



RVator's Log

Newsletter of the Twin Cities RV Builder's Group

Shop Notes

- Doug

June 2022

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Upcoming Events

TC RV Builders Summer Hangar

Saturday, July 9, 12 noon.
Details on page 8

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**Minnesota Wing
Van's Air Force**

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In spring of 1972, I was one year into my Air Force commitment and 2 years into married life. My military job at Wright-Patterson AFB in Dayton was pretty easy duty: Monday-Friday, 9-5, with enough spare time to rack up some serious flight instruction hours at the local civilian airport. It was boomtime for general aviation and I had all the flight students I could schedule plus I taught ground school in the evenings. In fact, I was making more money instructing than I did in my AF job (which paid an astonishing \$438 month!)



Somehow, I convinced my long-suffering spouse that we needed to buy another airplane (I sold my Piper Vagabond to get married, so you know the sacrifice I had made!). Our flight school had a half dozen Citabria's for trainers plus we were a Bellanca dealer. I was teaching Jean to fly in our school airplanes, so I hatched an idea. I had a sit-down talk with Harold Johnson, owner of the FBO and flight school. What if we bought a NEW Citabria and Harold would co-sign for it knowing that if we couldn't make the payments he'd end up with the airplane which he could easily resell or use in the flight school. In hindsight, I can't believe he bought into this with the caveat that we build up some sort of credit history (of which we had zero at the time). I ran right out and got a Shell gas credit card and started charging all the 37-cent-a-gallon gas our VW Beetle would hold. Two months later, Harold placed the order!

I kept the original purchase invoice and one can appreciate 1972 prices. The base price was \$6475. We couldn't afford a radio at the time but sprung for the radio installation kit (antenna and wiring) at \$268. Throw in a rear seat heater for \$88 and a landing light for \$21. For the base price you could have any color you wanted as long as it was orange. We had no concept of sound monetary policy so we sprung for blue paint for an extra \$79. Bottom line with taxes was \$7240. In today's dollars that comes to \$50627. Hmmm..... basic price for a 2022 American Champion 7ECA Citabria is a mind-blowing \$209,000!!

On August 4, 1972 we flew to MSP on North Central Airlines. We hired a CFI from a local FBO to fly us over to



Osceola, Wisconsin where our new blue and white Citabria had just come off the line at the Bellanca factory.

We happily flew N68503 for a couple years thereafter until we essentially ran out of money (this would not be the first time!!!) Harold bought back the airplane, turned around and sold it to a flying club in Cleveland and no doubt came out ahead of the game.

Sadly N68503 met an untimely end the following year when an instructor was demonstrating a short field take-off to a student off a short grass strip and they hit a power line. They survived but the airplane didn't.

* * * * *

Happy 50th Van's Aircraft!!

Oshkosh 1972 – A lanky 33-year-old engineer from Oregon shows up at the EAA convention with a tiny, single place, all-metal monoplane he calls the RV-3. This airplane perhaps was not all that remarkable among the dozens of other “home-builts” tied down on the field that week in August. With an empty weight of just 675 pounds and a 125 horsepower Lycoming, it just might be quite a performer. Designer Dick VanGunsven claimed a cruise speed of 175 mph. In 1974, Dick returned to Oshkosh and entered the Pazmany Efficiency Contest. The Pazmany competition requires high speed and low speed flybys that are entered into a formula which also consider weight and horsepower. The RV-3 clocked a high-speed run of 207 mph and a low speed run of 53 mph which handily won the competition.



1972 – the RV-3 debuts at Oshkosh

The rest is history. As you all know, Van's aircraft went on to become the largest manufacturer of kit aircraft with over 11,000 having flown. The latest RV.... the RV-15 is slated to be revealed at this year's EAA AirVenture. Stayed tuned....

What our members are building and flying

Balaji Thiagarfijan's Vans Built RV-12iS SLSA

-Frank Huber

Balaji took delivery of his beautiful RV-12iS SLSA Vans-built aircraft in March of this year. His interest in aviation began at a young age as he grew up in Chennai, the capital of the state of Tamil Nadu, India, just a few miles from the city airport. His father passed away when he was only five years old. So Balaji grew up with his mother, grandmother and brother in modest means, but made the most of the educational opportunities Indi has to offer.



