
CJ2+
N432W

Citations CJ1+ and CJ2+

More performance, more tanks-full payload, more cockpit capabilities

By Fred George
Photography by Paul Bowen

It's not often that an aircraft manufacturer introduces new derivative models that, compared to their predecessors, weigh more yet climb and cruise faster, burn less fuel and need less runway when departing hot-and-high airports. But that's exactly what Cessna has achieved with the Citations CJ1+ and CJ2+.

There's no smoke and mirrors here. The performance improvements in these two airplanes boil down to advances in engine technology, consistently the most important element to better numbers during the past 100-plus years of powered flight. (See "Williams FJ44-3 Turbofan Technology Aboard the CJ1+ and CJ2+" sidebar.)

The most noticeable improvement is aboard the CJ1+. MTOW is increased 100 pounds over the CJ1's, to 10,700 pounds. The boost enables typically equipped aircraft to carry three passengers with full tanks. Nearly all the weight increase, however, is consumed by optional equipment now made standard aboard the new aircraft, so there's very little change in tanks-full payload compared to the older model.

The CJ1+, though, has slightly better sea-level, standard-day takeoff performance because of a 2 percent boost in flat-rated takeoff thrust. The improvement in takeoff performance, versus the CJ1, becomes progressively better at hot-and-high airports. The CJ1+, for example, can depart *B&CA*'s 5,000-foot elevation, ISA+20°C airport at MTOW with no OEI climb gradient limitation. The CJ1, in contrast, was limited to a takeoff weight of 10,400 pounds by OEI climb requirements.

The CJ1+'s advantage in all-engine climb performance to cruise altitude is impressive. The older model needed 48 minutes to reach FL 410. The CJ1+ soars to 41,000 feet in 27 minutes, close to a 44 percent improvement. FADECs make possible set-and-forget thrust control during the climb. The CJ1+ also burns 30-percent less fuel during the climb, so maximum range is increased by about 40 miles at high-speed cruise.

Once level at maximum cruise altitude, the new model is up to 22 knots faster and yet it gets slightly better fuel economy in cruise. CJ1+ operators can plan on block speeds that are 20 KTAS faster than the CJ1's and a touch more range, if they opt to cruise at FL 410. That can save up to 15 minutes on a 1,300 nm trip.

The performance improvement offered by the CJ2+ is not as pronounced as that of the CJ1+, but nonetheless it's substantial. The aircraft gets a 125-pound boost in MTOW to 12,500 pounds, enabling operators of typically equipped aircraft to preserve its advertised nearly four-passenger, full-tanks payload. But a 180-pound increase in thrust doesn't fully offset the increased maximum takeoff weight, so the newer model actually needs slightly more runway on typical missions when departing landing facilities up to *B&CA*'s 5,000-foot elevation, ISA+20°C airport. At equal takeoff weights, though, the CJ2+ needs a little less runway than the CJ2 because of its higher takeoff thrust.

But if you're departing Aspen, Colo., on a warm day, the CJ2+ has a clear runway performance advantage over its predecessor. Assuming the outside air temperature is 30°C, you can depart at a takeoff weight of 11,500 pounds in the CJ2+, an increase of 500 pounds over the CJ2.

All-engine climb performance, however, is markedly better. Departing at MTOW, the CJ2+ can climb directly to FL 450 in 28 minutes, some 11 minutes faster than the CJ2. Once level, it cruises six to 12 knots faster than the older model and it burns slightly less fuel. CJ2+ operators will be hard pressed to log the subtle improvement in block speeds, fuel efficiency or maximum range, compared to the CJ2, but the 125-pound increase in MTOW and 2 percent better specific range will allow them to fly up to 100 nm farther with four to eight passengers aboard.

Both of these aircraft also received considerable upgrades to their Rockwell Collins Pro Line 21 avionics packages and a

Open the door and climb inside either the CJ1+ or CJ2+, and you'll discover plenty of upgrades for both pilots and passengers compared to the models they replace.

Citation CJ1+	
B&CA Equipped Price	$4,241,000
Characteristics	
Seating	1+7
Wing Loading	44.6
Power Loading	2.76
Noise (EPNdB)	73.5/85.2/88.5
Dimensions (ft/m)	
Internal	
Length	11.0/3.4
Height	4.8/1.5
Width (Maximum)	4.8/1.5
Width (Floor)	3.1/0.9
Power	
Engines	2 Wms FJ44-1AP
Output (lb)	1,941 ea.
Flat Rating OAT°C	ISA+7°C
TBO (hr)	3,500
Weights (lb/kg)	
Max Ramp	10,800/4,899
Max Takeoff	10,700/4,853
Max Landing	9,900/4,491
Zero Fuel	8,400/3,810c
BOW	6,965/3,159
Max Payload	1,435/651
Useful Load	3,835/1,740
Executive Payload	1,400/635
Max Fuel	3,220/1,461
Payload With Max Fuel	615/279
Fuel With Max Payload	2,400/1,089
Fuel With Executive Payload	2,435/1,105
Limits	
MMO	0.710
FL/VMO	FL 305/263
PSI	8.5
Climb	
Time to FL 370	21 min.
FAR Part 25 OEI rate (fpm/mpm)	596/182
FAR Part 25 OEI Gradient (ft/nm)/(m/km)	332/53
Ceilings (ft/m)	
Certificated	41,000/12,497
All-Engine Service	41,000/12,497
Engine-Out Service	21,200/6,462
Sea Level Cabin	22,027/6,714
Certification	FAR Part 23, 2005

Citation CJ2+	
B&CA Equipped Price	$5,745,000
Characteristics	
Seating	1+8/9
Wing Loading	47.3
Power Loading	2.51
Noise (EPNdB)	75.5/86.1/89.7
Dimensions (ft/m)	
Internal	
Length	13.6/4.1
Height	4.8/1.5
Width (Maximum)	4.8/1.5
Width (Floor)	3.1/0.9
Power	
Engines	2 Wms FJ44-3-24
Output (lb)	2,490 ea.
Flat Rating OAT°C	ISA+13°C
TBO (hr)	4,000
Weights (lb/kg)	
Max Ramp	12,625/5,727
Max Takeoff	12,500/5,670
Max Landing	11,525/5,228
Zero Fuel	9,700/4,400c
BOW	7,925/3,595
Max Payload	1,775/805
Useful Load	4,700/2,132
Executive Payload	1,600/726
Max Fuel	3,930/1,783
Payload With Max Fuel	770/349
Fuel With Max Payload	2,925/1,327
Fuel With Executive Payload	3,100/1,406
Limits	
MMO	0.737
FL/VMO	FL 291/278
PSI	8.9
Climb	
Time to FL 370	17 min.
FAR Part 25 OEI rate (fpm/mpm)	611/186
FAR Part 25 OEI Gradient (ft/nm)/(m/km)	316/52
Ceilings (ft/m)	
Certificated	45,000/13,716
All-Engine Service	45,000/13,716
Engine-Out Service	23,800/7,254
Sea Level Cabin	23,586/7,189
Certification	FAR Part 23, 2005

boatload of new standard equipment that had been on the options list.

