weekend getting N78ES back to Lake Lawn Airport, attaching wings and stabilizer and doing the last of my Annual inspection. After 3 months of flying inactivity it felt good to get back in the saddle again. Sun N Fun is a month away so it helps to be a bit current before heading into less familiar airspace. We hope to see a few of you there.

Aside from Sun N Fun we would like to start off the Midwest Sonerai flying season at the Sterling/Rock Falls fly-in breakfast again this year. I forgot exactly how many Sonerai's showed up last year but it was fun. I don't have the exact date either but it probably will be on June 9th, Sunday.

Sun N Fun Activities

We have a Sonerai Forum scheduled on opening day Sunday at 9 AM. This is the first available forum time so it might take some guts to get there so early. We did want to schedule it before our Sonerai Dinner which is tentatively scheduled for Tuesday night. Dean McGinnis, our local Sonerai enthusiast has set things up again this year for us. We'll have details at the Forum or contact me on the flight line or Steve Bennett at the Great Plains booth.

Dean also reports that he is trying to convince the Sun 100 Race people that there is enough interest to have a Volkswagen powered category. Last year the VW's were in with O-200 powered Tailwinds which have proved to be quite fast, not really in our class you might say. We'll have to wait and see about that. A few extra VW's might make it hard for them to ignore us.

Oh say, can you see?
...by the lor--an C.

I had planned to buy a hard drive for my computer this year, but then Fred Keip called to talk about Sun n Fun and his Loran came into the conversation. I had received a few outdoor catalogs from Cabela's, Gander Mountain and Bass Pro Shops that were showing the Interphase Pilot Lorans for $250.00. Interphase and Azure apparently have the same address out in California. Fred has been flying his Interphase loran for a year or more and has been very happy with it. Step 2 was to go look for a van for my wife to replace our 12 year old Pontiac. My plan was to go look at vans and then buy the Loran at Gander Mountain, which we did, but then we also ended up one week later with a new Aerostar, so in some ways the loran cost over $10,000 in the end. A lot of you know how that goes! She's happy, I'm happy.

The Pilot is mounted with the included mounting bracket to the main spar box in a nice location. I did forget that my main spars extend all the way together, so I had to cut a notch in the right spar plate to accommodate mounting bolt heads, but it was very easy overall. My unit takes 12 - 14 volts while Fred's has an internal battery and is therefore a little larger overall. In the first few flights everything seems to be working well. I mounted the antenna preamp in the bagage compartment and threaded in a replacement Ford car antenna bent back to look like a real airplane antenna and the reception here by the Great Lakes is almost maxxed out on the Noise to Signal status mode. I don't know if this unit reacts much slower than an aircraft one, I have limited experience with other types, but so far it looks pretty good.

I'm usually about 5 to 7 years behind the normal trends in sport flying so this will be old hat to a lot of you, but the price finally became hard to pass up. Of course this means that after 12 years of Sonerai cross countrys I will most likely get lost good heading South next month and end up in Nebraska (but at least I will know how much farther I have to go and when I will arrive). Also, is it true that when you fly inverted, the Latitude switches from North to South? Maybe I read the booklet wrong.

Carb Air Temperature Probe

When my wife asked what the kids might buy me for Christmas, I thought of lots of things but came up with one small item of interest. They bought me an indoor/outdoor thermometer from Radio Schack. It's the small unit costing about $15.00 with a LCD display and about 6 feet of cable to the remote probe. Anyhow, the idea is to mount this in my Posa Carb to see what is really happening in that unit after all these years of telling people that with the Sonerai cowling and the Posa carb and 100LL, we don't need carb heat. I've never been able to discern any ice but haven't known quite what was going on in there either.

So it came time to mount the probe somewhere in the induction assembly. I have already drilled and tapped into the "Y" casting for my vacuum gauge and was prepared to do that again, but after the cowling was off, I remembered an Allen screw in the Posa itself that didn't seem to be used for anything. It is right above the slide assy. on the side. Once removed it proved to be just an opening into the throat. So, I used a 100 degree countersink to remove some of the excess threaded area and was able to just thread the plastic sleeve of the probe into the opening until it protruded about 1/8" into the throat. Not trusting the plastic to hold itself in place during a backfire, I also wrapped safety wire around the "Y" casting and the probe for a better mechanical bond. It seems safe although a real induction fire on the ground probably would make an inspection necessary.

