Western Canada

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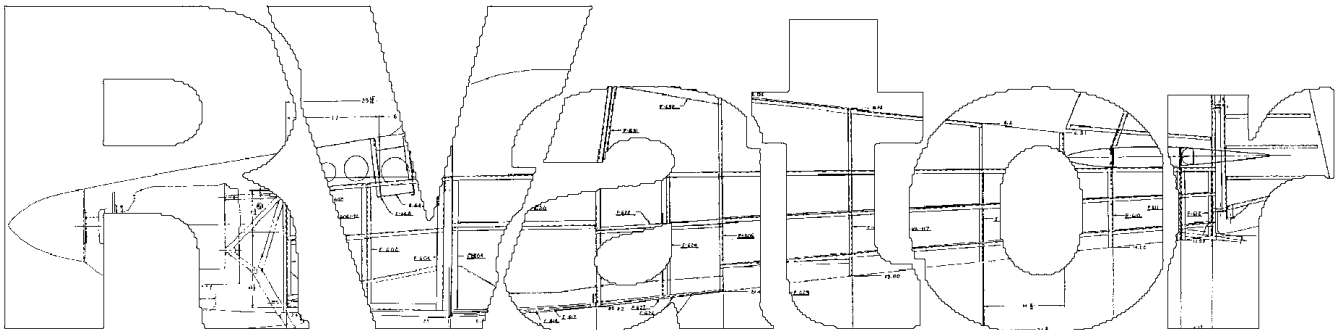

Newsletter of Van's Air Force—Western Canada Wing

Climb Testing Tips

Kevin Horton
Van's Air Force Ontario Wing
http://eccentrix.com/misc/rv8/rv8.html

You need smooth, stable air to get good data in your climb tests. Often it is worthwhile to get up really, really early to start work right after sunrise. Just before sunset can be a good time too, but not as good as often as early morning. If the air isn't perfect, don't force it. Try a different location, a higher altitude, or just give up and do some loops and rolls instead. Either way you win.

Kevin Horton's RV-8 fuselage, which has recently come out of the jig.
Kevin Horton photo

"You should be able to fly within plus or minus one mph with practice, in the right conditions."

General Tips

You have to have very good airspeed control. You should be able to fly within plus or minus one mph with practice, in the right conditions. Get the airspeed nailed before the planned start altitude, and use small pitch attitude corrections to control the airspeed. If you need to use big pitch attitude changes the run is no good. Throw it away and start over.

The wind will be changing as you climb, even on the best days. If you are climbing into or with the wind, the wind speed changes will cause airspeed changes, and you will have to raise or lower the nose to get back on the correct speed. This will affect the rate of climb, and you will have bad data. You want the wind at about 90 degrees to your heading, so the wind speed changes don't have as much affect on the airspeed. Also, do two runs at headings 180 degrees apart, and average the rates of climb for the two runs. A wind change with altitude that gives a speed increase on one run will give a speed decrease on the next run, and the average

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Inside...

...Climb Testing

will be pretty good. You need reasonably good heading control to make the most of this technique.

The amount of sideslip will also affect the drag, so make sure the ball is in the same place on all the runs.

If you are leaning during the climb, use a consistent technique.

If the local terrain has big hills, you need light winds, or you can get small waves being formed, giving very smooth, but rising and falling, air. If the airspeed keeps changing in level flight that is a bad sign.

Take several sets of data at each condition, preferably on different days. If you have enough data sets, you will be able to pick out the ones with strange results (either too high a rate of climb, or two low), and throw them out.

"If we timed how long it took to do the whole climb, we would see that the time was less than it was for cases 1 & 2, and we would calculate a higher average rate of climb, all because of this wind shear."

You need to be very, very patient and meticulous to get good performance data.

Wind Effects

Aircraft in flight have both potential and kinetic energy. Potential energy is the energy due to height and kinetic energy is the energy due to speed. You can trade those types of energy against each other by raising or lowering the nose. In level cruise, you can pull back on the stick and go into a steep zoom climb. Your potential energy (height) increases and your kinetic energy (speed) decreases. You can do the reverse with a steep dive.

