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King Katmai Mod: Safe STOL

With a stall speed of 31 knots, climb rate of more than 1500 FPM and no handling vices, the King Katmai is at home in the bush or on the pavement.

by Rick Durden

CHECKLIST

- ⊕ Low stall speed, high performance, good useful load.
- ⊕ Low deck angle when flying at low speed means good visibility.
- ~ High demand means a long waiting list for the conversion.

We've long been of the opinion that lower stall speeds are a good thing when it comes to safety of flight. It's our observation that pilots are less likely to inadvertently stall airplanes that have low stall speeds, and if they do so, having less energy to absorb on impact means more chance of surviving the error.

The Peterson's Performance Plus King Katmai, is the most recent conversion from the fertile mind of Todd Peterson, expanding on his line of STOL mods of the Cessna 182. It is a descendant of the Wren 460 which was an airplane with a stunning 27-knot stall speed. The King Katmai has a stall speed 4 knots faster, but, as a tradeoff, has twice the rate of climb and a few hundred pounds more useful load. As such, it has become a darling of the back-country pilot set, with a waiting list to get one and the few that come onto the used market getting snatched up quickly.

The Wren 460 was developed in the 1960s as a sophisticated modification of the Cessna 182. A push-rod operated lifting canard—stabilizer and elevator—was installed just below the midpoint of the cowling, full-span flaps replaced the ailerons and Fowler flaps and a complex spoiler system referred to as "Wren's teeth" was created for roll control.

Loaded, the airplane could operate from as little as 300 feet of runway, impressive performance for a four-place airplane; however, the mod was expensive, on the order of four times the price of a factory-new 182. The company folded in 1972.

EVOLUTION

In the 1980s, Todd Peterson acquired what few assets there were from the bankruptcy and began building Wrens again. The labor-intensive conversion and owner complaints about lack of useful load led him to consider how things might be improved. His testing showed that retaining the factory wing of the Cessna 182 and using only the canard portion of the Wren conversion would mean the stall speed would increase, but only to 35 knots.

Further, by going to the fuel-injected version of the 182's engine, an IO-470, power could be increased to 260 HP, giving much better climb performance with virtually no weight penalty. The resultant airplane was christened the Peterson 260SE. It could take off or land in 390 feet.

Almost immediately, Peterson began offering a number of versions of the 260SE, including installation, under various STCs, of speed mods. Finding that customers desired varying combinations of mods, as well as refurbishment of airframes, the business expanded. Peterson's company offered everything from simply installing the canard on a stock Cessna 182 through locating and purchasing a good used airplane, doing the full Peterson 260SE conversion, refurbishing the interior and paint and installing a customer-selected avionics suite.

As the 260SE gained popularity

300-HP engine, 31-knot stall speed and heavy-duty gear makes the King Katmai at home on rough, remote strips.

Push-rod-operated canard mounts outside the engine mount, above; brake line is routed behind main gear leg to avoid snags, above right, and gear leg has stainless steel leading edge.

with the back country and bush pilot community, Peterson sought a way to further reduce the stall speed. Installing the Wing-X STC added 18 inches to each wing and reduced the stall speed to 31 knots. The extended wing airplane was named the Katmai, after the National Park in Alaska.

Peterson's next step was to obtain an STC for installation of a 300-HP IO-550 in the airframe. After four years of work with the FAA, the big-engine King Katmai was certified. At a price of $130,000, it has become the preferred conversion sought by Peterson customers.

The full King Katmai modification consists of the canard, 300-HP IO-550, choice of 82- or 86-inch, three-blade prop, speed mods/drag reduction fairings, wing extension, increased gross weight, heavy-duty landing gear, which includes Cleveland brakes, stainless steel leading edges on the gear legs, brake lines faired in behind the main gear legs and routed so they are unlikely to be snagged during rough field operations, heavy-duty Airglas nose strut and oversize tires.

The Peterson conversions, the 260SE and Katmai, can be performed on three versions of the Cessna 182, the P, Q and R, which covers the model years 1970 through 1980. Some 7700 182s were built in those 11 years.

Peterson explained that those years also include a cross-section of changes in the 182 line, such as from spring steel to tubular landing gear, 14- to 24-volt electrical system, uncuffed and cuffed wing leading edges and fuel bladders to wet wings, so that a buyer can have a wide variety of basic airplanes from which to choose. Peterson said that he has no trouble finding and buying very good condition airplanes to convert.

With the STC for a gross weight increase to 3100 pounds, the King Katmai we flew had a useful load of 1031 pounds. With full fuel, 77 gallons, that left an allowance of 718 pounds in the cabin.

Peterson publishes a gross weight takeoff distance of 290 feet from a hard surface runway. Our observation is that it's about right.

