



"After three and a half years, I finished my RV-7 building. It's really a beautiful plane and pleasant to fly."

Roberto Oscar Buonocore, Mar del Plata Argentina



Van's bother Jerry and his wife Judy have traveled extensively in the RV community, but somehow they'd never made it down to Australia and New Zealand. They finally put those pins in the map in 2010.

Jerry reports that RV builders in both countries went out of their way to provide hospitality and flying opportunities.

Top left: Louise Coats has been flying the RV-6 she built for several years and it still looks brand new. She and Jerry went for a fly off the ski-jump strip at her hillside home.

Center left: Jerry logged his 9,999th RV landing flying with Australian Sue Ball.

Lower left: shortly thereafter, he rolled the land-o-meter over to five digits, making his 10,000th in Sam Richards' RV-6.

Top right: Down on the South Island of New Zealand, RV-6 builder John Ludgater provided a flight.

Bottom right: How's this for accomodations. South Island of New Zealand, nice room, comfy bed, RV waiting outside the window. "Judy and I decided we could tolerate about 300 days a year here," Jerry jokes.

SIX INTO TWELVE

One of our fondest hopes has always been to see RVs used as tools to get prospective pilots into the air affordably. To that end, we've always been attracted to the idea of group ownership – it cuts individual costs dramatically, shortens building times and with the right group of people and some well-understood rules, can actually increase the pleasure of owning an RV. Van wrote several articles on the subject when the RV-9 first came out, but for the idea never really took off. Now, with the extremely-easy-to-build RV-12 and the attractions of the Light Sport category, the time may have come. The Teenflight project in Van's shop and a couple of co-operative projects at nearby airports may be just the tip of the berg.

Back East, one group has already been successful. The Daedalus VI have finished and are flying a very attractive RV-12. I asked group member **Chuck Lotz** to give us the story:



WHO WE ARE

We are Daedalus VI, a group of six craftsmen who set out to build a RV-12. We completed and flew our aircraft on 16 March 2010.

HOW DID WE GET HERE?

We are all members of EAA Chapter 857 of Zelienople PA. Our EAA chapter has always wanted a project to do and an airplane to fly. A project with 45 members would have been an ungainly thing and would never have had much chance of success.

Group ownership seemed the only way to continue to fly with enough regularity to maintain proficiency, but group ownership of what? Any Cessna or Piper still needed 100LL, and expensive maintenance. Plus, several of us are getting older and that medical certificate is a pesky thing for just 20 or 30 hours of flying a year.

After each monthly meeting, the idea of group ownership and the new LSA market were often a major discussion points. As the discussion turned serious, a smaller core group of people formed. That group eventually distilled itself down to six.

They are: Bob Maple, Airbus 330 captain and RV-4 builder; Bob McMillin, owner of McMillin Apiaries and RV-9 builder; Bob Winkle, journeyman electrician and

Cessna 210 owner; Elden Lorah, retired USAF navigator and KIS/Pulsar 150 builder; Chuck Lotz, a USAirways A&P I/A mechanic and Citabria owner; and Larry Gaichas, a Duquesne University Latin Professor and flying club Cessna 172 renter.

Again, the LSA seemed the right direction, but which LSA?

Since the group already had experience building a RV-9 and a RV-4, an E-LSA RV-12 made sense. We liked the Rotax engine. The idea that the wings were removable also made sense. We were familiar and very happy with Van's other products, so again the RV-12 made sense.

However, just to be sure, Larry Gaichas, (being the tallest of the group) went to OSH in 2008 with the task of sitting in the 12's cockpit. Bob Maple also went to look over the general construction and to satisfy a few technical questions we had.

After Bob was satisfied and Larry certain that the canopy would not strike him in the head or be claustrophobic, the decision was easy.

We would pool our resources and buy a RV-12 kit. We called all morning on the first day that kits orders where being accepted and came away with kit number 120031.



WHAT DID WE DO TO MAKE OUR GROUP WORK?

First off, we formed a Limited Liability Corporation (LLC) and wrote simple, clear operating procedures as guidelines. This protects each of the members from some liability and from the financial problems of any other member. It would be unfortunate if you lost your airplane do to another member's tax liabilities or financial problems.

We hold quarterly meetings about the LLC and not about the RV-12. We approached it as a business. We opened a business checking account and got a Visa® card. (Try telling your banker you want a Visa® card for building an airplane, a real one, an experimental

Room was made in the back of a hangar at the airport (KPJC). It was decided to work there instead of at anyone's home. We felt it was important that everyone have equal access to the project.

The construction took 16 months and was time consuming, but straight forward and simple. Since this story is about group building, I'll omit the construction sequence other than to say "Read and re-read everything at least twice before you shoot that first rivet!"

IS THE RV-12 A GOOD GROUP PROJECT?

Short answer: yes.

Is working in a group for you? Maybe.

Group ownership allows sharing of talents, sharing of expenses and fellowship. Group ownership also means compromises, e.g., not always having the plane when you want it, not keeping it as clean as you like, and not getting the exact paint job you always wanted.

Being in a good group is every bit as demanding as being in a good marriage.

When you work in a group, it is important that you use each person's talents. Don't just use that person, but have them share their knowledge, let them give a ten minute lecture or demo on the subjects they know. One of the reasons for the project is to learn. Each person in our group is good at particular disciplines. Each person becomes a teacher; the others the students.



Above: early in the project, the tailcone goes together. Below: many hands make light work, especially on the thousands of blind rivets used in the RV-12 wing.

kit airplane at that, and that your entire collateral is that very airplane.)

We set aside specific days to work, and they really were work days. It is important that you work. We wanted to finish the project in a timely manner, so we greatly discouraged the idea of endlessly drinking coffee and gossiping. If you wanted to gossip and drink coffee, then that would have to be another day. This was very hard to do, but still very important.