So, today I was able to get the old Sonerai back to the airport, install the wings and get some airtime. It was a beautiful day with about 35 degrees OAT and no moisture to speak of. Before starting the gauge read about 23 degrees since we had a low overnight temp. Immediately after engine start it went to 16 and then began to climb back up. The gauge has a 15 second cycle so you don't get an instantaneous reading but it can jump 10 degrees at a time or more. So

with the engine slowly warming up as I got everything squared away, it was showing about 34 degrees by takeoff time. Once in the air where I estimate the OAT to be about 25 to 28 degrees (the remaining frost on the wings didn't come off for about 20 minutes), it stabilized at 46.5 degrees and really never varied. I pretty much kept the power at about 3000 RPM and 6 inches vacuum so can't relate it to power output. A second flight this afternoon with the OAT at about 40 degrees gave a reading of 54 degrees CAT.

So now I have one more gauge available to play with in my never ending quest for the first Glass Cockpit in a Sonerai. So far it looks like our cowling warmed intake air is doing a pretty good job keeping about a 15 to 20 degree increase over ambient temps. Since we have no venturi to cause a pressure and temperature drop in the manifold, maybe our reasoning will prove to be sound. The next step is to see about flight in very moist conditions (read that as the trip to Sun N Fun) and then this summer to see just how hot that air is going into our Osa and how much power we are losing for running hot air all the time. Stand by for further results ... .

High Altitudes with Bob Brown

68 Sycamore Ln.
Crystal Lake, IL 60014

Dear Ed,

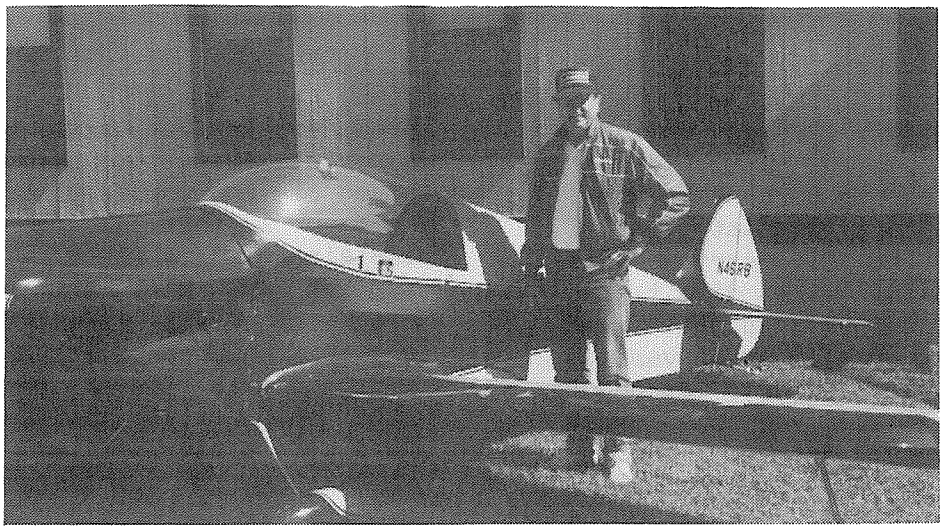
Dave And Cissy's Adventure in the last issue of the Newsletter was very interesting first of all because I know them and secondly because I've had my Sonerai IIL 2180 up to 10,500 feet. I was solo and it took just over 20 minutes as I recall. It also took 20 minutes to get down as I tried to maintain CHT by keeping some power on. At 10,500 my rate of climb was about 200 FPM. I could have zoomed higher but did not elect to explore that area, instead I checked my max. IAS and it was 120. Not bad for a low powered homebuilt.

I thought I might expand on your mention of "coffin corner". As everyone knows, the air flowing over the top of the wing goes faster than the air under it, thus some of the lift of the wing is produced. In a high performance jet aircraft, this top airflow reaches the speed of sound before the aircraft does. At Mach 1 (that is the top airflow not the aircraft) a shock wave forms on the top of the wing and causes a high frequency buffet (as opposed to the much slower frequency of a stall buffett). The airspeed that the aircraft is doing when this happens is called the "critical Mach". In the B727 (that I fly) this is around Mach .90 depending on the altitude and air temperature.

As the aircraft climbs higher the stall speed increases. It is possible to climb high enough so that the difference between the stall speed and the high speed buffet is just a few knots. As these come closer together you end up in the upper left hand corner (coffin corner) of the chart. It is possible to fly in this area in smooth air, however, problems arise if you hit turbulence. At about 1.4 to 1.5 G's in turbulence your stall speed is increased to cause a stall, the nose must be lowered and speed increased but this increase causes a high speed buffet. The airplane will descend either immediately by pilot input or out of control if left for very long. It is also possible to start this problem by banking too steeply in a turn.

