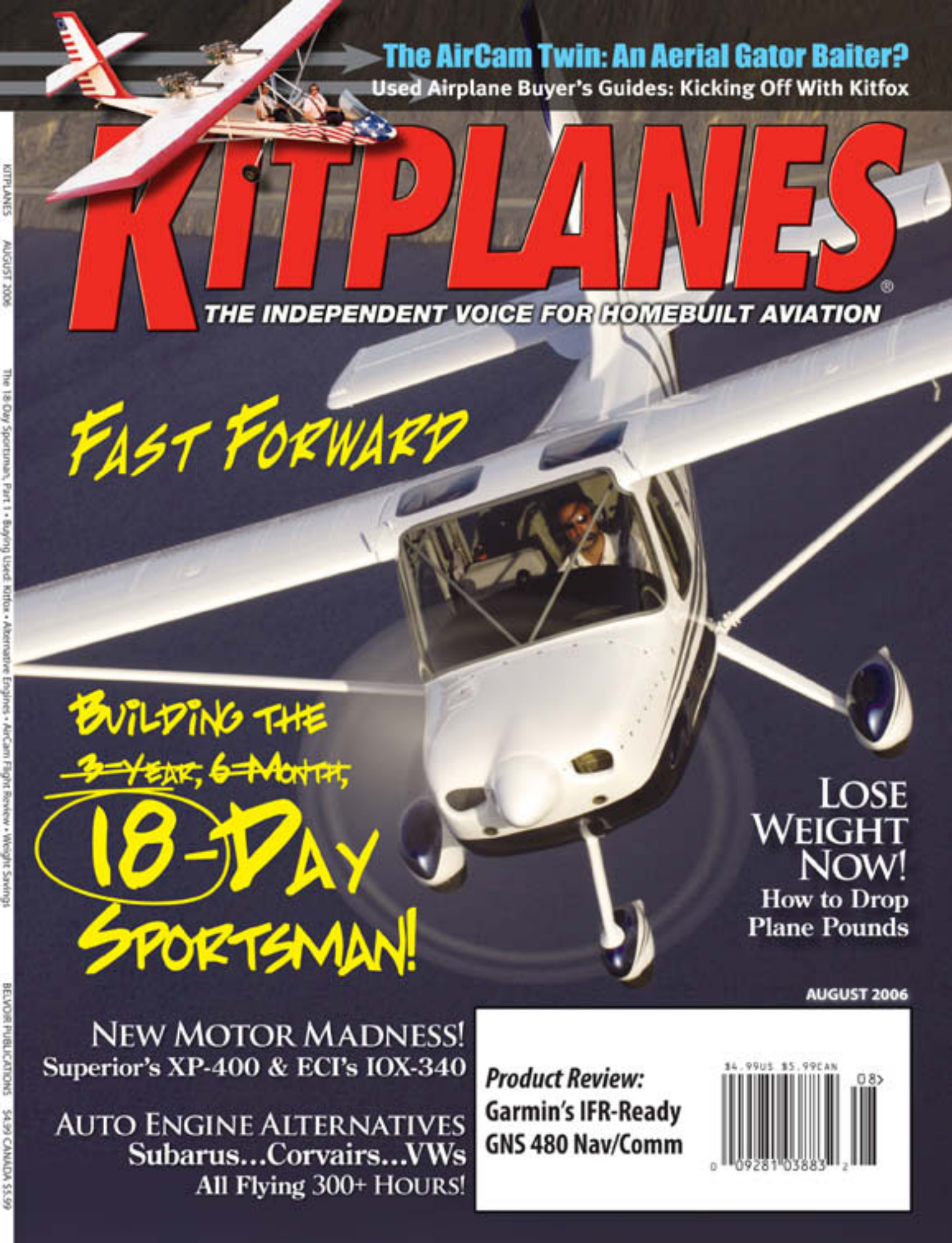
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The 18-Day Sportsman

Or, how to lose a couple weeks of your life and *gain an airplane.*

BY MARC COOK

In the beginning... This is N30KP before Day 1 of the prototype CAC program. It's already hoisted onto a special jig that keeps it level and stable.

Two hours in, and it's time to trim the wing struts. This and drilling the top mount holes would take weeks at home because of the need to be super precise in locating the holes and setting the wings' dihedral.

The author works alongside Brandon Rodstol drilling through the composite shell for one of the many cage-attachment fittings. It's early so everyone looks happy.

