50 years of the Cessna 310

General aviation's first modern light twin soldiers on

BY MARC E. COOK PHOTOS BY KEVIN WING

Cessna's own drives home On the back of brochure, ci there's the jaunty parked in front of a h Midwes Cessna's own literature drives home the point. On the back of a four-fold brochure, circa 1956, there's the jaunty new 310 parked in front of a handsome Midwestern FBO.





A man in suit and hat extends a hand to the disembarking female passenger. Behind the tail of the Honey Gold and Ebony Black 310 is a salmon-colored 1955 Cadillac convertible, resplendent in whitewall tires and the nubbinlike tail fins that were popular before the marque's aft flanks grew to outlandish proportions. Aside from the paint scheme—we'd call it retro today, of course—and the purposeful vertical tail, the 310 itself looks perfectly modern, dashing even, as it stands proud on tall, retractable landing gear.

And the Cadillac, to our eyes today, appears positively ancient. Classy, sure, but also bulbous and disproportionate to the people riding in it.

So can you imagine the impact of the 310 to contemporary sensibilities of the mid-1950s? No less surprising than finding Mary-Kate Olsen peering back from the In-n-Out drive-through window, we'd wager. Then again, sometimes it's not so much the suit but where you show it off: In that same brochure, Cessna calls attention to the entire 1956 lineup—"Five Great Cessnas-The Airfleet For Every Business Need"-which includes the strutbraced, taildragger 170, the newly nose-geared 172, the 180, and the 182 along with the retractable-gear, 190knot-max 310. Look back only two years, and Cessna's whole lineup consisted of the 170, the 180, and the 195. My how you've grown. For that matter, compare the sleek 310 to its only lighttwin competition of the time, the stubby Piper (nee Stinson) Apache. Which one of these is not like the others?

Today there are really two kinds of 310 owners. One is the pragmatist who wants a fast, capable airplane that's not extraordinarily difficult to fly or maintain. (Baron and 310 owners debate the relative merits of this chosen brand, but word is that the Cessna, despite being out of production for more than two decades, is not any more a maintenance burden than similarly complex airplanes.) The other owner is probably best called a practical romanticist. That describes Chuck Jessen, owner of this beautiful 1954 Cessna 310. Jessen's airplane was built at the end of 1954 and just missed its acceptance flight in that year to the Christmas holidays. (Actually, there's a third kind of early 310 owner: The crass soul who sees a dead-cheap multiengine airplane that can be run on minimal maintenance until something big goes wrong. Then another magnificent machine is essentially scrapped. This kind of owner figures prominently in the world of early vintage 310s.)

We're heartened by Jessen's attitude toward the 310. "My first airplane was a 1956 Cessna 172. I loved it, but wanted something more. I was shopping around for an early straight-tail 182 when friends of mine told me to consider a 310. I didn't even think of a multi before, but the buy-in was low." As Jessen knew going in, twins are often cheap to buy but never to own. "I put a lot of time and money into this airplane," he says, stroking the 310's stubby nose, "but now I have a fast, reliable, safe airplane."

Jessen's observation validates what Cessna was trying to achieve in the first place. In the early 1950s, Cessna rightly recognized a gap in the market for a "truly modern" light twin. The design we know as the Aero Commander was just starting production, and the Twin Stinson was flying. (Piper bought the rights to the Twin Stinson in 1948 but didn't produce the Apache from its design









Long props improve acceleration and make great noise (top left). Notice the 310's unusually flat engine nacelles. Tip tanks carry 50 gallons each; they are the only fuel vessels on the early 310s. Pilots like the roomy cockpit and friendly panel. It's three across in the back seat (top right).

until 1954.) But while Cessna—along with Beech, notably—was working on modern, all-aluminum airplanes and looking to the future, most mainstream manufacturers were locked to the past. Remember, the Piper Comanche didn't arrive until 1958, and Cherokee didn't arrive until 1960—both of which would form the basis for Piper's most successful twins.

Masterfully, Cessna's management recognized this market opportunity and decreed its new twin would not only slot in between the Stinson/Apache and the Aero Commander for weight and size, but vanquish both in performance and style. In his book Cessna: Wings for the World II William D. Thompson describes in exquisite detail the development of the 310-an airplane, incidentally, that never had a proper name, à la Skyhawk or Skyknight. Thompson was a flight-test engineer for Cessna during the period and played a particularly important role testing the 310. He describes a number of the early design considerations, among them that the 310 must fit into a common T-hangar, meaning it couldn't be overly long or have a sailplanelike wingspan. Also, in keeping with Cessna precepts of the day, it had to be very light and easily manufactured.