Anyway, I really love my Sonerai. I have just over 250 hours on it now and look forward to flying with you this Spring in Door County. I would be glad to host a fly-in to Cherryland Airport this Spring. It would be great to get a bunch of Sonerai pilots together. I can put up about 12 guys at my place on Lake Michigan if they want to make it overnight.

Ed's comments -- In standard day conditions at 10,500 ft. your indicated airspeed of 120 mph trues out to about 140 TAS. I don't normally fly that high but have on one or two occasions, it takes a while to get there. There was one time I think I saw that shock wave form when I did a split S out of a roll from 6000 feet. Things were happening too fast to be sure if it was a shock wave or just plain shock itself, they feel the same to me. It would be great to get up to Bob's place this spring, any takers?



Bob Barton's Experience

When Mel Lamb wrote about his experiences with his Sonerai II, he said that at max gross weight the airplane was "a little quicker". When I read that, I wondered exactly what he meant.

Obviously, the indicated airspeeds for the lift-off, stall, and approach would go up by the square root of the ratio of the weights. But unless he got a big movement of the CG, then the stability of the little bugger would be the same.

Well, I found out what he meant. I decided, during N46RB's test period, to ballast it up towards it's max weight to see how it would handle it. Rather than endangering the life and limb of some innocent, gullible passer-by, I strapped an old tent, which was packed into a duffle bag, into the front seat. I figured this would raise the takeoff weight to about 800 lbs.

On the ensuing take-off, I found out exactly what Mel meant by "quicker". Just as I lifted the tail, at about 40 kts., my little steed hung a left turn. Before I got to the edge of the runway, I tromped right rudder and immediately veered to the right.

I must have been going about 50 kts. by this time and decided that me and the runway weren't getting along too well, so I hauled back on the stick and staggered off the ground. At this point the engine protested with a hic-cup and I sank back to an altitude of 8" Above Ground Level. After that things improved. The engine resumed it's normal operation and I proceeded around the pattern to an uneventful (though slightly squirrelly) landing.

You may wonder how I remember these details so accurately and vividly. The reason for that is that Greg Jannakos was there, video-taping some of my takeoffs and landings and he got it all on tape. I must give Greg credit for the courage he exhibited during this episode. Though he made some embarrassing noises, never once did he dive to the earth or turn and run away.

Looking at the plane later, it was obvious that the extra weight had caused my 1/2" landing gear to splay outward, increasing the negative camber of the wheels. Before I flew again, I made and installed some tapered shims to straighten the wheels up about 5 or 6 degrees per side. Since then I have had no handling problems that I can fairly blame on the Sonerai. I recently took a 205 pound passenger up and it handled beautifully. Never the less, I can't get that old tent to go near the airplane again.

Bob Barton 3333 Hidden Acres
Doraville, GA 30340

Ed's comments -- I feel it is a wise decision to approach the max weight of the Sonerai part way at a time. My weight was a duffle bag of stuff to make about 50 lbs. It wasn't as great a change as taking my wife as a first passenger but did help. She still enjoys flying the Sonerai as much as my duffle does.

The hiccup on take-off may very well have been the result of a steeper than normal pitch-up on the low speed take-off. If a Posa type carb was installed then the chance of causing fuel to backflow out the fuel vent line and create a suction on the fuel line is pretty great. It has certainly happened to me and may again if I overfill the tank. At least we should all be aware of it. How do you stop the hiccup? Lower the nose, friend.

