



# RVator's Log

Newsletter of the Twin Cities RV Builder's Group

June 2006

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## Upcoming Events

**June 17: Minnesota Wing March Meeting** – Instrument panel design. Our usual panel of experts plus a tour of Stein Air's avionics installation shop. **DON'T MISS THIS ONE!!!**

**Oshkosh: RV Family Reunion BBQ during Air Venture, Details here:**  
<http://home.comcast.net/~bcol-linsrv7a/ea/2006bbq.html>

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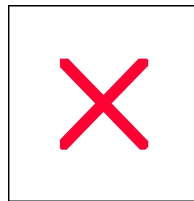
**Minnesota Wing  
Van's Air Force**

**Pres:** Doug Weiler, 651-398-1184, [dcw@mnwing.org](mailto:dcw@mnwing.org)

**Sec/Treas:** Jim Lenzmeier, 651-633-8488, [jlensmer@msn.com](mailto:jlensmer@msn.com)

## Shop Notes

-Doug



All right petroleum fans, how many of you old codgers like me remember the "gas wars" of the late 60's (yes, I am really dating myself). Gas stations on opposite street corners would actually duke it out in the marketplace and keep lowering their prices to attract customers (kind of like airlines do today). They gave away trading stamps and even would throw in a real cheap set of drinking glasses for a fill up. A fill up for my VW Beetle never cost more than \$3.00 unless I was running on fumes. 21 cents per gallon for regular was about the max and 80 octane at the local airport never rose above 37 cents.

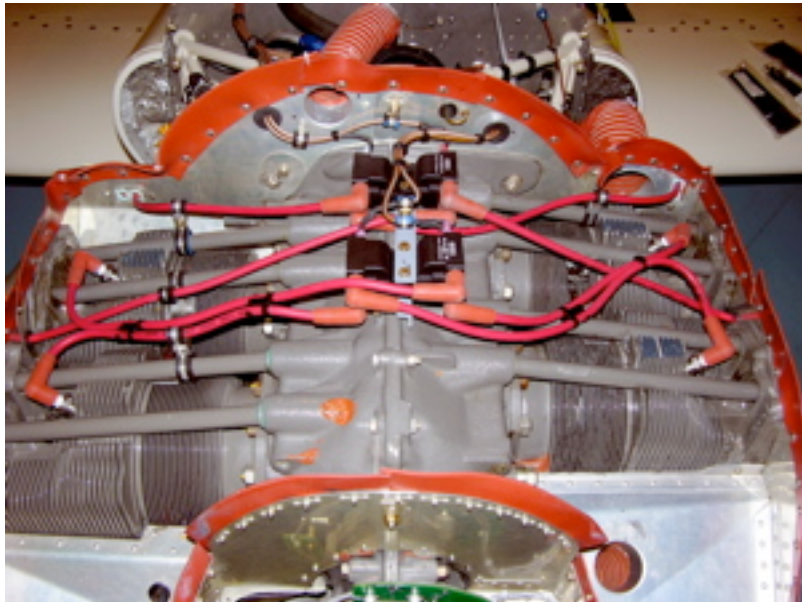
Today our \$30 pancake run to Eau Claire is more like a \$50 run as aviation fuel prices push \$4 a gallon and higher (much higher in many parts of the country). Since I have not yet seen Van announce an RV-Hybrid, I figured it might be time to consider a way to make my RV-4 more fuel-efficient. To begin with RVs are probably one of the more fuel-efficient light airplanes in the sky anyway. 170 knots on 8.5 gallons per hour is not too bad by any standards. But I was jealous of Tom Berge and Jim Lenzmeier consistently burning a gallon an hour less than I was. Their solution: electronic ignition. My Aerosport 0-360 had been running perfect but its spark comes from 1930 tractor technology. I was trying to remember just who invented magnetos (was it Ben Franklin or Leonardo DaVinci, I forget). But I convinced myself it was time to put a little more spark (pun intended) in 22DW, so I began doing some research on this "new" technology of electronic ignition.

