VAN'S AIRCRAFT RV-6A

SURVIVOR

Van's Aircraft enters its third decade on a roll.

BY MARC E. COOK

It's no secret that homebuilt airplanes have matured and prospered in ways few would have predicted 10 or 15 years ago. New designs from across the country pour into shops and garages at a nearly dizzying rate. And with this newfound success and diversity comes ever more sophisticated marketing, with the leading kit manufacturers able to out-slick and out-promote the Wichita types. What's more, with the revised certification compliance programs recently announced by the FAA, we may see some of the new kids on the block turn into the establishment in the decades to come—kind of like the Berkeley hippie shedding the bookstore job and Birkenstocks for the stock exchange and Florsheims. ■ Into shiny wingtips Richard VanGrunsven's feet do not easily slip, however. A man so low-key as to make Paul Tsongas seem like Richard Simmons, Van, as everyone calls him, has shepherded one of the longest-

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lived kit airplanes from humble roots to something of an aeronautical empire. Highly regarded by his competitors and adored by the builders, VanGrunsven has penned a series of airplanes—the RV-3, RV–4, RV–6, and RV–6A—that have become popular because they are, like the man himself, understated, straightforward, and absolutely no-nonsense.

Since starting to sell plans to the single-seat RV–3 in 1973, Van's Aircraft has cranked out approximately 3,500 airframe kits, with about 700 having been completed, the majority of which are the two-seat RV–4. An additional 3,000 sets of only plans have been sold. The completion rate has been accelerating for some time, with an average of one first flight every 3.5 days, or about 100 new RVs a year.

As with many designs, the VanGrunsven airplanes sprang from his dissatisfaction with another model. In 1962, VanGrunsven was flying a Stits Playboy, a single-seat, low-wing taildragger with a 65-horsepower Continental. Unhappy with the airplane's speed, he swapped out the engine for a 125-hp Lycoming, but the Stits was still no P–51. So in 1965, VanGrunsven designed and built a set of aluminum cantilever wings to replace the Playboy's strutted, wood-and-fabric wings. This transformed the airplane, and VanGrunsven flew it through 1968.

From the lessons learned with the Playboy, VanGrunsven penned the RV–3, an all-aluminum airplane quite similar to the Stits; it flew in late 1971. This single-seat taildragger was intended to be a sport airplane, capable of performing aerobatics for fun (rather than being a *pur sang* acro competitor) and conveying the pilot with reasonable dispatch to wherever fun might be found. By 1972, Van's was selling plans for the airplane.

Bowing to market demands, by the mid-1970s, VanGrunsven started work on a two-seat version of the RV–3, which would be called the RV–4.

That the RV–4 gained an extra pillion by placing it in tandem reflects VanGrunsven's thinking: Make the airplane remain a pilot's airplane, make it fly as much like the single-seater as

The Van's Aircraft current fleet includes (across the top): the RV–6, RV–6A, and RV–4. The latest addition is the RV–6T 180-hp version of the RV–6A (far left, foreground), flying in formation with the RV–6A. Father of the fleet, Richard VanGrunsven. The RV factory (above).

possible. He felt the tandem arrangement was best, preserving the basic lines and hindering weight and aerodynamics the least. The RV–4 was a success right out of the box.

But still the builders began calling for a side-by-side airplane, one where the spouse's view would be more than the back of the pilot's head. In this case, though, one builder, Art Chard, took it upon himself to answer the question. He began work in the late 1970s on a side-by-side version of the RV–4, with some help from the factory. His version flew two years before the RV–4 and was dubbed the RV–6 by Van's Aircraft. Unfortunately, the airplane turned out to be about 17 knots slower than the RV–4, validating VanGrunsven's contention that tandem seating was the way to go.

Finally, however, the company, now long tired of hearing from builders about a side-by-side airplane, decided to give it a go after all. In 1985, development began in earnest on the RV–6. Using a shallower canopy and tighter cowl than Chard's design, the RV–6 proved to be only slightly slower than the –4 and managed to retain much of the smaller airplane's handling qualities. Grudgingly, VanGrunsven admitted that the side-by-side concept could work.

