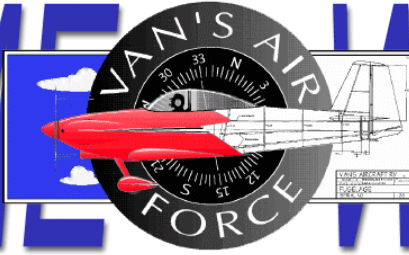


# HOME WING



Newsletter of the Home Wing of Van's Air Force — Builders and Fliers of Van's RV Series Aircraft

## RV-10's Cropping Up Everywhere

Robin Wessel is moving along quite well despite annoying work related trips to Asia. Compared to my pre-punched RV-6A tail, the RV-10 builds much faster.

According to my logs, I have spent 29 hours to build the vertical & orizontal stab and rudder.

Tips for faster building-

- Buy extra countersinking cages when you can find them cheap at Boeing surplus. This way you can have cages ready for pre-set depths and sizes without having to set them every time.

- I have 3 cordless drills and 2 air drills pre-chucked with different bits. Those extra few seconds to change a bit add up to a lot of time.

- Carefully read the instructions, highlighting critical steps. Since I travel a lot, I bring the manuals with me to study when on the plane or in a hotel.

- If you don't already have a cheap Harbor Freight belt sander, get one.

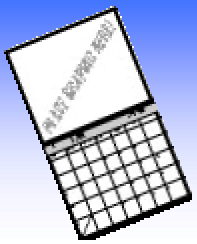


Bill and Tracy Saylor discussing their respective RV10 projects. This one may end up rotary powered. `Nothing Tracy builds is slow!



Dan Benua hasn't had time to do much on his -10, too busy flying 172's around Australia. Definite newsletter material. He sent some pics of what he has gotten done so far. (Dan always makes it look so easy!)

# Events Calendar



Meeting coordinator:  
**Randall Henderson**  
503-297-5045  
randallh@attbi.com



## November 2003 Meeting

**Steve Householder's RV-6**  
Address: **Steve's Hangar, Hillsboro Airport (HIO)**  
Date: **Thursday November 13, 2003**  
Time: **7:00 pm**  
Phone: **TBD**

The November meeting will be at the "Sheepspen" -- Steve Householder's hangar on Hillsboro airport. Steve has been working on his RV-6 for quite a while now and is currently working on the finish kit. Oh yes and he also happens to have two T-28s undergoing restoration in the hangar as well. And if this weren't enough, well, Steve's hangar is worth a visit all by itself. It's a large commercial one with lounge, bar, and lots of other fancy extras. Should be an interesting meeting all around!

**From Portland/Beaverton** take Sunset Highway (US 26) west to the Helvetia Road exit. Turn left off the exit (Shute Rd.) Follow the road south as it goes through several traffic lights and becomes Brookwood Parkway. Turn right at the light on Cornell road, then right again at the next light which is the entrance to the Hillsboro Terminal parking lot. Jog left and park near the west side of the parking lot; Steve's is the large gray commercial hangar just west of the terminal building.

**From Hillsboro** take Cornell road north, turn left into the HIO terminal parking lot, Steve's is the gray hangar just west of the terminal building.

Parking may be limited in the terminal parking lot; if you have gate code access you can come on in the secure gate at the far west end of the parking lot then swing around and park behind Steve's hangar.

EAA CHAPTER 105 Pancake Breakfast:  
Learn to eat grits on the first Saturday of every month at Twin Oaks Airpark, 8:00 am, \$5.00 (usually lot's of RVs to look at, too!)  
**This month: 11/1/2003**

EAA CHAPTER 105 Monthly Meeting:  
Third Thursday of every month at the EAA 105 hangar/clubhouse, Twin Oaks Airpark, 7:00 pm.  
www.eaa105.org for details  
**This month: 11/20/2003**

EAA CHAPTER 782 Monthly Meeting:  
Fourth Tuesday of every month at Pearson Air Museum, 7:00 pm. On November 25th we will be holding an avionics workshop, place yet to be determined. It will probably deal with wiring harnesses and other issues. Call me at (360) 906-6729 (day phone) or (360) 835-8831 (evening phone), or email me if you have any questions.  
**This month: 11/25/2003**

EAA CHAPTER 902 Monthly Meeting:  
Second Wednesday of every month at Mulino Airpark 7:00 pm  
**This month: 11/12/2003**

Want to host a meeting? [Contact the Meeting Coordinator](#)

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## Future Meetings

[December -- Carl Battjes Chard-6 Portland](#)  
[January -- TBD](#)  
[February -- TBD](#)

## This Month's Contributors



Randall Henderson—monthly meetings and fly-out activities. Find his picture as the AOPA volunteer of the month!



[Kevin Lane](#)—editor



Mike McGee - editor



Brian Moentneich - more safety related articles (no wonder I'm such a safe pilot, sharing a hangar with this guy!)

