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Citation Encore+

The Encore's encore

The Encore+ adds value to the CE-560 line

BY THOMAS A. HORNE

Cessna's new Encore+ is the latest entry in the Citation 560 series of "middle-weight" business jets. Like its predecessors in the 560 series (the Citations V, V Ultra, and Encore) the Encore+ brings incremental improvements to this popular straight-wing design. In this case, those increments are quite significant. The Encore+ one-ups the Encore (built from 2000 through 2006) with its full-authority digital engine controls (FADECs), new instrument panel, and greater load-hauling capability. The standard, seven-seat interior (eight, if you count the belted potty), with its dropped aisle, four center-club seats, aft-facing forward seat, and two forward-facing aft seats, differs slightly from the Encore in that new seat designs give passengers a bit more headroom. A double-club seating configuration is optional.

Although most customers fly the Encore and Encore+ as two-pilot airplanes, it is possible to secure a single-pilot exemption to the rules usually

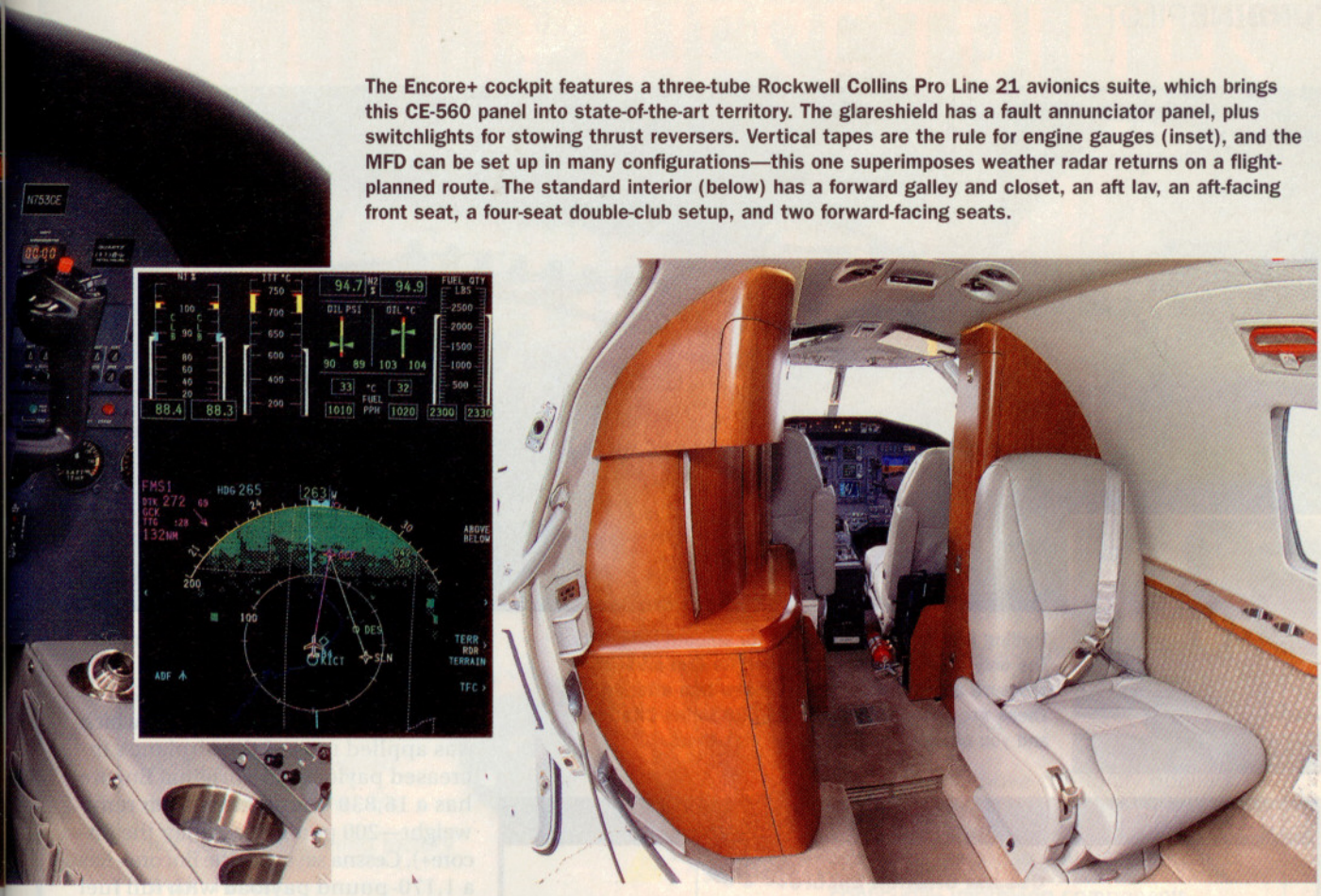
COURTESY OF CESSNA

The Encore+ has another plus that may appeal to some:
It's the biggest business jet that can be flown single-pilot.

governing turbofan airplanes in this weight category. But Cessna says that only about one in 25 owner-pilots earns the qualification to fly the Encore solo. This involves ordering a specific equipment package (to include a yoke-mounted transponder ident button, a functioning autopilot, and a boom microphone) and following certain training and operational guidelines. Five-day-long annual training is required, for example, and circling approaches are not approved.

FADEC power

The Encore+ powerplants have the same, 3,400-pound thrust ratings as those of the Encore, but power management is simpler and more precise with FADEC controls. The FADECs use computers to precisely set optimal power for takeoff, climb, or maximum cruise power, based on ambient air temperature, pressure, and airspeed inputs from the ship's air data computers. All the pilot has to do is slide the thrust levers into the