Takeoff procedure for all of the Peterson canard mods is to select 20 degrees of flaps, set normal takeoff trim and apply full power. A small amount of back pressure is applied after a few seconds. In a matter of moments, the airplane flies off at about 35 knots indicated. Forward pressure is immediately applied on the yoke to assume a level attitude, although the airplane continues to climb.

By the time we had reached this level attitude, the airspeed was going through 45 knots and the airplane was fully maneuverable. Should the engine fail, the low nose attitude during climb means that maintaining speed in a glide and flaring for landing is possible, something that is not necessarily the case with STOL airplanes that climb out nose-high.

The King Katmai rapidly accelerates to 60 knots indicated and requires substantial nose-down trim to maintain the increased speed. Loaded to approximately 400 pounds below gross weight, on a 60-degree day, we observed rates of climb of 1500 FPM with flaps at 20 degrees and 60 knots indicated. With flaps retracted and a climb speed of 90 knots selected, the rate of climb was 1700 FPM.

In cruise flight, with 65 percent power, burning 13.0 GPH lean of peak, true airspeed was 130 knots. While shoving 29-inch tires through the air, the King Katmai cruised at the same fuel burn and nearly the same speed as a stock Cessna 182.

CANARD

Adding any surface forward of the center of gravity is destabilizing, so we were curious to see whether the presence of the canard would result in any handling issues in pitch. Plus, as it served the reduce the stall speed by providing additional lifting surface at low speed and reducing tail-down force, thus reducing the weight borne by the wing, the positive effects seemed too good to be true.

There's no free lunch in aviation. There had to be some price, and we wanted to know the magnitude. Peterson explained that the canard is installed parallel to the thrust line and has little effect when the airspeed is above 60 knots—it has 7 degrees

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of downward deflection (nose up) and 1 degree of upward deflection. It is actuated via pushrods to a collar around the pilot's control column and rigged so that it is in a neutral position when the elevator is neutral.

The elevator control system of the 182, including the healthy downspring in it that allows the airplane to have such a long cg range, is unchanged.

Rolling into a steep turn from cruising flight, the King Katmai behaved as does a conventional Cessna 182: After 180 degrees of turn, it had decelerated about 15 knots, requiring some back pressure on the yoke and nose-up trim. It then was willing to chug around in circles until we got bored. If there was some reduction in pitch forces due to the canard at cruise speeds, it was not immediately noticeable.

The differences became apparent in slow flight, which proved a delight. Peterson recommends 50-60 knots as a loitering/surveillance speed. With 20 degrees of flaps extended, the deck angle is nearly level and only some 15 inches of manifold pressure is required to hold altitude. The airplane trims hands off, allowing the pilot to safely look over a proposed landing area and transition immediately to a high rate of climb if needed. In this configuration, the airplane would make very tight-radius, 45-degree banked turns, requiring only a slight power increase to hold altitude, something potentially life-saving in a canyon.

FLAT DECK ANGLE

This was our introduction to a STOL airplane that flies slowly without a steep deck angle, and at a relatively low angle of attack, something Peterson touts as increasing safety. We agree—even at 40 to 45 knots, with at least 20 degrees of flap, the nose was not so high that it prevented us from seeing directly ahead of the airplane.

Full application of opposite aileron and rudder at 45 knots did not induce a stall or any handling anomalies. Stalls were as uneventful as a stock 182.

In slow flight, during stalls and when flaring for landing, it was our observation that the elevator forces were less than in an unmodified 182 where raising the nose, especially with a forward cg means pulling against the elevator downspring. With the reduced down load on the tail due to the lifting effect of the canard, and with the effect of the canard providing lift, the force necessary to flare has been lessened.

On approach, a small amount of power is carried, which allows trimming for speeds as low as 45 knots. Twenty degrees of flaps are recommended for a normal, short field, landing as the stall speed does not diminish further with additional flaps. The configuration allows for an easy go around and transition to a positive rate of climb, just requiring nose-down trim, although control forces are not unreasonable.

Below 60 knots, as with any Cessna 182, the sink rate can become impressive, thus some power is generally needed on the approach. Should

NOSEWHEELS IN THE BUSH

Tailwheel STOL purists are undoubtedly firing up their computers to send us nasty emails about the very concept of using a nosewheel airplane in bush operations. Nevertheless, the facts have pointed in favor of nosewheel airplanes as better and safer for bush and STOL operations for some time.

Back in the early 1980s when Cessna was developing the 208 Caravan, it sent personnel throughout the U.S. and Canada to meet and fly with back-country operators to find out what was desired in a new design airplane. They were told by the operators that a tailwheel was desired, but that it was difficult to find pilots who were good tailwheel pilots because the guys they hired kept tearing up their airplanes in landing and takeoff accidents.

