

Used Aircraft Guide: Cessna Cardinal

An economical cruiser that looks more modern than a Skyhawk, the fixed-gear Cardinal is a good choice for performance-seekers on a budget.

By Aviation Consumer Staff | March 31, 2016



Although the design is more than four decades old, the Cessna 177 Cardinal—with its racy sloped windshield, wide doors and strutless wings—looks more modern than the newest Skyhawks coming out of Cessna's Independence, Kansas, plant. Yet, sadly, the Cardinal is a poster child for why innovation and audacity in general aviation development has often met dismal results in the market. Despite high expectations for a design that would usher in new thinking in light aircraft, the Cardinal had a rocky start and was gone from Cessna's inventory a decade after it emerged.

Although the Cardinal was intended to be a Skyhawk killer, the venerable 172 outlasted it and continues to be a mainstay in Cessna's current piston aircraft line. Still, the Cardinal enjoys enthusiastic support among owners for many of the reasons that Cessna thought it would become a hit. And despite its warts and shortfalls, many of which have been rectified, the airplane is an excellent choice for owners who want a bit more performance than the Skyhawk offers without stepping up to the 182 Skylane.

Model History

By the time the Cardinal appeared, the Cessna 172 was long in the tooth, having been on the market for 12 years. It was time for something new. When the first Cardinals hit dealers in 1967, buyers were clearly confronted with just that. Besides being sleeker and strutless, the new model had a stabilator, just like Piper's competing Cherokees did. With the wings placed aft of the main part of the cabin, the pilot sat ahead of the leading edge, which produced better inflight visibility than any of the previous Cessnas had.

The 1968 Cardinal had a fixed-pitch prop and a Lycoming O-320-E2D. The airplane was designed with the 180-HP engine in mind, but Cessna had ordered 2000 150-HP engines from Lycoming—its first purchase from the company.

Cessna was so confident that the Cardinal would succeed that the Skyhawk production line was actually shut down in anticipation of the Hawk's planned demise. Things didn't work out that way, however.

The 150-HP, fixed-pitch prop Cardinal looked great, but gained a reputation for lethargic climb performance. In reality, it took some time for Cessna to figure out that pilots were loading and flying the Cardinal as if it were a 172—which meant they were often over gross weight—since it carried 10 more gallons of fuel and had a heavier empty weight. Worse, Cessna discovered that pilots were climbing the aircraft well below V_y (V_y in the 172 was 10 MPH slower than it was for the Cardinal). When flown and maintained properly, the 150-HP Cardinal actually outclimbed and outran the 150-HP 172.

Cessna produced 1164 Cardinals that first year, but word got around about the airplane's performance. The following year, sales slumped, while other models were selling well. In fact, no more than 250 Cardinals were built in any single year after the airplane's introduction. (A total of 2752 were built, eventually.)

The Cardinal's wing was a high-performance NACA 6400 series airfoil, the same one used in the Aerostar and Learjet. But that airfoil tends to build up drag quickly at high angles of attack and low speeds, which isn't a good trait for an airplane flown by low-time, step-up pilots. The stall speed was higher than the Skyhawk's, too.

In the late 1970s, an accident involving an original model 150-HP Cardinal prompted a series of test flights (performed by an expert test pilot working for plaintiffs' attorneys) in an attempt to prove that the 177 didn't live up to its performance figures. The accident in question involved a pilot who supposedly had operated the airplane as described in the manual and wound up clipping the trees at the end of the runway. But because these trials weren't conducted by the FAA or Cessna, no official action was taken against Cessna. It wasn't until the early 1990s that the expert test pilot was proven wrong in court about his claims of the Cardinal's short field takeoff performance.

Touchy Control?

The 1968 Cardinal as originally delivered was quite sensitive on the controls, particularly in the pitch mode. In crosswinds, the stabilator could stall in the landing flare, resulting in a sudden loss of tail power and an unexpected plunge of the nosewheel onto the runway.

Porpoising and bounced landings were commonplace. Various studies showed a disproportionately high rate of hard landings and takeoff stall-mush accidents for the early models.

