



The Cardinal : Is It Cessna's Edsel? **Not by a Long Shot!**

by Archie Trammell

color photography by Paul Garrison





Cardinal

THE FIXED-GEAR CARDINAL FELL ON ITS FACE AND THE RG WAS THREATENING TO REPEAT THE ACT, BUT CESSNA'S MARKETING STRATEGY IS BEING OVERHAULED.

"THE CARDINAL is the biggest threat yet to the two-car family." Thus was Cessna's racy new Model 177 introduced in the early days of 1968. To a lot of people's embarrassment, however, the Cardinal hasn't become the airplane in every family's garage.

Those first Cardinals were nonetheless as excitingly satisfying to personal aircraft owners as early enthusiasm promised they would be. Ask any family that presently owns one of the 1,164 Cardinals manufactured that first model year: they love them. But few of those first airplanes initially went to private owners. Most were sold to fixed-base operators for use as rental and training aircraft alongside Cessna's own 172/Skyhawk. That proved to be a mistake.

In the earliest days of the Cardinal development program, Cessna discovered that the Cardinal is a pilot's airplane, as opposed to the airplane-driver's machine that the 172 is. This doesn't mean that they were slippery in any particular sense, only that it required a closer adherence to the basics than in a simple trainer or in the 172. The first Cardinals had a laminar airfoil, and so could not be driven into and out of the airport at any speed between 60 and 100 mph, and the stabilator required a smooth touch rather than the jerking and yanking that will suffice in other airplanes.

Those few operators who understood this had little trouble. Thomas Speer of Tri-State Aero, in Evansville, Indiana, is typical. He says they put a little extra effort into Cardinal checkouts and have enjoyed a profitable success with the airplanes from the beginning.

Other operators had quite a different experience. Some have correctly analyzed that their mistake was putting the airplane on the line with 172s. Their instructors quickly discovered that a Cardinal checkout required more work than one in a Skyhawk. Since most rental clients had had training in forgiving 150s, the Cardinal renter-pilots had to be shown the consequences of approaching too hot and climbing too steeply, something that had probably never been demonstrated to them before. So, Cardinals sat on the ramp and depreciated while the 172s flew.

Other operators never did catch on. They would give renters the standard 172 drive-it-up and drive-it-down checkout and then watch in amazement as Cardinals overshot 3,000-foot airports, or flew into the trees after takeoff from 2,000-foot strips, or hippity-hopped down the runway until their nose gears fell off.

In addition, Cessna ran into a problem with production tolerances in those first airplanes. The first prototype flew on July 15, 1966, and from then until October 1967, a string of prototype and pre-production airplanes were wrung out thor-

oughly to work off all the bugs. In production, though, things began to go wrong. Landing-gear tubes shook loose from their bushings, doors and windshield leaked, stabilators developed strange stall characteristics in slips with flaps down.

All this led to a lengthy service letter, which has become infamous as Cessna's Cardinal Rule. That, plus a redesigned wing leading edge, a slotted stabilator, lower mechanical advantage in the stabilator control circuit, a bigger engine, beefier door hinges and a myriad of other engineering changes, have made subsequent models of the Cardinal live up to the original promise. But 1968, most of whom exist on a profit margin of one or two percent, tend not to forgive an airplane that fell 10 percent below expectations, especially when they still have 172s, which deliver 105 percent every day.

Out in Wichita, however, there is a growing optimism that 1972 will finally be the year of the Cardinal. One reason is the sales picture. Total unit deliveries at Cessna were up 12.5 percent in the first quarter of the 1972 fiscal year over what went out the factory a year ago, but fixed-gear Cardinal deliveries increased 55 percent—more than four times the average for all models.

More important than numbers, though, is a shake-out in philosophy at Cessna and among Cessna's dealers. Although plans for dropping the 172 from the line were scrapped long ago, a "172 replacement" syndrome prevailed during the first several Cardinal model years. With the 172 consistently selling at a rate of almost 1,000 a year, and the Cardinal barely reaching 100, that thought created a mental block.

