

# SONERAI NEWSLETTER

JAN-FEB-MARCH 2001

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PHONE: 262-835-7714  
(AFTER 6PM CST)



## **MIKE RATH IN HIS SONERAI II**

*This is the stage where you get to sit in it and make airplane noises. In his last letter, Mike, who is from Burlington, KY, said that he was getting close to covering, and was considering the Great Plains rear-drive VW for his engine.*

## **WELCOME TO THE WINTER OF 2001**

As I write this during the week before Christmas up here in wonderful Wisconsin, we are in the throes of the worst winter in several years. We've had more snow in the month of December, than we had all of last winter, and tonight, the wind chill outside is in the neighborhood of -30°F.

Needless to say, my poor Sonerai is literally snowed into her hangar, and I won't have any ambition to dig her out until the temperature gets up to around +30°F. I have removed her battery, hand-held radios, and ANR headset, though, and have them stored in the basement. Those little AA

batteries seem to like that a whole lot more than the cold.

The cold weather does allow me to do a couple of things, though. The first is working on my Wag-A-Bond project. I've been fooling around with this project for about three years, and have the basic fuselage welded, the tail surfaces collected (They are Piper Cub parts), the wing ribs and spars made, and the RH wing about half built. I hope to get the wings assembled this winter, so I can get back on the fuselage this spring.

The second is to ponder the upcoming spring and summer flying season. I'm seriously thinking about taking the Sonerai to Sun-N-Fun 2001. I would like to take a couple weeks of vacation, and

go there via Dayton to visit the Air Force Museum, and Kitty Hawk to pay homage to the Wright brothers. We'll have to see what happens.

By the way, Sun-N-Fun runs from April 8<sup>th</sup> to the 14<sup>th</sup>. Hope to see you there.

## RENEWAL TIME

Yep, it's that time of year again. Time to renew your subscription to this outstanding piece of journalism. Before you throw away the envelope that this newsletter came in, look at the mailing label and check the "PD" date. If it says 2000, and you want to continue receiving the **Sonerai Newsletter**, please send me \$12.00 (Cash, check, or money order in US funds). If it says 2001, you are paid up and will get it for another year. Please make your checks out to "Fred Keip", and include a short update of your progress. And thanks for your continued support.

## SONERAI NEWS

- First Flights: Dick Morrow informed me that the Sonerai IILTS that he started, and subsequently sold to Shannon Lesko, has been finished and flown by Shannon. Congratulations to both Shannon and Dick!
- Great Plains Aircraft Supply News: There are a couple new things. First, the new and updated 2001 catalog is now available. Second, the wing ribs that were announced in the last issue are now in stock and ready for immediate shipment. And third, they now have new "Sonerai" logo decals in 9" and 12" sizes. If you're interested in any of this stuff, give Steve and Linda a call at 402-493-6507.
- Sonerai Wing Construction Manual: It's finally written. Perhaps a little later than I promised initially, but it is now done and in the process of being published. There are 26 pages of text, 85 photographs, and 12 drawings in the final draft. I hope to have them available by late January or early February. If you would like your own personal copy, sent me cash, check, or money order for \$25.00. Postage is included. For those of you who haven't bought your plans yet, the manual will be included with the plans in the near future.
- Back Issues: **Sonerai Newsletter** back issues are available in two forms. A 3-1/2" diskette which contains most of the significant

newsletter articles published by Ed Sterba from 1987 through 1995 is available for a mere \$10.00. There are also hardcopy back issues for \$3.00 each. I have the last two issues from 1994, and all of the issues from 1995, 1996, 1997, 1998, 1999, and 2000. If you want any of the above, send me a note requesting the ones you want and a check for the correct amount. The postage is included.

