



# CITATIONJET

*Tried and true plus brand-new*

BY RICHARD L. COLLINS

**C**essna has delivered more than 2,000 Citations, and the pace will quicken as deliveries of the latest iteration, the CitationJet, begin in earnest. The first CitationJet delivered epitomizes Cessna's dream of where the new airplane fits in the marketplace, too. It went in March to H. James Knuppe, who had owned and flown a Cessna 421 since 1981. Nobody likes the term "entry-level jet," but as the lowest priced new jet on the market, the CitationJet is a natural progression for people who have operated airplanes with propellers. ■ Powerplants have often been the driving force in new airplane development, and that is the case with the CitationJet, numbered 525 to fit it below the Citation II, which is a 550. The airplane sports two Williams-Rolls, Incorporated, FJ44-1A turbofans. This is the

PHOTOGRAPHY BY MIKE FIZER



first airplane certified with these engines, and, no, they are not the same engines used in missiles. They are based on some of the cruise missile engine concepts, but Williams International and Rolls-Royce joined together to create an all-new engine for jet airplanes. It produces 1,900 pounds of thrust, weighs but 450 pounds, has no external fuel lines, and has but one-third the number of parts as the Pratt & Whitney Canada JT15Ds that powered the original Citation, an airplane that will be used as a benchmark in evaluating the CitationJet.

To hit the high spots on comparisons, the CitationJet will fly 13 percent farther than the original Citation, on 17 percent less fuel. Its maximum cruising speed at a mid-cruise weight is more than 380 knots, where the original is about 40 knots slower. The new airplane is certified to 41,000 feet; the original was to 35,000 feet. The only number where the old airplane beats the

### *The all-new airplane draws on Cessna's experience in building Citations.*

new is in cabin length: 17.5 feet versus 15.9 feet. The new one, however, has more entry and exit headroom, thanks to a recessed aisle running the length of the cabin.

The comparisons end there because, while the CitationJet does have the same circular cross section of the original Citation, it is an all-new airplane that draws on Cessna's experience in building Citations 500 through 650, the latter being the big Citations VI and VII. The unswept wing is a new design that maintains laminar flow over a greater percentage of the wing chord than previous Citation straight wings. The laminar flow is enhanced by the use of bleed air heat for wing deicing. There are no boots, only a smoothly fitting, shiny leading edge. Further, the metalwork in the wing is exceptionally smooth, made possible in part by thicker top wing skins.

That full-length aisle in the cabin can be there because the CitationJet's wing attaches to the bottom of the fuselage, eliminating the passage of a spar through the cabin. When you first see the airplane on the ramp, the fact that the wing is attached beneath the fuselage is one of the more immediate visual impressions, followed by the distinctive T-tail. The cockpit side windows are smaller than in other Citations. The visibility is still excellent, yet the greenhouse effect that Citation pilots have lived with over the years is decreased.

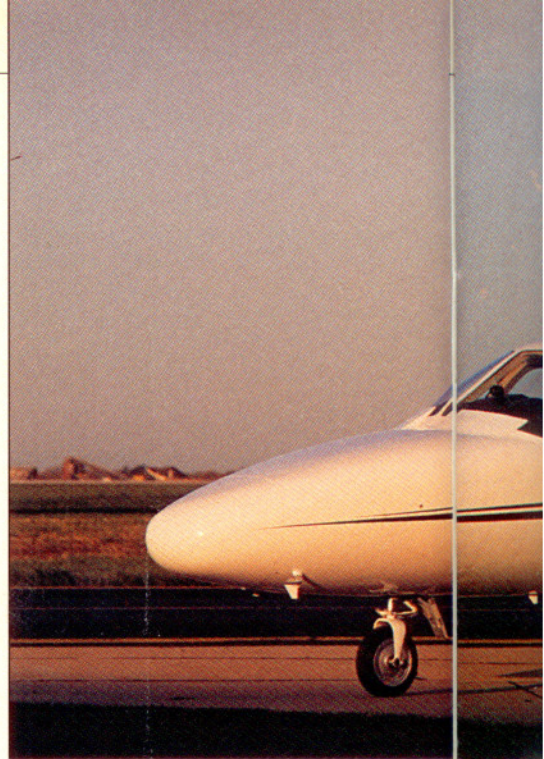
The systems of the CitationJet are adapted from other models and have been simplified. The hydraulic system operates speed brakes, flaps, landing gear, and thrust attenuators. Heating is with bleed air and cooling with an electrically powered freon air conditioning system. Like the wing deice, the engine anti-ice is bleed air; there is no deicing on the vertical tail; and the horizontal tail has boots. The windshield anti-ice is bleed air backed up on the pilot's side with alcohol. All the controls are direct linkages, and there is no rudder boost.