Introduction of the Cardinal RG last year created a similar situation relative to the Skylanes. The most often-asked question was: "Why pay \$30,000 for an RG when a \$25,000 Skylane will carry more at the same speed and for a greater distance?" New management is urging dealers to think of the fixed-gear Cardinal not as a threat to the "Hawk, but as an alternative to it, and the RG as an alternative to the Skylane. This new philosophy makes all the difference.

Base prices and raw statistics alone appear to distort the relationship between cost and performance. A fixed-gear Cardinal, for example, equipped for average use, retails for about \$24,000, against \$20,500 for a similarly equipped Skyhawk—a difference of some 17 percent, but judged by the traditional indicators of an airplane's worth (speed and performance), the Cardinal offers not nearly that much more. Since it fly a Skyhawk almost every day, the lack of real differences in raw transportation value between it and the fixed-gear Cardinal have stood out like a sore thumb during my several flights in them. With equal cabin loads, the Cardinal



With its 180-hp Lycoming, constant-speed prop and a redesigned wing, the 1972 Cardinal offers performance to match its beauty.

accelerates much faster and gets off a few feet sooner than the Hawk. Also, its initial climb is steeper, so it will come out of tight fields with more room to spare. That's the constant-speed prop at work. As soon as you reduce power to the top of the green (2,500 rpm and 24 inches), however, the rate of climb drops back to the same 600 to 700 feet per minute at 92 to 104 mph indicated that I see in my Skyhawk. This seemed so unreasonable to me that I flew three different 1972 Cardinals, thinking a high-reading tach was at fault, but that wasn't it. In a normal cruise-climb, the Cardinal climbs no faster than a 172.

At 7,500 feet in standard air, the last Cardinal I flew indicated 131 mph at 2,500 rpm and full throttle (75-percent power). Going to the owner's manual discloses that the airspeed reads four mph

high at that speed, so the corrected airspeed was 127 mph for a true of 143. Under those same conditions, a Skyhawk delivers an honest 128 mph. An increase of 15 mph is a considerable aerodynamic achievement, but it does seem a small gain for strutless wings, 30 more horsepower, a constant-speed prop and 3,500 more dollars. On a 300-mile flight, it would save only 12 minutes. In addition, with equal equipment and full tanks, the Cardinal has 47 fewer pounds useful load than the Skyhawk.

If prospective buyers stop there, as many do, the Cardinal has nothing but good looks to offer for the extra dollars. But, as Cessna management is beginning to tell dealers, that's like looking at a Chevrolet Caprice with a Nova attitude. No one buys a Caprice instead of a Nova to get there faster. What Caprice buyers

are after is more pride of ownership, a better life style, luxury. The Cardinal gives you plenty of that.

The Cardinal may or may not be the prettiest airplane in Cessna's single-engine line, but it's easily the most futuristically stylish of the airplanes in anyone's line. Its long, low look is appealing; and it's functional. The front seats, for example, are only 34 inches from the ground. This, coupled with the four-foot-wide doors that open out 90 degrees, the lack of struts, and a wing that's set well back, make it possible to walk up to the cabin, sit down on either front seat and swing the legs in without a single undignified stoop, squat or stretch. Entry to the rear is not quite that easy, but the big doors do make it better than getting into the rear of a 172.

The modified Frise ailerons are aerodynamically balanced, instead of being

appendages piano-hinged to the trailing edges. The flaps are identical to those on the 210, and fuel-tank vents are at the tips, pointing aft like those of the 210 and Super Skymaster to preclude ice blockage. Flap tracks are internal. Fuel caps are flush, and the integral fuel cells hold 49 usable gallons as opposed to the Hawk's 38. Finally, the hooded rings retract.

Moving on around to the nose, the cowling is bonded, and the nose-gear strut is the floating-piston type used on Cessna's top-of-the-line airplanes rather than the simple air-oil unit used on the 172 and 150. Inside the cabin, the heating system is from the Super Skymaster for more even mixing of hot and fresh air (as opposed to the perennial Skyhawk problem of roasted left- and rear-seat occupants while the right front passenger freezes).