Yet more queries from the builders (and prospective builders) for a tricycle version of the airplane resulted in the RV–6A, which first flew in 1988. Currently, kit sales are split three ways, among the RV–4, RV–6, and RV–6A. VanGrunsven admits that very few RV–3s are ordered today, much to his dismay—you can see when he says this that the –3 is his emotional favorite. In fact, when we visited Van's North Plains, Oregon, facility, there was a –3 in construction intended to be as light as possible, with the exclusion of starter, electrical system, and anything on the airplane that doesn't make it fly. With a gleam in his eyes and characteristic understatement, he says, "This one ought to be fun."

On our visit, we spent time with the –6A, largely because it has the most mainstream appeal, and because it forms the basis of a new model for Van's, the RV–6T, a 180-hp, constant-speed-prop version of the RV–6A. Still in flight test, the gleaming red RV–6T employs a number of refinements, including a taller, sliding canopy—its maximum gross weight has also been

boosted 50 pounds, to 1,650 pounds. Van's intends to certify it as a trainer/sport model under the revised certification compliance rules. It is also the only factory airplane to be fitted with IFR-capable radios and instruments.

As with all RVs, the 6A embodies the prime VanGrunsven design tenets: Keep it simple, keep it light, make it strong. Looking a bit like a Grumman two-seater, the RV–6A sports an impossibly stubby, constant-chord wing and a vaguely P–51-like tail. The wing, VanGrunsven says, is a NACA 230-series airfoil that has excellent characteristics for this airplane. It is easy to build and relatively insensitive to its surface condition, especially next to some of the laminar-flow airfoils. So whether it's bugs on the leading edge or imperfect build-up, it will remain forgiving. Other benefits include lighter weight than a higher aspect-ratio wing and reduced adverse yaw, because the Friese-type ailerons are so close to the aircraft centerline. Plain flaps reside inboard of the ailerons.

The RV's panel and sliding canopy (on the new -6T) highlight Van's reputation for efficient, conventional design. The fuel selector (right) clearly points to the tank in use.

Appearances are deceptive because on looks alone, the RV–6A doesn't suggest the superb handling to be found. And while you might have excused RV owners waxing poetic about their airplanes' handling qualities, their boasting goes beyond mere parental pride. In

every flight regime we sampled, the RV–6A's handling is exemplary.

Where many airplanes have traded control feel for stability, the RV–6A seems like the ideal compromise between yank-and-bank fantasy flights and the dulling reality of the long cross country. Lightest are the ailerons, with plentiful authority; during stall demonstrations, it's possible to waggle the wings on aileron input alone, well into the stall buffet. Pitch response is heavier, followed by a heavier-still rudder. Short-period longitudinal stability is excellent, and the airplane sticks to trim airspeed tenaciously. It is also more yaw-stable than such a short airplane ought to be.

Performance usually comes at the top of the list of questions, and the RV series as a whole does well in this regard, no surprise, really, considering the airplanes have low power loading. At 1,650 pounds and 180 hp, the new airplane has the maximum weight of a Cessna 152 but the power of an Archer, so there's little wonder why it pulls itself off the runway in even less distance than the 300 feet quoted for the 160-hp RV–6A. Maximum weight of the 160-hp airplane is 1,600 pounds, and it's capable of the aforementioned short takeoff roll coupled with an initial climb of 1,400 fpm. (And this is the most sluggish of the RVs; a 150-hp RV–3 can manage 2,300 fpm initially.)

Once leveled in cruise, using 75-percent power, the RV–6A can run up to 164 knots at 8,000 feet, a figure we verified on our visit. The taildragger RV–6 is slightly faster at 166 knots, in turn led by the 168-knot RV–4 and 174-knot RV–3. In other words, Bonanza speeds on Skyhawk power. Service ceilings range from 25,000 feet in the RV–3 to 16,300 feet in a maximum-gross RV–6A, which can claw its way up to 20,500 feet with a single soul aboard. Stall speeds run from 45 knots in the RV–3 to 48 knots in the RV–6A. Fuel capacity varies by model, ranging from a standard 24 gallons in the RV–3 to 38 gallons in the –6A.

At 43 inches, the cabin is quite wide, and you'll find plenty of legroom and shoulder room. With the side-by-side seating, the RV–6 and RV–6As panels are large enough for about all the gadgets your budget can stand. But be careful of the weight: With a typical empty weight of the –6A as 995 pounds, payload is 377 pounds, or two FAA-standard types and a bit of baggage. A panel full of twinkling lights could cut deep into that.