We designated one person as an airframe person, one as an avionics person and one as a powerplant person. We also designated just one person as our

Van's contact person to stop duplication of efforts and extra phone calls/e-mails. (An approach much appreciated on our end... ed.)

One person became the Revision/Service Bulletins master; all revisions were kept on a memory chip (along with the POH and MM) and the drawings duly updated and annotated by that person only.

Quality assurance was handled by only two people: Bob Maple and Chuck Lotz. Being frontline airline employees, they have a good understanding of quality assurance programs, resource management, human factors, and the correct way to do things. They became the 'go to' guys; everything had to be OK'd by them. When the opportunity arose, we sent Bob Maple to Lockwood Aviation for the one week Rotax school.



Above: Two thirds of the team moves the fuselage out into the sun.



Left: the attractive blue and gold sunburst required a lot of careful masking. Another benefit of group building — laying out the pattern is much easier with two or more people.

WHERE DID WE GET THE NAME?

Oh! I never did answer that question Daedalus was the older (and wiser) of the two early wax-wing aviators who escaped from the Labyrinth of Crete. He has come to symbolize the classic builder, a skilled mature craftsman, while his son Icarus symbolizes the romantic artist, with an impetuous, rebellious nature that is ultimately self-destructive. As six dedicated, mature

craftsman, it is no wonder that we have identified with such a cunning and accomplished craftsman as Daedalus. In deference to our Latin Professor, we decided to spell the six as VI.

WAS THE PROJECT A SUCCESS?

Yes. We are half way through the test flight phase, with almost no problems or surprises.

As a group we still work together and get along. We believe that our approach, treating the group as a company and grouping tasks together according to each person's talents, has worked. Each person took a role as leader. Each person had an area for which they were responsible. Do not expect one person to do it all. As a group, be a group.

WHAT DID WE LEARN?

That when you work together and rely on each other's skills, you can accomplish a lot.

We learned that insurance is difficult to obtain when you exceed four people because, in the eyes of an insurance company, you are a flying club or an FBO. You should double-check with the insurance companies early in your decision making. Bob Mackey of Falcon Insurance is very helpful and—we think—has written us a very good policy. He even wants our input on the RV-12's flying characteristics so that they may be better informed.

HOW LONG DO RV-12 WINGS REALLY TAKE?

KEN SCOTT

Struggling to recover from Valentine's Day, I received a second shock this February. My RV-12 Wing Kit was ready! Well, I was ready for it...I'd been waiting since October.

Of course, once I got it home, I didn't touch it for two and half weeks, while I finished up the engine and cowl installation. When I got the cowl and the cooling duct joined and ready to fill and sand, I decided I'd rather do that outdoors and keep the dust out of my shop. Unfortunately, it was slanting icy rain out of the southwest – blowing hard enough that'd I'd have to weigh the cowl down to keep it from going airborne without the airplane. Sanding fiberglass is grim enough work. There's no need to add to the misery by doing it in a cold, blowing rain.

So I pushed the fuselage over into the corner and pulled the workbench away from the wall. I have never kept track of my time on the RV-12 project – I mean, why log fun? – but the wings had me curious. Here was a discrete project with a definite beginning and end. I could keep track of my time and get some idea if our building estimates were realistic. One builder reported he'd spent 175 hours building his wings, but Mitch Lock, who built one of the first wing kits shipped, said sixty-five, including the flaperons, but without lights. I figured, as an exceedingly average builder, I'd fall somewhere in between. Applying the MKABF (Mitch/Ken Airplane Building Factor) at its currently accepted average middle-of-the-lunar-cycle value of 1.36, I was able to mathematically predict a wing kit completion time of 88.4 hours.

Both main wing panels went very smoothly, and I had them completed and in the rack in a total of 70 hours. This included 14 hours installing the lighting kit – more than I would have guessed. The Violinist helped me flip the wings over on the bench, and I had one evening's help from 13 year old aviation enthusiast Alex Bridgeman, but aside from that, nobody's hand but mine touched the wings. (Come to think of it, other than a neighbor's help joining the tailcone to the fuselage, a friend's assistance on the fiberglass around the canopy, and the exceptions noted above, all the work on the project has been solo. I've tried to interest Fo'Paw, but his sole mission in life is to get somebody -- anybody-- to throwdaball, throwdaball, throw...the...ball!



If RV-12 wings only take 85 hours solo, imagine how fast they'd go together with a full crew like this bunch from Teenflight...

Not much help from the poodle department, I'm afraid.)

The flaperons surprised me – I found them more difficult than the main wing panels. There's a lot of parts that look alike, but aren't quite, so pay attention. It's perfectly possible to put the inboard aft skin from one flaperon on the other, as long as you ignore the note about indicator holes on the drawing...and install it upside down to boot. Somewhere, Art Chard's cousin is laughing.

There's also quite a bit of clecoing, unclecoing, etc. to get a few holes match-drilled. One particular challenge was match-drilling the very hard stainless steel tubes that fit in the leading edge and serve as mass balances. I had my best luck using the skin as a template, using the drill to

just mark the stainless tube, then drilling the tube in a V-jig on my drill press. This is one of the very few times I've used a drill press on the RV-12. Making the rod-end bearing receivers and the angles at the inboard end with a file and a hacksaw burned some more time. I really must acquire one of those small 3-wheel belt sanders.

In the end, the first flaperon took about 14 hours, the second about nine, because I'd made the fittings for the second while I was at it for the first and I'd learned a few things along the way. Adding that 27 hours to the 70 for the wing panels gives a total of 97. Subtract out 14 hours for the light kit Mitch did not include in his hour count and you get: 83. (In retrospect, that might be 75 actually building and eight peeling blue plastic off the parts. Or maybe it was the other way around...)