A Letter from Mica Doane

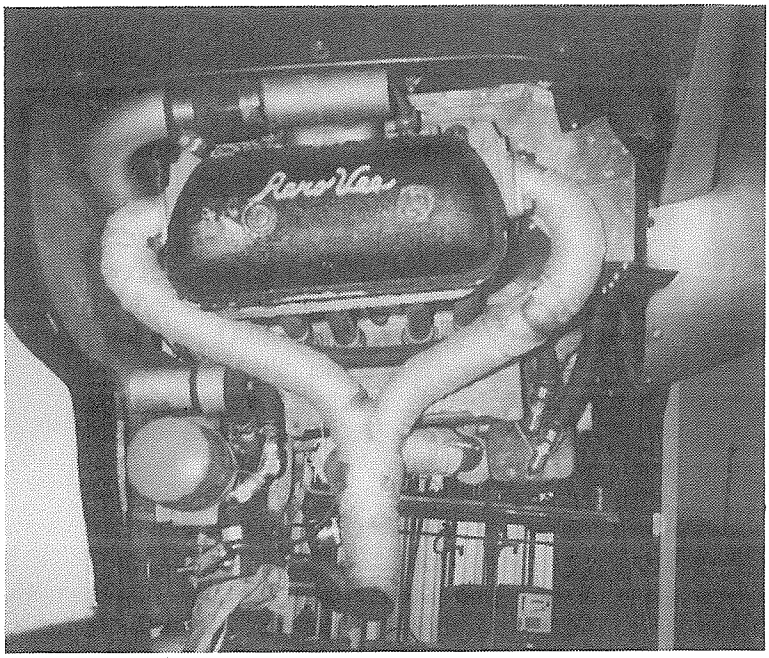
Rt 2 Box 82 Meno, OK 73760

I just wanted to write and describe a couple of recent modifications to my Sonerai II that have improved the performance a little and made life (and landing approaches) a lot easier.

The first mod is to the pitot/static system, and is pretty simple - I don't know why it took me so long to think of it. My airplane was built with the static line hooked into the wing-fold support tube in the aft fuselage (as per the plans) but the airspeed always read way too high. It was impressive to see 160 mph in level flight, but anything below about 80 mph felt really mushy and made it hard to set up a good approach. I tried venting the system into the cockpit, which brought the IAS in line with what I expected, but the readings would jump 5 mph as I opened or closed the fresh air vents. So, I went back to the original system, but I made a couple of plugs from 3/4" nylon rod to fit snugly into the ends of the support tube and drilled a 1/32" hole in each to restrict the rush of air through the open tube.

This stabilized the static pressure by doing away with the venturi effect in the open tube. My airspeed readings are now consistent throughout the range, and seem to be fairly accurate (I usually cruise about 135 mph @ 3200 rpm, fly approach at 75 mph solo and show about 50-55 at the stall.)

The other modification I made was a four-into-one exhaust system, built from 1 1/2" O.D. V-bends (ordered from J.C. Whitney for about $2.00 each) ending in a 2 1/4" O.D. collector. My cowling has a fresh air scoop in the center, to feed fresh air to the Posa, so I wasn't able to dump the exhaust outlet straight out the bottom like I wanted to. Consequently, the tubes from the left hand cylinders are a little longer thatn those on the right, but even so, the system breathes well enough that I had to richen my Posa 2 turns on the needle. I picked up 3 to 4 mph top speed and the noise level in the cockpit was greatly



reduced. The engine even seems to idle smoother. In order to keep the heat down in the cowling, I wrapped the exhaust tubes with insulating wrap, (also from J.C Whitney) which seems to work pretty well, so far I haven't scorched anything or had any vapor-lock problems.

By the way, I really enjoyed Dave Allen's letter in the RE-UP notice, I can't wait to go whip up on the T-38's from the nearby Vance AFB; maybe a nitrous oxide system would take the place of afterburners?

Ed's comments -- Mica, I still have my static system vented into the cockpit and yes it tends to jump the altimeter and airspeed in turbulent air. I plugged the holes in both instruments with a pipe plug but drilled a small (1/32") in the plugs to slow the movement of air in and out. Your method is better, I'm sure.

As long as your temps. stay in line, then the longer pipes will probably help in controlling corrosion problems on the exhaust valves by restricting moisture up there. I assume anyone flying Mogas would be more prone to vapor problems. Some people say that wrapping the pipes may cause corrosion to the pipe by trapping moisture when the airplane sits, but the idea of building a Sonerai is to fly more often at less cost, right? So maybe that won't a problem. Don't let it stay on the ground too long!

Baked Hams a la Sonerai

by Al Bertelmann
2481 Tettersol Dr.
Harvey, LA 70058

A frequent complaint of my infrequent passengers was of being fried by engine heat past my firewall seal. After numerous fixes ranging from the exotic to the sublime, I have settled on a Mickey Mouse solution which seems to have cured the problem.

One point first, I have installed cylinder shroud boxes which provides better cylinder cooling, but also lower cowling over pressure. Our thin cowls tend to bulge at higher airspeeds making firewall sealing difficult. I suggest either cylinder boxes or numerous retaining screws around the cowling at the firewall seal; ugly but effective.

