

# SONERAI NEWSLETTER

APRIL-MAY-JUNE 2002

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## **TOMMY WARREN AND HIS SONERAI I**

*A black and white photo just doesn't do justice to Tommy's paint scheme. The top is yellow, the bottom is blue, and the center stripe is red. The wings are polished with yellow wing tips. Very Sharp! Tommy says the addition of wheel pants will make the airplane look "muuuch" better. See his article elsewhere in the newsletter.*

## **IT'S SUN-N-FUN TIME!**

As I write this in mid-March, it's snowing outside on a Sunday afternoon. That makes it a great time to think about Sun-N-Fun, which is only three weeks away. (When you get this it'll only be a few days away.)

The winter here in southern Wisconsin has been unusually warm this year. In the last issue, I noted that I usually write off any flying in January because the weather usually is too nasty to fly. Not this year, though. I got to fly every weekend in

January and February. That's eight weekends in a row. But winter came in March, and I couldn't fly for two weekends. Hopefully, it'll get winter out of its system by Easter.

Anyway, back to Sun-N-Fun. I'm still planning to bring my Sonerai IIL down again this year, and I'm tentatively flying with the guys from American Champion. It should be fun.

There are several events planned. First, I'll be presenting the Sonerai Builders Forum on Tuesday, April 9, at 9:00 AM in Tent 8. Assuming I

get there in one piece, I plan to spend the mornings with my airplane. So stop by.

Second, Steve and Linda Bennett of Great Plains Aircraft Supply are having their Annual Customer Appreciation Picnic on Monday, April 8, at 5:30 PM in the Engine Workshop Tent. They're having brats, polish sausage, hot dogs, and all the fixings. All Sonerai, KR, and Sonex builders are invited. And it's free.

Steve will also be presenting VW Engine Building Workshops from Monday through Thursday at 1:00 PM in the Engine Workshop Tent (Keith Browne will be disassembling the engine each morning, if you want to watch). He's also giving a VW Engine Conversion forum on Friday, April 12 at 11:00 AM in tent 3, and a VW Installation and Service Tips forum on Sunday, April 7, at 11:00 AM in tent 3.

If you'd like to see the entire forum schedule ahead of time, go to the Sun-N-Fun website, [www.sun-n-fun.org](http://www.sun-n-fun.org).

After all is said and done, I'm thinking of flying up the east coast to Kitty Hawk, so I can land the Sonerai at First Flight airport, and visit the Wright Memorial before I head home. See you at SNF.

## SONERAI NEWS

- First Flights: There have been no reports of first flights this time. When your Sonerai flies for the first time, please send me a note (and a photo would be nice, 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 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 \$3.50 each. I have the last two issues from 1994, and all of the issues from 1995, 1996, 1997, 1998, 1999, 2000, and 2001. 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.

## TOMMY'S SONERAI I by Tommy Warren

*Tommy sent me the following letter in February along with the photos. He has kept me apprised of his progress over the years, and it's good to see the airplane finally flying. Tommy was the first person, other than me, to use my wing rib tooling to build his wing ribs from scratch.*

Well, it's that time of year to renew my subscription to the newsletter. This has been a big year for me. My Sonerai is finished, inspected, and flown. I retired in March after 40 years in the same company where we printed AOPA Pilot magazine, and Aviation Week magazine, among others. By July, my wife and I had moved to Georgia, actually not too far from Danny Kight, who still has his Sonerai IILT, but is in the process of painting his RV-6 in preparation for his airworthiness inspection. I have also just about completed a nice new metal hangar for the S-1 at the local airport (0GA2)... "Air Nautique"... 4 miles from our house.

I've enclosed a picture of N50TW taken shortly after it's first flight. I have the wheel pants but have not mounted them yet, and as you know, she will look muuuch better with them. It is powered by a GPAS 1835 set up for Avgas with a dual ignition setup, the same as yours, and a Force One prop hub with a 4-1/2" spool. There is no charging system at this time, and I only use the secondary as a backup. But the increased efficiency with both systems running has me thinking about adding a "simple" charging system in the future.