The CitationJet does not have reverse thrust, and lack of this feature is addressed in two ways. Thrust attenuators are fitted aft of the engines. These attenuators (the last ones I saw were on a Cessna T-37) deploy when the airplane is on the ground and when power is brought back to idle. They deflect the residual thrust to keep it from pushing the airplane along and are hydraulically operated. The other feature is what has been called a "lift-dump" system on other airplanes but is called "ground flaps" on the CitationJet. Normal full landing flaps deployment is 35 degrees; the ground position allows the flaps to be extended to 60 degrees along with speed brake deployment, which increases aerodynamic drag and enhances braking. Cessna has shown that the airplane is flyable with the flaps extended like this and the spoilers out, so the system can be activated at any time, but the flight manual prohibits use except on the ground.

Some will no doubt wish for thrust reversers, but they are expensive and heavy, and that weight is way in the back, which this airplane doesn't really need. Now, the only center-of-gravity condition that bears watching is with one pilot flying solo. Then, some ballast must be added in the nose to keep the CG ahead of the aft limit. With reversers hung on the engines, this condition would exist with two pilots and a passenger or two. As it is, the airplane has excellent runway performance. Reversers wouldn't help this (they are not used in calculating landing distances). The attenuators and ground flaps, plus the powerful antiskid brakes, address the question adequately.

Walking around a new airplane is always enjoyable, and a lot of things attract the eye on the CitationJet. One is the radome. Strips are bonded into the radome that help eliminate precipitation static.

In the back, an automatic intercooler system in the engine pylon modulates the temperature of the bleed air. The engines don't produce an excess of bleed air, but what there is comes out quite hot and









needs some cooling.

The first fan on the Williams-Rolls engine is made from a single piece of titanium—no separate blades. Should one of the blades be damaged, the fan can go back to the factory for repair. The high mounting of the engines should minimize the likelihood of foreign-object damage. Williams produces the front of the engines and Rolls the rear, hot section. The engines are certified to a 3,500-hour time between overhauls, with a hot-section inspection at 1,750 hours, but because they are new, the first five or six sets will have hot sections at 1,200 and overhauls at 2,400. Then a few more sets will be done at 1,500 and 3,000 hours before advantage is taken of the 3,500-hour TBO.

The landing gear is of the trailing-link variety, much the same as on the turbo-prop Cessna 425 and 441, which makes for better landings. The main gear doors retract with the gear. The tires remain exposed even after retraction.

Two external baggage compartments, one in the nose and one aft, provide a total space (55 cubic feet) and weight allowance (775 pounds) that should be adequate for any mission. The aft baggage can be modi-

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fied to accommodate six pairs of skis. Some baggage can be carried in the cabin if desired, and there's a place to hang coats.

The wing is the same distance above the ground as the wing on the other straight-wing Citations, but the fuselage is higher above the ground. The door is the same, but the low step is higher off the ground.

When you board the CitationJet and turn left, you are greeted by an instrument panel that is quite simple for a jet. The airplane comes with everything you need. There are few options. That preserves a good and useful payload/range combination. Those who wish to add heavy things will sacrifice that.

One key to light weight and the preservation of a useful nose baggage area is the panel-mounted avionics. They are the good old Bendix/King Silver Crown avionics that most of us know and love, though they are packaged a bit differently. The appearance is very jet-like, and these radios have a long history of reliable operation and excellent performance. Two transponders are standard; the navigator is a Ben-

dix/King KLN 88 loran, though most will have the optional KLN 90 GPS. A Global GNS-XC (GPS and loran or VLF/omega) is also optional. The weather radar is a Bendix/King RDS 81, and Honeywell provides the autopilot/flight director/two-tube electronic flight instrument system. The radar will not play on the EFIS tubes.