As I sat in N30KP atop a wet and darkening ramp on the last day of January, I thought wistfully back to the early planning days of this amazing project—when I could spend time in the comfort of my office and imagine what might be. It was a lot less work than the reality.

Day 2—green shirt day—and it's time to start riveting. Seth Town, barely seen, holds the bucking bar and offers pithy critiques. "Good," said quickly means "Well, it doesn't look like total crap." "Goood," said more slowly, means "Hey, you're actually starting to learn something." Indeed.

Now, around me was an airplane, a real, live, ready-to-aviate piece of machinery that started to take shape on January 9, and only the day before had been blessed by the FAA. An engine that I watched come together not 90 days earlier idled impatiently ahead of the firewall. The cabin was redolent with still-curing vinyl-ester resin and new-engine smell.

I'd completed a comparative handful of low-speed taxi tests, some brake wear-in runs and one high-speed test that proved nothing more than the airplane had enough rudder in the near-calm winds to track the runway and that the elevator could lift the nosewheel from the pavement.

I stopped on the taxiway in front of the hangar and asked one of the guys to come out and look under the cowling to make sure 30KP wasn't leaking any vital fluids or displaying flames from its primer-white belly. It wasn't. I looked again at the sky: 3500 feet broken, higher overcast, light winds and good visibility. About as fine a flying day as you're likely to find this time of year.

Now or...Someday

"OK, let's do it," I told the crew over the radio. With a quick taxi to the departure end of Runway 16, I had time to reconsider. I looked again at the instrument indications—the engine was happy, everything seemed to be working (or on the verge of it...), the airplane had plenty of gas—and ran my pre-takeoff checklist again. I was current, thanks to a flight with Glasair Aviation demo pilot Alan Negrin the day before, during which we practiced several emergency maneuvers in the factory airplane.

That first takeoff was thrilling, as all first flights should be. But it was more for the performance than out of apprehension for the outcome of the flight. Like any well-built airplane, this Sportsman came off straight; the engine showed every sign of wanting to us keep flying. Control pressures were fine, trim good, instrument indications now all in the green. By the time I'd slowed down enough to appreciate the moment, we were climbing through 2500 feet MSL at 1400 fpm. A bit less than an hour later—after an admonition from the ground crew that "you're not supposed to fly at night, remember?" and a series of near stalls to help determine a good reference speed for landing—I brought the airplane around for a slightly hot but smooth touchdown.

This first flight came after 18 working days in less than a single calendar month. It took another full day for the significance of the achievement to fully take hold—but by the end of that day, I had flown twice more and begun working through the list of squawks. Once again, I owned an Experimental/Amateur-Built airplane. *And it felt great.*

Why Are We Here?

The airplane you see here represents a radical departure for the industry. It is, I think, a remarkable bridge between the traditional way of building an airplane and one possible, albeit enticing, future direction.

Distilled down, the barriers restricting entry to our wonderful world of Experimental/Amateur-Built aircraft amount to time and money. Those with the time are likely to embrace the building process above all; that they get an airplane at the end of the deal is just one element of the journey. Those who cannot afford the time have been more likely to use every quickbuild component in the catalog and then farm out every bit of subassembly work they can. This is legal, but some builders take this outsourcing a step further and have entire airplanes built for them; this is, strictly speaking, not legal.

What Glasair Aviation has attempted to create in its new program, a prototype of which hatched the airplane on these pages, is a maximum distillation of time and full leveraging of legal outsourcing. Placed together with a highly developed builder-assist program—called the Customer Assembly Center—these concepts make it possible to take a Sportsman 2+2 from kit components to a machine ready for taxi tests in 12 working days crammed into two weeks. And, more importantly, this program is designed to adhere to not just the letter but the spirit of the rules underpinning Experimental aviation—that we do this for education and rec-

And you thought this was just about building an airframe? Constructing hoses from scratch—and installing firesleeve—is also part of the CAC curriculum.

This is visual evidence of the CAC containment program. Every major construction project is laid out on a table with every part, every tool, every piece of documentation at the ready.

Photos: Richard VanderMeulen, Marc Cook and Courtesy Glasair Aviation

reation. More on how these seemingly at-odds goals are accomplished later.