He received a college scholarship and earned a degree in electrical engineering. He became interested in computer programming while attending school and taught himself coding. Because of his talent with coding, he was hired by Microsoft for a job in India in 1998. He was then hired by a tech company based in San Francisco in 2000 but lost that job when the dot-com bubble burst in 2002. He bounced back from that setback and got a new job and a U.S. work visa with a company focused on HR support systems. In 2008 Balaji started his own tech company, Tech Digital Corporation, based in Burnsville, Minnesota.

Since that time, he has grown his business, offering more digital HR services and expanding his business with five offices, two in the US, two in India and one in Canada. Now in his forties, he decided it was time to enjoy the fruits of his labor and pursue his interest in aviation.

He started by joining an RC club in the south metro. He soon was being mentored by an experienced RC pilot, Mike Corgiat. Mike was also an A&P and worked for NWA. He got Balaji proficient flying RC aircraft and taught him construction techniques. Soon the discussion of building an RV experimental aircraft was brought up by Mike. Balaji really liked the idea of the Light Sport aircraft and pilot rating, but realized he did not want to take on a project that could take three to five or more years to build. So he decided to buy a Van's built RV-12iS SLSA aircraft. He placed his order in January 2021 with a July 2021 scheduled delivery date. Because of supply chain

issues and other issues at Vans, he finally took delivery of his aircraft in March of this year.



Balaji and his spanking new RV-12iS

The workmanship and fit and finish of the airplane is outstanding. His aircraft had the new fuel injection/electronic ignition Rotax 100 HP 912Si engine. Vans has also changed the design of the baggage compartment fuel tank, that now runs the width of the baggage compartment right behind the seats. This gives a much larger area for up to 75 lbs. of baggage. Vans made a number of nice improvements including: a newly designed cowling that's easier to remove, a new throttle quadrant design, quick-reacting electric flaps, quick-adjust seat back feature, improved canopy latch design, new and improved main landing gear attachment that is more rugged and better suited to the training environment along with other new improvements for the aircraft. Balaji has his aircraft equipped for future IFR flying with dual G3X Garmin touch screens, GTN 650 and a Garmin autopilot.



Balaji's RV-12 sports a full Garmin panel

While he was waiting for his aircraft to be finished, Balaji completed the Rainbow Aviation Services Repairman Maintenance Rating course and the Rotax one week engine course. He also did a 250-hour internship at the Stanton Airfield, working two days a week to learn more about aircraft maintenance and build hours towards and eventual A&P rating. This plays into his future plans for travel to different countries around the world. He will be able to maintain his plane while traveling abroad, which he plans to begin when he turns fifty. For now he is working on his Light Sport pilot rating flying with the best RV instructor in town, Tom Berge!



Tom and Balaji after a lesson

Tom tells me Balaji is making good progress and his a very good student. He is looking forward to flying with his wife and his three sons after he completes his training with Tom. His immediate plans after he successfully completes his Light Sport training is to do the Minnesota Passport flying program and then do the 48 states in 48 days flying expedition. He also plans to add the PPL rating and the instrument rating. With Balaji's history of learning and great successes, it will not be surprising when he begins his travels around the United States and then around the world. It will make for some great stories for future MN VAF newsletters and get together.

The Geek Corner: A 3-D Printed, High-Tech, Low-Cost Headset

- Pete Howell

I have been using a Clarity Aloft headset for 16 year and almost 2600 hours now. I like it, and at this point it owes me nothing! It is starting to show some age and I have patched up the audio cable on one side –

