Pilot Flight Check:

Robertson Cherokee Six Conversion

Full span flaps, spoilers and new leading edge produce STOL characteristics and spin resistance

by DON DOWNIE / AOPA 188441

■■ Piper's popular Cherokee Six now has a new licensed profile. As a logical follow-on to the successful Robertson-Piper Seneca I modification with full-span flaps and spoiler-ailerons, the Cherokee Six now has a similar STOL capability.

According to Henry McKay, vice president-marketing for Robertson, the aircraft is "virtually spin-safe and will recover from a spin merely by turning the control wheel. Thus airplane drivers can get themselves out of trouble without remembering those rudder pedals."

The spin resistance of the spoiler-aileron system has prompted Robertson to make a proposal that NASA take two Cherokee Six aircraft, one with con-

ROBERTSON CHEROKEE SIX

Full-Span, Spoiler-Aileron Conversion

Performance

	Unmodified Piper PA-32	Robertson PA-32
Takeoff distance (ground roll)	1,050 ft	750 ft
Takeoff over 50 ft	1,500 ft	1,150 ft
Rate of climb	1,050 fpm	1,050 fpm
Best rate of climb speed	105 mph	105 mph
Maximum level speed	174 mph	177 mph
Service ceiling	16,250 ft	16,550 ft
Stall speed (clean)	71 mph	70 mph
Stall speed (gear and flaps down)	63 mph	59 mph
Landing distance (ground roll)	630 ft	410 ft
Landing over 50 ft	1,000 ft	795 ft

CHEROKEE SIX continued

ventional configuration and the other with the Robertson spoiler-aileron/full-span flap system, and run an in-depth study on the entire performance envelope with emphasis on spins and recoveries. The proposed program would go even beyond the CG limits of the original design.

Spoiler-ailerons, while by no means a new configuration, were part of the original NASA advanced technology light twin (ATLIT) program that led to the original certification of the spoiler-aileron Seneca I.

To achieve improved performance on both the slow and fast ends of the spectrum, the Cherokee Six receives a new leading edge cuff and wing root modification that both delays stall and brings the nose down just over one degree in level flight. This adds 3 mph to maximum cruise speed, according to Robertson statistics.

However, it's aft at the rear spar where the real action begins. In fact, the entire wing is rebuilt from the rear spar aft with 40-degree Fowler flaps running the entire length of the wing. Flaps are electrically activated and have four preselect positions. Maximum airspeed for 10 degrees of flaps has been increased from 125 to 160 mph, with 20 degrees to 140 mph, and full 40 degrees to the same 125 mph listed in the original Piper book.

Assuming a flaps down and full deflection turn to the right, the inside (right) spoiler, measuring 8 feet by 4.5 inches, extends to dump lift on the inside of the turn. At the same time, the left spoiler closes three-eighths of an inch to seal the slot at the leading edge of the flaps, thereby accelerating the airflow and making that wing lift more efficiently. At an approach speed of 80 mph with full flaps, the Robertson installation is said to be a 100% improvement over standard ailerons. At 1.3 VSO, McKay advised that 30-degree left to 30-degree right, full-deflection rolls took 2.3 seconds with standard ailerons and under 1.5 seconds with the spoiler configuration.

In straight and level cruise, you can't tell the difference between the modified and unmodified aircraft. There is no noticeable detent going from zero spoiler into a turn.

At this writing, Cherokee Six N32979 is the only production single-engine airplane in the world with full-span flaps, spoiler ailerons and a high-lift modification of the leading edge. This airplane belongs to Gary T. Lasater, a wheat farmer from Prescott, Wash. Lasater does his own cropdusting and fertilizing with a Piper Pawnee and has owned several aircraft including a Piper Cherokee 235 with a Robertson modification.

Lasater wanted improved takeoff and landing performance for his recently purchased Cherokee Six. He provided the airplane and Robertson used engineering and production facilities to adapt the Seneca I system to it. The patented system has been certificated by the FAA.