The Encore+ cockpit features a three-tube Rockwell Collins Pro Line 21 avionics suite, which brings this CE-560 panel into state-of-the-art territory. The glareshield has a fault annunciator panel, plus switchlights for stowing thrust reversers. Vertical tapes are the rule for engine gauges (inset), and the MFD can be set up in many configurations—this one superimposes weather radar returns on a flight-planned route. The standard interior (below) has a forward galley and closet, an aft lav, an aft-facing front seat, a four-seat double-club setup, and two forward-facing seats.

takeoff, climb, or maximum cruise power click stops and the FADECs automatically calculate and command the correct power setting. Obviously, this lowers workload during takeoff and climb, leaving the pilot more freedom to scan for traffic and maintain control of the airplane.

During takeoff, for example, all you do is shove the thrust levers forward three clicks until they're in the "TO" notch. Automatically, the fan and turbine speeds come up to the right levels for takeoff. Now you're able to steer the airplane through the takeoff run without the distraction of having to fiddle with the power settings, trying to reach the exact N_1 values. Ditto for climb and max cruise settings. Just dial the power into the appropriate click stop—you can easily do it by feel—and you're done.

The Pratt & Whitney Canada PW535B engines (the "B" suffix denotes FADEC-equipped) generate enough power for the Encore+ to reach maximum cruise speeds of 438 knots while burning a total of 1,767 pph (or approximately 263 gph)—at 29,000 feet, that is. At more normal cruising altitudes—say, 39,000 feet—true airspeeds drop to 427 knots, but fuel burns are more economical 1,203 pph (or about 179 gph). At the airplane's maximum operating altitude of 45,000 feet, max cruise speeds and fuel burns are listed as being 414 knots and 892 pph (133 gph). All of those numbers assume standard conditions and a very light, 12,000-pound weight. Subtract five to seven knots for a 16,000-pound airplane flying at max cruise at 29,000 and 39,000 feet—which approximates an Encore+ carrying six passengers and flying with full fuel.

Pro Line 21 panel

The Encore+ features a three-tube Rockwell Collins Pro Line 21 avionics suite that includes two radio tuning units, Rockwell Collins' FMS-3000 flight management system, an integrated flight guidance/autopilot system, a Garmin GPS 500, dual attitude heading reference systems, and much more.