Large-Scale Cockpit Improvements

Pilots of these new models will find flight decks far different from those of the CJ1 and CJ2. Gone is the mix and match combo of Pro Line 21, 1980s-vintage Honeywell Bendix/King panel-mount radios and miscellaneous equipment from other vendors.

Following the lead of the CJ3, the two smaller Citation 525 family members have moved into the avionics big leagues with completely integrated Pro Line 21 avionics systems. Standard equipment includes left- and right-side eight-by-10-inch, active matrix LCD flat-panel PFDs and a left of center eight-by-10-inch MFD.

The displays have excellent resolution and they offer a high contrast ratio in bright ambient light. Vertical display control panels are mounted just inboard of the PFDs and the flight guidance control panels are positioned just above the PFDs.

The truncated attitude indicators on the PFDs, though, are squeezed in between the vertical tapes used to display air data. This is a holdover from the days of CRT-based EFIS technology. We'd prefer edge-to-edge attitude indicators with the air data tapes displayed as windows, similar to the displays Cessna is installing in the Citation Mustang. The top fifth of the MFD is reserved for electronic engine instrument displays. (Cessna chose to retain a triple row of glareshield mounted annunciators for crew alerting.) The remainder of the MFD screen area can be used to display a variety of position, weather, terrain and traffic awareness imagery.

The CJ1+ and CJ2+ each come with a single Rockwell Collins FMS-3000, which is a true multi-sensor, multi-waypoint VNAV FMS in the classic definition, not just a simple GPS navigator. This box is in a class with late-model Universal UNS-1 and Honeywell NZ-2000 systems. The FMS-3000 uses VOR, DME and GPS to navigate, so it's not a sole source navaid. The FMS is capable of providing waypoint VNAV and 3-D non-precision approach guidance. It will have a full tabular performance database enabling it to compute V speeds and takeoff distances, but that feature was not yet certified as we went to press. Notably, FMS navigation database updates are accomplished by means of a laptop computer and data port. A Web-based data download subscription is available.

The FMS-3000 also automatically tunes the Pro Line 21 nav radios and flight displays for approaches, making possible seamless transitions from FMS to ILS guidance. Just like folks flying much larger business jets,

CJ1+ and CJ2+ pilots will be able to couple the autopilot from the start of the en route climb from the departure airport until they're on short final at the destination airport solely by programming the avionics, adjusting thrust and making configuration changes. This is an important safety feature when flying a jet with one pilot because workload is reduced and the pilot can spend most of the time making strategic decisions and monitoring the results rather than being preoccupied with stick-and-rudder tasks.

Twin radio tuning units, stacked in the panel to the right of the MFD in the center panel, manage the functions of the Pro Line 21 CNS radios. The upper RTU, just right of the solid-state L-3 Communications integrated standby instrument system, is powered by the emergency bus. Its flat-panel display can function as a mini HSI capable of ILS or VOR guidance, plus it can display radio tuning information and engine instruments.

The FMS-3000 CDU also can be used for radio tuning, although we'd prefer to not use this feature unless the aircraft is equipped with the optional second FMS 3000, available for $59,225. Having dual FMS-3000s allows the pilot to use one FMS CDU for navigation chores while the other can be used for non-essential functions, such an alternate means of tuning the radios. Most buyers, however, are opting to equip their aircraft with a Garmin GPS 500 ($19,500) as the optional, second long-range nav system.

Other options include an L-3 cockpit

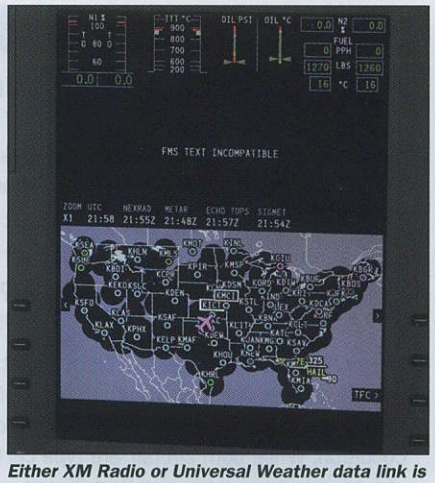
Pro Line 21 Avionics

The fully integrated Pro Line 21 avionics suite aboard the CJ1+ and CJ2+ has features and functionality on a level with far more expensive aircraft. Indeed, the Rockwell Collins Pro Line 21 systems aboard the CE 525 family of aircraft offer the most features of any of the current production Citations, including Citations X and Sovereign.

Standard equipment aboard both the CJ1+ and CJ2+ includes three, eight-by-10-inch, active matrix LCD displays, dual digital flight guidance computers, a single three-axis autopilot, dual solid-state attitude-heading reference systems, dual RVSM-compliant digital air data computers, dual sets of Pro Line 21 comm/nav/surveillance radios controlled by instrument panel mounted radio tuning units, a single full-function, multi-sensor FMS-3000 with 12 channel GPS receiver, dual audio control panels, solid-state 24-watt Weather radar and XM Radio data link weather receiver, plus Skywatch HP TCAS-1, Integrated Standby Instrument System and Landmark TAWS, all furnished by L-3 Communications.

What sets Pro Line 21 apart from competitive avionics systems in the light jet class is the availability of optional data link weather and electronic charts. Data link weather enables CJ1+ and CJ2+ pilots to tailor their flight plans "on the fly" to avoid weather hazards, even before they start the takeoff roll. Data link weather enables them to view all potential weather hazards from departure to destination, right in the chocks.

The electronic chart capability is equally impressive. It's linked to the FMS, so when a specific airport, departure or approach procedure is selected for navigation, the associated electronic chart is nominated for selection on a drop-down menu. Alternatively, the crew can call up any chart in the database for reference, such as the whole series of charts for the destination airport or charts for the alternate airport.



