SONERAI NEWSLETTER

JAN-FEB-MARCH 2003

FRED KEIP, *EDITOR/PUBLISHER*
11428 WEST SIX MILE RD.
FRANKSVILLE, WI 53126

PHONE: 262-835-7714
(AFTER 6PM CST)
EMAIL: fredkeip@aol.com

BOUND FOR SUN-N-FUN 2001

Here I am, somewhere over Alabama on a sunny afternoon, on my way to Sun-N-Fun 2001. I know it was afternoon because the entire morning was spent fogged-in in Auburn, AL. The photo was shot by Glenn Gauger from an American Champion Decathlon while he was flying. Not bad!!

IS IT 2003 ALREADY?

Time sure flies when you're having fun. Another year has passed, and we've survived another holiday season, so now it's time to reflect a bit on the past year, and to look forward to the coming year.

As those of you who've read my ramblings for the past year know, it's been an "interesting" year for me. After the surprise of being "downsized" out of a company where I worked for almost 29 years, and having the summer off to look for a new job, I was fortunate enough to find a new position doing similar work. And I didn't have to move, or anything.

Through it all, though, I've continued to fly the Sonerai as much as I could. She's got about 870 hours on the Hobbs meter and continues to perk along. Maintenance has been minimal, with a new set of tires and tubes being the big expense this year. Otherwise, it's been pretty much a gas up and go situation. I flew her to the Oshkosh again, and to the first annual SAA (Sport Aviation Association) Fly-In at Frasca Field in Champaign-Urbana, IL in June, and I planned to take her to Sun-N-Fun, but ended up taking the airlines because of the weather.

I've also made some progress on my Wagabond project. The wings are now complete except for leading edges and control cables, the landing gear legs are welded, and I managed to buy some Piper parts (an aileron, rudder pedal assembly, and instrument panel blank) at Sun-N-Fun to help move the project along. And there's the Lycoming O-235-C1 engine "kit" that needs a few parts to complete. (Don't worry guys. I plan on keeping and flying my Sonerai for a long time.)

As for 2003, I'm planning to make it to the big OSH event again, but the trip to Sun-N-Fun is in question. Because I get only one week of vacation between now and the end of August (as opposed to the 5 weeks I had before), there's not as much freedom to get out and about. So, I probably won't be there. There are some regional fly-ins I'd like to get to, though; namely, the 2nd Annual SAA Fly-In in June, and the Old Fashioned EAA Fly-In at Rock Falls, IL in September.

I hope to see a bunch of First Flight Reports this year, too. I know a lot of you guys are getting close, and I'd like to see pictures and reports when those airplanes fly for the first time. You'll find that all that time you've spent working in your workshop has been worth it.

Have a great 2003, and Happy Flying!

SONERAI NEWS

- ✈ Great Plains Aircraft Supply News: From the December 2002 issue of "The Original Beetle Flyer", there is now a button on the website (www.gpasc.com) that takes you to service bulletins. Also, they have sale prices on Sonerai parts, as well as a bunch of engine-related stuff through January 17. So, get your order in quickly.
- ✈ First Flights: No new reports this time. Be sure to send in your report when it happens. Send photos, too.
- ✈ 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 210 of the newsletter articles published by Ed Sterba from 1987 through 1995 is available for a mere $10.00. There are also hardcopy back issues for $3.50 each. I have the last two issues from 1994, and all of the issues from 1995, 1996, 1997, 1998, 1999, 2000, 2001 and 2002. 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.

IT'S RENEWAL TIME

It's January again, and it's time to renew your subscription to the **Sonerai Newsletter**. Be sure to take a look at the envelope this issue came in and check the mailing label. If it says "PD 2002" and you want to continue receiving this fine collection of wit and wisdom, please send money. The subscription rate is $14.00 (US funds) per year. So, make your check or money order (cash is acceptable, too) out to "Fred Keip" and send it before you forget. That way you won't miss a thing. And thanks again for your continued support.

