SONERAI NEWSLETTER

JULY-AUG-SEPT 2000

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(AFTER 6PM CDT)

BOB FLIPPO'S SONERAI IIL

Bob sent this note, dated June 2, along with the photo: "Here is the Sonerai II that we finished recently. FAA finally passed. Hopefully, a successful first flight tomorrow at Camarillo (CA) airport. It has the 5/8" gear and Cleveland toe brakes, Revmaster 2100 CDI (no mags), dual ignition, "your" trim actuator on the stabilizer, strobes and nav lights, rate-of-climb and turn coordinator, 6 gallon aft fuel tank, and the turtle deck 2" higher with oversize canopy (which is a big hit with most). It also has a starter and battery which are must-haves with old guys like me. Note the spinner has the Luftwaffe cork screw design. Looks good if I do say so. But, the proof of the pudding is in the eating. We shall see. Maybe Oshkosh next year." *OK Bob, now all we need is the first flight report. By the way, the airplane is painted white with red and black trim. Very nice!*

OSHKOSH 2000 PREVIEW

With summer now fully upon us, we should all be thinking about the Oshkosh AirVenture 2000 convention that is quickly coming up. For those of who haven't marked the dates on your calendar yet, it starts on Wednesday, July 26th, and ends on Tuesday, August 1st.

I'm going to use my old excuse for going again this year: Living only 90 miles away leaves me with no excuse for not being there. So, I'm planning to drive up the Sunday before to set up my campsite, and then I'll fly N99FK up on Monday and stay for the entire week.

The parking plan will be for us to be in the "Auto Engine" area just south of the Homebuilder's

Headquarters. This puts us just north of the West Ramp display area, right about in the center of the whole convention.

There are several things planned for this year. The first is the Sonerai Builder's Forum, that I'll be presenting. It's scheduled for Thursday, July 27th, at 2:30 PM in Pavilion 11 (double check the program to make sure). Bring your questions, and stories, as I would like to make this an interactive discussion.

The second event is the Monnett Builders Party which will be at John and Betty Monnett's Sonex hangar on Friday evening, July 28th from 8:00 to 10:00 PM. For those of you who haven't been there, it's located on the northeast side of Wittman Field. Stop by the Sonex booth for directions. This party is always a good time, and you'll get a chance to meet and talk to all of those Moni, Monerai, and Sonex builders, too.

Finally, EAA has scheduled a couple events that you might be interested in. The first is the Homebuilder's Headquarters Dinner on Saturday, July 29th from 6:00 to 9:00 PM at the EAA Nature Center. The cost is $8.00 and you get your tickets ahead of time at the Homebuilder's HQ. The other is Homebuilder's Donut Day at the HQ on Monday, July 31st from 8:00 to 10:00 AM. The donuts and coffee are free.

I hope to see many of you there. I'm planning to spend the mornings with my airplane, so please stop by and say hello.

SONERAI NEWS

- Fred Flynn's Sonerai II in Museum: Fred sent me a note to let me know that he has retired his Sonerai II, and it is now on display in the Mid Atlantic Air Museum at the Reading Regional Airport in Reading PA. Fred flew this very nice airplane a lot, with several trips to both Oshkosh and Sun N Fun.
- 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, and 1999. 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.

SUN N FUN 2000 REVIEW

As is typical, getting to Sun N Fun this year was more than half the fun. As I alluded to in the last newsletter, Keith Tridle, my hangar partner, and I flew a brand new American Champion Citabria down to Florida again this year. It was so new in fact, that it had only 1.1 hours on the Hobbs and wet paint on it when we departed late on Thursday afternoon, April 6th. Our plan was to leave in the morning to get as far south as we could to get ahead of some bad weather that was promised for Friday. But, when we got to Fox River Airport where ACAC is based the airplane wasn't quite done, nor had it been flight tested.

Needless to say, we still tried to get as far south as we could and ended up in Vincenes, IN for the night. Early the next morning we awoke to raging thunderstorms and wondered if we'd get any further south that day. But the weather gods were with us as we were at the extreme southern edge of a big weather system that dropped 8" of heavy wet snow on southern Wisconsin that day. As we headed south the weather just got better and better.