On the panel, the flaps have a pre-

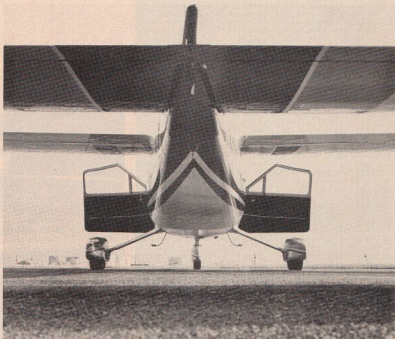
select control instead of the spring-loaded switch of the Skyhawk, a big plus in short-field work. Rudder trim is standard; instrument lighting is built into the glare shield instead of from an overhead slit in the dome light. The fuel-shutoff valve is separate from the tank selector, to end the possibility of going to "off" when meaning to go to "bids."

It's possible to continue naming these higher-quality features until you begin to wonder how Cessna does it for only \$3,900 more. With this attitude, a flight evolution takes on an entirely different character. It's no longer a question of how little more performance the Cardinal has; the question is, what else does it have that the 172 doesn't besides greater built-in value?

As we have seen, the Cardinal, like the Caprice, gets away from the gate a little quicker and has a bit more speed, but

at 2,500 rpm, those four-foot-wide doors let in more noise.

Coming back to 2,350 rpm and full throttle at 7,500 feet (about 72 percent), however, the engine smooths out, the noise level drops considerably and the air-speed backs off only five mph, to a true of 138. This makes a big difference. At 72-percent power, if previous experience with the Lycoming O-360 holds true for the Cardinal, fuel consumption is 9.5 to 10 gallons per hour. That's only a half gallon more than a Skyhawk burns at 7,500 feet and full throttle, and you're going an honest 10 mph faster. This, coupled with the Cardinal's higher usable fuel capacity, changes the speed situation considerably. The Skyhawk is good for only three hours VFR, with a reasonable reserve, and two to two and a half IFR, while the Cardinal is good for four hours VFR and three to three and a half IFR. That makes it an



A pair of four-foot doors makes getting into and out of the roomy cockpit a task that can be accomplished with ease and grace.

hour or more faster than a Skyhawk on longish trips by eliminating a fuel stop.

During our speed investigations, the Cardinal's cabin proved to be comfortable. At 2,350 rpm, the second level is about the same as in the Skyhawk, but with less of the low rumble from the engine and prop and more of the shrill sound of wind going by the doors and windows. The amount of cabin noise is six of one and a half dozen of the other when compared with the Skyhawk. The Cardinal is wider (44 inches) but not as tall. Visibility from the Cardinal is superb. There's a heavy doorpost slanting forward that compromises obvious viewing (just in the direction one ought to watch for traffic most), but in maneuvering, you quickly develop an unconscious habit of leaning forward and looking around it—in large measure because this also allows a look back over the top of the wing into turn. At cruise, if the seat is run well back for stretch-out comfort, side visibility is adequate.

Cessna rates an A-plus for their attention to occupant-protection details in the cabin. Shoulder harnesses are standard in the front seats, though only optional in the rear. They store in sleazy clips above the door, and since they're such a nuisance to clip out of the way, it's easier to just put them on. Next year, according to inside information, Cessna will go to inertial reels. The centers of the control columns are padded to help prevent chest injuries, and they've used a molded, "self-venting" urethane foam padding across the bottom of the instrument panel. Studies have shown this will prevent many leg injuries in sudden stops. After getting an A-plus for that, though, they get a D-minus for leaving the parking brake mechanism hanging below the left panel, just where it will rap the pilot's shins in a mishap. The glare shield is also molded urethane foam. It's a too bad instrument and avionics manufacturers haven't kept pace in this area, where the top and bottom panel padding is a forest of stumps growing out of gyros, altimeters, radios and autopilot.