The Pro Line 21's primary flight displays (PFDs) and multifunction display (MFD) have active matrix liquid crystal digital displays that are bright and sharp, which is great for daytime visibility, but also help when it comes to displaying the standard-equipment XM WX datalink weather information and Jeppesen electronic charts on the MFD. The charts are geo-referenced, so you can follow your symbolic airplane's position along an airport diagram's ramps, taxiways, and runways, or through published approach, departure, or arrival procedures.

Radios can be tuned using either the panel-mounted tuning units, or the center pedestal-mounted FMS keypad. Meanwhile, flight director modes are selected on a small horizontal panel atop the PFDs, and to engage the autopilot and yaw damper, the autopilot panel at the base of the center pedestal is used.

In keeping with the Citation strategy of making popular options in past airplanes standard in newer ones, the Encore+ also has a TCAS II (Traffic Collision Avoidance System, with aural and visual avoidance advisories) and a Class A TAWS (terrain awareness and warning system). The TAWS is a Honeywell Mark VIII EGPWS (enhanced ground proximity warning system) that has several alert modes, including: excessive descent rate; excessive terrain closure rate; altitude loss after takeoff; unsafe terrain clearance; and excessive deviation below glideslope. In short, the Encore+ has just about every safety fea-

Trailing link landing gear make for smooth landings. The only takeoff quirk is the need for firm aft-stick pressure at rotation, and nose-down trim after liftoff. These are characteristics of all 560-series Citations, and you quickly come to terms with them.

SPECSHEET

Cessna Citation Encore+
CE-560
Average equipped price: $8.273 million

Specifications

Powerplants..Two Pratt & Whitney Canada PW535B, 3,400-lbs thrust
Recommended TBO.....5,000 hr
Length.....48 ft 11 in
Height.....15 ft 2 in
Wingspan.....54 ft 9 in
Wing area.....322.3 sq ft
Wing loading.....52.2 lb/sq ft
Power loading.....2.48 lb/lbst
Seats.....7-9
Basic operating weight.....10,460 lb
Max ramp weight.....17,030 lb
Max takeoff weight.....16,830 lb
Max useful load.....7,030 lb
Payload w/full fuel.....1,170 lb
Max landing weight.....15,200 lb
Fuel capacity....5,400 lb (approx 806 gal)

Performance

Takeoff runway length.....3,590 ft
Rate of climb, sea level.....4,620 fpm
Single-engine ROC, sea level.....1,400 fpm
Cruise speed/range w/NBAA fuel rsv (fuel consumption)
@ Max cruise speed, 29,000 ft.....431 kt/ 1,200 nm (1,433 pph/214 gph)
@ Max range setting, 45,000 ft.....414 kt/1,760 nm (888 pph/133 gph)
Max operating altitude.....45,000 ft
Landing runway length.....2,770 ft

Limiting and Recommended Airspeeds

V_{MC} (min control w/one engine inoperative).....86 KIAS
V_{FE} (max flap extended).....200 KIAS
V_{LE} (max gear extended).....250 KIAS
V_{LO} (max gear operating)
Extend.....250 KIAS
Retract.....200 KIAS
V_{MO} (max operating speed; SL-8,000 ft).....261 KIAS
8,000 – 28,900 ft.....292 KIAS
M_{MO} (max Mach number).....0.755 M
V_{S1} (stall, clean).....97 KIAS
V_{SO} (stall, in landing configuration).....86 KIAS

For more information, contact Cessna Marketing, Cessna Aircraft Company, Post Office Box 7706, Wichita, Kansas 67277-7706; telephone 316/517-6449; (http://encoreplus.cessna.com/home.chtml.)

All specifications are based on manufacturer's calculations. All performance figures are based on standard day, standard atmosphere, sea level, gross weight conditions unless otherwise noted.

ture you'd expect in a much larger class of modern transport airplane.