Speaking of weight, N50TW came in at 503 lbs empty. Items I feel added to the final weight are the 5/8" landing gear, GPAS hydraulic brakes, secondary ignition system (with small motorcycle battery), carb heat, and cabin heat.

For anyone interested, here are some general notes to ponder:

- Box baffling cylinder heat cooling in conjunction with the standard "cool tins".
- Cowl flap which I have not evaluated yet. Right now it's always open.
- CHT probes on all cylinders to a 4-way selector switch feeding one gauge.
- Compression ratio of 8.3:1 = Avgas.
- Baffling around the Comp-u-fire coils (mounted on the engine side of the firewall) fed with cold air.
- Elephant's foot valve adjusters.
- Posa Supercarb with the mixture control safety wired in the closed position. But may change as I may need to lean out the Posa while taxiing (at idle).

- Old-style Monnett intake castings with aluminum dividers (similar to GPAS) along with a ½" ID aluminum balance tube connecting the left and right cylinder banks, resulting in a more balanced mixture/cylinder burn.
- Vacuum gauge with the vacuum line tapped at the "Y" in the intake manifold.
- Cruise at 120 mph...yeah, I know it's slow but I am still working on trim and I have not calibrated the airspeed instrument.
- Stall (power on) 45 mph, power off 55 mph.
- Rate of climb approx. 1500 fpm.

My flare speed is still too fast at 70-80, but the airplane tracks nicely though. Also, I HIGHLY recommend that anyone about to do their first flight to find an airstrip that is LONG and WIDE. I'm currently working out of a 4,900 ft field and it sure has been nice. After I'm comfortable getting it down properly, I'll fly it to my own field, which is 2,600 ft grass, and 50 ft wide.

Now, for the numbers (all taken on a 65°F day):

EGT: Idle 1022°F  
Climb 1472°F  
Cruise 1292°F

According to Steve at GPAS, these are a little bit on the high side, so I will be enrichening the Posa one turn. This will probably make my idle mixture

very rich so I will need to use the mixture control to lean.