Cessna realized it had made a major gaffe with the Cardinal. It restarted the Skyhawk production line (using the 150-HP engines that had been purchased for the Cardinal) and set to work fixing the Cardinal's problems. Under the "Cardinal Rule" program, it retrofitted leading edge slots to stabilators on all Cardinals already in the field and made them standard in new production machines. This fixed the stabilator-stalling problem, although pitch forces remained lighter than average for a Cessna.

The 1969 model (177A) had a 180-HP Lycoming engine, plus there was a 150-pound increase in gross weight to compensate for both the engine's increased mass and some shortcomings in the original airplane's useful load. The stabilator-to-wheel control linkage ratio was changed to slow the response in pitch slightly. The nosegear/firewall area was also beefed up to prevent bent metal from bounced landings. This fix was offered as a retrofit to 1968 models via an early bulletin. Despite the improvements, 1969 sales nose-dived to about 200 units, while Skyhawk sales rebounded to their former league-leading levels. In 1970, Cessna made more major improvements, yielding the 177B. The 6400 series airfoil was changed to a more conventional 2400-series similar to the Skyhawk's, plus a constant-speed propeller was added for better takeoff and climb performance.

At last, the Cardinal had all the makings of a good airplane. From 1971 on, the Cardinal got only minor changes. In 1973, a 61-gallon fuel capacity became optional, and cowling improvements boosted cruise speed from 139 to 143 MPH. In 1978, a 28-volt electrical system was added. These days, that's appreciated for avionics upgrades.

In 1975, speed went up again, but this was really mostly the result of some creative number crunching by Cessna. For example, the cruise RPM limit was increased so that 75 percent power could be obtained at 10,000 feet instead of at 8000 feet, as before.

At the time, Cessna's marketing department called the Cardinal "the fastest 180-HP, fixed-gear airplane in the world." Not true—the Grumman Tiger was at least 8 or 9 knots faster—at about the same price.

Finally, 1976 brought a new instrument panel. The older panels had a 1960s Buick-style split panel arrangement that did little but rob panel space. The 1976 panel is a more conventional, full-width design.

Throughout this period, the airplane continued to be a slow seller, despite Cessna's successful efforts to fix the original Cardinal's quirks. It was the only Cessna single that didn't lead its category in sales. Piper's Cherokee 180/Archer beat it handily, as did the upstart Grumman Tiger.

In 1977, Cessna finally gave up on further changes to the Cardinal. The Hawk XP was introduced—same performance, less attractive, worse handling, noisier, more cramped, much higher fuel consumption and engine maintenance, lower engine reliability and TBO. Such is the way of GA marketing, however.

Meanwhile, Cessna added ARC radios to the standard equipment list and boosted the Cardinal's price by about 50 percent. Customers preferred the Hawk XP by a four-to-one margin. Price and competition from Grumman and Piper undoubtedly had a lot to do with the poor sales, but the Cardinal's first year reputation clung to the model like a cheap suit.

In 1978, Cessna made one last-ditch effort to save the Cardinal. The company spruced it up with some fancy interior appointments and radio packages—along with an absurdly high price tag—and called it the Cardinal Classic. Only 79 intrepid souls sprang for the gussied-up airplane.

No surprise here because the average flyaway price of a Cardinal Classic was more than



The Cardinal wing and three-foot wide cabin door arrangement is a winner. It affords wonderful visibility and easy ingress/egress. The long seat adjustment and reclined seating position allows for a huge range of pilot sizes and shapes.



After-market paint schemes bring out the Cardinal's flowing lines.

\$50,000, compared to \$30,000 for a Tiger or under \$40,000 for an Archer. But the Classic remained devalued for quite some time. Normally, an airplane depreciates from its new value for eight years before resuming an upward value climb, eventually surpassing its new price.

As of spring 2014, a Cardinal Classic retails for around \$45,000, although some may fetch more, depending on avionics and other mods. We saw one at AirVenture last summer decked out with a Garmin G500 glass display, dual GTN750 navigators, a high-end autopilot, plus leather interior and other luxuries. Its owner was asking nearly \$70,000. Still, the airplane eventually took about 20 years to regain close to its original value, which is a dismal price performance compared to other models in this or any other class.