Either XM Radio or Universal Weather data link is available as an option. XM Radio Weather, available in the continental United States, can be overlaid on the flight plan map. Universal Weather is the better choice for international operations.

Welcome to Wichita! It's hard to get lost when you've ordered the optional e-chart package. The charts are geographically referenced with a moving airplane symbol depicting your precise location — on the ground or in the air.

E-charts are called up using a point-and-click menu on the MFD. The FMS nominates the appropriate chart mix for origin, destination and alternate. However, you can manually call up any other charts you want to review or use.

Cessna CJ1+

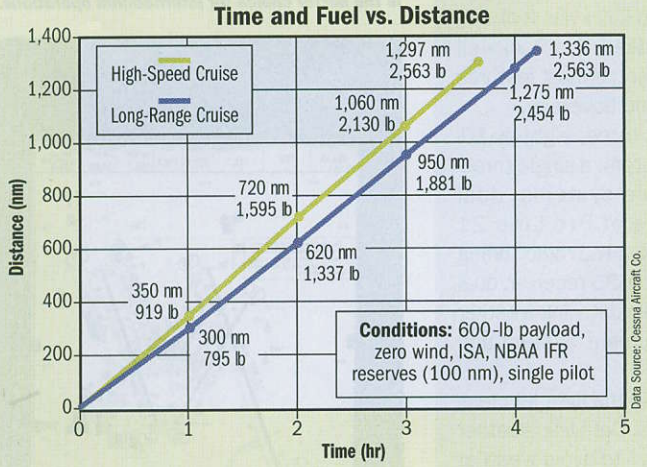
These graphs are designed to illustrate the performance of the CJ1+ and CJ2+ under a variety of range, payload, speed and density altitude conditions. Do not use these data for flight planning purposes because they are gross approximations of actual aircraft performance.

Time and Fuel vs. Distance — This graph shows the relationship between distance flown, block time and fuel consumption at high-speed cruise and long-range cruise for the CJ1+ and CJ2+.

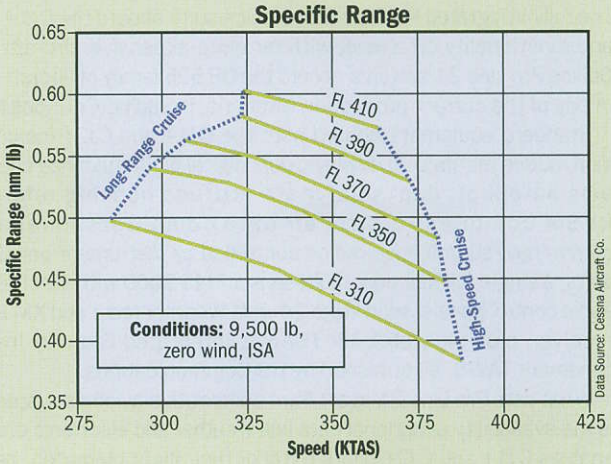
Specific Range (Mid-Range Weight, ISA) — This graph shows the relationship between cruise speed and fuel consumption for the CJ1+ and CJ2+ at representative cruise altitudes for mid-weight aircraft, according to Cessna's performance engineers. *B&CA* believes Cessna's performance estimates are accurate, if not conservative, based upon our demonstration flight observations. Operators should have no problems meeting or exceeding the numbers published in Cessna's flight planning guides, in our opinion.

Range/Payload Profile — The purpose of this graph is to provide simulations of various trips under a variety of payload and two airport density altitude conditions, with the goal of flying the longest distance at high-speed cruise. Each of the range/payload lines on the CJ1+ and CJ2+ charts was plotted from multiple data points by Cessna's performance engineers, ending at the maximum range for each payload condition. While both aircraft are type certificated in accordance with FAR Part 23, the takeoff field length numbers shown in the two charts were computed using Part 25 one-engine-inoperative standards. Notably, neither aircraft encounters any OEI second-segment climb restrictions that would limit maximum allowable takeoff weight when departing *B&CA*'s 5,000-foot elevation, ISA+20°C airport.

Time and Fuel vs. Distance

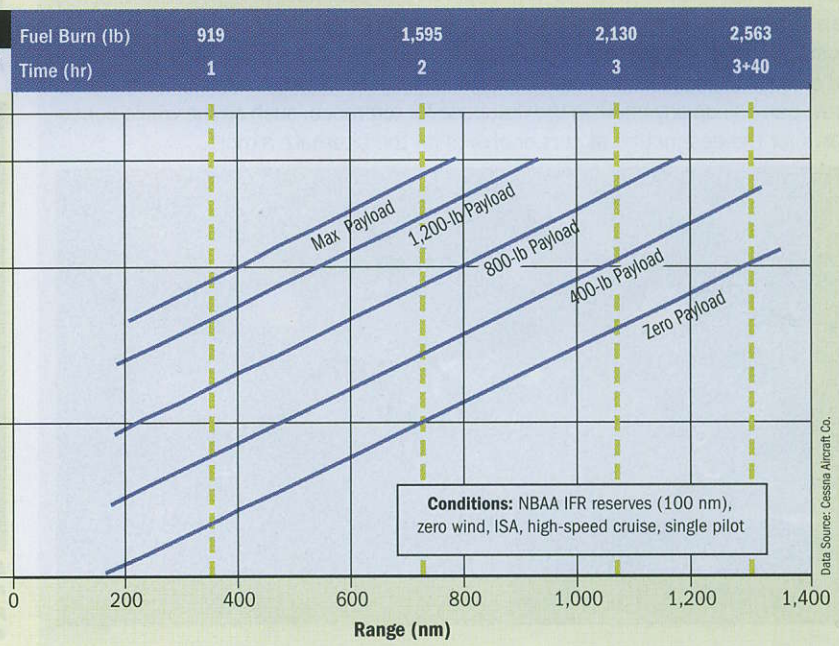


Specific Range



Range/Payload Profile

Takeoff Field Length (ft)		
SL ISA	5,000 ft ISA+20C	Gross Takeoff Weight (lb)
		11,000
3,250	5,890	10,700
2,820	4,850	10,000
2,570	3,570	9,000
2,480	2,790	8,000



Cessna CJ2+

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Time and Fuel vs. Distance — This graph shows the relationship between distance flown, block time and fuel consumption at high-speed cruise and long-range cruise for the CJ1+ and CJ2+.

