



Marcus Tuck flies his RV-8 registered as (what else?) G-TUCK over the farms and fields of a late summer England.



Not familiar with a "5R" registration? Neither were we. Michel Louys has finished and flown his RV-7 — the first RV we know of built and registered in the nation of Madagascar. A nice place to have an RV in December...



An RV Christmas Carol...by Alf Frog, a Norwegian RV-7 builder.

EQUIPMENT REDUNDANCY

HOW MUCH IS ENOUGH?

PAUL DYE

Several years ago, in an era when Van considered aircraft electrical system an effete luxury, we were amazed to hear about an RV-4 with two alternators! Two! And a battery! How did the builder arrive at the conclusion he needed redundant alternators? He was a smart guy, and must have had some reason he considered good enough to make the added weight, complexity, and cost worthwhile.

I don't have an organized way of making this kind of decision. But in the RV world we're lucky to have a guy who does. Paul Dye is a Flight Director for NASA – the guy who is responsible for the successful completion of Space Shuttle flights. Thinking about things like this in a trained and organized fashion is his job. So, herewith, his thoughts on the subject of redundancy.



If one of something is good, and two is better, then three must be better yet - right?

Maybe in some endeavors, but in aviation, it leads to heavy (and expensive) airplanes that can get so complicated that the pilot can't figure out how they really work! Redundancy for critical functions is a great and necessary idea, but how then do you decide when "enough is enough"?

In my business, we have different levels of redundancy: Fail Operational, Fail Safe, and Fail Critical. Fail Operational means you can take one failure and continue to complete your mission. Fail Safe means that if you have a failure you're not going to complete the mission but can get down safely. Fail Critical means that you're dead if a failure happens. So...to be truly Fail Ops/Fail Safe (we call that FOFS, or "Foefuss"), you pretty much need three systems for critical functions - which is why you end up with so much triple redundancy in sophisticated aircraft.

When helping RV builders bring this down to a more personal level, I like to start with one question: what is it that we want the airplane to do? There is no one "right" answer – the choice is up to each individual. If the answer is that we want a light, aerobatic plane that can be flown on a sunny weekend, then we should build it su-

per light with one radio and no lights. (Leave out the electrical system, hand-prop it, and you won't even need a transponder!) But if the requirement is a traveling machine with IFR capability, we need a slightly longer list of equipment. The mistake that many people make at this point is to start making a list of equipment. They miss the critical design step: listing the **functions** they require, rather than the equipment.

(Note: No matter what equipment is installed, Van's Aircraft, Inc. Aircraft kits are intended and designed solely for VFR personal use. We recommend that they be operated only in VFR conditions.)

What's the difference? "I need to communicate with ATC" is a statement of *function*. "I need a Garmin SL-40" is a way to *accomplish* that function. It's not a requirement, it's a solution. In order to build in required redundancy, we need to build a list of functions that we want to accomplish, then decide which of those functions are critical to our survival. Note that this does not need to include EVERY function you might want in the airplane (I haven't included landing lights, anti-collision lighting, radar transponders, etc. in the following examples. These are not usually critical to safe flight, although, in some cases, some pilots might consider them as such.) For example, such a list might include:

Function	Equipment
Navigation (position determination)	GPS Receiver
Attitude Determination	EFIS/AHRS
Communication	NavComm
Airspeed determination and display	EFIS/AHRS
Altitude Determination and display	EFIS/AHRS
Automatic aircraft control (autopilot)	Autopilot
Engine Monitoring and Display	EIS
Precision Approach capability	Navcomm w/ ILS Head

- Navigation (position determination)
- Attitude Determination
- Communication
- Airspeed Determination and display
- Altitude Determination and display
- Automatic aircraft control (autopilot)
- Engine Monitoring and Display
- Power Supply to Critical Devices
- Precision Approach Capability

Once we have a list of functions, we can then start listing equipment to satisfy those requirements. (This is a preliminary list - it helps to think of it that way, to avoid getting locked in to a particular choice in the design process.) This starts to become a table:

The next column in the table is where you begin brainstorming. We need to start listing the failures that might happen that would take this function/equipment away? Obviously, this is going to add rows to your table, because there are multiple failures that can take away a function. For instance, you might lose communication if the radio itself fails, if the power to the radio fails or if an antenna falls off. After listing the failures that might take away the function, you start yet another

Function	Equipment	Failures	Backup
Navigation (position determination)	GPS Receiver	Loss of Electrical	redundant power
			internal battery
		Receiver failure	backup GPS
		Loss of satellites	VOR receiver
			accepted risk
		Antenna failure	backup GPS
Attitude Determination	EFIS/AHRS	Power failure	redundant power
		Software failure	backup ADI
			"dissimilar redundant AHRS"
			autopilot w/ separate sensors
		Hardware failure	backup ADI
			"dissimilar redundant AHRS"
			autopilot w/ separate sensors
		Loss of Pitot/Static ?	design/selection criteria
Communication	NavComm	Loss of GPS ?	design/selection criteria
		power failure	Redundant Power
		radio failure	Second comm (panel or portable)
		loss of antenna	Second comm (panel or portable)
Airspeed determination and display	EFIS/AHRS	loss of pitot	heated pitot
		loss of static	alternate static source
		AHRS failure	backup ASI
Altitude Determination and display	EFIS/AHRS	loss of static	alternate static source
		loss of AHRS	backup Altimeter
Automatic aircraft control (autopilot)	Autopilot	power failure	Redundant power
			pilot control
		hardware/software failure	Redundant Power
			pilot control
Engine Monitoring and Display	EIS	power failure	Redundant Power
			Accepted Risk
		hardware/software failure	backup instruments
			no instruments
			critical instrument backup only
Precision Approach capability	Navcomm w/ ILS Head	Power Failure	Redundant Power
		Radio Failure	GCA
			Accepted risk
		Display/Head Failure	GCA
			Accepted Risk

column of backups that will protect you from those failures. For instance, loss of function due to power loss can be prevented with backup power. At this point, a spreadsheet becomes useful!