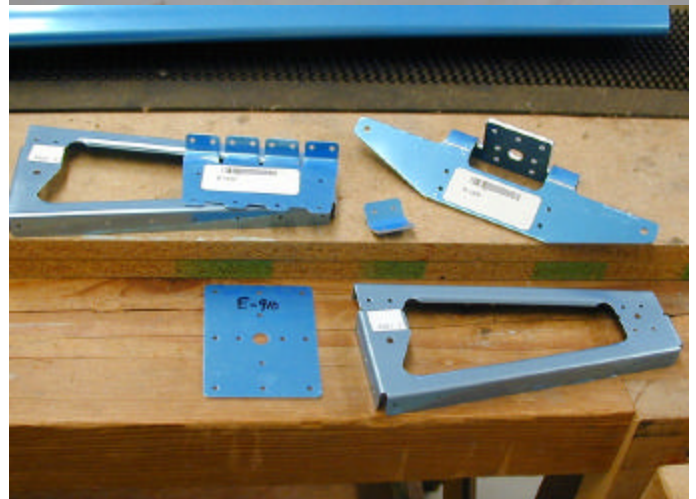
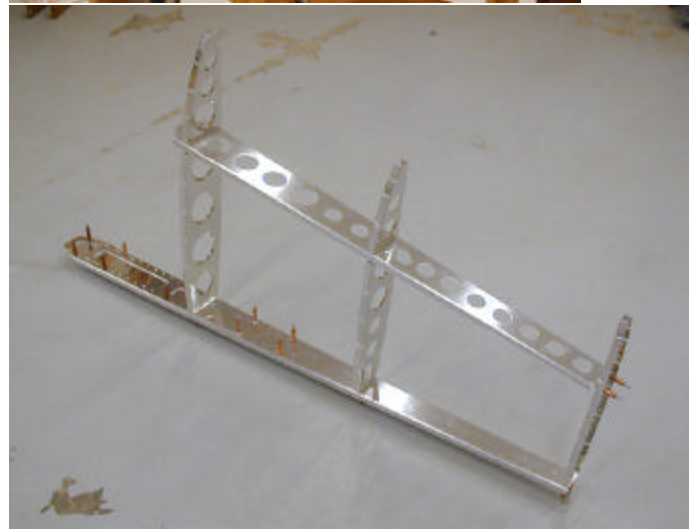
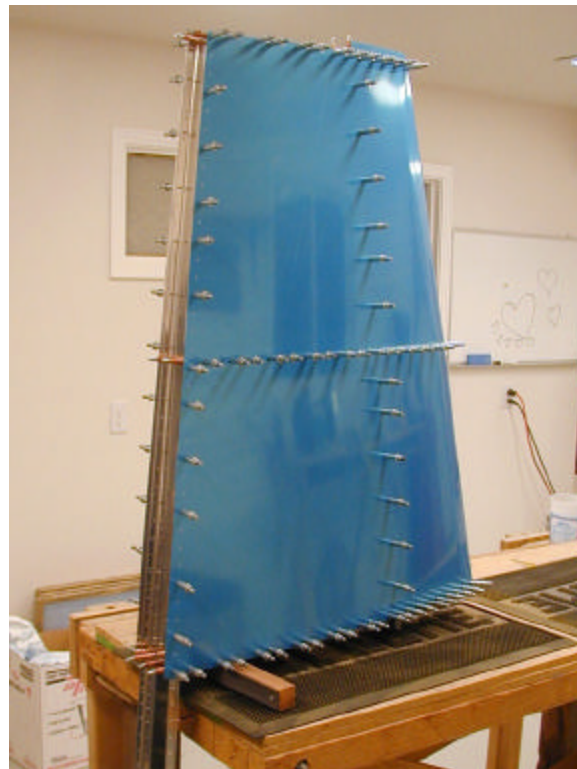


Amit Dagan - the Toolmeister has some articles on gauges you might want



Randy Lervold - Randy still handles the newsletter e-mail distribution

Not pictured, I guess he's too shy :- ) Mike Robertson, writes about the rules, of course.



# New Landing Light Gets a Test Run



*Inside the wingtip view*

Rion Johnson from Van's let me try out his new prototype landing light system he has been developing. It is based on a low cost 75W narrow beam halogen bulb. He supplied me with the bulb, a stamped piece that holds the bulb and another aluminum piece to retain the bulb. I bought a ceramic socket with high temp wires, some #6 machine screws



*Landing/taxi light mounts inside wingtip lens (nav light is Home Depot under cabinet light)*

and springs from Home Depot. I decided to mount the whole thing on a backer piece of .025 aluminum rather than trust the fiberglass to hold the adjusting screws. Not shown, but I wrapped the bulb in some insulation to help protect the fiberglass wingtip from heat distortion. With a DPDT switch I can either light both wingtips or activate the wig-wag alternating flashing lights using a school bus flasher unit( purchased before Bob Haan invented his). A flight to Florida this week should give it some real world testing, although my calm flying habits and ultra-smooth landings won't help much with the strain testing :-)



Rion didn't give me a price, but there is all of a dollar's worth of parts there plus the bulb (\$5?)- Kevin (I can now report that even the single bulb in one wingtip worked out well as I landed in Boulder City, near Las Vegas, at night. I will need to add another light for the other wing so that obstructions are clearly lit. I like how this installation doesn't compromise my leading edge airflow.)

*Typical "keep it simple" approach to a landing/taxi light system*



*The heart of the system*



Amit places his friends comfort above his fuselage's as he makes room inside for the Homewing members.

