



RVator's Log

Newsletter of the Twin Cities RV Builder's Group

September 2011

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Upcoming Events

September 25th: Picnic time!!! Everyone is invited for our annual Family Fly-In and Picnic. Sky Harbor Airpark as usual. Guarantee perfect fall weather!! Details on page!!!)

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**Minnesota Wing
Van's Air Force**

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were totally clueless and crossed the hall to the café where several customers were clustered around a TV in the adjacent bar. That's when we saw the black smoke coming from one of the World Trade Center buildings on the CNN broadcast. How could some little airplane have hit the tower on such a clear day in New York?

We ordered our pancakes and frankly only half-watched the broadcast on the TV through the doorway. But suddenly we saw the unmistakable shadow of a Boeing hit the second building and my plate of blueberry pancakes lost all their appeal. Like everyone else watching this horrible scene, we really could not believe what was happening. We sat spellbound watching the broadcast for a time and then it was announced that all aircraft in the U.S. had been ordered to land. Kevin and I asked each other, "Now what?" I called my wife back in Hudson and told her where we were and what was going on. She might have to come get us but I'd let her know later.

Shop Notes

September Memories...

It was a perfect Tuesday in Minnesota. Clear, no wind and pleasantly cool as I pulled 464EM from the hangar at Lake Elmo. Life was about as good as it could be. I had been flying right seat on the 757 for about a year "living the dream" as they say. I had recently bought Mike Eesley's RV-4 and with another week of vacation ahead of me, it was time for another pancake run to Eau Claire.



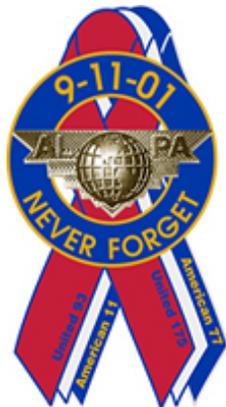
The night before I had called fellow NWA pilot and RV builder Kevin Knutson and invited him to come along. He lived near the Lakeville airport so the plan was to pick him up and then scoot to EAU and enjoy some great food and conversation.

Kevin was waiting when I landed at LVN around 0730. I shut down and he squeezed his 6-foot-plus frame into the very small rear seat. RV-4s were not designed for long-term passenger comfort but it was only about 25 minutes to EAU. We climbed out quickly in the crisp morning air. We were well clear of the Class B airspace so we only listened to Unicom for departure and arrival (EAU did not have a tower at that time). It was a perfectly smooth flight to Eau Claire as we motored along enjoying the scenery of southwestern Wisconsin.

We landed and taxied up to the terminal building, shut down and heading into the building, first making a pit stop in the men's room. As we entered, another guy was coming out and asked, "What are you guys doing flying here? Don't you know we've been attacked and all airplanes are grounded?" What was this guy talking about? We



Well we weren't just going to sit here. We hatched this plan to just head out to the airplane, takeoff, fly to Lakeville, drop off Kevin, and I'd high tail it back to Lake Elmo. No one was on the airport so we figured if the airport manager or someone intercepted us as we taxied out, we'd plead ignorance (I think the statute of limitations has run out by now).



So that's what we did. We strapped in, taxied across the airport unchallenged and took off for Lakeville. About halfway back, I tuned in ATIS at MSP and listened to the urgent NOTAM requiring all aircraft inflight to land at the closest airport immediately due to a national emergency. Now we were starting to think maybe we had screwed up. Here were two professional airline pilots knowingly violating a FAA emergency mandate. Thoughts of our licenses (and careers) evaporating ran through our minds. I suggested to Kevin that we make a beeline to Lake Elmo and I'd drive him home ASAP.

A slight right course correction put us on a direct path to 21D. I think we were the only airplane in the sky around the Twin Cities as we flew back to Lake Elmo. We put the RV away and I drove Kevin home as we listened to the radio news on the drive to Lakeville.

The following Saturday was our MN Wing September Picnic. VFR flight was still banned so our aircraft turn-out was limited to Tim Mahoney who filed IFR in his C-172. It was a somber yet welcome picnic as we gathered together that cloudy Saturday. Several of us were airline pilots flying the 767 and 757 and had our own visions of just what went on during the last moments of the hijacked aircraft. When I went back on the line the following week, everything had dramatically changed. No clear procedures for securing the cockpit had been implemented so it was rather hit and miss. One semi-official mandate was for the first officer (namely me) to pull out the fire axe and have it at the ready whenever the cockpit door was open in flight. I questioned just how effectively I could dispatch an unwanted intruder barging into our cockpit. Cooler heads finally prevailed and strict measures and procedures were finally clarified and are still in place today. The ten-year anniversary of 9/11 will be reviewed and replayed many times over this month. Certainly no event in the last decade has had such a significant effect on aviation, both commercial and general. Thankfully we are still free to build and fly our RV aircraft. It is a privilege to be cherished.