But there's a silver lining in that cloud for potential buyers. Because other models have had price spikes—namely the Archer and the Tiger—we think the Cardinal represents a better value, based on pure performance alone. With price parity, the buyer can choose the greater comfort of the Cardinal or the speed of the Tiger without paying a sizable premium either way.

Performance

The Cardinal's performance is adequate by 1970s standards for 180-HP airplanes but more modern designs best it. Book cruise speeds range from 120 to 130 knots, while the 150-HP 177 is listed at 115 knots. Those numbers fall short of the Grumman Tiger (139 knots) and are about on par with the Cherokee 180/Archer and better than the pokey Beech Sundowner. New-age designs such as the Diamond Star and Cirrus SR20—still four-place, fixed-gear cruisers like the Cardinal—obviously do better.

Owners report real-world performance reasonably close to book figures, except for the 1968 model. Typical figures: 125 knots on 9 to 10 GPH. The 1968 model, judging from some owner reports, is lucky to cruise at 110 knots, although we suspect faulty rigging has a lot to do with these low numbers. Climb rate is about average for this class of aircraft—again, with the exception of the 1968 airplane, whose owners universally complain about its lethargic climb performance.

Owners typically report useful loads in the 850-950-pound range, depending on installed equipment. That's a bit less than the Cherokee 180 or the Grumman Tiger, but perhaps not enough to rule in favor of one or the other solely on payload issues.

Assuming a fairly typical 900-pound useful load and 49-gallon tanks, the Cardinal has roughly 600 pounds for people and bags once the tanks are filled. That's three FAA-standard people—well, a little less if "standard" becomes 195 pounds—and 90 pounds of luggage.

If you want to carry four full-size people and 100 pounds of luggage, you'll be limited to perhaps 20 gallons of fuel—barely enough to fly anywhere safely. Weight limitations make the Cardinal essentially a three-passenger airplane, or at best a two-plus-two with adults and kids aboard, certainly not four large rear-ended adults—choose pax wisely.

With full tanks, the Cardinal has decent but not exceptional range. The 49 gallons usable and typical 9- to 10-GPH fuel flow allow the Cardinal to fly four hours with reserves and cover more than 500 miles. The 60-gallon tanks available on post-1973 models boost endurance by an hour and range by 150 miles, at the expense of 66 pounds of payload.

A typical 60-gallon Cardinal with tanks full can carry just 540 pounds of cabin load. The 1968 150-HP Cardinal (2350 pounds gross) has a gross weight 150 pounds lower than the 177A and 177B. Empty weight is only a bit less, so the 177's equipped useful load may be as low as 750 pounds. Put in four 170-pounders and 70 pounds of luggage and there's zero—yes zero—left for fuel.

Legally speaking, the 177s converted to the 180-HP constant-speed setup are worse, since useful load can't be legally increased while the new engine/prop package is about 50 pounds heavier. But most pilots of the 180-HP 177s fly as if they have 177As or Bs. From the performance point of view, they're perfectly safe doing that. As far as the landing gear and wing spar go, we're not so sure. Interestingly, the c.g. is so long that if you abide by the 120-pound baggage restrictions, it's nearly impossible to load out of c.g., even with two heavy-weights up front (but no passengers in the back), or two heavyweights in the back and a lightweight pilot up front.



A three-blade prop looks sharp on a Cardinal. While it reduces vibration and provides more clearance between the tips and the ground over a two-blade, there's no performance increase.

Cabin, Ergonomics

One goal Cessna hoped to achieve with the Cardinal was to improve cabin comfort and design over the 172/182 series aircraft and to best the competition. In this regard, it succeeded. The Cardinal cabin is fully 6 inches wider than a Cherokee's and puts its sibling Skyhawk to shame.

The baggage compartment is enormous and relatively easy to get to through a dedicated door. As noted, the airplane's wing sits higher and farther back, allowing excellent visibility out of the panoramic windshield. Unlike the other high-wing Cessnas, the pilot's vision up and to the side is not blocked by the wing.

To a degree, this gives the pilot some of the best of both worlds—good visibility up, down and to the side.

The Cardinal's enormous doors offer another benefit: Of all airplane models we're familiar with, it's the easiest to get in and out of. There's no wing strut to get in the way and the floor sits lower to the ground than other high-wing Cessnas, so the step up is a small one.