## Keep That Engine Running

By Brian Moentenich

During the 12 month period from 10/27/02 through 8/7/03, the NTSB recorded a total of 20 accidents involving RVs. Of those 20, four resulted in no injuries, 8 in minor injuries, 2 in serious injuries and six in fatalities. Of those six fatal accidents, four involved an engine failure or partial failure. One involved structural failure of the tail (probably due to loss of control) and one occurred during maneuvering (on downwind) during landing. Of the engine failures, two were clearly caused by running out of fuel (one at night). One occurred when the A/C had not flown for a year (it wasn't clear from the report what caused the engine to stop) but it was likely due to fuel contamination. The fourth report indicated the engine was "sputtering" immediately after takeoff into low IFR conditions which also suggests fuel contamination.

Engine failure is very dangerous. Fortunately, Lycoming engines are incredibly reliable. Most engine failures are pilot-caused. Running out of fuel or taking off with contaminated fuel is preventable. Always check your sumps before you go and plan to land with at least an hour of fuel in the tanks.

## Fly Safe

by Gary Dunfee

It was a nice day last spring; the clouds were around 4000 feet, lower than what we had hoped for. We had a couple visiting from Japan and wanted to show them our mountains, but the weather wasn't going to allow that. We told Majima-san with short notice about the possibility of going flying in a small private aircraft. He had had that impossible dream of flying in a fighter some day, his wife, well, an understatement would be to call her the nervous type in any aircraft. I think that most of us know that in Japan flying in private or military aircraft almost never happens. With 4 non-pilots to take flying I called my friend with his 172. We took off from Mulino airport with 2 full airplanes for a 3 hour tour of the coast. Yes, RV's can fly in a gaggle formation with a 172, 1800rpm vs. 2700, 5gph vs. 9.5gph, 2 people vs. 4. This was an unbelievable dream for these Japanese friends, and it came true that day. Majima rode with me in my RV, his wife and 2 others with John in his 172. You don't fly fast when traveling with a friend in a 172. Flying at 105mph, in an RV is easy and gives one a lot more time to enjoy Oregon with friends. On our way back from the coast where does a pilot take foreign visitors with a love of airplanes? The Spruce Goose of course and enjoy a late lunch at the museum. Well now, were flying with-in a couple hundred yards of each other as a flight of 2. John was announcing are position as a flight of 2 as we approach MMV. While on our 45 I'm trying to put some distance between us, as he will slow to 75mph by midfield and 65 to 70mph on final. Ok, lots of radio chatter, were on down wind with a nice distance between us, someone in a 235 announces intentions of crossing at midfield at 1800 feet and entering a down wind at 1200 feet. I'm already at midfield, no problem. Now, abeam the numbers, the distance between John and I is looking good, pattern altitude and speed are good...WHOA! Here comes the 235 cutting in on me from my right 150 feet away and doing, what? 140mph? I didn't know they could fly that fast! I ducked for cover and let him have my spot, he apologized when he spotted me and slowed down behind John. Next came a voice from another RV behind me wanting to know what I was going to do, he hadn't spotted me either, a little maneuvering and we all landed safely. We all shared a ride to the museum, as friends and with lessons learned.

Scheduling Mike Seager in Van's aircraft can be difficult to get for transition training, what with distance, getting week days off, good weather, his full schedule (he is a limited resource). Fortunately I live in a location and have a job that overcomes these problems. Here is part of Mikes training for an RV6A. As you descend from cruise to land at an airport slow down early, give the engine a chance to cool slowly, watch for slower aircraft, approach the airport from several miles out with only a few hundred feet to descend for the last 2 miles, at a speed of 120 to 125 (statute) mph. Boost pump on before you get to the down wind turn. Be prepared to find slower aircraft in the pattern, if they are flying at 80 mph on downwind you will be closing 60 feet per second. If it's Henry on downwind you could be closing at 100 feet per second. Be prepared to slow your speed down to match that of others or leave the pattern and re-enter with more space between you. "I (Mike) use 120 mph on downwind. Opposite the

November 2003

touchdown point I reduce power to Idle slow to 100 flaps to half, slow to 80 to 85 and power back up to 1200 for a fixed pitch prop or 1800 rpm for a constant speed prop, turn base and add flaps to full on base. Turn to final and adjust power and pitch to maintain 85 all the way down to the landing flare.”

I now fly 85 to 90 on downwind with half flaps, because most of the other aircraft in my area are slower, I fly final at 80 mph (in calm air) and 85 mph (in turbulent air) until the flare to land. If you get it too slow on final you will need lots of power on the backside of the curve, or you will bounce your landing. This is a good time to have the nose wheel fairing installed so that the end of the nose gear leg can't bight into the runway, better to sacrifice the fairing as a skid plate than to; Bend a prop, nose gear leg, bruise an ego or a your body. Be prepared to do a go-around if you get too slow or bounce it!

Can you imagine doing 140 to 160 knots in the pattern and coming up behind Larry in a Super Cub or Henry in his J5, both are equipped with 25 inch tires, on the down hill with full power Henry doesn't break 85 mph, his speed on the down wind and final? Very SLOW! Lets use a stop watch, Ultra-lights and bicycles are faster. You want pucker power for that seat cushion? Just get behind Henry at 160 knots in this situation and you'll find a real grip. RV's and 235's can fly slow, and in formation with 172's and J5's, we just need to practice our slow flight a safe altitude. We all know that RV's can fly fast, in the airport pattern is not the place to demonstrate it.