Anyway, the firewall seal:

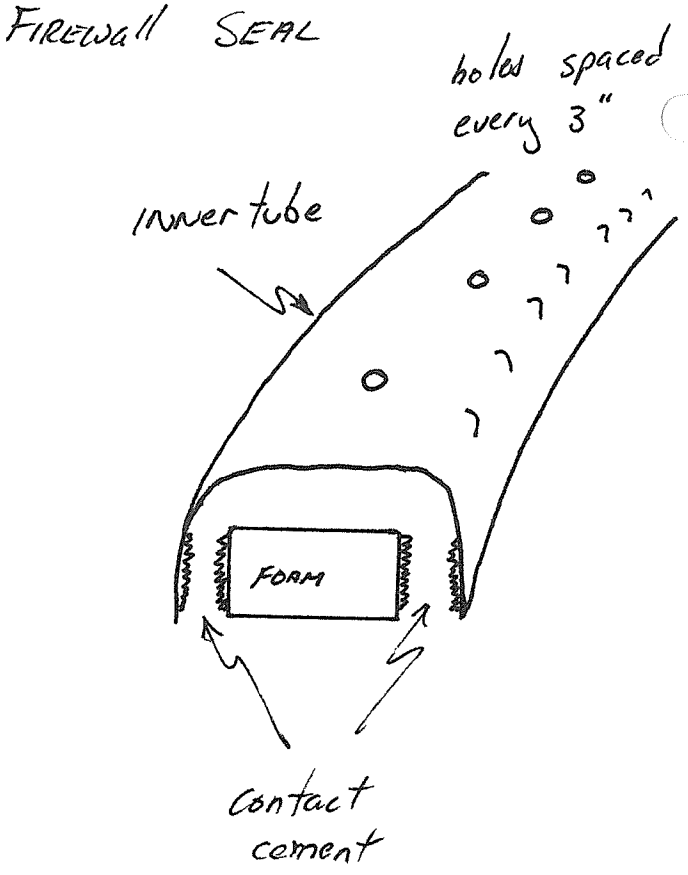
1 bicycle innertube 27" x 1 1/4"
1 pkg. air-conditioning weatherstrip
(1 1/4 x 1 1/4 x 42")
1 can contact cement
1 hole punch made from 1/4" tubing

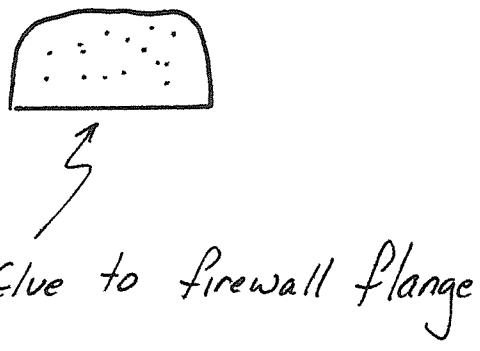
The weatherstrip foam can be from another source but it should be light density. Using scissors, cut the inner tube in half at the valve stem and throw the stem away. Cut the inner tube open all the way around at it's inner diameter and wash the talcom powder out of the tube. Cut the foam in half lengthwise and glue into one long length (now 1 1/4" x 5/8" x 84"). Punch holes in the inner tube every 3" down the center along it's length. This is to allow air to escape the seal when compressed by the cowl.

Put contact cement on the edges of the foam and let dry. Reglue foam edges and innertube sides as shown and press together. Double glue bottom of seal and firewall flange and install seal.

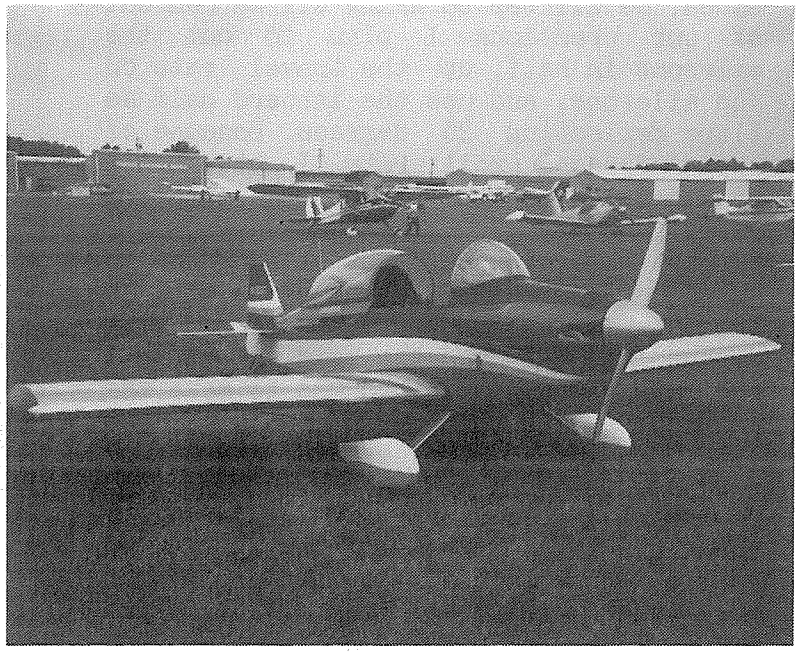
Ed's comment -- Al lives in a rather warm climate which may account for his passengers being crabby when flying in his Sonerai. That may be part of the problem, but it is warm in the front seat of most of our Sonerai's so sealing the firewall will surely help. Of course the other reason to have a good seal is more serious -- keep any flames that may occur on the forward side of the firewall. I wonder how many of our firewall's would pass that test?

