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# ONE X



FLIGHT REVIEW



85% scale equals 100% fun.

BY LEROY COOK

**Back in mid-2010**, Sonex Aircraft CEO Jeremy Monnett decided that the perfect answer to an imperfect economy would be a nice-flying little single-seat sport airplane that could get people into the air for relatively few dollars, and still offer the same or better performance than their flagship Sonex two-placer. Little did he know the Onex (pronounced One-X), as the 85-percent scaled-down Sonex was called, would chalk up 100 kit orders in the first year. Evidently, his timing was right; builders were looking for inexpensive wings, from a supplier with a proven track record.

Sonex has been around since 1998, located right on Wittman Field in Oshkosh, Wisconsin, where experimental aviation is practically distributed in the tap water. The Monnett name is well known to most homebuilders. In the 1970s, Jeremy's father, John Monnett, pioneered the AeroVee modifications that made the 2180cc VW engine a viable aircraft powerplant and designed a successful line of airplanes to use it. Now the Sonex all-metal kit airplane line-up is broad and expanding—including motorglider, jet and electric propulsion developments. There's not much Sonex isn't working on.

A couple of months after AirVenture 2012, we winged our way back to a vacant Oshkosh to meet with Sonex Aircraft and see why there was so much interest in a little single-place kit. We



were honored with a lengthy checkout and given carte blanche with the Onex tailwheel and nosewheel prototypes. As with all the Sonex demo fleet, these latest airplanes are painted bright flashing yellow; if you try to run off with one, it'll be easy to spot.

### Transitioning to the Onex

The Onex design is basically an 85-percent scaled-down version of the Sonex side-by-side two-seater, yet it uses the same basic engine options to make it perform with a certain élan. Don't worry, it still meets Light Sport limitations; 120 knots flat-out CAS at sea level, well under a 45-knot stall, and a gross weight of only 950 pounds. The recommended engine for the Onex is the 80 horsepower AeroVee 2180.

Unlike two-place Sonex aircraft, the 80 h.p. Jabiru 2200 and 120-hp Jabiru 3300 are not available for the Onex. All of the Sonex demo aircraft also use the AeroVee 2180, which is produced by AeroConversions, a subsidiary of Sonex Aircraft, LLC.

Obviously, only a wing-walk checkout can be done in the Onex, so it made sense to fly the Sonex dual-controls Sport Trainer with Jeremy, getting us familiar with engine and avionics operation and the handling of the ST in a 10-knot, 30-degree crosswind. Grossing at 1100 pounds and offering a 40-inch wide cabin, the Sonex accommodated the two of us quite well, climbing away at 400-fpm and showing us 132 mph in level flight at 3500 rpm. No surprises were expected and none were encoun-



The Onex builder/pilot has a choice of tricycle or conventional gear configurations.



The large canopy with low longerons give the pilot a spectacular view.

tered, so we subsequently proceeded to the Onex trigear demo plane, N222NX, to compare it to its larger sibling.

As the newest airplane in the fleet, the demo ship's engine had only accumulated 22 hours in service and was still breaking in. We were cautioned to expect the oil temperature to be in the upper end of the range and power output to be still in development. The propeller on both Onexes and the Sonex ST was the same Sensenich wood-core, swept-tip, composite-clad prop of 54-inch diameter and 44-inch pitch, so there would be no differences stemming from the prop installed.

### Something in a Smaller Size

A Onex walkaround requires some ducking and peeking, owing to the airplane's diminutive stature. The Onex is easy to push or pull to move it around on the ground; all three trigear tires are the same size, 4.10/3.50x5 units on Asuza wheels. Sonex is just phasing in hydraulic brakes, gaining a bit more restraint than that provided by the mechanical binders used until now. The Onex sits on a one-piece flat aluminum-spring maingear, a departure from the Sonex's titanium-rod maingear legs.

The chief design change of the Onex compared to its siblings is the folding

wing feature. While the Sonex, Waix and Xenos wings are easily removable at the fuselage, the Onex wing's dihedral begins outboard, originating at the ends of a 7½ foot-wide inboard center section, and a release under each wing unlocks this outboard section to let it fold up over-center, like a Corsair fighter on the hangar deck. The task is quickly done by

one person and confidently solid when locked in place; no control disconnect is needed, because the pushrods for the ailerons simply press against a paddle in the linkage when the wings are in place. The flaps are only installed on the non-folding inboard portion of the wing.