Safe flying

# HOMEBUILTS AND IFR

By Mike Robertson

Recently the issue has come across my desk several times about Amateur-Built aircraft and their ability to fly under Instrument Flight Rules (IFR). There are some that say that Amateur-Built aircraft cannot be certified to fly IFR unless all of the instruments and equipment installed in them are TSO'd (TSO means Technical Standard Order). There are some that say that there are NO requirements at all and that they can't be stopped from flying IFR. Then there are some in the middle that say that certain instruments and equipment must be TSO'd. In fact these are all incorrect. The real truth is somewhere in the middle. A TSO is simply a standard that has been published by which a manufacturer may seek prior approval from the FAA for their product to be used in an aircraft.

Before going any further let me explain that this article is mostly for new aircraft . Aircraft that have already been issued an airworthiness certificate and operating limitations must follow those operating limitations, or apply to have the operating limitations amended.

Amateur-Built aircraft today are certificated under 14 CFR 21.191(g) and operated under 14 CFR 91 (FAR 91). The guidance for FAA Inspectors and Designated Airworthiness Representatives (DARs) on how to issue airworthiness certificates to ALL aircraft is FAA Order 8130.2. Section 7 of the Order covers the requirements for Experimental Amateur-Built aircraft and tells us about eligibility, inspecting the aircraft, the issuance of the airworthiness certificate and drafting the operating limitations.

Paragraph 128 of the Order gives guidance on certification procedures. Paragraph 128.b. gives the paperwork and review requirements that must be done at the start of the certification process. Paragraph 128.c. gives eight items that must be inspected. They are 1) the ID plate must meet the requirements of FAR 45.11, as applicable (FAR 45 deals with identification and registration markings); 2) the information on the ID plate is correct, matches the information of Form 8130-6, and is in accordance with FAR 45.13, as applicable; 3) The aircraft nationality and registration

marks are in accordance with FAR 45, Subpart C; 4) The flight control system, engine(s), propeller(s), pitot static system, and associated instruments operate properly (anything here about a TSO?); 5) The cockpit instruments are appropriately marked, and needed placards are installed and placed for easy reference; 6) System controls (fuel selectors, throttles, switches and breakers, etc.) are appropriately placed, clearly marked, provide for easy access and operation, and function in accordance with the manufacturer's specifications ; 7) An ELT is installed, if required per FAR 91.207; and 8) All explosive devices used in ballistic parachutes are clearly marked and identified.

Paragraph 128.d gives guidance on issuing the airworthiness certificate. Paragraph 128.d(5) even states that if the aircraft does not meet the requirements for the requested certificate then a letter MUST be given to the applicant stating the reason(s) for denial.

In short, there is nothing in Order 8130.2 that mentions TSO'd equipment and instruments for Amateur-Built aircraft.

So lets look at FAR 91 and see what we have. There are three paragraphs that effect the operation of amateur-built aircraft that mention TSOs. FAR 91.207 address emergency locator transmitters (ELT) and states that any new installations after June 21, 1995, may not use an ELT that meets the requirements of TSO-C91. You will notice that it does not state what the newer models will meet but just what they won't meet. FAR 91.215 addresses ATC transponders and altitude reporting equipment and their use. It states that the ATC transponder equipment installed must meet the performance and environmental requirements of any class of TSO-C47b (Mode A) or any class of TSO-C74b (Mode A with altitude reporting capabilities) as appropriate, or the appropriate class of TSO-C112 (Mode S). Far 91.217 goes on to state that the altimeters and digitizers in the altitude reporting equipment must meet the standards in TSO-C10b and TSO-C88, respectively, or were tested and calibrated and shown to meet the standard(s) referenced therein.

You will notice that even here there is no wording that this equipment must, in fact, be TSO'd. Just that they must, or must not, meet the requirements of their prospective TSO. Does this mean that you could conceivably build your own transponder, and if you are able to prove it meets the requirements of the appropriate TSO, you can use it?

Is a picture beginning to develop here? So far all we have seen about TSOs are for all aircraft in any category and operated in any flight mode, be it VFR or IFR. So lets look at the requirements of FAR 91.205 to see what we have there. Most people talk about the requirements of instruments in aircraft per FAR 91.205, but if we look at the very first paragraph we will see that it states that this paragraph is for powered civil aircraft with a standard category US airworthiness certificate. That means that the entire paragraph does not apply to experimental aircraft. Except that in the operating limitations issued today there is a paragraph there that states "After completion of phase I flight testing, unless appropriately equipped for night and/or instrument flight *in accordance with §91.205*, this aircraft is to be operated under VFR, day only". Therefore, per the operating limitations issued to your aircraft, 91.205 DOES apply.