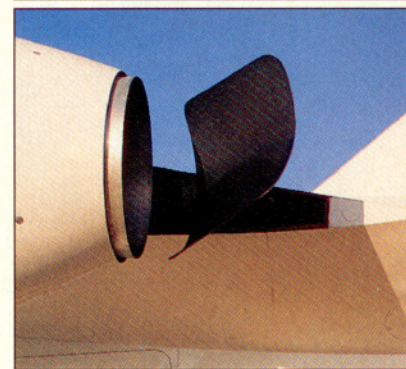
The 8.5-psi pressurization system has a nifty new automated control system. All you ever have to do is set, digitally, the destination airfield elevation plus 200 feet, and it does the rest.

The CitationJet is approved for single-pilot operation, and the simplicity of the cockpit, and of the start-up procedure, is a sign that Cessna did their human-factors homework. When taxiing, the excellent visibility is appreciated. The simple ground steering system (the pedals are connected to the nosewheel) of a Citation always makes me wonder why the nose steering systems of some airplanes are so complicated. There are no buttons to press on the CitationJet, just nice and easy steering. The brakes are smooth and effective.

For takeoff, we calculated that the power setting should be a fan speed of 97.2 percent (fan speed is presented in vertical tape and digital formats), and the three airspeed bugs for  $V_1$ ,  $V_R$ , and  $V_2$  would be bunched right together. The numbers were 100, 101, and 104 for our 9,400-pound takeoff weight (maximum is 10,400 pounds). Although the CitationJet is certified as a Federal Aviation Regulations Part 23 airplane, the manual's tables represent FAR Part 25 (Transport-category) takeoff requirements. At maximum takeoff weight, the required field length varies from 3,080 feet at standard temperature and sea level up to 5,100 feet on a 104-degree-Fahrenheit day at sea level. The CitationJet will manage a Denver takeoff at maximum weight up to 77°F on a 5,720-foot runway. If it's warmer, the weight must be reduced.

As an old Citation pilot brings the power up, he may not think the CitationJet accelerates as quickly, but it does. The pilot's eye height above the runway is greater than in the other straight-wing Citations, so the visual image is of slightly slower acceleration. The real kick in the pants is there, though, and that is what counts.

The airplane climbs quite well, with cruise-climb speed starting at 240 knots and dropping with altitude as dictated by the book. The Cessna pilot I flew with said to climb at 220, start reducing that a bit at 18,000 feet, and then fly Mach 0.5 when that was reached. With the temperature at standard, the airplane will climb directly to Flight Level 390 after a maximum-weight



*The CitationJet uses thrust attenuators instead of heavy, expensive reversers. Trailing-link gear aids in smooth landings.*









takeoff and then climb on to FL410 when the weight is down to 9,711 pounds, which wouldn't be long. That's not the way it would usually happen, though, because FL390 is a westbound altitude, and FL410 is for those eastbound. We were at FL350 in 16 minutes, and when level, the true airspeed increased to 361 knots in about three minutes. It would have inched up a bit more had we stayed level longer. The temperature aloft was above standard; at standard temperature at the weight we were flying, the book shows 379 knots at 827 pounds per hour total fuel.

When flown at FL370 or FL390, the CitationJet has good endurance. The airplane carries 3,220 pounds of fuel. The first hour would likely use about 1,000 pounds on a flight at FL370. That leaves 2,220; another two hours at 740 pph total would consume 1,480, leaving 800 pounds on landing. Flown in the high 30s, it is a more than four-hour-total-endurance airplane. Descend, and the cruise fuel flow goes over 1,000 pph at FL280. From there on down, the fuel flow stays close to 1,000 pph, and the speed drops—down to 323 knots at 15,000 feet.

For a descent, the speed brakes cause a good rumble and would be used mainly when the controller requests a hustle or when descending in icing conditions. When in ice, considerable power (70 percent of  $N_2$ , turbine speed) has to be maintained to produce a sufficient amount of bleed air for anti-icing and deicing, so the speed brakes would be required on anything but a gentle descent. Limiting indicated airspeeds are 260 knots to 30,500 feet and Mach 0.70 above that altitude. For severe turbulence, the recommended indicated airspeed is 180 knots.

The airplane has a stickshaker but no stick-pusher. I pulled the airplane up until the shaker fired and then recovered in what was a nonevent.