When evaluating our level of acceptable risk, it is useful to discuss a highly philosophical point - how much backup do we need?

Now it's time to start making some actual choices. For instance, you may decide that you don't need an "installed" backup for a particular function (a handheld radio might be adequate backup for the comm, or the pilot can reasonably be expected to be a backup to the autopilot). Your autopilot might give you a completely redundant backup to your AHRS for attitude, and therefore no backup ADI is required. And – most important - you will have the opportunity to *knowingly* and *rationally* accept certain risks. Everyone has a slightly different risk tolerance, and what they consider to be acceptable risk trades. A risk trade is, very simply, a determination that the potential gain is worth the risk, and this will tie into the decisions that you make about how much backup you really require.

My personal choice, since I have little economic need to "be there", is that I am quite comfortable with Fail Safe capability. You may choose differently, but this can lead to considerably more complex and heavier airplanes...and oh, by the way, you still have only one engine.

Experience is an important player in making many of these choices - not just design experience, but flying experience. For instance, take engine instrumentation. At first blush, the thought of flying around with NO engine instruments (when we are used to oil pressure, temperature, RPM, MAP, EGT's, CHT's, etc...) is pretty disquieting. But when you consider how simple a Lycoming engine really is, and that if it is running it will

probably continue to run (as long it has oil pressure), then maybe all you really need to know is if it still has oil pressure. This can be provided with a simple pressure switch and a light. What?! Fly without RPM?! Sure....any experienced pilot probably already knows how the engine should sound in cruise, or in the pattern, and while it won't be precise, or optimum, the airplane won't fall out of the sky. So (for me), the EIS goes on the "desired, but not essential" list.

A new pilot might not understand some of these trades, nor will a designer without flight experience. I think many people add equipment for very low probability failures – studying and understanding the causes of actual accidents will help to determine what you reasonably need to "fear", and what is unlikely to really affect you.

Going through the process on paper allows you to accept some risks in a rational fashion, while understanding better those risks that you simply don't want to take. It will also firm up your understanding of what your airplane can actually be expected to do. It will allow you to design in capability rather than simply throwing a bunch of stuff in that you saw in ads and Oshkosh display booths. And it will help to keep the weight down as you discover that some backup equipment just isn't necessary for the kind of flying that you do.

If all of this seems a bit tedious and complicated, it really isn't all that hard - and can lead to a very efficient design. Ask the question of every part: Does it actively fulfill a requirement, or is it just nice to have? Add nothing just because your friend or neighbor has one. Ask if YOU need it.

One of my guiding engineering principles has always been "Perfection in design does not come when there is no longer anything to add – but when nothing can be taken away."



No, it's not Van's new Minnesota branch office. Believe it or not, this is western Oregon — the place where the local brag is that "you don't have to shovel rain."

The longest "snow event" in memory started several days before Christmas and didn't let up until Boxing Day. At one point many areas had 1/2" of clear ice on top of several inches of powder snow. Then more snow fell on top of that.

Just getting to work became a quite sporting proposition, and for those of us in the hills, just impossible.

One thing we all learn from flying, especially: Nature's in charge and we cannot impose our will on weather. So if we were a bit slow getting your order out the door, we hope you'll forgive us...

And blame UPS or FedEx or somebody.

FAST TAXI TESTS

KEN SCOTT/VAN

Well, it happened again. The “fast-taxi” test has resulted in an injured airplane. This time we got lucky – nobody was hurt and the damage was contained to wheel components.

The RV-10 builder’s manual contains several cautions about fast taxi testing, emphasizing that both the pilot and the airplane must be prepared to fly. That’s because it is really difficult for any pilot in an airplane they’ve never flown before to determine the point where the airplane is going to leave the ground. In an airplane that accelerates as quickly as an RV, that point can arrive well before the pilot is ready. Over the years, several RVs have been damaged, some severely, when they left the ground during fast taxi tests. The unprepared and overwhelmed pilot couldn’t absorb the situation fast enough to make the appropriate response and, as a result, became an intensely interested passenger in a rapidly unfolding event.

In this case the test pilot (hired by the builder for his experience in fast-glass airplanes) set out with no intention of flying. Instead he decided to break in the brake pads. Now, the Cleveland Technicians manual describes a method for conditioning new nonasbestos organic brake linings – the ones used in RVs.

- **Taxi for 1500’, using about 1700 rpm and applying brakes as necessary to keep the speed down to 5-10 mph.**
- **Let the brakes cool for 10-15 minutes.**
- **Apply the brakes and run up the engine. If the brakes hold, you’re done.**

Instead, the pilot accelerated until he neared flying speed, then pulled the power and applied the brakes firmly to slow the airplane down and “break-in” his new brake pads. He did this three or four times.

Note that the manufacturer wants you to let the brakes cool for ten minutes. You might reasonably infer from this that a short, slow taxi heats them up enough to require cooling. Try to imagine how much more energy is developed when an airplane – in this case, an RV-10 with an empty weight about 200 lbs higher than most – is repeatedly hauled from near-flying speed to a slow walk. That energy is expressed as heat – lots of heat. In this case, enough heat to melt the inboard sidewall of the tire, warp the brake disc and send smoke whipping out of the wheel pant. Since it was blown aft in the slipstream of the prop, the pilot was blissfully unaware of the situation until he returned to his hangar, whereupon another builder who happened to be on hand took one look and attacked the landing gear with a fire extinguisher.

This whole subject might seem a bit familiar — in fact, a little over three years ago, Van wrote up his

thoughts on the fast-taxi test. But since almost 1500 new RVs have flown (and hundreds more are getting close) since that article appeared, it seems worthwhile to run it again:

BEWARE: THE HIGH SPEED TAXI TEST

A recent NTSB accident report read, in summation. “Pilot attempts high speed taxi test of not-yet-licensed RV, unexpectedly becomes airborne, elects to continue flight around traffic pattern, high descent rate while landing, bounces high, loses control, aircraft ends up inverted and largely destroyed.”