But I think we can all agree that, irregardless of what your operating limitations state, FAR 91.205 is a good guideline. Paragraph (b) talks about those instruments required for day VFR flight. Paragraph (c) gives the requirements for VFR flight at night. In paragraph (1) it states that those instruments and equipment required for day VFR per paragraph (b) must be installed. Paragraph (c)(2) and (c)(3) talk about position lights and anticollision lights, and clearly stated that they must be *approved*. To be approved the lights must meet the requirements of FAR 23 at a minimum. Therefore, if they do not come with an approval from the FAA then you must be able to prove that they meet the requirements of FAR 23. But you will notice that paragraph (c) doesn't say anything about a TSO.

Now to the part about IFR. Paragraph (d) gives the requirements for IFR flight. It states that for IFR flight all the instruments in paragraph (b) are required, and if the IFR flight is to be at night then the requirements of paragraph (c) must also be met. Then the paragraph states that two-way radio communications system and navigational equipment appropriate to the ground facilities to be used, a gyroscopic rate-of-turn indicator, a slip-skid indicator, a sensitive altimeter adjustable for barometric pressure, a clock displaying hours, minutes, and seconds, a generator or alternator of adequate capacity, a gyroscopic pitch and bank indicator (artificial horizon), and a gyroscopic direction indicator (directional gyro or equivalent). Paragraph (e) of 91.205 is for flight above 24,000 feet and states that if you are using a VOR then you must also have approved distance measuring equipment (DME). Paragraphs (f), (g), and (h) talk about Cat II and Cat III and do not pertain to this article unless you plan on building a jet powered aircraft.

So, after thoroughly looking at FAR 91.205 we see that there is nothing mentioned about a TSO. Then what is the

bottom line about Amateur-Built aircraft and IFR? There is nothing in Order 8130.2E or the FARs that states that you must have, and use, TSO'd equipment and instruments in order to fly IFR. The order states very clearly for the operating limitations issued to each aircraft that the aircraft is limited to day/VFR unless appropriately equipped for night and/or IFR flights. The ONLY guidance to meet these requirements is 91.205(b) through (e). The TSOs for the altitude encoder and the transponder only state that you must be able to meet the standards of those particular TSOs. So, theoretically, a person could build his own encoder and transponder and, provided he can show that they meet the requirements of the TSO, use them in flight. Now, the reasonably prudent builder would probably not want to build his own transponder or encoder, and will use a modern transponder that is already approved/TSO'd, so the point here is somewhat mute.

So here is the bottom line on Amateur-Built aircraft and IFR certification. There is no need for the FAA Inspector or the DAR to certify that your instruments and equipment are TSO'd because there is no requirement for any of the instruments or equipment to BE TSO'd.

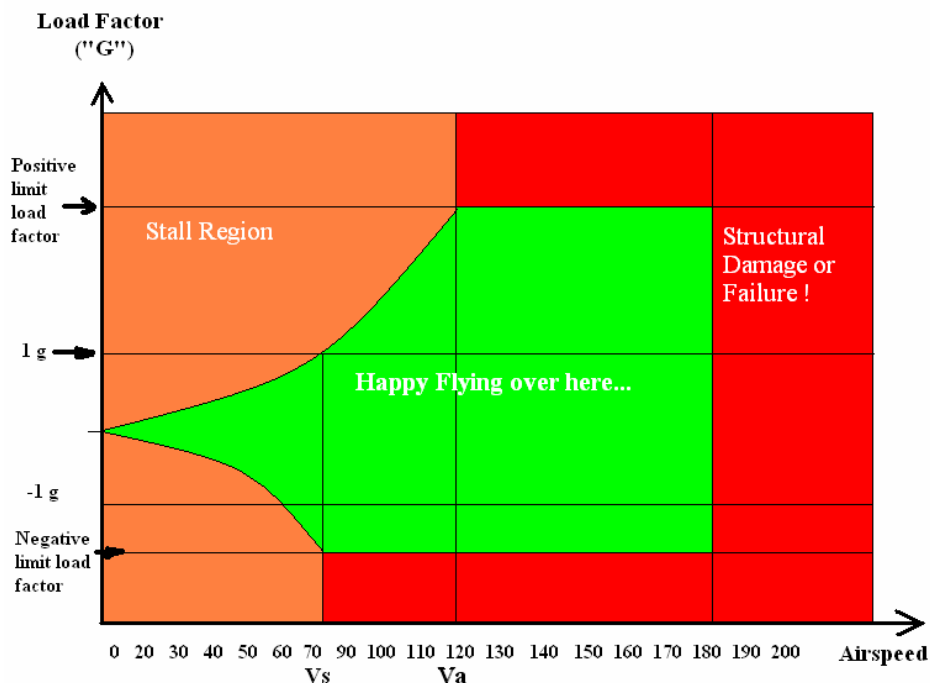
But please keep in mind that we all want to be safe while operating our aircraft that so much time has been spent building. And safety is the first concern when the aircraft are being inspected for issuance of an airworthiness certificate.

### A flight instrument for the future

In the past 100 years of aviation, how much have flight instruments changed? I am not referring to radars, radios and navigation instruments; I am talking about the basic instruments: altitude, airspeed, rate of climb, etc. Well, I don't really know, but I am about to suggest a big step forward. Here is an idea for a completely new instrument, one that could potentially keep you out of trouble:

We're all familiar with the term "exploring the envelope", or "flying at the edge of the envelope". The envelope we're talking about is not that famous piece of paper upon which the first sketch of a new aircraft is made, but rather the V-N diagram.

