



# RVator's Log

Newsletter of the Twin Cities RV Builder's Group

June 2021

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## Upcoming Events

**Yes, we are meeting in July!!! Sunday afternoon July 11 at ANE. See page 9 for details....**

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**Minnesota Wing  
Van's Air Force**

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## Shop Notes

- Doug

### Standards

As a 14-year-old nerd my first flying lesson was in a well worn 1946 Aeronca Champ. It was a faded red and white with silver patches on the fuselage and it's spartan "cabin" smelled of sweat and avgas. I had no idea what "airworthiness" meant, nor did I care. As an innocent student pilot, I naturally assumed my instructor Lefty would only teach in a safe and sound airplane and the last thing on my mind was the technical, safety, and legal aspects of aircraft construction. Eventually I learned that airplanes were rather highly regulated conveyances. They had to have annual inspections by federally licensed aircraft mechanics. Those mechanics could only install FAA-approved parts in these aircraft in certain FAA-approved ways. Over the years we have owned 11 airplanes, 8 of which were "certified" which meant all maintenance procedures needed to be accomplished in a FAA-approved shop with the corresponding FAA-approved prices! For a corporate or airline operation you can multiply those procedures (and prices!) by zillions of orders of magnitude. There is no denying aviation is one of the highly regulated industries on planet Earth.



For us amateur-built folks, as much as we sometimes squirm when the feds mandate some new rule or regulation, constructing and flying one's own airplane in the U.S. is pretty lenient in the big scheme of things. I guess there's really nothing to stop you from installing a solid rocket booster in your RV-7 to ramp up the takeoff performance on those hot days. Fortunately, you don't see us homebuilders running off the rails very often. The reason why is that one of the first things a new builder learns (or should learn) is just what is meant by "aircraft standards."

All of Van's instruction manuals include a major section titled General Information. Before you

get started, here is where you learn just what the term "aircraft standards" means. Things like: round aluminum corners, smooth edges, deburring holes, dimpling, scratch avoidance, riveting techniques, nuts and bolts, etc, etc.

Tom Berge and I have discussed this topic many times. He has inspected more RVs than I can count and having a "aircraft standards" mindset is readily apparent with even a cursory initial inspection. Fortunately, the quality of Van's kits makes this effort quite easy. Nearly all the hard work is done for you (and this gets better all the time.... the newest kits have deburred rivet holes, and I would venture pre-dimpling may be on the way.) Follow the rules and expect nothing less than quality workmanship. This means neat and quality wiring bundles, 100% aircraft hardware, proper aluminum finishing, and construction techniques that follow the FAA's guidelines outlined in FAR Part 43.



This is how's it's done. Tom Berge's handiwork!!



How not to do it. Look carefully at the bolts attaching the horizontal stabilizer to the fuselage of this RV-6. What do you see wrong???

Lastly, document everything. Have a builder's log of some type. Take a zillion photos (I had nearly 700 and still refer to them often). Label your wiring. Take the time to draw out your wiring diagrams. Believe me you will forget how you did the little things about six months after your first flight. If you ever modify or add equipment to your RV down the road, having clear and complete documentation will save you hours and hours of head scratching ("How did I do that way back when?") Always assume that any installed equipment will have to be removed at some point in time to be repaired or replaced. Not too long ago I was on my back, upside-down and backwards under my instrument panel replacing a broken trim controller thanking Tom for telling me to install items like that with cap screws and nutplates. As he said... "It doesn't have to be easy, but it does have to be possible."

Build on and enjoy.....

## What MNVAF Members Are Building and Flying

by Frank Huber

### John Aiton RV-7A

Member, John Aiton, is building an RV-7A. John and his wife, Barbara decided they wanted a side-by-side, nose wheel aircraft that offered good cross-country performance. They decided on a Vans aircraft because of the looks, builder support and great performance. John is building a regular slow build kit, which he began working on May 1, 2015, the day after he retired.