## A CRY FOR HELP (AGAIN)

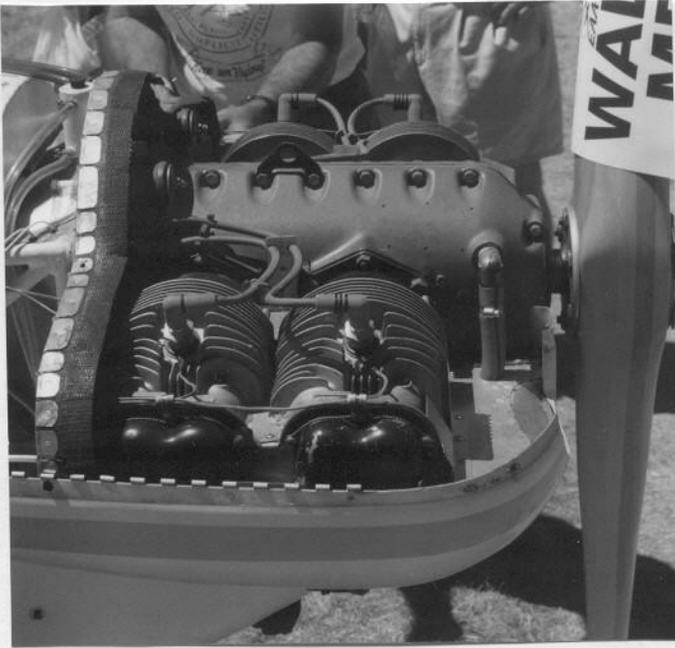
I know you've heard me say this before, but I'm going to say it again: Please send me stuff that I can publish in this newsletter. Photos of your airplane, finished or not, are greatly appreciated, as I'm running out of good ones for the front page. Articles are even more appreciated. You don't have 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 just hand write them, and I'll computerize them. Either way will do.

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 2000 newsletters, I'd like to thank Jim Gay, Jim Hardy, Dave Wilcox, and Vince Nicely for their input. Jim Hardy and Dave, you'll notice your subscriptions have been renewed. (Jim Gay and Vince took their renewals in 2000.)

## CONTINENTAL A65/A80 IN THE SONERAI

by Dave Wilcox

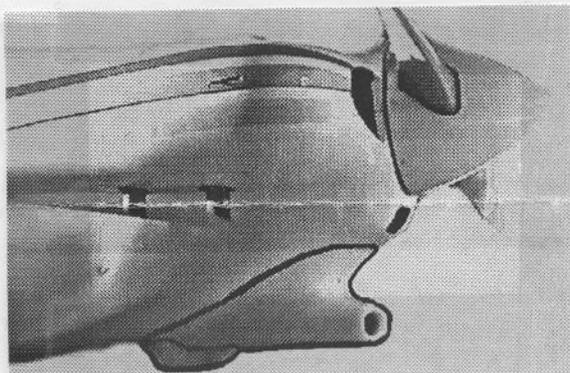
I'm writing this article, somewhat motivated by the letter from Lance Wells published in the July-Aug-Sept 2000 newsletter regarding using a Continental A65 in the Sonerai. I'll share what I know, with the hope that people struggling with the engine decision have at least one data point to go on. I have two friends who have Sonerai's. Neither will consider carrying a passenger. When we fly together, I have to circle for them to catch up during climb, even with my 620 pound empty weight. I attribute about half of the 80 extra pounds to the engine and installation. That's a 5% increase in my solo takeoff weight.



**Dave's A80 Installation**

Over the last few years, I have listened to many opinions about installing a Continental engine in the Sonerai aircraft. Most people revert to the original word of warning that is printed in the plans, "Standard aircraft engines are too large and too heavy to suit the design." That advice comes from the designer, whom I highly respect. However, we are at liberty in this business to use our own judgment, as I did when I decided to use the Continental A80 in my Sonerai IILS.

Currently, I have 575 hours, 700 nose wheel and 600 tail wheel landings in the A80 Sonerai. My plane is convertible from nose to tail wheel configurations. The 80 extra pounds comes from the engine, of course, a larger prop, 5/8" landing gear, dual landing gear mounts, 6" wheels, hydraulic brakes, shoulder belts, twelve gallon gas tank, and various other do-dads.



**Dave's Air Inlet Scoop**

The A80-8 has no provisions for a starter or generator. It is essentially an A65 with five-ring higher-compression pistons, and additional lubrication to turn the higher RPM's. The A65 has a compression ratio of 6.3 and red-lines at 2300 RPM. The A80 has a compression ratio on 7.55 and red-lines at 2700 RPM. This higher RPM better suits the 60 - 64 inch maximum prop diameter on the Sonerai. The A65 usually swings a 72 inch prop.

Reference the Great Plains catalog (1997-1998), page 6. A fully decked out VW 2180 is 165 pounds. The Continental A80-8 is 170 pounds according to the service manual. The VW has a full electrical system and the A80 has none. To achieve the indicated 540 pound empty weight for the Sonerai II Stretch, I believe the assumed engine weight is 140 pounds, and 1/2 inch landing gear, tail wheel configuration, and mechanical brakes are used.