The V in V-N stands for Velocity (speed) and the N is the normal load factor; better known as the "G" force (That is why the diagram is sometimes called a V-G diagram). Here is a V-N diagram for an imaginary aircraft:



At any given time, the airplane is flying within the green area.



The airplane will stall if you attempt flight in the orange area, outside of the curved portions of the envelope (known as the aerodynamic or lift limits), and it may bend or break if you attempt flight beyond the straight portions (red area).

We already know how to measure our airspeed.

We also have G meters, which indicate our load factor during flight.

By combining the information from these two independent sources, on a flat, color LCD display, with the V-N diagram above as the background, a little airplane symbol can show exactly where in the envelope the aircraft is at any moment!

You can know exactly how close you are to the stall, regardless of how many Gs you are pulling. You can also visually see how fast you are approaching the edge of the envelope, by detecting the rate of change in the position of the airplane symbol. If you could turn-on a “trace” feature, you could see how much of the envelope’s area you have explored in your test flights. Using some simple color effects, you can have the airplane symbol change color, size or even flash when you approach an edge of the envelope. The possibilities are limited only by your imagination.

Now that I have you all excited about this new instrument, which combines airspeed, G meter and an effective stall warning all in one, let’s take a look at the challenges in implementing such an instrument, and how to overcome them:

First, let’s take a closer look at the V-N diagram. It is the area defined by 5 lines. The 3 straight lines (top, bottom and right most edges of the envelope) are pre-determined by the design of the airplane, and do not change. The 2 curved lines, on the left top and left bottom of the envelope (forming the “tongue”) are a little bit more complicated. They actually vary with the mass of the plane! Remember  $V_a$  and  $V_s$  are not the same for an aircraft at minimum weight and for the same aircraft at maximum gross weight. Refer to your flight instructor or book for more details about that.

For our purpose, how are we going to change the background of our V-N diagram on the instrument’s face every time we fly, or indeed while we are flying as we are burning fuel and thus becoming lighter?

Well, there are two possibilities:

1. Ask the pilot for his W&B input at the beginning of each flight, and with the aid of a fuel totalizer compute the airplanes mass on-the-fly.
2. Err on the side of caution, and use a safe (in this case, the minimum empty weight would be a safe point) plot that never changes. This would give us a margin of safety.

Another point we should address, is that of a maneuver where we are not only pulling high Gs, but are also rolling the plane. One wing is coming “up”, the other is going “down” (up and down are relative to the cockpit) – the wing that is coming “up” actually “feels” more Gs than the one that is going “down”. This is asymmetric G loading.

The regular G-meter is measuring a load factor in the cockpit, which is somewhere in between what the wings are seeing. The solution: install two (or more) G sensors, at the extremes of the airplane (wingtips, tail) and use the value that gives you the worst case.

Just imagine what trace the little airplane symbol leaves behind it after a textbook take off, or a landing, or a loop or a roll, not to mention a complete aerobatic routine performed by Patty Wagstaff!!! Will it enhance the safety of our flying? Is there an added value to the pilot when using such an instrument in his flying?

In post-flight debriefing? In flight testing?

I think so.

Amit

## Fuel Awareness System for your RV

The problem:

A significant percentage of accidents is contributed to fuel starvation. It's unfortunately been proven many times, that the engine will not run without fuel. It is one of those things that you read about in the accidents reports, and you think to yourself - why ?! This is so easy to avoid. All it takes is planning, knowing how much usable fuel you have in your tanks, and making sure you land to refuel before it's too late. Simple right ? And yet time and time again we have fuel starvation accidents.

There are two general ways to know how much fuel you have in each tank at any given time:

1. Knowing your fuel burn rate, the initial amount of fuel you had and the amount of time you have been using each fuel tank, you can calculate how much fuel is left.
2. Have a fuel level indicator for each tank. This is actually an FAA requirement, see FAR section 23.1337 - Power plant instruments installation.



There are quite a few fuel level indicators out there, some include fuel flow calculation and are clever enough to cross check the total of fuel used with the fuel remaining in the tank. The one that comes to mind is integrated into Home Wing member Rob Hickman's engine monitor, the ACS2002.

See <http://www.advanced-control-systems.com>

Some stand-alone low fuel level warning systems, use their own sensors in the tank, to give a warning when the fuel level is below a certain pre-defined level. An example is the Fuel Guardian, available from Aircraft Spruce and Specialty.



This system has optical sensors in the tank. It operates by bouncing a beam of light into the sensors' lens. If it is reflected back into the sensor, there is no liquid present. If it is not reflected back, it is dissipated into the liquid media.

Simpler, less expensive low fuel level warning systems use the same sender that is used to indicate the fuel level in

your required fuel level gauge. A great example is actually from the marine world.



This 2" indicator is a 240-33 ohm indicator, incorporating a built in LED that turns on when the fuel level is below a pre-determined level. Also available in black....

Yours for only \$41, see <http://www.nisongermarine.com>

Finally, the best instrument in the world is doing you no good if you

- Don't use it,
- Aren't looking at it at the right time,
- Disregard what it is trying to tell you,
- or if you simply don't trust it.