Those doors require special care, by the way. Owners tell us that a gust of wind can damage the door and surrounding sheet metal when it opens violently. One reader pointed out that with both doors open and the airplane pointed downwind, the doors can act as fairly efficient sails.

Overall, the Cardinal is probably the roomiest four-place airplane made, not counting semi-six-seaters like the Bonanza or Cessna 210. The tradeoff for a big cabin, of course, is speed. The main reason for the Tiger's speed advantage over the Cardinal is that the latter has a bigger passenger compartment while the former is tight, with a minimal backseat and smaller frontal area.

Handling/Fuel Control

The Cardinal wins praise from owners for its handling qualities. Despite having lighter control forces than other Cessnas, the airplane makes a fine instrument platform. What was once considered an airplane that was "twitchy" in pitch is now considered more normal in that other airplanes with even lighter controls were subsequently marketed, such as the Grumman-American Cheetah and Tiger.

Nevertheless, pitch control forces are light and effective, even at low speed (particularly compared to the notoriously ponderous Skyhawk and Skylane), and Skyhawk pilots are sometimes surprised by the responsiveness and pitch authority. On takeoff, the Cardinal must be rotated with firm wheel pressure, at least with only two people in front and flaps up. This is, in part, because the pilot sits well ahead of the wing; all that weight out front has its consequences. Dropping 10 to 15 degrees of flaps for takeoff, however, will require a much less vigorous rotation moment.

In cruise flight, the Cardinal is a steady IFR airplane—if you can get it trimmed out laterally and keep the fuel balanced. Several owners reported gross fuel-flow discrepancies when the fuel selector is on "both," with the tendency for fuel to flow from the left wing. Left-right switching every half hour may be necessary to maintain good lateral trim or a few seconds of uncoordinated flight to clear the liquid from tank vent system, which is what causes the imbalance.



Later versions of the Cardinal had a panel with increased usable space; enough for almost anything one could desire to install.

Otherwise, the Cardinal's fuel system is well designed. There's a reservoir under the floor, which means that there's essentially no chance of unporting as the result of maneuvering with low fuel. There is, however, a warning in the handbook about long nose-down descents with low fuel, which tends to run to the front of the wing tanks. The tank vents are cross-connected to the opposite wing and are led through the trailing edge where ice buildup shouldn't be much of a concern.

Maintenance

At least some owners are attracted to the Cardinal because it has benign maintenance history with few expensive gotchas.

Owners tell us annual inspections typically cost about \$1000 to \$1500 for the basic once-over, which is typical for this class of airplane when performed by higher-end shops and thorough mechanics. But this can vary widely. You might have to spend \$5000-plus to bring back a barn dweller to airworthy status. Parts aren't a real problem, despite the model's relatively low population.

One other major maintenance factor: ARC radios, which are finally starting to disappear. Most Cardinals came with avionics manufactured by Cessna's onetime captive ARC company. Starting in the mid-1970s, the quality of ARC radios began to decline. ARC equipment rated dead last in our avionics owner surveys during that period and there were big shake-ups at the ARC factory at the time. Many owners have replaced part or all of older ARC panels. The 28-volt digital ARC navcomm radios, for example, are more serviceable than the mechanical 14-volt versions. We caution against spending money on these.

There are few onerous ADs on the Cardinal. A couple of shotgun ADs (2000-06-01 and 99-27-02) deal with fuel valves and strainers; not a big deal. Another shotgun AD is a big deal, however. It's 98-2-8, which calls for inspection of the crank bore for corrosion on the fixed-pitch airplanes. At the least, it's repetitive, and it could mean replacement of the crank. Make sure it has been done.

Mods, Owner Groups

The big mod for the Cardinal is the one that converts the 150-HP model to the 180-HP constant-speed Lycoming. The conversion is quick and easy, basically a bolt-on job, so no surprise that hundreds have been done.

Two STCs are available, one from Avcon Conversions (316-284-2842) and one from Bush (800-752-0748). The two are similar. Both sell STC paperwork and kit parts; you buy an engine and prop elsewhere and hire out the shop to do the job yourself.