And, of course, it had to be fast.

Speed is the child of a happy marriage of power and aerodynamic efficiency. Cessna took care of both parents. Although the 310 prototype flew with 225-horsepower engines—the Twin







Stinson had 125-horsepower Lycomings, by contrast-the company knew more power was coming. Continental was busy pushing for more power from the 470-cubic-inch, six-cylinder engine in the Beechcraft Bonanza. By the time production started in 1954, the O-470 was up to 240 horsepower; there would be another 20 horsepower to come from the 470s by the time the normally aspirated 310 went to IO-520s in 1975. Extra power doesn't always result in blinding speed for multiengine airplanes, but it never hurts takeoff and climb performance, which in turn allows either a higher maximum gross weight or better single-engine performance.

Power sorted out, that left aerodynamic efficiency, which is largely influenced by component placement and packaging in a twin. Cessna explored several new ideas and emerging technologies in the 310, all in the name of efficiency and, to some extent, in pursuit of low empty weight. For example, look carefully at the 310 engine nacelles. Hardly bigger than the bare engines they protect, yes? It wasn't an easy job, however. Often in designing an engine installation, the placement of the bare motor itself is the easy part; it's making room for the accessories, and exhaust and induction systems, that causes sleepless nights for the development engineers.

1962

Cessna worked with Continental to develop a new pressure carburetor that could be placed behind the engine instead of hung below, as was customary at the time. Think of this system as single-point fuel injection—although still subject to mixture maldistribution and icing, it handily solved the packaging problem. Later the 310 would get mechanical fuel injection.

Fads are nothing new, and one of them in aeronautical circles in the 1950s was called the *extractor* or *augmentor exhaust*. Cessna had good reason to try it in the 310, too. Wanting sleek nacelles without draggy, dangly cowl flaps, the company tried the thenpopular concept. It is this: Rather than run the exhaust system out the bottom of the cowling, in the 310 it sweeps up and back toward the top of the wing.

Before it gets to the main spar, the exhaust pipes abruptly stop. They are, however, facing, and slightly into, a pair of larger tubes that exit the back of the nacelle, ahead of the trailing edge of the wing. The idea is that the exhaust pulses will encourage airflow through the larger tubes, which act as the cowling outlets-all air entering the nacelles must exit through the augmentor tubes. It's a great concept for an aircooled engine: At the times when the engine needs the most cooling airtakeoff, initial climb, max-power climb on one engine at blueline speeds-it is provided, because the engine exhaust at high power is flowing forcefully through the tubes. At low power, conversely, the engine doesn't need as much cooling-air flow, and, in this design, doesn't get it.

Theory and reality parted company, however. Sit in an early 310 and listen to the engine idle. You'd swear someone replaced the Continental with a pair of Harley engines. *Thumpathumpa...pause...thumpa-thumpa*—all at high volume. The traditionally lumpy

Meet the blue canoe

Cessna's military success ensures support of civilian 310s

During the mid-1950s, a growing civil aviation market prompted the military to consider an off-the-shelf design for light transport duty. In 1956 Cessna beat Beech—which fielded the much larger Twin Bonanza—to a U.S. Air Force contract good for 160 air-craft. (That's significant, as Cessna produced around 200 310s a year for civilians.) Using the 1957 310A, the Air Force bought 80 labeled as the L-27A and another 80 dubbed the U-3A. Cessna sold another 36 in 1960, based on the 310E and called the U-3B by the service.

A side benefit for civilians was that the military demanded that Cessna produce a prodigious amount of spare parts and paid Cessna to keep them in inventory. Believe it or not, some of that original inventory is still available, making the acquisition of spares for early 310s much easier than for many contemporary designs. —*MEC*



1975



Cessna pursued development of the 310 with commendable vigor. In 1960, as jets captured pilots' imaginations, Cessna gave the 310 a swept vertical stabilizer and rudder. Tuna-shaped tip tanks gave way to upward-canted vessels in 1962. Numerous updates were implemented between then and the 1972 310Q, whose taller aft cabin and rear window gave passengers improved personal space. The original 310 had no luggage compartment in the nose, so the 32-inch stretch of the nose in 1975 for the 310R proved a welcome update. The 1981 310R was the last in line of a proud design.

My Cessna 310

By John S. Yodice

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As an owner of a late-model Cessna 310, I'll add my two cents to this story about an older 310. My aircraft, a Turbo 310R, was manufactured in 1981, the last year that 310s were made, which is, incidentally, why I have it. I had owned a 1978 model, and I liked it so that I decided to own one from the last year Cessna made them.

