
N210EX
Express

WHEELER EXPRESS

Express Yourself

This homebuilt might be a Skyhawk in spirit, but it's a hot rod at heart.

BY MARC E. COOK

Ken Wheeler doesn't mind if you call his airplane the Cessna 172 of homebuilts; in fact, he encourages it. Not that the sleek, four-place Wheeler Express looks anything like the Wichita-bred airplane of this comparison. Indeed, the perky pastel-on-white Express hardly resembles the stalwart Skyhawk in design, construction, or execution. Composite construction allows the Express to flaunt seductive compound curves and nary a ripple of rivet or seam on its molded fiberglass skin.

Wheeler's analogy pertains more to mission than hardware. He envisions his airplane as something of a departure from current high-performance, kit-built airplane designs—where big-inch engines are being squeezed into two-place, breast-

PHOTOGRAPHY BY MIKE FIZER

pocket-size airframes to come up with a rorty, big-biceps kind of mean machine. That's not Wheeler's intent at all. "I wanted an airplane that could seat four adults, take them cross country in comfort, and be simple and safe to fly." Beginning to sound like the 172 after all?

Of course, given a clean drawing board (or a blank screen on the computer-aided-design console, as was the case with the Express), Wheeler looked to the ubiquitous Cessna only in terms of its class-leading utility and simplicity. As such, Wheeler stuck to conventional technologies, planforms, and materials. The wing, for example, is a laminar-flow airfoil with a generous 126-square-foot wing area (typical for an airplane in the

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Express's weight class); drag reduction was pursued in other ways than using small, stub-like wings or critical airfoils. What's more, you'll find a cruciform tail on the Express, its placement an aid to spin recovery, according to the company. And the Express is constructed of E-Glass fiberglass with a polyurethane foam core; the various pieces are affixed with vinylester resin. Proponents of exotic composites might call this conservative, and Wheeler would not disagree. The airplane was designed to use contemporary technologies and, more important, to be simple to build.

Contemporary in reference to the Express also refers to performance. Wheeler claims a maximum true airspeed of 191 knots and a maximum cruise figure (75-percent power at 7,500 feet) of 183 knots, using a 210-horsepower engine. (If you prefer to use miles per hour, as most kit manufacturers do, that's 220 mph and 211 mph, respectively.) Our experience with the airplane suggests real-world speeds will be close to the claims. At 3,000 feet, 25 inches of manifold pressure, and 2,500 rpm, the Wheeler indicated 162 knots for a true of 177 knots. Several factors hurt the Express's cruise demonstration: The engine, with just 58 hours on the tachometer, was still pretty tight, according to the company, and we used full-rich mixture in deference to its youth. Also, the airspeed indicator had not been calibrated in this, the number-two airplane.

At a typical 75-percent fuel burn of 10 gallons per hour and with the standard tankage of 54 gallons aboard, the Wheeler ought to take you more than 805 nautical miles from home (with an hour's reserve) in one hop. You can order the optional 92-gallon tanks and stretch that no-wind range to more than 1,500 nm; that's 8.4 hours in the saddle, leaving a 1-hour reserve. Of course, tankering some 552 pounds of fuel cuts into the Express's claimed 1,143-pound useful load. Three FAA-standard adults still can file aboard, along with 81 pounds of baggage; with standard fuel, the Express is an honest four-place airplane.

While the Express didn't achieve book figures in cruise, it easily matched published climb performance. With two aboard and the standard 54-gallon tanks brimming, it managed to meet the claimed 1,400-feet-per-minute climb at an airspeed in excess of its best-rate number of 70 knots. At this speed, the nose obscures much of the horizon; we opted to climb at a more nose-low attitude, yielding about 90 knots. Even in cruise-climb configuration (25 inches and 2,500 rpm) at that speed, the Express held a constant 1,000-fpm ascent. Later, during air-to-air photography, the airplane easily kept up with the 300-hp Piper Saratoga camera ship.