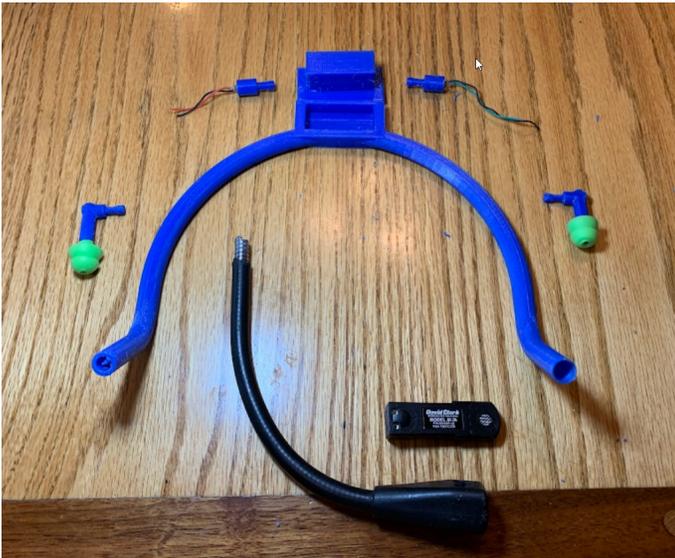


it is back in service, but I wanted to have a backup and one for Andi to use when she is awake.....

At \$400+ for most similar headsets – I thought I might put that engineering degree to use and make one myself. So I did some googling, and discovered that \$13 and 2 weeks will get some nice, tiny hearing aid drivers direct from Shenzhen. Then I was able to track down some dead headsets from some nice club members to supply the plugs and a mic on a boom. All that was needed as way to hold it all on your head (and some critical small pieces) to make it work.

The kids gave me a 3D printer that I had been dabbling with, so I knew the frame and small pieces could be made, but I would have to design them. I had never used CAD, but I knew grade schoolers were using it.....so, challenge accepted. I taught myself an online tool called Tinkercad and I was off!

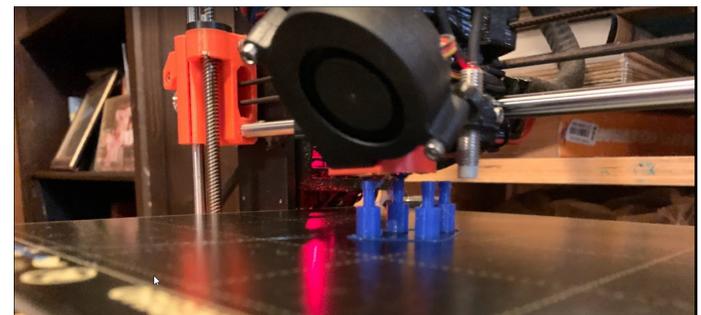
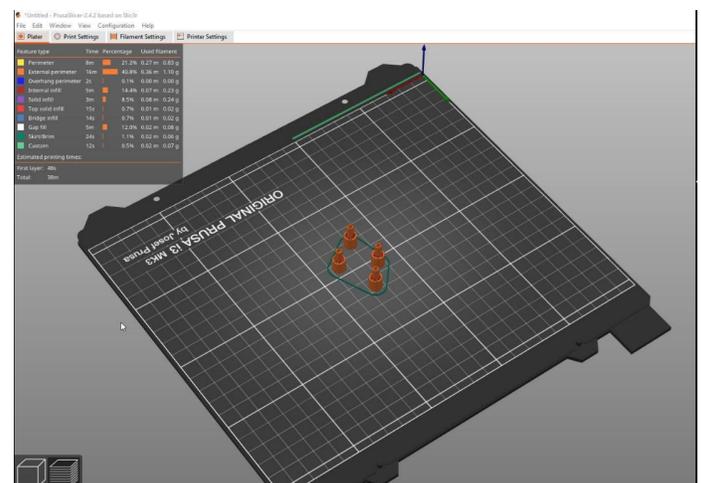
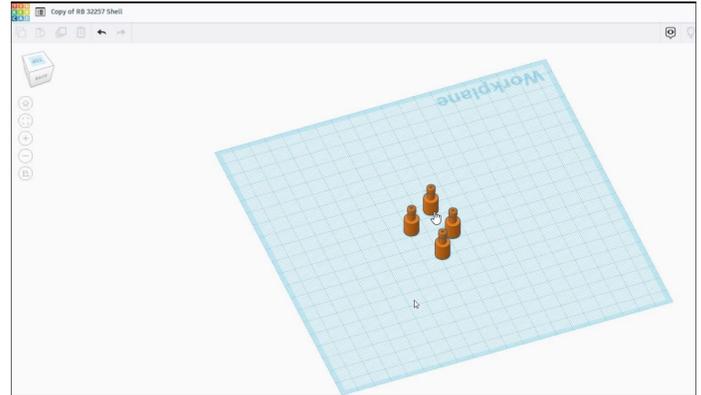
I'll not get into all the CAD details here - just rest assured if school kids and I can do it, you can too. I sketched out a tubular frame to go over the ears and around the back of the head. It has a "junction box in back to make connections easier and house the drivers. Wires from the plane come in one end of the tube and the mic comes out the other end. Here is an exploded view – anything in blue is 3D printed: the frame. Junction box, driver holders, and earbud elbows.