We stopped for gas at Lafayette, GA and again at Perry FL. All through Georgia the weather was perfect, with clear skies and light winds. The only thing to screw up the visibility was the number of forest fires burning. At one point, Keith counted 14 different fires in site from our 2500 foot high perch. We went on to spent Friday night in Spring Hill, FL with Keith's mom and dad.

On Saturday morning, just as the sun was breaking the eastern horizon, we departed Brooksville airport for the 37 mile flight to Lakeland. We wanted to be early enough to avoid the rush of traffic that would be coming later. We were so early in fact that the controllers were not even set up for the Lake Parker arrival (even though the ATIS said to use the procedure.), so the tower cleared us direct to LAL and we were the fifth or sixth airplane of the day to land.

After we got the airplane moved to its spot in the display area, we started enjoying our stay at Sun N Fun. Needless to say the weather was almost perfect. A cold front came through Saturday night and it was a bit chilly (47°F) Sunday morning, but

otherwise it was beautiful while we were there. It did rain most of the day on Friday, but we were home by then.

Only one Sonerai appeared this year. Bob Mahieu flew his A-65 Continental-powered Sonerai II down from Michigan. Hopefully, we'll be able to get a few of the four or five airplanes being built in the Lakeland area out to the show one of these years.

The Sonerai Builders Forum went well on Tuesday, with the exception of the overhead projector being knocked off the table by a wind-blown screen. Unfortunately the bulb failed in the fall, and there were no spares, so I had to forego the visual aids. There were a lot of good questions and input from those attending. Thanks to all who came.

The Great Plains Aircraft Supply Customer Appreciation Picnic Monday night was well attended, although I couldn't get there because we were ground transportation challenged. We were bumming rides back and forth from Brandon with Jerry Mehlhaff, ACAC's owner. And we had seven guys come to Vito's for the Sonerai Dinner Wednesday night. The food and conversation were good.

Keith and I ended our sojourn with a flight back to Milwaukee on a Sun Country 727 Thursday afternoon. It's always more fun flying an airplane down to Sun N Fun when you don't have to worry about getting it home.

HIGH ALTITUDE OPERATIONS & OTHER THINGS

Lance Wells of Hanksville, UT sent in a letter with a bunch of excellent questions. Here's his letter and my response:

Fred,

I have just purchased a Sonerai II original, and after repairing it and flying it, I have found it to be very underpowered. It has the single-port 1835 VW engine (HAPI) with a 52 x 42 Sterba prop. The elevation where I live is 4,500 feet in a valley with 10,000 feet to go any distance. After working with the timing and carb my flying RPM was around 2900. After talking to different owners about their airplanes, I get the feeling that the HP and weight limit that Great Plains suggest for the Sonerai's engine is conservative at least. I'm sure a different pitch prop would help, but I'd like your ideas before the money's spent on another prop-clock. I've talked to an owner who is working on a Corvair engine for his Sonerai, and have heard of Continentals also in them. I'm hoping that the newsletters that you've written will shed some light on things.

I also find conflict with the gross weight of 950 or 1150 lbs. How much weight can you have in the engine compartment? Can the design be changed to a tri-gear? Is it worth it? The airplane I have I believe is the original (not the S or upgraded wing). Has anybody designed a wing with flaps or possibly dive brakes?

Also, the airplane has the ½" landing gear; it has a weak side to it. Is the 5/8" gear that Great Plains offers strong enough? Or would the Grove or Hammerhead ¾" gear be a better choice? Have you talked to anyone who has tried the Great Plains reduction drive? What do you think of it? Will the Force One prop hub handle an Ivo Prop (not wood)?

I promise I won't hold you to any of your answers. I would very much enjoy honest opinions from someone with your insight.