Because the Onex flaps only occupy ⅓ of the semi-span, as opposed to the ⅔



The wing-fold mechanism allows automatic connection of the aileron pushrods.

# ONEX

Kit price (excluding quickbuild options).....	\$12,995
Estimated completed price.....	\$25,000
Estimated build time.....	500 hours
Number flying (at press time).....	4
Powerplant.....	AeroVee 2180, 80 hp @ 3400 rpm
Propeller.....	Sensenich fixed-pitch two-blade

## AIRFRAME

Wingspan.....	18.9 or 20 ft
Wing loading.....	12.18 or 11.25 lb/sq ft
Fuel capacity.....	15 gal
Maximum gross weight.....	950 lb
Typical empty weight.....	600 lb
Typical useful load.....	350 lb
Full fuel payload.....	260 lb
Seating capacity.....	1
Cabin Width.....	27 in
Baggage capacity.....	20 lb

## PERFORMANCE

Cruise speed.....	155 mph (135 kt) TAS
.....	8000 feet @ 75% power, 3.5-4 gph
Maximum rate of climb.....	450-600 fpm
Stall speed (landing configuration).....	45 mph (39 kt) IAS
Stall speed (clean).....	50 mph (43 kt) IAS
Takeoff distance.....	600 feet
Landing distance.....	500 feet

*Specifications are manufacturer's estimates and are based on the configuration of the demonstrator aircraft. Your mileage may vary.*

span of those on the Sonex wing, deflection is increased to 45 degrees over the 30 degrees of full flaps on the Sonex to gain a similar effect. All of the airplanes can descend at a generous rate with power off and flaps down; 1400 fpm for the heavier Sonex, 800 fpm for the Onex. The airplanes are usually parked with the flaps down, to inhibit careless footsteps ignoring the no-step placard.

The cowl is attached with piano-hinge, a sturdy, simple retention that keeps the cowl in place. The AeroVee engine's oil dipstick is reached through the left front air inlet, so no oil door is needed, and the gascolator is checked under the fuselage. Fuel is contained in a nose tank holding 15 gallons, all usable, serviced by a filler neck under a port in the windshield. The indicated quantity can be verified by looking under the panel at the level in the translucent tank, once the fuel is down to the halfway point.

AeroConversions, a product line of Sonex Aircraft LLC, offers a throttle-body AeroInjector fuel-delivery system, a development of earlier simple carburetor replacements. It worked well in the three aircraft we flew, but you have to remember that fuel will begin flowing

by gravity once the mixture is pushed in, so the starter should follow immediately afterward.

A 20-pound capacity baggage bin is located aft of the seatback, reached by lifting the luggage over the seat. The beefed-up turtledeck support structure behind the seat serves as turn-over protection. The conventional tailfeathers feature a cable-operated rudder and pushrod-actuated elevator; a tailskid stub under the aft fuselage protected the tailcone on the trigeared airplane.

We climbed the left-side wingwalk to board the Onex by the simple expedient of stepping on the seat cushion; the canopy hinges over to the right, restrained by a cable. The windshield is flat-wrapped Lexan polycarbonate. There's ample room in the 27-inch wide Onex cockpit; Jeremy had a 275-pound buyer try the airplane on for size at a show, pronouncing it adequate. The throttle, flaps and brake handles are on the left, leaving the stick for the right hand. A plain, yet sophisticated, VFR panel carried a slip indicator, compass and digital G-meter, with an MGL Stratomaster Xtreme electronic display providing



The magic beneath the skin of the folding wing—a rugged hinged spar allows the outer wing panels to fold for compact storage.



pages for engine, flight instruments, or a combination of everything—the option we selected. An MGL V-6 transceiver provided dual-frequency and memory frequency channels, all that was really needed.

### Initiating Onex Flight

The starting sequence is mixture lean, fuel on, and all switches flipped on, after which we cracked the throttle and pushed in the mixture, followed by a push of the starter button. The AeroVee 2180 fired up at once, settling into its usual VW warm-up idle.