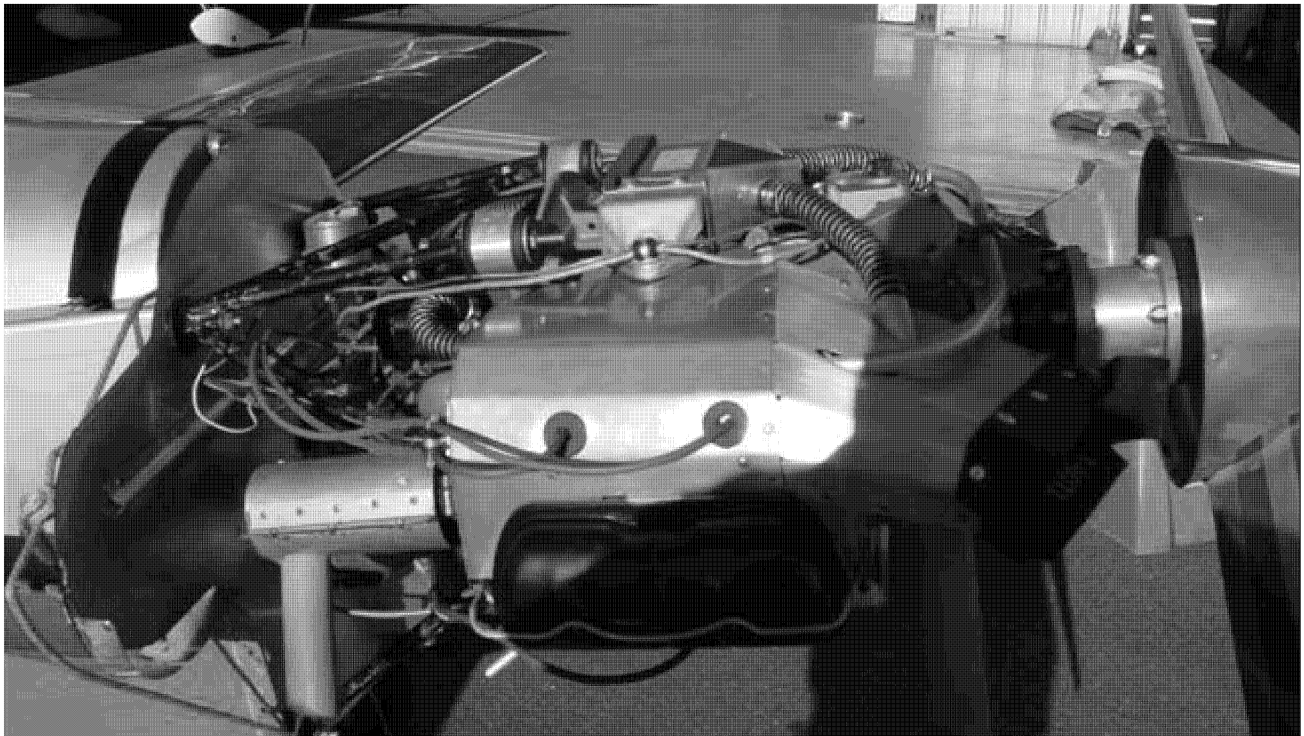
CHT: Climb 250-260°F  
Cruise 220-230°F

Oil Pressure:  
55 psi cold start  
40 psi cruise  
20 psi cold idle  
6 psi hot idle

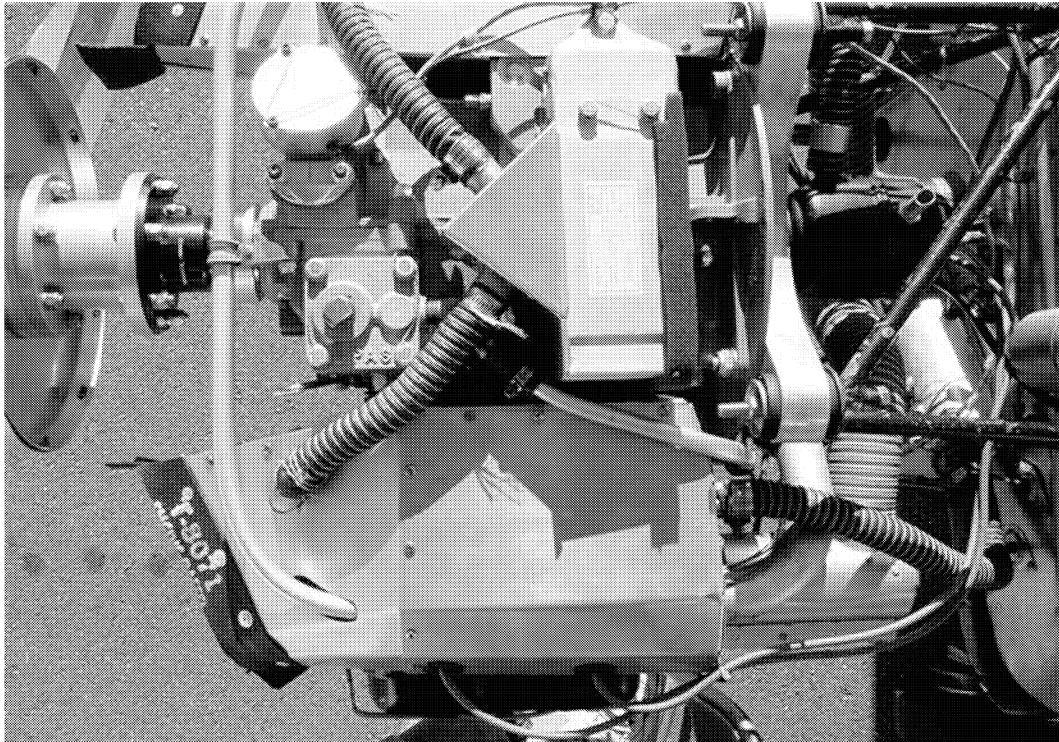
Oil Temp: I haven't been able to elevate the oil temp above 120°F. It just warms up to 120 and stays there. I use straight 30 wgt oil as recommended by GPAS. Steve says the oil temp is too low, and suggests blocking off some of the oil cooler until I get the temp up in the 160-200°F range.