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News, news, news....

Brand new RV-6... We have had at least one first flight this summer. Jerry Golden's RV-6 took to the air on July 7th after a LONG gestation period of some 20 years. Your editor was the PIC for the initial test.



It was a little bit of an interesting flight in that Jerry had a rather high-pitched wood prop installed. The takeoff rpm was pretty low but it flew fine... just not a lot of takeoff performance (it cruised great!). After landing we discussed the mer-

its of this prop and Jerry decided to replace it with a Sensenich metal prop, which he did. I flew it a couple weeks later and it

was a totally different airplane. Good rate of climb, good cruise, and much improved stability. Jerry is working on his transition training and will soon be enjoyed a nice RV-6.

Sometimes one slips by us... Minnesota builder Walt Ray flew his RV-6A last year and we somehow missed the news.



Here is Walt's story (*note to Tom Berge: and you thought you had the only wild yellow RV!!*)...

I started the build in 03 after retiring, worked on it as the time allowed, as I was also helping a friend build a Lancair Legacy. I found an IO-320 engine which was run-out and as money allowed, rebuilt it to factory new specs. The crankshaft turned out standard and Bolduc Aviation completed the NDT and AD requirements. The buildup included o/haul of all accessories using magnetos and a Lamar lightweight starter and Van's alternator. The fuel injection system was overhauled and I used the airflow performance pump and filter unit. No gascolator was used as the filter performs this function. I found a M1B sump from a IO-360 that worked just fine after Larry Vetterman supplied the new intake pipes as the stock pipes are too long for the 320. He also supplied the exhaust system. I used the snorkel intake which requires it to be shortened 3/4 of an inch to fit properly.

The airframe was a slow build and with Doug's help found the jig to build it up on. That saved a months work. The wings fitted just fine after completion, which was a welcome relief. I installed the steps on the inside of the skin, which gives a more finished look. Also used the Sikaflex system to install the canopy. I fabricated aluminum skirts for the canopy and aluminum frame for the lower portion of the windshield. I did offset the vertical fin 1/4" which worked out fine. No tab required.

The instrument panel has the conventional Airspeed, Altimeter, ROC, along with a Dynon D-100 EFIS a VMC-1000C engine instrumentation system. and Tru-Trak autopilot. The Com is a IC-210 and a King KT-76A transponder.

The 1st flight was July of 2010 and went well with no major gigs. I spent the winter months prepping for paint and helping a friend paint his 172 and overhauling his engine. Finished painting my A/C this month and flew it with all the fairings on for the 1st time and what a difference in performance, I owned a Bonanza for many years and this would fly circles around it. What a great performer it is. The grin continues!!

It's back..... After a LONG six months in the paint shop, Peter Fruehling's RV-7 is back on Minnesota soil. Yep, the job is amazing. All ready to kill bugs!!



Plan S

- Tom Berge

My first RV was a simple RV6 with an O-360 and a fixed pitch prop. The thing just ran well, was quite fast and never, I mean never had any temperature issues. My oil cooler was the standard 7 row (small) cooler that Vans sold at the time and if anything, I struggled to get enough temps at certain times of the year.



During winter, the cooler was completely blocked and still temps would just barely get to 160 F. CHT's also were a non-issue.

Eventually builders' withdrawal crept in and about that time I won a \$750 gift certificate off a TruTrack autopilot and installing it in my old, slow RV6 just didn't make sense. By the way, notice how easily I turned on old faithful? Anyway, I hatched a plan to build a new RV7A around the new autopilot and being aware of rumors about tri-gear RV's suffering from high oil temperatures a bit more than the tail wheel version, I planned on installing the biggest, baddest oil cooler I could stuff behind the #4 cylinder baffle. I chose the 10 row cooler that Vans sold and this became plan A, though I didn't know it was plan A until later. The basic equipment list is an O-360, constant speed prop and dual electronic ignition.