John has the wings and tail completed, except for the fiberglass work and one panel on each wing. The fuselage is almost complete, and the slider canopy has been fitted, cut and drilled. He has all the remaining kits, and the engine is on the way.



John and his handiwork at his garage in Burnsville.

John is installing a YIO-360-M1B, 180hp engine with a FM-150 Airflow Performance fuel servo and dual P-mags driving a Hartzell 74 inch constant speed prop. He plans to install 2 Garmin GDU460-G3Xs, a GNX-375 TXPDR/GPS/ADSB, a GTR-200 Com radio, a GMC507 Autopilot, a GMA-245 Audio Panel and a G5 on his panel. He is planning to install the

SuperTracks canopy extension and use the Skybolt VLoc fasteners on his cowling.



Yep... his vehicles have been relegated to live out in the driveway

difficult projects so far have been bending the canopy frame to properly fit the airframe and making and firing the aft fairing skirts. After finishing the work on the fuselage, he will be working on the engine installation and then the instrument panel.



The obligatory paper instrument panel

was flying was no longer available. He plans to base his aircraft, N729JA, at the Flying Cloud Airport. His wife and John are planning on exploring the western United States and make visits to his son and family in Phoenix. Doug tells me John is doing an excellent job on his construction, so there will be another fine aircraft joining the MNVAF when it's completed.

## AirVenture is coming....

*Oshkosh is just around the corner. Flying into the world's largest airshow is lots of fun but it can be challenging and cause for being familiar with the arrival procedures as outlined in the NOTAM for this year's event. Here's some past narratives from NASA's Callback Safety Reporting System that provides food for thought....*

### Conflict, Distraction, Deviation, and Discipline

This homebuilt aircraft pilot experienced distraction and confusion after an airborne conflict during the arrival. The pilot's rationale for the resulting deviation is shared.

- I was flying the Fisk approach into the Oshkosh airshow and established at 85 to 90 knots indicated airspeed and 1,800 feet MSL. A PA-28 passed me closely to my right, overtaking me and cutting in front of me. In the confusion that ensued in avoiding a collision, I overflew the controllers at Fisk, and my passenger said he believed the "wing rock" [radio transmission] was for us. I was already too far from Fisk for them to see my wing rock. I proceeded to Runway 36L, and upon reaching short final and committed to land, I did not get a clearance specifically for a [colored] dot. Going around was deemed far more dangerous than just landing and vacating the runway due to the incredible traffic density and my good traffic separation at the time. The discipline by pilots during the arrival was poor at best.

### Beehive Behavior

A Piper PA-28 pilot identified several difficult-to-mitigate Oshkosh fly-in hazards. They were likely instrumental in this near miss airborne conflict while flying the arrival.

- I [began] the Fisk arrival at Ripon heading to Fisk. Traffic was extremely busy. My concentration was out...front trying to maintain separation from other aircraft trying to get in to Oshkosh. Out of the corner of my eye to the left, I caught a light-colored aircraft approaching directly toward me and a little high in a left turn to intersect my path. He passed directly overhead by 20 feet, and I believe he slowed down and settled in behind me. Since the Piper doesn't have rear windows, I could not see where he went. Evasive action wasn't safe, as there were planes near me, some at lower altitudes.

I believe the problem was caused by a chain of events:

1. The temporary Approach ATC didn't like the bunched-up gaggle of planes and told everyone at Fisk to turn left, go around, and try setting up again. They wanted us to be safe, but what you ended up with was 40 to 50 planes all turning left at the same time in uncontrolled airspace. Some adhered to the NOTAM and followed procedures, some did not. If

anything, we were in a very unsafe environment.

2. As time went on, pilots were getting angry and trying to get to Oshkosh at any cost. That's where all the maverick moves were done to cut in line. Sometimes we had very good separation in front of us, and someone would see that as a hole to fill with their airplane and ruin it for us. Perhaps that's what the [conflicting aircraft] was doing.