Both Tom and Jim have Lightspeed systems. I was attracted to the new P-Mag/E-Mag systems but I wish they had a little more of a track record. I had heard of some reliability problems with a couple other manufacturers also. On the other hand, Klaus Savier's Lightspeed EI system has been around since the 80's and after much digging, I really couldn't find anyone having any significant problems with the LSI system. About this time, RV-6A builder Alex Peterson was on his third failure of his Unison Lazar system so he was on the verge of jerking the Lazar system off and using it for a boat anchor. A short discussion later and we decided to convert our respective airplanes to dual LSI systems.

We placed our orders and I began to pull off 12 pounds of Slick mags, harness, and \$60 Iridium aviation spark plugs. Sold the whole shebang on the Internet in one day (there is always someone looking for a bargain out in home-builder's cyberspace). We both decided to go with the direct crank sensor installation, which required that the prop and starter ring gear be removed. I sent my ring gear out to LSI in California for installation of the sensor magnets. Alex is braver than I and installed them himself. We were committed now.



Klaus' latest revisions to the LSI system have resulted in each unit using only 1.3 amps. If your alternator failed, you would run out of gas long before running your battery down powering even a dual LSI system. But what if your main battery shorted out or some other weird malfunction? Klaus provides a dual battery wiring diagram so Alex and I decided a small backup battery would be a wise



Four high-energy ignition coils are mounted on top of the engine switch to power one LSI system from the aux battery and a small digital voltmeter to monitor aux battery voltage, and the installation was just about complete.

From what I have read and what others tell me, most of the efficiency gains from the EI system will be seen at high altitude. Supposedly the spark timing is retarded as a function of manifold pressure and rpm. This allows leaning on the lean side of peak without the engine running rough (like my current set up.) I did accomplish some flight tests before this project so I hope to have some data to compare. We'll see.

As this issue goes to press, I am getting close to wrapping up this project. Work at good old NWA takes me away from the project for a good portion of the week. As with any modification done to your flying RV, the time frame is probably twice as long had you incorporated this system into the aircraft while under construction. Lots of time is spent undoing things and then redoing things. Next issue, I'll give a complete pilot report and we'll see if all the pain and anguish was worth it.



The Plasma III controllers were mounted on the firewall. Spaciousness is not a virtual of the RV-4. Every square inch is precious.

## Dave Cheung's First Flight

*Several Minnesota Wing RVs are nearing completion and will likely be flying this year. Dave Cheung of Marshalltown, IA has the pleasure of being number two for 2006. His narrative...*

I got my airworthiness certificate on the 14th of April and made first flight April 23<sup>rd</sup>. It was a piece of cake. No wind, sky clear, sunny. I was doing a high-speed taxi and the 6A literally jumped into the air at about 70. I looked down and the runway went away real quick. That got my heart pounding fast! I decided long before hand that if that happened, I would just go for altitude just in case.

The day of the inspection I went up with a friend of mine with

a RV6 and he let me do some approaches with his tail dragger. I gave it back to him on final. Didn't seem like a big deal.

The other part of the plan was if the engine quit I would look for something straight ahead and since this is farm country all I had to do was choose which field I was going to land in. The day before I ran it up on the ground for 4 minutes to make sure I could make the pattern. The engine performed just fine so I knew that making the runway would not be a problem.

I put a 0-320 and a Sensenich prop on it and the plane really was pulled through the sky. It was so strong that it was like I was just sitting on the engine. The DAR stated I have to placard the prop to avoid continuous operation above 2600 rpm which is mandated by Sensenich.

It was smooth climbing. I kept a low angle of attack to make sure I didn't stall. I climbed about 500 ft per min at 120mph. At 3000', I backed off the throttle to 2000 rpm and it settled at 120 mph. I left all the fairings and pants off to increase drag. I did some slow turns left and right. I also calibrated my compass to my GPS. No doubt about it, I need a new compass. It was about 30 degrees off the GPS. It is an in-dash compass and maybe I have some ferrous stuff on the dash. The other gages seemed to be operating okay. I will double check on them next flight.

The toughest thing was to focus on the airplane. Everything looked great outside and I was the only one in the sky that day so I stayed near the airport. Another good thing is that the roads around here, all point to the cardinal headings so the compass was really of no concern.