This handily beats the predicted 88.4 and lowers the MKABF to a mere 1.27.

I'm gainin' on him!

AERO 2010

**KEN KRUEGER ATTENDS THE BIG SHOW
IN FRIEDRICHSHAFEN, GERMANY**

The year 2010 marks the first time that Van's Aircraft had a display at a trade show on the continent of Europe.

AERO is the name of the general aviation trade show that, as of 2010, occurs annually in the town of Friedrichshafen in southern Germany. Situated on the northern shore of the Bodensee (or Lake Constance) Friedrichshafen is located in the heart of Europe with Switzerland visible across the lake. Austria and Italy are not far and the town is easily reached from practically anywhere in Europe. The town of Friedrichshafen has a deep and historical aeronautical flavor to it -- it is the home of the Zeppelin Airship and Dornier Flugzeugwerke. As a bonus, the beautiful trade show venue just happens to be adjacent to the airport. Small wonder that AERO is the largest general aviation trade show in Europe, and it makes sense that Van's would want to reach out to those attending this event.

In the last decade, international sales have grown to represent a sizeable fraction of Van's total sales so exhibiting at AERO afforded us the opportunity to gain a sense for the potential size of the European market. Van visited AERO in 2003 (returning with lots of photos of graceful sailplanes...imagine that!) and I visited AERO last year. I came back with the thought that Van's Aircraft might not be reaching as many potential customers as we could/would like to.

For 2010, Stefan Schroeter generously offered to make the short flight from his home near Stuttgart to Friedrichshafen to display his beautiful RV-7A during the show. Besides Stefan and myself, RV-7A builder Klaus-Peter Morhard, RV-12 builder Volker Koenig, and Van's enthusiast Gerald Graf also volunteered to help-out at the display. The help of these men turned out to be extremely valuable as each were knowledgeable and enthusiastic salespeople. More importantly they spoke German, the "heart-language" of most AERO visitors. (Besides German and English, Klaus-Peter also speaks French...what an eye-opening experience for me as I could see doors open for Klaus-Peter as he switched easily between languages.) The organizers placed the Van's Aircraft display in Hall B3, the EAA hall (good!) but we were placed at the back of the hall (not so good). Despite the less-than-ideal situation, the five of us working the display were kept very busy talking to potential new customers as well as many of our current customers.

The people we talked to fell into two basic categories: those who had never heard of an RV before and those who had. The response of those who had never heard of an RV before was typically, "This is a beautiful



aircraft. What is it and how can I get one?" The response of those who were already aware of Van's Aircraft was typically, "It's great that Van's is exhibiting here at AERO."

It turns out the world's most popular line of home-built aircraft is simply not as well known and popular in Europe as in North America. The reasons for this are several...RV's are not widely marketed in Europe, particularly on the continent. The activity of homebuilding aircraft is simply not as common in Europe as it is here in the USA. (This seems to be a fall-out of our different cultures but I can't say exactly why -- many of the very active German glider clubs have built their own sailplanes.) EAA hopes to change this and is actively working to establish a network of EAA chapters in Europe.

During my time in Germany I was able to do some flying - one local sightseeing flight and a long cross-country flight. I came away from these flights with a new appreciation for the relative affordability and easy access to flying that we enjoy here in the USA. Almost every aspect of flying is more difficult in Germany. Klaus-Peter summed it up well when he said, "America is a dreamland for flying."

Shows like AERO constantly remind us that advances in communications and transportation technology have opened up more of the world economy to business -- including our business. With Europe's increasing influence in the world economy, we at Van's Aircraft want to make our products better known to that population. Whether or not Van's Aircraft will have a display at AERO 2011 remains uncertain -- but I sure hope we do.

Every time I travel, I marvel that the human desire to fly truly does cross oceans, borders, and cultures. Van's Aircraft wants RVs to be the aircraft of choice the world over.

HOW DO I REGISTER AND CERTIFICATE AN E-LSA?

MEL ASBERRY

Registering and certifying the RV-12 as an E-LSA is a different paper chase than the traditional Experimental Amateur Built RV. I asked Mel Asberry, who has inspected scores of RVs of all types, for a step-by-step explanation of the process:

Question: OK, I have my RV-12 almost finished. Paperwork is confusing to me, especially when it involves the FAA. What do I need to do to get the aircraft registered and certificated?

Answer: First and foremost, you will need to go through everything you got from the manufacturer, in this case Van's Aircraft.

Make sure that you have the items listed in FAR part 21.193, especially subpart (e):

1. Evidence that there is a certificated S-LSA upon which your aircraft is based
2. Operational instructions for your aircraft.
3. Maintenance and inspection procedures.
4. Statement of compliance for the kit. This is form 8130-15 and must have an original signature from the kit manufacturer.
5. The flight training supplement.

(The Powerplant kit order automatically triggers the generation of these documents, and they will arrive by mail a couple weeks after the powerplant kit ships.)

Once you are sure you have all these things, you are ready to register the aircraft with the FAA aircraft registry. Go to www.faa.gov webpage and follow the prompts to "New Light-Sport Aircraft." Here you will find a list of what you must provide. They are as follows:

1. Light-Sport Aircraft Manufacturer's Affidavit AC Form 8050-88A or its equivalent, completed by the light-sport aircraft manufacturer, unless previously submitted to the registry by the manufacturer.
2. Evidence of ownership from the manufacturer for the aircraft. This would be your 8050-2, "kit" bill of sale.
3. An aircraft Registration Application, AC Form 8050-1. This is the 3-part "carbon copy" form. Be sure that you type or print your name below your signature. Many people miss this all-important step.
4. If you already have a registration number reserved, include a cover letter stating that you want that reserved number applied to this aircraft.
5. And, most important, don't forget to include the \$5.00 registration fee.

