



Sierra's Eagle II Mod

Slow no more

New life for
old Citations

BY THOMAS A. HORNE

Pilots look on early Cessna Citations with an odd mixture of ridicule and respect. By "early" Citations we're referring to the first of the breed, the Citation (the model 500, 352 of which were sold between 1971 and 1977), and the Citation I (the model 501, with 345 sales between 1977 and 1985). Ridicule because of the enduring jokes about these Citations' comparatively slow cruise speeds. Respect because these airplanes were such hits that they spawned a successor fleet of 18 different Citation models. Obviously, Cessna got it right with the Citations—notwithstanding the disco-era speed jokes.

The Citation and Citation I remain popular in the used market chiefly because of their relatively low acquisition cost: Some 500s sell for as low as \$500,000 these days. Another reason is the Citation I SP—the single-pilot variant of the Citation I. Certified under FAR Part 23, the I SP appeals to the owner-flown crowd, and now sells in the \$1 million-to-\$1.5 million price range. The 500- and straight-501-model Citations were certified under FAR Part 25, and require two pilots.

While the early Citations were big hits, there's no doubt that time is passing them by. Since 1980, Sierra Industries, of Uvalde, Texas, has developed 28 modifications to help address these airplanes' shortcomings, improve their utility and quality, and make their performance competitive with more modern business jets. The mods range from the mundane (roll-down cockpit sun shades, forward potties, baggage

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compartment redesigns, aft divans) to Sierra's latest, most ambitious project: the Eagle II modification.

The crux of the Eagle II mod involves two elements: a wing conversion and swapping out the Citations' Pratt & Whitney JT15D-1 engines of 2,200 pounds static thrust for a pair of brand-new Williams FJ44-2A turbofans—the same 2,300-lb-st engines that power Raytheon's Premier I. The Williams engines are smaller and more fuel efficient than the old Pratts, have about half the moving parts, and can produce more thrust at higher altitudes and ambient temperatures. Sierra Industries President Mark Huffstutler says that at altitude the Williams engines put out 35 percent more thrust than the Pratts and burn 40 percent less fuel. "That's what 30 years of engineering advances will do for you," says Huffstutler.