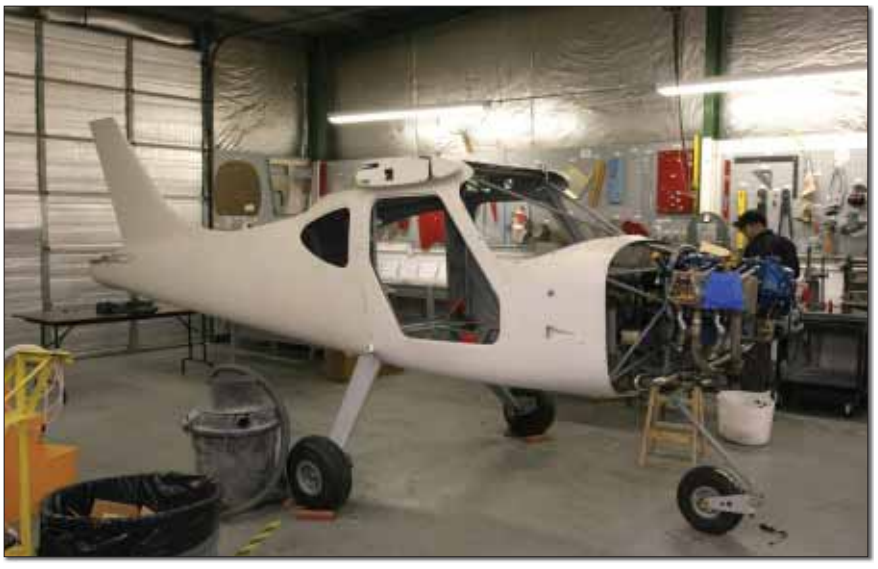
It was through the CAC, as a prototype of the company's Two Weeks To Taxi program slated to start about the time you read this, that my Sportsman 2+2 was taken from first task to first flight in a breathtaking 18 days. My project was a dry run of this new TWT—please don't say "twit"—just to see if such a thing were even possible. Company president Mikael Via pitched the idea to me after I'd indicated my interest in the conventional three-week CAC program. Via felt that because I had previous building experience, I would be the ideal person—read that as guinea pig—to help vet the program.

Why the Sportsman 2+2?

Before we jump right to the building, I'd like to explain the thought process that culminated with an actual airplane. I knew coming into this job in late 2004 that I could not for long resist the siren song of building. I'd done it once (a Pulsar), and was eager to have another Experimental airplane. For myself, sure, but also because this magazine would benefit in a multitude of ways by having, in effect, a company airplane into which exciting new gear could be installed and thoroughly tested.

But which airplane? I have a family of three, so a two-place machine is simply not on the ballot. This requirement narrowed the field considerably. I also wanted to try new materials; I wouldn't mind having another composite airplane—like, say, a Velocity—but I was eager to work some metal.

We're riveting now! Blue shirt means Day 3, and the wing is nearly complete, structurally. Some systems remain to be installed.

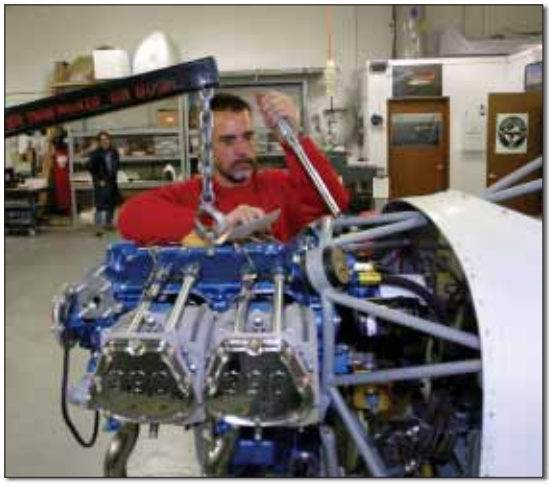


Jumping ahead just a bit. This is the end of Day 5. The airplane is on the gear—has been for a day and a half—and has the engine hung. We pushed the engine hanging ahead in time to be sure the four-into-one exhaust would fit. Yet another prototype part on N30KP!

Sounds like an RV-10 is the perfect fit, right? I thought so, too, but there were two other considerations—ones that are, admittedly, specific to my job—that influenced the decision. One is that we often need an airplane to fly as the camera ship for air-to-air photography. The Sportsman, with the rear cabin door removed, looked good there. It would take some cunning modifications to find a portal in the RV-10 that would make it a good camera platform. (In case you don't know, we never shoot through windows.)