In a climb at constant airspeed, we are trying to increase the potential energy. The rate of climb is determined by how quickly we can increase the potential energy, which is governed by how much horsepower we are using, how efficiently the prop uses the horsepower, the drag of the aircraft, the aircraft weight, etc. The kinetic energy stays the same (ignoring the fact that the difference between IAS and TAS changes as we climb–this will have the same effect on all the cases we are examining, so we can ignore it for to simplify this discussion).

Now, let's picture a few different cases so we can examine the effect of wind.

1. In an ideal world, with absolutely still air (no wind), we could do a dozen climb tests at the same conditions, and get exactly the same results. Another way to look at it is to look at the change in kinetic energy during a climb. If we climb at a constant airspeed in still air, we have the same kinetic energy at the top of climb as we had at the bottom, but our potential energy is higher.

2. Now let's say that we have 50 kt of wind at all altitudes. The aircraft doesn't know the wind is there, and we get exactly the same climb rate as case 1. Once again, we have the same kinetic energy at the top as we had at the bottom.

3. Now let's look at a situation with calm air at the start of the climb, and a 50 kt wind shear in the middle of the climb. Our climb rate at the start of the climb is exactly the same as cases 1 & 2. But when we hit this sudden wind shear, we instantly gain 50 kt of airspeed. We pull back on the stick to get back to our target climb speed, and that gives us a zoom climb for a moment, with a higher than normal rate of climb. Once we get back on our target airspeed we lower the nose, and have the same rate of climb we had before. But, if we timed how long it took to do the whole climb, we would see that the time was less than it was for cases 1 & 2, and we would calculate a higher average rate of climb, all because of this wind shear. If we look at the kinetic energy, we see that we have 50 kt less ground speed at the top of climb as we had at the bottom, so we have less kinetic energy. This energy didn't simply disappear, it got converted to potential energy when we zoomed to get rid of that extra 50 kt of airspeed.

4. Now, let's picture instead that we have five 10-kt wind shears during this climb. Our airspeed will suddenly increase 10 kt and we will have to raise the nose to get back on speed. This will happen five times, and our calculated rate of climb will be higher than it would be for cases 1 & 2. The ground speed at the top of climb is 50 kt less than it was at the bottom. Once again, we have less kinetic energy at the top than at the bottom, so we must have changed that energy into potential energy during those five small zooms.

5. Now, let's say we have fifty 1-kt wind shears. We will still be getting a higher calculated rate of climb, but we won't be able to detect these wind shears from the cockpit. The ground speed at the top of climb is 50 kt less than it was at the bottom. We have less kinetic energy at the top than at the bottom, so we must have changed that energy into potential energy during the climb.

Bottomline - changing headwind component will affect the apparent rate of climb. This is a different problem than the classical argument on downwind turns, because a constant altitude turn all happens in the same air mass, moving at the same speed. In a climb we see a continually changing wind speed.

Keeping Your Oil Cool

Eustace Bowhay, Blind Bay, BC
ebowhay@jetstream.net

The engine oil temperature on the Lycomings we are using is controlled by the thermostatic valve. This valve threads into the oil filter adapter; it looks like a heavy duty coil spring with a ball on the end. (Not a good description.) On the top of the valve it should have the temperature setting stamped into it. This is usually 85C, which converts to around 185F.

From what I have been told, on a cold start oil pressures within the engine and cooler can be as high as 300 PSI. This is not indicated on the oil pressure gauge due to where the reading is being taken from. As the engine warms up the spring in the vernatherm valve begins to expand, closing of the bypass and forcing more oil through the cooler to maintain the 185 F setting. I have found that this setting can vary five degrees or so either way.

If the oil temperature goes above say 190 F it is telling us that we have reached the limit of the cooler's ability to cool the oil, so cooler size and location becomes critical.

The approach I took to it was based on past experience. As there was no standard installation for the RV6 with an 0360 that I was aware of I used some guide lines that I would be comfortable with, safety and reliably being the priority.