Our reaction? Oh, NOT the “fast taxi” thing again ...!

We need not list the number of mistakes made--- you can do that yourself. We are grateful that the pilot suffered no serious injury. But this has happened too often before, and despite our repeated cautions, there’s another unfortunate statistic and expensive damage to a brand new airplane. For years, we’ve advised against fast-taxi test, lift-offs, crow-hops, tail-up runs on the runway, etc. But Bubba, down to the airport café, he says you should take off and throttle back to stay just above the runway and feel ‘er out before you really fly. Who do you believe?

WHAT IS THERE TO LEARN?

We expect that the motivation for such testing is often the eagerness to “see how it works” while waiting weeks for that final inspection. We assume that there are many successful, thus unreported, high speed taxi tests and “down-the-runway” lift off flights made in new RVs. But still we wonder...what do pilots hope to learn from fast taxi tests and brief lift-offs that they cannot learn from sedate taxi speeds and actual take-offs?

Well, there’s theories and there’s facts:

THEORY: It is desirable – even safer -- to perform high speed taxi tests during the pre-test flight phase of homebuilt aircraft development because nothing can go wrong at speeds less than stall/take off speed.

FACT: There is little to be learned from high speed taxi tests, other than that RVs accelerate faster than expected, and may take flight at lower speeds than expected. An RV is capable of flying, particularly in ground effect, at very low throttle settings. Even at far less than full throttle, an RV can quickly accelerate to, maybe, 40 mph. The pilot then pulls the throttle back a bit to hold that speed while he exercises the ailerons and elevator a bit, to “feel it out”. But that retarded throttle position, maybe only 1/3 open, is still too much and has, within seconds, accelerated the plane to 60+ mph – enough that in the hands of an inexperienced (in RVs) pilot, unanticipated flight is probable. Suddenly in a situation (and at an altitude) he has not anticipated,

the pilot now has some fast thinking and reacting to do to remain safe.

THEORY: A good way to incrementally test your new RV is to do short, low flights down the runway. By lifting off just a foot or so, and just a couple MPH above stall speed, you need only reduce power and the airplane will drop back on the runway--you really don't have to do a normal landing. Nothing bad can happen if you are only a foot high and just above stall speed.

F A C T : Since the pilot is presumably using this "sort of flight" exercise because he feels he needs to learn more about his RV before "really flying", it follows that he might not yet be capable holding the speed and altitude desired.

Veteran RV transition instructor Mike Seager tells us that, even after several sessions of air work, most of his RV transition students are not able to demonstrate good speed and altitude control when asked to demonstrate a low, slow, pass down the runway. Even during a well-executed crow hop down the runway the pilot does not have time to exercise the elevator or aileron controls enough to really learn anything. The airplane really landed itself, dropping in from that 1-2 ft. altitude after cutting power. If the speed and altitude exceeds intentions, then the pilot is faced with needing to make a "real" landing, possibly with marginal runway left, after only seconds of flight experience. Either that or very quickly decide to "really" fly the airplane, which he probably has not properly prepared for.

NOT ALL BAD NEWS:

If there is so much wrong with the "fast-taxi" or "brief lift-off" concept, why is it so persistent? Perhaps it is a carry-over from the procedures used by professional test pilots experimenting with truly new and different airplanes. Brand new designs with many unknowns may need to be explored gradually. An example of this might have been the prototype VariEze. At the time it was a completely new and quite unconventional design, so there were many uncertainties regarding stability and control, C.G. position, control travel limits, etc. It was probably prudent for Dick Rutan, on the long Mojave runway, to proceed incrementally. You, on the other hand, will be testing an RV, which if built at all ac-

curately, will be very predictable and you do not necessarily have the "velvet hands" of Dick Rutan. Better you follow a test flight regimen with greater safety margins and demonstrated results.

Our question remains: How much knowledge is really gained from this testing, and is it worth the possible consequences of the failure of this testing concept?

**YOU CAN LEARN ALL
THAT YOU NEED TO
KNOW WITHOUT THE
TEMPTATION TO "HIGH
SPEED TAXI".**

OUR ADVICE:

1. Practice taxiing on the taxiway at taxi speeds. You can learn all that you need to know without the temptation to "high speed taxi". If you are in a taildragger, do not try to lift the tail off the ground.
2. After thorough airframe inspection, engine ground runs tests, pilot preparation planning, etc., take the runway, apply full power, take-off and climb to a safe altitude. There, you can perform preliminary flight test exercises, monitor engine functions, make a planned approach and landing, and live happily ever after.

If you feel that you need to perform high-speed taxi tests, do so only when both the airplane and the pilot are prepared for flight. Inspected, signed off, adequate fuel in tanks, safety procedures memorized, ground crew in place, etc. Then, if (as happens all too often) you find yourself in the air, you can go to Plan B. Note the key word: PLAN.

So, these are our recommendations, based both on our own experience and that of numerous hapless RV fledglings. If, on the other hand, you prefer the advice of others such as the resident expert at the airport café, please consider the background and credibility of said expert.

RV-12 MUSINGS

KEN SCOTT

There's quite a few of the little beasts going together now, and we're getting some feedback from the field. Most of it is complimentary. The parts fit very well indeed and the airframes are going together very quickly. Here's a few notes from the program:

FIREWALL SEALANT

When the prototype RV-12 was built, engineering specified MC-CS-1900 high temperature firewall sealant. This was a stock item, straight out of our Accessories Catalog. It came in handy tubes that made mixing and applying it easy and simple. Buy tube, smear on airplane, rivet firewall, life is good.