Entering the pattern at Wichita for a couple of touch-and-go landings, I realized that I had been flying the CitationJet for about an hour and had never given a thought to compensating for any flight characteristic of the airplane. All the Citations are nice to fly; this new model is exceptionally nice. In every flight regime, it works just right. Consider the takeoff, for instance. On many T-tail airplanes, a lot more back pressure



is required to rotate than is required once the rotation is finished. That means that you have to start pushing and trimming as soon as the climb attitude is reached. On the CitationJet, the nose comes smoothly to the attitude and stays there when you reduce back pressure. Then all that's required is a lit-

**Cessna 525 CitationJet**  
Current base price: \$2,988,400

**Specifications**

Powerplants	Two Williams-Rolls FJ44-1A turboprops, 1,900 lbst ea
TBO	3,500 hr
Length	42 ft 6 in
Height	13 ft 7 in
Wingspan	46 ft 8 in
Wing area	240 sq ft
Wing loading	43.33 lb/sq ft
Power loading	2.74 lb/lbst
Cabin seats	6 max
Cabin length	15 ft 9 in
Cabin width	4 ft 9 in
Cabin height, over aisle	4 ft 8 in
Standard empty weight	6,159 lb
Maximum ramp weight	10,500 lb
Maximum takeoff weight	10,400 lb
Useful load	4,341 lb
Zero fuel weight	7,900 lb
Maximum landing weight	9,700 lb
Fuel capacity	3,220 lb

**Performance**

Balanced field length	3,080 ft
Rate of climb, engine out	868 fpm
Rate of climb, two engines	3,540 fpm
Cruise speed, max	380 kt
Maximum certified altitude	41,000 ft
Landing distance	2,750 ft

**Limiting and Recommended Airspeeds**

$V_R$ (rotation)	107 kt
$V_2$ (takeoff safety)	110 kt
$V_{LO}$ (max gear operating)	185 kt
$V_{LE}$ (max gear extended)	185 kt
$V_{FE}$ (max flap extended) (15 degrees)	185 kt
$V_{FE}$ (max flap extended) (35 degrees)	160 kt
$V_{FE}$ (max flap extended) (60 degrees)	ground
$V_{MO}$ (max operating) (SL to 30,500 ft)	260 kt
$M_{MO}$ (max operating) (30,500 and above)	M 0.70

For more information, contact Cessna Aircraft Company, Post Office Box 7706, Wichita, Kansas 67277; telephone 316/946-6000.

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.

tle trimming as the speed increases. The CitationJet has electric trim, but the manual wheel is still there and is my choice. The landing is more like a light airplane than a jet. Hold it off for a smooth, tail-low touchdown.

The flying qualities are quite simply impeccable from start to finish.

For the passengers, the CitationJet flown had a standard interior. This includes a club

seating arrangement; a side-facing seat forward, opposite the cabin door; a refreshment unit behind the captain's chair; and a non-belted, non-flushing potty in the rear, facing the baggage and coat area. The potty isn't belted because the emergency exit is behind it. A flushing unit is available but would weigh more.

The club seats are closer together, it seems to me, than they should be or need to be. There's serious interlocking of knees when folks are facing in the club seats, and there appears to be plenty of room in the cabin to improve on this condition. On the plus side, the cabin is quieter and smoother than most jets. The "grinding" that you hear in the cabin of a lot of fanjets is muted, if not gone. It is even quieter on the flight deck, where you can almost mumble and be heard.

With standard equipment and full fuel, the CitationJet will carry 200 pounds of pilot and charts and 820 pounds of payload. Options or a second pilot would come out of the 820, or if you wished to carry more payload, some fuel could be left out. The limit on payload, set by the zero fuel weight, is 1,440 pounds.

The airplane requires a new "Cessna 525" type rating. This comes in two flavors, single pilot and regular, and training for two pilots and two mechanics is included in the purchase price. Cessna's pilot requirements for the CitationJet training program are a commercial certificate with multiengine and instrument ratings and 1,000 hours total time.

The Citation came along more than 20 years ago—an all-new airframe with new engines. Now it is the CitationJet's turn, and you have only to look at the evolution of the original Citation into the I, II, S/II, and V to imagine what will happen next. For now, though, the CitationJet comes on strong to offer jet transportation to a broader market than ever. □