It should be mentioned in passing that Cessna has made a large number of additional improvements in the Cardinal for 1972. An over-voltage light alerts the pilot when the alternator goes off line, and a split master switch facilitates getting it fired up again. The control wheels have bigger, more solid-feeling grips. Optional retracting assist handles back by the tail give a hand hold when moving the strutless rascal.

The fixed-gear Cardinal has the tameness of stall characteristics I've encountered recently—better even than the 172. The Cardinal will spin—it's approved for intentional spins, in fact, at a utility weight of 2,200 pounds with the rear seat and baggage compartment empty—but you al-

most have to put a hex on it to get it into one. I tried every kind of club-footed stall possible, including one with flaps down, full left rudder and ailerons hand over to the right. They were all equally unexciting.

The 1972 Cardinal retains all the ground-handling charm of the original 1968 model. The mains are way back and the nose gear way forward in relation to the pilot, so the airplane turns about a point about your hip pockets for easy maneuvering in tight corners.

Takeoffs have the same drive-it-away ease of the Skyhawk, but landings require just a bit more finesse. The Cardinal flaps come down only 30 degrees, so they create less drag than the 40-degree barn doors on the 172. One of the Hawk's least pleasant characteristics is that it will not make a go-around with flaps full down. It'll accelerate to about 65 mph, and that's all until you milk the flaps up. By comparison, a Cardinal go-around is simple: push and go. A 172 can be driven down to the runway at any speed from 70 to 100, however, and it'll still land reasonably short; the Cardinal approach must be at the recommended 70 to 80 mph (flaps down) or it'll float like a circus balloon. It also has a flatter approach, so get it slowed to 70 to sink it down over obstacles to a short field. This isn't a critical speed, and it leaves plenty of elevator to flare. In fact, I made several approaches at 60 indicated (but 300 pounds under gross) and still had stabilator power enough to pull the nose up at touchdown.

This is not recommended, though, because the rate of sink is high and the flare is critical. It's better to slip, which is approved with flaps up or down. With proper attention to the recommended numbers, the Cardinal is as nice to land as any airplane Cessna builds. Cross the fence at 70 and then bring the nose up smoothly and it sinks in satisfyingly. The Cardinal, like every other small airplane, should not be driven onto the runway flat. That's what started the problem with it in 1968. Get the nose up in the flare and keep it up well into the rollout, if you drive it on and then try to plant the nosewheel with forward stick, that big stabilator will lively lift the tail and start a tailwheel-running runway.

Moving on to the Buicks in the lineup, what is true of a fixed-gear Cardinal and 172 comparison is largely true of the Cardinal RG and Skylark. The difference in equipped price is only about 12 percent (about \$3,500) but what the 12 percent buys is obvious: RG.

Although some will argue that retractable gear is not worth the added maintenance and insurance costs, the expenses actually just about balance out. On a typical 500-mile trip, the Cardinal RG will burn about 10 gallons less fuel than a Skylark, or an average saving of \$300 to \$400 per year. Adding the decreased



Cessna Cardinal RG

Basic price	\$55,995
Basic RP price	\$33,320
Price as equipped	\$37,495
Engine	
Lycorning IO-360-A1B5, 200 hp at 2,700 rpm	
TBO	1,400 hrs.
Propeller	McCaulley constant speed
Length	27 ft. 3 in.
Wingspan	35 ft. 8 in.
Wing area	174 sq. ft.
Wing loading	16.1 lb./sq. ft.
Seats	4
Empty weight	1,645 lbs.
Useful load	1,155 lbs.
Loaded with full fuel, average equip.	755 lbs.
Gross weight	2,800 lbs.
Power loading	14 hp/300 lbs.
Fuel capacity	50 gal./300 lbs.
Baggage area	120 lbs.
	70.65 cu. ft.