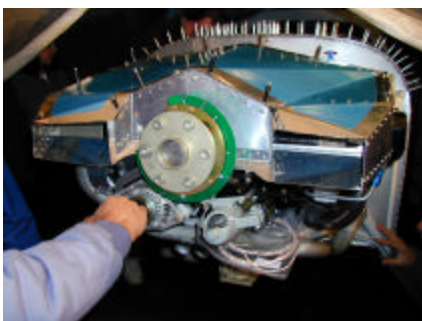
## Use Common Sense !



Amit's monthly meeting makes room for everyone and every thing, which means we all can't be in the garage



Amit, the new Toolmeister, displays the Homewing's wonderful collection of expensive, rarely needed but when you need it, you need it set of tools for loan.



They're always so pretty before they actually run and need oil. (and leak oil!) Amit is using a Lightspeed electronic ignition.

Home Wing - Van's Air Force

# Alternatively Speaking...

compiled by Paul Lamar

- > I needed some custom size thin wall hose for connecting the various
- > parts of my tunable intake manifold so I decided to make some.
- > Most hose comes in 1/4 increments and I was using pipe
- > instead of tubing.
- >
- > Step 1 cut the form out of plastic pipe the right size.
- >
- > Step 2 wrap the pipe form with 10 or more layers of
- > thick (3 mil) clear plastic. Hold in place with
- > scotch tape.
- >
- > Step 3 wrap with one layer of teflon tape sticky side out.
- > Part number 3M Permacel P421 3/4
- >
- > Step 4 wrap with one layer of red silicone tape.
- > Part number Versaitek Moxness 603 1 inch red sticky
- > side out.
- >
- > Step 5 cut two layers of fiberglass tape.
- >
- > Step 6 wet out the two layers of precut fiber glass tape with red RTV between layers of clear plastic. Strip off
- > the plastic and wrap the saturated fiberglass around the form.
- >
- > Step 7 finish wrap one layer of red silicone tape sticky side down.
- >
- > It takes longer to describe the process than actually doing it. What you now have is high quality, fiberglass reinforced, Teflon lined high temp hose.
- >
- "Joe Hull (Pilgrim Technologies)" wrote:
- > Aren't you concerned about parts of the Teflon tape delaminating from its adhesive with temperature and age and sagging into the pipe/tube?



No! First because the tubes are butted together. Also it does not make much sense to use a low temp adhesive on a 800 degree F teflon tape. I have used this teflon tape on motor mount tubes adjacent to the exhaust on my C182 and I see no such deterioration. It appears to be a miracle of modern chemistry. Delete the teflon step if you are worried about it. I used it because it is inert to gasoline while silicone is not.

Here is the finished hose clamped to a plastic pipe using those nifty 1/4 inch wide Breeze miniature hose clamps.

Paul Lamar

The AirCraft Rotary Engine NewsLetter. Powered by Linux.  
ACRE NL web site. <http://home.earthlink.net/~rotaryeng/>  
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Home Wing - Van's Air Force

Tracy Crook wrote:

>

> Subject: EM2 Survey & Function List

>>> OK, below is the list. It was designed to replace virtually \*every\* steam gauge on the panel but there are a lot of pilots out there that want their steam gauges but also want the limit & alarm features of a digital monitor and would install the EM2 to get them. It has the ability to be field calibrated to most any sensor in use so it can be put in parallel with most existing installations without replacing anything. I'm tired of squinting at my LCD engine monitor so the EM2 uses a VFD vacuum florescent display.

>>> (see website for a picture (although the layout has changed from that pix).

>>> 1. Coolant Temp                    2. Oil temp    3. Engine RPM                    4. Coolant pressure  
>>> 5. Left fuel tank level            6. Right fuel tank level    7. OAT (outside air temp) 8. Oil Pressure  
>>> 9. Fuel pressure                    9. Fuel Mixture            10. Fuel flow (GPH)            11. Fuel used since reset or gallons remaining

>>> 12. HP output (based on fuel flow & BSFC or rpm & MAP using an engine index table)

>>> 13. % of power (based on HP & Engine rating) 14. Manifold pressure 15. Carb Temp (ice) (for those who refuse to go FI) 16 Aux 1 air temp (for experimenters measuring in/out rad temps, etc)

>>> 17 Aux 2 air temp 18 Aux 1 liquid temp 19 Aux 2 liquid temp 20 System Voltage (alternator)

>>> 21 Flight timer ( oil pressure starts it) 22 Hobbs meter ( " enables it) 23 Hours since oil change

>>> 24 General purpose timer (seconds & minutes)

>>> 25 - 28 4 Cylinder temps (for Lycs or gen purpose temp measurements)

>>> 29 - 32 4 EGT temps (digital or bargraph) Highest one always displayed in digital format)

>>> 33 Dynamic air pressure in " H2O for testing. (Added in

> honor of Paul Lamar :)

>>> Programmable High & Low limits on all engine functions. Alarm light or audible alarm feed to audio panel.

>>> In addition to the OAT mentioned above, the following air data is also displayed.