My seal is made from asbestos tape glued on with silastic rubber, it has held up well for the past 12 years even though a bit oil soaked down by the carb area. As to how well it seals when flying at high speeds, it is a bit hard to tell when in the air.





A letter from Fletcher Burns
514 B Jerstad Ct.
Andrews AFB, MD 20331



I don't recall asking for your Newsletter but I sure do appreciate it. I've been flying my Sonerai IIL since May '85. As you can see, I put the big canopy on it but made it slide on telescoping rails. It gives it more of the fighter plane look and I can fly with it open 6" or so. The funny thing is that the faster you go, the more it wants to close itself!

It's powered by a 2180 mostly Great Plains engine. I should say it was powered by a VW, right now it's sitting in my garage with a Cont. A-75 on the nose waiting for me to make a new cowling. Some interesting facts were learned during the swap. The VW engine with dual ignition, fuel pump (for the wet wings) counterweighted crank, remote cooler and filter all ready to fly weighed 172 lbs. The Cont. A-75 all ready to fly weighs 175 lbs. and since everything is in back of the engine, (both mags, oil pump, timing gears, oil sump) the C.G. is farther aft than the VW's and it appears the weight difference in props is going to put me right back at my old C.G.

As you can see from the picture, my wings are thicker than normal. After a bent wing on my way to Oshkosh (that's another story in itself) and all the stories about wings folding in flight, I came up with a 15% thick airfoil from Harry Riblett and I love it. I don't think it's slowed me down at all. I've sandbagged them down to 9 G's static without a wrinkle. Thicker is stronger. This is a general aviation airfoil not a pylon race airfoil. It lands much softer now, climbs better with 2 aboard and the roll rate really improved (although it didn't need to). I even tapered the spar down to where it all slides into the stock spar carrythru. Incidently, I used the spar carrythru to support the wings in my 9 G testing at 800 lbs. gross weight and since 4.5 to 5 G's is all I care to take, I have a good safety margin. I do need to make new wing tips though, the stock ones are stretched to the limit. Also I'm using straight bolts in the carrythru because I can't find the right taper reamer. Does anyone have a reamer I could rent? I have the pins which are threaded.

This airplane has been a lot of fun and has truly been experimental. The FAA has been very good to me, especially with the new wings. I've wanted to build my own plane since high school and even joined the Air Force as a sheetmetal man to learn how they were built. That was 13 years ago and both the Air Force and I have benefited from my enlistment. I've fixed every broken airplane they have thrown at me and I got to build my own airplane. 7 more years and I can retire.

If anyone has any questions about my modifications, have them write me. And use this letter any way you want and please add my picture to your collection.

*** Fletcher's second letter ***

You mentioned flaperons. Other than the structural advantages of the thicker wings, my main purpose in picking the airfoil I did is it's improved reaction to a control surface on it's trailing edge. This was really confirmed with the increase in roll rate. My next step is to put flaps on it to further improve the

climb and shorten landings. I told you this airplane was very experimental. Besides, we all try to wring all we can out of our creations. I plan to cut the ailerons in half, up the travel rate on the ailerons, and use the inboard half as flaps deflecting 25 degrees. Because of the increased roll rate I have now I should be able to return to my stock rate.