Except. Except when our shipping supervisor found that shipping rules and regulations had changed which suddenly made firewall sealant a "hazardous material" which could only be shipped by very expensive means by people with expensive qualifications. The penalties for ignoring said regulations were severe – go-to-jail kind of severe. We stopped shipping and began researching alternatives. Within a couple of weeks, engineering determined that regular MC-236-B2 fuel tank sealant was adequate for sealing the firewall bulkheads. This is a chemically different material that can be shipped without trouble. Sealing cable and wiring penetrations through the firewall will still require the high temp material and we're working on ways to solve the shipping problem.

QUESTIONS FROM BUILDERS

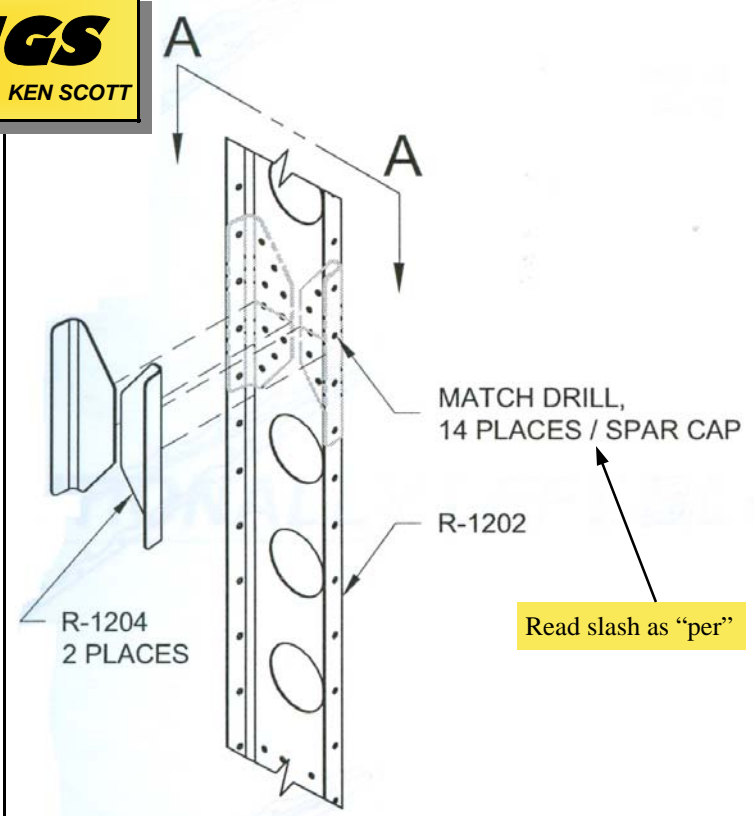
The tech help guys have learned that many (of the relatively few) questions come from those who have built earlier model RVs. They like to use their knowledge to jump ahead, bypass the text and just follow the drawings, sometimes into a dead end. Our best advice: Remember how to use the tools, but forget everything you know about how past airplanes went together. On the RV-12, you MUST follow the directions step-by-step, phrase-by-phrase, even word-by-word. If it doesn't say "rivet", don't rivet. You'll be told when. With a little practice, you will work your way into the 'cadence' of RV-12 instructions. It is sooooo easy!

EMPENNAGE KIT QUESTIONS

There are a couple of terminology conventions it helps to know:

A slash means "per." See the illustration above. "Match Drill 14 places/spar cap" can be read aloud as "match drill 14 places per spar cap."

Q: Why can't I press my COM 3-5 bearing into the



VS-1211A or VS-1211B?

A: Some of these components managed to avoid the reaming operation that brings the bearing hole to full-size, so the bearing just won't fit. Builders can fix the part by enlarging the hole with a unibit. This glitch was caught early, so only a few early kits contained improper parts.

Q: When I rivet the VS-1211A and B parts around the bearing, the bearing binds up and won't turn.

A: There was a very small and rather unpredictable manufacturing variation that could produce this result. We found a way to make the parts that eliminates the problem. New parts were shipped with the rivet "care package" (see below.)

Q: When I try to pull the small CCR-264SS-3-2 3/32 blind rivets, the mandrel pulls through without snapping off like other blind rivets. Is this ok?

A: Yes. That's the way these rivets work. We only use these rivets for small jobs like attaching nutplates and our tests show they are more than adequate, even without the mandrel.

Q: There's a tight fit between the J-sections bent along one edge of the F-1282 skins and the cutouts in the fuselage frames (aka bulkheads.) Can I file the bulkhead openings or the J-section of the fuselage skins?

A: Yes...in fact, this is specifically noted in Step 9 of Page 10-06. However, because the fuselage is up-

SEEN ON THE RAMP



We had a couple of interesting visitors on the Aurora ramp this year. Above: Turns out another airplane company used their initials on a “-6”: DC. This one is still earning a living, about sixty years after it left the Douglas factory. Everts Air Cargo uses it to deliver freight and fuel to remote areas in Alaska. Four R-2800s make a satisfying roar on a post D-check run-up.

Left: Greg Halverson built an almost-all-metal cowl for his RV-6. Once he gets the compound curved portions figured out on his English wheel, it should be totally cool!

side-down at this point, it's difficult to see how these parts are fitting and easy to assume they are fine – at least until you look and find that thin sheet metal is bent. Take the hint offered by the directions, climb under the assembly and check the fit. If you find interference (and you might not...there's some variation in the bends of the J-section) it's better to open up the bulkhead with a small round file and leave the J-section straight.

Q: I've finished my wings and fuselage and am well along on my empennage kits. It doesn't look like I'll have enough LP4-3 blind rivets to finish, even though I bought the “fastener package” with the first kit. What's wrong?

A: The fastener package was our best estimate when the wing kit was released. As more kits came on line and our fastener counts became more accurate, we found there weren't enough rivets for the complete airplane. Builders who had all the kits were shipped a “care package” containing another 2500 rivets. Those who didn't have all the kits will receive them as part of the empennage kit.