Size is the biggest problem. I used the standard Sonerai cowling, which is a very snug fit around the cylinders. Even using unshielded automotive spark plugs, the cowling needed to be adjusted. I added an oil cooler for another 3 pounds. The carburetor is forced outside the standard cowling. The inlet scoop shown here is another 2.5 pounds.

The engine mounts directly to the firewall using the same height for the upper mounts as shown in the plans. Using 1.125" spacers and the Continental rubber cones, the propeller is properly located. The firewall area must be modified for the magnetos and the oil tank. Many details must be adjusted, undoubtedly adding a few more pounds. If anyone would like to discuss the details, feel free to call me at home (480-892-7189, david.e.wilcox@honeywell.com). The easiest way to communicate is via e-photos.

The following performance data is for an approximate gross weight of 843 pounds, conventional gear, wheel pants, with a 62 x 62 propeller:

**WEIGHT**

Aircraft:	620 lbs
Fuel	36 lbs
Oil	8 lbs
Stuff	9 lbs
Pilot:	170 lbs

**CONDITIONS**

OAT	90°F
Humidity	30%

Press Alt 2500'  
Density Alt 5000'  
Wind 180° @ 8

#### TEST DATA

Throttle	Wide Open	Partial
MP Hg"	27	22
RPM	2700	2250
IAS MPH	145	126
TAS (E6B)	156	136
GPS Triangle	155-159-149	138-137-132
Avg GS	154	136

Climb from 2500' to 4000' pressure altitude is 900 FPM. Average fuel burn, purchased gas/hobbs is 3.33 GPH. Cruise is more like 3.7 GPH @ 21 Hg" MP.

Dave Wilcox  
517 E. Saratoga St.  
Gilbert, AZ 85296

*Freditorial Comment:* Next to construction tips, the subject I'm probably most often asked about is alternative engines. I guess some of you guys just don't like the VW, although mine has treated me pretty well over the years. That's why I will usually defer specific questions about the Continental installation to Dave and to Jim Quinn (607-786-0995). This is a great article, with hard facts. And it also shows the truth of the old adage that there is no substitute for cubic inches and torque when it comes to increasing performance. The A65/A80 displaces 171 cubic inches, while the 2180 VW displaces 133, and the ubiquitous 1835 displaces only 112. The difference in torque can be seen in the propeller spec. Dave is using a 62 x 62, while most 2180's use a 52 x 48.

I would like to ask any of the rest of you who might be installing a non-VW engine to send me info and photos. I know there are a few Jabiru 2200's, a Corvair, and a couple of Subaru's being installed out there. One guy was even talking about the 120 HP, 163 lb Jabiru 3300. Wouldn't that be a hoot?

## A SECOND LETTER FROM RON WRIGHT

After answering Ron's first letter that I published in the last issue, he sent me the following follow-up letter.

Fred: THANK YOU for the info you returned to in your 29 DEC 98 letter. All of it is helpful, and the HAPI ULTRA carb manual is "priceless". Please accept the enclosed to help cover postage/copying costs.

As an update, my wings each contain 10 ribs(!). All rib flanges are LH. Spacing from the fuselage (inboard) side is 2"/5-1/2"/6"/11-1/2"/11-1/2"/12"/12"/12"/11-1/2"/11". These wings have the angle/stiffeners on the first six bays (as far as I can see) on the main spar web and on the ribs, themselves. Have you seen or heard of this wing arrangement?????

Also, in reading thru the many **Sonerai Newsletters**, I have not yet seen if:

1. The spar taper pins could be replaced with aircraft quality bolts and nuts (of the required diameter). My a/c project does not have the "folding wing" feature, and once the wings are on...they would stay on.
2. Using the HAPI Ultra carb without a heat box, is it really safe? Does it need outside (filtered) ram air, or does the carb work OK by using heated/filtered air from within the cowling?
3. Has anyone used a "vented" gas filler cap in addition to the troublesome (sometimes) vent line in an effort to prevent "engine roughness/silence on takeoff"?
4. Does the main landing gear leg require 1 or 2 holes to drilled into it to secure the gear to the support straps attached to the fuselage? My set of plans shows the gear legs with 1 hole and 2 holes drilled. Let me clarify: a hole for each strap, or just 1 hole in the RH strap?
5. Is there a source for the 1/2" dia. Foam that is used as a seal between the cowling/firewall, as shown in an old INAV catalog (that came with this project)? I've tried Aircraft Spruce and Wicks.

Fred, thanks again and again for all the help.