My first flight was June of 2003 and on that first flight I had high oil temps. Now part of the problem was a partial cover over the oil cooler and to this day I have no idea which idiot left that in there. The next flight had the cover removed and while the temps were manageable, they were still higher than I would like to see. Turns out, a good question is what are "good" temps versus "bad" temps? From what I could find perusing the vast information available on the web for Lycoming, the consensus was below 200F oil temperature and below 400F CHT's were fine. Throughout the 8 years I've been flying 369TB, I have almost always remained below those limits with the occasional transgression when OAT's

were very high. And so I flew it with oil generally around 200F in the summer and the #4 CHT (my hottest) around 395F. The issue as I saw it was being at the upper limit without much wiggle room. Any slow flight at all, any extended ground ops and bingo, high oil temps. My first trip to OSH had the oil at 235F due to the long taxi up through Canada, over to Michigan and finally to RV parking. But, in reality it wasn't broken, so why fix it? Well, because its there, silly!



A word about temperature data... Getting good accurate data to compare modifications is extremely hard to do because getting conditions exactly the same is just impossible. Think about it, OAT, power setting, leaning, altitude, the list goes on. Each of these items changes the data so seeing a 1 or 2 degree "improvement" is just not a reliable indicator of what's happening

with the engine. Oil temps are controlled by a vernatherm valve, which operates much like the thermostat in your car. It's trying to adjust the temps to a given value by controlling the flow of oil to the cooler, making it that much more difficult to trust a particular modifications effectiveness. Cylinder head temps tend to track OAT's degree for degree, not exactly, but pretty close, so I tend to keep an eye on what's happening to those temps to check on my progress. Each of my modifications hoped for results were always 5 degrees at a minimum. I rarely succeeded. By the way, most of my knowledge has come from participating in the trial and error series of courses from Shade Tree University, which is a continuing education program. That and my lack of fear of failure have led to an interesting 8-year odyssey to control temperatures.

My normal power settings are 23.6" and 2360 rpm, leaned to 8.2 gph, which is lean of peak. Yes, lean of peak, deal with it. It's in the cruise configuration that I was most interested in controlling temps, so those were the temps I kept an eye on. For the parts of the year where spit didn't freeze before hitting the ground, aka summer, my power settings would yield about 200F or a bit less oil temps and 395F CHT on my hottest cylinder, which was #4. The other three cylinders would be 25 degrees cooler. The higher the altitude, the higher the temps, so I tended to stay lower. The times I would fly high (altitude wise) were times filled with anxiety while CHT's went over 400 and oil would top 200F. By the way, I learned to control high CHT's during climb by leaving the throttle full in during the climb which was a tricked I read about in Sport Aviation. That made a huge difference.

The first minor changes were to increase the baffle openings around the cylinders, which did no harm, but also no help. The first major renovation was replacing the Positech oil cooler with a Niagara cooler. That was worth about 5 degrees, which certainly helped. CHT's remained the same, but at least the oil

was below the magic 200F. Other changes over the years were as follows.

Plan D - Added a fairing around the lower horizontal engine mount tube to smooth the air exiting the cowl – its still there

Plan E - Added louvers on the cowl bottom to move more air through the system – this was on Vans cowl

Plan F - Cut the bottom of the cowl lip forward to "increase" the effective opening – also on Vans cowl

Plan G - Retarded the ignition timing a few degrees – returned to original timing

Plan H - Replaced Vans cowl with a Sam James cowl and pressure plenum – still flying with it though it did *raise* the temps a bit

Plan I - Sealed every opening I could find in the baffles

Plan J - Swapped my hottest cylinder (#4) with my coldest. A note on my cylinders: my first set of Superior cylinders would not stop using excessive oil, so AeroSport exchanged them with new ECI's. That set of cylinders got caught up in ECI's cylinder AD a couple of years ago, so they too were replaced. It was on the first set of ECI's that the #4 got considerably hotter, so I swapped it with the #1 cylinder, and sure enough, the temps went down. Don't know why, don't care. It worked so I kept my mouth shut.

Plan K - Moved the oil cooler away from the cylinder to create a small plenum – still that way

Plan L - Added louvers on the side of the Sam James cowl – recently removed

Plan M - Added an extension to the cowl exit to try and smooth the air flow – removed

Plan N - Added a "fence" to guide airflow back to the #4 cylinder - removed

Plan O - Had the main jet size increased on the carburetor – still that way

Plan P - Made sure all flashing from the casting process was removed between the cylinder fins

Plan Q - Put thermal tape on the intake tubes to reduce temperatures of the fuel/air mixture - removed

Plan R - I tested my thermocouples to make sure my instrumentation was correct – it was

So that brings me to plan S. Since I had removed the side louvers on my Sam James cowl, and it had to be repainted at some point anyway, why not play some more? I have always wanted to open up the exit area by reshaping the lower lip of the cowl and not being afraid of failure, grabbed my trusty Dremel tool and went to work. I cut along the side of the exit scoop and lowered the lip $\frac{3}{4}$ of an inch, which increased the exit area from 59.5 sq. in. to 70 sq. in. That equates to an 18% increase. The first test flight yielded some pretty interesting data. I've flown my RV enough to know where my temps will fall and used 195F oil and 395F CHT as my starting point. I saw a 15-degree drop in the #4 cylinder. Oil temperatures very slowly climbed back to 195F but that didn't surprise me since I expected the vernatherm valve to adjust accordingly.