Well Fred, that's enough of my rambling. Of course, if you want to use any of this for the newsletter, you may edit it as much as you want. After the test flights are completed, I will send more info. But for now I'm really pleased with the way it flies. See you at S-N-F.

Tom Warren  
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Hartwell, GA 30643  
mntnest@hartcom.net

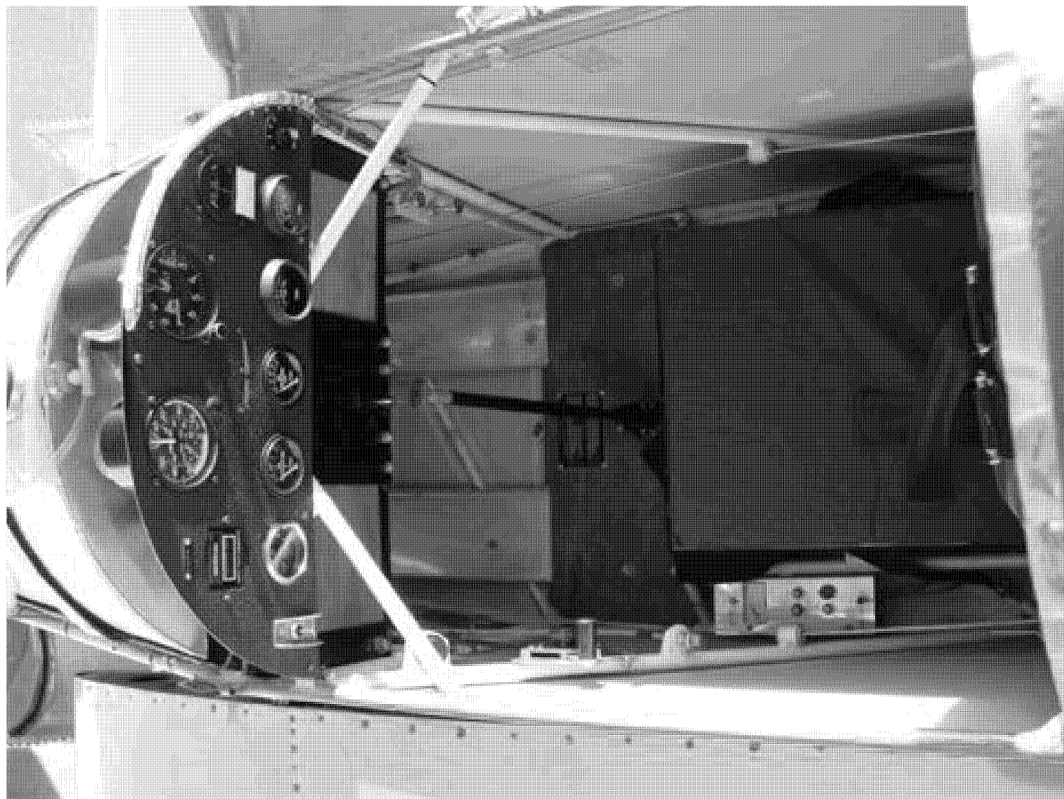


Tommy Warren's Engine Installation (RH Side)



Tommy's Engine Installation (Top View)

Tommy sent this note along with this photo: "This shows, among other things, the oil cooling baffle using your setback plate, a 1/2" ID aluminum balance tube, and especially the mounting of the secondary ignition coils (on the firewall, enclosed by a semicircular aluminum baffle with a 1" cooling CAT tube on one end)."