Cessna noted that the models 205 and 206 had long been doing just fine in the bush, so it built the 208 with a beefy nosewheel, and it's been a success throughout the remote areas of the world for nearly 30 years.

Any look at NTSB accident reports shows that tailwheel airplanes suffer disproportionately from runway loss of control accidents. While they are rarely fatal, disabling the airplane because of a groundloop or simply by misapplying the brakes, putting it up on the nose on a remote mountain airstrip is a deadly serious event.

A Katmai on big, low-pressure bush tires spreads its weight over a larger area than a tailwheel airplane, reducing the risk of bogging down on a soft surface. The pilot of a nosewheel airplane can apply maximum braking immediately on touchdown with no fear of flipping the airplane over.

In addition, save for the brief time the nose is high during the final portion of the landing flare and first part of the rollout, she can see the runway. In many tailwheel airplanes, much of the runway surface is invisible during much of the takeoff and landing roll, increasing the risk of hitting something that will disable the airplane.

The NTSB reports for takeoff and landing accidents show that tailwheel airplanes are more likely to hit an obstruction just before landing, on the runway or just after liftoff than a nosewheel airplane.

The oft-stated concern is that a rough field is likely to break off a nosewheel on landing or takeoff. Our search of accident reports did not reveal evidence to support that concern.

Having operated on terrain so rough that it broke the tailwheel off of the airplane, we cannot support a blank assertion that tailwheel airplanes are better suited for bush and back-country operations. It is an aviation myth that needs to be put to rest, as it is our opinion that a properly designed nosewheel airplane can be used for STOL, back-country operations right alongside their tailwheel brethren, and do so with less risk of having an accident in the process.

a steeper approach be desired, additional flaps will allow a descent path best described as "plummet."

Coming into the flare at 45-50 knots, a small amount of power allowed a smooth flare, getting the control wheel all the way aft and a soft touchdown. Power off, the deceleration in the flare is so fast that it is difficult to make a landing that is other than firm. A number of STOL airplanes we have flown require a great deal of power to check the descent and flare for landing—that was not the case with the King Katmai. In fact, it was initially challenging to avoid using too much power in the flare—the airplane will float.

OFF-AIRPORT

We made a number of landings and takeoffs on what Peterson described as "Jeep trails" in the prairie of the Flint Hills east of his home base of El Dorado, Kansas. These were winding, rutted dirt vehicle trails used by ranchers to oversee livestock. We were able to find sections that were more or less straight and reasonably level for about 400 feet or so, with clear approaches.

The normal procedure of approaching with 20 degrees of flap, power as needed, and assuring the control wheel was full aft prior to touchdown resulted in landings within 50 feet of the desired spot. Power was reduced to idle at touchdown and heavy braking immediately applied, to the point of sliding the tires. The nose blocked forward visibility during the few moments of the flare, but came down immediately after touchdown, allowing clear view of the surface ahead and for us to easily steer around potholes and obstructions.

Landings were made at various angles to a 10- to 15-knot wind, including a 90-degree crosswind. At no time did we need more than 300 feet to get stopped from the point of touchdown.

Peterson told us that some buyers never intend to land off airport with their airplanes. They buy the mod simply because of the substantial reduction in stall speed and increased level of safety they have by having a greater margin above stall speed in normal operations.

Peterson provides a number of videos on the company website that describe the capabilities and operating procedures for the 260SE series of mods. We found them to be concise, well done and informative.

OPTIONS

The number of options for the Peterson conversions is initially daunting. We found it best to think of them as two lines of conversions—the 260SE and its outgrowths and the Katmai series (everything includes the canard, which is the underlying basis of the line of mods). The difference between the two is the extended wing—all Katmais, no matter what engine size or landing gear selected, have the extended wing with its reduced stall speed. The 260SE series, no matter what engine size or landing gear configuration, does not have the extended wing.

Once the decision is made as to whether to go with the extended wing, it's a matter of deciding on speed mods, engine (stock 230 HP, 260 HP or 300 HP), landing gear and incidentals such as extended baggage area, increased gross weight and a Honda generator for power in the back country. Peterson will buy a 182 to convert or use what the buyer provides, so long as it's in decent, airworthy condition. His company will also subcontract such refurbishment and upgrades, including avionics as the buyer desires.

We were impressed with the quality of work on the finished airplanes we saw and with the handling and performance of the King Katmai. We came to the conclusion that the aerodynamic price for the benefits of the canard was a slight increase in wetted area and drag and the weight of the installation. Pitch forces were linear, without disruption, in all portions of the envelope we explored. The King Katmai appears to be a well-engineered, well-built mod that is well suited to anything from the busiest airport to the most remote airstrip.