3. I am guessing that the [conflicting aircraft] may not have seen us since he was a little higher and starting into a turn. The pilot was on the left side, and we were on his right.

4. The weather was...below VFR minimums in the morning. When it lifted, everyone was trying to get to the same place.

I think something has to be done to rework the arrival into Oshkosh for AirVenture week. There were literally hundreds of planes in very tight proximity to each other trying to squeeze into one arrival path.... It would be nice if [ATC issued] more IFR arrivals.... The VFR approach method isn't working with the amount of traffic that this event has grown to.... Lastly, ATC can't wash their hands of us when they tell everyone to go back to Ripon and try it again. They are sending us out there among pilots of varying levels of competency and in very close proximity to remain clear of each other. There are too many planes in that situation to reliably keep track of, and they aren't all following the NOTAM's procedure.

### Risk and Reward in 20/20 Hindsight

This multiple-option arrival plan flirted with self-induced hazards and unnecessary flight risks. Fortunately, the arrival was successful, and lessons were eventually perceived.

■ I tried to get an IFR reservation to Oshkosh but could not because they were all taken. I chose to get an IFR reservation to C47, a nearby airport, with the plan to shoot an instrument approach to Runway 18 at C47, then either plan A: land and wait for weather to turn VFR and continue from there to Oshkosh via the visual approach in the Oshkosh NOTAM (Ripon to Fisk, then direct Oshkosh), or plan B: if I broke out visually on the approach to C47, then fly visually to Oshkosh via Ripon and Fisk per NOTAM.... On the approach, I did break out visually at about 1,400 feet MSL before reaching minimums. I then elected to fly at 1,400 feet MSL to Ripon to try the visual approach. The problem was that cloud bases were ragged and less than 100 feet above me. I had no cloud separation, barely keeping clear of clouds and barely 400 to 500 feet AGL. I rationalized that this was OK because of the special circumstances of AirAdventure procedures at Oshkosh. Fortunately, everything worked out, and conditions improved to VFR after I passed Fisk inbound

to the Oshkosh traffic pattern.... I was taking a risk by scud running in such a narrow margin and declaring my own Special VFR without ATC permission. I did have ADS-B out onboard, but that does not show all traffic. Worst case, I could have collided with another plane which was also scud running nearby or hit a tower or wires. I should have landed at C47 and waited patiently for weather to get better between C47 and Fisk before proceeding to Oshkosh.

### Taxi Turmoil

While under flagmen's directions, this pilot experienced an unexpected taxi threat. A quick reaction prevented a collision, but a better idea was conceived after the fact.

■ I was following a flagman's direction while taxiing south on the parallel taxiway near show center. A twin-engine aircraft that I'd been following turned off of the taxiway, opening approximately a 100-yard gap between me and the next aircraft in front of me. Flagmen waved me to accelerate to close that gap. A ramp worker [wearing] an orange vest and mounted on a small scooter crossed the ramp about 75 yards in front of me, moving from my right to my left. I expected that he would continue across the taxiway to the turf on the other side, but I was surprised when he, instead, turned on the edge of the paved ramp and motored straight toward me. I began braking, but there was still a brief period where it felt like we were playing chicken.

Afraid that there wouldn't be clearance between the oncoming scooter driver and my left...wing tip, I swerved pretty hard to my right near...the right...edge of the taxiway. At almost the same instant, he swerved to his own right and pulled off the taxiway onto the turf. I estimate that we cleared each other by about 10 to 20 feet.

I was trying to keep moving so as not to interfere with the busy Oshkosh ground traffic flow. In retrospect, however, I wish that I'd braked hard to a complete stop at the moment...the scooter driver surprised me by turning onto a possible collision course, and then waited for the conflict to resolve while sitting in a static position.

### It's Not Over Until It's Over

After departing the fly-in, this pilot encountered a surprise on the return flight home. The incident was complicated by a relaxation of concentration and discipline after the show.