Send all this to the FAA aircraft registry in Okla-

homa City. Complete instructions are included on the cover sheet of the registration form.

Typically if everything is in order you will receive your registration in about 2 weeks. Once the aircraft is properly registered, it's time to find an inspector. You will need to call your local FSDO or MIDO. They will most likely refer you to a DAR. You may also go to www.faa.gov/other_visit/aviation_industry/designees_delegations/designee_types/media/DARDirectory.pdf and search for a DAR on your own. You will be searching for a DAR who holds function code 47. Even if you go this route, you will still need to contact the FAA office as they need to be in the loop.

Once you have contacted your inspector of choice, he or she will send you a packet of paperwork to fill out. You may have already obtained a packet from the FAA or EAA, but many times the inspector will have some individual preferences. This packet will contain the **program letter** (FAA inspector Keith Ruchinich recommended downloading the EAA program letter and using that. "Frankly, it's better than ours," he said.) that outlines the purpose of the experiment. It will list all the information about the aircraft that the inspector needs to complete the certification process including your requested flight test area. Also included will be an **airworthiness application (form 8130-6)**. You will need to complete, sign, and return these papers to the inspector.

He will also request a copy of your weight & balance information and pictures or a 3-view drawing of the completed aircraft. When the inspector has received the packet back, he will review the information and set up an appointment for the actual inspection.

Hey, we're getting close! Each inspector will have preferences as to how much of the aircraft should be opened up for the inspection. Personally, I request that the aircraft be opened up as much as practical so that I can inspect control linkages and fuel connections. Some inspectors may want to see the engine run. All of this will be discussed at the time the inspection is set up.

Once the inspector has completed the inspection, he will give you a list of discrepancies that need to be addressed. If they are simple, and they usually are, he will probably allow you to correct them on the spot. Once all the discrepancies have been cleared, he will issue the Special Airworthiness Certificate and Operating Limitations that must be carried aboard the aircraft at all times. He will also point out that the Operating Limitations are a part of the Special Airworthiness Certificate and that one is no good without the other.

Congratulations! You now have an airplane instead of a project. Well, we all know that it will always be a project, but at least, now it's an airplane too!

GROWING PAINS

VAN

The reason we flight-test a new airplane is to find and correct problems. Of course, we always hope that there won't be any, but secretly, we must know better. Certainly I should have known better when my RV-12 N912DV was signed off. A small parade of problems and improvements kept me busy for several weeks after the first flight.

CARB/MIXTURE PROBLEM

Almost from the beginning of the flight testing of my RV-12, I experienced an occasional rough running/partial power loss condition with my Rotax 912 ULS engine. After running for anywhere from 3-10 minutes it would lose several hundred rpm and run rough. Because it was an occasional condition, I had trouble tracking down the cause. Usually, I could get it to run smooth again by reducing throttle, but sometimes only at the slow cruise condition. On the next engine start-take off, all would be fine again, for a while. I could never duplicate the malfunction on the ground. Bottom line is that I couldn't come to any definite conclusion---any corrective direction to head.

I finally came upon what seemed to have been a well-kept secret; a local, certified Rotax expert. With his help we were able to determine that the problem was lean operation of one of the carbs. His diagnostic method is one that had eluded me --apply the choke. Choke? None of the engines I had flown behind for 10,000+ hours had chokes. Yes, I have routinely experimented with mixture control to assess rich/lean engine operation. However, the Rotax has no mixture control, relying instead on altitude compensating carbs. It simply hadn't occurred to me to experiment with the choke during high power operation. On the Rotax, the choke is used for cold starting, and it works well for that purpose. I am also familiar with chokes on very old cars and lawn mowers. Traditional chokes function as their name implies; their application blocks nearly all airflow so that a very rich fuel mixture results. These engines could not develop much power when choked so you didn't use choke at high throttle settings. Well, the Bing carb on the Rotax use a different principle for the choke. It adds a little extra fuel without restricting airflow with a butterfly valve. Thus, it is OK to experiment with choke application at high power settings -- adding the extra fuel effectively richens the mixture.

When I applied choke during low cruise-power flight, it added just enough fuel flow to partially overcome the effect of the blockage in the main jet. Eureka! This was our clue that the roughness was the result of intermittent lean operation rather than something else such as perhaps an ignition anomaly. Live and learn!

We removed the carbs and he took them to his shop for further inspection and repair. The problem was a



speck of foreign matter in the jet of one carb. This speck was shaped more like a flake rather than a sphere. It was wedged in place in a manner that apparently made it function somewhat like a reed valve or miniature carb butterfly valve. It would rotate to partially block fuel flow; or not. Intermittent problems are truly evil!

I have flown behind Lycomings and Continentals for over 10,000 hours and have done my share of trouble shooting induction and ignition problems. The Rotax is a different breed of cat. Yes, it is an internal combustion, spark ignition, reciprocating 4-stroke engine. However, its systems are different. For instance: The Rotax ignition has two pairs of trigger coils on the flywheel. Each coil fires either No. 1 & 2, or No. 3 & 4 cylinders. The twin carbs feed cylinders 1 & 3 and 2 & 4 respectively. Thus, trouble shooting is a bit more complicated when trying to determine whether the problem is ignition or carburation related. It's more difficult to ascertain where the problem is originating.

INVERTED MAGNETOMETER INSTALLATION

Though I tried several times, I couldn't get the directional indicator of the Dynon to indicate accurately. At one point we determined that a wire had been mislocated in a cannon plug. Correcting this didn't help. I was locked into the idea that there must be a wiring problem. Finally I did what should have been done much sooner—I called the Dynon service dept. (I chronically hesitate doing this because the outcome is usually a badly bruised ego). The short story is that through my description of the malady, the service guy felt that we had probably installed the magnetometer upside down. (see what I mean about getting my ego bruised—ouch!) The magnetometer is not any easy component to access or service in the RV-12, but it did prove to be the problem. The only ego-damage mitigation was that my building assistant had done the magnetometer installation. He wasn't alone... other RV-12 builders have made the same mistake.