Q: Is there a preferred order of construction like the other RVs?

A: We have decided that the best sequence for building the RV-12 is the same as the other airplanes: empennage, wing, fuselage, finish. Originally, it seemed to make little difference which kit came first and in fact, most early builders started with the wing kit. I'd actually told at least one potential builder it didn't matter whether the fuselage or wing was built first. In my own defense, I wasn't the only one who thought

that. I've since learned better -- there are a couple of small but important steps that are much easier if the wing is completed before the fuselage. Now that the empennage kit is available, we recommend starting with that. This also has the added advantage of making the building instructions, (which were written with this sequence in mind, as you can see from the numbering system) read more smoothly and logically.

Q: I got Sections 1-3 and Section 5 in my plans. What happened to Section 4?

A: Section 4 of the RV-12 builder's manual is a complete index of parts and the drawing on which they appear. This has been completed and is now available as a downloadable pdf document. See the front page of our website www.vansaircraft.com.

DRAWING REVISIONS

We are posting RV-12 drawing revisions on our website. Click on Service Information/Revisions and when the new page appears, scroll all the way to the bottom. You can compare the revision number in the title block of drawing there to your drawing. Use the drawing with the higher number.

IN THE FUTURE

We are working diligently on the Finish kit. This particular kit is more of the “herding cats” variety, where products from several vendors have to be obtained and organized. It's a painstaking project. Right now we hope to have the Finish kit available in late January or early February. However, as always, better too good than too soon, so we're making no guarantees.



SIX GRAND!

At 11:19 a.m. PST on December 9, we posted the six thousandth completed RV on our website. Fittingly enough, it was built by a Repeat Offender. RV-6 builder Louis Palmenteri decided he needed an RV-10. After 3 ½ years of work he flew it on November 22, 2008. He built the entire airplane from a standard kit, doing his own paint

and interior. "The only thing I farmed out was the seat upholstery. After all the work, N510RV flew well -- once I caught up with it. I couldn't believe how quickly it got up. It has a carbureted 250 HP O-540, VFR equipped," Louis says.

Six thousand finished airplanes. Even when you can see it coming, it's hard to believe. Last year, Van and I were wending our way from our Oshkosh booth to a forum tent, through acres of RVs parked in the lot west of our booth. "And this is only about eight months worth of completions," he said as we surveyed a field of RVs that seemed to stretch to the far horizon. Then he just shook his head and we walked on.

The 6000 number is just those airplanes for which we've received first-flight notices -- confirmed kills, so to speak. We have no idea how many might be flying that we've never heard about. Shortly after the website 'hobbs meter' hit 6000, Gus ran a short search of an FAA database and came up with nine RV-4s that we didn't know were flying. The databases are tricky because many RVs are registered as a "Blodgett Special" or something similar and don't turn up when you search on "RV-4." It seems likely that about 500 new RVs will be completed in 2008. That's a little short of the 600+ we saw in 2007, but still a pretty respectable number.

SURVEY OF 2008

It doesn't seem very long ago that I flipped open a new calendar and wrote "5335" in the January 1 square -- the number of RVs flying on that date. Now, within a few days, I'll be doing it again and writing some number larger than 6000. Boy, that went by in a hurry.

When we look back on it, several noteworthy things happened in our world during 2008. In April, we started taking orders for the RV-12. Because the tail design hadn't been frozen, early adopters started with the wings. About 180 projects are underway, and just because it's a round number, we're hoping to have 200 on the books before the new year is here. Fuselage kits were announced at AirVenture in July and Empennage kits began shipping in September. We hope to announce Finish kits early in 2009.

Orders for Lycoming powered RVs continued to go well. Some time in 2009, we should ship RV-10 start 1000. We could well see the 2000th RV-9/9A and the 3000th RV-8/8A. It would be nice to think we could register the 4000th RV-7/7A too, but realistically that will probably occur in 2010.

We sent factory airplanes to two major fly-ins, Sun 'n Fun in Florida and AirVenture in Oshkosh, Wisconsin. Despite record high fuel prices and an economy showing stress cracks, we did well enough at both shows to make attendance worthwhile. Every year, though, Florida especially seems a little farther away, so after this year's show we welcomed the addition of Mitch Lock, a multiple RV builder from Maryland, as an East Coast representative. Mitch currently flies an RV-8 and is well along on an RV-12. We expect his enthusiasm and knowledge will expand the RV world along the eastern seaboard -- a place that's hard to reach from our position on the Correct Coast.

We published articles in almost every issue of the *RVator* about different aspects of the FAA's possible revamping of the Experimental Category and the "51%" rule. At the end of the year, the comment period had been extended and a final rule was still somewhere in the indefinite future. Well, the FAA is a government agency and it was an election year. With that out of the way, perhaps we'll see some progress.

Late in the year, the RV-12 made the cover of both *Kitplanes* and *Sport Aviation*, but pilots Ken Krueger and Joe Blank have so far declined all requests for autographs -- no, wait...Joe and his co-pilot Daryl Sahnaw did sign a cover for one customer. Heroes of the Wisconsin skies!

All in all, we had a decent year, despite the economic roller-coaster that rocked world economies. We hope you did too. And we hope for better in 2009. Thanks for your patronage, your patience and your support.

RV-12: A TOOL FOR GROWING AVIATION

VAN

In the last couple of issues of the *RVator*, I talked about how the unique design and features of the RV-12 not only make it a great little airplane for current GA pilots, but make it a great tool for those seeking a means of becoming involved in GA

SCHOOL/YOUTH GROUP KIT PLANE BUILDING

Since the beginning of my involvement in aviation, about 55 years ago, I have read editorials and heard prophets of doom bemoaning the fact that private flying was not attracting enough young people. Unfortunately, this is true, and the situation doesn't seem to be improving. I keep waiting and waiting for it to improve, but it just doesn't. "They" aren't doing enough to make this happen. OK, you get my drift; its not going to happen if we just stand back and watch.