Somehow droning around at cruise settings seemed a waste of the airplane's potential, so we hopped over from the Van's factory grass strip to Portland-Hillsboro Airport for pattern work. It would be reasonable to expect a short wing like the RV–6A's to be sensitive to proper airspeed on approach, and it is. The magic number is 69 knots. At or above that velocity, the airplane is solid and stable, with a normal descent rate and angle. Drop it below 69 knots, and that old aspect ratio thing comes into play; the sink rate picks up in earnest. Not that the airplane is knife-edged in this regard, but the characteristic is there and quite dramatic if you're looking for it. Ultimately, though, there remains enough energy once into ground effect that the high sink rate can be easily managed, and with a bit too much speed, the airplane will even float a bit. A Mooney it's not, but it is more forgiving of a dragged-in approach than an old Hershey-bar Cherokee.

If you get from this description that the RV–6A is in every way except performance conventional, you're getting the point. Conventional also describes the construction materials and methods. Nothing on the airplane would raise the eyebrow of someone who had been hammering together Cessnas or Beeches for decades. You have your basic stressed aluminum skins, standard rivets, and the occasional use of fiberglass on fairings and the cowling. Some builders admit to being apprehensive about riveting, but most agree that with some practice the routine becomes second-nature, and the anxiety level therefore drops quite dramatically.

As for build time, Van's estimates range from 1,200 hours for the RV–3 up to 1,800 hours for an RV–6A, which assumes a basic airplane with no fancy paint, interior, or avionics. Forty or 50 man-hours can be saved by purchasing the main wing spar premade from Phlogiston Products of Forrest Grove, Oregon; cost is $695. Many builders have taken advantage of Phlogiston's spar service to cut the build time and to ensure that such a critical component is done *absolutely right* (although Van's has done the drilling on the standard spar to reduce the chances of builder error).

Conventional materials and design help keep costs in line, too. The basic kit, which includes plans, all the raw aluminum cut and in many cases formed to final shape, hardware, and fiberglass pieces, runs $9,975 for the –6A, $9,370 for the –6, $8,660 for the –4, and $6,310 for the –3. Add to this the usual engine, prop, interior, paint, instruments, and radios, and you could have a basic, no-frills –6A in the air for around $20,000, assuming you found a used, overhauled engine and didn't go crazy with the options.

And what you get for your investment of both time and money might not be the flashiest airplane on the ramp, but it will be a solid, thoroughly tested and understood conveyance. These are qualities that have helped the RV series sell itself for almost 20 years now, a situation that shows no signs of letting up. □

Van's Aircraft RV–6A
Kit price: $9,975

Specifications

Powerplant	Lycoming O-320, 160 hp
Propeller	Sensenich fixed-pitch, 70-in diameter
Length	19 ft 11 in
Height	7 ft
Wingspan	23 ft
Wing area	110 sq ft
Wing loading	14.5 lb/sq ft
Power loading	10 lb/hp
Seats	2
Empty weight	995 lb
Max takeoff weight	1,600 lb
Fuel capacity, std	38 gal (38 gal usable)
Oil capacity	8 qt

Performance

Takeoff distance, ground roll	300 ft
Rate of climb, sea level	1,400 fpm
Max level speed, sea level	174 kt
Cruise speed (fuel consumption)	
@ 75-percent power	164 kt
8,000 feet	(8.4 gph/50 pph)
Landing distance, ground roll	500 ft

Limiting and Recommended Airspeeds

V_A (design maneuvering)	117 KIAS
V_{NO} (max structural cruising)	156 KIAS
V_{S1} (stall, clean)	50 KIAS
V_{SO} (stall, flaps)	48 KIAS

For more information, contact Van's Aircraft, Post Office Box 160, North Plains, Oregon 97133; telephone 503/647-5117.

All specifications are based on manufacturer's calculations. All performance figures are based on standard day, standard atmosphere, sea level, gross weight conditions unless otherwise noted.

A BUILDERS' STORY

The family that bucks rivets together. . . .

BY WILLIAM L. GRUBER

If you took all the standing jokes in the homebuilding community seriously, you'd think that building your own airplane must be a leading cause of divorce in America.

For George and Becki Orndorff, proud owners of a new, homespun RV–6A, quite the opposite is true.

It would be just as cliché to wax poetic about how much closer together their homebuilding project brought them, but for the Orndorffs, the RV was an equal partnership from the start. Their experience proves that kitplanes and domestic tranquility may indeed coexist in the same household.