Tommy's Cockpit



## INSTALLING A CANOPY SAFETY CATCH

Back in 1987 during the first flight of my Sonerai IIL, I had the canopy come open shortly after reaching pattern altitude. Needless to say, the flight was a very short and exciting one. Fortunately for me, the canopy remained attached to the airplane and the airplane remained fully controllable. (I also remembered to keep flying the airplane.) This allowed me to put it down on a freshly planted farmer's field adjacent to the airport, with the only damage being to the canopy frame and wheel pants.

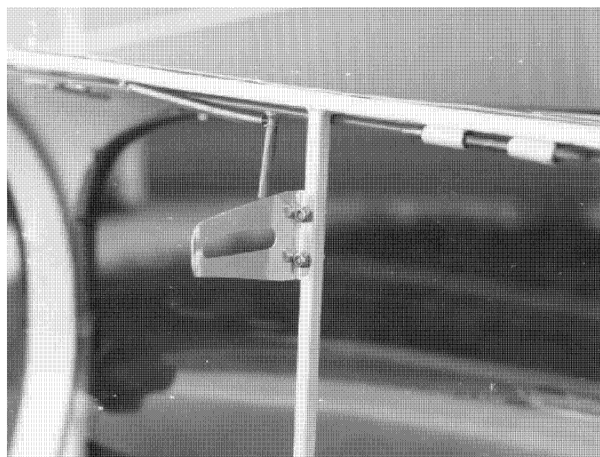


Photo 1

When I built the canopy frame and latch mechanism, the plans were followed very closely. The only problem was that nowhere on the drawings was there direct mention made of the latch spring size or location. I attempted to solve the problem by looking at other Sonerai's to see how other builders mounted their latch spring. I subsequently mounted a spring, and had what I thought was a workable system.

The reason the canopy opened is related to the latch spring and the latch pin arrangement. There were three primary contributors: (1) In order to make the latch work smoothly, I filed a long lead-in taper on each of the three latch pins, (2) the latch spring was much too weak, and (3) it never occurred to me that the canopy would try to open in flight. I assumed that the airflow would force the canopy down. What, in fact, happens is that the canopy attempts to lift upwards, because the canopy is shaped, essentially, like the top of an airfoil. It was this combination of canopy lift along with engine vibration that backed the tapered latch pins out against the weak spring.

A safety catch of some sort would have prevented the canopy from opening completely. I made two changes. The first was the addition of a much stronger spring to keep the latch pins engaged. The second was the addition of a Vari-Eze style safety catch. The catch allows the canopy to open only 1.50" if the latch should fail.

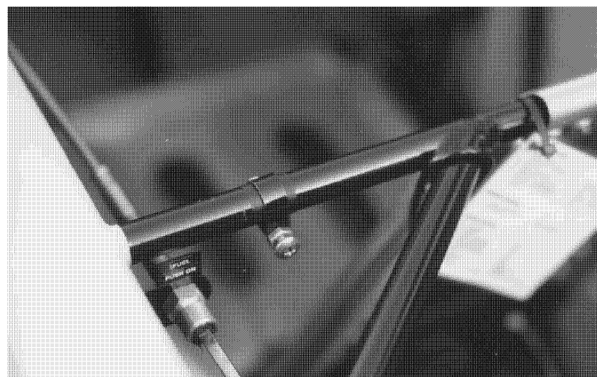


Photo 2

The problem with a safety catch is that if someone has to open the canopy from the outside, it becomes difficult unless you design it like is shown in the photo. The slot is long enough to allow the canopy to open about 1.50". This allows you to slip a hand under the rim of the canopy and bend the catch back to allow the canopy to completely open. Figure 1 shows a cross-section of the canopy latch, and Photo 1 shows the canopy catch tab with the long slot. Photo 2 shows the #10 stainless machine screw that the slot pops over and holds on to. (If you're building a new fuselage, you could weld a bushing to the cross member, instead of using a strap.)