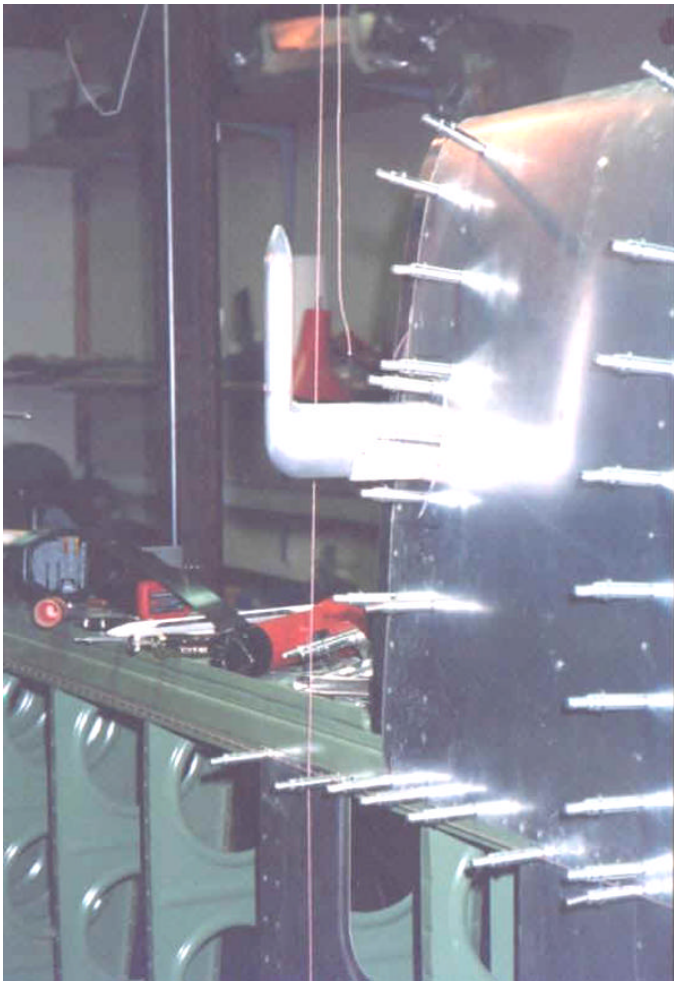
I chose to use the Stewart Warner model 8432 because it is one of the most proven coolers, with years of use, and I had seen it used on other certified installations and have been told it will pressure test up to 600 PSI. The dimensions of the basic cooler are 3 1/2 inches thick, 5 1/2 x 8. With the two 90-degree fittings in the front it becomes 6 3/4 front to back. It is a 9-row cooler.

I installed it under the left front engine baffle with a 4 x 5 3/4 opening in the baffle, with the inlet and outlet fittings facing forward. There is ample room for it there. I didn't want to cut a hole in the back baffle and have the scat tube in the rear as associated with a firewall mounted installation and possible loss of cylinder cooling efficiency. On the other hand I wasn't sure what my installation would do to the cooling on #2 cylinder. I ran the cooler lines between the cylinders and the intake pipes to the accessory case.

The end result was a pleasant surprise. I use an "Insight Gem" graphic display for engine monitoring and my O-360 is fuel injected. I have total control over my oil temps. Using 75% power for climb and 115-120 indicated the oil temp never exceeds 200, even at take-off temps as high as 95 F. By the time it reaches 195 to 200 you are in cool enough air and the power has dropped so that it returns to the thermo valve setting. In level flight at 65% it will maintain the basic setting flying in OAT as high as 100.

Mounting in this location has no effect on the cooling of # 2 cylinder, all four are basically the same.

"If the oil temperature goes above say 190 F it is telling us that we have reached the limit of the cooler's ability to cool the oil, so cooler size and location becomes critical."