Lesson learned (again): pay close attention to ALL the instructions/illustrations in the construction manual.

WINTER + TURF RUNWAY = MUD

I have flown from turf for the vast majority of my total hours, and generally love these runways. They are soft and green (in a non-political sense). Some times, when it rains in Western Oregon, they become softer and less green. Mud is the operative word here. I started my aircraft manufacturing career over 50 years ago with the design and manufacturing of wheel fairings, so its only natural that all of my fixed gear aircraft have been so equipped. They do a passable job of blocking mud-to-airframe distribution, in addition to enhancing esthetics and aerodynamics.



My RV-12 took to the skies in October, about the time that the seasonal rains began. Since the factory wheel fairing development was not finished and not of highest priority, I flew with naked wheels and re-learned just how effective wheels fairings are as mud flaps. After a couple months of washing the airplane after each landing, I found some factory-reject wheel fairings in the dusty loft and went to work. Nothing fancy, as this was to be a one-off installation. It still took quite a few hours because of the trial and error vs. computer design installation approach. But I prevailed, they look good, add a bit of speed, and make an immense difference in limiting vertical mud acceleration.

PERFORMANCE MEASUREMENT DIFFICULTIES

I had hoped to perform accurate performance testing early in the test program. Difficulties with the engine carburetor were a major deterrent. The other was winter weather. Contrary to popular belief, it does not rain every day in western Oregon. There are not low clouds every day either. However, winter weather patterns are such that when the skies are clear, or clear enough to fly at 8-12,000', the atmosphere is rarely stable. If there is not a weather front over us, there is either another on the way from the SW, or the next is being held at bay by strong East wind. Either way, there is not only a strong wind (at altitude) which contribute drift factors into speed calculations, but almost always the winds contribute vertical instability to the air mass. Even when the air feels smooth there are often waves

of low frequency that really mess things up. When holding steady power, heading, and altitude while flying through these invisible and smooth waves, airspeed can vary by 5 mph or more. It's very frustrating trying to get good results. Multiple runs on multiple days did average out pretty well, but I never felt certain until I finally found stable air for testing. At last I could answer the question: how fast is my RV-12?

Fast enough! Particularly with wheel fairings installed, published figures are easily achieved. It seems that the vast majority of the 50 or so LSA aircraft out there are listing speeds within a few mph of each other. I get the feeling that because the rules set a speed limit, LSA sellers all claim THAT to be their speed; as if it were an entitlement! We knew at the start of the RV-12 project that there was no guarantee of attaining the maximum allowable speed. There are too many variables. Even with the best of Computational Fluid Dynamics (CFD) computer design programs, it would take a lot more than a few key strokes to arrive at a realistic projection. Really, with a larger cabin (frontal area) than a Cessna 150 and a wing large enough to meet the stall criteria, why should anyone expect that it will be dramatically faster on the same 100 HP? With this realization, we applied our hard-earned knowledge, made compromises where necessary for utilitarian purposes, and accepted the results.

Are we satisfied with these results? Very much so! We achieved the target speed with less than available max. power, and have realized all of the utilitarian feature we sought. Everybody wins.

To Speed Freaks, the following will probably sound like the ultimate heresy. Since any airplane licensed or operated as LSA is top speed limited by regulation, the normal goal of minimum airframe drag can seem counterproductive. But, the accepted rules interpretation is that the speed cannot exceed 120 knots at maximum continuous operating RPM. Thus, if the airframe is clean enough to exceed 120 knots at full throttle, it is acceptable to reduce the prop pitch angle so 120 knots will not be exceeded at the engine's maximum continuous engine RPM (5500 for the Rotax 912ULS). The result is that the fuel consumption rate will be lower than at full throttle, and the take-off and climb RPM and thrust will be improved. All the speed the law allows (at reduced consumption) plus enhanced climb performance. I can live with that. For those who's goal is always to drive faster than posted speed limits and to "hot rod" more speed from their airplanes: sorry.

Many have never accepted the reasoning behind the top speed limit for LSAs. Without debating that issue again, we accept the rules and are happy with our end package in the RV-12. We have not yet had the opportunity to compare the RV-12's speed with other LSA offerings (other than Mitch Lock's description of running away and leaving the AOPA Remos). RVs have always fared well in real world performance comparisons and we are eager to see how the RV-12 will fare when it gets the opportunity.

**NEEDED:
5000
VOLUNTEERS**

VAN

There are over 5000 volunteers contributing to the success of EAA AirVenture at Oshkosh each year. That's what it takes to help make this the premier GA aviation event of the world. Those of us who fly in to display our aircraft, or to "work the booth" as we from Van's do, probably don't appreciate the inner workings of this vast volunteer network. We are busy contributing in our own way. However, I'm sure that most of us are volunteers on the local scene, either through EAA Chapter involvement or through informal mentoring of fellow builders.



Within EAA, AOPA, etc., there is an increasing awareness on the need and importance of volunteerism and outreach for the future of GA. Despite ongoing efforts of these organizations and the GA industry, private flying continues to struggle. It's a real battle to remain viable, let alone to grow. AOPA president Craig Fuller in a speech at Sun'N'Fun stressed the need for all pilots to "get involved". EAA, AOPA, etc., at least at the national level, cannot by themselves reach out and grow aviation. They can conceive, organize, and promote outreach programs, but the most effective salespeople are the pilots themselves who provide the flights for Young Eagles, and who inspire their non-flying friends to "give it a try".