■ I was flying eastbound to Maryland returning from Oshkosh at 11,000 feet on an IFR flight plan. My autopilot disconnected and revealed an out-of-trim condition, which caused the aircraft to yaw to the left. I had stretched my right leg to the right of the cockpit for comfort. When the aircraft yawed, I instinctively pressed my right foot on the rudder pedal. This caused the aircraft to yaw even more to the left,

requiring full right aileron to keep from rolling inverted. I turned the autopilot off and released the rudder trim with no effect. I also reduced power and lowered the nose to get better control, advising ATC that I was turning and descending with a flight control problem. ATC advised me that Cambridge Airport was ahead about ten miles (I had turned about 120 degrees to the left, so I was heading northwest instead of east. As I continued to troubleshoot, I noted that my right foot was pressing on the copilot's left rudder pedal instead of the pilot's right rudder pedal. As soon as I got my foot on the correct rudder pedal, I was able to control the aircraft and advised ATC. I continued the flight to Maryland.... I am just glad that I was able to keep flying the aircraft until I found what the problem was - Me!!

## ***Fly The High Road Or The Low Road?***

*-LeRoy Cook*

Flight planning invariably includes choosing an expected altitude for the trip and varying it as necessary for anticipated terrain encounters and ATC requirements. The question at the outset will often be, shall I go as high as practical, or as low as I can? Many factors enter into the decision, with each trip having du jour considerations to be applied.

Some of the weather factors going into the mix when picking an altitude are the day's expected winds and temperatures aloft, low-level turbulence, cloud type and height, and flight visibility. Obviously, IFR capability opens up some altitude choices that may not be available to VFR operators, but filing instruments also requires added consideration of airframe icing, minimum en-route altitudes, and selection of alternate airports. In any case, weather can play a big role in choosing an altitude for the trip.



If your airplane has good climb performance, there's no reason to dillydally down low in hot, rough, and hazy conditions.  
Photo: Ed Hicks

Most likely, there will no single altitude applicable to the full duration of any trip of appreciable length. You can level off at an altitude that you hope will work, but seldom will you be able to stay there for the duration. During the 3½-hour final leg into AirVenture 2018, I changed my cruising altitude a half-dozen times, mostly to avoid inconvenient clouds. On the return leg outbound after the show, I climbed to 6500 feet and sat there undisturbed for nearly 4 hours. One can only plan and hope; the weather is what it is, not what it's forecast to be.

Weather notwithstanding, your airplane's characteristics and capabilities can lead you to choose an altitude that you know your plane likes. Editor Paul Dye says that his RV optimizes at around 10,000 feet MSL, where there's less drag, smooth air, and yet sufficient remaining horsepower for efficient cruising. An airplane with strong climb capability, able to reach a height of 2 miles above the takeoff airport's elevation in 15 minutes or less, makes selection of thin-air altitudes an easy option, while a low-powered homebuilt, or one with a diminutive wing area, might have to struggle to climb 10,000 feet in a half hour, so its pilot tends to stop the climb early.

And then there's plain old pilot preference. Some VFR pilots just like to stay low enough to see landmarks easily, while others want to remove themselves from earthbound considerations, flying up where it's cool and smooth. I usually fly by the "hemorrhoid rule," leveling off only after the bouncing of rough air abates.

Is It Legal?



Few experimentals can reach FL 280 like this Turbine Evolution, but many non-turbocharged piston engines give good performance up through 7000 to 10,000 feet. Photo: Richard VanderMeulen

There is, of course, a more serious legal obligation to maintain a cruising altitude appropriate to our direction of flight as defined by the "hemisphere rule." Said regulation, codified as FAR 91.159 and 91.179, mandates that if we are in level cruising flight at more than 3000 feet above ground level, we must maintain, under VFR, an odd thousand feet of altitude plus

500 feet if flying a magnetic course (not heading) between 0 and 179 degrees. To somewhat minimize head-on attacks, airplanes flying a magnetic course lying between 180 and 359 degrees must maintain even thousands of feet plus 500. If flying IFR, you are to maintain the ATC-assigned altitude or, in uncontrolled airspace, odd thousands of MSL altitude on courses between 0 and 179 degrees and even thousands between 180 and 359.