To be honest with you the 6A handled very gently... just like my Cessna 150. I also didn't do anything stupid other than take off. The stick movement was only about 1/4 inch in any direction at that speed. When I slowed for landing the movement went to about 1/2 to 3/4 inch play. Full flap and approach at 85 with touch down at 70. I was also very light on the rudders. It doesn't seem to need the extra permanent rudder trim that I have seen on other airplanes. I will check this again though it was straight and true.

There I was back on the ground and it seemed surreal. The last 6 years seems to melt away now that the ground-plane is now an airplane. The RV grin is real!! The funny part is that the grin is on the inside too. Only 24 more hours to go in the test area.

Now I need to get it painted. The only rash I got was from Irene when I got home and told her what I did. Oh well!!



Dave, his wife Irene, and the new addition to the family

### *Update, May 11, 2006...*

I now have 8 hours on the RV6A (N822DC). I have been doing steady cruise flights to seat the rings on the engine. My info is that changing the throttle settings is not that healthy for the rings. I had some minor things like a slight oil leak near the cooler, so I have tightened everything down well. On one descent I made I topped out at 180mph. I had a right main brake locking up and I re-torqued the disc places and that seem to do the trick.

I have been following the protocol that is laid out in the EAA first flight program. I circled to 10K over my airport to check power settings, temps and pressures. Boy, everything looks so tiny from up there. I did have one occasion to chase a friend of mine who owns a Cherokee 140 and it was so tough not to shoot him down, I just turned off and flew away.

Overall, the flying that I have in my 6A is nothing short of incredible. I am fulfilling a childhood dream of building a model airplane that I could climb into and fly. It wouldn't stand a chance in a beauty contest; however, I can now fly along side the best of them. The building experience has added something to me so wonderful that I can't describe it. The funny thing is that the only other people that know the feeling are the ones that have already done that. Others just look at you like you have a horn growing out the center of you head.

I guess I will just hang around my fellow unicorns. For those of you still pounding rivets and scraping your knuckles, do not despair, because the RV Grin is worth all the work you put into it.

## Multiple Auxiliary Inputs into a Single Aux Output

By Pete Howell

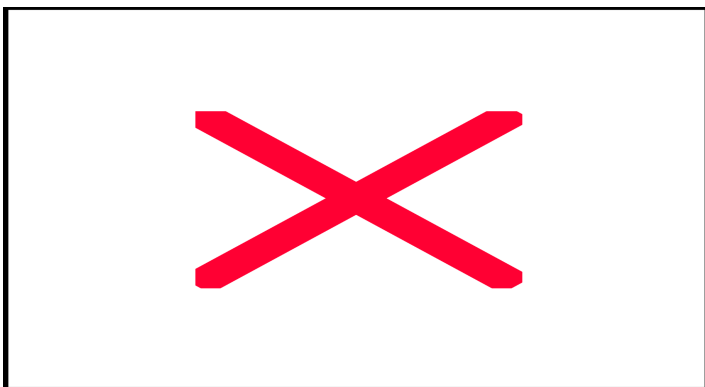
Today's cockpits feature more and more devices that offer audio output, whether it is for warning or entertainment. I am just finishing the wiring on my RV-9A and realized I had 4 audio sources I wanted to be able to hear over the pilot and copilot headphones. I have:

- Grand Rapids EIS4000 Engine Monitor – mono warning tone
- Garmin 396 – stereo XM radio
- TrafficScope VRX – stereo voice warnings
- Ipod – Kids stereo music

There are some high-end audio panels that can handle multiple inputs easily, but they come with a pretty high price tag. I have a VFR cockpit and a simple stereo intercom (Flightcom 403) will cover most of my audio needs very well, except most intercoms only have one aux input.

For the electronically challenged, (like me) the simple answer is to just connect all the wires together and let her rip. This might work, but you would have to get lucky and have all the sources electronically matched. This is pretty unlikely, and you could actually damage your audio sources if the output from one device “bleeds” over into another device. We need to prevent this “bleed over” from happening. Isolating the audio sources from one another electronically does this. Isolation just means that the output from one device will be able to flow into the intercom, but not back into the other devices. In the rest of this article, I'll show how I made a very simple audio isolator for use in my plane.