My father was fifteen in 1927, the year that Lindbergh flew the Atlantic. Probably 98% of the kids then were aviation enthusiasts. The same is not true today, as we all know. We also know the reasons: too many more affordable recreational options, perceptions that aviation is unattainable, no role models like Lindbergh, etc. Still, I believe that there are enough kids out there to re-populate GA if given the opportunity.

School related aircraft building projects have been around since the early days of EAA and some have been much more successful than others. One possible limitation of such projects is the labor-intensive nature of most homebuilts. Also, I think that the homebuilding expertise of the shop instructor is a vital element. Shop class periods are short, and with emphasis on education, actual building progress can be slow. It often takes years to complete an airplane under these conditions. If it is a single seat airplane, the students would not have the opportunity to experience flight in it. While students would learn skills and disciplines from the building project, the potential positive impact would not be maximized, particularly for students who graduate and never see the end result.

By contrast, I can envision that a school or extra-curricular school RV-12 project could be completed in the course of a school year. Experienced local homebuilders could serve as tech advisors or teaching assistants. The aircraft itself could be donated to and owned by the school, or it could remain the property of the sponsor/donor. I would like to entertain the possibility that the student-builders could later receive flight training in the aircraft, at least up through pre-solo level. Insurance and liability concerns would no doubt be limiting factors, particularly in a public school system.

An extra-curricular aircraft building project for young



Is this the perfect airplane to build a new pilot population?

people might be a more viable model. EAA chapters, or just groups of interested pilot/builders, might sponsor and conduct building projects. Weekend or evening work sessions could be less inhibited by bureaucracy than a formal school program, and could contain longer and more productive work periods.

One current program which is gaining momentum is the "Build-A-Plane" program initiated by the Thomas Wathen Foundation. (www.buildaplane.org) I am not personally familiar with the details other than what I've read in magazine news briefs and on their website. I'm sure that there is much which can be learned from their project models and from their several years of experience. To my knowledge, many of the Build-A-Plane projects are rebuilds of old light planes which have been donated, and these are often school projects.

The Port Townsend Air Museum (www.porttownsendairmuseum.org)



nately, Bob contracted cancer and passed away in September. At his memorial service several of us revisited this airplane building concept and started working with members of the CAS board. As I write this, the leadership of CAS, EAA Chapter 105, and Van's Aircraft are working together to bring this idea to fruition. Enthusiasm is high and we'd like to get underway soon. This could serve as a pilot project for similar efforts elsewhere. We'll keep you posted.

I know that many of you feel strongly about strengthening GA and particularly getting young people involved to provide a base for the future. There are certainly various means of accomplishing this. Since our (Van's Aircraft and you)

ptaeromuseum.com) has a program where youth are involved in aircraft restoration and flight training. While it may not be an ideal model for programs elsewhere, it is worth visiting their website (and visiting their facility if possible) to learn more about their very effective program.

ONE EXAMPLE

One aviation youth education group I am familiar and involved with is the "Centers for Airway Science" (CAS) here in Portland, OR. It is the brainchild of Robert Strickland who, about 15 years ago, conceived the idea of "tricking" kids into learning math and science using special programs based around aviation. Their extra-curricular projects are aimed at the Junior High age bracket (ages about 11-14) and have been very successful. They primarily work with computer flight simulation programs and build radio controlled model aircraft. One of Bob's goals was to attract "at risk" kids from the inner city and help get them on the right track. Some of their success stories are heartwarming.

About a year ago, at a fundraiser for the CAS, I mentioned to Bob the idea of expanding his program to older kids, perhaps in the 14-18 age bracket. My idea was that after they graduated from models, they could build an actual airplane and fly it, or at the very least, fly in it. I suggested the RV-12 would be an ideal aircraft for such a concept. He was very interested, and another supporter of the CAS expressed interest in sponsorship. Because the RV-12 kit was not yet market ready, I kept this thought on the back burner. Unfortu-



Now, imagine how these kids would look if they could fly an RV-12!

expertise is in homebuilt aircraft, it is only natural to envision this medium as the conduit for getting youth involved. And why not? You know how much more meaningful it is to fly your own "creation" than a factory airplane. The same should apply to kids. What they learn about aviation in the process of building provides them with a much better base of understanding than if they walked into a flight school and began training.

OK. Let's get thinking and talking about this. How could you make this happen in your area, your EAA chapter, or at your airport. Who, individual or group of individuals, might step forward and sponsor such a project? There are various ways this could happen, depending on local circumstances. I'm willing to correspond with anyone interested.

IN THE SHOP

Winter is here. One way I know that for sure is the cold blast of air on the back of my neck, coming in around the aft rail of my sliding canopy.

That's why I'm going to try this idea sent in by RV-7 Builder **Al Herron**. "I've come up with an alternative to the cable or fish line lanyard for the C-679 canopy slide seal on the slider canopy. You're welcome to use it if you think it has merit," Al says.