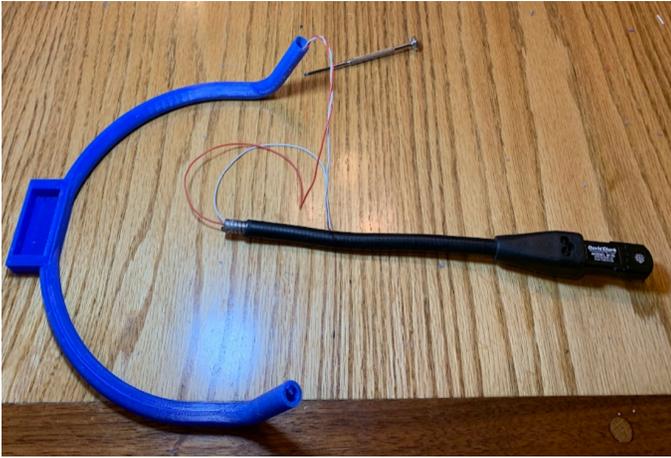
Step 1 - I measured my melon and sized the tubular frame. I added the box in back and made sure the tube opening could interface with the gooseneck from the mic and the cable from the plane.

After a bit of T&E, I had the frame and it fit my head! You can easily make the frame bigger or smaller in CAD and print whatever size you need. I used PETG to print all my parts.

Step 2 - Next up the driver holders – these would hold the tiny driver speakers and allow me to interface then to the frame. I modeled these holders after some simple earbuds I had seen on the web. The key is a close tolerance cavity in the holder to securely hold the drivers. I made 4, because I have worked with me before and know I will screw up at least 2! The cavity was made just bigger than the drivers at 2.75mm high and 3.15mm wide in CAD. Here they are in CAD, then in the 3D slicer, and finally, being printed.



Step 3 – Start wiring. The mic was first. I use super flexible silicone wires b/c it is easy to work with. Make the wires long enough to feed thru to the junction box. The mic uses 2 wires and polarization does not seem to matter.



Step 4 - use heat shrink to join the mic part to the frame



Step 6 - -use heat shrink to attach the cable to the frame.

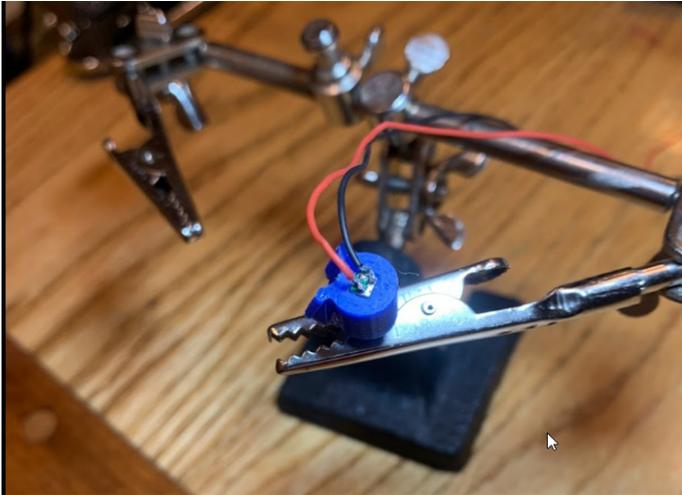


Step 5 – strip your donor cable and feed the wires thru the frame to the junction box