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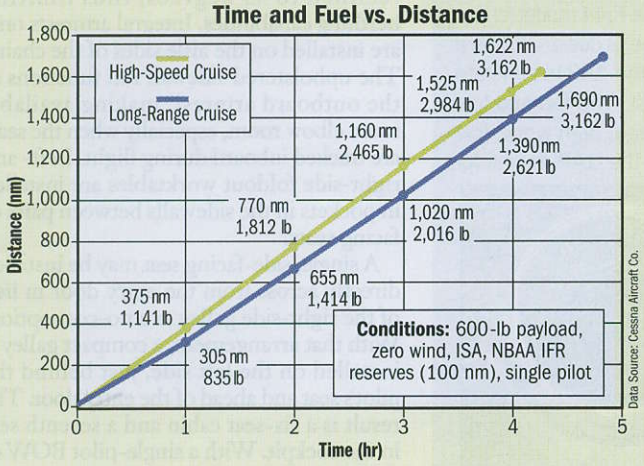
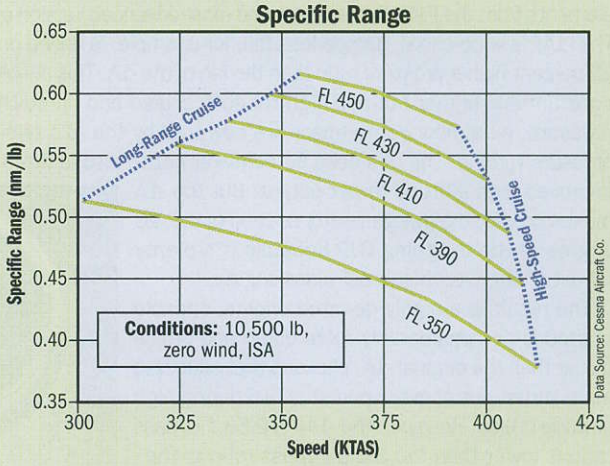
Time and Fuel vs. Distance

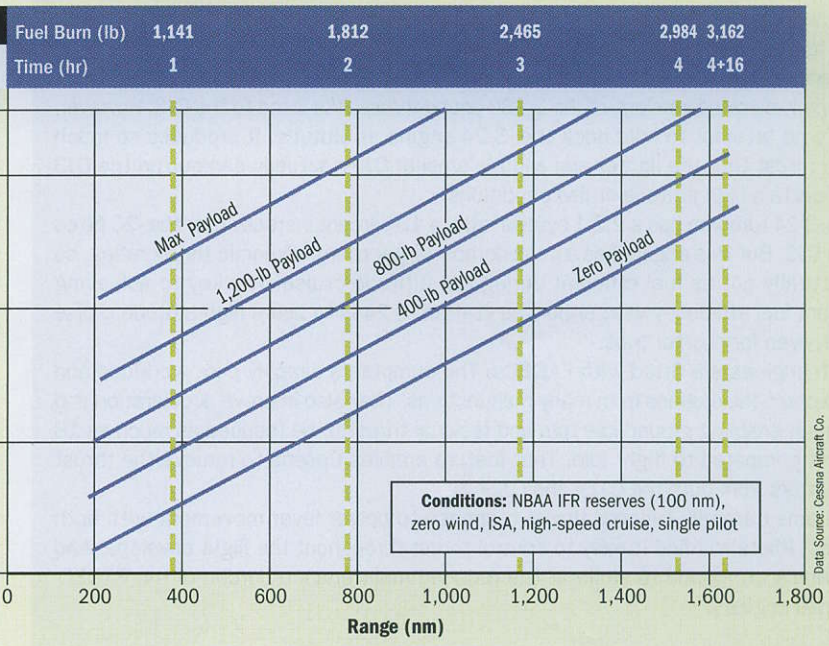


Specific Range



Range/Payload Profile

Takeoff Field Length (ft)		
SL ISA	5,000 ft ISA+20C	Gross Takeoff Weight (lb)
3,360	5,180	12,500
3,140	4,750	12,000
2,700	3,990	11,000
2,360	2,990	10,000
2,160	2,780	9,000



voice recorder ($25,100), dual Euro-spec Mode S diversity transponders ($29,437) and Collins HF-9000 HF transceiver ($60,450).

The two most popular big-ticket options are likely to be the electronic charts package ($23,400) and data link text and graphic weather. The electronic chart package uses a single file server and MFD for display. There is no redundancy, so the e-chart option does not qualify as a Class 3 Electronic Flight Bag. You'll still need to carry hard copy charts as a backup, but you'll only have to use them in the event of an e-chart system malfunction.

The standard system also includes an XM Radio weather receiver, so operators only need to activate the subscription for $50 per month. There is a wide variety of weather products available through XM Radio and all the graphics are geographically referenced, thereby enabling the weather to be portrayed in the context of aircraft position and flight plan route on the MFD.

For use outside the continental United States, there is an optional two-way VHF data link radio ($49,500), but none of the weather charts are geographically referenced to aircraft position or flight plan route. In addition, the monthly charge associated with this service is based upon the number of products or services downloaded. The actual cost of the subscription, as a result, is substantially more expensive than the XM Radio weather services.

Improved Passenger Amenities

The cabins of the CJ1+ and CJ2+ are case studies in efficient space utilization. Belted potty seats now are standard, along with internally serviced flushing toilets. The CJ1+ has a lavatory privacy curtain that spans the right two-thirds of the cabin, opening up the seating area to the rest of the cabin for the occasional passenger occupying the lav seat.

The center of the cabin has four chairs in club configuration, each with track, swivel and rake adjustments. The seats may be reclined to 45 degrees, thus limiting berthing capabilities. Integral armrests only are installed on the aisle sides of the chairs. The upholstered sidewall rail functions as the outboard armrest, making available more elbow room, especially when the seats are tracked inboard during flight. Left- and right-side foldout worktables are installed in pockets in the sidewalls between pairs of facing seats.

A single, side-facing seat may be installed directly across from the entry door in lieu of the right-side galley as a no-cost option. With that arrangement, a compact galley is installed on the left side, just behind the pilot's seat and ahead of the entry door. The result is a six-seat cabin and a seventh seat in the cockpit. With a single-pilot BOW of 6,935 pounds and an 8,400-pound maximum zero fuel weight, CJ1+ operators can fill all chairs with 200-pound occupants and remain within max payload limits.

The left-side galley may be compact, but inside there's excellent space utilization. There's room for a heated beverage container, twin disposable cup dispensers, canned beverage storage, ice drawer with overboard drain and small trash bin. Each of the seats in the cockpit and main cabin has twin beverage cup holders in the sidewall armrests.