George, 40, and Becki, 39, are computer specialists who work together in an office at the U.S. Army's Fort Detrick in Frederick, Maryland. They turned the basement of their home in nearby Myersville into a miniature airplane factory and, in a few years, have gone from kitplane novices to relative experts who now even offer homebuilder seminars in their house.

They had discussed the idea of building an airplane even before they were married in February 1989. Although George earned his private pilot certificate in 1985, he hadn't flown nearly as much as he would have liked to, in large part because he couldn't justify the high cost of renting airplanes. With his own airplane, he figured, he could better rationalize the expense, and he'd have something tangible to show for the time and money invested in flying. Becki was all for it. "I just wanted to fly," she explains.

By chance, they met Craig Fuller, a local homebuilder who was hard at work on an RV–4 kit. The Orndorffs stopped by Fuller's house one day to look over a land parcel he had for sale. "Craig's in the basement working on the airplane," Fuller's wife said after answering the door.

"Airplane?" George recalls saying with heightened alertness. They spent the rest of the night in Fuller's cellar, talking homebuilts. It was the beginning of a rewarding and educational friendship that still is going strong.

In April 1989, the Orndorffs ordered their airplane kit sight-unseen from Van's Aircraft. They chose the RV–6A for its side-by-side seating and tricycle landing gear. Also, they preferred working with metal rather than fiberglass, in part because Becki feared an allergic reaction from the resins used to build a glass airplane. Another big reason was the infectious enthusiasm Fuller felt for the RV prod-

PHOTOGRAPHY BY MIKE FIZER

ucts and customer support. As their kit made its way toward Maryland, George was on his way to Oregon. "I saw the factory, met Van [company owner Richard VanGrunsven], and got a ride in his 6A out there," says George, who was pleased with what he heard and saw on his visit.

The week after the kit arrived, the Frederick chapter of the Experimental Aircraft Association held its first annual RV Forum. The Orndorffs attended, hungrily soaking up as much guidance, instruction, and advice as they could, then rushed home to practice their newly acquired skills.

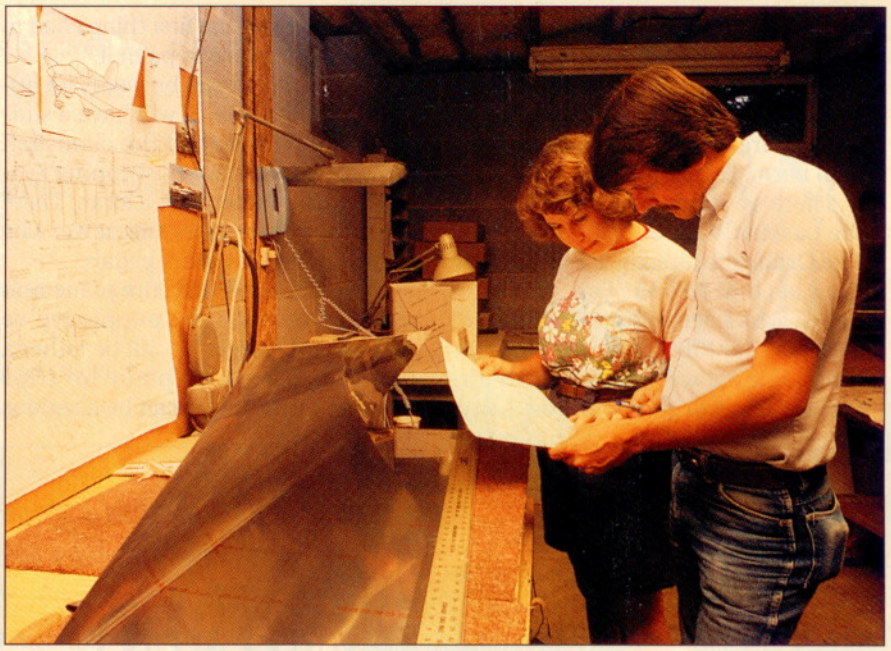
"I'd buck and she'd rivet, then she'd buck and I'd rivet," recalls George. "We decided that she was a better bucker and I was a better riveter, and that's what we stuck to." Becki

"The best part was when it flew—and* it really flew," *Becki says, as if she's still a little awed by it all.

was an avid and active partner in the entire kit-building process.

"I guess we are both just natural-born builders," says George. Becki had been active in crafts, and together the couple had restored an old MG Midget, but this was their first project on such a large scale.