HELP WANTED

Every year at this time I say the same thing, and I suspect you're probably getting tired of it, but I'm going to say it again: Please send me stuff that I can publish in this newsletter. Photos of your airplane, finished or not, are greatly appreciated, (I'm running out of good ones for the front page.) Articles are even more appreciated. You don't have to be a great writer, nor do you have to write thousands of words. As your editor, I will correct any spelling errors and embellish where necessary, so you don't need to worry about that either. You can type them up on your computer, and send them on diskette, or via email. Or just hand write them, stick them in the snail mail, and I'll computerize them. Either way works for me.

Also, if you have any suggestions for technical articles for future issues let me know.

As an incentive, when you send an article and I publish it, you'll get the next year's subscription of the **Sonerai Newsletter** for free. For their contributions to the 2002 newsletters, I'd like to thank James Gay, Tommy Warren, Tom Hubbuch, Bob Barton, and Vince Nicely for their input. You guys will notice your subscriptions have been renewed.

DIRECTORY 2002

ISSUE	TITLE	SUBJECT
JFM '02	Welcome to 2002	Intro
JFM '02	It's Renewal Time	Misc
JFM '02	Input Requested	Misc
JFM '02	First Flights	A/C Report
JFM '02	E-mail Update #4	Misc
JFM '02	Carb Heat – One Solution	Engine
JFM '02	What's It For? by Bob Barton	Tall Tales
JFM '02	From the Archives (Cowling Installation)	Cowling
AMJ '02	It's Sun-N-Fun Time!	Sun'N'Fun
AMJ '02	Tommy's Sonerai I by Tommy Warren	A/C Report
AMJ '02	Tommy's Sonerai I by Tommy Warren	Engine
AMJ '02	Installing a Canopy Safety Catch	Canopy
AMJ '02	From the Archives (Magneto Timing)	Engine
JAS '02	It's Oshkosh Time!	Oshkosh
JAS '02	First Flights	A/C Report
JAS '02	Sun'N'Fun 2002 Report	Sun'N'Fun
JAS '02	Sonerai Performance by Vince Nicely	A/C Report
JAS '02	My Trim System by Vince Nicely	Trim System
JAS '02	Floyd Smith's Tale by Bob Barton	Tall Tales
OND '02	A Look Back at OSH 2002	Oshkosh
OND '02	Two Cents Worth by James Gay III	Engine
OND '02	Static Source Fix	Static System

THINKING ABOUT SUN-N-FUN

I know that I usually wait until the April-May-June issue to hype the annual spring bash at Lakeland, FL, but there's a real timing problem this year, so I'll talk about it now. Since the A-M-J issue gets mailed on April 1, and Sun-N-Fun runs from April 2 through April 8 this year, most of you won't receive your newsletter until the event is almost over.

Please note the dates again. Past Sun-N-Fun fly-ins have always run from a Sunday through the following Saturday. This year it starts on Wednesday, April 2nd, and ends on Tuesday, April 8th. So, you'll have to adjust your timing accordingly.

Unfortunately, since I probably won't be there, there won't be a Sonerai Builders Forum this year. I apologize for that, but hopefully we will do it at OSH, and try to schedule it again in 2004. Steve and Linda Bennett of Great Plains Aircraft Supply will have their booth there again, and Steve will be doing his VW engine-building workshop, again, as well as two forums. The first is on "VW Engines", and the second is titled "Other than Certified Engines in Sport Aircraft". So, check them out, along with the long list of other forums.

Finally, if any of you are going, I'd appreciate it if someone would write an article with photos of the Sonerai's that came to the event, so that the rest of us can know what we missed.

E-MAIL UPDATE #5

Here's a list of the e-mail addresses that I've been supplied to date:

John Avent (IIL-J2200) jlavent@aventprogramming.com
Gary Bailey (IILS) gbail@adams.com
Rick Bailey rickbailey@adelphia.net
Bob Barton (II-1835) rabarton@mindspring.com
Al Bertelmann (IIL) altonb@singnet.com.sg
Dave Bilgri (IILTS-J2200) dbcpa@powerweb.net
Wes Blake (IIL-Revmaster) blakew@web-ster.com
Allen Bruggink (IL) allenb@hnet.net
David Bubolz (IILTS-2180) dabubolz@umich.edu
Ray Burgner (II-2180) karla-b@msn.com
Ron Burns rburns@microspace.com
Barry Burns (II-2180) barryb@nts-online.net
David Cannizzaro dcannizzaro@computronix.net
Craig Caylor…axismachine@lycos.com
Darrell Cloud (IILTS)…cloud9@strata.net
Jeff Conners…jconners@cox.net
Bill Craft billc851@home.com
Ken Crowley kencrow@1st.net
Ron Devoll (IILTS-C85) rdevoll@usa.net
Robert Dunleavy dunleavy@iamerica.net
James Feighny…jfeighny@satx.rr.com
Chris Hagie (II) cljmh@aol.com
Barry Hall…bahall@lg.com
Russ Hampton hamptons@gte.net
Roy Hardin royhardin@aol.com
Jim Hardy (I) jehardy@nortexinfo.net
Phil Hartman phil@nicoletplastics.com
Jon Hubbell (IIL-1835) rv6@indystart.com
Tom Hubbuch hthomw@yahoo.com
Jeff Hudson (II) jeffsbanjos@aol.com
Ted Hultzapple (IIL-L65) thultzap@rochester.rr.com
Mat Isa Sapar matisa@telekom.com.my
Arlan Jaspers (IIL) flyinoutlaw@msn.com
Joey Jenkins josaj@webtv.net
Glenn Johnston (IILS) eaa187pilot@hotmail.com
Steve Kaurich (II-1835) snakestr@beci.net
Fred Keip (IIL-1850) fredkeip@aol.com
Anthony Krause (II) alskrause@go.com
Kevin Landers (IIL-2180RD) krlanders331@aol.com
Edward Larsen (IILS) eclarsen81@aol.com
Roger Lee (II) rogerllee@bigfoot.com
John Lundeen johnlundeen@netscape.net
Richard McClain (IILTS) rsmcclain@sssnet.com
Rusty McDowell (I-2180) soneraired@aol.com
Steve Miller (IILS) stphnair@mediaone.net
Paul Mombourquette (II-2180) pmombo@technanogy.net
Joe Moreno alohajoe@aol.com
Jon Morris controlhorn@aol.com
Jerry Mudd jerry.mudd@veridian.com
Vince Nicely (IILTS) vincenicely@intermediatn.net
William Olsen whojo@webtv.net
Chuck Orange (IILS) orange@wiktel.com
Doug Owens (II) soneri2000@yahoo.com
Thomas Pekar thomaspekar@hotmail.com
Jeffrey Penn jetajeff@aol.com
George Perkins george_p20@yahoo.com
Scott Plischke (IIL-2180) splischke@tcac.net
Henry Povolny hankp@glasscity.net
Roy Roberts (II) rgrob@techisp.com
Martin Roy (IILT) gmroy@excite.com
Edward Schrom (IILS) eschrom@paoline.com
Callum Simcoe (IILS) csimcoe@ibm.net
Peter Slevin (IILS) k.white@ecu.edu.au
Sam Sorgen sorgen5@cs.com
Kevin Swann kevinbethswann@yahoo.com
Mike Then (IILTS-2180) sonerai@core.com
Ronald Voss (Sonex) ronterracreek@aol.com

Jay Warren (IIL-2100D) jw80900@alltel.net
Tom Warren (I-1835) mtnest@shentel.net
Steve Weathers n6055a@worldnet.att.net
Eddie Weathersbee weatersbee@netzero.net
Dana Weigle (IIL-1835) dkweig@aol.com
Lance Wells (II-1835) lwellsbunch@hanksville.com
Dave Wilcox (IILS-A80) david.e.wilcox@honeywell.com
Dennis Winkel (IILT-1850) dwinkel@powerweb.net
Shawn Wolk (I) shawnwolk@sprint.ca
Ron Wright (IIL-1835) sonerairon1@netzero.com
Robert Yonge (II-2180) goosechrt@aol.com
Gary Zahn (IILT-2165) gzahnz@netscape.net

If your address isn't here, or has changed, and you'd like me to add it or fix it, send me an email.