Bear in mind that a 3500-foot MSL eastward cruising altitude is obligatory only if the ground elevation is 500 feet or less; if the terrain is higher than that, 3500 is up for grabs by airplanes flying in any direction. Say, for instance, you depart from an airport with a field elevation of 1100 feet and head eastward over similar flatlands; upon climbing past 3,600 feet, you are required to continue the climb to at least 5500 feet if cruising VFR. And if you wish to go higher, your next legal altitude is 7500 feet, and then 9500 and so forth. If westerly bound (or northwesterly or southwesterly), you can use 4500, 6500, 8500, and on. Under IFR, omit the 500-foot suffix when filing; bear in mind that if operating by IFR as “VFR on top,” you must maintain an appropriate VFR altitude unless assigned otherwise.

Don't get lackadaisical with your cruising level. I was buzzing along westbound at 4500 MSL one day when I suddenly saw a bug-spot on my windshield sprout wings. A red V-tail Bonanza streaked past me, dead level, eastbound. I know exactly what he was doing because we've all been guilty of it. As the air below 3,000 feet AGL started to get rough, he eased up a bit at a time to stay in smooth air, eventually rising to an illegal cruising altitude. Do not rely on the ADS-B In traffic display to protect you; make sure you're at the right altitude.

### Why Take the High Road?



If you're only flying 25 miles to get a hamburger, there's not much point in climbing to 6000 feet AGL, just to come back down again. Photo: Mariano Rosales

Probably the foremost reason to climb high before leveling off is comfort. If your airplane has good climb performance, there's no reason to dillydally down low in hot, rough, and hazy conditions. Given that navigation has been simplified by GPS courses depicted on flat-panel electronic charts, we can just disconnect ourselves from watching for water towers and railroad tracks, taking advantage of the cool, smooth air aloft. Tracking our magenta line will keep us oriented.

If negotiating with tall terrain, you'll have no choice except to fly as high as it takes to stay out of the rocks. Even though you're familiar with a lower route that will avoid the tallest peaks, don't skimp on terrain clearance, particularly later in the day, when turbulence worsens. Don't forget that winds blowing perpendicular to the ridgelines can generate some attention-getting downdrafts on the lee side of the crest; 2000 feet of clearance as you cross over may be barely enough.

Topping weather is a good reason to seek a high cruising altitude. Getting up high to avoid weaving around cumulus, or to get out of the haze and smoke trapped in an inversion layer, improves flight visibility to a more comfortable level. In thunderstorm weather, getting high enough to clear the lower clouds lets us see the heavy rain shafts and ugly buildups so we can plan deviations earlier.

### How High?



When flying VFR, you must remain clear of clouds. In Class E airspace, the minimum distance is 500 feet below, 1000 feet above, and 2000 feet horizontally. Photo: Kevin Wing

In general, non-turbocharged engines give good cruising power up through 7000 to 10,000 feet, depending on what percentage of rated horsepower you want to use. With the lessened aerodynamic drag from the thinner air, you can pick up 10 knots over using the same power down low. Again, every airplane has its sweet spot, depending on the wing's aspect ratio, the engine's ability to breathe, and the propeller design.

Turbocharging makes it easier to use higher altitudes, not just because power remains available at greater height, but because the climb rate remains fairly constant, instead of falling away as would be the case when a non-turbocharged airplane's climb power drops off. Until reaching the turbo's critical altitude, where the controlling wastegate is fully closed and power finally begins to decrease, the turbocharged airplane just keeps going up. The downside of turbocharged altitudes is the need to use supplemental oxygen as you exceed your own "critical altitude" in high-altitude cruising.