I don't have an electrical engineering degree, so I turned to an electrical engineer friend who knows his stuff and likes to tinker. He explained that we could accomplish isolation by using a resistor and a capacitor on each input. We chose 510 Ohm resistors and 10uF axial lead capacitors. I can't explain why it works – but an EE can and you can find references on the web. Here is a simple schematic of my setup:



Now that the design was done, I wanted a simple way to package it. You could make a little printed circuit board, but that would be expensive and time consuming. You could just solder the wires together and cover everything with heat shrink, but that would be a mess. I decided to create a “dongle” using a crimp pin d-sub connector. This would be easy to make, compact, and give me the ability to make changes if needed.

Here is what you will need:

Item	Qty	Source
15 pin d-sub female shell	1	Steinair
15 pin d-sub female shell	1	Steinair
d-sub machined crimp pins	15	Steinair
d-sub machined crimp sockets	15	Steinair
510 Ohm ¼ watt resistors	7	Radio Shack or Mouser
10uF axial Lead capacitors	7	Radio Shack or Mouser
Soldering iron and solder		Radio Shack or Mouser
Machine pin crimper		Steinair
Heat shrink tube		Steinair

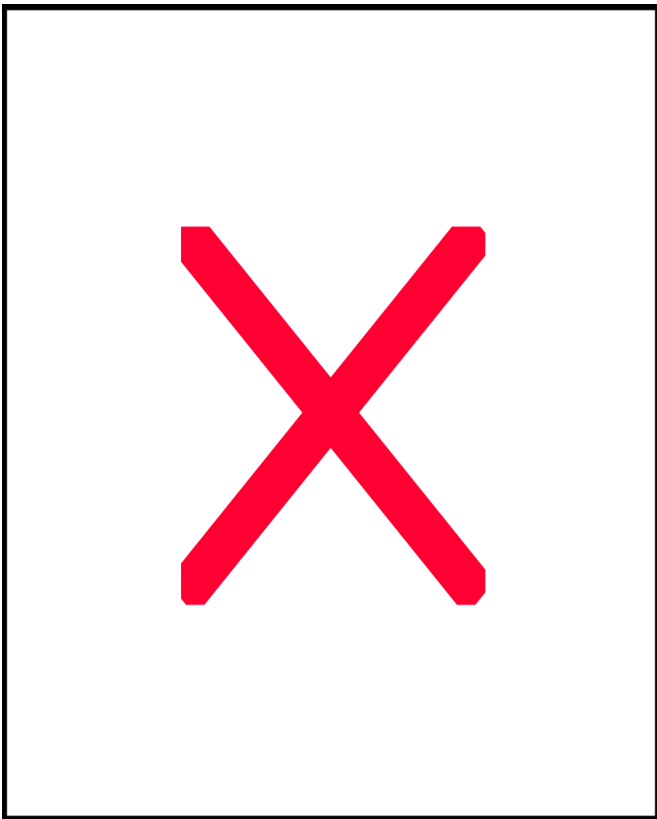
The rest is pretty straightforward. Solder the leads of the resistor and the capacitor together as seen in the picture. You can also see that I crimped on the d-sub sockets on the leads at the bottom. You will need to make one of these combinations for each input you have. If the input is stereo you will need 2 per input (right and left).



I then covered the sub assembly with heat shrink and while the heat shrink was still hot, crimped the top together to seal the unit:



Next I created a diagram of what would go where:



Then I inserted the resistor-capacitor units into the d-sub shell. The pins just snap into place.



I went back and added some heat shrink to the legs of the resistors and capacitors to make sure they would not short. (No picture of this)

Finally, I wrapped the whole thing in some large heat shrink to make it secure. It is not very pretty, but it will be hidden behind the panel.



The last step was to mount the "dongle" and run the input and output wires to it. I used a male d-sub shell and crimp pins for the inputs and outputs. On the output side, the right side wires and the left side wire are each connected and run to one side of the intercom aux input. So the right side outputs are run to pin 18 and the left side outputs are run to pin 19. The mono output can be run to either side.