Yes, the joys of priming and painting. Where's his eye protection? It's the end of Day 4, the hardest, so don't ask unless you want an earful.

But it was consideration number two that got me: Late in 2004, I witnessed the old—now superseded—CAC in action. I happened by on a Tuesday on my way to Canada, saw the shop and the process in brief, and then was coerced to come back through on the following Friday. The progress in the Sportsman under construction startled me, and I decided soon after that I wouldn't undertake another long-term, build-in-your-garage project. There was simply too much to be gained by taking advantage of the CAC's facilities and expertise.



The mighty Barrett IO-390 is hung onto the airframe in the early afternoon of Day 5. Still the first week. Don't get weepy; there's still a huge amount of work left to do.

In the months leading up to the start of the build, Via continued to fill me in on the process and began sprinkling the

Alongside subassembly projects come extensive maintenance-oriented discussions. It's Day 3, and the airplane is being readied to go on the gear.

seeds of the TWT program. My original goal seemed hugely aggressive: Start the airplane and fly it within 90 days. As we worked though planning, the focus then shifted to doing it in 60 days, a figure I thought at the time was ludicrous. Then, just a few months before I was to start, Via floated the idea of doing it in 30 days. He'd outlined the process, showed me the prototype syllabus of TWT and I reluctantly agreed that if everything went smoothly—no production delays on their end, having an engine, prop and avionics suite ready to go by the first of the year—we might, just might, get it done in 30 days. Hence the registration number: N30KP. I figured it would perhaps be a way to motivate the troops.

I had no idea this estimate would turn out to be conservative.

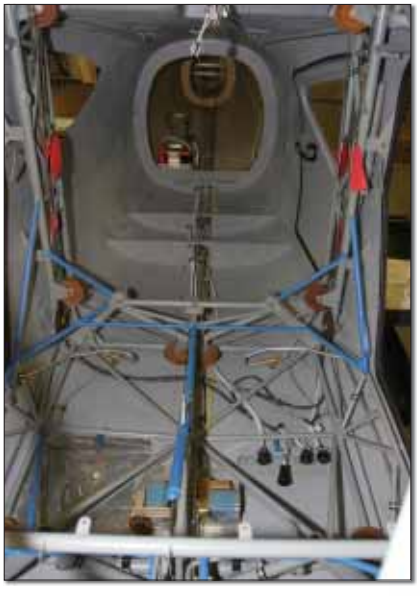
January in Arlington

I'll say this about the Pacific Northwest: It has great summers. Long days, moderate temperatures, plenty to see and do. Early January, well...not so much. My home away from home was the Hawthorn Suites, a very comfortable and reasonably priced hotel about 7 minutes from the CAC facility, which is located a stone's throw from the Arlington airport. Every morning: Breakfast, a double or quad latte from one of the six coffee stands between the hotel and the CAC—

I kid you not; I counted them—and a quick drive in dark and drizzle to the shop. It would be useful to find a new routine because, as I was to discover, the work pace would be relentless.

Every session started with a 15-minute briefing on what was to be accomplished during that day coupled to a look forward to any outstanding items that might pop up later in the week. Like a good fighter pilot, the CAC's focus is not just on the job at hand but the jobs that will take place a day or three down the road. When you're moving at this pace, you simply cannot afford to be held up waiting for parts. In fact, the CAC's relationship with the factory—it is a wholly owned subsidiary—ensures that the basic airframe components will all be there on time. (I also came to depend on Aircraft Spruce having a massive stock of parts as we came to the true prototyping part of the project. Thanks to them and FedEx is all I can say.)

Crucial to the success of our mission was starting with as many quickbuild components as possible. For the old CAC and the new TWT, you're obligated to plump for every QB option in the catalog, but I think they're an incredible deal. The wings, for example, come



Jumping to Day 9. The inside of the fuselage starts to get cramped. The factory-supplied wiring harness—note the canon plugs on the floor—was installed in a day.

Yes, You'll Get Your Hands Dirty

Brian tries his hand at countersinking fiberglass, a tricky prospect any time. Next came nutplates. "How many are there on a Sportsman, anyway?"