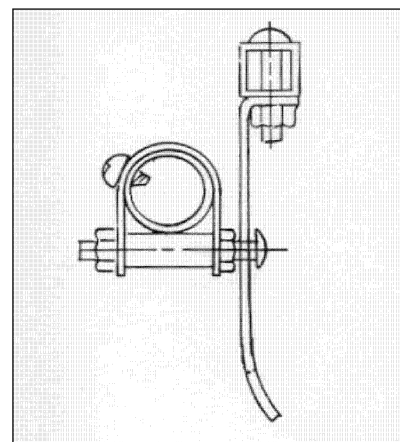


Figure 1

This was a relatively simple fix to install on my canopy, and I strongly recommend, to anyone who doesn't have one, installing a safety catch on his canopy. You may never need it, but it might save a harrowing flight like my first one.

## IDEAS ON RIB MAKING by Tom Hubbuch

*Tom emailed this to me in January. This is another really quick way to crank out ribs. I wish I had thought of this when I built mine. It would have save a couple years.*

Fred, in a recent e-mail I described some wrinkles at the ends of the stiffener ribs. You assured me this was no problem – they are minor, and I agree with you.

I did finish fabricating all the ribs. After finishing, I had some ideas to streamline this work. I used all the techniques below, but not in this exact order. Here are my ideas – maybe someone can consider them in the future:

1. Cut an accurate base block (I used 3/4" medium density fiberboard, MDF), allowing 1/2" extra for flanges, sand the edge profile smooth. Make a clamp block, slightly smaller than the base block. In both base and clamp blocks, accurately cut holes the same diameter as the lightening holes. Smooth those cuts. Drill 1/4" holes for pilot/clamping, and slightly countersink the faces to allow the bolt heads to be flush with the surface. Stack several layers (I stacked 7 layers) of rough cut .025 alum., clamp with 1/4" bolts. Drill 7/16" starter holes through the lightening holes. Using a router in a table, with a 3/8" carbide straight laminate trimming bit with pilot bearing, follow the outline of the base block to get the rib outline, and do the same for the lightening holes. The result is a batch of accurate rib blanks with flange allowance, good radius in the corners, and lightening holes cut. Smooth/debur edges (they were not too bad from the routing).
2. Then, make an airfoil form block by cutting the flange allowance off of the previous base block. Chamfer the working edge (after chamfering, I carefully cut about 15 degrees extra relief angle to allow for flange spring-back, and added some scallops to make room for the eventual flutes). Cut stiffening rib slots in both form and clamp blocks. Chamfer the working surface side of the lightening holes and stiffener rib slots.
3. Make forming dies from steel, aluminum, or hard wood for each size of lightening holes and stiffener ribs (I used a sandwich of MDF and aluminum for lightening holes dies, and oak for rib stiffener dies).
4. Put one rib blank in, clamp with the clamp block and 1/4" bolts, and, add c-clamps at the ends of

the stiffening slots. Hammer the flanges, occasionally adding some fluting. Then, using an hydraulic press, press the forming dies down into the lightening holes and stiffener slots (I had a cap on the stiffener slot dies to limit travel).

5. Remove the formed rib, tweak with fluting pliers to straighten.

Like so many things, a lot of the work is in the preparation and tool making. Also, routing of aluminum is loud. But, on the positive side, with a new bit, cuts like butter, and the "sawdust" doesn't float around.

Tom Hubbuch  
Sonera II LTS

## SNL DIRECTORY

As you probably noticed, the back page of the Jan-Feb-March 2002 issue contained a directory/index of all the Sonera Newsletters published by yours truly since 1997 (that's when I started). I set it up more as a table-of-contents, with the title of each article and the article's basic subject matter. If the article contained more than one subject, it is listed more than once.

My intent, in the future, is to provide an index for each year's newsletters in the Jan-Feb-March issue of the following year. I hope these are of value when searching for a particular article.