Ron Wright, Peoria, IL

*Dear Ron:* I'm glad you got my last letter and that the Ultra Carb manual is what you need. It's been a good carb for me. It eliminated all of the fooling around I had to do to keep the POSA running properly. As far as your wings go, I have never seen this particular combination of locations. It could be somebody's "better" idea. If it's possible, you might try to contact the original builder to find out why he did things this way. I don't believe that the configuration will affect the strength of the wing at all, as long as the angle has been included on

*the upper spar caps and the spar web stiffeners are all installed (which you said they are.)*

*Now, for your new questions:*

- 1. Replacing the spar taper pins with bolts? The spar taper pins can be replaced with bolts. It will be necessary to ream the holes to obtain the proper fit to the bolts.*
- 2. Heat box on a HAPI Ultra Carb? When I bought my Ultra Carb, the guys at HAPI told me that the carb should be set up with a source of filtered, pressurized air and a source of carb heat. I built a carb air box that mounts to the bottom of the baffle pan mounted under the oil pan. It takes high pressure air from this area and passes it through a pleated-paper Briggs and Stratton lawn mower air filter. I also mounted a carb heat stove on the RH rear exhaust pipe and connected it to the air box, which has a flapper door to control the air flow.*
- 3. Vented gas filler cap? I have not personally seen a vented gas cap used on a Sonerai since most of us use the rubber plug type of cap. Some people have added another vent connection to the front of the tank to eliminate the problem of vent stoppage when the fuel sloshes to the back of the tank during takeoff acceleration. If you are using a float bowl carburetor, this vent stoppage is generally not a problem since the sloshing only happens for a few seconds, and there is plenty of fuel in the bowl to deal with this.*
- 4. Drilling of the main landing gear? It is only necessary to drill the landing gear at one strap. The 3/16" hole is to allow the installation of an AN3 bolt or clevis pin to transmit any landing gear side load into the fuselage.*
- 5. 1/2" diameter foam for the firewall? I'm not sure which foam product you mean since I don't have an old INAV catalog anymore. I have enclosed a small sample of the seal material that I've used for years. It's actually designed to seal the doors on your house, and you can get it at Ace Hardware.*

### **A QUESTION ON TURBO-CHARGING**

*I got the following letter from Bill Post after the Oshkosh 2000 convention.*

*Dear Fred: I just joined your newsletter gang at Oshkosh in August and was surprised to get my copies so promptly.*

*I've written very few letters in my life (then only to relatives) but I just couldn't help comment on Lance Wells' problem on high-altitude operations in the J-A-S 2000 newsletter. To me, the most simple solution would be to turbo-charge that 1835.*

*I'm far from being an authority on turbo-charging, but I think, with a little bit of boost, he could get horsepower equal to, or better than, a 2180 at any altitude he would be flying.*

*I know they do this on Beetles, and there are kits out for this.*

*Has anyone ever tried this on a Sonerai?*

*Bill Post  
4991 Doyle Road  
Pittsburgh, PA 15227  
(412) 882-6869*

*The concept of turbo-charging the VW in our little airplanes to get more horsepower is an intriguing one. Unfortunately, what appears to be simple on the surface, has many complications hidden underneath.*

*There are several interrelated issues. The first, and most important, is reliability. The VW engine was never designed to be turbo-charged. There is a significant risk of severely damaging the engine if it is over-boosted. This means that the turbo-charger must be properly controlled. You control it by means of a wastegate. A manual wastegate is the cheapest, but requires constant vigilance on the part of the pilot, while an automatic wastegate is expensive.*

*Second, on the Sonerai, there is a very definite space issue. It would be a real challenge to install the turbo and its wastegate, all of its exhaust piping and all of its intake piping along with the carburetor in the limited confines of the Sonerai cowling. Then, what do you do with all of the heat? Turbos and exhaust systems get very hot, which would require that the fiberglass cowling be protected so that it wouldn't melt.*