Since then I've experienced a cross country to Texas, and I do mean experienced. Wow, was it hot there! Peter Fruehling and I brought along some fruit pies to keep us nourished and by the time we arrived in the Austin area, we had hot apple pies. OAT's were in the mid 80's at 6000 ft and both CHT and oil temps were fine. The following day when we left Giddings, TX on our way to Georgetown, TX, the OAT at 2500 feet settled at 98 degrees F. The #4 CHT settled at 406 and the oil at 206. During the next days travels back to Minnesota, we started with an OAT of 80F which gradually cooled as we went north and the #4 CHT stayed in the lower 390's and oil stayed in the mid 190's until the OAT dropped to the mid 70's at which time the #4 CHT dropped to the mid 380's and the oil to upper 180's. Last summer during a trip to Yellowstone, I had an OAT of 92F and my #4 was 417 and my oil was between 210 and 212 and this was before the exit area modification. My best guess as of now, subject to change of course, is I've lowered my CHT's by 10-15 degrees, which I feel is a phenomenal accomplishment. With the exception of the oil cooler change mentioned earlier, all the other attempts produced exactly nothing. My summer time temps would always settle at 395 on my #4 cylinder and oil would always settle around 195. Now my "normal" appears to be 380-385 CHT's and oil 185-190. And this by the way is without a speed loss as far as I can tell. Probably best not to check that out too much, lest it start another 8-year odyssey! Check out the pictures. If I didn't tell you I had made the change, you would never notice it, would you?



The temporary modification



The end result.... Hard to see the difference!

Tom Irlbeck and "Bear" New "tidbits"

Well, I've installed the new Lithium battery in 214FF. I think I had previously mentioned that I ran it in my Dodge Van, down in Florida for a month. All went well, and I couldn't tell any difference in the operation of the Van. The Van only draws 150 amps for starting, so no real challenge. When we got back to Wisconsin, I installed it in my Ford Expedition. Didn't have any tools to measure the cranking amps. The battery that was installed is a 665-amp battery that weighs in at 57.8 lbs. When I showed it to a couple of my "car nut" friends, they just shook their heads in disbelief. It looks like it belongs in my Moped, and not a big "Honking" SUV, that's what my grandson Michael calls the Expedition.

Naturally, I like to weigh everything that goes in my birds. You might notice on my camp gear, I have everything labeled as to how much it weighs. This goes back to my bush flying



The original cowl outlet

days in the Idaho Frank Church wilderness area outings. You don't want to be dropping into a 900 ft. strip in a dead end canyon, and be too heavy to get out.

The new Lithium battery weighs in at 3.5 lbs. and is rated for 440 amps, and that is weighed with my special scale that is supposed to be accurate to 1/10 of a pound, not grandma's bathroom scale. My Concorde 25XC that I removed weighs in at 23.5 lbs., a savings of over 20 lbs. One of the first tests that I wanted to do is a crank test. With my carburetor engine I seldom crank longer than a few seconds, and I'm started. So, I started cranking and hit the stop watch, I stopped at 20 seconds, don't want to break the battery before I've even flown it. It didn't slow or show any abnormal signs. Plan on doing a 30 second run, and more later, keeping track of the starter limits and heating. I know my 0360 with higher compression pistons (9.2-1) measured 340 cranking amps in a mild temperature, 75 degrees, start up.

Now if you want to check up on Lithium batteries, try this web site: www.LITHUMAVIATIONBATTERY.com

Andy Reich is the engineer, head sales man, and bottle washer. I met him at Sun n Fun, appears to be quite involved with the battery World. The battery that I have lists at \$400 dollars. This appears a little steep, but it should out live the acid batteries by at least 2-1, and claims are stating 3-1 life. The 20 lbs. weight savings is substantial, shelf life greater than acid, and doesn't consume as much space. I have a sneaky feeling that we will be seeing a lot more of the lithium's in aviation. Stayed tuned, and we'll see what "Bear" has to say about his new power source for electrons.

Tom and "Bear"



The "old, heavy, clunky" Concorde battery



A comparison: lithium vs. the "boat-anchor"



Lot's of saved space and weight

BUSTED!