On top of all this, the Pro Line 21 enabled a weight savings, much of which was applied toward the airplane's increased payload (the original Encore has a 16,830 pound maximum ramp weight—200 pounds less than the Encore+). Cessna says that the Encore+ has a 1,170-pound payload with full fuel (with a maximum takeoff weight of 16,830 pounds). That's approximately 217 pounds more than the Encore's full-fuel payload.

Flying the Encore+

My flight in the Encore+ was with Steve Workman, a flight supervisor and senior pilot in Cessna's 70-pilot demo pool. Workman had little explaining to do when it came to firing up. All you do is push a button, then monitor the interturbine temperatures (ITTs) during the start sequence. We computed our V-speeds for takeoff at our 15,500-pound takeoff weight, and at our temperature of 10 degrees above standard. That day at Wichita's Mid-Continent Airport (and Cessna's headquarters) V_1 (takeoff decision speed) came in at 95 knots; V_R (rotation speed) was 101 knots; and V_2 (takeoff safety speed) was 112 knots. All those numbers were dialed into the "refs" menu on the PFDs, and then were posted automatically on the vertical-tape airspeed indicators.

After lineup and clearance to take off, I advanced the power—click, click, click—to the takeoff detent, and soon we were rushing down Wichita's Runway 19L. The first two V-speeds came and went in sec-

onds, and after a hefty pull, we launched. The somewhat high stick forces for rotation are because the main landing gear is well aft of the center of gravity. After liftoff, it was time to trim nose down to compensate for all the pitch-up created by those 6,800 pounds of thrust, and dial the thrust levers back one click to the climb setting. Workman pointed out how blue carats on the N_1 vertical tape show maximum continuous power levels. Our white N_1 tape readouts were snug in the blue carats, indicating that the FADECs were indeed making the engines meet climb power requirements.

We settled into a 247-knot, 3,600-fpm climb, and went directly to 40,000 feet in just under 15 minutes, holding 2,000 fpm even as we passed through 34,000 feet. After levelling off at 40,000 feet I clicked back to the max cruise detent, watched our true airspeed build to 223 knots indicated, then saw a true airspeed of 419 knots on the PFD's readout. Our fuel burn was 590 pph per engine, or about 176 gph total. Not bad, and right on book numbers, given that the air temperature was now two degrees below standard.

We descended to 10,000 feet for some airwork and approach stalls. As I slowed the airplane and extended flaps to their full, 35-degree deflection, an autotrim interconnect helped by introducing some nose-down trim as the stall approached. The Encore+ has a stick-shaker to announce an impending stall, but no stick-pusher to automatically command corrective, nose-down action. I held the nose up until the stall break, which came with a prompt rolloff to the left that was easily corrected during recovery.

An ILS to the Hutchinson, Kansas, municipal airport, followed by a circle-to-land maneuver to Runway 22, came next. V_{REF} was targeted as 104 knots, and the landing was pretty good, if I must say so myself—a testimony to the Encore+'s docility in low-speed maneuvering, and its forgiving, trailing-link main gear. (The last time I flew an Encore was in 2001.)

The takeoff from Runway 22 was a bit more exciting, as it involved a V_1 cut at liftoff. There is no rudder bias on the Encore+, so there is a need for firm rudder pressure to keep the nose straight during climbout. After trimming for the yaw, it was time for a return to the runway for a single-engine landing. V_{REF} this time was 115 knots for the single-engine condition, but the landing, if anything, was better than the previous one. More focused attention, I guess.

After all that excitement, the return to Wichita was a piece of cake. After 1.4 hours getting used to the Encore+, I was starting to feel at least somewhat at home. Easy to fly, a strong performer at altitude, able to fly five passengers from coast to coast with one stop, and a service center never far away—these are the reasons Citations continue to account for large portions of the business jet market.

Apart from that, the Encore+ has another plus that may appeal to some: It's the biggest business jet that can be flown single-pilot. The next step up the Citation 560 line is the $11 million, big-cabin XLS+. At $8.2 million, the Encore+ may be out of reach to you or me, but so far, 15 customers have seen fit to take delivery. AOPA

E-mail the author at tom.horne@aopa.org.