THE 1ST ANNUAL SAA FLY-IN

Back in early 2000, good friend, long-time EAA member, and fellow EAA Chapter 18 member Ron Scott convinced me that I should become a member of a newly formed aviation organization called the **Sport Aviation Association**. This organization had recently been formed by EAA founder Paul Poberezny to provide an outlet for those of us who wanted to get back to the real "grassroots" of homebuilt aviation. By that, I mean the simple, scratch-built airplanes that don't cost an arm and a leg to build and own, but might take more than a couple of months to build. You know, kinda like the Sonerai.

In the middle of June 2002, the SAA held its first Annual Fly-in at Frasca Field, just north of Champaign-Urbana, IL. Frasca Field is an immaculate privately-owned, public-use airport owned by Rudy Frasca. Besides being the home of the vast collection of airplanes he keeps there, the airport is also home to Frasca International, Inc, the company that designs and manufactures flight simulators. The Fly-in was organized as an SAA member only event, with no invitations to the public, no commercial displays, and no airshow. Just a weekend to gather with people of like interests, and have a good time.

My hangar partner, Keith, and I decided that this would be a fun event to attend, so the plan was to leave Friday morning, and return on Sunday. Keith flew his Wag Aero Cubby, and of course, I took the Sonerai. The weather was forecast to be a little iffy, with thunder showers forecast for the northern half of the route, in the Chicago area. But the ceiling and visibility was OK at departure time, and there was nothing huge showing on the radar, so we departed.

Given that Keith's Cubby is slower than my airplane, he departed first with me right behind. By the time we got to the Illinois border I had passed him. The flying was good, but we could see rain showers ahead. The visibility was good enough that they were easy to fly around.

Sonerai, Cubby, and the Rain Showers

Once south of Chicago, the showers dissipated and it was an easy jaunt until about 10 miles north of Frasca. There was another big cell growing to the northwest of the field, but I found that I had plenty of time to land before it would pass. Keith, on the other hand, was far enough behind me that he had to fly around the west side of the cell to let it pass before he could land.

After we got tied down, we got registered and signed up for the evening steak dinner. Then we went off to look at the airplanes that had already arrived. This and talking to the folks at the fly-in were the big activities of each day. It was an enjoyable and laid-back time. About the middle of the afternoon, Rudy was giving a guided tour of the Frasca International facility. This was worth the trip all by itself. It is not only a simulator design and manufacturing plant, but it is also a museum holding Rudy's collection of World War II paintings and memorabilia.

The steak dinner Friday night was superb. We had grilled steak, baked potatoes, and all the fixings, along with drinks from the Budweiser wagon. Paul and Rudy talked some, and there was even some music.

Saturday was more of the same. Many more airplanes arrived throughout the day, giving us more to look at. Several forums were given on various aspects of airplane construction. We checked out Rudy's aviation collection, which included an F4F Wildcat, a P-40, and a Spitfire, along with a bunch of nice smaller airplanes. Several of the guys flew fly-bys, and all-in-all, everyone had a good time. Dinner that night was barbeque beef and turkey with baked beans and potato salad (and don't forget the Budweiser). Needless to say, we ate well.

The flight home Sunday morning was relatively uneventful, except that we had a fairly stiff northwest wind that slowed us down a bit. It also made the ride a bit bumpy as we got closer to Burlington. It was great weekend, and we're already planning for the 2003 event.

If you think you might be interested in joining the SAA, all you need to do is submit your name and address to SAA Headquarters (Sport Aviation Association, P.O. Box 2343, Oshkosh, WI 54903-2343). There is no formal dues structure, as each member decides what monetary value he places on the membership. Each member receives the SAA quarterly publication **To Fly**. You can also visit the website at www.sportaviation.org.

TEMPERATURE GAUGE OPERATION

Oftentimes I get questions from guys having problems with engine temperatures, particularly when first getting started and during the first few flights. Sometimes these problems are real, and sometimes they the result of misunderstanding the operation of the thermocouple-type gauges we typically use for CHT (cylinder head temperature) and EGT (exhaust gas temperature). The following short dissertation was written by Dave Wilcox in response to a problem being discussed on the Yahoo Sonerai Group site a while ago. It was so good that I stole it for use here. Thanks, Dave.