I recently had the opportunity to attend an EAA Directors/Industry Leaders conference in Oshkosh. EAA was announcing their new 5-year plan and wanted input from industry on the viability of this plan and help from them to assure its successful implementation. I'm sure that you will see more about this in future issues of *Sport Aviation* and internet sources. The bottom line seems to be that while AirVenture is a tremendous event, but it is the appetizer, not the entrée. It only lasts one week, and cannot be expected to sustain GA by itself. The real heart of GA for the remaining 51 weeks of the year is the man-on-the-street, or perhaps more appropriately, the man-at-the-airport or in his home workshop. YOU are GA!

I used this committee opportunity to not only agree with the consensus on the importance of more individual involvement, but to showcase a couple of "grow aviation" examples now underway in my home area. One is the Teenflight RV-12 project which I have previously written about and which was featured in the April issue of *Sport Aviation*. The other is a group of five

members of Chapter 105 who are co-building a RV-12 in the chapter hangar. (See my proposal/challenge in the February 2010 newsletter posted on www.eaa105.org.) Construction started at the beginning of April. The Empennage/Tail Cone kit is finished and they expect to have the wing kit finished well before the end of May. Most of those involved did not have the time and money to get started building an airplane of their own at this time, but collectively they are on track to having a nice new airplane in perhaps 6-9 months. I feel that both of these examples embody concepts that could be emulated and built upon by many others.

I know that there have been other airplanes built by kids, and the BuildAPlane foundation is currently very active in this regard. Other chapters have involved group-build projects. However, the choice of the airplane and organizational structure for the project can greatly affect ultimate success. One of the committee members, Hal Shevers of Sporty's, has initiated a successful on-line Ground School program.

Though they were very enthusiastic, most other committee members were not in a position to offer specific program ideas. I hope that will come with time.

The Young Eagles program is considered a success not only because it introduces a lot of kids to flying, but because it gives pilots another reason to fly more and remain proficient. However, I feel that it has a latent potential to be much more. After their Young Eagles flight, the kids and their parents leave the airport, perhaps never to return. What can be done to keep the kids interested in aviation? What sort of programs and activities can chapters create which could offer continuing involvement for the more enthusiastic kids? What means could be devised to use the Young Eagle flight to inform and inspire their parents to learn to fly or otherwise get involved in aviation? If you have a success-

ful monthly breakfast as we have at Chapt. 105, how can this event be better utilized as a catalyst to get attendees better informed and more involved?

One thing that I was very impressed with was the dedication of the individual members of the EAA's Board of Directors. Typically successful in business and aviation careers, these folks put in a lot of time and effort toward dealing with problems and defining future goals of EAA. They put in a lot of effort on our behalf. I was also impressed with the EAA staffers I met with. They are a knowledgeable and motivated group.

Fun with numbers:

I started off talking about the 5000 volunteers who make AirVenture a success year after year. If we had 5000 volunteer mentors like those now watching over the Teenflight kids, with perhaps 10 mentors per project, that would calculate out to be 500 RV-12s.

Impossible?

All we need is 500 sponsors!

You get the idea. Not all volunteers would be qualified RV-12 mentors, but not all outreach programs would center on RV-12s, or even on airplane building. We need to apply our imagination and innovative spirit to come up with various ways to get people, young or otherwise, excited about and involved in aviation. With EAA's membership of some 150,000, there is no reason for not having far more than 5000 active volunteers in the field working at some aspects of aviation outreach.

Will you be one of them?



Determined to get any stick time he can, Parker Arkey gets a grip on his grandfather's RV. He'll probably have a hundred hours logged by the time he's two years old...

Tom Webber stopped by the shop on March 15 and while he was browsing the gift shop, his wife quietly asked what it would take to arrange a demo ride. "It's his birthday," she confided to Ken Scott. Hey, March 15 is Ken's birthday too...so the birthday boys went flying in the RV-7A.. They both liked it!

THINGS TO KNOW ABOUT THE ROTAX

SCOTT McDANIELS and ED CHESNEY

With the knowledge that comes from a combined operating experience of about 600 hrs spread over 3 different airplanes, and information gleaned from others that have much more experience than us; we present these hints and tips for use by RV-12 builders/flyers. They are in no way intended to replace information or procedures provide in the Rotax documentation. They are instead intended to help clarify, and provide information that has become common knowledge to those who have gained a lot of experience operating the engines.

First off – A couple of useful web sites, useful for accessing maintenance information, service instructions/bulletins, etc.

www.rotax-aircraft-engines.com

www.rotax-owner.com

GENERAL OPERATION

A 912 Rotax in good operating condition does not burn oil! If you need to add much oil to your oil tank between oil changes there are only two possible reasons.

- You have a serious internal problem.
- It is leaking out.

If you have to add much on a regular basis, you should be investigating these two possibilities.

Do not add any oil before burping the engine to verify that the majority of the oil is actually in the oil tank.

The burping process is much easier with warm oil (lower viscosity) than with cold.

The burping process will require far fewer turns of the propeller if you move the propeller (in the normal rotation direction only, never in the reverse direction) to the top of a compression stroke and then stop for approx. 5 seconds. Then turn to the next compression stroke and pause again. Repeat until the air burp is heard in the oil tank. This gives the compressed cyl. air time to leak past the compression rings and pressurize the crankcase. Only after burping the engine can you make a valid check of the oil level in the tank and determine whether you need to add any.

STARTING

The choke control is not really controlling a choke in the traditional sense. It actually controls a starting carburetor circuit within each carburetor (kind of a carb within a carb). It only functions well if the main throttle is fully closed (or very nearly so). It will function as a variable control, not just full-on or full-off.