Monnett says they don't like magnets, so the AeroVee uses an electronic magnetic-trigger ignition that generates its own electricity as long as the engine is rotating, backed up by a secondary coil-boosted ignition powered by the ship's electrical system. The two spark plugs in each cylinder are thereby fired independently.

We taxied out, finding the steerable nosewheel positive and quick, and the visibility over the nose quite good. The one-lever hydraulic brake system worked fine, with a simple notch to hold it engaged for parking. Once the engine was warmed up (there's no choke), we turned up 2000 rpm to verify the independent functioning of each ignition system, set the pitch



The tiny but adequate instrument panel is a perfect match for modern compact instrumentation.

trim knob to “nose down” for takeoff, verified altimeter setting on the MGL system and stirred the control stick. With the tower's blessing, we swung out onto the massive Oshkosh runway 18 and rolled for takeoff.

As predicted, acceleration was swift and we scooted off the ground at 60 mph in 500 feet or so. After gaining 80 mph for the full-throttle climbout, we observed a 450-fpm climb rate as we proceeded out to the west for the practice area around Ripon. Between the

wind and thermal activity, the air was quite busy, requiring attention to attitude to keep the numbers on the flight display approximating what was desired. We leveled at 3500 feet to let the airplane show us max-speed performance; the yet-young engine could only muster 3300 rpm, giving us a 128-mph IAS and truing 138 mph on the Stratomaster display. Sonex touts a 42-mpg efficiency number, which the airplane should be able to do at altitude, with a leaned-out burn rate of only about 3.5 gph.

## Simple Construction, Sound Company

The Sonex airplanes are primarily made of 6061-T6 aluminum, blind-riveted except for a bucked-rivet main wingspar and are put together with simple tools. A bandsaw, drill press, rivet squeezer, hand tools and Clecos are about all you'll need. The only composite components are the non-structural cowling, wheel fairings and wing and tail tips, so you can paint it purple or pink or anything you choose.

The factory tour showed Sonex's progression over the decade-and-a-half the company's been producing kits. The first building, quickly outgrown, is now devoted to offices and builder support; a two-bay second hangar has brought room for research and development projects, and a large warehouse has been added to stockpile a growing inventory of parts.

“At any given time,” Monnett said, “we intend to have enough parts on hand to build 10 to 30 airplanes. We outsource most of the components, rather than try to build them ourselves, in order to get a better product from people specializing in machining or fiberglass. We do the quality assurance and kit assembly for shipping.” From what we saw, with rows of fuel tanks and gear legs, bins of machined parts and stacks of extrusions and raw angle stock, Sonex is set to deliver.



According to Jeremy Monnett, the Sonex factory is well-stocked with parts to support the quickly growing Onex community.

— L.C.



The swing-over canopy provides easy access to the cockpit.

Handling was well balanced, with the ailerons providing quick, but not overly sensitive response; we estimated the roll rate at 180 degrees/second, enough to tempt us into a roll or two without breaking stride. The elevators are properly secondary in sensitivity; we flew with our arm on our leg, holding the stick low, and weren't overshooting pitch targets with a too-light response. Rudder is used only occasionally, responsive when needed but not twitchy; the AeroVee requires left rudder for

P-factor, its propeller turning opposite to American-designed engines.

Slow flight and stall checks presented no surprises; the airplane goes where it's pointed, advertising its off-trim speed change by increasing control force, and the Onex flew nicely at 50 mph. We pulled off the power and waited for a clean stall to show up, which occurred at 42 mph TAS, showing 37 mph IAS. With flaps down, we found the stall break about 2 or 3 mph slower; the flaps' main purpose is to provide drag to lower

the nose on approach. In every case, power on or power off, flaps up or down, turning or straight ahead, the Onex told us it was stalling and broke obediently in a safe direction, losing only 100 or 200 feet in recovery.

Back at the airport, it was time for pattern work, which produced no surprises, thanks to Monnett's tutoring in the Sonex. The Onex likes to be kept high on the base leg, because it will come down on final with flaps out and power back, but it glides in nicely with

The diminutive Onex is no bigger than it needs to be to hold its pilot.