Lance

Dear Lance,

*First of all, thanks for the subscription to the **Sonerai Newsletter**. I hope it proves to be of some value to you. Now, let's see if I can answer your many questions with some degree of intelligence.*

1. *<u>1835 cc VW engine at 4500 ft:</u> This is primarily a density altitude problem. You know, the higher and hotter it is, the lower the horsepower output of the engine. Your airport's altitude is higher than I normally fly. In fact, my airplane almost automatically levels off at 2500 feet. Because you are starting out at this higher density altitude, your engine is operating with a much lower <u>effective</u> compression ratio than our engines down here on the flat land. I see four possible solutions that may be incorporated individually or in combination. The first (and perhaps the easiest) is to advance the ignition timing to 32° BTDC to allow the leaner fuel mixture to burn more completely. The second would be to increase the calculated compression ratio to 9 or 10 to 1. If your engine has cylinder spacers, reduce the thickness of them. If not, have the heads milled down. (The only risk involved would occur if you decided to visit us down here in the flat land where your effective compression ratio would increase.) The third, as you suggest, would be to change the*

propeller to a flatter pitch to allow the engine to produce more horsepower at a higher rpm. And the fourth would be to convert your 1835 to a 2180. The extra cc's will provide more horsepower. The use of a Continental or Corvair engine may, or may not, solve your power problem since they are affected by altitude, too, plus they are generally heavier than the VW. This extra weight usually offsets the small horsepower increase. If you are seriously considering alternative engines, the 80 hp Jabiru 2200 or Rotax 912, or 100 hp 912S are lighter weight, but rather pricey possibilities.

2. *950 or 1150 lbs Gross Weight: Allowable Sonerai II gross weight is a function of the wing construction and engine size. The airplane is allowed to have the higher gross weight only if it has the 11-rib "B" or "S" wing or the reinforced 9-rib "A" wing, and the 2180 cc engine. If you have the original non-reinforced "A" wing and/or a smaller engine, you are restricted to the lower allowable gross weight.*
3. *Engine Compartment Weight: I would recommend keeping the total installed engine weight under 200 lbs, with 185 lbs a better target. The Sonerai II's tend to be a bit nose heavy, so you want to be careful with engine compartment weight.*
4. *Tri-gear Option: Installing the tri-gear option is a personal decision. I'm somewhat biased toward the tailwheel airplane, but they both fly well, and while the tri-gear is probably easier to land, the tailwheel version is not difficult. You just need to know what to do with your feet.*
5. *Wing Flaps and/or Dive Brakes: To my knowledge no one has redesigned the wing for flaps. If they did, the airplane would no longer be a Sonerai. I have heard of a couple of people incorporating a mixer in the aileron control system to provide the ability to droop the ailerons, making them "flaperons". Being a firm believer in the "KIS" principle, though, I think all of this is unnecessary. The airplane slips extremely well, so all of this extra mechanism just adds unneeded weight.*
6. *½" vs 5/8" vs Grove ¾" Landing Gears: I have the original ½" x 6" landing gear on my airplane, which has close to 700 hours and probably 800 or 900 landings on it. In the last year or so, I've noticed that the gear is slowly beginning to splay outwards. I don't know if this is due to a few of my recent "arrivals" or not, but I've decided to install the 5/8" x 6" gear from Great Plains to get the increased stiffness. I looked at the ¾" x 5" Grove gear as well, but opted for the 5/8" gear based on price. The Grove gear is about $105 more expensive (($500 vs $395). I did a bending stiffness and weight comparison, too. The 5/8" x 6" gear is 95.4% stiffer and 25% heavier than the ½" x 6" gear. The ¾" x 5" Grove gear is 181.2% stiffer and 25% heavier than the ½" x 6" gear, and 44% stiffer (at about the same weight) than the 5/8" x 6" gear. For my airplane at its 950 lb gross weight, I think the 5/8" gear is more than adequate.*
7. *Great Plains Reduction Drive: I assume that you are referring to the belt-reduction unit. To my knowledge, no one has installed one on a Sonerai. I did watch one fly on a VW installed in a two-place ultralight at Oshkosh last year, and it appeared to perform very well. The problem that I see with installation in the Sonerai would be fitting the engine in the cowling while maintaining the thrust line. It would require extensive cowling and motor mount modifications.*
8. *Force One and an IVO Prop: Since most of the non-wood prop-induced engine failures that I'm aware of involved torsional failures of the crankshaft, I don't think the Force One prop hub will decrease the risk of that type of failure. Please stick with wood props with the conventional VW conversion. The Great Plains Rear-Drive conversion effectively isolates the prop shaft from the crankshaft with an elastomeric coupling. You might want to look into that, although it will require an engine mount and a new cowling.*

I hope this bunch of thoughts and opinions is useful.