Jim Jewell wanted a heated pitot tube, but didn't like Van's price for the bracket, so he made his own. You can get the plans at:
http://mnellis.jnet.net/rv-6_page/JimJewellIdeas.htm

RV-6/9 Luggage Compartment

This ski rack installation is a second luggage compartment that is completely sealed off from the rest of the fuselage. Many builders have modified their aircraft to carry skis using a door in the rear bulkhead and a sling, further back. Easy to do and adds next to no weight. I elected to go for the security of a sealed off area. At first I had a hard time justifying the weight penalty of my addition but soon I realised how many different items I can now carry with ease. Golf bags, snowboards, water skis, fishing rods, rifles, camping gear... The weight penalty of the whole installation is about 3 lbs. I don't consider that very much. My aircraft can handle quite a bit of cargo weight back there with my plans to buy a constant speed prop. I didn't do the math for a wood prop and a light panel aircraft so I don't know if they can try this. It is a must to work out the weight and balance before thinking about a mod like this.

Photo 1 Here sits my fuselage in close harmony with my painted wings. The ski rack is a sealed luggage compartment that spans three bays from the rear luggage bulkhead rearward. In this photo the rear two bays are installed. The front section sits on top of the skeleton. Each section is made of .020 2024 sheet with three .025 stiffners on each side of each panel.

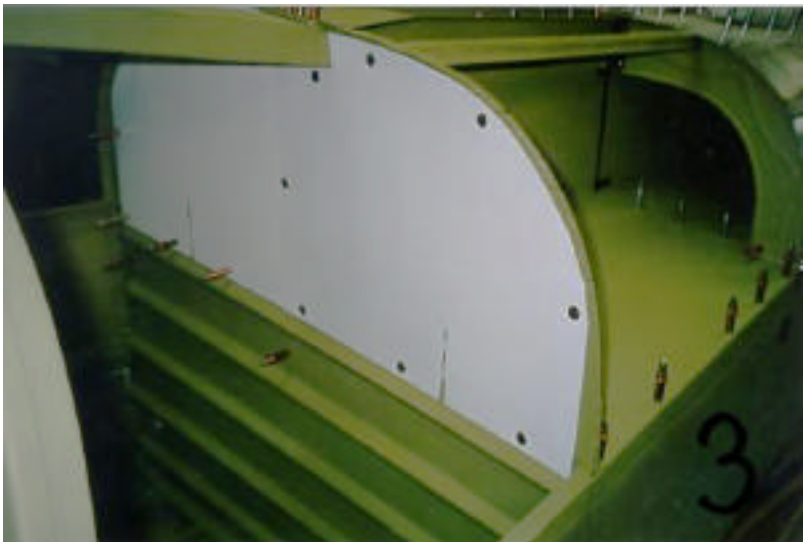


Photo 2 This is the front section with the passage into the middle section visible. This is the area that will limit the size of the golf bags. I figure two of those mid size bags will fit but only one big one. The front section is quite wide. The vertical pillar is beefed up with some .063 3/4" angle, as is the front bottom edge of the new baggage compartment. They are tied together with a hunk of .125 1.5" angle with lightening holes. The top edge of the side wall has a 90-degree edge which ties it into the existing rib up there. The rear edge of the front compartment sits on a piece of .063 3/4" angle spanning the whole fuselage tying the bulkhead sides

Norman Hunger, Delta, BC

together.

Photo 3 Rear luggage compartment bulkhead. The large lower piece has had the bend cut off the bottom and a new flange bent on that lowers the whole thing one inch. This is to get a good flat spot at the top edge. The floor of the new compartment is the height of the longerons so the lower bulhead had to go down a bit. It will be fastened with #8 screws as will the top right. The left upper piece is the door and is currently fastened with Southco fastners from ACS.