One thing to remember on these basic thermocouples that we use for CHT... The reference temperature is not controlled. When thermocouples are used in industry, the cold junction is kept at a known temperature, typically 32°F because the cold junction is immersed in ice water. Thermocouples do not measure absolute temperature. They measure differential temperature between the hot and cold junctions. The junctions are wherever the alloys, chromel/aluminel, are connected. The cold junction is not always obvious, but on my CHT leads it's where the shielded wires connect to a barrier strip and are led forward using copper wires. The temperature of the barrier strip becomes the reference temperature.

On these cheap gages (<$100) that we use, the temperature markings assume that the cold junction is standard temperature or 68F. Changing the temperature of the cold junction affects the reading equally as changes to the hot junction at the spark plug sensor. So if you're flying around at 38F OAT instead of 68F, assuming the cold junction is in this air, then your CHT or EGT or whatever, is reading 30F too high. *To get the corrected temperature, you need to subtract the difference between the actual temperature and 68° from the gauge reading. Likewise, if the OAT is above 68°, you must add the difference to the gauge reading.*

Some better electronic systems use a thermister to compensate for this problem.

By the way, if you're not a part of the Yahoo Sonerai Group, I'd strongly recommend signing on. It doesn't cost anything, there are a lot of good guys in it, and a ton of good information gets transmitted back and forth. Just go to http://groups.yahoo.com/group/sonerai *and follow the instructions. Fred*

FROM THE ARCHIVES

*From the January/February 1982 issue of the **Monink** is another article written by Randy Novak on the hardware we use in our airplanes.*

Cherry "N" – CC Rivets: The rivets we furnish in the Sonerai rivet kits for attaching the wing skins are stainless steel blind rivets. They are installed with a regular hardware store type pop rivet gun. The rivets are available in both countersunk and protruding head styles, and we feel that they are superior to the standard AN-AD aluminum rivets. They are much faster to install and have high strength values. We've taken the most favorable strength values for 2117 aluminum and compared them to our "CC" rivets:

	AD Rivets	CC Rivets
Ult. Tensile Strength Per 1/8" rivet	527 lbs	600 lbs
Ult. Shear Strength Per 1/8" Rivet	343 lbs	450 lbs

These figures use an ultimate tensile strength of 43,000 psi for 2117 alloy aluminum rivets.

Standard procedure for installation of the "CC" riviets is to drill a 1/8" or #30 hole for the protruding head rivets, and for the countersunk style to drill a #32 hole prior to dimpling. The dimpling process stretches the hole to 1'8".

When pulling the rivet, care must be taken to insure that the materials being riveted are in contact with each other. The rivet must be pulled properly to be able to achieve full strength. For installation or inspection purposes use the following as a guideline. If using a "Cherry" rivet gun, a full pulling stroke (when squeezing the handles) before the mandrel breaks, shows adequate rivet length, or after the rivet breaks, the ball of the mandrel should be inside of the deformed part of the rivet shank, and the shank must have covered the ball sufficiently to prevent it from falling out. These rivets are a fast and economical alternative for the builders of a variety of homebuilt aircraft that incorporate sheet metal construction.

<u>AN Bolt Torque Values:</u> Refer to the chart below if you are in doubt about whether or not you have tightened your aircraft bolts and nuts adequately. If using a castle nut, torque to the specified value, and if necessary, back off to the nearest notch and insert the cotter key. These torque values do not apply to assemblies where movement of the bolt is necessary, and it is only tightened lightly. Generally, under-torque can result in unnecessary wear of nuts and bolts, as well as the parts they are holding together. Over-torque can be equally bad because of overstressing a nut or bolt could lead to failure.

The torque values given are for bolt and nut threads that are dry and free from oil and grease. When torque is applied to the bolt head, the friction drag torque must be added to the specified torque value. The friction drag torque is the amount of torque required to turn the bolt in the assembly prior to the nut being installed. Whenever possible, the nut should be turned when applying torque.