Baggage capacity is another of the aircraft's strong points. The CJ1+ has a 30.2-cubic-foot aft external baggage compartment, useful for bulky items, and a 15-cubic-foot nose baggage compartment, capable of storing smaller items. We like to use the forward compartment for hanging bags because they fit better and usually don't block the sight gauges on the right aft side of the compartment that must be inspected during preflight inspection.

The CJ2+ has a similar layout, although its extra 31 inches of cabin length makes room for two more forward-facing chairs

Williams FJ44-3 Turbofan Technology Aboard the CJ1+ and CJ2+

The CJ1+'s 1,965-pound-thrust FJ44-1AP turbofans are far more advanced than the -1A engines fitted to the CJ1 and CitationJet. The -1AP engines use several technology elements from the FJ44-3, the latest and most advanced version of the FJ44 model family. The -1AP's wide-chord, damperless fan, for example, is based on the -3 design. It has a 12-percent higher pressure ratio than the fan of the -1A. This enables the -1AP to generate considerably higher hot-and-high takeoff, cruise and climb thrust. The fan and low pressure, axial flow compressor are powered by the -3's two-stage, high work, low pressure turbine. The -3's deep fluted mixer nozzle also is fitted to the -1AP engine for improved high altitude thrust output. But the -1A makes do with the gas generator section of the -2C engine of the outgoing CJ2 because it's plenty robust enough for this thrust class engine.

The result is a highly de-rated engine, capable of producing considerably more climb and cruise thrust than the original -1A, plus one that squeezes more thrust out of every pound of fuel during high altitude cruise. However, the -1AP's 2.58:1 bypass ratio is lower than the 3.3:1 bypass ratio of the -1A, so it's not as fuel efficient at low altitude. The -1AP is larger, taller and eight pounds heavier than the -1A, so the two engines are not interchangeable. Initial maintenance intervals are conservatively pegged at 1,750 hours for mid-life inspection and 3,500 hours for overhaul.

Meanwhile, the CJ2+ is fitted with a pair of 2,490-pound—thrust FJ44-3-24 turbofans, essentially de-rated versions of the 2,780-pound-thrust -3As fitted to the CJ3. However, there's no attempt to hold back the -3-24 engine at altitude. It produces so much cruise thrust that the lighter and slightly smaller CJ2+ actually can outrun the CJ3 under certain high altitude cruise conditions.

The -3-24 turbofan has a 2.2:1 bypass ratio, a 10-percent increase over the -2C fitted to the CJ2. But this engine has a considerably larger thermodynamic thrust rating, so it's actually not as fuel efficient during low altitude cruise. The key to achieving optimum fuel efficiency with either the -1AP or -3-24 is to use a high altitude cruise profile, even for shorter trips.

Both engines are fitted with FADECs. The computers simplify pilot workload and they protect the engines from many malfunctions. They also improve acceleration and response, enabling ground idle rpm and residual thrust to be reduced as much as 18 percent compared to flight idle. That feature enables Cessna to remove the thrust attenuators from both the CJ1+ and CJ2+.

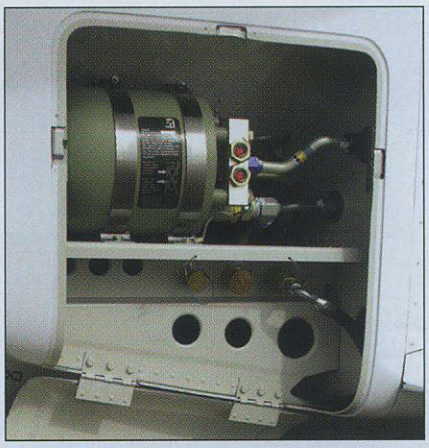
Williams carefully tailored thrust response to power lever movement with both engines. Pilots will find it easy to control thrust throughout the flight envelope. And mechanics are bound to smile at the reduced maintenance burden of the FADEC-equipped engines.

The CJ2+, now fitted with Williams FJ44-3-24 turbofans, will outrun the CJ3 at some high cruise altitudes. The set-and-forget FADEC-equipped engines enable the crew to pull back the thrust levers to the max continuous detent after takeoff and then not touch the throttles until level-off. We had to reduce cruise thrust at FL 450 in order not to exceed redline.

between the lavatory and main club seat section. The lavatory has symmetric left and right bulkheads on the cabin side because the belted potty seat isn't likely to be used other than as a toilet seat. So, there's no need to make the occupant feel like part of the crowd in the main cabin.

The main reason for the enclosed lav layout is the CJ2+'s available payload capacity. Cessna upped the ZFW by 400 pounds, to 9,700 pounds. Even so, the single-pilot BOW now is 7,925 pounds. That results in an available payload of 1,775 pounds, just shy of nine 200-pound occupants. The aircraft we flew for this report, for example, had a 7,975-pound single-pilot BOW, so its gross payload was limited to 1,725 pounds. As a result, it's not likely that a ninth seat will be needed often, even if it's certified for full-time occupancy.

The CJ2+ has considerably more baggage capacity than the CJ1+ because of its 50-cubic-foot aft external baggage compartment. The aft compartment has a 600-pound capacity, but filling it will limit the cabin load to five-plus passengers. Both aircraft have been fitted with long-life LED overhead wash lights instead of fluorescent tubes or incandescent bulbs. This is a welcome reliability improvement. However, Cessna chose to retain incandescent bulbs in the reading lights, so plan on changing them at regular intervals. We prefer high-intensity LED reading lights over the hot and relatively short-life incandescents. (See "LED There Be Light," page 82.)