"Craig was a godsend," says George, with enthusiastic nods from Becki. "He was just there whenever we panicked and needed help. It would be 9:30 at night, and I'd call up and say, 'Craig, I screwed up, and the



whole airplane is garbage.' He'd say, 'Now, calm down. I'll be right over.' "

The Orndorffs soon discovered that RV builders comprise a warm and supportive network (now that they are experienced builders, they routinely get three or four telephone calls a night from others who are just starting out). They also made frequent calls to the factory, receiving friendly, helpful responses from VanGrunsven. "It seems there's a real camaraderie with the RVs," says George. "I don't know if it's the plane or the type of people who like working with aluminum and metal, or if it's Van himself and the company. Once you get to know Van, you can't help but like him."

The most difficult phase of the building process was the finishing kit, including the canopy and cowling, which must be sanded to a perfect fit. "You put it on and take it off and put it on and take it off," says Becki. The easiest part, they agreed, was the fuselage, which is fairly straightforward and has lots of open access room.

"The empennage," George says with a grin, "is the scariest part, because you just know that if you screw that up, you're going to fall out of the sky and die."

What's the best part?

"The best part was when it flew—and *it really flew,*" Becki says, as if she's still a little awed by it all. George nods and smiles: "It really flew."

That first flight took place on September 28, 1991. Fuller, a former airline pilot much more experienced than George in high-performance airplanes, offered to make the first test flight. The aircraft lifted off spritely from Fuller's backyard grass strip in the early morning and performed flawlessly (the Orndorffs got it all on video). Fuller circled the field several times, tried stalls and configuration changes, then landed. After the cowling was removed and everything checked out okay, Fuller gave George a check-out in his new airplane.

George and Becki estimate that it took them about 2,000 hours to build the RV–6A, with a six-month break to

The completed RV–6A (above and left) was well worth the effort, according to proud owners George and Becki Orndorff. The couple (above and below) is now hard at work on their next RV–6A project. The second airplane will be Becki's.

build their new house. The basement has several concessions to their avocation, including a 14-foot removable wall, off-center support beams to allow more working area, and higher than normal ceilings.

There's a modest machine shop in the basement, and it's far from idle. The Orndorffs already are at work on their second RV–6A. This one is for Becki, who earned her private pilot certificate in July, about four months after starting work on her own airplane. "It's going to be yellow," says Becki. "That was the first thing I had to figure out, was how to paint it."

Becki's aircraft will be nearly identical to the first one. It will have a sliding canopy instead of the clamshell design and a Global Positioning System receiver rather than a loran. There are minor changes in the newer kits such as different rudder pedals.

"We're tickled with the plane and just tickled with the people we've met," says George. "It can be either a Saturday-afternoon plane for trips near the airport, or it can be a serious IFR airplane in which you can fly around the world."

The Orndorffs have made several cross-country forays, including a trip to the EAA convention in Oshkosh. They bear in mind their relative newness to the airplane and limited flying experience—George is a VFR pilot with a little more than 200 hours, about a third of them in the RV. But the aircraft has been all they hoped it would be. Except for early cooling problems resolved by changing the oil cooler, the RV has performed without a hiccup.

Meanwhile, the Orndorffs have become more and more involved in the homebuilder community. George now is president of the local EAA chapter ("Four years ago, I stumbled in not knowing how to spell EAA," he quips), and VanGrunsven is a personal friend who stays at their house during the local RV forums. The couple even volunteers to work in the Van's Aircraft booth at Oshkosh.

This year, the Orndorffs produced a video on how to use tools needed to complete an RV, and they now are at work on a more polished instructional video for builders.

They also enjoy conducting seminars for novice builders. Classes comprise no more than four people, each of whom pays a modest $150 for the weekend course, which covers all basic building skills. The Orndorffs have duplicates of all necessary tools and supply all materials, with lunch provided to boot.

"We've had a ball doing the workshops," says George. "We've had husband-and-wife teams, father-and-son teams, neighbor-and-neighbor teams. We've also had people who were complete strangers, but they always exchange phone numbers at the end of the weekend and leave as friends."

The empennage on Becki's airplane is nearly complete, and the wing kit is on order. Now that the Orndorffs have mastered many of the tricks of the homebuilder trade, the work tends to go a lot faster. But they still figure that it will be another two or three years before Becki's yellow hornet makes its maiden flight over the Maryland countryside.

"We built the first one fast because we wanted to go fly," she explains. "Now we have an airplane, so we don't spend every weekend working on the airplane. We want to go flying." □