KEVIN LANDERS' REAR DRIVE INSTALLATION

To the best of our knowledge, Kevin Landers is the first builder to purchase the Great Plains Rear Drive engine for use in a Sonerai. Kevin, who lives only a few miles from your intrepid editor and works for American Champion Aircraft, is building a IILS and is pretty well along with it. The wings are done and the fuselage is on the gear, with the tail surfaces covered.

As you can see in the photograph, he has the engine mounted on the front of the airplane. Kevin built the 2180 cc engine from the Great Plains kit, and even though he's an A&P, he found the assembly more work than he thought it would be. It is mounted on a motor mount designed and welded by Greg Klemp at Specialty Welding.

Kevin Landers' Rear Drive Installation

Kevin relocated the firewall motor mount bushings to the corners of the firewall station, and added gussets to the front corners of the fuselage frame. He is planning on adapting a Sonerai SuperVee cowling. (It will need to be extended several inches.)

I've been looking over his shoulder as the installation moves forward, and plan to publish more info on this installation as he gets it done. Stay tuned.

WING SPAR RIVETING ALTERNATIVE

Late last winter, after delivering the IILTS wings to Greg Klemp, I stopped by the Sonex LTD. shop in Oshkosh to see what John and Jeremy Monnett were up to. While showing me around his new shop/hangar, John took out and demonstrated the rivet driving set up that he is now recommending to builders of the Sonex. And a cheaper riveting tool will be hard to find.

Riveting Alternative - Photo 1

As can be seen in photo 1, it consists of a heavy steel base (there are two different bases in the photo), a 4" or 5" long ½" bolt with nuts and large-diameter washers, and a large ball peen hammer. The bases shown are configured to suit the tee-section extrusions used on the Sonex wing. For the Sonerai, all you'd need is a piece of ½" to ¾" steel plate 8" to 10" square.

The bolt is a standard hardware store bolt with a large washer sandwiched between two nuts to protect your hand from the ball peen hammer should you miss. The head of the bolt must ground flat and polished smooth.

Photo 2 shows the riveting process. Once the rivet is cut to length and inserted in the hole, the head of the bolt is set on the end of the rivet, and the nut end of the bolt given several strokes of the hammer. The short rivets in the photo only took about three strokes.

Because the head of the rivet is resting on the flat steel plate, it will be flatten slightly, but John says

that this is entirely acceptable. And besides, there is no risk of putting a "smiley" in the rivet head.

Riveting Alternative - Photo 2

PISTON RINGS, AGAIN

In light of the piston ring gap alignment problem I had on my return from MERFI '99 last September, I feel the need to bring everyone up-to-date on my latest ring adventure.

It all started with an oil leak; an oil leak that I couldn't find a source for. The leak was in the area of the #3 cylinder (LH front when viewed from the cockpit), which if you all remember was the problem cylinder last fall. At first I thought it might be a cracked push rod tube because the oil was dripping off the front one. So, I bought a set of new push rod tubes and proceeded to remove the LH cylinder head to install them.

As I removed the head, I noticed a small dark spot at the bottom of the #3 combustion chamber where the cylinder barrel seats in the head. Apparently, when I had reassembled the head last fall, a small piece of junk had fallen down between the cylinder and the head and when the head nuts were torqued, a small indentation was formed.

After saying several bad words to myself about the quality of my assembly work, and realizing that the only way to remove the dent was by milling the heads, I then proceeded to remove the RH head. This was necessary so that all four cylinder bores could be machined the same amount to keep the compression ratio same on all four cylinders.

A trip to a local automotive machine shop resulted in the removal of .013" from each cylinder head. Of course, removing material from the cylinder bore barrel seat results in an increase in compression ratio. To verify the amount of the increase, I measured the cylinder head volume and recalculated the C.R. It increased from 8.67 to 8.89. This was OK since I only burn 100LL, but I expected to see slightly higher CHT's.