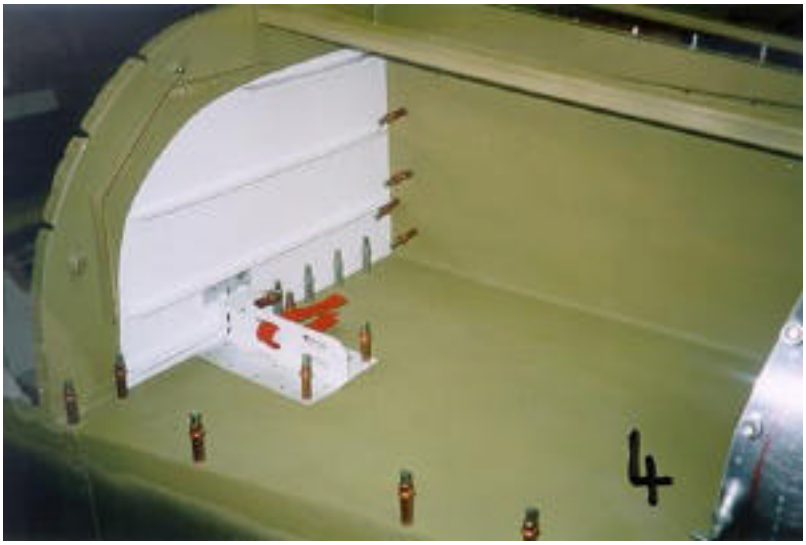
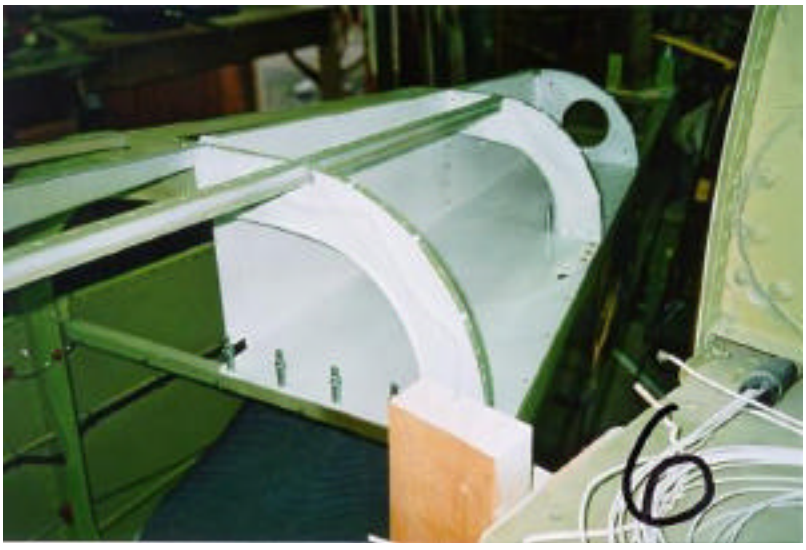


Photo 4 Shows the first compartment with the door closed. There is a hardpoint in the middle that will allow small ratchet straps (one cut away shown in red) to hold cargo. It is made from heavy angle and sits on two doublers. Hard to see is the small nylon platform at the front that holds the seat belt cable two inches above the longerons. It travels inside the compartment to mount as per the palns. The front end is one inch above stock to line up with my shoulders better.

Photo 5 The backs of both upper panels. Made from .025 with .025 stiffners. Everything is countersunk for a flat outside look.

Photo 6 These are the back two sections installed without the front section. The whole interior of the compartment is painted white. The skins get their insides painted off the airplane before riveting. The stock seat belt cable mount can be seen in the middle compartment along the edge. The floor has a hole reamed in to allow the clevis to sit natural. the rear round hole will get a pre-painted cover put on from the rear. The top edges of both sections are joined to the rear skin with a new line of rivets.



Project Report: RV-6

Barry Tunzelmann, Canoe, BC

The past months have seen some real progress in my -6 fuselage. It is now starting to look like an airplane, but is still a long way from rubber leaving the pavement. Career and house renovations have taken their toll as well.

Basically, I have adhered strictly to the Van's plans and have rejected any desire to deviate and try to implement "improvements," which so many others have before me. I take note of a recent article from Terri Jantzi when he stated that the fuselage skin stiffeners he had installed have now shown cracking at the ends of the stiffeners because he did not attach the stiffener brackets to the bulkheads. Another proponent of adhering to Van's plans is Eustace Bowhay. His achievements and experiences speak for themselves in matters like this.

Once the fuselage was turned upright, I noticed an ever so slight twist. So I sawed off the legs of the jig (I can 'cause it's mine) and placed the fuselage close to the floor for work height convenience. The jig allowed me to level the fuselage and cross brace at the tail end from the top of the rear fin attachment area (Bulkhead F612) down to each side of the jig. To hold the front end I placed the wood wing spar simulators in place, bolted them in tight and braced directly down to the main fuselage supports. This has held the fuselage perfectly level for the top work and the placement of the skins. I then installed a temporary plywood floor to allow someone to lie down inside the fuselage without having a bulkhead dig in to you and also to protect the bulkheads and floor from damage during the building process.