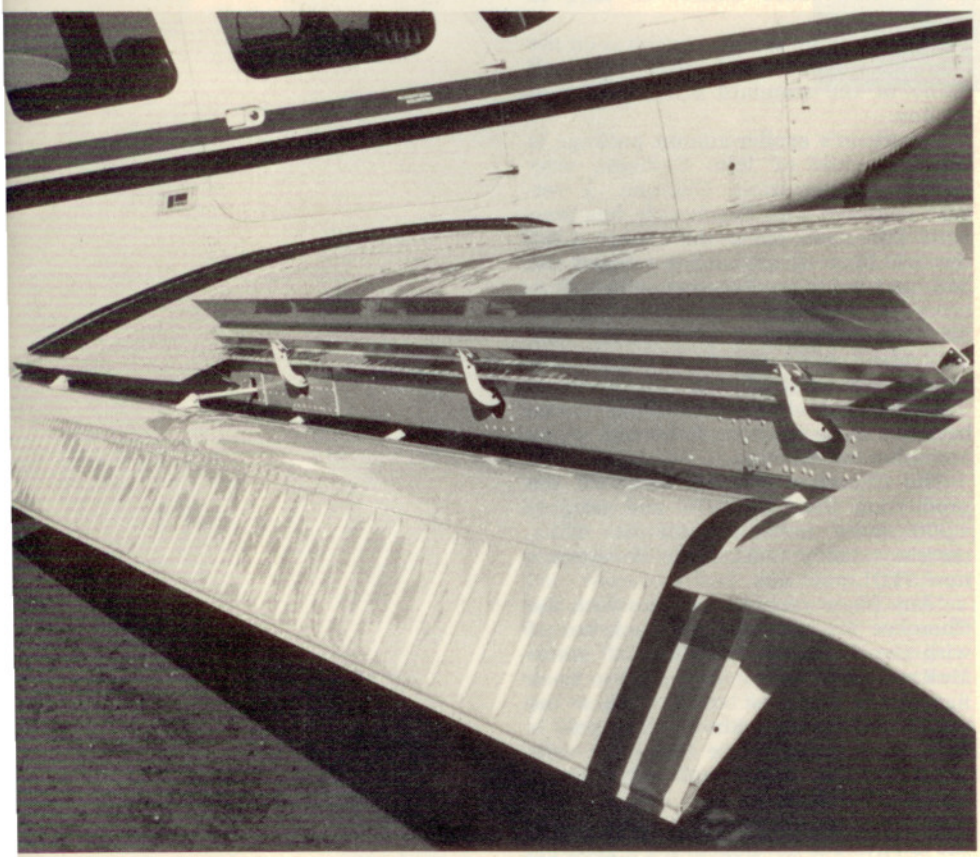
The prime reason for Lasater's interest in STOL performance is the unique configuration of his ranch "airport." It's down in a little valley in the rolling wheat farms of southeastern Washington. Depending on the time of the year, the hills may be clear, plowed or golden with wheat awaiting harvest. During our brief visit, the hills were golden.

The Lasater airport is some 1,500 feet long with a tapering dog leg. You won't find it on the charts. In fact, during

our arrival, McKay had trouble spotting it from the air and he'd been there before. Once the location was fixed, the shiny red-and-white "Big Six" was clearly visible, parked next to a row of farm equipment buildings. We landed in an unmodified Seneca I and came to a stop uncomfortably close to the wheat at the end of the field. There was a pungent odor of too-hot brakes and a bit of smoke trickled from under the wing as we taxied back.

We climbed out and met Lasater and his friends. McKay took the modified Six around the patch (a proper description at this location) for photos as the afternoon shadows changed rapidly to a warm, clear sunset. McKay's solo takeoffs were spectacular and his steep approach to landing made the whole procedure seem almost convenient.

At approach speeds above 85 mph, McKay uses full flaps, no power and a rapid roundout to provide the best possible visibility. At approach speeds below 85 mph in the Cherokee Six he uses a subtle combination of power and speed to establish the proper approach angle to touchdown. At these slower speeds, it's best not to come all the way off the power until you're in ground effect and are prepared for an immediate touchdown. Such maximum performance STOL landings take experience, familiarity with the equipment, practice, and sometimes even a little luck.



Combination of full-span, 40-degree Fowler flaps and spoiler-ailerons is said to give 100% improvement in roll control at approach speeds.

This is one of the reasons that Robertson provides a personal checkout to each of its customers, regardless of the type of equipment. Demonstrations are made both within the normal envelope and at the extremely slow speeds required for only very short, high and/or rough airports.

