Peterson's Performance Plus:

The 182, Optimized

by Tim Kern

It's one thing to be able to take off and land short, and very much a different thing to do it on soft, or bumpy, or uneven rocky surfaces, with a load of gear. Traditionally, nosewheel aircraft haven't done that task too well. The exceptions come from El Dorado, Kansas, where Peterson's has built a devoted following for its 260SE/STOL, Kenai, and King Katmai, and where you may still see a Wren drop in.

The Cessna 182 has been a dedicated workhorse for decades, fulfilling a wide spot in the continuum of personal aircraft: big enough, fast enough, strong enough – a champion in its weight class. So why make it better?

The real answer is, why not make it better? Make it carry more. Make it easier to land, give it infinitely more available landing possibilities, let it fly and maneuver 'way slower. Increase visibility. In other words, make it able to get into and out of spots a standard Cessna can't even use. As Todd Peterson, President of Peterson's Performance, explains it, "I'm not interested in doing something quick, or something cheap, or something exotic. I just want the best I can get."

Unlike most STOL machines, the modern Peterson's birds aren't slow. Since the canard is effectively trimmed out at cruise, drag is negligible; and while you just can't make 29" tundra tires go fast, the standard-tire versions have aerodynamically-enhanced wheel pants that are slicker than the originals from Wichita.

HISTORY

The concept started in the 1960s, when the Wren 460 appeared. It had a full spread of STOL devices, including a series of top-of-wing air dams that came to be known as "Wren's teeth," plus its most-distinctive feature, a canard with a movable elevator. Though the Wren achieved a dedicated following, that following was quite small. Thirty-some years ago, Todd Peterson was looking at this remarkable machine.

"The Wren was very expensive to build," he found out, "so I thought I'd build without the canard. The [takeoff and landing] distances increased about 40% and the tail authority was diminished without it." That wasn't the solution, so he continued to build Wrens in the 1980s, as he appraised each design feature. "The Wren was a little like the Helio Courier in function and uniqueness, but they both needed more high-altitude functionality, more speed, more ceiling."

After a lot of thought and experimentation, Todd retained the most-effective aero innovations; he upgraded power, interior, and everything else, and offered the 260SE. It turned out to fill the bill quite nicely: "The 260SE has a lot bigger market and took a fourth as much time to build as the Wren."

It is interesting how the "typical customer," someone who Todd insists doesn't exist, came to look at the 260SE: "They wanted a good cross-country airplane with good useful load, but they weren't what you'd call hard-core backcountry guys. Looking at it, they were more safety-oriented than anything."

WHY BUILD A "DUCK?"

Todd emphasized the low-speed maneuverability that the front-mounted elevator provided. "So I went on with the canard [French for "duck"]. The wind tunnel showed that at about 60 knots or more, it does just about nothing. But below 60kt, it becomes more and more effective, the slower you go." It turns out that "where it lifts is just as important as that it lifts." Adding lift at the nose removes the need for download from the tail, and allows a flat attitude at low speeds. Even at 55kt, the wing chord is flat to the horizon. And as the machine slows further, the canard helps even more.

As you're scouting landing areas, the machines "fly flat at low speeds – you don't have that nose always blocking your forward vision." And that's also important, since Peterson feels that "the Skylane is a nose-heavy airplane." The heavy load on the nose wheel limits its use on soft or bumpy strips. The canard helps more and more as speeds decline, to the point where, "Down around 45, the elevator on the nose-mounted canard provides as much pitch authority as the entire elevator. This lets you use strips that are otherwise way too soft or rough."

When it's time to leave, "You have a 35-38kt liftoff. Then you release a little backpressure and you can see straight ahead; by 45, the airplane rotates to dead-flat attitude – you gain available angle of attack; you have a better chance of making a safe emergency landing."

With a more-level attitude, the air atop the wing is clean and the ailerons are thus in clean air, increasing the wing's lift and the ailerons' authority. That means the pilot has more options. "When you're flat, you can do a max performance climb straight ahead (~1800fpm), or you can safely bank the airplane."

Drawbacks? Peterson says, "You've got to be careful you don't snag a wingtip in the dirt! I can flare, touch down, and turn – with one wheel on the ground." Peterson is an airshow pilot with thousands of hours in these machines. Still, he wouldn't get away with that in pretty much anything else – and in nothing with the wide speed envelope of his machines.

Your landing options increase as control options increase, and "At 50-55kt (an average approach speed), you come in flat; you can do 100% cross-control, without having anything bad happen." In demo flights, "I do this – then I cross-control the other way – the airspeed moves in a 10-kt range. Your sink rate may be higher than in, say, a Cub or a Husky, but you're stable."

SO, WHAT COULD BE BETTER? MORE POWER, OF COURSE.

When you think of short-field performance, you have two things always in balance: power and aerodynamics. Peterson explains, "The 230 and the King Katmai both take off at 35 knots, but the [King Katmai's] 300hp gets to 35 a lot faster. With the power, you have a lot of options that you don't have with a marginally-powered airplane."