Cessna started with a great airplane and continued to introduce upgrades and improvements over the years. The 1981 model was the culmination of all of them. In the more than two decades that I have owned and flown the 1981 version, I have added some improvements, especially in avionics, but none of them suggest that the airplane was anything but capable when it came off the assembly line.

All airplanes are designed with compromises. This airplane has the optimum compromises, for me at least. It is fast, but not the fastest. It has a spacious interior, but not the biggest. It is expensive to operate, but not the most expensive. Initially, I didn't find it the easiest to fly, having owned a relatively easy-to-fly Beechcraft Baron, but when I added MicroAerodynamics vortex generators, directional control and stability at low speeds improved the flying characteristics immensely.

I can get an honest 180 knots true airspeed at about 60-percent power at the middle altitudes, where I fly most. When I need it, I can operate higher, with turbocharging and built-in oxygen, picking up speed and operational flexibility. The cabin is spacious and my nonpilot passengers find it very comfortable. As for expense, I average about 30 gallons an hour, which for the speed is not bad. Maintenance is not bad either, except for some repetitive airworthiness directives issued by a trigger-happy FAA, such as on the exhaust system, which have yet to find a significant problem. I am cautiously following FAA activity on the wing spar that started on some 400-series Cessnas, and threatened to trickle down to the 310s. For the moment the FAA has seemed to back off. I have changed the engines once (they went 1,700 hours on a 1,400-hour time between overhauls) and I have had the airplane painted once

(hangared mostly). I've also done minor interior work, though the interior is next on the list for replacement. As for avionics, I still have most of the original

Cessna radios and autopilot. I replaced one nav/com unit. I hope that I am not jinxing myself by saying that I have not experienced the bad reputation that these radios get. My biggest problem is that Cessna does not continue to support them, so that even minor repairs are sometimes troublesome. The autopilot is starting to get a bit cranky and getting good service on that is problematic.

My improvements have made the airplane even nicer to fly. I mentioned the MicroAerodynamics vortex generators. I made this improvement to pick up a 180-pound increase in gross weight. I was pleasantly surprised by the other benefits that I received in handling characteristics from reduced V_{MC} , V_{S} , and V_{S0} . I added an Insight Gemini engine monitor (a valuable addition to monitor the health of the engines) and a PS Engineering intercom (don't know how I did without it before). My most recent addition, an Avidyne FlightMax EX500, is spectacular. It would take another article to extol the wonders of this instrument.

As you can tell, I am very happy with my airplane. I use it regularly in my law practice. For trips up to 1,000 nautical miles I can usually beat the airlines and use more convenient airports to boot. The current hysteria about security makes using a private airplane more convenient for even longer trips.

I should mention that owning and flying it has been facilitated by my membership in the 310 owners association (now enlarged to include all twin Cessnas) with its publication, *The Twin Cessna Flyer*. Larry Ball, as editor, continues to provide valuable information, as does Tony Saxton, director of tech support for the association. It relates the shared experiences of many twin Cessna owners, and provides a wealth of expert technical guidance. John Frank and his Cessna Pilots Association are other excellent sources that I rely on.

John S. Yodice is the legal counsel for AOPA.

Continental idle and occasional wheeze from the pressure carbs only add to the ambience. Maybe the designers wanted to recapture the character of a radial engine or something. Throttle up to clear your parking spot and the airplane comes alive with vibration-the glareshield quivers, the jaunty engine controls emanating from the stylish pedestal do a little rumba. In any event, the augmentor exhaust was particularly boisterous, especially for occupants of the airplane; and this was all before anyone thought to fly with headsets. Cessna tried a large box muffler and an extended nacelle in later years, and eventually moved to an under-wing exhaust. But there's still nothing like the loping syncopation of an early 310 trundling down the taxiway-in itself a pure expression of engineering bravado and optimism.

Bring up the power and that lumpy idle turns to a fierce growl as the augmentors come into their own and the 81-inch props take a bite. In Jessen's airplane, the takeoff is a visceral thrill. The light airplane—its maximum gross weight is a mere 4,600 pounds, 900 fewer than the last nonturbo 310 built accelerates rapidly, with exemplary visibility over the sharply raked, stubby nose. In fact, the pilot more accustomed to a face full of cowling during the climb will be slightly put off by the lack of references in the 310—pick a spot on the window frame, and that's about the best you can do. Full-power rate of climb is listed at 1,495 fpm at max gross weight, and at a lower overall weight, Jessen's airplane could match the published climb rate even at reduced power and faster-than-optimum airspeed. For a Bonanza pilot, the 310's ascent is just shy of breathtaking.