After the photo session, we climbed aboard N32979 and taxied back for a takeoff with McKay. Both main and aux tanks were nearly full, but with just two of us aboard, McKay estimated our weight at 500 pounds below the 3,400-pound gross weight. A maximum performance takeoff calls for 20 degrees of flaps with either brakes locked or power applied briskly. Since we were at relatively light weight, we applied power moderately to keep from nicking the prop with any loose rocks from the unsurfaced strip. We were off and climbing within 500 feet.

Wheat fields disappeared quickly under the nose and we climbed out with half flaps at an indicated 85 mph. The unmodified version lists best climb speed at 105 mph. The actual 1,050-fpm rate of climb at gross weight remains unchanged, but with a 20-mph reduction in climb speed, the angle of climb is substantially improved. The standard model will clear a 50-foot obstacle in 1,500 feet while Robertson claims 1,150. Electric flap retraction takes about nine seconds.

A cuffed V at the leading edge of the wing root delays a conventional tail buffet to below stalling speed. With power off, full flaps and the wheel all the way back, Robertson estimates the rate of sink at 700 to 900 fpm while the unmodified model has a 200-fpm greater sink rate. With the spoilers there was no mushy feeling at slow speeds as the spoilers take a good, solid bite out of the lifting airflow and drop a gust-lifted wing immediately. Contrary to conventional aileron systems, little if any rudder is needed for fully coordinated turns at slow speeds, since there is no adverse yaw generated by the spoilers. With the standard Cherokee

Robertson Cherokee Six lands 205 feet shorter, takes off 350 feet shorter over a 50-foot obstacle, yet cruises 3 mph faster than unmodified version. Conversion costs $8,500.

configuration, the "up" aileron on the inside of the turn travels 25 degrees while the "down" one on the outside of the turn travels only 10 degrees. This difference causes some yaw to the outside of the turn that should be corrected either by rudder or rudder interconnect. The interconnect system used on some airplanes has the undesirable feature of having the nose gear turned off center on some installations at touchdown.

After getting a feel for the new system with and without power, it was time to beat the sunset back to the unlighted Lasater strip.

When you fly a downwind leg for this wheat field, the runway promptly goes out of sight in the rolling hills. You turn a fairly high base leg and wind your way down a golden gully of wheat until the far end of the runway looms like a land-locked Lorelei. Here's where it's handy to have the steep approach capability of full-span flaps as you drop the nose and find the end of the runway.

I don't think that we really put either the gear or a wingtip into the top of the wheat, but there wasn't too much space remaining. Ground effect was noticeable during flareout but touchdown was prompt as the throttle came closed. We held the nose gear off as long as possible and used only moderate braking to come to a stop beside the buildings. No smoking brakes this time.

During our return flight to Seattle, McKay explained that the Cherokee Six is actually available in two licensed STOL configurations. One version is the full-span flap/spoiler-aileron version we had just flown and the other a standard Robertson kit utilizing drooping ailerons, modified leading edge, mid-span airflow fences and electric pre-set for the flaps. The spoiler version lists at $8,500, the same price as the Seneca I conversion, and takes 10 working days to install at the factory. The standard unit sells for $5,170 and takes almost as long to install.

"Now that the spoiler version is on the market, I don't think that we'll sell many of the standard kits," explained McKay.

Robertson's spoiler-aileron package is the brainchild of John Calhoun, vice-president-engineering. Calhoun, a veteran engineer with Beechcraft, has been with Robertson since the inception of the ATLIT program and developed the Seneca I package. Because of the similarity of the Seneca and the Cherokee Six, the single-engine certification took only about 10% as much engineering time as the original twin.

As the retractable-gear Piper Lance becomes more popular, Robertson plans a similar certification.

The Cherokee Six first came off the production lines in 1976 and roughly 4,000 units have been built. Thus, there's a ready market for Robertson's new STOL package.

"Any place you can get into with the Cherokee Six, you can get back out of with the Robertson installation," states McKay unbashfully. According to book figures, he's almost correct since the standard Cherokee Six landing roll is listed at 630 feet while Robertson calls for a 750-foot takeoff roll at full gross, sea-level conditions.

Whether or not the Robertson proposal to NASA is developed, it's a good bet that more than a few Cherokee Six units will congregate at Renton, Wash., for this new STOL face-lift. □