This style of speed and climb capability is without peer in production aircraft of the same horsepower and configuration. Pitted against the retractable Mooney 201, the Express still shows well. With just 10 additional horsepower but with fixed gear, the Wheeler holds a claimed 20-knot advantage; even the less-than-book performance we witnessed beats the Mooney by a 10-knot margin. Among fixed-gear airplanes—

forget it. Piper's 235-hp Dakota can't get within 25 knots of the Express.

Performance certainly is an Express calling card, but more important is that its speed doesn't require pin-sharp pilot technique as compensation. Control forces through the stick and rudder pedals are, in typical homebuilt fashion, lighter than that of most production aircraft. Perhaps the closest to the Express in control feel is the F33A Bonanza, although the Beech has slightly lighter ailerons—especially in cruise, where the Express's become a tad heavy compared to the other axes. There is trim for the elevator only, but with forces so light, you really don't miss aileron or rudder trim. Well-balanced forces mate with plentiful control authority to make the Express an engaging airplane to fly.

(For the military pilots out there snorting at a left-hand-stick arrangement, you can always build yours right-hand drive. But for most, the factory setup works quite well, with little time needed to settle in.)

Stalls in the airplane are an anticli-

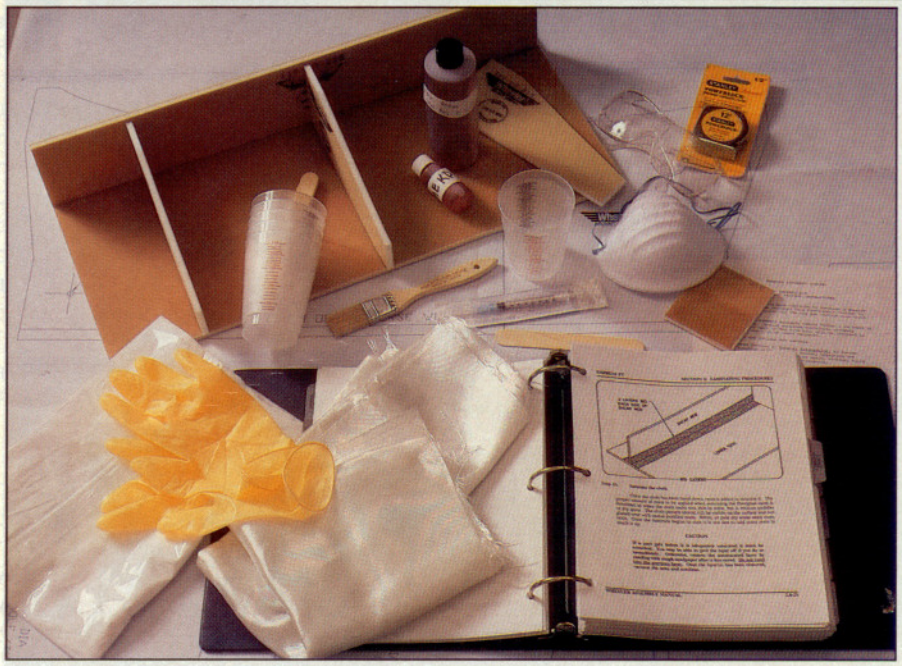
max. It bobs and shudders before the break, and recovery is as close as your left hand—slight relaxation of back pressure sets the Express flying at once. The prototype we flew was not tenacious in seeking trimmed airspeed, taking its time recovering from an airspeed excursion. Even so, this tendency did not show up as instability in our VFR-only flights. In fact, the Express proves as stable as a Swiss bank account once set into turns, steep or shallow. Good thing, too: The Wheeler's direct, precise control responses make you want to rack the airplane around the sky in quick successions of 60-degree banks.

One reason you might want to work out your Walter Mitty fantasies would be to enjoy the airplane's superb visibility. The windows are large, and the two main cabin windows cut deeply into the roofline. Moreover, the cowling resides well below the horizon in cruise, affording the front-seat occupants a panoramic view. These attributes make pattern turns and traffic-spotting much less difficult tasks; in this regard, the Express shames most production airplanes.