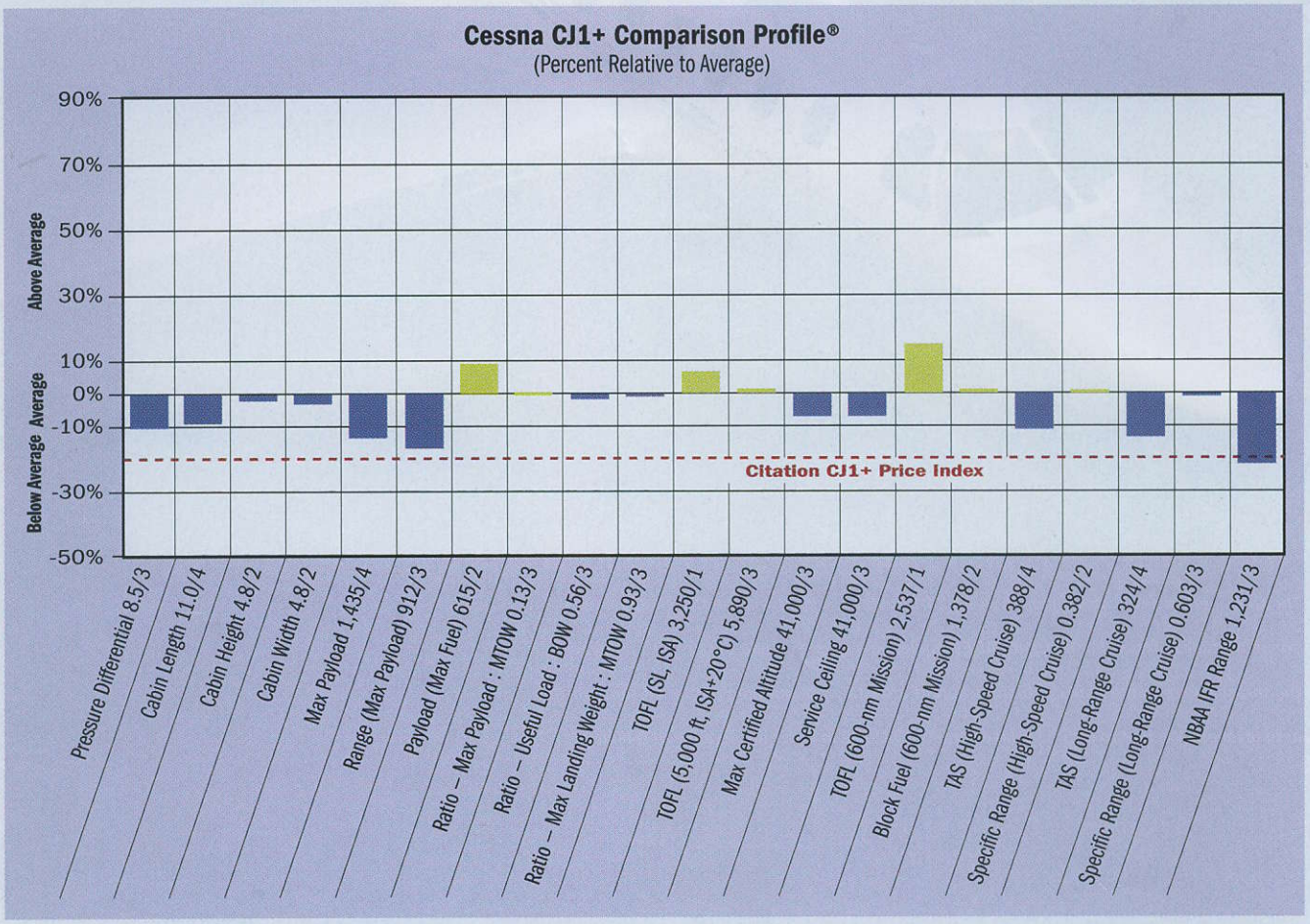
The hydraulic reservoir is located in the right, rear wing root fairing for easy preflight inspection and maintenance access. The fluid color is MIL-H-5606 bright red, but it's actually a weight-saving synthetic.

The cabin and cockpit now come equipped with 110-VAC power outlets to power laptops and other portable gear. The cockpit has mono-rail sun visors as part of its redesigned overhead panel. All seats have fire-blocked foam and upholstery.

Flying Impressions

Having previously reported on the CJ1 in *B&CA*'s June 2000 issue (page 48) and the CJ2 in November 2000 (page 56), we'll highlight some of features of the two newest 525 family members and focus on what's been changed on the CJ1+ and CJ2+. Both aircraft are built from conventional aluminum alloys, using a combination of mechanical fasteners and structural adhesives. The wing has a natural laminar flow airfoil that's considerably more efficient, has lower drag and is smaller than the NACA 23000 airfoils fitted to first-generation Model 500 family aircraft. It's also protected from ice buildup by bleed air heat rather than the rubber de-ice boots fitted to first-generation, straight-wing Citations. The empennage, though, retains boots for ice protection.

Trailing link landing gear make for smooth touchdowns. The CJ2 had a number of wheel brake problems, but three



service bulletins appear to have put those concerns to rest. The brake accumulator has been relocated to the right wing fairing aboard the CJ2+. Along with other changes, brake responsiveness has been improved, according to Cessna officials.

We flew CJ2+ s.n. 525A-0300 for this report. It was equipped with optional Aircell ST-3100 Iridium satcom, Garmin GPS 500, Honeywell Mk 8 EGPWS and HF transceiver, plus the electronic chart package and XM Radio weather service. With optional equipment, the single-pilot BOW was 7,975 pounds. Accompanied by factory demonstration pilots David Bodlak and Mark Zerener, the zero fuel weight was 8,375 pounds. With 2,510 pounds of fuel aboard, the ramp weight was 10,885 pounds.

It was chilly that February day in Wichita, elevation 1,333 feet. The outside air temperature was -4°C, the dew point was -15°C, the barometer was 30.59 inches and the wind was 020 at 14 mph. Based on a computed takeoff weight of 10,700 pounds, we bugged takeoff V speeds at 95 KIAS for V1, 100 KIAS for rotation and 110 KIAS for the V2 OEI takeoff safety speed. The no-wind TOFL was 2,580 feet and adjusting for the headwind, the TOFL was 2,410 feet.