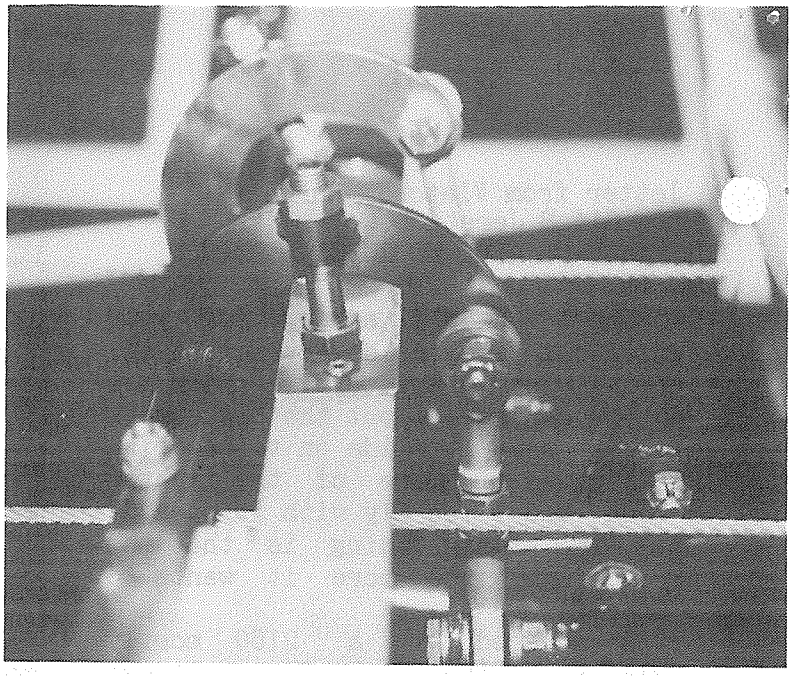
Long ago I put a set of wings on it which were 10 feet each panel hoping to increase my climb rate, but I was very disappointed. I used the original airfoil and all I accomplished was to make the plane difficult to fly. Adverse yaw was terrible and it refused to sink out of ground effect on landing, it just sort of fell through, it never did land right. I thought about just cutting off 2 feet on each side but then I read that book and I just had to see what a new airfoil would do. I also failed to mention that the thing turns on a dime now without the stick shaking. This would probably help those pylon race types, but mine is a sport plane and this wing really helped. Now for the new engine, then later the flaps and then who knows, floats?

Ed's comments --- Well, Fletcher's Sonerai has had an interesting life so far. The book that he mentions is by Harry Ribblett for anyone concerned, you will have to contact Fletcher to see what he used and where it might be available. I haven't experienced any stick shaking in turns, but maybe I don't turn that fast?

Other people have gone to Continentals before so his should be a good comparison. Quite a few of you folks have asked about wing tip extentions, so here is some info to consider in that vain. Maybe they aren't the way to go after all we find.

Comments from Dick Morrow
418-24th Ave. Ct.
E. Moline, IL 61244

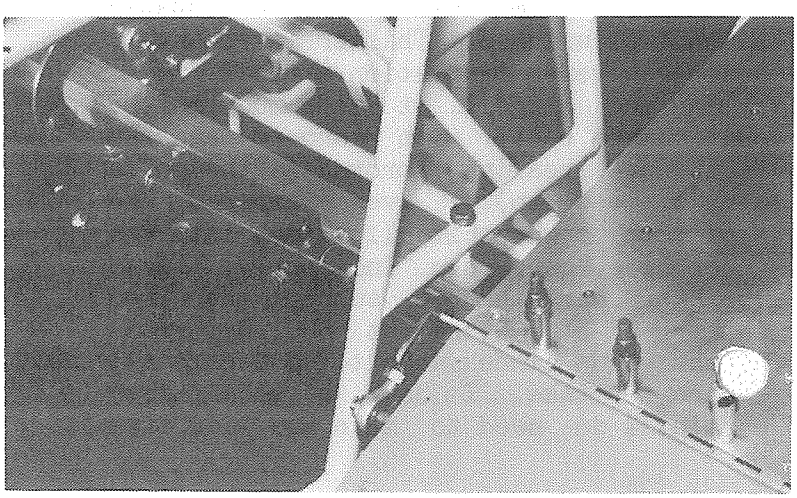
I just received my Sonerai Newsletter and thought I would send along a couple of comments. (Jan-Feb-Mar 91)
1. I agree with your suggestion on page 7 on moving the ribs. The only critical one is the one where the inner and outer skins overlap. If you are building the spar, now is the time to get that rib in the correct location.



2. On page 3 the aileron linkage may be different on a IIL than a Stretch or there may have been updates on the plans. Also note, my approach to the ailerons stops. The tubing is threaded so the nut just serves as a lock. I also used Heim rod joints on the aileron arms. Makes the operation real smooth!

Ed's comments on your comments --

Seems like a good way to go on you aileron linkage, Dick. I sort of did the same thing but actually drilled a hole through the spar carrythrough and used two nuts on a longer bolt. The head of the bolt just contacts the inside of the curved arm. By the way, I have heard that some FAA people ask that a large washer be put on the outside of all rod ends so that if the bearing should happen to pull out of the arm, it can not slip off over the nut. It doesn't look like that could happen to your installation.