After an hour in the air, Wheeler demonstration pilot Gary Mavrovic coerced me into taking the Express back to Tacoma Narrows Airport. Working the airplane into the pattern proves no more challenging than in a fast production airplane—a Mooney, for example. The Wheeler is a slick airplane and reminds you of that fact by asking for very little power to maintain 90 knots in the pattern. You blip the flaps down through base and final turns; they produce little pitch change, nor does slowing for landing. What forces develop can be dispatched quickly with the Express's electric trim (there is no manual wheel, only a switch on the stick grip).

Trimmed for an approach speed of 70 knots, the Express reluctantly descends. Find yourself even slightly above the glideslope, and you must pull all the power off to make the landing. Fortunately, the airplane slips marvelously, and once you are accustomed to the characteristics of the slippery airframe, setting up a stabilized approach comes easily. Control authority is strong throughout the flare and touchdown. Pitch response is quick, more so than with most production airplanes, and I found myself overcontrolling at first. Also, the Express will float if you carry any excess airspeed into the flare.

For reasons of weight and expense, Wheeler chose not to give the Express a



The stuff of which an Express is made. Wheeler will send a sample kit containing cloth, glue, sandpaper, and other raw materials that go into the construction of an airplane so that customers can get their gloves wet before tackling the full project.

steerable nosewheel. As in Grumman/American General singles, you use differential braking to steer on the ground. On the landing roll, as on takeoff, rudder authority is sufficient to steer the airplane at remarkably low speeds; after that, alternating brake applications will do the trick. Although a bit awkward at first—especially to those used to Piper-like positive nosewheel steering—this arrangement feels more natural as you gain time in the airplane. Another side effect of the swiveling nosewheel is extreme nimbleness on the ramp; the Express will swing around in a bit more than its own wingspan.

As good as Wheeler feels the Express is, there have been significant changes to the kit recently. The fuselage is larger now, with an additional 1 inch in cabin height, 3.5 inches in width, and 2 inches in depth. The windshield is thicker, at three-eighths inch; the flaps are now electric instead of manual—they are adjustable infinitely from 10 degrees reflex (above the trailing edge of the wing) to 30 degrees down. The tail has been given a horizontal stabilizer and elevator with greater span, and the leading edge of the vertical stabilizer has been moved forward of the horizontal stabilizer junction. Wheeler claims improved aerodynamics and greater pitch authority as reasons for the two changes.

Wheeler has added another engine choice to the Express's roster. Early kits were built around four-cylinder Textron Lycoming engines of 160 to 200 hp; the first prototype used a fuel-injected, 200-hp IO-360 powerplant typically found in normally aspirated Piper Arrows and Mooney M20s. Currently flying in Express 210EX is a Teledyne Continental IO-360-ES1 (the suffix denotes a special package for the Express), producing 210 hp at 2,700 rpm. Retrofit kits are available to convert Lycoming-style mounts and cowlings to the Continental parts. The kit still comes configured for the Lycoming, though.

Wheeler elected to go with the six-cylinder Continental for a variety of reasons. The factory feels the Continental is smoother than the four-cylinder Lycomings it replaces and provides another 10 hp without having to move up to a much larger engine. The Continental installation is heavier than the Lycoming's, due in part to its bed mounting system (it rests on four pads below the engine rather than hanging from mounts behind the crankcase, as is common on small Lycomings) and an extra pair of jugs. (As a side benefit, bed-mounting the Continental provides a better location for the nosewheel structure; in the first airplane, the nosewheel strut continues well back to the fire wall.)

The engine Continental provides is something of a hybrid, using some heavy-duty pieces from the turbocharged Mooney 252 installation. The pistons employ oil-cooling jets, for example, and the cases are heavier than on most normally aspirated IO-360 models. Also, the Wheeler's IO-360 uses a tuned induction system, which promises more even mixture distribution, greater volumetric efficiency, and smoother running over a conventional induction system. The IO-360 carries a 2,000-hour recommended time between overhaul period.