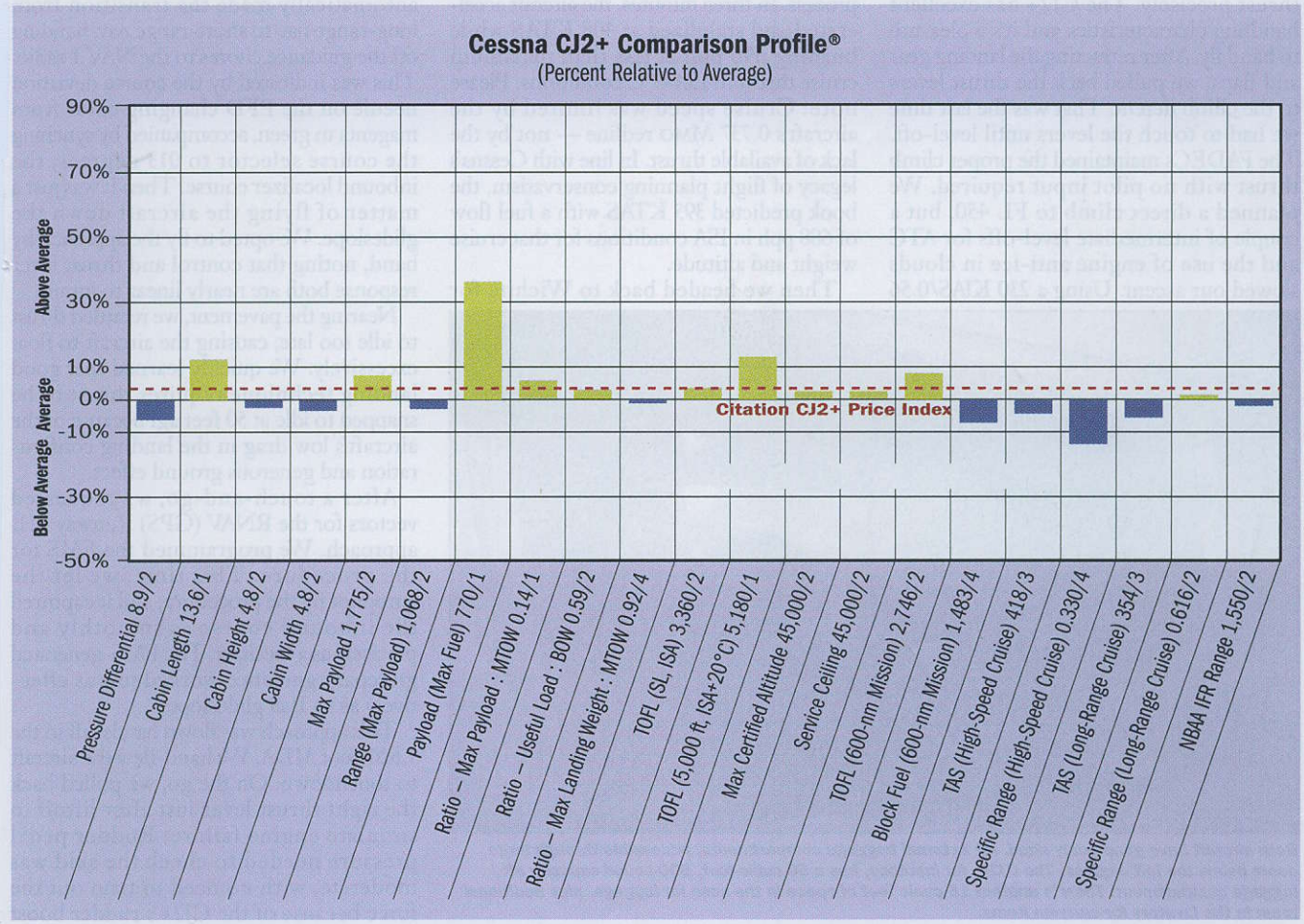
The standard battery is a nicad, but lead-acid batteries will be offered as no-cost options.

Both the CJ1+ and CJ2+ have an extra step in the pre-start checklist. Now, there's a FADEC check item to make sure that both computer channels are functional prior to engine start. This aircraft was equipped with a standard 44 AH nicad battery, but a lead-acid battery will be made a no-cost option.

Engine start is quite conventional. Touch the start button, advance the power lever at 10 percent N2 rpm and the FADEC does the rest. Engine acceleration during start was quite rapid and ground idle stabilized at just over 24 percent N1 fan speed. This is considerably lower than the idle rpm of the FJ44-2 engines fitted to the CJ2, so Cessna was able to eliminate the thrust attenuators from the engine nacelles.

Releasing the parking brakes, we noted very little aircraft movement at ground idle, even though the aircraft was comparatively lightweight. Advancing the power levers to move out of the ramp, we experienced a considerable lag in engine response and then an overshoot in rpm. After we snapped the thrust levers back to idle, it took a few seconds for the rpm to settle back to ground idle.

Nosewheel steering through the bungee linkage is responsive. But even though the CJ2+ has upgraded wheel brakes compared to the CJ2, we found it difficult to modulate the brakes smoothly during taxi and there was noticeable brake chatter. It reminded us of the original brake-by-wire system of the first-generation Gulfstream IV, although the CJ2+'s brake system isn't a BBW design; the rudder pedals are connected mechanically to the brake control unit.



Cabins are equipped with long-life LED wash lights in the ceiling panels. Newly redesigned, manually operated window shades should offer improved reliability. Sturdy, foldout worktables are located between facing pairs of seats in the club section.

Cleared for takeoff, we advanced the thrust levers fully forward to the takeoff detent and the FADECs set maximum thrust precisely. The CJ2+ has excellent handling characteristics and it's a pleasure to hand fly. After retracting the landing gear and flaps, we pulled back the thrust levers to the climb detent. That was the last time we had to touch the levers until level-off. The FADECs maintained the proper climb thrust with no pilot input required. We planned a direct climb to FL 450, but a couple of intermediate level-offs for ATC and the use of engine anti-ice in clouds slowed our ascent. Using a 230 KIAS/0.56 IMN climb schedule in ISA-10°C to -4°C conditions, we reached FL 450 in 21 minutes, burning about 400 pounds in the process. In three minutes, the aircraft accelerated and stabilized at 408 KTAS while burning 690 pph at less than maximum cruise thrust in ISA-3°C conditions. Please note: Cruise speed was limited by the aircraft's 0.737 MMO redline — not by the lack of available thrust. In line with Cessna's legacy of flight planning conservatism, the book predicted 395 KTAS with a fuel flow of 688 pph in ISA conditions for that cruise weight and altitude.

Then we headed back to Wichita for pattern work. This is where the power of the FMS-3000 and the utility of the e-chart package could be demonstrated. Based on a landing weight of 10,000 pounds, our computed VREF speed was 104 KIAS. If we had been landing at the aircraft's 11,525-pound max landing weight, Vref would have been 112 KIAS.

Both aircraft have generously sized, aft external baggage compartments, accessible through large doors below the left engines. The CJ2+, for instance, has a 50-cubic-foot, 500-pound capacity aft luggage compartment. There's another 15 cubic feet of space in the nose for luggage, plus additional room in the lavatory for carry-on items.