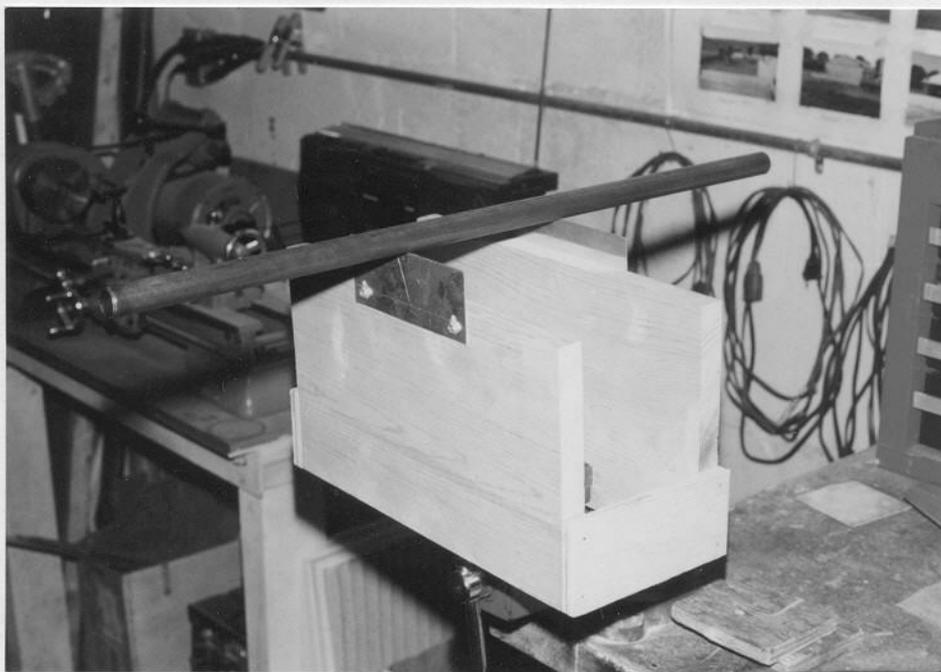
*And finally, there's the issue of cost and weight increase. The turbo and all of its related parts will add significant cost and significant weight to the airplane.*

*Being a believer in the KIS principle, I still think the simplest and most reliable solution to the high altitude problem is to install the largest, carbureted*

engine, with increased compression ratio, as possible.

*If anyone of you has tackled these challenges, and installed a turbo on your Sonerai, please send info and photos to me.*

plywood, 2-1/2" wide x 5-1/2" long, glued and nailed in place. The knife edges are made from .025" x 2" x 5" 2024-T3 aluminum. The back knife edge is attached to the pine board with two small screws so that it is in a fixed position. The front knife edge is also held with two screws, but the holes are slotted vertically to allow it to be leveled relative to the other knife edge.



Prop Balancer - Photo 1

To use the balancer, clamp the assembly in a bench vise so that the rear knife edge is level. Use a small bubble level to check. Then level the front knife edge so that it is level both side-to-side, and front-to-rear from the rear knife edge. Once the front edge is level in two planes, insure that the screws holding are tight, and you are ready to balance your prop.

My Sterba prop has a 3/4" diameter hole bored through the center. Your prop should have something similar. Slide an 8" or 10" long piece of 3/4" x .035" tubing through

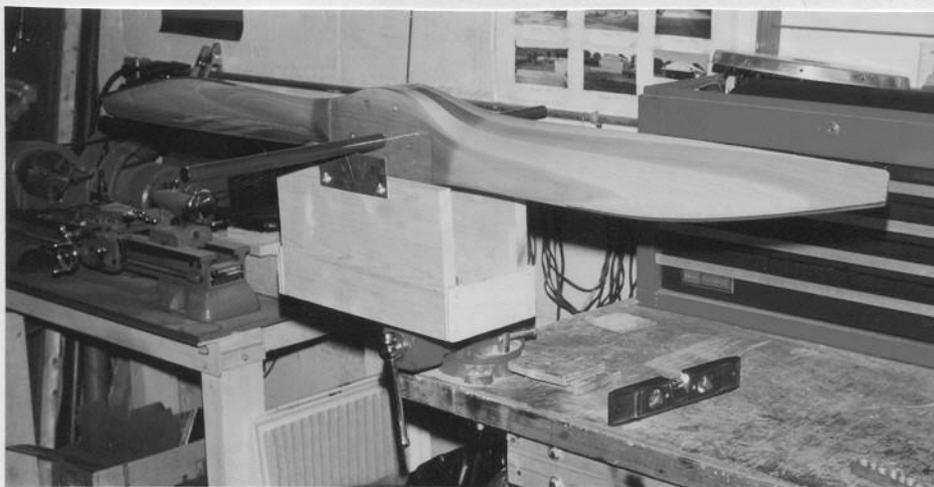
## PROP BALANCING

No matter what engine you use on your Sonerai, there's an almost 100 % probability that you will use a custom-built wooden propeller to provide the thrust. To make the production of this thrust as smooth and vibration free as possible, it will be necessary to occasionally check and adjust the balance of your propeller, since temperature and humidity changes will affect it over time. This is not a difficult task, and can be easily accomplished using a knife-edge balancer similar to the one shown in the photo 1.