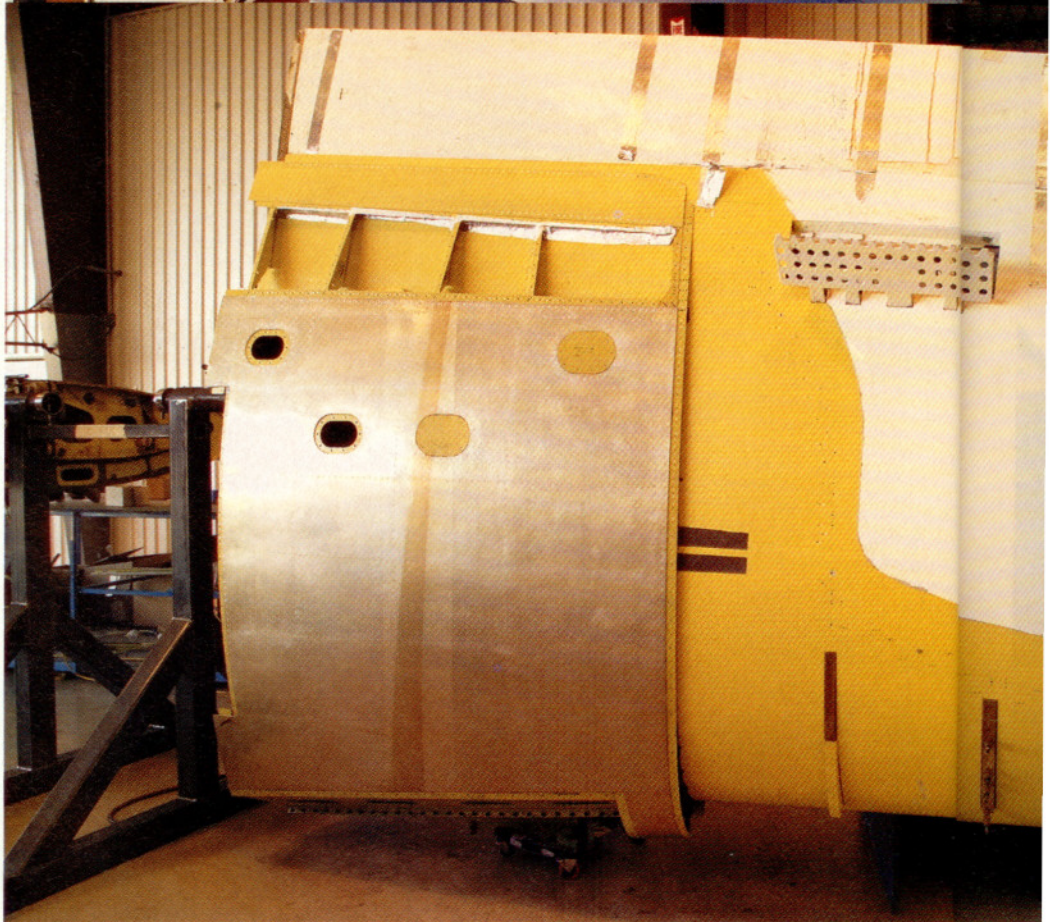
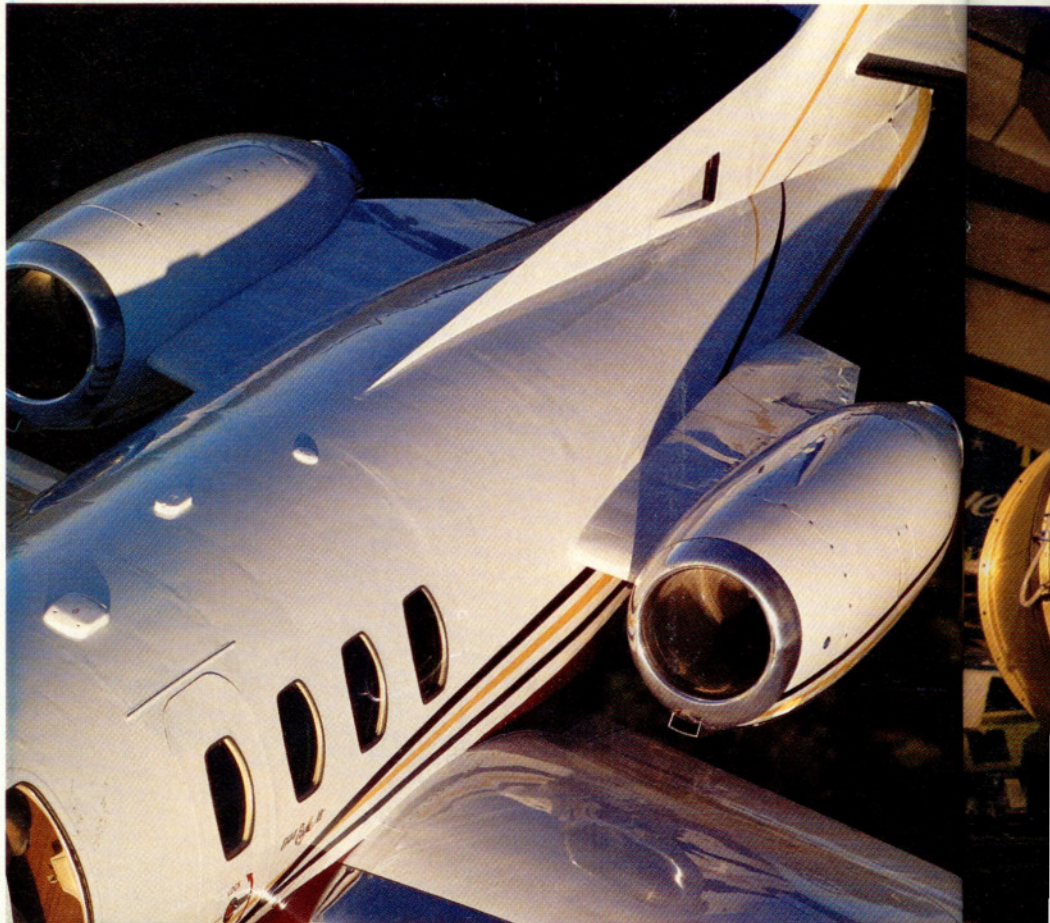
This all translates into huge performance increases. Compared to a standard-issue Citation or Citation I, Sierra says the Eagle II mod lets you climb straight to 41,000 feet at gross weight in less than 30 minutes (the stock airplane takes one hour, 20 minutes), cruise at least 50 knots faster (Sierra's sales brochure claims a maximum of 400 KTAS, versus the standard airplane's 310 KTAS), and fly 250 to 300 nm farther. At maximum-range power settings, Sierra says that an Eagle II-equipped Citation can cruise for up to 2,000 nm with NBAA IFR fuel reserves.