I found the rollbar a very time consuming project for what it seemed to be. Sometimes a simple job is difficult and vice versa. I did remember to lower the F632A Rollbar to bulkhead support in order to be able to remove the bugs that seem to accumulate there after a short period of flying. The level called for in the plans does not allow a cloth to be pulled through the gap. The plans call for a .032" shim between the F674 skin and the F632B angle. I increased this to 3/16". The rudder cables are now installed as

More on page 7...

Night and the Cadillac of RVs

Anonymous

Recently had occasion to go over to the jet centre where chicken wings and beer were the feature of the night, along with Karioke.

The joint was full of aviation trades, pilots, babes, and singers. But over by the windows, which front right on the tarmac, a great view could be had of the prairie winter sun sinking behind the hangars. Cold out there...a red band over the hangars and frost on the wings of the resident airplanes...

But here comes a set of flashing wing-tip strobes and all else I could see was the point of red and green on the tips as points of jewelled light between the flashes. Nice silver disc of a prop arc and the captain blasts the tail around and she stops right here, just in front. I cannot hear the singer or the music, nor put the chicken wing to mouth because I am transfixed by the object of my affection just outside in the freezing cold.

An RV, no less !

This little dart that muscles its way between the Citations and Challengers of big corporate money whose plush interiors are said to cost more than my house, has arrived and claimed a place of distinction. She has a romance and charisma about her that tells you that she symbolizes the individuality and rebel spirit of sport performance among crass business tools.

What is an RV doing here, at night, among the big guys at the jet center? Flew in to overnight and fuel before the next leg tomorrow when the GPS appears to be clocking in metric and controllers ask again, "what kind of ship are you?" Off across the winter plains and snow drifts that blot out the easy landmarks and mile after mile sees the RV closer to the land of Arctic wolves and frozen oil patches. Where he was bound, I was never to discover. Just out there...

Soon after though, some days later, I see in a hangar heretofore always closed, an RV which, with its racehorse stance and beautiful coat, begs a closer look. What a sight! The closer you get, the more you see of wonder. A panel which is almost intimidating in its shear complexity, array, and of course, cost. Fighter grips on both sticks, buttons and switches everywhere, and the most fantastic leather I have seen in any airplane. A big fat prop, chrome engine bay, throttle body, new engine—shiny pipes, a canopy that looks like a fighter and rolls like silk, and at every backward glance, a portrait of color and paint which was laid on without a single bug or nib of dust and just shines and shines.

Man oh man! These RVs are indeed thoroughbreds and they do like to run. Just standing on the ground, they look like a rocket which, when you strap one on, is going to take you on the ride of your life.

Guess now I can look back at the guy sitting by the window of the beer and chicken joint, see past the frozen crimson hills as night settles in, and see perhaps myself on the other side of the glass as I roll in with my little fighter, strobes and taxi lights playing on the silver disc of my prop and inspiring someone within to get up, pay up, go home, and start-in working at metal—that magic carpet made of metal...

Imagine what that pilot sees from his perch in the warm enclosure of the RV. A metropolis below which spreads for miles around the compass rose with dotted lights that appear as silver points of mercury dipped by a pen and pointed here and there in the million dots placed on a black velvet portrait. A river with no lights at all winds through the city like a black ribbon dropped casually across the picture, weaving a path of dark among the blaze of light. The airport itself is beautiful from the air as the runway, with two long parallel strings of pearls calls you on for almost 2 miles past the white, red and green of the threshold and from thence to the subtle blue of the taxi way as you head in to the buildings bathed in yellow window light and toward the red and white wands of the man who tells you to park.

There are more grand sides to flying than we think of when bent over the drawings and dreaming of hamburger heavens. Try formation for a start...

...RV-6 Project

I am trying to get everything that belongs inside the fuselage (wiring, rudder cables, seat belt anchors and elevator controls) to avoid having to get in after I remove the temporary floor that I have installed. I have used my 3 year old ProSeal to glue the rudder cable bushings in to the bulkheads. At time of writing this update I have to rivet the F674 skin on and will start on the Baggage compartment bulkhead cover and floor.