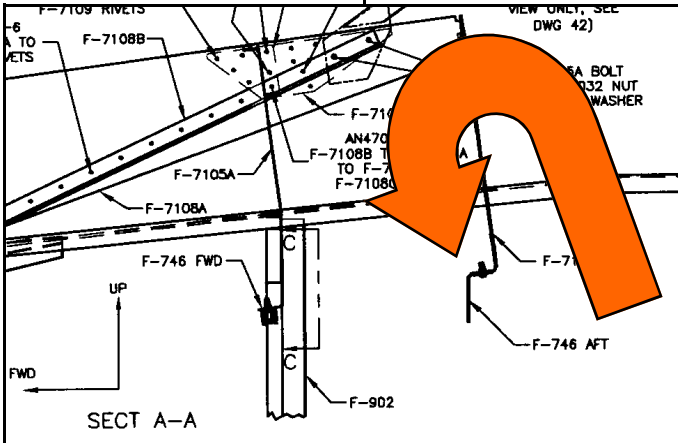
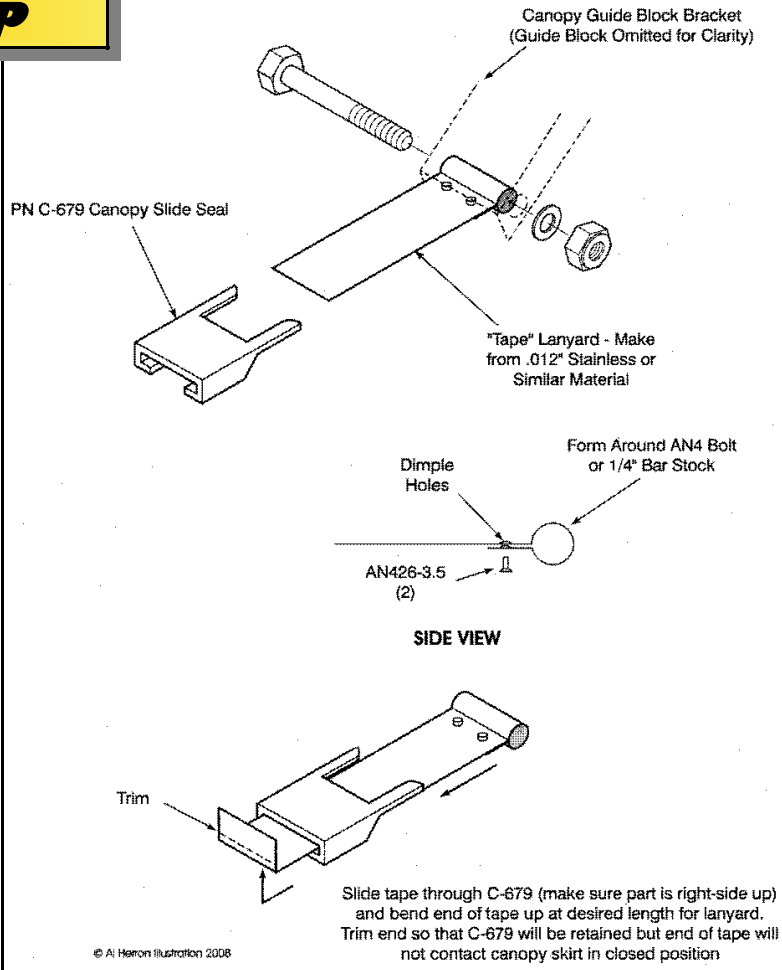
His very clear drawing at right explains the concept completely.

Occasionally, we'll get calls from builders saying that the throttle and mixture cables supplied in their firewall forward kits are too short. This has puzzled us, since we've — and the majority of builders — seem to use them without problem. Sharp eyed Gus Funnell spotted one possible reason on the photo below.

As you can see from the plans insert below, the F-746 Aft is shown with the vertical face an inch or more behind the instrument panel. In the photo the builder has chosen to mount it flush with the face of the panel. That looks good, and structurally it

should be fine, but it does stick the throttle/mixture/prop cables farther back into the cockpit, and could easily change the length of cable(s) required. It might also interfere with full stick travel.

Just another example of the ripple effect caused by seemingly small changes.



PRICES	RV-3	RV-4	RV-6	RV-6A	RV-7	RV-7A	RV-8	RV-8A	RV-9	RV-9A
PREVIEW PLANS (required with/before empennage kit)	\$45	\$50	\$55	\$55	\$55	\$55	\$55	\$55	\$55	\$55
EMPENNAGE KIT	\$940	\$1260	N/A	N/A	\$1600	\$1600	\$1550	\$1550	\$1620	\$1620
WING KIT	\$5450	\$5600	\$5570	\$5570	\$6450	\$6450	\$6420	\$6420	\$6810	\$6810
FUSELAGE KIT	\$2880	\$3930	\$4550	\$5250	\$5550	\$6240	\$7220	\$6570	\$5580	\$6240
FINISHING KIT	\$4820	\$5250	\$6230	\$6410	\$6080	\$6250	\$5340	\$6240	\$6210	\$6390
COMPLETE STANDARD KIT	\$14,090	\$16,040	x	x	\$19,670	\$20,530	\$20,510	\$20,760	\$20,210	\$21,050
COMPLETE QUICKBUILD KIT (includes QB wing & fuselage kits)	N/A	N/A	N/A	N/A	\$29,660	\$30,520	\$30,510	\$30,760	\$30,200	\$31,040
Q/BUILD WING KIT ONLY	RV-3 add \$3930 to Standard Wing Kit price (call before ordering.) RV-6/6A add \$5310. Others add \$5040. (No RV-4 QB wing available).									
Q/BUILD FUSELAGE KIT ONLY	RV-6/6A add \$5310 to Standard Fuselage Kit price. Others add \$5040. (No RV-3 or RV-4 QB fuselage available).									

PRICES	RV-10	RV-12
EMPENNAGE/TAILCONE KIT	\$3500	\$2150.00 (fastener kit \$250.00)
STANDARD WING KIT (QuickBuild Option)	\$9040 (\$14,670)	\$5480.00
STANDARD FUSELAGE KIT (QuickBuild Option)	\$14,090 (\$20,520)	\$4600.00
FINISHING KIT	\$13,555	TBA
COMPLETE STANDARD KIT	\$40,185	TBA
COMPLETE QUICKBUILD KIT (includes QuickBuild wing and fuselage.)	\$52,145	TBA

PRICES FOR 2009

Above are our kit prices for 2009... or at least the start of 2009. We have every intention of holding them, but if 2008 has taught us all anything, it's that financial and business conditions can change overnight, so the usual caveats apply — prices subject to change, blah, blah.