So, now the engine was reassembled with the new push rod tubes, and test flown. And guess what? It still leaked from the same place between the head and the cylinder on #3. I couldn't understand how it could still leak there. I knew there was no "junk" in there this time. So, I threw up hands in disgust, and decided to disassemble the LH side again. Sure enough, I could see where the oil was being pushed past the cylinder head joint, but there was no dent. After inspecting the head thoroughly and with some prompting from friend and fellow Wag-a-bond builder Tom O;Neill, we pulled the #3 cylinder. As I was inspecting the cylinder bore, which looked just fine, Tom decided to check the rings to see if they had realigned. As he was moving the rings in their grooves, I heard a little tinkle as half of the top compression ring fell onto the floor. Sure enough, a broken ring. It hadn't happened last fall like we had initially thought, but it did happen now. Maybe this was the cause of the oil pumping.

When I showed the ring to Keith, my hangar partner, he took one look and asked what the ring side clearance was. A quick check with the feeler gauges showed it to be .019". The second ring had about .002" clearance. Obviously it was much too large on the top ring. A check of a VW assembly manual revealed that the clearance was supposed to be from .002" to .004". An interesting thing to note is that .019" is the same as .5 mm. The grooves in the piston were cut to accept 2mm wide piston rings. The ring that came with the

piston/cylinder set was 1.5mm. Someone screwed up, and I wasn't smart enough to check the side clearance when I had initially assembled them. I assumed that all of the parts were correct. (You know what happens when you assume things.....)

A trip to MOFOCO in Milwaukee, and a $20.00 bill, provide me with a complete set of Grant piston rings for all four cylinders. Interestingly, disassembly of the other three cylinders found that #4 had a narrow top ring, but #1 and #2 had the correct rings. I replaced them all anyway. Fortunately, there was no damage to piston ring grooves.

Test flying the engine after it was all put together highlighted several things. First, the oil leak went away. Apparently the failed ring was allowing too much oil to get to the cylinder/head joint and it was getting forced through the joint. Second, I did get higher cylinder head temperatures, but only slightly higher, except on #4 which was a lot higher. It turned out that the thermocouple probe was the culprit. The thermocouple itself is crimped into the ring that sits under the spark plug, and the crimp had loosened. Once it was re-crimped the temperature reading was in line with the other cylinders. And the third thing was that the engine seemed to have more power. It is true that the two most important variables in the horsepower equation are cubic inches (or cc's) and compression ratio. The easiest way to get an increase in HP is to increase either or both of the two.

WILL IT STILL BE A SONERAI?

By Vince Nicely

There are a multitude of well proven engines for experimental aircraft in the correct weight and power range that might work well on the Sonerai frame by simply providing a proper motor mount. Either two or four cycle power plants might be used. For example, the Rotax 912 and the Juburu are obvious four cycle choices. Several of the two cycle engines seen attractive because of their cost, their power-to-weight ratios and their physical configuration. Reliability seems less of a concern than it used to be with two cycle engines because many have redundancy in ignition, carburation and cylinders. Either air or liquid models might be used. For example, 2si has several liquid cooled models that might be attractive including their Model 690 L70 and their Models 808 L95 and L100. Rotax supplies several liquid cooled models, also.

Out of the multitude of engines in the 60-100 HP range, the Hirth Model 2706 engine seems especially attractive for this application. It is a two cycle, two cylinder inline fan cooled engine of 65 HP @ 6300 rpm which has dual ignition and dual carbs. It weighs 82 pounds including an electrical system, electric starter and exhaust system. The motor mount, battery, gear reduction and propeller will add a few pounds. The whole mounted engine with accessories will likely be approximately 50 pounds less than the VW engine without a starter or exhaust system. So weight reduction is one potential reward for a change, but what about other potential problems?

Aircraft balance owing to the lower engine weight is certainly a potential problem. A ballast in the nose would fix that, but surely there is a better way! After some thought, moving the pilot forward seems an obvious way to compensate for the loss of front end weight. By using information from several sources about the usual weight and balance of Sonerai aircraft, a spread sheet has been constructed to estimate the effect of changes on the weight and balance of modified Sonerai aircraft. From these estimates, a 175 pound pilot in the front seat with 0-10 gallons of fuel in the front tank is expected to have a CG behind the forward limit for a Sonerai II LTS with the Hirth engine. The same pilot and plane could start a flight with 20 gallons of fuel having 10 in a rear auxiliary tank and carry up to 100 pounds of extra weight in the rear seat. However, the pilot would need to use the fuel from the rear tank first to avoid developing a balance problem during the flight. The real limitation is for the rear seat capacity. The present estimate is that with 5 or more gallons of fuel in the front tank, the rear seat will be limited to 130 pounds. For many purposes, that will not be a problem. The provision of a removable nose ballast would easily provide for more back seat capacity, and this plane will likely have fittings for weights in increments of about 15 pounds each. However, careful and continual consideration for balance must become a routine part of every flight because it will be easy to get out of acceptable limits for the CG.