Getting that power was no piece of cake. "Some of the 550s shake – we had to track that down." While a lot of airframers, Todd says, simply live with it, "We worked with MacCauley to get rid of that – and we still have the rated climb and no vibration. It took us four years to certify the thing, but now it's done, and we don't have the drawbacks." And no, he won't tell you exactly what he did.

Todd continued to offer the 470, even after the 550 was fully developed, but once the IO550 (normally-aspirated at 260hp) became available, "No one has asked for the 470 since."

This is at its core a "get-away" airplane, and things can happen out there, where a service bay isn't available. The fuel injection needs electricity; what if your battery goes dead?

"I wanted something bulletproof for the back country, so I developed a backup manual fuel pump. I'm always looking for ways to increase safety. When I started with the 550, we certified a backup manual fuel primer."

Of course, the bigger engine adds weight, and as Todd already acknowledged, the Skylane starts life a tad nose-heavy. "We developed a full-flap design that helps counteract the additional 40 lbs – the 300 flies exactly like the 470 and the 260SE. With the CG full forward and the 550, I can still trim it up, even with 20 degrees of flaps. (Full flap travel is always available, airspeed permitting.) And in flight, the canard lightens the force required for pitch inputs by half to 2/3.

But, with that lifting surface out front, how does it change pitch in all phases of power and speed? Interestingly but not coincidentally, it's the right size, in the right place, and there is simply no pitch change with power.

"The canard does just what it looks like it should do," said Todd, "but it's also a lot more subtle than it looks. It provides no appreciable lift – or drag -- in cruise, but it really kicks in near the ground, adding useful (AoA) drag and ground-effect lift of the nose, just when the nosewheel is most vulnerable."

And it's not any harder to perform routine maintenance, since it's not mounted to the cowl, but to a subframe inside the cowl, so the cowl can be removed while the canard stays on. Only if you need to do something as involved as pulling a jug will the assembly need to come off; and it hooks back up with a minimum of rigging: the forward stabilizer section goes on in just one position, and push-pull rods move the elevator section, so rigging doesn't change

in a simple on/off procedure. As far as the front elevator is concerned, mounting and adjustment are dead simple: there is no trim, no cables. Travel is non-adjustable, and rigging goes thus: when the rear elevator is at zero, so is the front one.

With all these modifications and developments over the years, what is the Airworthiness Directive situation? What should buyers of used Peterson machines look out for? "We haven't had a single AD, ever. Not even on the original Wren." Match that.

...AND WITH MORE POWER, WHAT ELSE CAN WE DO?

Though the 260SE goes places as fast as a Skylane and flies flat and lands easier (and the Kenai, at 156kt, is a lot faster), Todd had a hankering for more back-country capability. Peterson's had offered a big-tire bird, but didn't push the option, selling one every four or five years.

Then, Todd related, "Long about 10 years ago, I decided to build a back-country machine, just for me. I built the first King Katmai: big tires, 300 horses. I flew it around the back country – I convinced my wife we'd sell 4 of these a year." He didn't. "We sold 26 the first six months." Was there a market? "Until recently, we were building pretty much nothing by but King Katmais – about 30 a year."

CUSTOMIZATION

"Our customers have jets, TBMs, anything they want," says Todd. "This is a getaway airplane. This airplane flies to the back country. It gets away from work; we build for CEOs, race team owners, small business owners."

You can have the safety and performance in a number of ways. Long wing or three feet shorter – "A lot of customers want the safety and low-speed stability, but they want to cruise a little faster and don't go to the far-out strips, so they opt for the shorter wing, so what we're doing is building the shorter wing – we need about 60 more feet of runway (350 vs 290 feet to get off the ground), but they have the higher cruise speed. It fits their flight profile a little better. Oh, yeah, you can still do back country work; you retain the option to get into country you'd never touch with a stock 182."

Customers can spec streamlined wheel pants, or 26 inch, even 29-inch bush wheels; extended cargo options, and "avionics from next to nothing, to everything in the world."

Corporate identity is often carried through to the Kenai or King Katmai – select leathers and custom carpets, logos, colors. Or a full-utility interior. Or some of each.

HOW MUCH WILL THIS COST?

Like everything else, it depends. Peterson says that he and his wife, Jo, an expert sheet metal fabricator and also an airshow pilot, "can take a nice, low-time 182 and roll it out the door for $240-260k; or you can match your corporate image for maybe $300k, including the airframe." A full-corporate King Katmai with a fancy panel can run $440-460k.

"I'm not a water flyer," Todd says, but this year, the first King Katmai on floats is going to a customer who is. There aren't a lot of details available, but he notes that he's mounting the floats that the customer wants.

Todd and Jo are enjoying their lifetime in aviation. "We build for our friends. We fly with our friends. I'm just the luckiest guy in the world."

Peterson says, "There are a lot of good airplanes out there. This airplane, though, is kinda the end of the road – if there were a better airplane, even for $50k more, our customers would buy it. These just do everything well." Over 500 customers in 14 countries tend to agree.

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