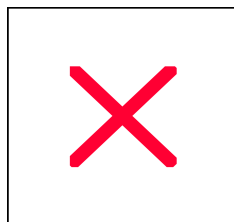
Secure all your wires and you are done. It is not pretty, but it is effective, simple, light and cheap. If you are looking for a more elaborate solution with the option to add an amplifier, look here:

<http://www.aeroelectric.com/Catalog/AEC/9009/9009-700E.pdf>.

Good luck! If you have any questions, contact me at [pete.howell@gecko-group.com](mailto:pete.howell@gecko-group.com)

## The RV as a Sailplane

*An interesting tale from Brian Denk, from the RV-List*



I've learned a lot about what NOT to put in a carburetor in the past couple of days, that's for sure. As for how I handled the RV8 in "glider mode", well, I owe it to strict procedures that were drilled into my noggin from my first flight lesson a mere four years ago. I learned the military way, in

the Air Force Aero Club. I flew with active duty and retired military instructors who were insistent upon strict compliance with safety procedures. I think my second or third flight; the CFI pulled the power off on climb out and said, "Where are you going to land it?" Well, I replied something to the effect of, "that field over there....waaaay over there looks pretty

clear". WRONG! "What about the empty field RIGHT UNDER US AT THIS VERY MOMENT?" was his reply.

I learned right there to not assume that you can make it to a really good looking spot some distance away, with no airspeed or altitude left if conditions don't go in your favor. What if the wind speed or direction changes? So, I now believe that the best place to consider for an emergency landing is the closest point to you at the time, even though it may not be as good looking as that clearing off in the distance. Power lines are pretty much invisible until you're headed right for them and by then, it's too late!

So, by sheer grace of the All Mighty, Grants airport was under my left wing. The approach to the landing was really quite straightforward. Moral of this story to all of us: learn to work altitude and airspeed to put your RV EXACTLY where you want it in ALL wind conditions. The winds on Sunday were gusty, variable and thoroughly unpredictable. I orbited mid-field in a constant speed descent and when at pattern altitude, I turned base sooner than I would normally with power applied. I still had excess altitude but that's a GOOD thing. My wife was holding on for dear life while I cranked it into a slip. Floating down the runway and off into the weeds is NOT good form and tends to prang airplanes. On short final, that's when the prop stopped but I had the runway made, and Debbie assuringly reminded me of that. "There's the runway baby! You made it!".

So, we all owe it to ourselves and our valued passengers, to be thoroughly competent in dealing with power failures. KNOW your airplane, and plan your routes to give you the best chance of success if the Lycosaur let's you down. That straight line GPS course over those scenic, majestic mountains may look awesome, but Kodak moments seldom make good emergency landing fields. Are you prepared, both emotionally and tactically, to put it down RIGHT NOW? Where? Into the treetops? That riverbed? What speed? Flaps now or after you get there? HMMM?? The more rugged and unfriendly the terrain, the higher I want to go. Altitude is your friend. Unfortunately for those of us in the Rocky Mountains, going much higher than the terrain can require an astronaut's rating! Man, it gets COLD up there. We crossed a ridgeline just before the RV became a sailplane and had to be at 11,000' to do so comfortably.

I received a most inspiring and reassuring note from Sam Buchanan. He related the engine failure to having a trusted friend let you down or betray you. So very true this is. I went flying today. My RV and me went off to the practice area to "have a heart to heart talk". We came to terms, upside down, going fast, going slow, high, low, lots of G's, and no G's. My trust has not completely returned, but who can be mad at an RV? It's like trying to stay mad at your new puppy after it chews up your new shoes! I checked the fuel system, and all is clean and clear. I wouldn't be overly concerned about the RTV Van's recommends to use around the airbox plate where it mates to the carb body. It's only an issue when it's sub-

merged in gas all the time. Don't go into ANTI RTV mode guys, just know its limitations and learn from my mistake.

Go do some pattern work this weekend. Get it on downwind then pull the power. If you normally make power off approaches, then you should be well versed. If you like to carry power all the way down, you may be in for quite a surprise. I have to admit I normally use power. I'm now changing my procedures but will stay competent and SAFE in the use of both techniques.