Months earlier, when talk of Marc Cook's Sportsman 2+2 first heated up, my excitement grew as the plan began to hatch. I could just picture it. . . Me, apprentice extraordinaire, always in the right place at the right time with the right tool, ready to offer the master craftsman an assist before he even knew he needed one. Dirty work? No problem. If Marc needed someone to spend hours deburring holes, mixing epoxy or sweeping the floors, I'd be the man for the job.

I've got a hankering to build, you see, but I'm still assembling the puzzle pieces on the road to a project of my own. So what better way to gain some expertise than to serve as right-hand man on a cool project like the Sportsman? A week here, a week there. . . I'd be a homebuilding virtuoso in no time.

Until, ahem, I heard about Glasair's ridiculously accelerated build program. Three weeks? With an unforgiving magazine production schedule pasting me to my office chair, I worried I wouldn't even get my hands dirty! And that role I'd so gleefully envisioned myself in? Taken. Yep, there were two guys on the building team ready to serve as the perfect assistants—Seth and Brandon, whoever they were.

Ah, well, hopes deflated. But when it came to Glasair's assist program, I took solace in the fact that Marc fit the customer profile perfectly—he wanted to fly *now*, and he didn't have an unlimited amount of time to build. So while Marc adjusted to the early days of the hypersonic build process, I trekked the 2900 miles across the continent to witness a full day of madness in the Arlington shop.

Following the requisite caffeination ritual of the Seattle area and an explanation from Marc about why it was still pitch black at 7:30 a.m., we headed to the facility. Morning started with the team gathered for a planning session: goals were stated, strategies discussed and challenges considered. After almost two weeks of building, Day 10 promised to be interesting—the instrument panel was scheduled to arrive.

Briefing complete, I stood back, armed with a camera and ready to observe. Marc and his two full-time teammates manned their positions and wasted no time starting. The pace was quick for sure, but not to the extreme I expected—I'd pictured guys running around the shop at double speed, giving instructions and shouting orders at the frenetic tempo of the ATC guys at New York Approach.

As the day progressed, I acquired a quick introduction to what makes this program work. In short, it's the organization of the workflow to a minute level. Need a tool? Someone's handing it to you. Don't understand the next step? There's someone to explain it to you. Understand how to install these nutplates? Great, we'll do the rest for you.

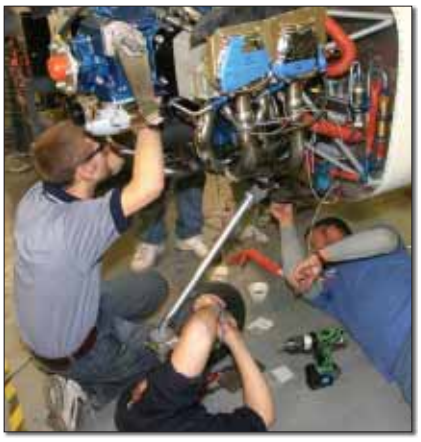
No doubt, there are those of you in the audience who eye this breakneck program with suspicion. The hired guns exist out there—we all know it—and the CAC is just a better publicized outfit for illegally turning out ready-to-fly airplanes with an Amateur-Built designation, right?

Wrong. As a witness far removed from the process Marc experienced building N30KP, a single day provided a glimpse into the work ethic it takes to get an airplane built. Marc knows better than me—and he'll tell you this throughout this series of articles—you'll know every component and system just as well as if you'd built the airplane in your garage over the course of four or five years.

That doesn't mean that it's for everyone, of course. There are those of us who want to fly ASAP, and there are those of us who savor every moment of the building process and even suffer builder's withdrawal upon completion. If you fall closer to the first group and are willing to push yourself to exhaustion for a couple of weeks, consider a program like this. But if you're looking for a chance to tour the Pacific Northwest, stopping by only to sign a few checks and make a few appearances to keep the DAR happy, look elsewhere.

Nobody stands around at the CAC, I learned quickly. By day's end, I'd installed the tiny latch on the oil access door, riveted the whole oil door assembly to the cowling, drilled out and inserted an inordinate number of nutplates along the edges of the top and bottom cowling halves, and shaped and prepped a section of stainless steel destined for reinforcement at the nose wheel attach point. Oh, and I even got to lend a hand while the guys fitted the instrument panel. I know every time Marc pops the hatch to check the oil or removes the cowl to change an oil filter, he'll think of me. Yes, I got my hands dirty.