>>> 1. TAS true airspeed (corrected for temperature & altitude)

>>> 2. Altitude (up to 32,000 ft)

>>> 3. VSI vertical speed

>>>

>>> The EM2 also functions as a visual interface for the EC2 engine controller. Shows the MAP table in bargraph form and allows you to edit it. Makes "holes" in the table very obvious and easy to correct. For data logging,

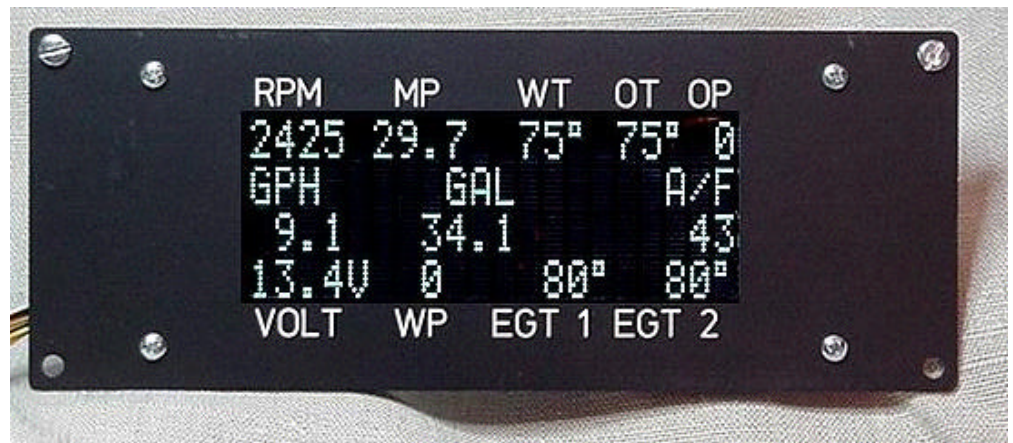
>>> engine parameters will be output via serial interface.

>>> **Price not set yet but will be introduced at under \$1000 & will include basic engine sensors.**

>>> Did I forget anything?

>>>

>>> Tracy



# Home Wing web site: [www.vanshomewing.org](http://www.vanshomewing.org)

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## The Tool Crib

Being a current Home Wing entitles you to access the group's tools, a major benefit. The Home Wing owns a growing selection of those expensive and seldom-used tools that are very nice to have access to. This program is managed by The Toolmeister: **Amit Dagan (503) 292-9780** [amitdagan@hotmail.com](mailto:amitdagan@hotmail.com) Please help protect the group's assets, observe our Tool Policy:

- Everything goes through Amit — do not give the tool to another member.
- Amit will keep an accurate sign-out sheet for each item so he knows where it is at all times.
- Amit will inspect all tools upon their return. If there is any damage he will ask you to pay for the repair . More ToolCrib rules can be found at the Home Wing website

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## Classifieds...

### FOR SALE/WANTED

**Duckworks Landing Lights** - Retro-fittable, light, easy installation. Kits start at \$75, check 'em out at [www.duckworksaviation.com](http://www.duckworksaviation.com)

RV-8A Subkits for Sale by Chapter 105  
Empennage assembled; one wing assembled, one just started. Can be built as RV-8 (tailwheel). Plans #81205. Located at Chap 105 hangar at Twin Oaks. Asking \$6500. Contact Rion for viewing -- 503-646-8763 (eve), 503-670-1144 (day), 503-720-9394 (cell)

### **RV-9A Quickbuild fuselage kit for STANDARD build wings.**

Comes with a tip-up canopy, one external step (left), dual brake kit, static air kit, manual aileron trim and reflects a credit for electric elevator trim that I purchased with the empennage. I'm asking \$9,700 for the QB fuselage (what I have in it), with the buyer paying shipping from Van's in Oregon (No 9-10 month wait it's at Van's RIGHT NOW!). Email: [mwjonesesq@aol.com](mailto:mwjonesesq@aol.com) and my cell phone number 312-909-0063 Mike Jones

Classifieds are free to Home Wing members. Ads will run for three months. Send to editor by e-mail or mail. Renewals ok, just let editor know. Date at end of the ad is last month ad scheduled to run.

#### Found:

- >At Amit's garage after last meeting, a nice travel coffee mug.
- >Contact Amit to get it back (yes, it is washed).

## Home Wing Membership Sign-up/Renewal

To join or renew, fill out this form and mail to **Randy Lervold, 5228 NW 14th Circle, Camas, WA 98607**, along with \$10 for renewals or new subscriptions. *Please make checks payable to either Randy Lervold or Home Wing.* If you are renewing you only need to give your name, payment method, and any other information that has changed. Please don't forget your e-mail address and newsletter distribution method.

*Use this form for address changes too!*

**name** – **Payment** – cash( ) check( ) (payable to Home Wing)

**address** – EAA chapter -

**city/st/zip-**

home phone/work phone- **e-mail address-**

If info change only, such as building status or address change, check here-( )

Building – RV3( ) RV4( ) RV6( )/6A( ) RV7( )/7A( ) RV8( )/8A( ) RV9( )/9A( ) undecided( )

Status – empennage( ) wings( ) fuselage( ) finish( ) flying( ) tail number( N )

\*note – only e-mail (acrobat PDF format) delivery of newsletter is available for new members, no snail mail (USPS)

- -above info to appear in a member roster listing available to members only

-----fold-----fold-----fold-----fold-----

Return address:

**Randy Lervold**

**5228 NW 14th Circle**

**Camas, WA 98607**