### Some Riveting Thoughts

-Gary Zilik

We use two types of regulators in the air systems we use to pound rivets in our aircraft.

1) Pressure regulator - This is the one usually mounted on the compressor or downstream where you attach the hose. Small ones can also

be mounted right on the tool. This regulator controls the actual pressure in the line and to a smaller extent the volume of air (cfm).

Less pressure = less cfm.

2) Air Valve (regulator may be the wrong term). - This is usually found installed on the tool or in the airline as it enters the tool. This controls CFM, not pressure. The air pressure the tools sees is constant when open or restricted.

Type 1 really effects how hard the piston/hammer strikes the rivet. Less pressure on the piston and less cfm slows the piston down. Lots of hits required to buck a 3/32 rivet.

Type 2 effects how fast the piston/hammer strikes the rivet. Close the valve down and the gun runs slower but with harder hits, but not as hard as wide open. This takes fewer hits to set the rivet.

I prefer using the type 2 (air valve) at the gun. I can adjust the gun to set any rivet in any skin on any skeleton and not dent the skin. One major reason people get divets when riveting is that they adjust the air pressure too low (30 psi) use heavy pressure on the gun (lean on it to hard) and smash the rivets for 5 seconds to get it set. Try a light pressure on the gun, just enough to keep it from bouncing. Don't lean heavily on it. Use 60 psi and an air valve (type 2) at the gun. It will take about 2 seconds (braaaaaaaaaaaaaaaaaaaaaaap) and you rivet will be set, without being work hardened to the point of becoming weak.

### Last Call!!!!!!

Your friendly Treasurer Jim Lenzmeier has completed a tally of members who are behind in paying their dues and he has compiled a list of just over 80 folks on the "delinquent" list.

So.... one last appeal... he is going to clean out the files for the September newsletter so if you think you have fallen behind, drop Jim an email at [jlenzmer@msn.com](mailto:jlenzmer@msn.com) or call him at 651-633-8488 to stay on the mailing list. Your executive management team appreciates it!!!

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### Minnesota Wing's - June Meeting Saturday, June 17, 10 am

We spend countless hours building these fine aircraft agonizing over every rivet. But when we finally get flying, all of our time will be spent staring at the instrument panel and fiddling with all those expensive goodies in front of us. Our next meeting will focus on instrument panel design. We'll touch on human factors, panel layout, new innovations in avionics, functionality, resale value, and all those nuances that make your RV, your RV. Stein Bruch has invited us to his shop where we can see how the pros do it. SteinAir typically has 4 or 5 panels under construction from the simple layouts to mega-buck Chelton systems plus over 30 panels in the design stage. Interesting too is the junk pile and why these panels became just that. There is also an RV-4 and RV-8 in the shop getting new glass panels which will be of interest as well.



*This will be a meeting you will certainly want to attend!!!! Details on page 8...*



Minnesota Wing – Van’s Air Force  
65 15<sup>th</sup> Ave. SW  
New Brighton, MN 55112-3454

First Class

## Minnesota Wing – June Meeting Panel Design

Sat. June 17, 2006, 10:00 am

**Stein Air**  
21170 Eaton Ave, Suite A  
Farmington, MN 55024

Here is a great opportunity to learn all about planning, designing, and building a user-friendly instrument panel layout. Stein Bruch will host this meeting at his shop in Farmington. We'll also have our usual cadre of RV experts to answer your questions and kick around some ideas regarding one of the most important parts of your RV project.

Coffee and goodies as always. See you all there on the 17<sup>th</sup>!!!

**Driving directions:** Stein Air is located off 212<sup>th</sup> St. West in Farmington, MN. If coming from then cities go south on I-35 and exit at exit 85, CR5/CR50. Go SE on Kenwood Trail to 202<sup>nd</sup> St. W. Turn right (south) on Cedar Ave. Turn left (east) on 212<sup>th</sup> St. West. Eaton St. is on the left past Pilot Knob. **Phones: Stein Air: 651-460-6955, Doug's cell: 651-398-1184**