These prices were determined by a thorough analysis of our costs and margins and represent a very sharp pencil. If you take them as a whole, they represent an increase of approximately 3%. Some sub-kits have increased more than that, some have not increased at all. This is a result of our careful cost analysis — rather than take a broad brush to all the subkits and raise the prices by a blanket percentage, the new numbers represent real costs.



Here's a brand new Australian RV-10, registration VH-OSH. Makes you wonder what kind of trips the owners have in mind, doesn't it?

"We are pleased to advise that our RV-10 "VH-OSH" had its first flight on 17 Dec 2008 at Hervey Bay Airport in Queensland, Australia. The project has been exhilarating to say the least.

We want to especially thank Colin and Yvonne Crittenden of Hervey Bay and Jake Jansen of Aero Assist for their expert help and support throughout the project.

VH-OSH now has 27 hours of flight time and is performing well.

Kind regards and happy flying"

Evan and Tania Andrews
40379 builders.... and now flyers.

CAPTION CONTEST



We didn't get many entries, which was too bad....the photo has soooo many possibilities.

Now....drum roll....the winner, based solely on the fact that it made me smile when I read it, is RV-7A builder Scott Diffenbaugh:

"YOU KNOW TIMES ARE TOUGH WHEN VAN IS WILLING TO TRADE AN AIRPLANE KIT FOR A TRUCKLOAD OF TWINKIES."

A shiny new Van's 2009 calendar is on the way to Scott.

We have fun with these photos and captions, so if you have any candidates, send them along.

RETIREMENT PARTY

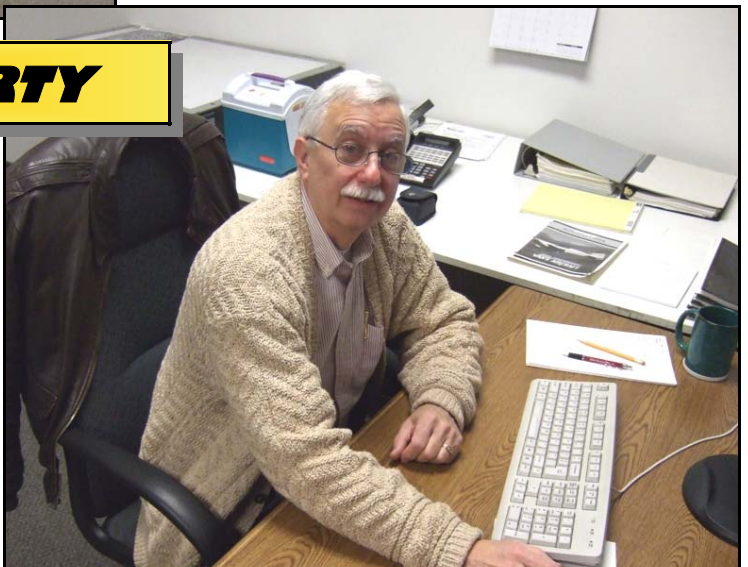
It doesn't seem too long ago that Bruce Reynolds was the NGOP — the New Guy On Phone. But RVs aren't the only thing that fly around here — time does as well.

Bruce joined us seven years ago after a full career as a machinist/sales rep at Adec, a local manufacturer of dental equipment. While at Adec, he'd built a good deal of a Barracuda (a plans-built wood two-seater) and all of an RV-6A, which he still owns and flies. His background suited our needs well, so Tom Green recruited him into the tech help department.

We didn't ignore his abilities in the shop either. Bruce spent a fair portion of his time in the production and prototype shops, building fixtures and instructing personnel working on mills and lathes. His work helped us improve our production accuracy and develop new and more efficient production methods.

Bruce lives on a small grass strip about fifteen miles south of Aurora where he recently built a large shop building. Now he's decided to play by his own rules, with his own tools, tuning up his '41 Ford, building working mechanical models, maintaining his RV-6A, building all sorts of useful bits and pieces for different "things". He'll also learn which end of a dog sled the dog belongs on...

Bruce retired on December 31. We wish him all the best and look forward to seeing what comes out of that shop.



RESUBSCRIBE to the *RVator* !!

The *RVator* is available on Van's website for free, but if you're a print person, we also offer the printed black and white version. Six issues a year for \$15.00 — the same price it's been for years and years. Just fill out and return this form.

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PARTING THOUGHTS

KEN SCOTT

So, is 2009 the year you stop sitting on the sideline and start building an airplane?

*I read **Gene Bumgarner's** post on Doug Reeves site just after I'd taken my RV-6 on*

its fifteenth anniversary flight. His words made me think: my airplane's been flyable for twelve and a half of those fifteen years, giving me eleven hundred airborne hours and uncounted emotions of every type including several moments of real joy. I started building when I was 37 — which seems impossibly young now — and often wished I'd started it ten years earlier. It's been with me in one form or another for twenty years. But what if I hadn't built it... Here's Gene's story, slightly edited:

The fellow that got me into flying (after I'd dreamed about it for half a lifetime) suggested the RV-6 to me in 1994 after I complained that I hated renting. I read the material on the RV-6 and thought it was a really neat idea. I bought a compressor and stopped. Things I thought were getting in the way — things I now see were minor inconveniences, not real roadblocks. I bought into a bad partnership and sold. I bought a C-150 in Ohio and flew her home to Washington State with 79 hours under my belt. I sold half interest to a good friend and it's worked out great.

I never could get used to the poor performance of the C-150 in the mountains and it takes forever to get somewhere. I found Dan Checkoway's site and read it every night. I fell in love with the RV. I finally started building an RV-7 in September. But now instead of being 42, I'm 57. I can't see them dang little holes when dimpling, I can't bend worth a darn, I like to go to bed way too early and I should have been flying one of these for years now. I've worked with my regular glasses on upside down to get the right transition lens lined up and it is embarrassing when the dog rolls his eyes and leaves the room. It's a little more physical effort now but I WILL NOT give up my dream !

Don't wait, do it, do it slow if that's the only way, but don't put it off.