The Onex doing its Navy fighter impersonation—you could fit a lot of them in a carrier hangar deck—or your local hangar.

70 mph in hand, even when idling, giving plenty of energy in the flare. We started out with 90 on downwind, slowing to 80 on base and lowering the flaps to turn final. Turnoff was made with no braking in about 2500 feet.

### One Down, One to Go

Now, we were up to fly the sleeker, cleaner tailwheel version, which had the earlier mechanical brake system. Monnett stressed that the tricycle Onex demo ship was about as speed-challenged

as it was possible to get; the wingtips were extended by about a foot over the tailwheel model, the engine was still breaking in, and it was hampered by the drag and weight of a third leg. The tricycle-gear airplane weighed 593 pounds, as built, while the conventional-gear model weighed nine pounds less.

Starting was identical, but taxiing gave the flavor of a WW-II inline-engine fighter, with what appeared to be a long nose that restricted the view ahead. No problem—just S-turn with style and

grace to clear the path ahead. Again, we checked engine, controls and panel and called the tower for a departure to the west. This time, we took a few seconds to swing out onto the centerline and advance the throttle, making sure we were lined up before dropping the hammer. There's little need to hoist the nose up, as the tailwheel Onex happily flies off almost three-point, although I couldn't resist pushing and pulling a bit in an attempt to help the airplane.

We estimated that a little less runway was used to get to the 60 mph liftoff speed and climb was markedly better with the broken-in engine, notching about 600 fpm by our timing. The aileron response was much quicker than with the longer-winged tricycle airplane. We didn't find them overly sensitive to the point of distraction, but we could roll 90 degrees to 90 degrees in a second or less; "neck-popping," I reported to Monnett after the flight. Otherwise, the handling was similar to the tricycle model.

In high-speed flight, the tailwheel Onex's engine could turn 3500 rpm, but



The light and simple AeroVee provides plenty of horsepower for the compact Onex.

## What's in the Box

The Onex can be ordered as a full airframe kit or in subkits: tail, fuselage, wing and gear, firewall forward and control systems. Sonex also offers quickbuild options. These include pre-assembled wing spars and a set of machined angle parts. Ordering both of these adds \$4500, but saves considerable build time. The basic kit includes metal for skins, fittings,



gussets and plates, spar cap extrusions, motor mount, canopy and windshield, fuel tank and gear legs, with standard wheels and brakes. The tricycle-gear version on the Onex is a \$600 option. Not included are upholstery, panel items, paint and the engine.

— L.C.

the airspeed wall remained intact; we saw 135 mph IAS with a true of 146. At a more economical 3000 rpm, we trued 117 and indicated 106. All speeds were off the mark from turbulence and low altitude; the airplane needs 7000 feet to put in its best numbers.

Stall behavior was unchanged from the training-wheel airplane, breaking at about 38 mph indicated. We got the IAS down to 30 mph, a clearly erroneous number, in a high-angle, power-on break. Back to the runway for the challenge of landing, we again found the Onex's runway manners predictable, considering the airplane's small size and direct tailwheel steering. Monnett always three-points the airplane, to get the fight out of it, and that worked well for us, even when we rolled the tailwheel on first. We found the shorter wing felt better with 75 mph retained over the fence, instead of 70. We did one wheel landing at the conclusion, just for variation; the Onex didn't complain and



There is no doubt that Sonex likes the color yellow—and their numerous models wear it well.

stuck obediently to the pavement with a touch of forward pole, patiently waiting to dart for the runway edge until we had the tail down. Just don't ever relax during a tailwheel rollout, particularly with a crosswind, and the airplane will respect you.

So, the Onex evaluation reveals no surprises—straightforward handling,

economical cruising, and light aerobatic qualities if you don't let the nose stay down too long. For the money, the Onex will deliver a lot of fighter-plane feel and fun flying on a tight budget. †

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*For more information, call 920/231-8297 or visit [www.sonexaircraft.com](http://www.sonexaircraft.com). Find a direct link at [www.kitplanes.com](http://www.kitplanes.com).*