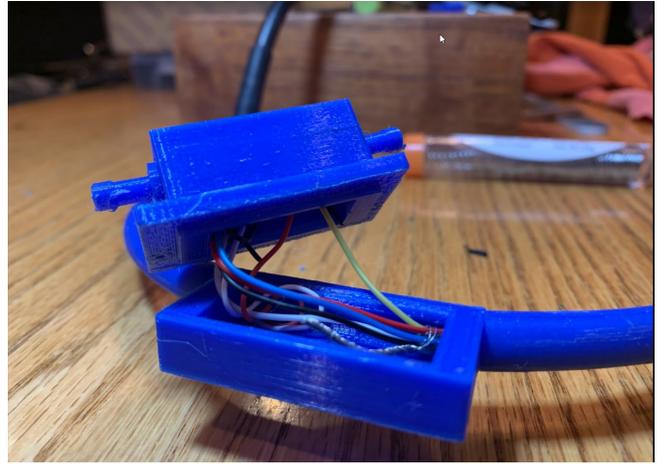


Step 7 – wire up the drivers – some sporty soldering is required, but once again if I can do it..... they are stupid small..... a wide tip hot iron with a pre-tinned 26ga wire seemed to work well. A tapping motion with the iron helped to not overheat the small driver



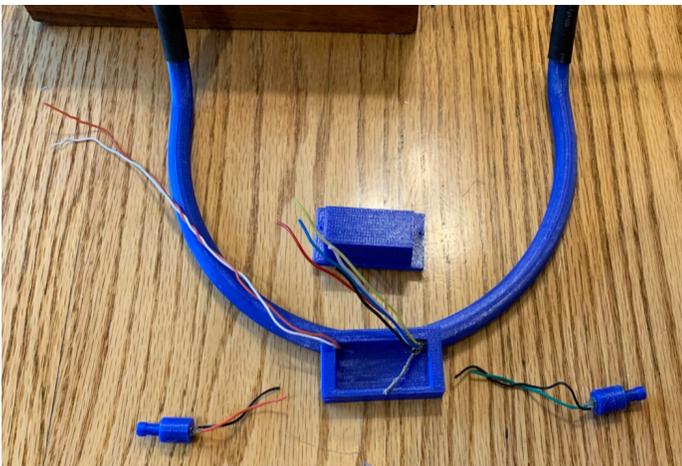


Step 8 - Junction box time. Mic wires are passthroughs – red to red and white to white. Black is audio common - your wires colors will probably vary. It is a stereo headset, so be attentive to connections. Wires are soldered and insulated with heat shrink.



Step 10 – connect the drivers to the ear elbows with some silicone tubing and you are ready to try out your new “audiophile” headset. Next time I’ll cover how to make the DIY comfort-foam ear tips – cheap and comfortable!

Here she is complete with some in plane glamour shots.....



Step 9 – close up the junction box – you can see how the driver holders mount in the junction box. The box is simply zip tied for testing.





- Prusa Slicer

Tools

- Good soldering iron
- Access to 3D printer with PETG filament
 - I printed everything at .15 mm resolution

I've made 3 pair now – some with aux input for music, but this basic head set is cheap and pretty easy to make. Hit me up with questions, bring beer for Andi....haha!

Thoughts from the Right Seat – a Golden Oldie From 2007.....

– Doug

This summer I have had the pleasure of giving quite a bit of transition training to a variety of RV pilots. I can look back at almost 40 years of flight instructing and truly say that teaching in RVs rates high on the fun meter. Granted, I always got a big kick out of starting a primary student from scratch and helping them to gain the skill and judgment required to fly an airplane. But the RV “student” is unique. In most cases he built the airplane he is learning in. For years he has dreamed of the day when he graduated to being a flying RV pilot. This brings a special set of expectations to the left (or front) seat.

The term “transition training” might be a new one to you. In other circumstances one might use the word “checkout”. We’ve all been “checked-out” in a new aircraft model. We show up at Joe’s Aircraft Rental Emporium and a bored CFI gives us a brief intro to that shiny new Belchfire 500. We do some steep turns and stalls, then back to the pattern for a couple bounces. If things work out, the instructor bestows his blessing on you and you are “checked-out” to rent that Belchfire 500 and amaze your family and friends with your aeronautical acumen.