Torque Values (In-lbs) for Steel Fasteners

	Tension		Shear	
Nut/Bolt Size	Min.	Max.	Min.	Max.
AN3 (10-32)	20	25	12	15
AN4 (1/4-28)	50	70	30	40
AN5 (5/16-24)	100	140	60	85
AN6 (3/8-24)	160	190	95	110

HOW TO TEST YOUR AIRSPEED INDICATOR

*Not being one to turn down a good opportunity when I see one, or to steal a useful article when I find one, I found the following article in the October 1987 issue of the **Canard Pusher**, the Long-EZ/Vari-Eze newsletter published by Burt Rutan. It was written by Vern Vawter, and describes a simple method to calibrate your pitot system and airspeed indicator.*

One instrument in my airplane that has been a source of constant irritation is the airspeed indicator. For some reason mine always reads too low and my friends, at least during hangar flying sessions, say that their airplanes are always faster than mine.

On the verge of an inferiority complex, I decided to do some investigating which revealed that the airspeed indicators are based on well-known physical law, and that it is feasible for owners to check and calibrate their own aircraft's speedometer.

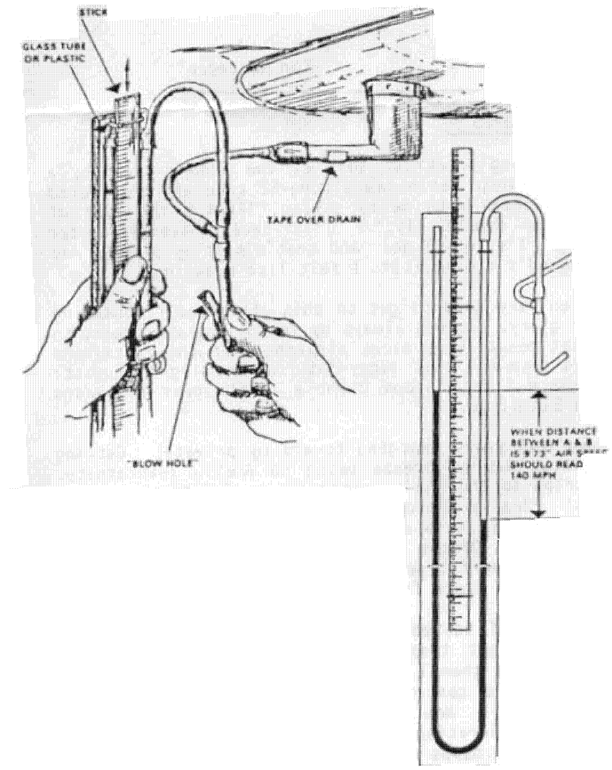

Figure 1

Before I relate the principles of airspeed theory, based on Bernoulli's law, let's get right into how simple it is to make an instrument called a manometer, which is easily put together of a little this and that found at most hardware stores.

Equipment Requirements:
1. Approximately 10 feet of clear plastic tubing, preferably ¼" inside diameter.
2. A board, 30" long, suitable for mounting the plastic tubing in a "U" shape.
3. A small tee fitting
4. A yard stick
5. A few ounces of water with a little bit of food coloring to aid visibility, and a small quantity of detergent as a wetting agent.

Testing Procedures:
1. Assemble the manometer as shown in Figure 1
2. Examine the pitot tube carefully and if there is a small drain hole, cover it with tape.

3. Stretch one end of the plastic tubing over the nose of the pitot tube (see Figure 1).
4. Blow air into the manometer through the "blow hole" (*use your lungs, not an air compressor)* until the water level between the two sides of the tube has approximately 20 inches difference in heights. Pinch off the air supply tube and check for leaks. If the manometer and pitot system are free of leaks the water level will remain constant. (*Note: Be very careful when pressurizing the system, as it will be very easy to over pressurize it and damage the airspeed indicator*)
5. With one person in the cockpit viewing the airspeed indicator, bleed off the air by releasing the pinch, and use the attached table to determine that proper height differences. Start with a water level that is appropriate for the speed of your aircraft. For example, if your airplane is capable of 180 mph, there should be a 15.94" difference between the levels of the water in the "U" shaped tube. If your airspeed is reading 183 mph at the 15.94" differential level, you know it's reading 3 mph fast. Repeat the procedure at 160 mph, 140 mph, 120 mph and so on. Most airspeed indicators are usually two to three mph off somewhat in their range. Naturally, if there is a leak in your pitot system, this is indicated by an inability to hold the water level. It is sometimes difficult to bleed the correct amount of air to reach the exact inch difference you want. Often several attempts are required. The yardstick is moved up and down so as to measure the different levels that the water will reach.