I keep a log book on progress and so far have 930 hours into my project spread over 5 years. I am trying to get the next 400 hours in less than 12 months. Hopefully I can make real progress and at least have the aircraft on static display at the Salmon Arm Air Affair next year.

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Mission

To provide information and entertainment for members of Van's Air Force—Western Canada Wing, builders and flyers of kits made by Van's Aircraft.

Membership

Membership is CDN$10.00, or US$7.50 per year, which includes four issues of WCRVator. U.S. members are welcome. Mail membership dues to the address above.

Submissions

We encourage submissions from any source, without compensation but with thanks. You can submit by hard copy, disk, or email. Mail submissions to the address above, or email them to

editor@vansairforce.org

Data Formats

Disks	DOS (Windows)and Macintosh—please use ASCII (text only) format
Image Files	GIF, TIFF, JPEG, or PICT
Email Encoding	Please use ASCII. We do not support HTML encoding. We also do not support any proprietary encoding scheme, such as CC:Mail, Word, or RTF. We will not extract executables. Please don't use any of those formats.

Disclaimer

Member's Corner

Tedd McHenry, Editor

Lots of New Stuff on the Wing Web Site

Over the past month or so I've added a lot of new material and features to the web site. If you haven't been for a while, you should probably visit it.

Now that I've stopped publishing the RVator (see below), the web site is our primary means of communication. The RVator may have ended, but the Wing is just getting set to take off. We have more members than ever, many of them having joined through the web site.

If you subscribed to the the RVator, you are a Western Canada Wing member, and your membership survives the newsletter. There's no longer any fee to belong to the wing, but it'll be a lot easier for you to stay in touch if you have email. If you haven't been getting emails from me about the Wing, it's because I don't have your email address. Send me your address, or visit the web site (www.vansairforce.org) and click on the button that says, "Join!"

Last RVator

This will probably be the last Western Canada RVator, at least for a while. I haven't managed to convince anyone to take over yet, and I won't be doing it in the new year. Some of you have paid in advance for 2001. I will reimburse you from the remaining funds.

Classifieds

RV-6 For Sale
119 HR TTAF; 0-320E2D ON CONDITION; VAL 760 COMM AND BASIC VFR PANEL
$50,000 CANADIAN
PH 250-376-9148; FAX 250-376-3800; E-MAIL mouser@direct.ca

FOR SALE: RV6A KIT
EMPENNAGE (finished); WING KIT with refinished PHLOGISTON SPAR.
$5500.00
Many high quality tools available and misc. items. Call 949-240-4842 or email at hobihawk@aol.com.

MUST SELL—Lost MEDICAL
New RV-4; 25 hrs. TTAF & SMOH, -320-E2D Lycoming (150 hp), day VFR, new King COMM+TRPDR (mode C), 2-place intercom, Colin Walker wood prop
Flies great, ready to paint.
CDN$63,000 or closest offer.
Terry: (902) 762-2568

FOR SALE - RV-6A
Custom Built — Fast — Comfortable — Economical; 90 hrs TTSN April/00; Lycoming A4M 0-360 Bendix fuel injected, electronic CD ignition with automatic advance; too many features to list. See the classifieds section on the Western Canada Wing web page: www.vanairforce.org.
Contact Homer for more detailed information and pictures at shrogers@cablelan.net

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For Sale: RV-4
Locally built, August 89, by George Worden; standard blue on white colour; wheel pants; Lycoming O-320-E2D 150 HP, 800 SMOH; Walker propeller. Avionics: ICOM A20 COMM; Telex intercomm; Terra 250 TXPR (mode C); Garmin 55 GPS; Attitude gyro
Hangared, but has covers for all surfaces.
US$35,000
(604) 534-5804; (604) 534-7758 (fax)
Reason: Retiring. Excellent aircraft.

RV4 project
Pretty well complete up to finishing kit.
Phlogiston spar.
Pat 604-536-8576 cpdayman@home.com