Part of Wheeler's decision to use the Continental powerplant stems from the October 1989 crash of Express number one. Mavrovic and Wheeler sales manager Jim Cooper were departing Santa Monica (California) Municipal during a round of demonstration flights when Mavrovic noticed the 200-hp Lycoming's oil pressure falling. He elected to return to Santa Monica but crashed into a house short of the field when the engine seized.

Though the airplane was a total loss, both pilots emerged with minor injuries; no one on the ground was injured, although a house was partially burned. Wheeler looks back on the crash philosophically: "It proved the crashworthiness of the design, at least." Subsequent inspection of the engine suggested that both piston-pin buttons in one cylinder had come adrift and destroyed that barrel, depositing debris in the oil system as a result. That debris clogged a main-bearing oil journal, causing bearing failure and breakage of the connecting rod; your basic catastrophic failure, in other words.

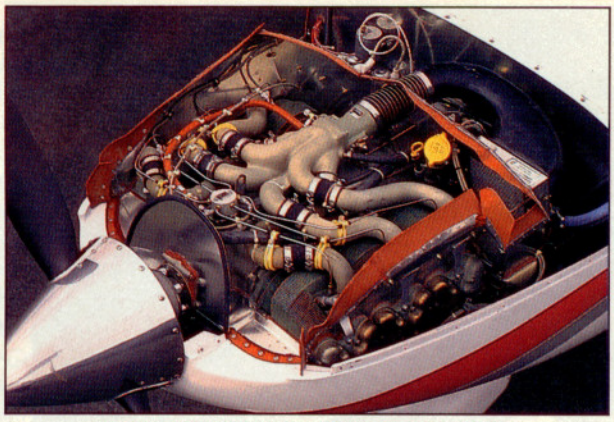
Continued

With no demonstrator on hand (and no customer airplanes yet flying), Wheeler accelerated work on number two, in the process making myriad changes. Inside, the number-one airplane's center console was eliminated in the interest of better ingress and egress. The instrument panel has grown, too; you'll probably run out of money trying to fill the commodious panel. Wheeler has also made good use of 2-inch, turbine-style engine instruments to save space. Vernier controls are arranged in the center, at the lower edge of the panel, up from their somewhat unconventional arrangement on the console in the first airplane. The result is impressive. For the builder, think of it as a larger canvas on which to paint the ideal panel.

Wheeler hasn't spent all its efforts on the panel, though. The semireclining seats on the prototype are comfortable and generously sized. The rear seats can be installed conventionally or with the pilot-side seat facing aft. This arrangement provides outstanding foot room and shoulder room for that passenger, as well as the second-best seat in the house, view-wise. (The best is the left front, as it should be.) Overall, the Express's ergonomics—both for pilot and passengers—is first-rate.

Perhaps the worst thing about the Express is that you can't enjoy its virtues until you've built one. And in this regard, Wheeler has done as much as possible to ease the building process. A veteran of a Glasair project, Wheeler decided that today's homebuilders aren't interested in cutting wing ribs or fabricating their own control systems. The Express comes essentially ready to assemble; there's really little to fabricate other than electrical harnesses (no small feat, admittedly, but a requirement of any homebuilt) and interior touches. External skins are finished and primed; the main spar already is in place; and the fuselage is split horizontally. This feature makes laying control runs, the electrical system, and other systems simpler, says Wheeler. Because of the extensive prebuilding by Wheeler, estimated build time clocks in at 1,000 hours.

To make sure prospective customers are comfortable working with the Express's vinylester and fiberglass construction, Wheeler will provide a placebo kit for $45. Essentially a wing skin and rib, the test kit allows the customer to see the methods and materials used throughout the kit. "Most people know right away if they've got the skills to build the airplane. It saves a lot of money and heartache," Wheeler says.



Factory Wheeler flies behind a 210-hp TCM IO-360 engine that uses a tuned induction system and many heavy-duty parts from the turbocharged Mooney 252 powerplant.