I look at RV transition training somewhat different. “Transition” is the key word. It is defined as “the process or a period of changing from one state or condition to another”. For the average RV student this may be a two-fold process. First is the transition from a builder to a current pilot. Many builders spend the vast majority of their efforts during the building process, doing just that: building. The focus is on everything BUT flying. The time, the money, and the opportunity to maintain one’s flying skills may be few and far between. So when the project is finally completed, a transition has to be made from aircraft builder who scoffs at the sight of a toppled rivet to safe, competent and current pilot.

Dusting off the cobwebs does not necessarily have to be done in an RV. And frankly, if you are truly rusty and have not flown for several years, I highly suggest that you regain your currency in an airplane you were previously familiar with. Is that a waste of time and money? Not necessarily. You will regain your flying skills quicker in something a little more familiar and maybe a little slower. Something with a constant

Final thoughts:

- Lightweight – Check
- Comfortable – Check
- Cheap – Check – 50 bucks if you have a donor headset
- Audio Quality – Check – It really is good, the foam ear buds work well, No ANR though for the Bose crowd.
- Transmit quality – ATC loved it!
- Looks – OK it looks a bit goofy – I had Blue PETG so I used it.
- Reliable – time will tell – not much to break

I’m happy to share my designs, sources, and ideas with anyone who wants to make one. Many schools and libraries now have 3D printer you can use.

Parts:

- Mic – aviation mic from a donor headset
- Cables and plugs- also from the donor headset
- Frame, driver holder, ear elbows and junction box – CAD designed and 3D printed – I’m happy to share my designs
- Drivers – Knowles ED-29689 (probably clone) units from Ebay
- Audio tubes – 2mm ID silicone tube or RC fuel tubing
- DIY comfort-foam units(next issue!) or Shure rubber trees EAT-FL1-6
- Assorted 3;1 shrink ratio tubing
- 26ga Silicone wire in various colors

Software

- TinkerCad

speed prop might be good if you are not familiar with its operation.

If you have built a tail dragger RV and are not tailwheel current, more of a challenge lies ahead. Finding a qualified tail dragger CFI and an appropriate airplane is increasingly difficult. If you can find one, a Citabria is a perfect tailwheel trainer. I spent over 3000 hours in the back seat of Citabrias and in my opinion if you are comfortable in this aircraft, the transition to a tail wheel RV will be relatively smooth.

Once you have sanded off most of the rust, part two of the transition process is to move from current pilot to current RV pilot. So what is different about RVs? Well they are kind of the Porsche of the light aircraft world. They are quick, responsive, and handle wonderfully. Here are some traits that I consider a little “different” than the typical Wichita spam can:

1. Landing gear - The tri-gear RVs have a non-steerable nose gear. You need to use the brakes to assist maneuvering. Not a big deal, but different at first. The nosewheel looks a little spindly doesn't it?. It is. RVs are not designed to compete with Beavers on tundra tires. Those little tires require caution on unimproved surfaces. Baby that nose gear!! For tailwheel RVs, their taildragger handling is considered exemplary. But they are short-coupled and quick. Directional steering is positive and truly depends on the tail spring arrangement. Each tailwheel RV differs in this regard.

2. Weight and balance – Tandem RVs handle quite differently with an aft CG. The -8s are not too bad, but the -4s certainly are pitch sensitive when aft loaded. Worse case is a 150 hp RV-4 with a wood prop. The side-by-sides are much better but still expect a more sensitive flare when landing a -7(A) with light fuel and a full baggage compliment.

3. And speaking of sensitivity, new RV pilots do a lot of bobbin' and weavin' the first time they take the stick. Just calm down, be SMOOTH and use some finesse.

4. Constant speed prop vs. fixed pitch – the c/s prop RV accelerates like a dragster. Lots of right rudder needed. BIG fun factor but things happen fast. Climb rate is a kick. BUT lots of drag on final approach. A fixed pitch RV is rather sedate on takeoff in comparison. Same for the climb. Big time glider however on approach and much harder to slow down.