We programmed the FMS for the ILS Runway 01L, along with the vectors-to-final transition. The FMS automatically tuned the NAV 1 radio to the 109.1 MHz localizer frequency and pre-selected the inbound course to 013 degrees. Using the MFD control panel on the console, we activated the e-chart mode, causing the ILS Runway 01L approach chart to be displayed. The chart is geographically referenced, so the crew can track the progress of the aircraft on the approach by viewing a small airplane symbol that moves along the chart.

The e-chart system is an excellent cockpit resource management aid. If two pilots are flying the aircraft, the approach can be briefed by pointing out the important data as though the chart were posted on the instrument panel.

Arming the system for approach, the FMS automatically made the transition from long-range nav to short-range nav, handing off the guidance chores to the NAV 1 radio. This was indicated by the course deviation needle on the PFD changing color from magenta to green, accompanied by synching the course selector to 013 degrees, the inbound localizer course. Then it was just a matter of flying the aircraft down the glideslope. We opted to fly the approach by hand, noting that control and thrust lever response both are nearly linear to inputs.

Nearing the pavement, we retarded thrust to idle too late, causing the aircraft to float excessively. We quickly learned that good landing technique requires thrust to be snapped to idle at 50 feet agl because of the aircraft's low drag in the landing configuration and generous ground effect.

After a touch-and-go, we requested vectors for the RNAV (GPS) Runway 01L approach. We programmed the FMS for the procedure. This time, we let the autopilot fly the procedure, and it captured the inbound course as smoothly and precisely as a localizer. The FMS-generated glidepath guidance worked just as effectively as an ILS glideslope.

This approach was flown hands-off to the 1,620-foot MDA. We hand-flew the aircraft to touchdown. On the go, we pulled back the right thrust lever just after liftoff to simulate engine failure. Rudder pedal pressure needed to check the skid was moderate, with no need to trim out the force because of the CJ2+'s rudder boost

The compact, left-side galley accommodates a hot beverage container, ice chest, hot and cold beverage cups, beverage storage and refuse receptacle. The galley is ideal for short-range missions. Longer trips will require storing lunch boxes in the lav or in the cabin.

system. We've flown many aircraft with powered flight controls that required considerably more pedal pressure to control adverse yaw than the CJ2+, which is fitted with manual primary flight controls.

Our final approach was a visual to Runway 01R, next door to the Citation factory. We touched down smoothly, but deliberately and selected maximum 55-degree flaps. This also activated speed brake extension as part of the lift dump function. We applied maximum brakes. The new brake system indeed is powerful and there's virtually no hopping or skipping with anti-skid activated. Apparently, the harder one applies the brakes, the smoother and more effective the braking action.

Long-travel, trailing-link main landing gear make for smooth landings and a comfortable ride on rough taxiways. The wheel brakes are improved, but we had difficulty modulating them smoothly during taxi.

Taxiing back to Cessna's ramp, though, we still had problems modulating the brakes smoothly at slow taxi speeds. Doubtlessly, we could have achieved smoother braking action with some practice in the airplane.

Price and Value vs. the Competition

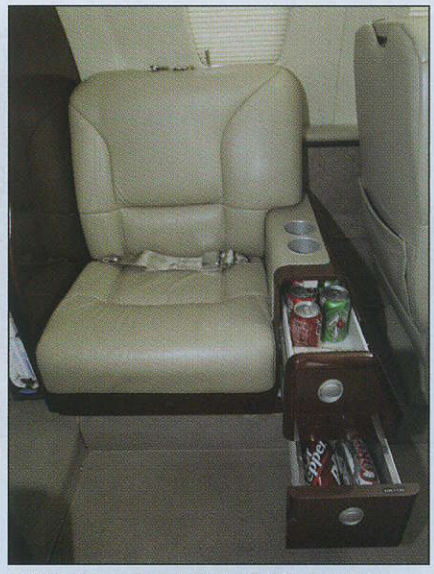
Cessna is the master of product positioning, as shown by the accompanying Comparison Profiles. When compared to other light jets, such as the CJ2+, the Sino Swearingen SJ30-2 and the Raytheon Premier I, the CJ1+'s shortcomings appear to outweigh its strong points two to one. But the CJ1+ really has no direct competitors because it's the lowest priced light jet available today. Factor in the CJ1+'s nearly 20-percent price advantage over the composite average of the four light jets, as shown by the dashed price index line, and it comes out as the value leader in the group although it's not the performance champion.

The value equation is different for the CJ2+. As shown by the dashed price index line, the CJ2+ has only a 3-plus percent price advantage over the composite average of the same group of light jets. But it's the performance leader in most categories. As expected, runway performance is the strong suit of both Citations, particularly during hot-and-high departures. The CJ1+, for instance, can depart Aspen on a 30°C day and fly four passengers to San Francisco, Houston or St. Louis. The CJ2+'s performance is even more impressive. Departing Aspen at that temperature, it can fly four folks to Illinois' Palwaukee Airport; Pensacola, Fla.; or any place west of those two locations.

Much improved climb and cruise performance makes the CJ1+ and CJ2+ considerably more competitive in the light jet class. Faster block speeds on typical 600-nm trips enable them to arrive within three to eight minutes of the speedy Premier I.

Docile handling is another advantage offered by the Citations. No competitors in the light jet class are more forgiving, easier to fly or as simple in systems design. Cessna's legacy for building "Simple Citations" goes back more than three decades to the original Citation 500. Owner/operators and even some full-time pilots just feel comfortable flying most straight—wing Citations and the marque's outstanding safety record supports their faith in the product.

The CJ1+ and CJ2+ now have Pro Line 21 avionics suites virtually on par with Raytheon's Premier IA. The availability of e-charts and data link weather puts these three aircraft into a class with much larger and more expensive aircraft fitted with the newest generation of large-format, flat-panel displays. It's not certain when or even if such features will be available on the Primus Epic CDS system installed in the SJ30-2.



A right side-facing chair, behind the copilot's seat, is standard on the CJ1+ and optional on the CJ2+. Two drawers on the aft side of the chair store beverage cans and light snacks.

Product support long has been Cessna's strong suit, but Raytheon now is offering its crosstown rival strong competition in this vital area. An evaluation of Sino Swearingen's product support will have to wait until production deliveries begin.

Add up the improvements in engines, avionics and interior features, plus outstanding product support, and it appears that Cessna has created two potential big winners in the light jet sales race. **B&CA**

Nosewheel steering, in keeping with legacy short-wing Citation design practice, is actuated by means of bungees through the rudder pedals. It works just fine. Very tight turns require use of differential thrust and/or braking.