For engine start you should pull the control fully on but do not lock it in position. Crank the engine and as



soon as it starts, move the control towards off to prevent the engine from exceeding the warm up RPM limit of 2500. Now the choke control can be lock at an interim position for warm-up. The choke control can also be used as a second throttle control during warm up to control engine speed for taxi, etc (but obey the 2500 max. RPM limitation). After running for a couple minutes, the engine will be warm enough to fully turn off the choke and switch to the main throttle for engine speed control.

Better gearbox longevity is attained if the engine is idled at no lower than 1800 RPM during ground operations. It is not practical to set the idle stops for an idle speed this high because it makes landings more difficult, but you can maintain this minimum manually using the throttle.

When operating with 100LL fuel always cruise at engine speeds higher than 5000 RPM (the higher the better) for improved lead scavenging.

When the engine is run exclusively on 100LL watch for valve sticking to begin occurring at about 700 hrs. The engine also needs earlier gearbox inspections and/or maintenance.

Do not attempt engine starts with a low battery. It is a sure way to get a kickback which can cause expensive repairs to the starter motor drive system (The Rotax requires splitting the engine case to do this kind of repair).

Aftermarket soft start units are available for the ignition system (cost approx. \$200). They produce a smoother start and reduce the chance of kickback. The aftermarket module requires a change in starting procedures. During start only switch on the ignition that has the soft start installed. After the engine is running switch on the second ignition.

New engines shipped with electronic ignition modules that have yellow colored labels have soft start technology already built into both modules, and require no special starting procedure.

STOPPING

You will get a smoother engine shut down by doing

the following...

- With the engine idling at 1800 – 1900 RPM
- Briskly pull the throttle to the idle stop
- As the engine speed reduces to about 1500 RPM switch off one of the ignition switches.
- About a second later switch off the second switch.

MAINTENANCE

Spring steel clamps are used on all coolant hoses for a reason. The aluminum coolant pipes on the engine expand and contract between cold and normal operating temperature. If non-expanding clamps (like screw-tightened radiator clamps) are used, the rubber hose gets compressed and starts to leak. Do not change to a different style clamp!

Maintenance intervals are required to be done on hobbs time, not tach. time (Page 05-10-00 Page 3 of Line Maint. Manual)

Do not run the engine for an extended period of time after installation without doing the carb synch procedure using a set of vacuum gauges. **You can not make the throttle cable adjustments accurately without gauges.**

When balancing carburetors and adjusting idle speed, set idle for about 125-150 RPM below what the desired idle speed is. Idle speed will increase approx. this amount when the engine and oil temps change from the typical 135-140 F. that can be attained test running on the ground, to the normal operating temp of 180-190F.

When making throttle cable adjustments to balance the vacuum levels of the carburetors, a rotation of two flats of the anchor nut equals approximately a 0.5 inch change in vacuum.

When filling/adding coolant, run engine for one minute and then recheck the coolant level. Add more coolant as needed and repeat until level does not change.

When doing an oil change, follow the maintenance manual instructions carefully. Burp the engine first. There is no need to warm-up the engine before draining the oil. **Important:** When draining the oil tank, replace the drain plug as soon as the oil stops running as a continuous stream and begins to drip. Allowing the tank to drip for an extended period of time can result in siphoning oil from the oil circuit within the engine which would then require that the entire oil system purge procedure be done.

Rotate the new filter until it just contacts the seal flange, then turn $\frac{3}{4}$ rotation more. Start engine and run for a couple minutes. Shut down, check for leaks and confirm that filter can not be tightened any further.

Dow4 silicone grease is good for use under fastener hardware and on all electrical plug connections to prevent corrosion. It is also a good choice for surface treatment when installing a water pump gasket (helps ease future removal).

Spark plug caps unscrew from the ends of the ignition leads for removal. If you remove one, trim a small amount off of the end of the ignition lead (1/2") and screw the lead back on after an application of silicon grease.

When reinstalling the magnetic plug after inspection, only torque to 100-140 inch pounds to prevent very difficult removal at next inspection. Tie off with safety wire.

One drip per minute is an acceptable leakage rate for coolant from the weep hole in the coolant pump housing.

Use only silicate-free Dex Cool™ type coolant and distilled water mixture in the cooling system.

Loctite 648 works better for sealing water pump coolant pipes but is more difficult to disassemble.

TROUBLESHOOTING

Never operate the ignition system without the spark plug leads connected to grounded plugs to prevent damaging the ignition modules (very expensive - **\$1000**).

When troubleshooting ignition problems, the spark produced at starter cranking speeds is difficult to see. Ignition system needs a crank speed of at least 250 RPM to function

For any ignition problem, first check, clean, and re-tighten all ground connections for the ignition system.

Loss of a single cylinder operation causes about a 400 – 500 RPM drop. Loss of two cylinders causes about an 800 – 900 RPM drop.

When choke is applied at 3500-4000 RPM it leans the mixture. Rough operation at midrange RPM's can be checked by pulling on the choke. If engine performance improves or gets worse there is probably a carburetor problem.

The carburetors are very sensitive to any type of contamination. With any abnormal engine operation such as surging, imbalanced EGT temps, etc. (particularly intermittent performance problems) that are not an obvious ignition problem, disassemble both carburetors, inspect for any foreign matter contamination and blow out all passages. This corrects a large portion of the performance problems.

If a carburetor inspection ever shows a fuel metering needle to have visible wear, replace both the metering needle and the jet insert.

Cylinder head temperature over 350 F will anneal (soften) the heads which will then require replacement. CHTs of about 275 F or higher have high risk of pre-ignition. When trying to determine if a damaging over temp. has occurred on a 912 engine, some signs to look for are....

Oil leaks on rocker covers (heads slightly warped)

Exhaust gas leaks at exhaust system flanges adjacent to heads.

Plastic insulator melted out of the center of the CHT temp sensors.

Rocker pin bosses on the heads miss aligned so that pin removal and reinstallation is difficult.