5. Fuel management – should be familiar to low wing types coming from Pipers. Ya gotta switch tanks and don't forget. Fuel pressure keeps the fan turning. The FP gauge is an IMPORTANT instrument. And you have a boost pump to manage. It's ON during critical aspects of flight (such as takeoffs and landings).

5. RVs are CLEAN. They can build up speed very quickly going downhill (especially the fixed pitch prop versions.) Plan accordingly. By the same token, at cruise you will fly these aircraft high and fast. Descent planning is required. A 500 fpm rate of descent is comfortable on the ears. Your GPS gives you your time to go to destination. At a 500 fpm rate of descent, multiply the altitude to lose in thousands of feet by 2 and that is how long it takes to go down. If you have 6000 feet to lose, 6×2 equals 12 so start down 12 minutes out. Reducing power by 5 inches of manifold pressure equates easily to a 500 fpm rate of descent (that tidbit courtesy of Tom Berge).

6. Stalls – A rather small wing with no twist results in a “quick” stall. Very little buffet (-8s seem to have more). You might expect an “exhilarating” wing drop if the ball is not centered (or if you built a crooked wing). Reduce the angle of attack with smooth forward elevator and you have a flying airplane.

7. I teach the NWA method of stabilized approaches. In the big iron we have to be on speed, gear and flaps down and on glide path at 1000 feet AGL or we go around. I would say 300 AGL is applicable for an RV. If all your approach ducks are in a row (speed, flaps, glide angle, runway alignment, etc.) the landing is MUCH easier. Remember the old “Hershey Bar” winged Piper Cherokee 140/180. They could get a high sink rate if you got them slow. RVs (especially with the constant speed prop) are very similar. They can drop out from under you. The c/s-prop RVs approach like a heavy single (Bonanzas, C-210s) with power on to maintain a normal glide path.

8. Landing – don't flare high, don't flare high. Tom Berge beat this into my thick skull when he introduced me to his RV-6 almost 20 years ago. You can't dawdle and play with the flare like you can in a Cessna. Not a lot of “residual” lift as I call it. You must flare low, establish the sight picture over the nose, and hold it off, 2 inches above the runway. You CAN-NOT allow the airplane to drop in. Believe me it happened to me once in my RV-4 and I was amazed I didn't bend the gear. Lesson learned. One good thing about touchdowns in an RV: the wing stalls abruptly and you are on the ground. Almost like ground spoilers on the big jets. Nice feature on a windy day.

Most insurance companies now seem to require 5 hours of dual no matter what your previous experience. That might be enough, or it could be significantly more. Regardless, as your airplane nears completion, develop a plan for, 1) who will make your first test flight, 2) how do I rejuvenate my rusty flying skills in an airplane I am familiar with, and 3) find a qualified RV transition instructor and discuss your training program. And then... have fun!!!

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Twin Cities RV Builders Summer Hangar Party

Saturday, July 9th – 12 noon

**Bernie Weiss' hangar – India Lane
Anoka Airport, Blaine, MN (KANE)**

Summer comes all at once around here therefore..... it's time to celebrate blue skies and temps above freezing. Join us for our Anoka hangar party as guests of Bernie Weiss and Pete Howell. The process is the same as years past. Members are encouraged to bring along a guest and fly-ins are especially invited. Feel free come a bit early and we'll start official eating at noon. AND... the best part.. lunch is on us courtesy of our club treasury.

Bring along a camp chair for your dining comfort. We'll be asking for a headcount, as we get closer to the date so be on the lookout for an email that will have all the details.



For fly-ins:

You can park at the north end of the hangar line (ask for taxi instructions to “Fox Hollow” at the west end of the airport (taxi lane “India”)) or on the grass on India Lane opposite the hangars.

For drivers:

From Rte 65: Turn east on 93rd Lane NE. Turn left at airport entrance (gate code 12185). Turn right at T intersection then immediate left on India Lane.

From I35W and Rte 10: Go west on Rte 10 and exit on 93rd Lane. Turn right and take second airport entrance to the right and follow directions above.

Please park on grass or hard surface clear of hangar doors!!!!!!

Questions: Call Doug at 651-398-1184