Performance	
Minimum runway requirement	2,585 ft.
Rate of climb	925 fpm
Service ceiling	17,100 ft.
Maximum speed	180 mph/156 knots
Cruise (75% @ 7,000')	170 mph/148 knots
1000 cruise (65% @ 10,000')	658 mph/580 nm
Range @ max cruise (45-min reserve)	160 mph/139 knots
Range @ econ cruise (45-min reserve)	790 nm/699 nm
Duration @ max cruise (no reserve)	4.6 hrs.
Stall speed (clean)	44 mph/37 knots
Stall speed (gear, flaps down)	57 mph/50 knots
Flight characteristics	
Handling qualities (clean)	Good
Stall recovery	Excellent
Hands-off stability	Good
Turn and turn handling	Excellent

Pilot ability	
Visibility	Excellent
Seat comfort	Good
Occupant-protection features	Good and getting better
Accessibility of switches, etc.	Excellent
Panel layout	Good
Instrument lighting	Excellent
Fuel and runway lighting	Good
Cabin comfort	Outstanding
Entry-exit ease	Good
Front-seat room	Good
Rear-seat room	Good
Ventilation (in flight)	Nearly full excellent
Ventilation (on ground)	Excellent
Cabin sound (w/ 75% power)	Fair
Quality	Good
Exterior finish	Excellent
Accessories and mechanisms	Fair

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The Cardinal

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cost of maintenance (eight spark plugs to be replaced instead of 12, and so on) totals up to a considerable amount of money for gear maintenance and insurance.

Other than the retraction gear, the 12 percent extra for the RG Cardinal buys a more modern and functional design. Like its fixed-gear sister, the RG sits low enough to be walked up to and sat in, rather than crawled under and climbed up into. Visibility from the RG is significantly better than from the Skylane, and the RG's smoother, struts wing and tuck-away gear give it a five- to 10-mph edge, and a 35-mpg greater climb although its engine puts out 30 less horsepower. From there on, though, the RG barely matches the Skylane and even loses a point or two here and there.

Taking the losing points first, the RG gives up both cabin and baggage room to the Skylane. More important, unlike the 177/172 comparison, in which the 177 imparts a marked feeling of higher quality, the RG gives up a measure of quality and comfort to the Skylane. Its four-cylinder engine transmits a banging through the structure that makes some passengers think the engine is running rough, and the overhead fresh-air vents are noisy. All three RGs that I flew while compiling this report—an early 1971, a late 1971 and a mid-1972 model—lacked the polish and graciousness that the Skylane has accumulated over the 17 years of its production life. Like its fixed-gear predecessor, the RG has its idiosyncrasy problems. In 1971, Chief among them was a landing gear that sometimes wouldn't come down. That was fixed with a modification to the electrical portion of the electro-hydraulic retraction system. Tail problem was fixed with a redesign of the switch-indicator unit. (But that still requires careful adjustment to avoid problems, so checkout in the RG should include flap-ups-landings.) Thermal insulation and soundproofing have been added behind the firewall to eliminate heat transfer into the cabin and hush the noise.

The most significant change was a redesign of the prop blades to a Clark Y leading-edge section. This, and removal of the fixed entry step, have resulted in a five-mph jump in cruising speed and a 65-mpg increase in rate of climb. In my experience, the RG performs above the figures Cessna gives. The late 1971 model I flew would indicate 139 knots, right at the bottom of the yellow, at 6,500 feet. 2,500 rpm and full throttle (75 percent). The book gives a correction factor of minus four, so the CAS was 135 knots and trim 148. Book speed for either of these but then, being thoroughly practical, we'd all eat hamburger, never sirloin, because one fills the belly as well as the other.

speed is little affected by weight. Anything above the minimum usually goes into the rear areas, which diminishes down-loads on the stabilizer and balances out the extra drag. The 1972 model I flew tried an even 150 knots at 2,500 rpm, full throttle, and 7,500 feet. Book is 147. Coming back to 2,350 rpm, I tried 145, three knots above book.

The fuel-flow meter and the book both indicated that we were burning just over 10 gallons per hour. That makes the RG an efficient cross-country machine. With average equipment and full tanks, there's about 755 pounds left for people and baggage. That's four average adults and 75 pounds in the baggage area. (The baggage compartment will accept up to 120 pounds.)