Pilots who believe all Bonanzas are built like elegant tanks and all Cessnas are made from recycled beer cans-not us, incidentally-will get a swift education in the early 310. Although Cessna most definitely paid attention to keeping weight down, the 310 flies like the substantial airplane that it is. Pitch response and stability are both exemplary at midcenter-of-gravity loadings. Like so many designs, the first of the breed fly the best, with good control harmony and an undeniable honesty. True of the 310, as well. As the airplane gained weightfrom equipment as well as a move to six full seats from the original's two-infront, three-across-the-back arrangement-engineers had to rework the control system to accommodate a broader CG envelope. Inevitably, these machinations add artifacts to the handling, such that the later airplanes—as mentioned, utterly capable and desirable—are much more "numbers" airplanes, less enticing to hand-fly.

Step into the 310 and the first thing you'll notice about the handling is the roll response. So much has been written over the years that it hardly bears repeating, but let's just say this: The fuel in the tips dramatically affects the feel of the airplane. New pilots struggle with it until they learn to manage the mass—learn when to be aggressive with the control wheel to keep the bank angle where they want it, yet know when to leave well enough alone. It isn't necessarily good, not necessarily bad; it just is.

While we're here, let's slay another 310 old wives' tale regarding the fuel system. In its original design, it was pretty darn good. It's worth noting that Cessna didn't use tip tanks just to be clever. Within the dimensional constraints set down early on, the wingspan was limited. Cessna's engineers also didn't want fuel between the engine nacelles and the cabin—not that there'd be a lot of room anyway, with the hefty main gear swinging inboard. Without making the 230-series airfoils unacceptably thick, there just wasn't enough volume in the wing outboard of the nacelles to carry the desired amount of fuel. Cessna was also wed to using rubber fuel bladders-it was the industry norm at the time-so much of the wing was off limits to fuel anyway. That left tip tanks, a decision reinforced, as Thompson says, by contemporary accidents in which the aircraft caught fire from spilled fuel. Thus the tips would give them everything they wanted-sufficient capacity within the desired wingspan and the safety potential of having the tips detach in a crash. Plus, there was thought to be some "end plate" effect, which would improve performance. (Later flight tests showed the tips provided a minimal increase in climb rate and slight penalties in cruise on a 310 flown with and without the tip tanks.)

For the early airplanes, the fuel system is delightfully simple—each selector says On, Off, and Crossfeed. Under normal conditions, you never touch the levers. Later airplanes, however, grew ever more complex. Auxiliary tanks appeared in the wings, but the catch was that the engine returned fuel vapor back to the mains (the tips) so you couldn't run from the auxes with full tips. Even later models used a combination of main, aux, and wing locker tanks—complicated, yes, but not impossible to learn.

Cessna produced the 310 for 26 years, and made thousands of changes large and small. Here are the highlights. The straight-tail "classic" 310 was produced from 1954 to 1959, with an uprated version of the O-470 featuring fuel injection and 260 horsepower that also arrived in 1959. In 1960, the 310D debuted a swept tail: the 1962 310G brought the upwardcanted tip tanks-previous versions were unofficially called "tuna tanks." The 310I of 1964 got under-wing exhausts; in 1967 a one-piece windshield became standard. (Early airplanes, like Jessen's, can be retrofitted.) In 1972 for the 310Q, Cessna literally raised the roof and gave backseaters not only more headroom but a window as well. The final iteration, the 310R, arrived in 1975 sporting a 32-inch-longer nose, IO-520 Continentals, and a host of other changes. At 5,500 pounds max gross, six full seats, and equipment that wasn't even dreamt of in 1954, the last 310s shared scant resemblance to the first models. Capable, highly evolved, sure, but vastly different.

Romanticists like Jessen see early 310s moldering on the ramp and want to take them home. But think about the whole picture. An early straight-tail 310 is more likely than not a restoration project. Economics doesn't know from beauty or attitude, so many early 310s have fallen through the ranks as slightly outmoded twins, then trainers, then budget twins for the maintenance disinclined—the ultimate ignominy. At some point, the cost of upkeep outstrips intrinsic value.

Stalwarts like Jessen see the beauty under the chalky paint, see the capable airplane beneath the layer of grime and the list of needed parts. His 310 has seen five decades of service, five figures worth of updates and repairs since purchase, and still has revamped instruments and avionics in its future. That this 310 has a future at all speaks volumes about the goodness of the design. Here's to another 50 years.

Former AOPA Pilot Senior Editor Marc E. Cook now lives in California.

Links to additional information about Cessna may be found on AOPA Online (www.aopa.org/pilot/links.shtml).