—Brian E. Clark



Welcome to the scrum. The author, on the floor, works on the firewall fairing while Seth, left, figures out where the starter wire ought to go. Brandon (dark shirt) documents the IO-390 installation for future builders. You're welcome.

from Philippines—the same shop Van's uses—with all the major components prefabricated. Both spars, all but the end ribs, leading-edge and top skins are all in place. The top is off so you can run controls, electrics and the fuel system, but the wing starts out looking amazingly complete.

It's the same deal with the fuselage: The QB option starts with the cage already mounted to the two-piece composite fuselage shell—a process done by hand with my airplane but that will be semi-automated by what Glasair calls the "yellow monster," a fixture that sets all the critical cage and shell dimensions before they're mated.

Walking in on Day 0—the afternoon before we started—I was amazed by the completeness of the kit and how far along the process was. Little did I know that with this airplane, as with others, looks can be deceptive. The pristine shell beneath the floor of the cage was a sight to behold; in the completed airplane it teems with cables, hoses, wires and other components, carefully weaved together so they all fit beneath the composite seat pans. But there is hardly an inch to spare.

A side benefit I hadn't appreciated until this build is that the CAC feeds back to the factory a hundred small things from every airplane that influence how the kit is built. As Ted Setzer, who has worked on every Glasair prototype built, points out: "We don't get this kind of feedback from normal kits. The

factory builds one or two prototypes, which often aren't a lot like the final kits, and then we hardly see them again. This way [referring to the Sportsman CAC], we get to see a lot of our own product."

So I arrived every morning at 7:30, with a reasonably high caffeine level, expecting to savor every moment of the build. I was there to learn and to improve my skills. That expectation—the part about savoring—was snuffed out by the end of Day 1. Why? The CAC is a lot more like a production line than a traditional home-building program. You don't get to deviate from the plans and instructions often, if at all. (Believe you're coming into the CAC to show the guys who's the boss and you'll be frustrated at every turn.) Improvisation is heartily discouraged. In short, be prepared to build the airplane the factory way.

On the tenth day, the panel arrives from Pacific Coast Avionics. It's been pre-wired with a harness that mates to the already installed airframe's...we fervently hoped. (And, in fact, it did.)

Moreover, because the need to compress time is so great, construction of a Sportsman in the CAC hardly follows the manual. In fact, it seemed for the first few days that we were jumping around almost willy nilly. But it soon became clear that the organization plays a critical role in moving through the project. That and two guys named Brandon and Seth, who worked me like a rented mule. I suppose that's the natural upside of being young, enthusiastic, competent and driven. Them I mean... I batted no better than .500 in that game.

It's the Organization, Stupid!

Each task is defined by its place in the overall scheme with a critical eye toward minimizing the inevitable put-it-together-now-take-it-apart process of homebuilding. But it goes a lot deeper than that. The CAC is organized around maximizing the builder's time on the project.

Think about it. For any task you would perform on your own airplane project, you have to first read up on it, find the parts, assemble the tools, create a clean working space, read up on it some more, commit the actual work, then put the subassembly, tools and supplies away before you can move to the next task. What would happen if someone was there to work ahead, set up subassemblies before you begin and clean up after you? For that matter, how valuable is the expertise of someone who has completed the same airplane you're building? What if that person has done, say, 20 of them?

On the second weekend, the Cook girls arrived: Daughter Millie (flying) and wife Martha offered comfort and approval.

It's Day 12—two days left before being kicked out of the CAC's shop—and N30KP is starting to look whole. The wings are on for the last time—we hope—and the engine installation is nearly done.

These are the underlying concepts, and they're executed to near perfection in the CAC. For my project, we had three of us working full time—Brandon, Seth and myself—plus Ted Setzer hovering over the project working through the prototyping of the TWT program as well as for the IO-390 installation. The breakdown of labor—who does what—is highly variable, but reduces to something like this: One helper normally works directly with you while the other is busy setting up for or cleaning up after a specific task. During my build, Seth was responsible for the wings (generally) and Brandon concentrated on the fuselage and tail section.

I would bounce around like a human pinball. Example? No sooner had I finished a task on the tail, Seth would call, "I'm ready for you." I swear these guys can count rivets by sound or something; there was no chance of lingering on a job to catch your breath. "Hold on, just a few more rivets," won't cut it. For the first two and a half weeks, the standing around time might have added up to 30 minutes excluding lunch and two compulsory 10-minute breaks during the day.