The standard cowling will not fit. It will be too short and far wider than needed. Oh well, that's part of the fun of experimental aircraft!

What about the flying characteristics? It will burn a little more fuel that a VW powered Sonerai, but it will use auto gasoline.. Otherwise, the handling should be very similar to a VW powered aircraft

with one exception. The shape of the torque curve for the two cycle engine will either make for a very long take-off run or a low top speed when using a fixed pitch propellor. If the prop has enough pitch to give 130-150 mph top speed, it will provide enough drag at low speeds, say in a take-off run, to cause the engine to only develop low rpm and little power. Of course, as the run proceeds, the engine speed and power come up, but it does prolong the process. Experiments on a 50 HP Rotax engine with a ground adjustable prop on a Kolb Firestar II aircraft support this conclusion. However, a variable pitch propellor could give very different results. The cock-pit adjustable IVO prop seems just the ticket. In the simplest case, it could be used as a two angle propellor with the low pitch for take off and the high pitch for cruise. Because it is completely adjustable over a range of angles, it could approximate the performance of a constant speed prop. Should the adjustable feature fail in flight, the airplane will still fly fine and have power so the pitch adjustable feature should not lead to safety concerns.

Will it still be a Sonerai when built it as described? The front end will certainly look different, and it will sound very different than the usual Sonerai. However, it should handle and perform similar to the conventional model to provide a fun machine to fly.

If you have thought of or have tried similar approaches, I would be interested in hearing about them. Perhaps you recognize some other concerns about the combination outlined above. I would welcome any comments, questions or concerns you might have. Of course, I would be willing to share my estimates and spread sheets with anyone interested.

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For Sale or Trade: Older Sonerai kit - tack welded two place low wing taildragger fuselage, all fiberglass, new canopy, etc. Want motorglider for 220 lb person with broad shoulders and beam. M. Lee Wachs, call nights Pacific time, (707)463-0467 (1/00)

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: Sonerai II project; fuselage frame on gear, controls & spar box done, canopy frame tacked, tow hitch, canopy, ABS wheel pants, spars riveted, ribs fitted, ailerons 80%, ELT, reman. 1835 w/ Monnett mount, Posa & Zenith carbs, $3995. Loris Mandel (918)343-0697 (2/00)

For Sale: Revmaster 2100 w/ dual Bendix mag, starter, Revflow carb, oil cooler, prop (56x45), approx 400 hrs, came off KR-2, $2250, Doug Evenson, devenson@mindspring.com, (770)445-6826, (678)643-6826 (2/00)

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 (620)263-7937 (2/00)

For Sale: Plans for Sonerai II midwing. Also have Cassutt & Varieze. All Plans are complete, unused, & with newsletters, $30 each. Joe Mayer (904)532-0292 (2/00)

Looking For: Sonerai I and Sonerai II or IIL. Both need to be well-built, nice & Clean. Roy Roberts (512)575-2744 (2/00)

For Sale: Welded chromoly Sonerai One fuselage w/ horizontal stabilizer, elevator, rudder, aluminum seat, aluminum fuel tank, main landing gear, including additional components to finish as trike, wheels, mech. rakes, elevator push-pull tube, rudder pedals, rudder cables, misc. control system components, plans, builder's manual, supplements, & instructions for installing optional nose gear. Entire project fits into a pickup. $1250. John Borra (785)628-0658, johnborra@media-net.net (2/00)

For Sale: Hand held radio power amp, Communications Specialist Inc. CS-10. ½ price off Chick Aircraft catalog. $84.50. Boost hand held transmit from 1 to 10 watts. (602)231-2804 (3/00)

For Sale: 2180 VW with Force One prop hub, dual ignition, 0 SMOH, complete firewall forward from Sonerai II, $2500, Fred Dube, (203)284-8642 or n99fd@webtv.net (3/00)