Wheeler Express

Kit price, airframe only: $25,975

Kit price, airframe and powerplant: $51,750

Specifications

Powerplant	Teledyne Continental IO-360-ES1, 210 hp at 2,700 rpm
Recommended TBO	2,000 hr
Propeller	McCauley, constant-speed
Length	25 ft
Height	7 ft
Wingspan	31 ft
Wing area	126 sq ft
Wing loading	21.1 lb/sq ft
Power loading	12.7 lb/hp
Seats	4
Cabin length	10.8 ft
Cabin width	3.7 ft
Cabin height	3.7 ft
Empty weight	1,550 lb
Max ramp weight	2,895 lb
Gross weight	2,895 lb
Useful load	1,345 lb
Payload w/full fuel, standard tanks	1,021 lb
Payload w/full fuel, optional tanks	793 lb
Fuel capacity, std	54 gal (54 gal usable) 324 lb (324 lb usable)
Fuel capacity, w/opt tanks	92 gal (92 gal usable) 552 lb (552 lb usable)
Oil capacity	8 qt
Baggage capacity	20.6 cu ft

Performance

Takeoff distance over 50-ft obstacle	1,000 ft
Max demonstrated crosswind component	29 kt
Rate of climb, sea level	1,400 fpm
Max level speed, sea level	191 kt
Cruise speed/endurance w/45-min rsv, std fuel (fuel consumption, ea engine)	
@ 75% power, best economy	183 kt/4.7 hr
7,500 ft	(60 pph/10 gph)
Service ceiling	20,000 ft
Landing distance over 50-ft obstacle	1,000 ft
Landing distance, ground roll	800 ft

Limiting and Recommended Airspeeds

Vx (best angle of climb)	59 KIAS
Vy (best rate of climb)	70 KIAS
Va (design maneuvering)	153 KIAS
Vfe (max flap extended)	96 KIAS
Vno (max structural cruising)	200 KIAS
Vne (never exceed)	230 KIAS
Vs1 (stall, clean)	55 KIAS
Vso (stall, in landing configuration)	50 KIAS

Specifications based on manufacturer's calculations. Performance figures based on standard day, standard atmosphere, sea level, gross weight conditions unless otherwise noted.

For more information, contact Wheeler Technologies, Tacoma Narrows Airport, Gig Harbor, Washington 98335; telephone 206/851-5793. □

The kit is supplied in five parts, which allows the customer to pay in installments rather than forking over the total amount in advance. The first two kits include both wings, fuel systems, landing-gear mounting system, and controls; they are $5,750 each. Kit number three includes the lower fuselage kit, fire wall, wing spar carry-through, flight controls, and part of the interior. Like each of the last three kits, this one runs $4,825. The fourth kit brings together the upper fuselage and empennage, while the last kit includes parts for final assembly, including landing gear, wheel fairings, cowling, and exhaust system, among others.

Save your calculator batteries: The total comes to $25,975 with standard tanks and another $300 for long-range tankage. A retractable-gear model, now receiving more attention at Wheeler since the number-two airplane has been finished, should be ready late in the year; it will cost $4,010 more than the fixed-gear version and have an extra 10 to 15 knots' cruise in store.

Along with the kit, Wheeler will sell you a factory-new Continental IO-360 package with a factory-new engine, McCauley two-blade, constant-speed prop, governor, engine controls, fuel injection system, and engine mounts for $25,775 (add $220 if you've opted for the long-range fuel tanks). Add it all up, and you'll spend $52,270, sans avionics or interior. A meticulous builder—especially one with a penchant for avionics—could drop 80 grand into the airplane by the time the project's finished.

That price might seem steep considering the substantial amount of labor that precedes a finished airplane, but as Wheeler points out, if Cessna 172s were in production, you probably couldn't buy one for $80,000. And that should be the last comparison to the Skyhawk because the Express ultimately is more than your basic, simple people-hauler—much, much more. □