Its manufacture is really simple. It is made up of two 1 x 8 pine boards 12" long, spaced 4" apart, and held by two pieces of 1/2"

the prop, and place the prop on the balancer as shown in photo 2. If the prop is in balance it will not rotate on the tube. If it is out of balance, the heavy blade will slowly rotate downwards.

To balance the prop it will be necessary to paint a coat of varnish on the light blade so that it is just slightly heavy. That way when the varnish dries



Prop Balancer - Photo 2

the balance will be correct. When I asked Ed Sterba about the balancing tolerance, he told me that he tries to get the prop so that it will center with a folded dollar bill draped over the light blade at mid-blade length. I've found that you can get a whole lot closer than this if you're careful.

You can also check the hub balance by inserting the propeller into the balancer with the blades oriented vertically. If the hub is out of balance, you will need to drill a hole in the hub on the light side and epoxy in a piece of steel rod stock or lead shot.

Once you've balanced your prop, you'll be amazed at how much more smoothly your engine runs.

### E-MAIL UPDATE #3

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

Don Archangeli (IIL-1835) scalywag@concentric.net  
Bob Barton (II-1835) rabarton@mindspring.com  
Al Bertelmann (IIL) altonb@singnet.com.sg  
Dave Bilgri dbcpa@powerweb.net  
Wes Blake (IIL-Revmaster) blakew@web-ster.com  
Dan Bohn (IILTS) daniel.bohn@gte.net  
Jim Bohnsack (II) bohnsackja@gvl.esys.com  
Kyle Bond bondracing@aol.com  
David Bubolz (IILTS-2180) dabubolz@umich.edu  
Mark Burnham desmo@interport.net  
George Chapman (II) cgk@mb.sympatico.ca  
David Claxon (IIL) dwclax@fbwebmaster.com  
Bill Craft billc851@home.com  
Doug Evenson devenson@mindspring.com  
Timothy Eyer (I-1600) foils@tds.net  
Gene Forsthofel (IIT) gene12@uswest.net  
Nick Fourdraine (II) fourdraine@auracom.com  
Randy Gaskins (IIL) randy@icomnet.com  
Robert Halsmer halsmer@air.ups.com  
Jim Hardy (I) jehardy@nortexinfo.net  
Don Hegeman (II-2180) dwh6305@aol.com  
George Henderson (II-1835) geowade@airmail.net  
James Hodge (IILTS) grnpaj@aol.com  
Jack Holgate (I-1600) jholgate@bellsouth.net  
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Larry West (IIL-2276) tailskidwest@sprintmail.com  
Dave Wilcox (IILS-A80) david.e.wilcox@honeywell.com  
Ron Wright (IIL-1835) wright.ronald1@mcleodusa.net  
Gary Zahn (IILT-2165) gzahn@vbe.com

If your address isn't here and you'd like me to add it, call me or send it by snail-mail. (No, I don't have an address, yet, but I will by the next issue.

### ENGINE STORAGE

*This article comes from the Fall-Winter 1990 issue of the Great Plains Aircraft Supply Beetle Flyer.*

With cold weather finally here, one of the most often asked questions we receive is "What is the best way to store my engine for the winter?" For short-term storage, we recommend the following:

1. Start the engine and run it until thoroughly warm. Shut the engine off.
2. Immediately remove the valve covers and remove the rocker arm assemblies.
3. Re-install the valve covers, and remove the spark plugs. Squirt 10cc of light weight oil in each cylinder and the crankshaft several revolutions.
4. Re-install the spark plugs and change the oil. Rotate the crankshaft several revolutions each week.

Most non-use corrosion occurs on the valve seat/valve face and the the cylinder barrel. The corrosion is caused mainly by moisture. Dehydrator plugs used in place of spark plugs will help eliminate cylinder corrosion. Moisture combined with the by-products of combustion cause erosion of the valve seat/valve face when the valve is held open over an extended period of time.

There is no reason to keep the valve springs compressed over a 3 to 4 month period, also.

Keep the engine in a warm area if possible. The worst possible place for an engine is on the cement floor of an unheated garage. If you do not have heat in your garage, simply place the engine up off the floor and throw a blanket around it. Place a small 60w light bulb under one side of the engine. The light bulb will produce enough heat to keep moisture off the engine.