## FROM THE ARCHIVES

*From the January/February 1984 issue of the **Monink**, written by Randy Novak, is an excellent explanation of the process of **Magneto Timing**.*

The Monnett Aero Vee conversion uses a stock 4216 (now 4316) Slick magneto with a lag angle of 25 degrees. For engines of 2020 cc or smaller, we have always set the mag/engine timing at 28 degrees BTDC (Before Top Dead Center), however with the larger engines we use 25 degrees BTDC. The difference is not much, but does seem to make the starting a little easier for the larger engines.

For those of you building your own engine, you'll have to set the initial mag timing. As a part of regular maintenance, the timing should also be checked every 100 hours, or on a yearly basis. There are two problems you'll have to overcome for doing this.

1. You'll need a magneto timing light. The light will indicate (glow) when the breaker points in the magneto are opening and when spark would be occurring. If a mag timing light cannot be found, then an ohmmeter can be used.
2. You will need to accurately determine the position of the crankshaft at 25 or 28 degrees BTDC. To help you do this, we've made a full-size drawing of the front of the propeller hub flange. Simply cut it out and slip it onto the hub, aligning the hub keyway with the key position shown on the drawing. On the outside diameter of the flange use a stamp, or punch, and small hammer to make a mark adjacent to the proper timing position. When this mark is in line with the crankcase split line on the top of the engine, it is in the proper position to find the firing position of the no. 1 cylinder. Remove the spark plug from that cylinder, and place your finger over the hole, turn the prop hub thru in the normal direction of rotation until you feel air pressure forcing your finger from the hole. Now, you keep rotating until the timing mark on your hub is lined up with the split line. The piston is now in a proper position for firing.

The mag is roughly timed by using the pin and directions that come with the unit. The mag is assembled to the engine, and then the final timing can take place. For this the spark plug leads should all be disconnected and the p-lead terminal must not be grounded to the engine or airframe. The mag timing light is connected to the p-lead terminal and a grounding point on the engine.

When the prop hub is rotated backwards about 10-15 degrees and brought back into position, the light should just start to indicate as the timing mark comes into position. If the hub is backed off too much, the magneto impulse coupling will engage and the indication will not be correct. To disengage the coupling, just rotate the hub past the timing mark and the impulse should snap somewhere around TDC, then return back past your timing mark and try again. If you accidentally make a full rotation of the hub, or are not sure of the position of the no. 1 piston, repeat the process to determine that the piston is on the compression stroke. It is easy to become confused and the timing could get 360 off, the result being that the spark would be occurring on the exhaust stroke instead of compression.

Freditorial Comments: Randy's article needs a little elaboration. The actual timing process goes something like this:

1. *With the mag rough timed with the pin in place, and the timing mark on the prop hub in the correct position, clamp the mag in position on the engine. Do not rotate the crankshaft while the pin is engaged or you will risk damaging the mag. Now, remove the pin.*
2. *Connect the timing light to the mag and engine.*
3. *Loosen the mag clamps just enough to allow the mag to turn. If the timing light indicator is on, turn the mag slightly in one direction or the other until the light goes off. Then, turn the mag in the opposite direction until the light just comes on. Retighten the mag clamps.*
4. *To double-check the timing, rotate the prop hub backwards 10-15 degrees, and then rotate it forwards. As the timing mark aligns with the crankcase split, the light should start to illuminate.*

*Another way to determine the timing mark location is to measure along the O.D. of the prop flange from the TDC mark. This of course requires the location of the TDC mark. One way to do this is to take an old 14mm automotive spark plug, break off and drive out the ceramic insulator, and epoxy in a piece of steel round stock long enough to keep the piston from reaching TDC.*