The 1968 177A and B are on the same type certificate and some have upgraded to the later Cessna-selected counterbalanced engine/prop configuration.

Horton Industries (800-835-205) offers a STOL kit for the Cardinal consisting of a leading-edge cuff, conical wing tips and vortex generators on the vertical fin. The above-mentioned Bush also offers a STOL mod for the Cardinal, as does Sierra Industries. Contact Sierra at 888-835-9377 or www.sijet.com.

There's a burgeoning business in Cardinal speed mods. Canadian Roy Sobchuck came up with most of them and they're sold by Maple Leaf Aviation (204-728-7618). The mods include a nose strut fairing—claimed speed gain of 8 MPH—tailcone fairing (177A/B only, 7 MPH claimed but seldom seen) exhaust stack fairing, for a 2 MPH gain and a 75-degree drop in engine temperature.



With a low center of gravity and effective flight controls, ground handling is excellent.

The company also sells landing light covers, cowl cheek fairings, fuel drain fairings, ADF loop covers and wheel pants for which minor speed increases are claimed.

Cardinal owners have a choice of two major organizations. The Cessna Pilots Association (www.cessna.org and 805-922-2580) is the biggest overall Cessna group and publishes useful technical info, much of it of interest to other single-engine Cessna owners.

For the true Cardinal fan, we recommend the highly regarded Cardinal Flyers Online, (www.cardinalflyers.com) which has a first-rate website and a near daily e-mail newsletter.

Owner Feedback

I purchased my 1975 177B in 2007. Since then, I've flown it all over the country and twice, coast-to-coast. The two best attributes are the cabin (longer and wider than a 182) and the improved visibility in a turn compared to other Cessnas.

My Cardinal has a three-blade prop and while I love the way it looks, I wouldn't recommend it. This is not because it results in lower cruise speeds, which I haven't observed, but because of the significantly increased weight on the nose as well as the unnecessary drag during descent. This makes power-off landings a challenge, requiring a large and well-timed pitch change between short final and flare. Normal and crosswind landings are simple as long as a small amount of power is carried through the approach and the throttle is pulled to idle just prior to flare.

Insurance is around \$800 per year and the airplane has been relatively inexpensive to maintain. I associate most of the more expensive repairs with high time and age rather than the aircraft type. A few issues unique to the Cardinal that I've dealt with are overheating (typically on 90-degree-plus days, solved by flushing the oil cooler and installing the Maple Leaf exhaust fairing). There are loose door hinges and nose wheel shimmy. Most issues are well-understood thanks to the exceptional support provided by Cardinal Flyers Online, run by Paul Millner and Keith Peterson, plus an array of knowledgeable owners who gather around their site.

Chris Berg, Woodbridge, Virginia

I've owned a 1973 Cardinal since 2010 and bought it for training before even getting my license (I was a little worried that I may have been a bit impulsive). However, more than three years later, I've had no regrets. When I purchased it, the plane was almost all original, including engine, paint and interior. It has always been hangared and only had 1160 total hours since new. Since purchase, I've added a Garmin GNS430W, JPI 830 engine analyzer, PMA8000 intercom, Alpha Systems Angle of Attack indicator and a Guardian CO detector that I connect to cabin iPads.

I paid \$51,000 for the plane and generally flight plan for a fuel burn of 11 GPH, which is conservative. For insurance, I have a \$1 million smooth policy that costs under \$1400 per year, which is probably a bit higher than it will be when I get my instrument rating and over the 500-hour hurdle. It's a little hard for me to separate out the pure maintenance costs versus the upgrades I've made, but it would probably come in at about \$2500 per year. I use Savvy Aircraft Maintenance, who coordinates with Cecil County Aero in Elkton, Maryland. Both have been outstanding. Although the 1650-hour engine is 40 years old, it seems to be doing fine and I am not yet considering an overhaul.

The cabin feels relatively roomy and my wife doesn't get claustrophobic. It's also a lot easier to get in and out of compared to the low wing planes we looked at before buying the Cardinal. I flight plan for 116 knots, so it's not real fast but it cuts my trips from Wilmington, Delaware, to our summer place on Cape Cod from about eight hours driving time to around 2.5 hours in the air.