Speed (mph)	Inches of H2O
60	1.77
70	2.41
80	3.15
90	3.98
100	4.92
110	5.95
120	7.08
130	8.31
140	9.64
160	12.59
180	15.94
200	19.68

ELEVATOR PUSH-PULL ALTERNATIVE

There have been several questions posed over the years about the design of the elevator push-pull tube and its support tube at station 115-3/8 (station 127-3/8 on the LTS). As it is shown in the plans, there is a 2" long piece of ¾" OD x .035" wall tubing attached to a vertically mounted 3/8" square tube that the push-pull slides through. The purpose of this support is to prevent the long push-pull tube from buckling under high compression loads.

The perceived problem with this configuration is that side-to-side stick motion for control of the ailerons requires that the elevator push-pull bend to accommodate this motion. Many of you don't like that idea, and neither did I. In my case, the problem was exaggerated by the fact that I had to make the elevator horn longer to allow the attachment of the aft end of the push-pull tube. (This was the result of my configuring the top longerons so that their centerlines coincided with the centerline of the tail post per the plans. I found out after the welding was complete, that the top longerons needed to be mounted on the outside of the tail post.) This required that the bellcrank on the rear end of the control stick assembly had to be longer as well. When I went to full aileron deflection, the elevator push-pull would have been bent even more.

After looking at some other designs, namely the Pitts Special and the EAA Acrosport, I decided that the solution was to split the push-pull into two pieces and add an idler arm at station 115-3/8 (or 127-3/8). The forward push-pull is made from 5/8" OD x .035" wall 4130 tubing. An AN490HT10P threaded rod end is bolted into each end with AN3 bolts as shown in the plans. An REPB3N2 (Heim F35-14) rod end bearing is installed on each end. The aft end of the aft push-pull is made as shown on the plans. The front end is made as shown on Figure 1. The .090" 4130 plates are welded to the tube so that they straddle the upper end of the idler arm and the rear rod end bearing.

The idler arm is made from a piece of ½" OD x .035" wall tubing, and 2 pieces of ¼" bushing stock. The lower idler arm mounting brackets are made from .090" 4130 and welded to the cross-member at station 115-3/8 (or 127-3/8). You'll need to drill the appropriately sized holes to attach everything. Use AN4 bolts with AN310-4 castle nuts and cotter pins for the idler arm, and AN3 bolts with AN310-3 castle nuts and cotter pins for the rod end bearings. It will be necessary to install spacer washers on either side of each of the rod end bearings to center them.

Figure 2 is a schematic representation of the configuration. There are no dimensions given because each installation will vary slightly. This is truly a cut-to-fit, and weld-to-suit situation. When determining the length of the forward push-pull, configure it so that the rod end bearings are threaded half of their travel onto the rod ends.

This will allow for sufficient adjustment when you do your final control rigging.

This system has worked well in my IIL for 16-1/2 years. There is no friction or binding in the system anywhere in its motion.