With one day left before having to leave the nest, the Sportsman is wheeled outside for a first engine start (on the airframe). Look, it's raining!

Practice Makes Perfect

One of the prime benefits of a program like the CAC's is that you're working alongside guys who really know their stuff. Let's take riveting the wing. I worked with Seth on it and quickly exposed my lack of riveting acumen. I'd done a little but hardly anything on the scale of a wing. During my program, the first rivets I drove were in my actual

wing. After confessing my concern about my own skills here, the company elected to create a short course on riveting using a salvaged Sportsman wing. This program went into place for the next Sportsman CAC after mine, and provided a couple hours' banging rivets into unimportant metal to get the hang of it.

Nevertheless, after we'd worked most of the way through one wing by the end of Day 2—that's no typo, the second day!—my skills were ramping up and our progress accelerated. It helps, of course, that Seth did most of the bucking and knew how to use the handful of specialized bucking bars created just for this airplane. (How long would it take you, working at home, to come to this solution? An hour? A day? How long would it take to build the massive, steady, accurate wing jig like the CAC's? A week?)

Imagine that every part of the airplane, every system you touch has a raft of special tools and fixtures that save anywhere from a few seconds of setup work to weeks of possible hair-pulling and tooth-gnashing. I'd understood the concept before I began N30KP but only now do I fully appreciate how much time is wasted looking for solutions to problems created by assembly instructions that are described in three words. "Assemble the ailerons."

FAA designee Charlie Cotton (right) offers up a handshake for the completion of the last bit of paperwork. The airplane can finally get its registration numbers applied.

Education and Recreation...Really

Beyond the success of his endeavor—measured by there being a near-flyable airplane at the end of 12 working days—come the ethical questions. (More on this topic in Around the Patch, Page 2.) Is this really building? Am I just watching my airplane taking shape or am I actively participating?

My answer is that this is building, absolutely and positively, just not in the form we have come to expect. During the build, I worked on every system and worked with every material to be found on a Sportsman. I pounded rivets. I worked with fiberglass layups—there aren't many of them in the QB version, but it was a nice way to remember my Pulsar—and I worked on the electrical and hydraulic systems. I assembled minor components like the wheels and brakes, and did the big things like hang the wings and control surfaces. I even got to cut the lift struts to length. (Amazingly, this takes place by 9 a.m. on Day 1, over the span of about 20 minutes. Were I at home, I'd be inclined to spend days or weeks making sure the wings are just right before I cut or drilled even once. Thanks to the fixtures and expertise, cutting and drilling the struts is a minor item on the checklist; no big deal.)

Proof that it flies: N30KP joins the flock on January 31. One milestone down, about a million little tasks left to do...

Recreation is harder to underscore than education but there's no denying the sense of accomplishment as you ease into the shower after a long day, more items checked off the build list during one shift than you could manage, alone, in a month or more. Education comes from actually working the materials, learning the ropes. And, importantly, by modules built into the program that discuss ongoing maintenance items for the airframe.

In fact, my strongest recommendation to builders considering doing the TWT is to really use vacation time. Turn the rest of your life off. Leave the cell phone at home, ask your spouse to keep track of the e-mail. You will not—trust me on this—have the mental (or, probably, the physical) energy to do much more than collapse into bed each night.

Not Quite the Epilog

The airplane flies but it's not finished—builders know there can be dozens of tasks to complete after first flight and Phase I. Ultimately, pushing through 18 dark, dreary days in upstate Washington served not only to break new ground for homebuilding but moved me headlong to where I am now: Not just a builder, but a flyer.

This is just the beginning of the story. I hope you'll follow along in the next few months as I take you through the engine-building process, avionics choices, paint and interior, flight testing and, finally, an analysis of the true costs of building the beast—you may want to cover your ears for that one. It'll be easier for the rest of you because Glasair has instituted bundled pricing for the TWT program, starting at $128,995 for a carbureted, O-360-powered airframe with a fixed-pitch prop, VFR avionics and a basic interior. The price includes every option and accessory you're likely to want—my bottom line swelled by more than $11,000 in options—plus the CAC process itself. The number may seem big until you account for the long list of extras you'd normally have to purchase separately and, more crucially, the value of your time. ✝

For more information on the Two Weeks to Taxi program, call Glasair Aviation at 360/435-8533. A direct link to the company's web site can be found at www.kitplanes.com.