### Why Go Low?



Most low-level flying is done early in the day, before the thermals build up, or just before sunset, when the earth cools and winds drop off. Photo: Richard VanderMeulen

Flying low is great for sightseeing. At 1500 feet or so above the ground, one gets to peer down into backyards and timber clearings, where there's a never-ending panoply of vistas opening up as we cruise along. I can get bored when flying at high altitude, but there's always something to keep my attention down low.

Obviously, most low-level flying is done early in the day, before the thermals build up, or just before sunset, when the earth cools and winds drop off. Light homebuilts like a Pietyenpol are perfectly suited to these fun-oriented flights. We may not have the horsepower to buzz up above 5000 feet AGL, but there's nothing to see up there anyway. If your little airplane makes minimal noise impact, there's no reason not to drop down to 500 or 1000 feet over open countryside and check out everything. And if you're flying with an open cockpit, you may need to stay low to keep warm.

Slow is best when cruising at low level. A 200-mph Lancair covering a mile every 20 seconds doesn't leave much time for sightseeing down low, but a Kitfox at 500 feet is a perfect platform.



In mountainous terrain, fly as high as it takes to stay out of the rocks. Even on lower routes that avoid the tallest peaks, don't skimp on terrain clearance, particularly later in the day when turbulence worsens. Photo: Paul Dye

Another reason to fly at low altitude is weather avoidance. If flying VFR, it's necessary to stay 500 feet below the cloud bases, not just to be legal, but to improve forward visibility. Low-level navigation can be a challenge unless you're following a major roadway or other line of position, but the pervasiveness of GPS has taken a lot of uncertainty away from wandering along down low. Just remember the reduced forced-landing options when you give up altitude; don't blindly follow the magenta line across stretches of unlandable terrain or water.

Even instrument pilots fly low occasionally. Many times, I've flown IFR at the lowest altitude available just to stay clear of icing in the colder clouds up high. Bear in mind that others may be trying to do the same thing, so ATC might have to move you up for traffic reasons. Know what the MEAs are along your route, and be prepared to use them, even if radar contact may be lost by doing so.

Fighting strong winds on a westbound route sometimes requires flying low, sacrificing some comfort in order to build up a fuel reserve. Winds aloft generally switch to a more westerly direction and increase in strength at higher altitudes, so we tend to seek a high cruising altitude when headed east and a lower altitude when going west. That said, every day is different, and there are exceptions to the usual expectations.



Flying low is great for sightseeing. If your airplane makes minimal noise, there's no reason not to drop down to 500 or 1000 feet over open countryside. Photo: Notley Hawkins

Pressure-pattern flying used to be a more-common cross-country technique, when one chose an easterly route around the north side of a high-pressure area to gain a tailwind and flew south of a low for the same reason (speaking strictly of flying in the Northern Hemisphere). Going westbound, we would seek out a pattern that would give an easterly tailwind, over the top of a low or around the bottom of a high. At low altitude, friction effect tends to move winds aloft directions more in line with the surface winds reported by ASOS broadcasts.

Choosing a cruising altitude is a mix of considerations: the purpose of the flight, the prevailing weather, the importance of comfort, the capability of the aircraft, and the wishes of the pilot. If you're only flying 25 miles to get a hamburger, there's not much point in climbing to 6000 feet AGL, just to come back down again. On the other hand, if you're making a 3-hour trip, why not go up to the airplane's best altitude to gain efficiency and comfort? In general, if one-third of the trip can be spent in level flight, I'll consider the high-altitude option. But sometimes we just feel like flying low...

*This article originally appeared in the June 2019 issue of Kitplanes magazine.*

# Twin Cities RV Builders Summer Hangar Party

Sunday, July 11, 2021 1:00 pm

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

Finally..... summer is here and COVID restrictions are lifted and it's time to gather. Has it really been over a year? 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 to come by around noon and we'll start official eating at one. A free will offering will be taken

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 look out 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 93<sup>rd</sup> 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 93<sup>rd</sup> 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