With full tanks, the RG has an honest range of 575 nautical miles VFR, 450 nautical IFR. Stall characteristics of the 1972 RG were, interestingly, a smidgeon more exciting than those of the fixed-gear model. Since the airframes are presumably identical, this must be due to the changed airflow caused by the open wheel wells. Whatever, the RG has stall characteristics much like those of the Skylane: not as good as the fixed-gear version, but outstandingly good nonetheless. If you misread it enough, it tries to roll off into a spin (NOT approved in the RG), but relaxing on the stabilizer and a shot of power rights everything instantly. The fish-river chord evidently have a beneficial effect on the reattachment of the airflow for quick stall recovery.

Takeoffs, landings and ground-handling characteristics are closely akin to those of the fixed-gear Cardinal. The airplane is heavier forward of the main gear, so it takes more of a pull to get it rotated on takeoff, and it has a heavier feel on the stabilizer in the flare, but this doesn't seem to matter. With 10 degrees of flaps or no flaps, it lifts off smoothly with the barest hint of a pitch-up. When the gear comes up or down, there's a considerable pitch change, but the trim wheel being just under your throttle-hand thumb takes most of the inconvenience out of that. Flap changes have little effect on trim.

Bad landings seem not to be possible if the approach pattern and speeds are followed within reason. I used an RG regularly to give a young lady her first checkout in an aircraft, and she made me blush with her painted-on touchdowns.

The Cardinals are the Caprice and Riviera of Cessna's single-engine line. Being thoroughly practical, one wouldn't pay the \$3,500 extra for either of these but then, being thoroughly practical, we'd all eat hamburger, never sirloin, because one fills the belly as well as the other.

Cessna Cardinal

Basic price	\$19,300
Basic IFR price	\$25,955
Price as equipped	\$31,800
Engine	Clycoming O-360-A116
TBO	2,000 hrs.
Propeller	2-blade McCauley, constant-speed
Length	27 ft. 3 in.
Height	8 ft. 7 in.
Wingspan	35 ft. 6 in.
Airfoil	NACA 24010, modified
Wing area	174 sq. ft.
Wing loading	14.4 lb./sq. ft.
Seats	4
Empty weight	1,485 lb.
Useful load	1,015 lb.
Payload with full fuel	666 lb.
Gross weight	2,500 lb.
Power loading	13.9 hp./sq. ft.
Fuel capacity	49 gals./234 lbs.
Baggage capacity	120 lb.
Baggage area	18.2 cu. ft.

Performance

Minimum runway requirement	1,400 ft.
Rate of climb (gross)	840 ft./min.
Service ceiling	14,600 ft.
Maximum speed	153 mph/133 knots
Cruise (75%)	142 mph/124 knots
Econ cruise (66% @ 10,000')	135 mph/117 knots
Range @ econ cruise (45-min reserve)	583 mi/566 nm
Range @ max cruise (45-min reserve)	559 mi/521 nm
Duration @ max cruise (no reserve)	4.9 hrs.
Stall speed (gross)	63 mph/53 knots
Stall speed (flaps down)	63 mph/46 knots

Flight characteristics

Handling qualities (normal)	Good
Handling qualities (slow flight)	Excellent
Stall recovery	Excellent
Hand-off stability	Good
Adverse yaw handling	Good
Crosswind handling	Good

Pilot utility

Visibility	Excellent
Self comfort	Good
Occupant-protection features	Good
Accessibility of controls, etc.	Good and getting better
Panel layout	Excellent
Panel layout/Good instrument graphics	Excellent
Instrument lighting	Excellent
Taxi and runway lighting	Good

Cabin comfort

Entry exit ease	Outstanding
Front-seat room	Good
Rear-seat room	Good
Ventilation (all high)	Good
Ventilation (on ground)	Excellent
Cabin sound (at 75% power)	Good

Quality

Interior finish	Good
Exterior finish	Excellent
Accessories and mechanisms	Fair

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