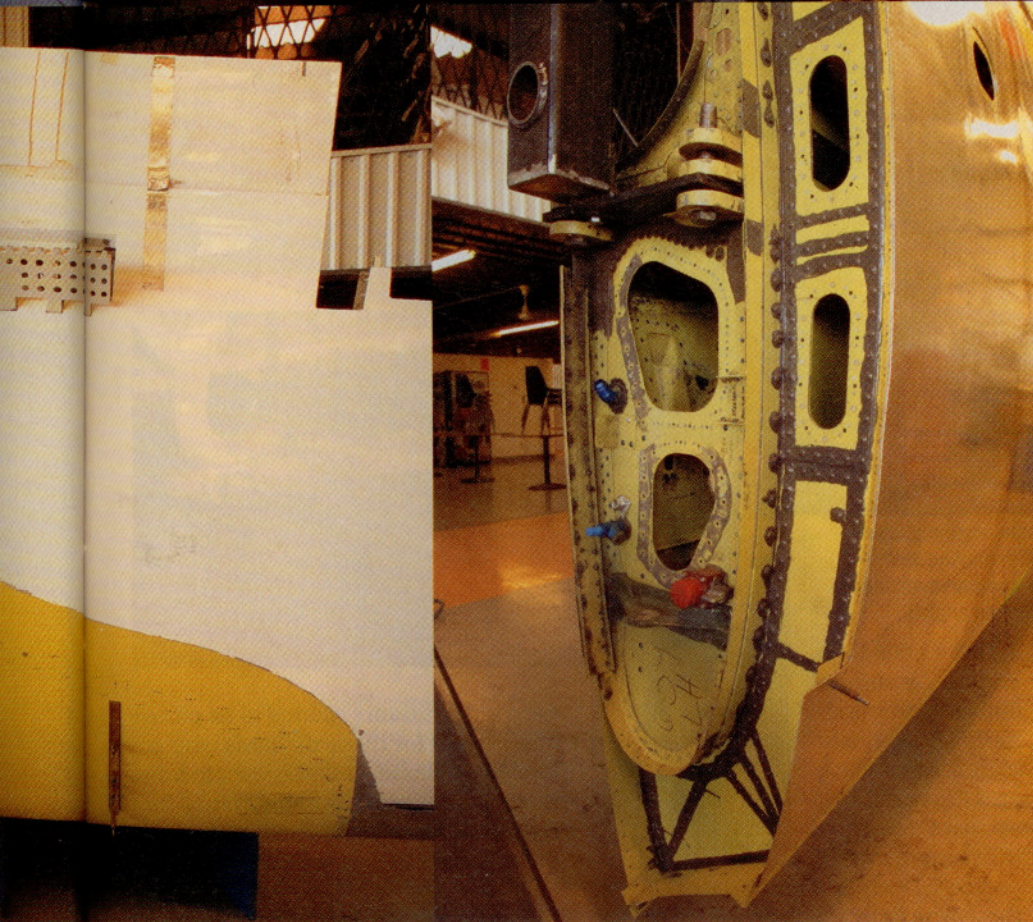
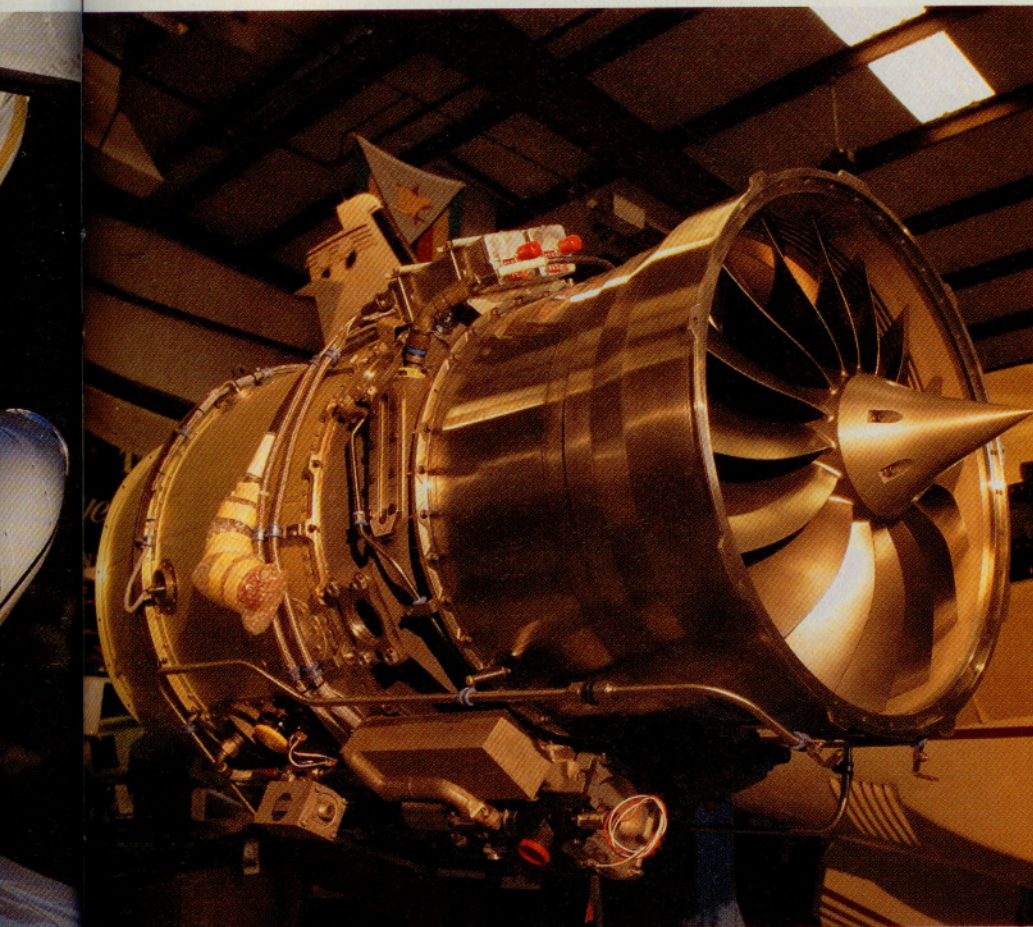
Huffstutler ticks off more of the Eagle II's advantages in quick cadence:

- A maximum operating altitude of 43,000 feet.
- A 40-percent shorter takeoff distance than a standard Citation.
- A 5,000-fpm climb rate.
- A cruise that's 50 knots faster at the same fuel flows as stock Citations—or the ability to fly the old speeds at 30-percent less fuel flow.
- 375 KTAS at Flight Level 390, burning 800 pph.
- 365 KTAS at FL410, burning 750 pph.
- 355 KTAS at FL430, burning 700 pph.

Of course, fuel efficiencies are greatest at high altitude, where fuel flows are lowest. For this reason, the Eagle II mod only makes sense for those Citations

The Eagle wing mod installs a recontoured leading-edge cuff (right). The extra room created by the deeper cross section allows a 106-gallon boost in fuel capacity over stock Citations. The Eagle II's Williams engines (facing page, top) use single-piece fans, or blisks (merged blades and disks).





after serial number 213. That's when the airplane's maximum operating altitude went from 35,000 to 41,000 feet—thanks to a three-foot increase in wingspan and a boost to the JT15D's fan speed limits.

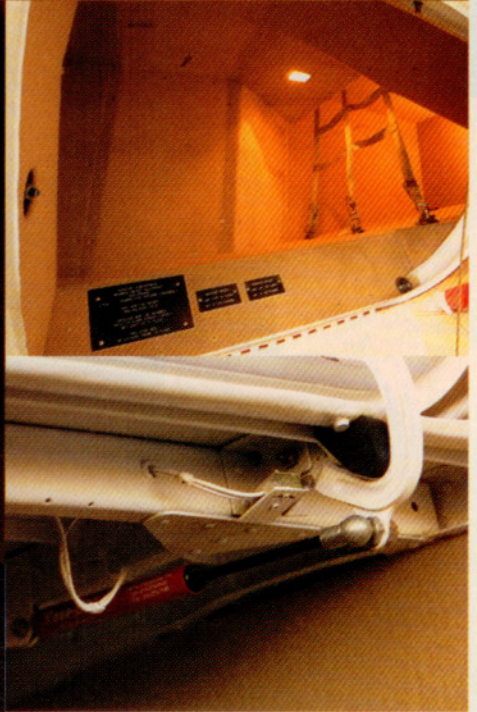
Wing modifications in the Eagle II package include installation of wing-root cuffs, wing-to-fuselage fairings, a wingspan stretch, new main gear uplocks, flap-gap seals, new wing deice boots, compliance with a spar modification service bulletin, and a new paint job. The idea behind the cuffs and fairings is to cut drag at high airspeeds, preserve laminar flow at higher angles of attack, and increase the volume of undisturbed air flowing into the engine air intakes. An additional bonus of the cuffs—which add seven inches to the thickness of the wing root—is room for 710 extra pounds (about 106 gallons) of fuel.

The wing modification preceded the full-blown Eagle II package, and was sold as the Eagle mod (see "Turbine Pilot: Sierra's Citation Upgrades," May 1995 *Pilot*). It was offered as a standalone STC that let standard-engine early Citations fly higher and farther. But the weight of the Eagle wing fixes prompted Sierra to hike the airplane's maximum takeoff weight (from 11,850 to 12,500 pounds) to preserve payload, and this caused speed penalties. If an Eagle-winged Citation was to achieve speeds comparable to newer airplanes, more thrust would be needed. Ergo, adding the Williams engines to the Eagle, creating the Eagle II.

The mod is installed by Garrett Aviation Service Centers at the company's Houston facility. Sierra used to do the work at its Uvalde headquarters, but a recent licensing agreement with Garrett provides more service, marketing, and sales personnel, and the economies of scale that Sierra—a "boutique" certification house—couldn't realize. So far, Sierra has sold some 69 of its 200-odd supplemental type certificates (STCs) to Garrett.

The Eagle II is priced at \$1.75 million including the Eagle wing conversion, or \$1.55 million for those that already have it. Don't own a Citation and want Garrett to set you up with a Citation Eagle II from scratch? Expect to fork over \$2.5 million to \$3.3 million.

Whichever way you cut it, it's a lot of money for a 20- to 30-year-old jet. But as Huffstutler says, the Eagle II is a great upgrade for pilots coming out of King Airs and Twin Commanders, looking for "the performance of a new CJ2 but without the \$5 million price tag." *Continued*



With the Eagle II, gone are the stock vertical-tape engine gauges. They're replaced by circular Hickock gauges (above). Another popular Sierra Citation mod is a larger baggage compartment and a sturdier baggage door hinge and latching mechanism (right).

So far, seven airplanes have undergone the Eagle II upgrade; by the end of the year Garrett says 20 airplanes will have been converted. Next will be a reduced vertical separation minimums (RVSM) program, scheduled for approval in January 2005. And after that? Sierra says a souped-up Williams-powered Citation II project is in the works. Dubbed the "Super II," this will feature

FJ44-3 (3,000 lbst) engines, a 500- to 600-pound maximum gross weight increase, winglets, and a panel built around Meggitt instruments.

Are all these mods worth it? For those who flatly proclaim the early Cita-

i Links to additional information about Citations and Sierra's mods may be found on AOPA Online (www.aopa.org/pilot/links.shtml). Keyword search: Citation.

tions are dinosaurs waiting to be parted out, no. But for those diehards who are loyal to the brand, and who want to bring their "Slo-tations" into the twenty-first century, Sierra's Eagle II and other mods make perfect sense.

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