-- Another unsolved mystery --

Well, I have one last parting shot to put across your bow. The first year that Bob O'Day and I flew down to Lakeland my Sonerai was able to cruise hands off when in calm air. By that I mean that once she was trimmed up right and my little trim spring could hold a bit of back pressure on the stick, you could let go of the controls in order to tend to cockpit chores like turning charts or scratching your chin. Then, as was indicated a few years ago in this Newsletter, something happened to the rigg of the wings or ailerons while at the Airshow because all the way home it was just about impossible to release the stick at all without a sharp right bank developing. It sort of scared me at first and then just became a nuisance. Something had changed, no doubt about it.

Soon after the return trip, I thought the problem through and lowered the right rear spar carrythrough angle by two washers, (about 1/8" total). That took care of the problem and I was back to normal. That is until this year! After getting the airplane back together last week and checking everything over, the first flight went well, except that when the stick was centered, there was a definite rolling tendency to the Left this time! Eight years with the right rear spar lowered and now she decides to roll the other way.

So what do I do but remove the same two washers from the past and get in the air again with no rolling tendancies noticable. We are back to square one. I don't know why it needed the fix in the beginning and I sure haven't the foggiest idea why my Sonerai chose this year to decide to go back to it's roots and fly straight. I checked to make sure I have the same number of washers on each side of the stabilizer (12). I haven't added anything to either wing. My ears are both reasonably clean, and my wallett is still in my left rear pocket. If anyone else has seen this sort of thing happen, maybe it's better if I don't know about it.

SS FOR SALE -- SONERAI STYLE SS

For Sale -- Sonerai IILS 2180 Monnett Conv., 55 hrs.TT, Exc. workmanship, needs prop, canopy, minor tail damage. $5500.00
Larry Hurley 2153 Foxhill Dr.Apt 11
Grand Blanc, MI 48439 313-695-0414

For Sale -- Sonerai II midwing, taildragger, Hapi 1834 dual ign., Ellison T-Body, Sterba prop, Narco 830, Loran -- 360 TT Asking $6000.00 or trade on T-Craft etc.
Fred Kugel 810 Kensington
Celina, OH 45822 419-586-4956 ev.

For Sale -- Sonerai II Mid-wing 1700 VW Alt.,Strobe and Nav. 60 hrs TT
Ron Pfeil W 199 N11525 Rosewood
Germantown, WI 53022
414-628-4716

For Sale -- Sonerai II LT 95% complete Hapi 1834 dual ign.,Great Am.Prop, Trade up or down f/ flying airplane $ 6500 or best offer
Roy Johnson 26 Raleigh Rd.
Framingham, MA 01701

For Sale -- Sonerai II N176EM TTA 81 hrs TTs 12 hrs. Excellent condtion 1700 cc Monnett conv. Warnke adj. prop, Genave 100 radio, 519 lbs. empty. Has Monnett spar beef-up done. Asking $6500.00
Tom Kolb 216-257-7529
Ed Fisher 216-428-7947 after 6 PM

For Sale -- Sonerai IILT almost ready to fly, will finish and sell with special roll-on trailer, or trade for something slower Up or Down, 2 place. My equity $8000.00 Claude Icard P.O.Box 274
Rutherford College, NC 28671
704-874-2033

For Sale -- Sonerai II midwing 1835, wing mod. done, Genave Nav-Com, red with white trim, featured April 1983 Sport Aviation.
Minneapolis, Minn.
612-753-3245

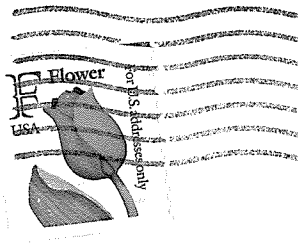
For Sale -- Sonerai IIL Kit - all welding done, 50 % complete, 1900 Limbach engine and access. $ 6000.00 or best offer
303-666-5494

For Sale -- Sonerai I Project: Welded fuselage-tail-controls--primed-- spars, caps,ribs and sheet stock, some hardware. Manuals and video. $2000.00
Bob Schank 313-697-7057 home

For Sale -- Sonerai IILTS project, fuse. welded, have rest of kit to finish aircraft including Stits material, two fuel tanks, no engine $ 3000.00
Pete Fidler 708-526-3022

For Sale -- Sonerai II midwing, HAPI 1834 dual ign.,starter, heater, stab.trim, under 100 hrs.excellent cond.,trailerable asking $ 8500.00
Dave Zeidler 516-868-8827
3490 Stevens Rd Baldwin, NY 11510

For Sale -- Sonerai IIL Kit-- all welding done, 50% completed. $1500 + Limbach engine and accessories. Trade?
303-666-5494



Sonerai News

SONERAI NEWSLETTER
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414-728-1367

To:

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