- Anonymous

Today I have the honor of being able to write about something I did in my airplane that I always wondered how other people could do. I used to cringe when I thought of those poor, mindless pilots that get "the number" from a tower controller so they can call the tower and find out what they did wrong. Last week I got the number...and knew I was getting it before I landed.

Nearly all of us put some kind of autopilot in our RV's. They're a safety feature, if nothing else, taking care of tasks that we really shouldn't have to bother ourselves with when flying our hot-rod airplanes. One such menial task is a slow climb up to an altitude where your weather briefing said you might pick up 5 kts of ground speed. How can we resist such a monumental speed gain? Two clicks of the little "up" button and up we go at 200 feet per minute. The great thing about autopilots is now we have time to do what ever we want. We can look for traffic, marvel at our ground speed, have a drink of water, change the tunes on our little MP3 player, whatever want. All the while our faithful autopilot is doing exactly what we told it to do, at 200 feet per minute. While I'm at it, maybe I'll have a look at that forest fire and oh that's right, I brought a candy bar! Today is a great day to fly! Check out my ground speed! That's awesome! Mmmm that candy bar was good! What else should I do while I'm...wait....am I still climbing? I better drop back down to 4500 where I planned to end up when I put that climb in a few minutes ago. Now the panic sets in. My GPS shows me just passing the edge of 4000 foot ring of the Class B airspace. Not good.



When I finally landed I knew what I was in for. Sure enough the FBO Manager handed me a slip of paper with a number to call and it all started. I called immediately which they appreciated and we talked about what happen. The controller was very interested in what type of plane I was flying and said he had always wanted to build one himself but that didn't change the fact that the error needed to be reported and I would be working with a FSDO investigator. I was embarrassed, and angry with myself all at the same time. As of this writing, I'm still waiting to speak with the investigator and there is no telling what will happen. I could be required to do some airspace training with a local instructor or it could be worse. Much worse. However it plays out, the experience has changed the way I fly and how I use my equipment forever.

Highly capable autopilots and ever more sophisticated and affordable EFIS's that are designed to reduce pilot workload are not designed to reduce pilot responsibility. Even our great new portable GPS's that tell us right where the airspace is can

cause us not to be as careful when we plan a flight. I'll admit that I used to be diligent about the Class B airspace considering I was taking off under the 2300 foot ring of the Minneapolis Class B. Last week I barely checked my route for the short pleasure flight because I knew I would have the information with me in the cockpit. That relaxed attitude became a serious airspace violation and thankfully didn't endanger any other aircraft.



Automation and the safety tools we have to reduce pilot workload and let us focus on flying the airplane are great! Let's be sure we're using them as such and not taking the extra time we have for tasks that take us away from flying, managing our location on our maps and watching for traffic. Last week I failed in my duty as a pilot and as an ambassador for experimental aircraft. I will be moving back to the way I used to plan for and execute my flights no matter what the destination or route. I hope my experience can help bring that focus back for all of us flying with portable GPS's, autopilots or any of the new tools we have available today.

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"When you're in a high performance airplane, you really have to—despite what might be happening in your personal life or things with your job, or things on the ground—you really have to focus on what you're doing right now."

— *Scott Kelly, Commander of the International Space Station, former Navy test pilot, and brother of shot Tucson Congresswoman Gabrielle Giffords' husband Mark Kelly. She was shot while he was in space. New York Times, 4 February 2011.*

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

First Class

Minnesota Wing Fall Family Picnic and Fly-In

Sunday, September 25, 2011, eatin’ starts at 1 pm

Sky Harbor Air Park (1MN8)

**N44 31.7, W093 19.5, FGT (115.7) 218 degree radial, 9.0 nm, CTAF: 122.9
Cass Trail, Webster, MN 55088**



Time to enjoy the cool fall air and talk RVs again with our friends and neighbors at Sky Harbor!

Kim and Roy Fuhrmann are again hosting with the able assistance of the folks on the airpark.

Please bring a salad or dessert to share. A lawn

chair might be nice also. Everything else will be provided. Fly-ins are welcome as always. Please fly safe and monitor 122.9!!! See you then!!!!!!

Directions:

From Minneapolis, south on I-35. Exit at the Elko, New Market exit. East on Cty Rd 2 then south on Cty Rd 46. Then west on Cty Rd 3. You will cross I-35. Take the second entrance to Sky Harbor (Cass Trail). Follow the driveway to the Fuhrmann's on the left. You can't miss it!

If lost, please call Doug at 651-398-1184