Steve Furlong, Via email

I have owned N1419C, a 1978 Cardinal Classic for six years and have flown it for just over 1000 hours. I have used it primarily to transport passengers for Angel Flight and Life Line Pilots. Most of the flights are to transport passengers for cancer treatment but also to transport children to summer special needs summer camps in northern Minnesota. I have also had a flight for Pilots and Paws, transporting rescue dogs, which I found to be a very rewarding experience.

Many of these passengers find it difficult to get in and out of small airplanes, but the Cardinal's wide doors and low stance make it much easier for the physically limited passengers to get in and out of the plane. These wide doors can be a problem if they get caught in a tail wind because they are so big, but this problem is solved by installing the Door Steward modification. The Cardinal Flyers Online web page has been an invaluable aid in learning about the plane, the many upgrades and modifications, plus special maintenance solutions. It has been a very reliable and comfortable plane—especially for the needy passengers I transport.

Derek Sharvelle, Battle Ground, Indiana

Our family of four has owned a 1968 Cardinal for five years. The Cardinal has proven to be a versatile airplane and flying in it is a real treat compared to other Cessnas. Probably the most obvious to pilot and passengers is the absence of a wing strut. This results in improved views down, but most noticeable is the much easier entrance and egress. The large size of the doors also contributes to easy access, but they do require caution when opening in a tail wind.

Another feature of the Cardinal is the location of the front of the wing—it's farther back than other Cessna models and results in improved visibility for the pilot and front passenger when looking up.

Our Cardinal has the original Lycoming O-320-E2D with the LyCon 160-HP STC. The performance is such that I am routinely comfortable taking off from our home airport that is 5000 feet above sea level. Not all pilots would be comfortable with the climb rate in the summer, which is often 200-300 FPM at our elevation.

We live in the eastern foothills of the Rocky Mountains, which means that 14,000-foot peaks are only about 30 miles west. As a result, I avoid going directly west through the mountains but have experienced no difficulties. Our Cardinal burns a little over 8 GPH and I flight plan for 110 knots, making it a fairly economical flyer. We have to decide whether the Cardinal is full of fuel or people, but with minimal planning, it routinely suits our missions.

Having done owner-assisted annuals on the Cardinal, I have not found it a difficult plane to work on. More important though is that my mechanics have not found it difficult to work on. However, they do remind me on occasion that there are many parts on the Cardinal that are unique, since it was a clean slate design.

My annuals typically run around \$1500, with the high being \$2600—comparable with other four-cylinder, fixed-gear, fixed-pitch aircraft. The insurance on the Cardinal is also very reasonable, and I have managed to get decent coverage for under \$600 a year.



The Cardinal has the largest interior of any four-place Cessna, which has caused pilots to overload the airplane.

One of the benefits of being a Cardinal owner is the enthusiastic following of the aircraft. From model-specific support groups like Cardinal Flyers Online, to the many modifications from Roy Sobchuk, it is relatively easy to get expert support and improvements to keep a Cardinal safe and efficient.

Owning a Cardinal is just enough different to be fun. Not everyone has seen one and most would agree that it was one of Cessna's best efforts when it comes to ramp appeal. The 150-160-HP Cardinals are not as fast as they look, but as all pilots know, looks count for something.

Tom Lynch, Fort Collins, Colorado

We note, with sadness, that the designer of the Cardinal, Ted Moody, died this past February after a protracted battle with cancer.

Rick Durden, our senior editor, spent extended periods of time with Mr. Moody from 1979 through 1994 and had access to the original design records of the Cardinal. He recalls Mr. Moody's description of the intense secrecy surrounding the development of the airplane, including referring to it as the "Model 172J" so that competitors would think that Cessna was just coming up with another model year change for the 172. In fact, the original Cardinal had no virtually no parts in common with the 1967 172 beyond such things as brakes, wheels and tires. The Cardinal was the nearest to a clean sheet of paper design any of the manufacturers had created in some years.

Durden recalls Mr. Moody's description of how devastated he was upon learning of the first fatal Cardinal accident because, as Durden put it, "Ted Moody put his heart and soul into that airplane."

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