FLORIDA...AGAIN

GUS FUNNELL

This year, I went to S'nF the easy way, via United to DC, then taking Van's east coast RV-12 demo airplane down to Lakeland from there. Luckily, I'd had a heads-up from my brother, who lives and flies in the DC area, on the requirement to take an online FAA course if you plan to fly within 60 nm of the DCA VOR, so I was fully prepared to brandish my "Certificate of Achievement" in the event of a ramp check. Failing that, I could wave it at the F-16 driver pulling up alongside...

Mitch had arranged clear weather, and even rustled up a tailwind that shortened the trip. We covered 720 nm in 6.5 hobbs hours. With the new wheelpants on, the Dynon consistently showed about 119k TAS at about 5400 rpm at 4500'. There didn't seem to be any reason to go higher – unlike out West, there's no high terrain, and 4500' allowed me to scoot over all the Class Cs along the route.

Joe, Daryl and Jamie made the long haul from Aurora in the RV-10. Rian came down in his personal RV-7A, en route to a Caribbean vacation – the payoff for his prolonged hard work on the RV-12 development. A magneto problem delayed him briefly (or so he says – some suspect he just wanted to linger in the fleshpots of Nebraska). Compensating for his tardiness, Mike Seager and Georgeanna flew down in their RV-7 and arrived a couple of days early to spread Van's transition training gospel among the Floridians. Van breezed in via Southwest on Monday, eager for the fray even after 30-odd years.

We were fortunate to be able to display a couple of customer-built RV-12s on the booth this year when "New Blue" was away doing demo flights. Larry Geiger and Jim Olsen both have good looking and well-built examples of the type, and graciously tolerated the sticky fingers run over their pristine paint jobs. Larry was also kind enough to regale the crowd at our Wednesday BBQ with his experiences building his 12, which he (mostly) seemed to have enjoyed.



Above: When the strongbox key didn't show up, Gus was able to break in, using a Swiss Army knife loaned to him by a real Swiss RV builder.

Left: newly qualified RV-10 pilot Daryl Sahnou and AFS ribbon-bearer Kelsey Hickman share a Sun 'n Fun birthday.

Below: something about Daryl in a Top Gun T-shirt struck Van as really, really funny.

The weather, at least until Sunday's rain, was just about perfect – low 80s and sunny. As usual, we chatted to builders and prospective builders (the expected large Brazilian delegation attended), flew some demo flights at Plant City, and stuffed in earplugs for the airshow. Attendance seemed down a little to me compared with previous years, perhaps no surprise given the economy.

A recent S&F tradition was observed, a cake and ice-cream feast at the Van's booth courtesy of Jeff and Becky Rogers of Airplane Plastics (purveyors of RV canopies), to celebrate the birthdays of Daryl Sahnou (vendor wrangler) and Kelsey Hickman (heiress to the Advanced Flight Systems empire). Unlikely as it seems, they share the same birthday, which made me lose what little credence I ever placed in astrology.

The trip back up to Maryland wasn't quite so fast as the trip down. We got a late start from Lakeland on Monday as the field didn't go VFR til 1030 or so, and poor planning meant that the tailwind was now a headwind. Poorer planning still saw an abortive attempt to refuel at a recently closed airport. The yellow Xs on the runway clued me in on the downwind. If you live in NC, forget refueling (or anything else) at the late lamented KRZZ, Roanoke Rapids.

However, early evening saw the RV-12 skimming over the Potomac into its home at St Mary's Regional, where I swiftly abandoned it, boarded a jet for home and left Mitch to vacuum out the Florida sand.

FLYING THE FORD



At a recent meeting in Oshkosh, Van had the chance to both ride in and pilot the EAA Ford Trimotor. He reports that the controls are a LOT heavier than his own Ford — an F-150 pickup.

THE VIOLIN CONNECTION Ken Scott

Much of *Flying* magazine concerns itself with aspects of aviation that having nothing to do with me. I'm pretty sure I'll never sit in the left seat of a business jet nor re-equip my airplane with an engine that costs as much as a downtown office building. Nevertheless, I read every issue that comes through Van's door for two reasons: Lane Wallace and Peter Garrison. I enjoy Peter's erudite style, humor, and ability to clearly explain even arcane points. But what I *really* want, someday, is to write as well as Lane Wallace.

Her latest column, in the April issue, hit pretty close to home — my home, anyway. It concerns RV-7A builder Jeremy Constant, who — in his day job -- happens to be assistant concertmaster of the San Francisco Symphony. For those of you who aren't conversant with classical music, that is a Big Deal. It is a position that requires a level of dedication, musicianship and artistry that very few people achieve, or *can* achieve.

The combination of RV building and classical violin playing is something has been a big part of my life since Camilla, aka "The Violinist," and I were married twelve years ago. I've learned a lot about the demands playing the instrument places on the player. It isn't known as the "devil's instrument" for nothing. I've learned some interesting facts of musical economics as well. (For instance, few RV builders realize that the cost of a really good violin bow can easily equal the cost of a basic RV-7. No, not the violin — just the bow. If you're in the market for a nice Italian violin from the 19th century, you'd better plan on selling both your RV-7s...and your car.)

Cami read the story, and thinks she remembers meeting Jeremy in Weisshaar's Violin Shop. He was interested in her instrument case, she lusted after his fiddle. She also pointed out that she'd attended summer music camp with little Mikey Thomas — now Michael Tilson Thomas, music director and conductor of the San Francisco Symphony where Jeremy plays. As Jeremy noted, there aren't many degrees of separation in the world of classical music.

I enjoyed Lane's column about Jeremy's two worlds. But when I finished, I had to smile. I'm one up on him! Not only did I get a life filled with music (without having to do all the hard work) and an RV — I got The Violinist, too.