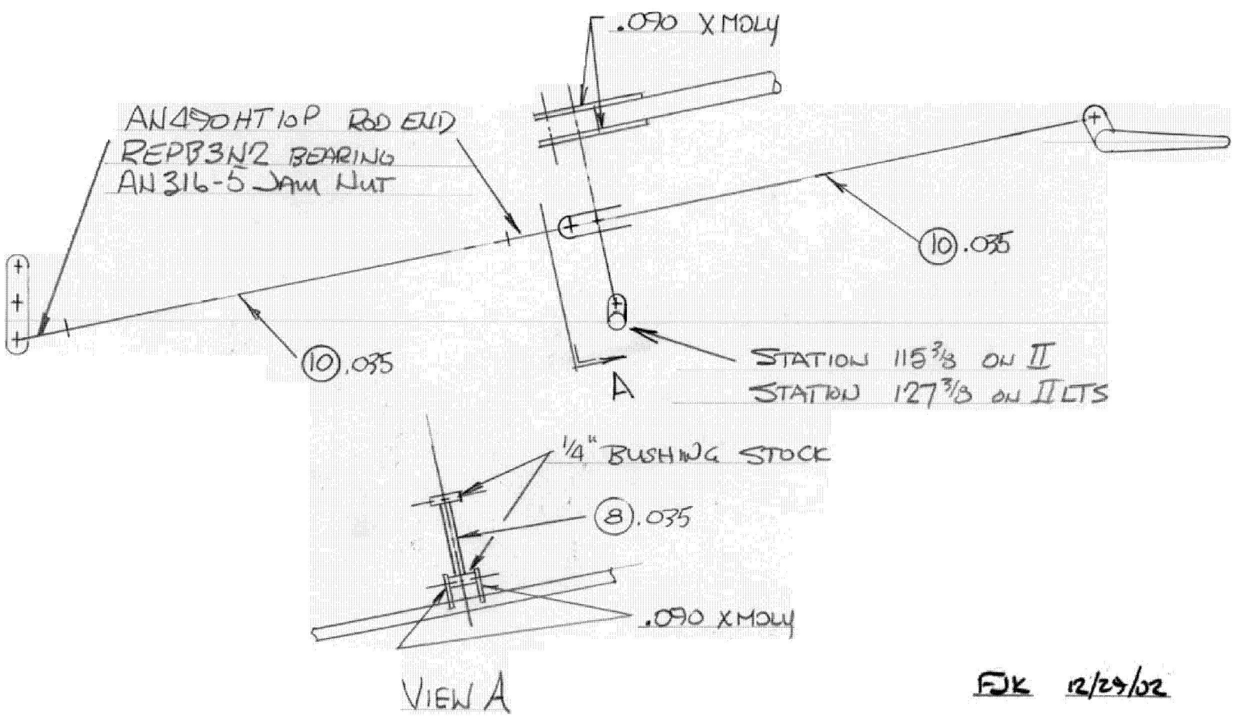

Figure 2

WANT ADS

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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: Sonerai II Stretch fuselage, prebuilt spars, ailerons, Monnett ribs, fiberglass cowling, wing tips, & wheel pants, nosewheel, tailwheel, canopy, Great Plains 2180 w/dual ign., Diehl case, starter, no alt. or intake sys, some instruments. $8000. Call Steve Garn, 336-877-0318 (2/02)

For Sale: Sonerai IILS, fuselage and wings complete, on the gear, cowling, canopy, needs engine and prop. $7500. Don Jester, 417-466-3013 (1/02)

Wanted: O-320 Lycoming, 150 hp, all accessories, dynafocal, mid-time or less. No prop strikes. Call Fred Ninneman, (816)353-1161 (2/02)

For Sale: Sonerai IIL. Fuselage welded, on gear, wings/ailerons done, 2180 engine, no prop, cowling, canopy there but needs finishing, no instruments, lots of parts. $4200/offer/ trade. Eric Stadjuhar, (402)896-6352 or (402)669-0271, Omaha,NE (2/02)

Wanted: Folding Wing Sonerai (in process OK). Joe Hearn, (352)628-1027 (3/02)

For Sale: Sonerai Parts. Complete instrument panel, Rand-Robinson 3-blade prop, Posa Supercarb, Slick Mag & harness, gascolator, 5-point harness. All new! Gary Harvey, (705)799-7448 (3/02)

For Sale: #68 Zenith Carb, $75; Monnett X-casting, $50; Monnett SuperVee prop extension ass'y, $150; Monnett single-port intake manifold, $50; Aero-Vee valve covers, $25; 2" steel prop hub & plate, $25. Jim Meier, (608)255-6773 between 8am & 5pm, or (608)849-9499 after 5pm (3/02)

For Sale: Sonerai II mid-wing, only needs paint and assembly, 1835 with dual ignition (Slick mag and Bosch 009). $5000 OBO or trade. Greg Buckley, (559)226-5992, **glbflyfun@cs.com** (1/03)

Wanted: A completed set of Sonerai II wings. Ron Wright, **sonerairon1@netzero.com** (1/03)