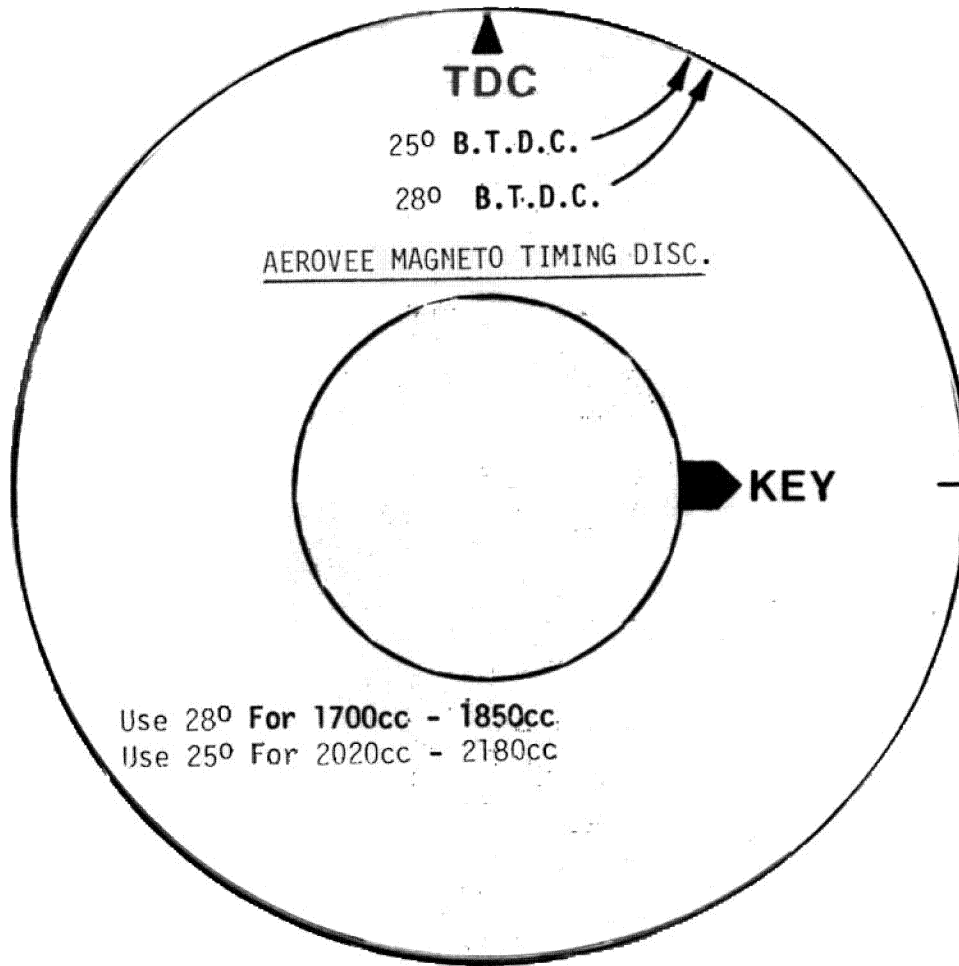
*With the piston of the #1 cylinder near BDC, screw in the modified plug. Now, slowly turn the prop hub until the piston stops on the plug. Using a straightedge, make a pencil mark on the edge of the prop flange. Next, rotate the prop hub in the opposite direction until the piston stops on the plug, and mark the flange again. The TDC is half way between these marks. Mark with a punch. Do the same thing using the #2 cylinder to mark the BDC. These two marks are very useful for adjusting the valves.*

*To locate the timing mark, accurately measure the O.D. of the prop hub, then calculate arc distance to the mark:*

$$\text{For } 25^\circ: \text{ arc distance} = \pi D(25/360) \\ (\text{If } D = 5", \text{ arc distance} = 1.09")$$

$$\text{For } 28^\circ: \text{ arc distance} = \pi D(28/360) \\ (\text{If } D = 5", \text{ arc distance} = 1.22")$$

*Using a flexible ruler, measure clockwise from the TDC mark and mark with a punch.*



## 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: 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)

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

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 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,

jhhall6980@aol.com, Southern California

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, (402)353-1161 (2/02)

For Sale: Sonerai IIL. Fuselage welded, on gear, wings/aileron 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)

Trade: For Sonerai I – Murphy Renegade Spirit, 532 Rotax, basic instruments, radio, intercom, 250 TTAF&E. Mike Hedglin, (308)385-0578 (2/02)